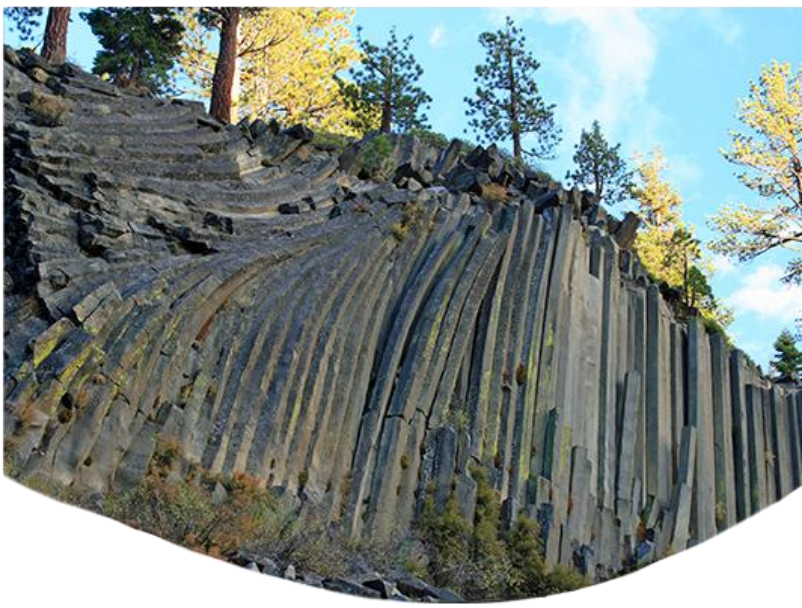
Madera County Multi-Jurisdictional Local Hazard Mitigation Plan Update

March 2026



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Executive Summary

Madera County and the two incorporated communities prepared this 2026 Local Hazard Mitigation Plan (LHMP) Update to the Federal Emergency Management Agency (FEMA) approved 2018 Madera County LHMP. This Madera County LHMP is a multi-jurisdictional plan that geographically covers the entire area within Madera County's jurisdictional boundaries (hereinafter referred to as the Planning Area). The following jurisdictions participated in the planning process and are seeking FEMA approval of the LHMP Update:

- Madera County*
- City of Chowchilla*
- City of Madera *

* Participated in 2018 Madera County LHMP

One jurisdiction that was approved for the 2018 LHMP, but are not seeking approval for this Plan Update include:

- North Fork Rancheria

The purpose of this 2026 Madera County LHMP Update and the hazard mitigation planning process is to reduce or eliminate long-term risk to people and property, critical facilities and infrastructure, natural and historic and cultural resources, and other community assets from future hazard events and natural disasters. This LHMP Update demonstrates the participating jurisdictions' commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This LHMP Update was also developed in order for the participating jurisdictions to be eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) program, and the Flood Mitigation Assistance (FMA) program.

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 natural hazard mitigation.

2026 LHMP Update Plan Development Process

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented. This LHMP Update documents the 2026 hazard mitigation planning process and identifies relevant hazards, community risk and vulnerabilities, and mitigation strategies the

participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability in the Madera County Planning Area.

This LHMP Update was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390), 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, and current FEMA guidance. Madera County jurisdictions followed a planning process prescribed by FEMA as detailed in Table ES-1.

Table ES-1 Local Hazard Mitigation Planning Process

DMA Process	Modified CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	
201.6(c)(2)(i)	4) Identify the Hazards
201.6(c)(2)(ii)	5) Assess the Risks
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	6) Set Goals
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

The planning process began with the organizational phase to establish the Hazard Mitigation Planning Committee (HMPC), comprised of key Madera County jurisdictional representatives, and other local and regional stakeholders; to involve the public; and to coordinate with other departments and agencies. A detailed risk assessment was then conducted followed by the development of a focused mitigation strategy for the Madera County Planning Area and specific to each participating jurisdiction. Once approved by Cal OES and FEMA, this 2026 LHMP Update will be adopted and implemented by the participating jurisdictions over the next five years.

Risk Assessment

A natural hazard risk assessment was conducted that identified and profiled hazards that pose a risk to the Madera County Planning Area and to each participating jurisdiction, assessed the vulnerability of the Madera County Planning Area and jurisdictions to these hazards, and examined the existing jurisdictional capabilities to mitigate identified hazards. The Madera County Planning Area is vulnerable to numerous hazards that are identified, profiled, and analyzed in this 2026 LHMP Update. Wildfires, floods,

earthquakes, drought, dam failure, and other severe weather events are among the hazards that can have a significant impact on the Planning Area. Table ES-2 details the hazards identified for this 2026 LHMP Update.

Table ES-2 Madera County Planning Area Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude / Severity	Significance	Climate Change Influence
Agricultural Hazard: Severe Weather/Pests/Invasives	Extensive	Likely	Critical	High	Medium
Climate Change	Extensive	Likely	Limited	Medium	--
Dam Failure	Significant	Unlikely	Critical	High	Medium
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake (w/subhazards)	Significant	Unlikely	Critical	Medium	Low
Floods: 1%/0.2% annual chance (w/levee failure)	Significant	Occasional/ Unlikely	Critical	High	Medium
Floods: Localized Stormwater	Extensive	Highly Likely	Limited	Medium	Medium
Hazardous Materials Transportation	Limited	Occasional	Limited	Medium	Low
Landslide, Mudslide, Debris Flow	Limited	Likely	Limited	Medium	Medium
Severe Weather: Extreme Cold, Freeze, and Snow	Significant	Highly Likely	Limited	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	Medium	High
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely	Limited	Medium	Medium
Wildfire (w/smoke and air quality)	Extensive	Highly Likely	Catastrophic	High	Medium/High

Geographic Extent

Limited: Less than 10% of planning area

Significant: 10-50% of planning area

Extensive: 50-100% of planning area

Likelihood 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 10 years or less.

Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

Catastrophic: More than 50 percent of property severely damaged; 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 and/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

Climate Change Influence

Low: Minimal potential impact

Medium: Moderate potential impact

High: Widespread potential impact

Mitigation Strategy

Based on the results of the risk assessment, a mitigation action strategy was developed to reduce the Madera County Planning Area's risk and vulnerability to identified natural hazards. The resulting mitigation strategy is comprised of goals and objectives, and a mitigation action plan which includes a series of mitigation actions, projects, and implementation measures. The 2026 LHMP Update Goals and Objectives are detailed below followed by a summary table of the 2026 mitigation actions and projects.

Goal 1: Reduce risk and vulnerability throughout Madera County to hazards and protect lives and prevent losses to property, public health and safety, economy, and the environment

- Reduce exposure and hazard related losses to residents, visitors, businesses, governmental, non-profit, and educational partners by implementing whole-community risk reduction and resilience strategies
- Provide protection for public health and safety including vulnerable and underserved populations
- Provide protection for the existing built environment and future development
- Strengthen and protect critical facilities, utilities, and services; and community lifelines; and minimize disruption through improved infrastructure resilience and redundancy
- Provide protection for the environmental, natural, cultural, and historical resources
  - Protect economic stability and continuity from hazard impacts

Goal 2: Increase community education, outreach, and awareness of risk and vulnerability to hazards and promote preparedness, engagement, and readiness to reduce hazard-related losses

- Inform and educate residents and businesses about potential hazards they are exposed to, where they occur, and what they can do to mitigate exposure or damages through a multi-media, multi-agency outreach programs
- Improve accessible resources and education for underserved and vulnerable populations, including individuals with access and functional needs
- Emphasize preparedness and self-reliance to residents
  - Educate and outreach on evacuation and shelter in place routes, locations, and procedures

Goal 3: Improve communities' capabilities to prevent/mitigate hazard-related losses and to be prepared for, respond to, and recover from a disaster event

- Continue to update and maintain hazard mitigation and disaster plans to minimize risk and potential harm from future disaster losses
- Promote equitable emergency management planning and risk reduction countywide
- Continued enhancements to alert and warning, evacuation, and sheltering procedures and information for residents, businesses, visitors, individuals with access and functional needs, and animals
- Protect and improve critical transportation corridors for EMS and evacuation during emergencies
- Improve and maintain interagency communications. Ensure functionality and redundancy of communications, information technology, and other critical systems
- Increase interoperability and use of shared resources and mutual aid among agencies operating in Madera County
- Make better use of technology and evidence-based solutions

- Build capacity and strategies to increase disaster resilience among historically underserved and vulnerable populations, individuals with access and functional needs, and communities disproportionately impacted by disasters
- Improve communication and training of staff for hazard mitigation, emergency preparedness, response, and recovery measures
- Improve methods and timeliness of communication during hazard events and address disinformation promptly
- Establish enhanced data collection and retention practices as required by law
- Improve and maintain communications with governing bodies, while maintaining compliance with the Ralph M. Brown Act
- Ensure pre-planning activities include anticipation of goods and services to meet basic community needs and advance arrangements/agreements are in place to ensure swift response
    - Encourage conditions that facilitate public and private stewardship

Goal 4: Increase and maintain wildfire prevention and protection

- Promote community resiliency to wildfires by reducing wildfire risk and vulnerability countywide
- Reduce life safety issues, property loss, damages, and air quality impacts associated with wildfires through education and prevention
- Develop, implement, and maintain countywide fuel reduction strategies
- Promote tree mortality monitoring and mitigation
- Promote Firewise communities and individual responsibility for wildfire prevention and protection
- Increase public knowledge on home defensible space and fire hardening methods
- Educate residents of and visitors to Madera County with wildfire safe practices
- Increase the ability of underserved and vulnerable populations to survive a wildfire event with minimal property damage and prevent loss of life
- Identify and communicate solutions to assist homeowners with wildfire insurance alternatives
- Enhance the reliability and capacity of community water systems to ensure adequate resources for fire suppression
    - Promote and enhance fire-fighting capabilities (e.g., access roads, water supply, etc.)

Goal 5: Improve community resiliency to drought conditions and water shortage including establishing a sustainable water supply

- Reduce drought/water shortage risk and vulnerability in Madera County
- Promote continued groundwater sustainability programs
- Identify and mitigate hazards to prevent long-term impacts to water quality
- Enhance the reliability, capacity, and redundancy of community water systems to ensure adequate resources for end users
- Increase water storage facilities to provide for consistent water supply and to mitigate flooding
- Develop comprehensive, countywide water plan(s) to provide for existing development and to guide future development opportunities
- Address drought impacts related to tree mortality to include dead tree removal that contributes to wildfire risk (i.e., increased fuel loads), flood risk (i.e., downed trees blocking flood control facilities), severe weather, and localized flooding
- Increase water recharge opportunities and facilities

Goal 6: Improve community resiliency to flooding

- Reduce flood risk and vulnerability

- Reduce life safety issues, property loss, and damages associated with flooding
- Promote multi-agency collaboration to protect and manage natural drainageways, waterways, floodplains, and retention basins
- Prioritize stormwater master plan updates, including flood management plans for local waterways and localized areas of concern, and project implementation with considerations for climate change
- Establish ongoing funding source(s) for Madera County Flood Control Agency and other local flood control agencies
- Review appropriate flood protection infrastructure improvements in both urban and non-urban areas to provide 100-year level of protection where feasible and address localized flooding caused by stormwater and weather events

Goal 7: Improve community education and resilience to climate-related impacts to life and safety

- Continue to update and maintain climate action plans and vulnerability assessments that include analysis of climate change impacts on other natural hazards and community resilience and provide opportunities to explore impact mitigation and/or reduction
- Improve community education and response to air quality and similar climate-related vulnerabilities caused by both climate-change and natural disasters

Goal 8: Maintain FEMA eligibility for grant funding

- Conformance to federal and state hazard mitigation initiatives and maximize potential for mitigation implementation
- Position jurisdictions for grant funding through monitoring and communicating available grant programs, timelines, and processes to all agencies and community mitigation partners
- Educate jurisdictions on grant eligibility and reimbursement requirements and strategies
- Reduce exposure to hazard-related losses through realistic mitigation project planning and implementation, ensuring that actions can be undertaken and sustained without excessive depletion of economic resources

Based on the risk assessment review and goal setting process, the HMPC identified mitigation actions (Table ES-3), which provide direction for reducing future hazard-related losses within the Madera County Planning Area and specific to each participating jurisdiction.

Table ES-3 Madera County Planning Area Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Madera County					
Multi-Hazard Actions					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	Previous Action	X	X	X	Prevention Public Education
Action 3. Secondary Evacuation Routes during Emergencies	New Action	X	X		Prevention Property Protection Natural Resource Protection Emergency Services Public Information
Agricultural Hazard: Severe Weather/Pests/Invasives Actions					
Action 4. Agricultural Emergency Preparedness Plan	Previous Action	X	X		Prevention Natural Resource Protection Emergency Services
Climate Change Actions					
Action 5. Climate Preparedness and Response Plan	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Dam Failure Action					
Action 6. Dam Monitoring and Early Warning Enhancement Program	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services
Drought and Water Shortage Actions					
Action 7. DWR Grant Program for SB 552 - Drought Task Force and County Drought Resiliency Planning and Project Implementation (Short term (i.e., Availability and Distribution of Water during Hazard Events) and Long-Term Planning (such as System Enhancements, Consolidation, etc.))	New Action	X	X		Prevention Property Protection
Action 8. Groundwater Recharge	New Action	X			Property Protection Natural Resource Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 9. Countywide Domestic Well Mitigation Programs (including Madera County – Madera GSA "White Area" DWMP).	Previous Action	X	X		Property Protection Natural Resource Protection
Action 10. Groundwater Sustainability Plans (GSPs)	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 11. Countywide Domestic Well Mitigation Programs (including Madera County – Madera GSA "White Area" DWMP).	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 12. Emergency Water Storage Tanks	New Action	X	X		Prevention Property Protection Natural Resource Protection
Earthquake Actions					
Action 13. Seismic Assessment and Retrofit of Critical Facilities	Previous Action	X	X		Emergency Services Property Protection Natural Resource Protection
Flood, Localized Flood, Severe Weather: Heavy Rains and Storm Actions					
Action 14. Establish Tactical Facilities for firefighting, Floodfighting, etc. (Airports, Heliports, Water Facilities, and Others and to Include Sandbag Locations at Fire Stations, USFS Facilities, Maintenance Yards, and Other Locations; w/ Public Education Component	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services Public Information
Action 15. Stormwater Plan updates and Project Implementation w/ Considerations for Climate Change	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 16. Continue to Implement and Maintain Routine Maintenance Processes/SOPs/projects Contained in the Flood O & M Manuals to Include: Vegetation Removal, Rodent Control, Sediment Removal, Erosion Repair and Restoration, Rehabilitation of Levee Patrol Roads, Flood Channel and Levee Inspections	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services
Action 17. Localized Flood Mitigation	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Hazardous Materials Transportation Actions					
Action 18. Hazardous Materials Incident Prevention and Response Mitigation	Previous Action	X	X		Prevention Property Protection Natural Resource Protection Emergency Services
Landslide, Mudslide, and Debris Flow Action					
Action 19. Madera County GIS Inventory & Risk Mapping: Landslide/Slide Locations and Roadside Culverts	New Action	X	X		Prevention Property Protection Natural Resource Protection Emergency Services
Severe Weather: Extreme Cold Actions					
Action 20. Countywide Snow Removal and Haul-Out Operations Plan for Public Roadways	Previous Action	X	X		Property Protection Emergency Services
Action 21. Create, Maintain, Enhance, and Outreach – Senior Firewood Assistance Program	New Action	X	X		Prevention Property Protection Natural Resource Protection
Wildfire Actions (with Smoke and Air Quality), Drought and Water Shortage, Landslide, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados					
Action 22. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Mudge Ranch/French Gulch Wildfire Fuels Reduction Project	New Action	X	X		Property Protection Natural Resource Protection
Action 23. Expansion of Strategic Hazard Reduction Burning Program in High-Risk Wildland–Urban Interface (WUI) Corridors	Previous Action	X	X		Property Protection Natural Resource Protection
Action 24. Removal of Down & Dead Trees	New Action	X	X		Property Protection Natural Resource Protection
Action 25. Taylor Mountain Fuel Break	New Action	X	X		Property Protection Natural Resource Protection
Action 26. Eastern Madera County WUI Communities Landscape Vegetation Treatments	New Action	X	X		Property Protection Natural Resource Protection
Action 27. Fire Adapted Madera County Collaborative Planning and Outreach Initiative: Preparation, Mitigation, Response, and Recovery Action	New Action	X	X		Prevention Property Protection Natural Resource Protection Public Information

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 28. Fuel Reduction within Recognized Firewise Communities & Growth/Development of the Firewise Program (subject to change)	Previous Action	X	X		Prevention Property Protection Natural Resource Protection Public Information
Action 29. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Konklin Road Wildfire Fuels Reduction Project	New Action	X	X		Property Protection Natural Resource Protection
Action 30. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Bass Lake South Wildfire Fuels Reduction Project	New Action	X	X		Property Protection Natural Resource Protection
Action 31. Eastern Madera County Strategic Home Hardening Program	New Action	X	X		Prevention Property Protection
Action 32. Eastern Madera County WUI Community Evacuation Route	New Action	X	X		Prevention Emergency Services
Action 33. Strategic Water Storage Infrastructure Project – Eastern Madera County WUI	New Action	X	X		Prevention Property Protection Structural Projects
Action 34. Fresno River Unsheltered Encampment Fire Risk	New Action	X	X		Prevention Property Protection Structural Projects
Action 35. Home Hardening against Wildfires	New Action	X	X		Prevention Property Protection Structural Projects
Action 36. Helicopter Water Dip Site (Drafting Pond/Tank) Connected to Main Water System with Remote-Control/Automated Filling for Wildfire Suppression	New Action	X	X		Prevention Property Protection Structural Projects
City of Chowchilla					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	Previous Action	X	X	X	Prevention Public Information
Action 3. Stormwater Pump Station Resilience Project	Previous Action	X	X	X	Property Protection
Action 4. Well Site Backup Generator Project	Previous Action	X	X		Property Protection Emergency Services
Action 5. SCADA System Modernization Project	New Action	X	X		Property Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 6. New Production Wells for Water Supply Redundancy	New Action	X	X		Property Protection Natural Resource Protection
Action 7. SR 99 / SR 233 Interchange and Bridge Expansion Project	New Action	X	X		Structural Projects
Action 8. Ventura Avenue Complete Streets and Evacuation Route Project	New Action	X	X		Structural Projects Emergency Services
Action 9. Citywide Tree Trimming and Vegetation Management Program	New Action	X	X		Property Protection Natural Resource Protection
Action 10. Truman Pond Flood Control and Stormwater Recharge Project	New Action	X	X	X	Property Protection Natural Resource Protection
Action 11. Wastewater Treatment Plant (WWTP) Electrical and Process Resilience Project	New Action	X	X		Property Protection Natural Resource Protection
Action 12. Airport Runway Drainage and Stormwater Improvements Project	New Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 13. Ash Slough/Berenda Slough Levee Improvement and Erosion Repair Project	Previous Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 14. Municipal Yard Fueling and Operations Resilience Project	New Action	X	X		Property Protection Natural Resource Protection
City of Madera					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	New Action	X	X	X	Prevention Public Education
Action 3. Storm Drain Master Plan Update, Stormwater Retention Improvements, Debris Removal and Minimizing Localized Flooding	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection Structural Projects
Action 4. Basin/Water Storage Capacity	New Action	X	X	X	Property Protection Natural Resource Protection Structural Projects

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 5. Pavement Management Systems	New Action	X	X		Property Protection
Action 6. Development of Climate Action Plans: i.e., Climate Action Plan, Climate Adaptation Plan, Climate Vulnerability Assessment	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 7. Supervisory Control and Data Acquisition (SCADA) Upgrade	New Action	X	X		Property Protection
Action 8. Tree Trimming Program/Urban Forestry Team	New Action	X	X		Property Protection Natural Resource Protection
Action 9. Participate in Update to Groundwater Sustainability Plan and Implement Plan Recommendations	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 10. Water Conservation Program Implementation	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 11. Water Tank Improvements	New Action	X	X		Property Protection Natural Resource Protection
Action 12. Update Urban Water Management Plan and Implement Plan Recommendations	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 13. Seismic Retrofit Programs	New Action	X	X		Prevention Property Protection Structural Projects
Action 14. Conduct Exploratory Studies Regarding Natural Waterways Related to Capacity-building, Bank Stability, and Property Preservation	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 15. Implement Communication System(s) to Ensure Information is Shared Timely and all Citizens have Access.	New Action	X	X		Public Information Emergency Services
Action 16. Backup Power Redundancy & Fuel Tanks for Critical Infrastructure	New Action	X	X		Property Protection Emergency Services
Action 17. Update Safety Element	New Action	X	X		Prevention
Action 18. Debris Removal, Tree Trimming and Fresno River Restoration	New Action	X	X	X	Property Protection Natural Resource Protection
Action 19. Yellow Reflective Border on Traffic Signal Backplates	New Action	X	X		Emergency Services

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 20. Heating and Cooling Centers and Buildings of Respite for Vulnerable Population	New Action	X	X		Prevention Emergency Services Public Information
Action 21. Target Hardening for Extreme Weather and Air Quality for Public Infrastructure and Buildings	New Action	X	X		Property Protection Emergency Services
Action 22. Grade Separation for Railroad Lines	New Action	X	X		Emergency Services

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Abbreviations and Acronyms

Acronym	Definition
AB	Assembly Bill
AF	Acre-feet
AMI	Area of Median Income
APG	California Adaptation Planning Guide
AQI	Air Quality Index
ARC	American Red Cross
ASTDR	Agency for Toxic Substances and Disease Registry's
BAM	Best Available Map
BCA	Benefit Cost Analysis
BCEGS	Building Code Effectiveness Grading Schedule
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe
BRIC	Building Resilient Infrastructure and Communities
CA-DWR	California Department of Water Resources
CAISO	California Independent System Operator
CAC	Community Assistance Contact
Cal EPA	Environmental Protection Agency
Cal OES	California Office of Emergency Services
CAP	Climate Adaptation Plan
CARB	California Air Resources Board
CAS	Climate Adaptation Strategy
CAV	Community Assistance Visit
CBC	California Building Code
CCHPR	Climate Change and Health Profile Report
CCSM	Community Climate System Model
CDAA	California Disaster Assistance Act
CDBG	Community Development Block Grant
CDC	Center for Disease Control
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CFS	Cubic Feet Per Second
CGS	California Geological Survey
CHWMP	County's Hazardous Waste Management Plan
CLOMR	Conditional Letter of Map Revision

Acronym	Definition
CMD	County Maintenance District
CNPS	California Native Plant Society
CNRA	California Natural Resource Agency
CPUC	California Public Utilities Commission
CRC	Community Resource Centers
CRS	(National Flood Insurance Program's) Community Rating System
CRV	Contents Replacement Value
CUPA	Certified Unified Program Agency
CVP	Central Valley Project
CWPP	Community Wildfire Protection Plan
DAC	Disadvantaged Community
DDS	California Department of Developmental Services
DFIRM	Digital Flood Insurance Rate Map
DMA	Disaster Mitigation Act of 2000
DOF	Department of Finance
DSOD	Division of Safety of Dams
EBB	Earthquake Brace & Bolt
EF	Enhanced Fujita
EHS	Extremely Hazardous Substances
ELI	Extremely low-income
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EPSS	Enhanced Powerline Safety Settings
ESPM	University of California, Berkeley's Department of Environmental Science, Policy, and Management
F	Fujita
FAC	Family Assistance Center
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance Program
FMAG	Fire Management Assistance Grant
FMCOC	Fresno-Madera Continuum of Care
FMPP	Farmland Mapping and Monitoring Program
FPA	Floodplain Administrator
FRA	Federal Responsibility Area
FRAP	Fire and Resource Assessment Program

Acronym	Definition
FWS	US Fish and Wildlife Service
GFDL	Geophysical Fluid Dynamics Laboratory
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GPH	Gallons per Hour
GRASP	Geospatial Research, Analysis & Services Program
GSP	Groundwater Sustainability Plan
HHPD	High Hazard Potential Dam
HI	Heat Index
HMGP	Hazard Mitigation Grant Program
HMPC	Hazard Mitigation Planning Committee
HUD	Housing and Urban Development
IBC	International Building Code
ICC	Increased Cost of Compliance
ICS	Incident Command System
IPAWS	Integrated Public Alert & Warning System
IPCC	Intergovernmental Panel on Climate Change
IRC	International Residential Code
IRWM	Integrated Regional Water Management
LHMP	Local Hazard Mitigation Plan
LFPZ	Levee Flood Protection Zone
LMA	Local Maintenance Agency
LOMA	Letter of Map Amendment
LOMC	Letters of Map Change
LOMR	Letter of Map Revision
LRA	Local Responsibility Area
MHI	Median Household Income
MMI	Modified Mercalli Intensity Scale
MPH	Miles Per Hour
MSL	Mean Sea Level
MW	Megawatt
NASA	National Aerospace and Science Agency
NAVD	North American Vertical Datum
NCDC	National Climactic Data Center
NDMC	National Drought Mitigation Center
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NIDIS	National Integrated Drought Information System

Acronym	Definition
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRI	National Risk Index
NRP	National Response Plan
NWS	National Weather Service
O/M	Maintenance and Operation
OHP	Office of Historic Preservation
OSHA	U.S. Occupational Safety and Health Administration
PCS	Parks and Community Services (City of Madera)
PDM	Pre-Disaster Mitigation Program
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIT	Point-in-time Homeless Count
PM	Particulate Matter
PNAS	Proceedings of the National Academy of Sciences
PSPS	Public Safety Power Shutoff
RCP	Representative Concentration Pathway
RL	Repetitive Loss
SAC-SJ	Sacramento-San Joaquin Valley
SB	Senate Bill
SBA	Small Business Administration
SCADA	Supervisory Control and Data Acquisition
SEMS	Standard Emergency Management System
SFHA	Special Flood Hazard Area
SGMA	Sustainable Groundwater Management Act
SHBC	State Historical Building Code
SJAQMD	San Joaquin Air Quality Management District
SRA	State Responsibility Area
SRL	Severe Repetitive Loss
SVI	Social Vulnerability Index
SWP	State Water Project
UBC	Uniform Building Code
UCERF	Uniform California Earthquake Rupture Forecast
UDP	Urban Displacement Project at the University of California, Berkeley
UNFCCC	United Nations Framework Convention on Climate Change
UPRR	Union Pacific Railroad
URM	Unreinforced Masonry
USACE	US Army Corp of Engineers
USBR	U.S. Bureau of Reclamation

Acronym	Definition
USDA	United States Department of Agriculture
USDOT	U.S. Department of Transportation
USGS	United States Geologic Survey
WRCC	Western Regional Climate Center
WSOC	Wildfire Safety Operations Center
WUI	Wildland Urban Interface
WWTP	Wastewater Treatment Plant

Chapter 1 Introduction

1.1 Purpose

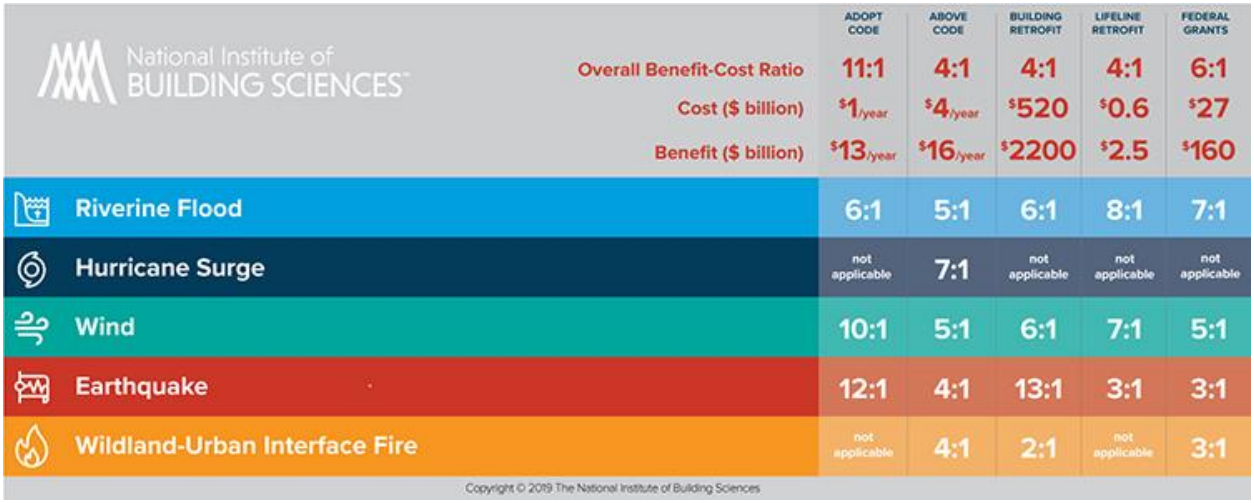
Madera County and its two incorporated communities prepared this Local Hazard Mitigation Plan (LHMP) Update to the Federal Emergency Management Agency (FEMA) approved 2018 Madera County LHMP. The purpose of this LHMP Update is to guide hazard mitigation planning to better protect the people and property of the County from the effects of hazard events and natural disasters. This LHMP Update demonstrates the communities' commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This LHMP Update was also developed, among other things, to ensure Madera County and participating jurisdictions' continued eligibility for certain federal disaster assistance: specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, Building Resilient Infrastructure and Communities (BRIC) program, and the Flood Mitigation Assistance (FMA) program.

1.2 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 most expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Although the timing of natural disasters is unpredictable, their occurrence is largely predictable over time, and much of the damage caused by these events can be significantly reduced though hazard 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, overall, mitigation activities are highly cost-effective investments. On average, each dollar spent on mitigation saves society an average of $6 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2019 Interim Report) (see Figure 1-1).

Figure 1-1 Natural Hazard Mitigation Savings by Hazard Type and Mitigation Type



Source: National Institute of Building Science Multi-Hazard Mitigation Council 2019 Interim Report

Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented. This plan documents Madera County's hazard mitigation planning process and identifies relevant hazards and vulnerabilities and strategies the County and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability in the community.

This Madera County LHMP is a multi-jurisdictional plan that geographically covers the entire area within Madera County's jurisdictional boundaries (hereinafter referred to as the Planning Area). The following jurisdictions participated in the planning process and are seeking FEMA approval of the LHMP Update:

- Madera County*
- City of Chowchilla*
- City of Madera*

* Participated in 2018 Madera County LHMP

One jurisdiction that was approved for the 2018 LHMP, but are not seeking approval for this Plan Update include:

- North Folk Rancheria (have pursued doing their own tribal hazard mitigation plan)

This LHMP Update 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 (DMA) or DMA 2000.) This planning effort also follows FEMA's most current effective LHMP Preparation and Review Guidance, LHMP Policy Guide FP 206-21-0002 effective April 11, 2025. While DMA 2000 emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations establish the requirements that local hazard mitigation plans must meet in order 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 Madera County Planning Area is subject to many kinds of hazards, access to these programs is vital.

Information in this LHMP Update 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 public health and safety and critical community facilities; reducing liability exposure; and minimizing overall community impacts and disruptions. In the past, the Madera County Planning Area has been affected by numerous hazards on multiple occasions. The participating jurisdictions are thus committed to reducing future impacts from hazard events and maintaining eligibility for mitigation-related federal funding.

1.3 Madera County Profile

Madera County covers 2,147 square miles and is located in the geographic center of the State of California. It extends northeast from the center of the San Joaquin Valley to the summit of the Sierra Nevada. Madera County is bordered on the northeast by Tuolumne and Mono Counties, on the south by Fresno County, and on the northwest by Merced and Mariposa Counties. The San Joaquin River forms most of the boundary between Madera and Fresno Counties. The western third of the County is part of the nearly flat San Joaquin Valley which is oriented northwest to southeast and has a length of about 225 miles and an average width of about 50 miles. The elevation of the valley floor is approximately 180 feet and nearly flat. Elevations increase up the western slope of the Sierra Nevada to approximately 13,000 feet. Parts of Madera County are included in Yosemite National Park, Devil's Postpile National Monument, and the Sierra National Forest. There are two incorporated communities in the County: the City of Chowchilla and the City of Madera.

A map of the County is shown in Figure 1-2. A map of elevations in the County is shown in Figure 1-3. A map of land ownership in the County is shown in Figure 1-4.

Figure 1-2 Madera County Planning Area

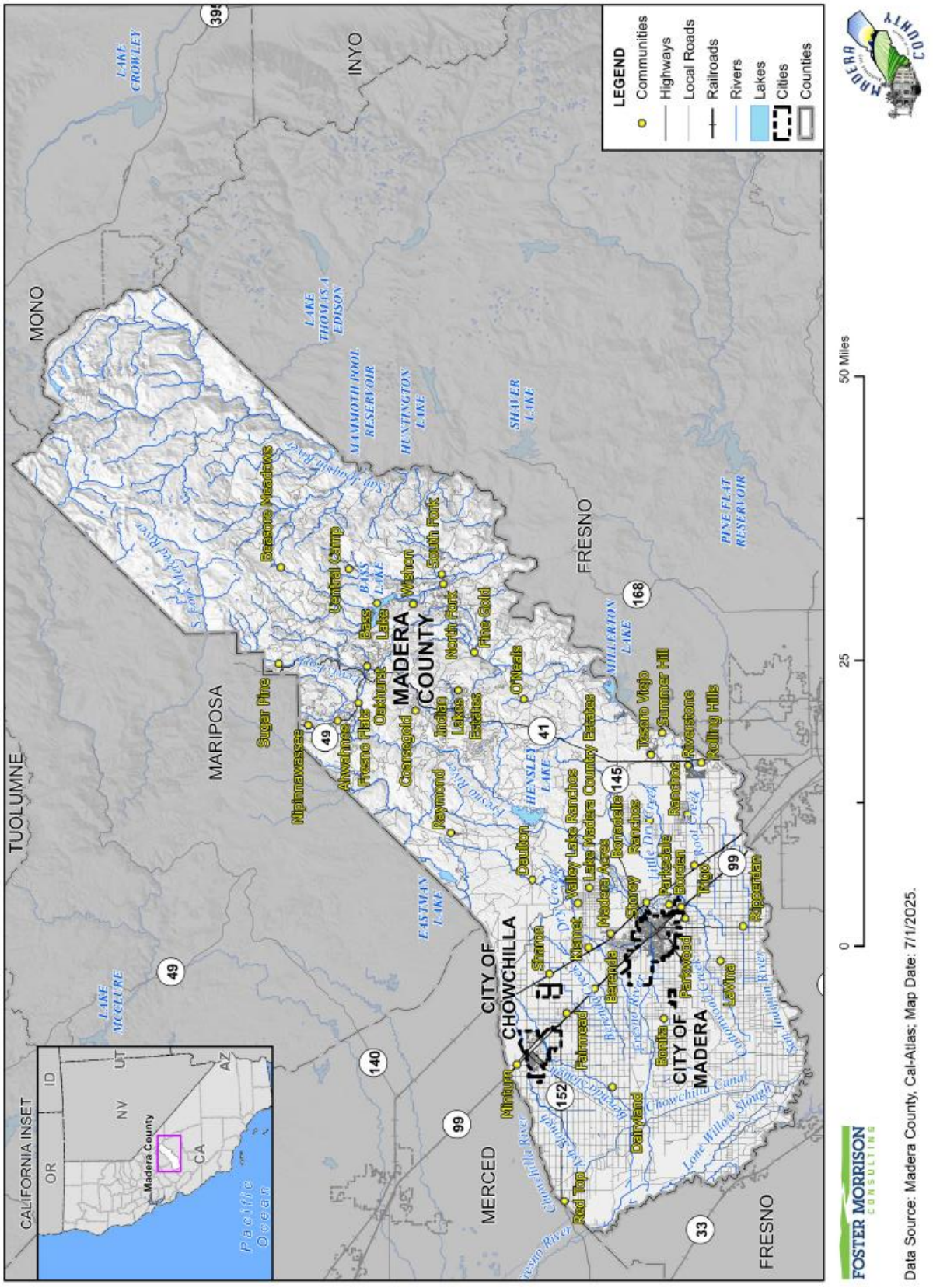


Figure 1-3 Madera County Planning Area Elevations

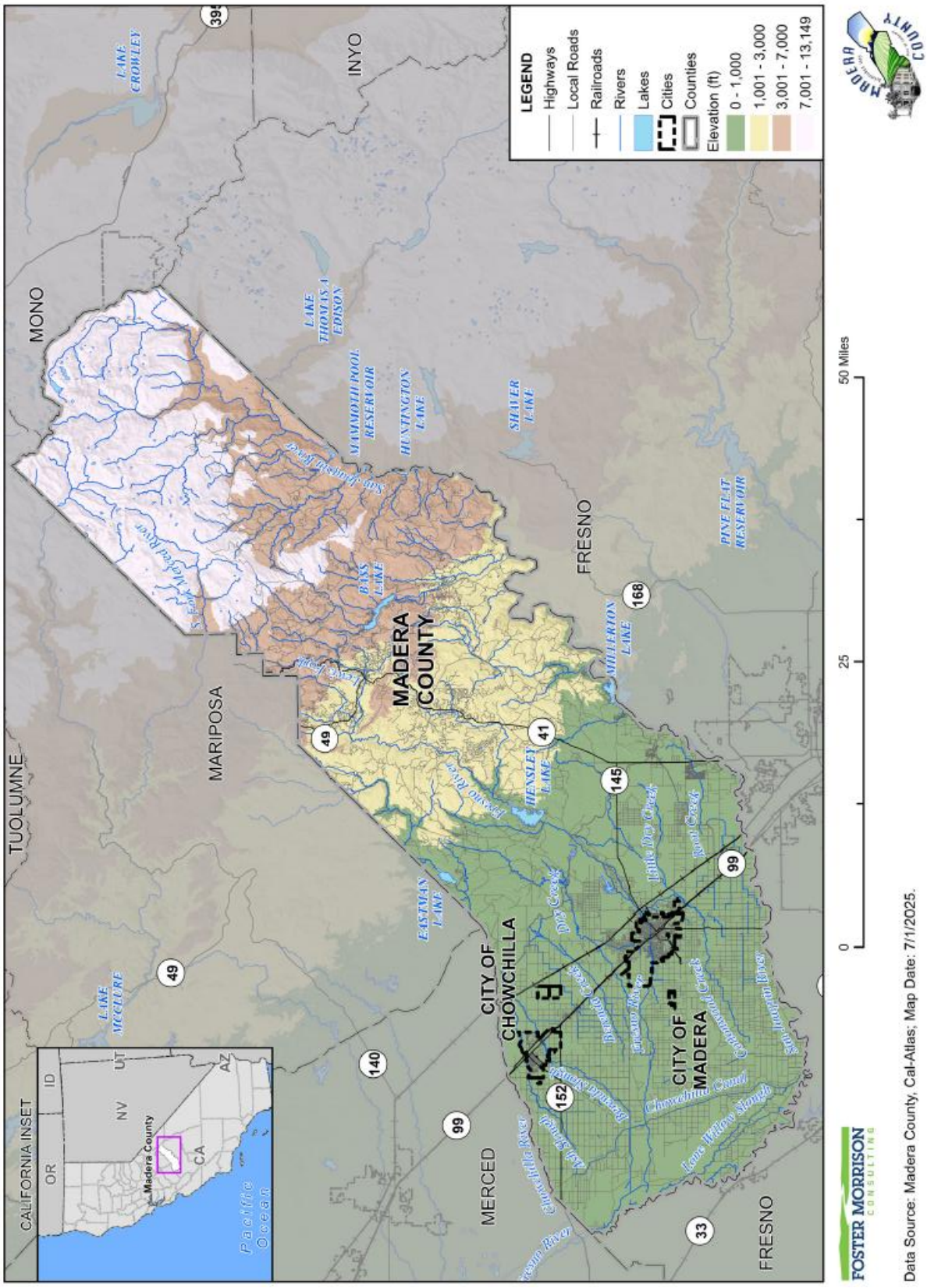
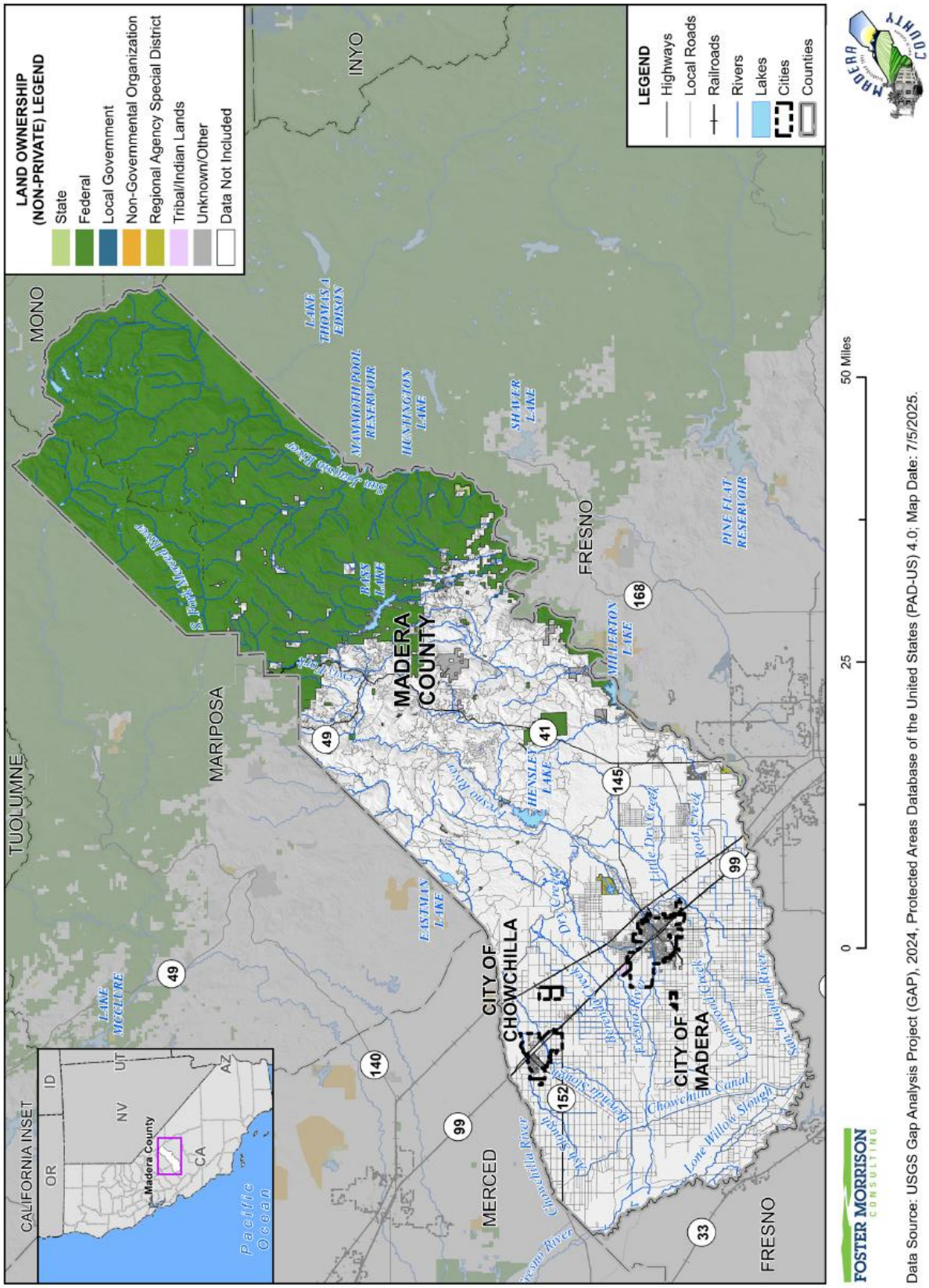


Figure 1-4 Madera County Planning Area Land Ownership



1.3.1. History

Madera County was first inhabited by indigenous peoples between 10,000 and 20,000 years ago. The Valley region was occupied by several tribal entities including the Northern Valley Yokuts, the Foothill area was occupied by the Foothill Yokuts, and the mountainous areas were occupied by the Sierra Miwok and Monache Tribes.

Madera is the Spanish word for lumber or wood, the first major industry in the County. European settlers arrived in the early 1800s, but Madera County did not have a substantial population until the California Gold Rush. Evidence of the Gold Rush remains today in the names of some of Madera County's towns such as Coarsegold, Finegold, and Grub Gulch. The County was formed from a portion of Fresno County in a special election of the residents of the area, and was incorporated in 1893.

1.3.2. Geography and Climate

Madera County is located in central California. The western portion of the County lies in the Central Valley of California, and the eastern portion of the County is located in the Sierra Nevada mountains. Between the mountains and the Central Valley is an area of foothills. Madera County is bordered by Fresno County to the south and west, Merced and Mariposa Counties to the north, and Mono County to the east. The southern portion of Yosemite National Park is located in the northeast of Madera County.

Madera County is approximately 20 miles from Fresno, 166 miles from the Bay Area, and 240 miles from Los Angeles. The County occupies approximately 2,153 square miles, of which 2,136 square miles are land and the remaining 17 square miles are occupied by water. Elevations in Madera County range from 180 feet above sea level to 13,157 feet at Mount Ritter, the highest point in the County.

Madera County's climate varies by location within the County. The climate in the Valley is warm and dry, with hot summers (temperatures in July normally reaching 100 degrees Fahrenheit) and fairly mild winters. The average rainfall is 12 inches. In the mountain communities, winters are colder, and summers are not quite as hot. Above 7,000 feet, winters can be severe with year-round snow at the highest elevations. Fog is common in Madera County, particularly in the winter months but also can occur in the summer.

1.3.3. Population and Demographics

The California Department of Finance 2024 estimates for population of Madera County and its jurisdictions are shown in Table 1-1.

Table 1-1 Madera County Population by Jurisdiction, 2024

Jurisdiction	Total Population
City of Chowchilla	18,775
City of Madera	66,269
Unincorporated County	72,865
Total	**157,909**

Source: California Department of Finance, 2024 E-1 Report

Select social and economic information for the unincorporated Madera County are shown in Table 1-2.

Table 1-2 Unincorporated Madera County – Select Social and Economic Statistics

Statistic	Number
Populations	
Population under 5	6.6%
Population over 65	14.6%
Median Age	31.0
White	35.9%
Black or African American	2.9%
American Indian or Alaska Native	3.7%
Asian	2.1%
Native Hawaiian or Pacific Islander	0.8%
Some Other Race	33.2%
Two or more races	21.4%
Median income	$66,553
Mean Income	$87,692
Poverty rate – All families	15.1%
Poverty rate – All people	18.2%
Unemployment Rate (February 2024)	7.7%

Source: 2020 US Census, 2023 US Census Bureau American Community Survey, California Employment Development Department

1.3.4. Economy and Tax Base

Madera County has a diverse economy. US Census estimates show economic characteristics for the unincorporated County. These are shown in Table 1-3 and Table 1-4.

Table 1-3 Unincorporated Madera County Civilian Employed Population 16 years and Over by Industry

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	7,559	11.9%
Construction	4,172	6.6%
Manufacturing	6,495	10.2%
Wholesale trade	1,980	3.1%
Retail trade	5,488	8.7%
Transportation and warehousing, and utilities	6,124	9.7%
Information	894	1.4%
Finance and insurance, and real estate and rental and leasing	2,995	4.7%

Industry	Estimated Employment	Percent
Professional, scientific, and management, and administrative and waste management services	3,454	5.4%
Educational services, and health care and social assistance	12,154	19.2%
Arts, entertainment, and recreation, and accommodation and food services	5,573	8.8%
Other services, except public administration	2,885	4.5%
Public administration	3,645	5.7%

Source: US Census Bureau American Community Survey 2023 Estimates

Table 1-4 Unincorporated Madera County – Income and Benefits

Income Bracket	Percent
<$10,000	5.0%
$10,000 – $14,999	2.7%
$15,000 - $24,9999	6.0%
$25,000 – $34,999	6.8%
$35,000 – $49,999	9.4%
$50,000 – $74,999	20.3%
$75,000 – $99,999	15.0%
$100,000 – $149,999	15.7%
$150,000 – $199,999	11.7%
$200,000 or more	7.5%

Source: US Census Bureau American Community Survey 2023 Estimates

Major employers in the County are shown in Table 1-5.

Table 1-5 Major Employers in Madera County Planning Area

Employer Name	Location	Industry
Ardagh Group	Madera	Glass Containers (mfrs)
Baltimore Aircoil Co	Madera	Refrigerating Equip Supls & Parts-Mfrs
Certain Teed Corp	Chowchilla	Manufacturers
Cherokee Freight Lines	Madera	Trucking-Motor Freight
Chukchansi Gold Resrt & Casino	Coarsegold	Casinos
EVAPCO Inc	Madera	Evaporative Coolers Mfg & Wholesale
Georgia-Pacific	Madera	Sawmills (mfrs)
Home Depot	Madera	Home Centers
JBT Food Tech	Madera	Food Processing Equipment & Supls-Mfrs
Lamanuzzi & Pantaleo Cold Stge	Madera	Fruits & Vegetables-Harvesting
Lion Brothers Farm-Newstone	Madera	Farming Service
Lion Raisins Inc	Madera	Vineyards

Employer Name	Location	Industry
Lowe's Home Improvement	Madera	Home Centers
Madera City Hall	Madera	City Hall
Madera High School	Madera	Schools
Madera Rehab Ctr	Madera	Senior Citizens Service
Madera South High School	Madera	Schools
Millview School	Madera	Schools-Pre-School/Kindergarten-Academic
Mission Bell Winery	Madera	Wineries (mfrs)
San Joaquin Wine Co	Madera	Wineries (mfrs)
Sierra Tel	Oakhurst	Telephone Companies
Span Construction Inc	Madera	Contractors-Equip/Supls-Dlrs/Svc (whls)
Valley State Prison For Women	Chowchilla	Government Offices-State
Walmart	Madera	Department Stores
Warnock Food Products	Madera	Food Products & Manufacturers

Source: America's Labor Market Information System (ALMIS) Employer Database, 2025 1st Edition.

1.4 Plan Organization

The 2026 Madera County LHMP Update is organized as follows:

- Chapters
  - ✓ Chapter 1: Introduction
  - ✓ Chapter 2: Community Profile
  - ✓ Chapter 3: Planning Process
  - ✓ Chapter 4: Risk Assessment
  - ✓ Chapter 5: Mitigation Strategy
  - ✓ Chapter 6: Plan Adoption
  - ✓ Chapter 7: Plan Implementation and Maintenance

- Annexes
  - ✓ Annex A: City of Chowchilla
  - ✓ Annex B: City of Madera

- Appendices
  - ✓ Appendix A: Planning Process
  - ✓ Appendix B: References
  - ✓ Appendix C: Mitigation Strategy
  - ✓ Appendix D: Adoption Resolution
  - ✓ Appendix E: Threatened and Endangered Species
  - ✓ Appendix F: Critical Facilities
  - ✓ Appendix G: FEMA National Risk Index
  - ✓ Appendix H: Hazus Scenarios

The **Base Plan** provides the overall framework for this multi-jurisdictional LHMP. It is the umbrella document that includes the planning process, methodologies, and process requirements for all participating

jurisdictions (i.e., unincorporated County and Jurisdictional annexes). As such, Chapters 1-7 of the Base Plan apply to the unincorporated County and the two incorporated communities, as participants to this LHMP Update seeking FEMA approval of the Plan. Because this is a multi-jurisdictional plan, the Base Plan addresses the LHMP hazard mitigation planning elements specific to the Madera County Planning Area which includes data, information and analysis specific to all participating jurisdictions and also includes data, information, and analysis specific to unincorporated Madera County.

The **Jurisdictional Annexes** detail the hazard mitigation planning elements specific to each additional participating jurisdiction to this Madera County LHMP Update. Each annex is not intended to be a standalone document, but appends to, supplements, and incorporates by reference the information contained in the Base Plan document. As such, all Chapters 1-7 of the Base Plan, including the planning process and other procedural requirements and planning elements apply to and were met by each participating jurisdiction. The annexes provide additional information specific to each participating jurisdiction, with a focus on providing additional details on the risk assessment and mitigation strategy.

The **Appendices** provide additional information, data, and planning process documentation that applies to all participating jurisdictions (i.e., unincorporated County and the two jurisdictional annexes) to this Madera County LHMP Update.

Chapter 2 What's New

44 CFR §201.6(d)(3) and §201.7(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 previous 2018 Local Hazard Mitigation Plan (LHMP), being updated as part of this 2026 Madera County LHMP Update, contained descriptions of the planning process, the risk assessments of identified hazards, and mitigation strategies for reducing the risk and vulnerability from these hazards. Since approval of the 2018 LHMP by FEMA, progress has been made on implementation of the 2018 mitigation strategies, as applicable to the respective participating jurisdictions. As part of this LHMP Update, a thorough review and update of the 2018 LHMP was conducted to ensure that this 2026 Madera County LHMP Update reflects current conditions and priorities in order to realign the updated mitigation strategy for the forthcoming five-year planning period. This section of this LHMP Update includes the following:

- **What's New in the LHMP Update**. Section 2.1 provides an overview of the approach to updating the previous LHMP and identifies new analyses, data and information included in this LHMP Update to reflect current community conditions. This includes a summary of new hazard and risk assessment data as it relates to the Madera County Planning Area and participating jurisdictions as well as information on current and future development trends affecting hazard vulnerability and related issues. The actual updated data, discussions, and associated analyses are contained in their respective sections within this LHMP Update.
- **Summary of Significant Changes to Current Conditions, Planning Area Vulnerability, and Hazard Mitigation Program Priorities**. Section 2.2 provides a summary of significant changes in current conditions, changes in hazard vulnerability, and resulting modifications to the Madera County hazard mitigation program priorities.
- **2018 Mitigation Strategy Status and Successes**. Section 2.3.2 provides a description of the status of mitigation actions from the 2018 LHMP and also indicates whether a project is no longer relevant or is recommended for inclusion in the updated mitigation strategy. This section also highlights key mitigation success stories since the 2018 LHMP.

This What's New section provides documentation of Madera County Planning Area's progress or changes in risk and vulnerability to hazards and overall hazard mitigation programs. Completion of this LHMP Update further provides documentation of the participating jurisdictions to this Madera County Planning Area's continued commitment and engagement in the hazard mitigation planning process.

2.1 What's New in the Plan Update

Preparing the 2026 LHMP Update involved a comprehensive review and update of each section of the 2018 LHMP and includes an assessment of the success of the participating jurisdictions in evaluating, monitoring, and implementing the mitigation strategy outlined in the 2018 LHMP. Only the information and data still valid from the 2018 LHMP was carried forward as applicable into this LHMP Update.

Also to be noted, Chapter 7 Implementation and Maintenance of this LHMP Update identifies key requirements for updating future plans:

- Consider changes in vulnerability due to action implementation of mitigation actions;
- Document success stories where mitigation actions have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to inventories; and
- Incorporate new recommended mitigation actions or changes in the prioritization of mitigation actions.

These requirements and others as detailed throughout this Plan were addressed during this LHMP Update process.

As part of the comprehensive review and update of each section of the LHMP Update, the participating jurisdictions recognized that updated data, if available, would enhance the analysis presented in the risk assessment and utilized in the development of the updated mitigation strategy. Highlights of new data used for this LHMP Update are identified below and also sourced in context within both the Chapter 4 Risk Assessment and the jurisdictional annexes. Sources of specific data used are also provided throughout this LHMP Update and included in Appendix D References. This new data and associated analysis contributed to the development of the updated risk assessment and mitigation strategy presented in Chapter 4 and Chapter 5 of this LHMP Update, as well as within the jurisdictional annexes to this Plan.

Highlights of new information and analyses contained in this LHMP Update include the following:

- A thorough countywide planning process was conducted for this multi-jurisdictional LHMP Update including outreaching and inviting a broad range of agency, public, and private stakeholders for all participating jurisdictions, including those supporting underserved and vulnerable populations in the Madera County Planning Area.
- Disaster declarations were updated, including federal, state, and USDA disaster declarations. NCDC Storm Events and past historic hazard occurrences since the previous plans were added for each jurisdiction.
- A Local Concerns section was added to each jurisdiction's vulnerability assessment to capture local issues and to support the resulting mitigation strategy.
- Incorporation and analysis of the updated California Department of Finance population data was utilized for this LHMP Update.
- A detailed discussion of socially vulnerable and underserved populations were added to the Base Plan and to each jurisdictional annex and included a discussion of how these populations could be affected by each hazard.
- An updated critical facility GIS layer was provided by the County and jurisdictions for the Madera County Planning Area. This allowed for an updated analysis of critical facilities for each mapped hazard in the Madera County Planning Area.
- Community lifelines were added to the overall asset inventory.
- Economic assets and community activities of value were added to the overall asset inventory.

- Development since the last plan was analyzed in detail for each jurisdiction.
- Future development was gathered from each jurisdiction and analyzed using the most recent hazard data. This was included in the Base Plan for the unincorporated County and in each participating jurisdiction's annex.
- A new section on Power Shortage/Failure was added. Public Safety Power Shutoff events were also added.
- Impacts of future conditions, including climate change, changes in population patterns, and changes in land use and development ,was reviewed and discussed for each hazard and for each jurisdiction.
- Cal-Adapt and other state and local climate change data was added to the climate change section, as well as to other hazards that are exacerbated by climate change.
- Most hazards from the 2018 plan were profiled in this LHMP Update, with the exception of fog and volcano. Levee failure was placed inside the flood hazard. Winter storms and snow was included in the extreme cold and freeze hazard. No new hazards were added.
- An updated and enhanced assessment of each participating jurisdictions' continued compliance with the NFIP was conducted and used to support additional flood risk reduction measures.
- FEMA National Risk Index data for the County was added to all of the natural hazards in the Base Plan.
- New dam data provided by Cal OES and CA DSOD was used for the dam inventory and analysis. This data included an updated hazard classification for identified dams and updated inundation mapping. Assets at risk to dam inundation was analyzed. Critical facilities at risk to dams were tabulated.
- Additional Hazus runs were performed on four separate earthquake shake scenarios for the Madera County Planning Area.
- Deep seated landslide data was added to the landslide hazard profile and vulnerability analysis. An analysis was performed on values at risk (including populations, structures, critical facilities, and future development).
- New CAL FIRE mapping and analyses were conducted using the 2024 State Responsibility Area and the 2025 Local Responsibility Area Fire Hazard Severity Zones data.
- To better meet the revised FEMA plan review tool, a more extensive analysis of the extents to identified hazards was conducted and included in this LHMP Update for all jurisdictions.
- A greater study of all jurisdiction's mitigation capabilities was added.
- All previous mitigation actions were updated, and many new actions were added to this LHMP Update, including mitigation actions to address issues related to mitigation planning for vulnerable and underserved populations.

2.2 Summary of Significant Changes to Current Conditions, Planning Area Vulnerability, and Hazard Mitigation Priorities

This section provides a summary, by hazard, of significant changes in current conditions, Madera County Planning Area vulnerabilities, and resulting modifications to the Madera County participating jurisdictions' mitigation program priorities since the 2018 LHMP. As a result of this analysis of factors resulting in changes in community vulnerability since the last Plan, mitigation planning priorities were modified by participating jurisdictions as reflected in each jurisdiction's updated lists of priority hazards of concern, updated LHMP goals and objectives, and an updated list and prioritization of mitigation actions and projects for this 2026 LHMP Update.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Agricultural Hazards (severe weather/ pests/ invasive species)			X

- Since 2014, variable drought conditions have stressed local crops, timber, and grazing lands making them more susceptible to insect infestation, and other issues.
- Changing access and availability of water to agricultural users due to drought conditions has further impacted the ag industry.
- Successful crop production relies on predicable weather patterns. For example, crops in bloom can be impacted by off season rains and snow; extreme heat conditions at the wrong time can also impact crops.
- A reduction in pollinators due to climate and other factors can impact the ag industry.
- Noxious weeds can be more drought and herbicide tolerant – better able to compete for water over local crops and vegetation, and also increases wildfire risk.
- Since 2014, variable drought conditions have increased tree mortality in the County further impacting the wildfire hazard.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Climate Change			X

- Data suggests that changing climate conditions influence multiple hazards, such as heat, intensity of storms, flooding, wildfire, and others.
- NWS data indicates temperatures are increasing resulting in more extreme heat days. Recent years (2021-2025) have been some of the hottest years on record.
- Increased temperatures increase the use and costs of energy leaving critical systems and infrastructure more vulnerable.
- Weather extremes have become more common. This includes precipitation intensity, as seen with the atmospheric river events in recent years, as well as periods of abnormally dry conditions.
- Climate change effects include snowpack levels occurring at higher elevations. This, along with recent drought conditions, have led to an increase in tree mortality. Higher snow and freeze levels do not kill beetles in the lower elevations, thus contributing to increased levels of tree mortality.
- Other issues include impacts to food sources and food-related diseases, eco-system changes, public health issues, etc.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Dam Failure		X	

- Risk increases over the years due to aging dam infrastructure. However, dams are more regulated than ever, with requirements for Emergency Action Plans, inspections and maintenance.

- With more people moving into dam inundation areas, the vulnerability increases due to an increase in potentially affected populations, but not due to an increased risk of dam failure.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Drought and Water Shortage			X

- Since 2014, drought conditions, including water supply access issues, have had an impact on the Madera County Planning Area and California. As a result, the drought hazard remains a significant priority for mitigation planning.
- State drought mandates, including conservations measures, to protect water supply throughout California have been implemented, with some continuing within the Planning Area.
- Since 2017, the City of Madera has been implementing Level B water restrictions.
- The County overlies all or portions of the Madera, Delta-Mendota, and Chowchilla Subbasins of the San Joaquin Valley Groundwater Basin. All three of these Subbasins have been classified under the SGMA as in critical overdraft, due to long term declines in groundwater levels driven by groundwater use that has exceeded average recharge for many decades.
- During periods of drought, wells have gone dry in the County. It was noted that Madera Water #1 and #2 domestic wells have gone dry in the past. Eastern Madera County, such as in the Hillview area, has seen wells go dry in past droughts as well. American Water in Oakhurst has also struggled with water shortage. There are senior populations in these areas who are on fixed incomes. Trucking in water for them is very costly.
- Agricultural usage makes up 93% of usage in the County. Water supply issues can affect crops dependent on water.
- Drought conditions have contributed to an increase in tree mortality issues, dry fuels, and general increase in wildfire conditions.
- Drought conditions impact aquatic habitats and other environmental systems due to a decrease in water availability and delivery to these resources.
- Drought impacts the stability of soils in the Planning Area leading to more erosion and other issues.
- Water quality concerns are exacerbated in drought conditions.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Earthquake (w/subhazards)		X	

- Overall, Madera County is in a low to moderate seismically active area, with areas in the upper Sierra Nevada region at a greater seismic risk. However, there is little development in these areas to significantly affect vulnerability of the Planning Area.
- The primary factor that might change the earthquake vulnerability is additional development and more people moving to the area. Adherence to California building codes should ensure sound development in new development areas.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Flood: 1%/0.2% events (w/levee failure)			X

- Overall, the net increase or decrease in flood vulnerability depends on the location within the Planning Area, weather, and development activities.
- Recent, 2023 disaster declarations for heavy rains, storms, and flooding caused flood impacts throughout the Planning Area and contributed to an increase in flood issues.
- Atmospheric river events are occurring more frequently, including several events in the winter of 2022/2023 and 2023/2024, increasing the vulnerability of the Planning Area to increased flooding.
- Similar to other hazards, increased development in areas protected by levees can increase vulnerability.
- Land use planning, flood control measures, and adherence to development requirements in identified floodplains continue to mitigate additional exposure to this hazard in the Planning Area, even in years of heavy storms.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Flood: Localized Stormwater Flooding			X

- Climate change issues may result in more localized flooding as the climate warms and more frequent, wetter, and greater intensity storms create more runoff. Weather extremes seem more variable; the Planning Area seems to fluctuate between heavy rains and dry periods.
- There were four 2023 disaster declarations for heavy rains, storms, and flooding, including greater intensity atmospheric river events, resulted in more localized flooding throughout the Planning Area. Generally damage occurs in low lying areas and around creeks and streams. Road damage and closures continue to occur during heavy storm events.
- Outdated and undersized drainage systems also contribute to a greater vulnerability to localized stormwater flooding.
- Recent drought conditions in some areas have hardened soils and predisposed areas to worse flooding.
- Increased development in unmapped flood hazard areas could result in a net increase in vulnerability should these areas experience increased stormwater/localized flooding. However, development requirements, that require mitigation of stormwater runoff work to mitigate this hazard.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Hazardous Materials Transportation		X	

- The main concerns with hazardous material transport would be the two main transportation infrastructures (highways and railroads) and their proximity to population areas. These include major

transportation routes such as Highway 99 and the BNSF rail line that run through Madera County's densely populated areas.

- There has been no real change in vulnerability of the Planning Area to this hazard since the 2018 LHMP.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Landslide, Mudslide, and Debris Flow			X

- Over the last several years, with the severe drought, much of the vegetation along sloped areas is failing to thrive, thus there is a lack of vegetation to hold soil contributing to the landslide/mudslide potential.
- Combined with recent heavy rains from 2023 storm events contributing to saturated soils, the landslide potential increased in the Planning Area, especially in post fire areas.
- There are landslide concerns along 600, Highway 41, and Cavin Lane. Cameras have been installed in some of these areas to monitor conditions.
- Most landslide areas generally occur in remote, undeveloped areas that would have limited damages during a landslide event.
- Homeless encampments have compounded these concerns, especially along stream banks and levees, where digging into embankment causes erosion and washouts.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: Extreme Cold, Freeze and Snow			X

- Similar to other weather hazards, the overall vulnerability of the Planning Area changes from year to year depending on the season. Events in the winters of 2022/2023 and 2023/2024 caused road and school closures, hazardous driving conditions, and snow removal and snow hauling to occur.
- The western portion of the Madera County Planning Area does experience rare snowfall on a seasonal basis; however, the eastern portions of the County receive an abundance of snow, mostly between the months of November through March. Winter snowstorms in this part of the County, including strong winds and blizzard conditions, continue to result in localized power and phone outages and closures of streets, highways, schools, businesses, and nonessential government operations.
- During periods of heavy snow there is also an increase in the number and severity of traffic accidents.
- Snow removal costs can impact budgets significantly. Heavy snowfall during winter can lead to flooding or landslides during the spring if the area snowpack melts too quickly and can also create numerous challenges for emergency responders.
- Bass Lake often has problems with buried fire hydrants, but snow has to remain for more than 24 hours.
- The agricultural industry is particularly vulnerable to increasing extreme cold, freeze, and snow events.
- People can become isolated in their homes and vehicles and are unable to receive essential services. This causes issues for people who heat with propane or wood (both of which are popular in the more remote areas of the County). Many of these remote areas also have single ingress/egress, which causes problems during large snow events.

- Vulnerable and underserved populations are also at heightened vulnerability to this hazard.
- Vulnerable populations are at the greatest risk to this hazard. Economically challenged residents may not be able to afford heat. Seniors, the very young, medically vulnerable, and the unhoused are not as resilient to this hazard. The increase in seniors and other vulnerable populations increase the population at risk to this hazard.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: Extreme Heat			X

- NWS data indicates temperatures are increasing resulting in more extreme heat days in recent years. Recent years (2021-2025) have been some of the hottest on record.
- Climate change issues will continue to increase heat related impacts and vulnerabilities.
- Extreme heat can cause crop damage. These can be substantial if extreme heat occurs during periods of plant susceptibility to heat.
- Air quality issues increase with more extreme heat days.
- Extreme heat, combined with drought conditions, increase the potential for catastrophic wildfires, as well as PSPS events and other power outages.
- Vulnerable populations are at the greatest risk to this hazard. Economically challenged residents may not be able to afford air conditioning. Seniors, the very young, medically vulnerable, and the unhoused are not as resilient to this hazard. The increase in seniors and other vulnerable populations increase the population at risk to this hazard.
- Cooling centers can be expensive to keep them continuously open and safe, and can be difficult to staff.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)			X

- Similar to other weather hazards, the overall vulnerability of the Planning Area changes from year to year depending on the season. Recent years have seen heavy rains, and an increase in atmospheric river events causing flooding and other adverse impacts to the County.
- Climate change brings renewed concern moving forward for heavy rains, storms and associated issues to the County.
- Post fire conditions and areas previously impacted by drought conditions can be especially vulnerable during periods of heavy rain and storms resulting in increased erosion, landslides, and other slope failures.
- The potential for power outages increase during extreme storm events leaving the Planning Ara and its residents more vulnerable.
- Outdated and undersized drainage systems also contribute to a greater vulnerability to localized, stormwater flooding during heavy rain events.
- Hazardous trees are more prone to falling with increase in overly saturated soils.

- Streams, creeks, and other areas build up with excess tree, limb, trash, and other materials during storms impeding flows and causing other issues.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: High Winds and Tornadoes			X

- Severe wind events have had a greater impact in recent years following several years of drought combined with years of heavy rains, resulting in dead and downed trees in the Planning Area. These conditions lead to compromised, hazardous trees often falling over during high wind and heavy rain and storm events.
- High winds, combined with extreme heat, also contribute to the wildfire hazard, including the potential for a PSPS event.

2026 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Wildfire (w/smoke and air quality)			X

- Compounded by recent drought conditions (increasing tree mortality and overall wildfire conditions), the wildfire hazard has substantially increased and is no longer just a seasonal issue. The wildfire season, including the potential for a catastrophic wildfire, is a year around concern.
- Climate change continues to affect the nature and intensity of wildfires.
- Wind is a major contributor to the potential for catastrophic wildfires. And, when combined with extreme heat, can also trigger a PSPS which leaves the community at risk in other ways.
- Increased development in WUI areas within the County also contributes to an increase in vulnerability.
- The road network and infrastructure, including connectivity and ingress-egress issues in some of the more wildfire prone areas of the County, compound the wildfire vulnerability and impact.
- With large wildfires occurring throughout California, the Planning Area has seen a significant change in air quality from smoke resulting in more recorded bad air days.
- In addition to wildfires in the County, air quality from distant fires often cause issues in the County. Also a concern, wood burning to heat homes in the County compounds air quality issues. The eastern side of the County burns significantly for a heat source.
- Wildfire, smoke and air quality issues, and the physical impacts from ash fall have a significant impact on tourism, especially on the eastern side of the County.
- Smoke and air quality impacts have resulted in hospitals becoming overloaded and school closures. Purchasing N95 masks and other PPE for students and other vulnerable populations has been a challenge in recent years. This was a notable issue during the Creek Fire.
- Vulnerable populations are at the greatest risk to this hazard. Seniors, the very young, medically vulnerable, and the unhoused are not as resilient to this hazard. The increase in seniors and other vulnerable populations increase the population at risk to this hazard.

- Within WUI areas, there has been increased difficulty in obtaining home insurance and the cost of insurance premiums. Some residents have experienced cancellations of their policies due to catastrophic and recent wildfires occurring throughout California which has reduced the risk tolerance of many insurance companies. This increased cost to those who live in the WUI, and in some circumstances limits where people choose to live.
- CEQA issues for wildfire mitigation are difficult to navigate. Requiring a team on site during project work drives costs (i.e. archaeologist on site and others). The CEQA process can take 12-18 months to work through.

2.3 2018 LHMP Mitigation Strategy Successes and Status

The participating jurisdictions successfully implemented numerous mitigation actions identified in the 2018 LHMP mitigation strategies, thus working diligently towards meeting their 2018 goals and objectives, as follows:

Goal 1: Minimize risk and vulnerability of Madera County to hazards and protect lives and prevent losses to property, public health and safety, economy, and the environment.

- Identify strategies for mitigating hazards to reduce adverse impacts and hazard related losses.
- Provide protection for existing and future development.
- Provide protection for critical facilities, utilities, and services and minimize disruption.
- Provide protection for the environment and natural and cultural resources.
- Prevent repetitive losses and reoccurring damages from happening.
- Minimize hazard related losses through master planning of communities.

Goal 2: Increase community outreach, education, and awareness of risk and vulnerability to hazards and promote preparedness and engagement to reduce hazard-related losses.

- Inform and educate residents and businesses about all hazards they are exposed to, where they occur, and what they can do to mitigate exposure or damages.
- Emphasize preparedness and self-responsibility to residents.

Goal 3: Improve communities' capabilities to prevent/mitigate hazard-related losses and to be prepared for, respond to, and recover from a disaster event.

- Continued improvements to emergency services and public safety capabilities.
- Maintain coordination of disaster/emergency response plans and exercises with changing Department of Homeland Security/FEMA needs and with all agencies operating in Madera County.
- Develop/improve warning, evacuation, and sheltering procedures and information for residents, businesses, visitors, individuals with access and functional needs, and animals, with a focus on high-risk areas.
- Improve/Maintain interagency communications. Ensure functionality and redundancy of communications, information technology, and other critical systems.
- Increase interoperability and use of shared resources and mutual aid among agencies operating in Madera County.
- Establish enhanced data collection and retention practices.

- Minimize the over dependence on governmental regulation and allow the public and markets to implement reasonable measures.
- Encourage more stable conditions that facilitate public and private stewardship.

Goal 4: Increase and maintain wildfire prevention and protection in Madera County.

- Reduce the wildfire risk and vulnerability in Madera County
- Reduce life safety issues, property loss, and damages associated with wildfires.
- Develop a countywide fuels reduction implementation strategy.
- Promote tree mortality mitigation activities.
- Promote and enhance fire-fighting capabilities (e.g., access roads, water supply, etc.)

Goa1 5: Improve community resiliency to drought conditions including establishing a sustainable water supply in Madera County.

- Reduce the drought/water shortage risk and vulnerability in Madera County.
- Develop a comprehensive, countywide water plan to provide for existing development, to foster preservation of economic base, and to guide future development opportunities.
- Promote continued groundwater conservation.
- Increase water storage facilities to provide for consistent water supply and to mitigate flooding.
- Address drought impacts related to tree mortality to include dead tree removal that contributes to wildfire risk (i.e., increased fuel loads) and flood risk (i.e., downed trees blocking flood control facilities).

Goa1 6: Improve community resiliency to flooding in Madera County

- Reduce the flood risk and vulnerability in Madera County.
- Reduce life safety issues, property loss, and damages associated with flooding.
- Review appropriate flood protection infrastructure improvements in both urban and non-urban areas to provide 100-year level of protection where feasible.

Goal 7: Maintain FEMA eligibility for grant funding

- Assure conformance to federal and state hazard mitigation initiatives and maximize potential for mitigation implementation.
- Position jurisdictions for grant funding through monitoring and communicating available grant programs, timelines, and processes to all communities.
- Reduce exposure to hazard-related losses through realistic mitigation project planning and implementation, ensuring that actions can be undertaken and sustained without excessive depletion of economic resources.

2.3.1. Success Stories

Since the 2018 LHMP, progress has been made on the implementation of the mitigation strategies contained within the previous Plan. Beyond the mitigation strategy implementation from the 2018 LHMP, the participating jurisdictions also continue to implement additional hazard mitigation measures not contained within the previous Plan. This section highlights key mitigation success since the 2018 LHMP.

Madera County Success Stories

Hazard Tree Mortality Program:

Madera County's Hazard Tree Removal Program stands as a model of fiscally responsible, interagency-driven hazard mitigation that directly advances public safety. Originating from the 2015 State of Emergency declared due to extreme drought and widespread tree mortality in the Central Sierra, the program leveraged California Disaster Assistance Act (CDAA) funding to reimburse 75% of eligible costs for removing dead or dying trees that threatened County infrastructure.

Since transitioning operations fully in-house under the Sheriff's Office of Emergency Services (OES), the County has built a streamlined contracting and project management framework, utilizing competitively bid master agreements with qualified vendors to ensure rapid deployment and cost control. Through a multi-layered internal review process and the strategic use of extra-help personnel to maximize reimbursement eligibility, Sheriff's OES has delivered efficient project turnaround while maintaining compliance with CAL OES requirements.

The program has also integrated technology solutions by partnering with County IT–GIS to develop a comprehensive tree tracking database, documenting each tree removed with unique identifiers, diameter measurements, and before-and-after photographs to meet state reporting standards.

Collaboration with the U.S. Forest Service has further expanded mitigation efforts where County infrastructure intersects with Sierra National Forest lands, ensuring coordinated treatment across jurisdictional boundaries.

To date, the County has mitigated more than 22,000 hazardous trees at an average cost of $305.77 per tree, with total project expenditures of approximately $6.8 million and roughly $6.3 million recovered through CAL-OES reimbursements, CAL-FIRE grants, and donated resources—resulting in a net County cost of about $600,000 over the life of the program. This sustained effort reflects a high-return public safety investment that protects County roadways and critical infrastructure while aligning with the County's Strategic Plan under Public Safety objectives

Firewise Communities:

Madera County's expansion of the Firewise Communities program has measurably strengthened wildfire resilience within high-risk Wildland-Urban Interface (WUI) areas. By facilitating neighborhood-level organization, defensible space education, hazardous fuel reduction, and resident-led mitigation initiatives, the County has shifted from a primarily reactive suppression posture to a proactive risk-reduction framework.

A key partner in this effort is the Eastern Madera County Fire Safe Council (EMCFSC), a grassroots 501(c)(3) nonprofit focused on increasing wildfire resilience through education, outreach, fuel reduction, and homeowner support programs tailored to local needs. EMCFSC collaborates with residents and agencies to implement wildfire preparedness initiatives and support community-driven mitigation efforts.

EMCFSC currently offers defensible space assistance, chipping services, and hazard tree removal support to vulnerable homeowners across Eastern Madera County, lowering structure ignition potential and promoting safer landscapes around homes. These programs amplify Firewise principles by helping residents reduce combustible materials near structures and apply best practices for wildfire risk mitigation on private property.

Participation in the Firewise program—as coordinated locally through partners like EMCFSC and the Coarsegold Resource Conservation District—has advanced home hardening practices, reduced ladder and surface fuel continuity in the Home Ignition Zone (HIZ), and improved resident coordination during Red Flag Warning conditions. These actions directly reduce the potential for structure ignition, limit fire spread between properties, and increase structural survivability during wildfire incidents.

EMCFSC also serves as a community engagement hub, disseminating wildfire preparedness resources, coordinating local meetings and outreach, and building neighborhood capacity to act collectively before, during, and after wildfire threats.

In addition to reducing physical risk, Firewise participation enhances the County's competitiveness for state and federal mitigation funding by demonstrating quantifiable, community-driven risk reduction and sustained local commitment. Documented compliance with nationally recognized wildfire mitigation standards strengthens grant scoring criteria related to capability, leveraging, and long-term maintenance of mitigation investments.

Highway 41 Fuels Reduction Project

CAL FIRE's Highway 41 Fuel Break Project represents a data-driven and strategically executed wildfire mitigation success within the Madera, Mariposa, Merced Unit (MMU). Historically, this stretch of Highway 41 has experienced more fires annually than any other area within the MMU, making it the Unit's most persistent roadside ignition corridor. In the ten years prior to project implementation, CAL FIRE responded to 87 roadside fire starts along this section of roadway.

These frequent ignitions often resulted in temporary highway closures—many occurring during peak commute hours—disrupting traffic flow, delaying residents and emergency responders, impacting school transportation and commerce, and creating secondary public safety hazards along this critical north–south transportation and evacuation route.

In response, and following Governor Newsom's March 22, 2019 Emergency Proclamation prioritizing 35 fuel reduction projects statewide, the Highway 41 project was designated as a priority under the Community Wildfire Prevention and Mitigation Report. The project established a 104-acre, 200-foot-wide, 11-mile-long fuel break along Highway 41 near the communities of Coarsegold, O'Neals, and Hidden Lakes—isolated residential areas identified as high-risk fire zones

The primary objectives were to significantly reduce highway fire hazards, improve ingress and egress, enhance conditions for safe evacuations, and reduce fire suppression costs. Treatment methods included prescribed burning of annual grasses, pruning mature trees to reduce ladder fuels, thinning understory vegetation, removing roadside brush, and felling dead hazard trees while retaining healthy live trees. The project was designed to reduce existing fuel loading by approximately 80 percent in treated areas. All

burning operations were conducted under San Joaquin Valley Air Pollution Control District permits and performed by qualified personnel during periods of low fire danger.

CAL FIRE incorporated comprehensive Best Management Practices (BMPs), including protection of riparian zones, cultural resource avoidance, biological surveys through the California Natural Diversity Database, coordination with the Regional Water Quality Control Board and the Department of Fish and Wildlife, and onsite oversight by Registered Professional Foresters. Outreach included coordination with Sheriff's Office, Caltrans, CHP, Madera County Roads, local landowners, and regional partners to ensure cooperative implementation

Since the program's inception in 2019, CAL FIRE has documented a 97% reduction in roadside vegetation fires along this treated corridor. This measurable decline demonstrates the effectiveness of targeted, science-based fuels management applied along a high-frequency ignition source. Beyond reducing wildfire incidence, the project has substantially minimized unplanned roadway shutdowns during high-traffic periods, preserved Highway 41's reliability as a primary evacuation and response route, strengthened community protection for O'Neals, Hidden Lakes, and Coarsegold, and enhanced overall operational efficiency within the MMU. The Highway 41 Emergency Fuel Break stands as a model of proactive, collaborative wildfire risk reduction with quantifiable public safety outcomes.

Moving Station 3

The completion and relocation of Madera County Fire Station No. 3 represents a significant enhancement to Madera County's emergency response capacity and hazard mitigation framework. In 2018, LHMP, Fire Station 3, was identified as a government facility located within a floodplain. Its relocation was identified as a project within the 2018 LHMP.

The original Station No. 3 facility was established in 1986 as a leased mobile home and later expanded with an apparatus bay; however, it also suffered from structural deficiencies, leading to its closure in 2017 due to habitability and safety concerns.

Recognizing this long-standing infrastructure vulnerability, Madera County designed and constructed a new permanent fire station outside the floodplain. The 7,985 sq ft, multi-bay emergency response station brought the station up to modern standards with dedicated living quarters, apparatus support areas, and operational support spaces.

Relocating Fire Station No. 3 away from its prior compromised conditions eliminated ongoing operational risk associated with the outdated building and, importantly, reduced exposure to known local flood hazards inherent in the previous site's floodplain location. This relocation enhances continuity of service during flood events and strengthens multi-hazard operational resilience by ensuring that critical response infrastructure remains functional under extreme weather conditions, supported by County flood planning efforts.

Strategically sited to address service gaps in a high-risk and growing response area, the new Fire Station No. 3 has reduced response times and improved deployment readiness for both structural and wildland fire incidents. These improvements bolster the County's initial attack capability, increasing the likelihood of early containment and reducing the potential for large-loss wildfire events. The facility also expands

regional mutual aid capacity and supports an all-hazards response model, including emergency medical services and disaster operations. The Station is also a public-facing sandbag location.

This capital investment strengthens life-safety protection, reduces the potential for long-term property loss, and improves overall community resilience by combining infrastructure risk reduction (i.e., removing an essential facility from a floodplain and replacing it with a modern station) with operational enhancements aligned with the County's hazard mitigation objectives.

Sox Fence Slope Stabilization Project (Creek Fire Recovery)

Following the devastating 2020 Creek Fire, widely recognized as one of California's largest wildfires and burning approximately 379,895 acres across Fresno and Madera Counties, Madera County acted swiftly to mitigate secondary disaster risks related to post-fire watershed instability and debris flows.

On April 13, 2021, the Madera County Sheriff's Office of Emergency Services (Sheriff's OES) announced a partnership between Sheriff's OES and SOX Erosion Solutions to implement a targeted slope stabilization project in North Fork, one of the communities most impacted by burn scar conditions.

Earlier in 2021, the Madera County Department of Water and Natural Resources funded a geology report by ENGEO, an independent geotechnical and hazard assessment firm, to identify burn scar areas requiring repair or restoration, or presenting potential instability risks. Based on ENGEO's technical findings and the prioritization of high-risk drainage channels and unstable slopes, OES developed a debris-flow and stabilization-control strategy to prevent post-fire mudslides and landslides.

In partnership with SOX Erosion Solutions, the County implemented the SOX Fence Project, which involved installing SOXFence® sediment-control barriers in high-risk drainage channels and along slopes susceptible to erosion and debris flows. Installation of materials began on April 13, 2021, in advance of subsequent storm seasons.

SOX Erosion Solutions donated nearly 2,000 linear feet of sediment control protective fencing, representing approximately 50% of the total materials required for the project. The remaining eligible project costs were supported by FEMA funding, which covered 75% of those costs, demonstrating effective leveraging of federal disaster assistance and private-sector in-kind contributions.

The SOXFence® technology serves multiple mitigation functions:

Stabilizing slopes and hillsides where vegetation and root systems were lost due to wildfire, reducing the potential for catastrophic erosion during winter rainfall;

- Containing sediments and reducing debris flow impacts, limiting sediment transport into waterways, protecting downstream infrastructure, and preventing damage to private property and public assets;
- Preserving fire access roads and critical transportation corridors by reducing the likelihood that post-fire runoff and mudslides obstruct or degrade essential routes;
- Providing a flexible and reusable perimeter stabilization system, allowing the County to reposition materials in response to evolving erosion hazards in future years.

As a result of these rapid, data-driven post-fire mitigation measures, Madera County reduced the likelihood and severity of sedimentation and flood damage during subsequent storm events. By addressing burn scar vulnerability before the onset of major winter storms, the County minimized compounding disaster impacts, reduced potential emergency response and recovery costs, and protected downstream communities and infrastructure.

The Sox Fence Project demonstrates the effectiveness of proactive, technically informed post-fire mitigation supported by interagency coordination, federal cost-share funding, and public-private partnership. It serves as a model for addressing cascading hazards following large-scale wildfire events and advancing long-term watershed resilience.

2021 Mono Wind Event

In January 2021, a significant Mono Wind Event impacted eastern Madera County, particularly the communities of Oakhurst, Bass Lake, and North Fork. Wind speeds frequently exceeded 50 mph, with localized terrain channeling intensifying impacts. Prolonged drought conditions and bark beetle infestation contributed to widespread tree failure, resulting in approximately 300 downed trees along County-maintained roadways and damage to 10 roadway infrastructure sites, including protective curb structures and guardrails.

The County proclaimed a local state of emergency. This action activated the County's emergency authorities and positioned Madera County to pursue state reimbursement and implement coordinated recovery operations.

Sheriff's Office of Emergency Services (OES), in coordination with the Madera County Road Department, conducted rapid damage assessments and prioritized clearance of critical transportation corridors. Emergency protective measures included debris removal, restoration of emergency ingress and egress, and processing of vegetative debris to reduce secondary wildfire ignition risk.

The County demonstrated interdepartmental coordination by integrating Sheriff's OES, Public Works, County Administration, and contracted vendors under established emergency management procedures. All operational activities were documented through ICS 214 Activity Logs, reinforcing compliance with SEMS/NIMS protocols and reimbursement requirements

This operation produced both immediate life-safety improvements and long-term mitigation benefits. Removal of vegetative debris reduced hazardous fuel loads along transportation corridors, lowering future wildfire ignition and spread potential. Infrastructure repairs restored protective curb and guardrail systems to pre-disaster condition while meeting current standards, enhancing roadway resilience against future storm and runoff impacts

The 2021 Mono Wind response demonstrates Madera County's capability in the following areas:

- Rapid damage assessment and emergency route restoration
- Interdepartmental coordination under SEMS/NIMS
- Competitive procurement and contract oversight
- Compliance with County, State, and reimbursement standards

- Documentation and cost tracking for disaster assistance eligibility

Integration of response actions with long-term hazard mitigation objectives

Collectively, this event underscores Madera County's institutional, operational, and fiscal capacity to manage severe weather incidents and implement recovery actions that advance hazard mitigation goals consistent with LHMP priorities.

City of Chowchilla Success Stories

Urban Runoff Management (Sonoma Storm Drain)

The City completed Phase 3 of the Sonoma Storm Drain project in April 2025, which consisted of installing a new storm drainage pipeline under Sonoma Avenue from 5th Street to 15th Street. This improved pipeline allows excess storm rain and water to be led and dumped out to the new underground recharge basin at Edward Ray Park, located on 15th Street. This new recharge basin was also constructed during Phase 3, and was created to prevent flooding on Sonoma Avenue. This project is expected to benefit the City and the community for the next twenty years.

Humboldt Storm Drain & Street Improvements

The Humboldt Storm Drain and Street Improvements project was completed in July 2023. The project consisted of installing a new pipeline and improving the existing storm drain system on Humboldt Avenue from 3rd Street to 15th Street. With the new pipeline, there will be a reduction of flooding. This area was of high importance to the City as Chowchilla's Union High School is located on Humboldt Avenue, and as such, is an area with high foot and car traffic. With the improvements to the storm drain and street pavement, students and parents alike are able to safely navigate to and from the high school.

Civic Center Generator

A back-up generator was installed at the Civic Center in 2025. As a government building, the Civic Center is expected to operate and be open to the community during business hours. The community also relies on the Civic Center during times of emergencies, including but not limited to: wildfires, heavy rain and storms, and severe weather conditions such as high winds, severe cold, and severe heat. The new generator will ensure that the Civic Center can keep operating during business hours for its residents.

Well 15

The City of Chowchilla has multiple well projects, including the recently drilled and constructed Well 15. Well 15 was determined to be a beneficial source of water and growth for The City and its residents. As older wells go out of service, it is important that The City continue growing and expanding its options for water. The importance of the well is to provide water to the community, especially during times of emergencies. Well 15 also has its own back-up generator to ensure there is always water available to the community.

City of Madera Success Stories

City of Madera: Safe & Clean Team

Through a combination of grant, state, and local tax funding sources, the City has developed a Safe & Clean Team dedicated to various clean-up activities, including debris and vegetation removal in the Fresno River to mitigate flood hazard and remove fuel for wildfires. The team has been outfitted with equipment to be successful, including a skid steer with masticator and tractor with both boom and flail mowers. The Safe & Clean team is an integral part of the City's flood mitigation activities and fire fuel removal within the Fresno River.

US DOT Federal Grant: Union Pacific Railroad - Study of Seven at-Grade Crossings Improvements

The City successfully obtained a planning grant of $1.6 million through the US Department of Transportation Federal Railroad Administration to study seven at-grade crossings along the Union Pacific Railroad. The project will conduct a rail safety planning study, engage stakeholders, and perform an alternatives analysis. The long term goal is to identify and determine options to provide grade separation at crossings with high traffic volumes and frequent train activity. If supported by the study, future funding will be sought for design and build of the multimodal crossings in support of public safety response to critical incidents.

Public Assistance Repair Projects for Catastrophic Infrastructure Failures

During the January 2023 disaster identified as DR-4683-CA California Sever Winter Storms, Flooding, Landslides, and Mudslides, the City experienced catastrophic infrastructure failures in sewer, transportation, and storm drainage systems caused by the volume and severity of stormwater and stormwater intrusion. All response/repair projects related to this disaster are complete.

Emergency Generator Projects

Funding and procurement for three emergency generators has been completed with installation pending for emergency backup power at City Hall, Fire Station 57, and the Frank Bergon Senior Center. These generators will ensure critical facilities can continue operations during power outages. The Frank Bergon Senior Center is in close proximity to the Madera Police Department and can be utilized for operational overflow, sheltering, and/or as a heating/cooling center.

Storm Pump Replacements and Upgrades

The City has successfully replaced and upgraded storm pumps at Pump Stations 6 ,7, 8, 9, 10, 16 and 19. Upgrading storm pumps reduces localized flooding by increasing the system's ability to move stormwater out of an area faster than it arrives, preventing backups in drains and manholes, and keeping low lying streets from filling like basins during heavy rain. Modern pumps have higher capacity, stronger motors, and clog resistant designs that handle debris more effectively, which helps them stay operational during intense storms. They're also built with redundancies—such as backup generators and multiple pumps—to stay reliable during power outages or equipment failures. Because many older drainage systems were designed

for smaller, outdated rainfall patterns, upgraded pumps are sized for today's more intense downpours and increased urban runoff, making them better suited to prevent flooding under modern conditions.

Groundwater Wells Rehabilitation Projects

Three full rehabilitations have been completed on Groundwater Wells 17, 33, and 34. Groundwater well rehabilitations are a critical mitigation measure that strengthens the City's resilience against natural hazards such as drought, flooding, and extreme heat. Rehabilitation restores well efficiency by removing mineral scaling, biofouling, and repairing structural components, which increases production capacity and reduces drawdown. This ensures reliable water supply during prolonged droughts and peak demand periods, minimizing the risk of service interruptions and emergency restrictions. Additionally, improved well integrity reduces contamination risks during flood events and enhances aquifer sustainability, helping prevent subsidence in the region. By maintaining redundancy and operational flexibility, rehabilitated wells provide dependable backup capacity during emergencies such as wildfire-related power shutoffs or mechanical failures, ensuring continuity of service for residents and critical facilities.

Water Well Maintenance Project for System Reliability

The City has successfully procured an ongoing water well maintenance contract to ensure a proactive and rapid-response framework for system reliability. Scheduled inspections, preventive servicing, and performance monitoring reduce the likelihood of unexpected failures during hazard conditions, while contractual service-level agreements guarantee expedited repairs after events such as earthquakes, storms, or Public Safety Power Shutoff outages. Including emergency protocols in the contract ensures the City can quickly restore operations and maintain water quality standards even under stress. These measures not only protect public health and safety but also reduce long-term costs by preventing catastrophic failures and enabling data-driven asset management. Together, well rehabilitation and structured maintenance provide a robust, cost-effective strategy to safeguard the City's water infrastructure against natural hazards and ensure uninterrupted service to the community.

2.3.2. 2018 Mitigation Strategy Update

The 2018 LHMP contained separate mitigation strategies for each participating jurisdiction. These have been combined below. The 2018 LHMP contained 63 separate mitigation actions for the jurisdictions. Of these, 10 are complete, 3 are ongoing, and 19 have not been started. 32 actions have been identified for 4inclusion in this LHMP Update and have been carried forward in Chapter 5. Table 2-1 provides a status summary of the mitigation action projects from the 2018 LHMP. Following the table is a description of the status of each project. It should be noted that in the 2018 LHMP that the North Fork Rancheria participated and put forth actions. Those actions are not tracked below, as the Rancheria is not a participant to this LHMP Update.

Table 2-1 Madera County Planning Area 2018 LHMP: Mitigation Action Status Summary

Action Title	Complete	Ongoing	Not Yet Started	In 2026 Update*
Madera County				
Multi-Hazard Actions				
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan		X		Y
Action 2. Improved Public Outreach		X		Y
Action 3. Review and Bring Current County Plans	X			Y
Action 4. Shelter Emergency Plan	X			N
Action 5. Training & Exercises		X		Y
Action 6. Recovery Plan	X			N
Action 7. Countywide GIS Data Base			X	N
Action 8. Community Pet Education and Disaster Preparedness		X		N
Agricultural Hazards Actions				
Action 9. Agriculture Emergency Plan			X	Y
Climate Change Actions				
Action 10. Climate Adaptation Plan		X		Y
Dam Failure Actions				
Action 11. Dam Monitoring		X		Y
Drought Actions				
Action 12. Well Rehabilitation Program			X	N
Action 13. Public Water Systems		X		Y
Action 14. Expand Surface Water Locations			X	N
Earthquake Actions				
Action 15. Bridge Retrofits and Replacements			X	Y
Flood Actions				
Action 16. Relocate County fire station out of floodplain	X			N
Action 17. Relocation of Government Facilities in the Floodplain			X	N
Action 18. Erosion Repair and Restoration Projects	X			Y
Action 19. Woody Debris Removals		X		Y
Action 20. Flood Insurance Promotion			X	N
Action 21. Stormwater Management Plan		X		Y
Action 22. Flood Studies and Action Project				N
Action 23. Ash Slough Arundo Removal and Channel Clearing		X		Y
Action 24. Berenda Creek Arundo Removal, Channel Clearing and Levee Repairs		X	X	Y
Action 25. Berenda Slough Arundo Removal and Channel Clearing		X		Y
Action 26. Cottonwood Creek Channel Clearing and Levee Repairs				Y
Action 27. Dry Creek Channel Clearing and Levee/Embankment Repairs				Y

Action Title	Complete	Ongoing	Not Yet Started	In 2026 Update*
Action 28. Fresno River Channel Clearing and Levee/Embankment Repairs		X		Y
Hazardous Materials Actions				
Action 29. Crude Oil Emergency Response			X	N
Action 30. Hazardous Materials Decontamination Kits			X	N
Action 31. Ethanol Emergency Response			X	N
Action 32. Madera County ICS typing of Hazardous Materials Team			X	N
Action 33. Mutual Aid Agreements	X			N
Action 34. HAZ-MAT Response			X	Y
Extreme Heat/Cold Actions				
Action 35. Cooling/Warming Centers	X			Y
Wind and Tornado Actions				
Action 36. Woody Debris Removal - Roadway	X			N
Winter Storms/Snow Actions				
Action 37. Snow Removal Plan			X	Y
Wildfire Actions				
Action 38. Educate the public on fire safety and hazard reduction		X		Y
Action 39. Fuel Reduction		X		Y
Action 40. Pre-suppression plan and Wildland urban interface map	X			N
Action 41. Fire Fighting Access Issues		X		N
Action 42. Tree Mortality		X		N
Action 43. FireWise Communities		X		Y
Action 44. Community Chipping Program		X		N
Action 45. Reforestation Projects			X	N
City of Chowchilla Actions				
All Hazard Actions				
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan		X		Y
Action 2. Public awareness, education, outreach, and preparedness program enhancements for all hazards (simplify, multi-media, educate and clarify various emergency systems, messaging and training; promote self-responsibility)		X		Y
Action 3. Conduct evacuation and shelter planning for all communities and populations (to include all critical hazards, at risk populations, medical, ADA, animals, and with outreach and security components)		X		N
Action 4. Enhance and maintain GIS mapping of City assets and critical facilities		X		N
Action 5. Explore additional surface water resources for City		X		N
Action 6. Provide backup generators for wells		X		Y
Action 7. Evaluate joining the National Flood Insurance Program	X			N

Action Title	Complete	Ongoing	Not Yet Started	In 2026 Update*
Action 8. Erosion repair		X		Y
Action 9. Implement stormwater master plans		X		Y
Action 10. Undergrounding of stormwater system – Downtown area		X		N
City of Madera Actions				
All Hazard Mitigation Actions				
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan		X		Y
Action 2. Installation of variable frequency drives onto wells to increase capacity			X	N
Action 3. Install backup motors for wells with an emphasis on critical facilities. Provide backup generators for wells.			X	N
Action 4. Install Variable Frequency Drives (VFD) on Existing City Wells to Increase Capacity			X	N
Action 5. Provide Backup Generators for City Wells		X		N
Action 6. Implement Improvements Recommended in the Storm Drainage System Master Plan		X		Y
Action 7. 4th Street Flooding Improvements Installed in accordance with that recommended in the Storm Drainage System Master Plan		X		N
Action 8. Conduct New Studies/Modeling and Mapping of the Fresno River within the City's Growth Boundary			X	Y

* Actions not carried forward were determined by the jurisdictions to be no longer feasible, relevant, lacked funding and local resources to implement, and/or no longer considered a priority.

Chapter 3 Planning Process

44 CFR §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:
1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
2) 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
3) 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.

Madera County, as the project lead, and the other two participating jurisdictions to this 2026 Madera County LHMP Update, recognized the need for and importance of the update process for their 2018 LHMP and initiated its development. After securing FEMA funding for this LHMP Update, Madera County contracted with Foster Morrison Consulting, Ltd. (Foster Morrison) to facilitate and develop the Plan. Jeanine Foster, a professional planner with Foster Morrison, was the project manager in charge of overseeing the planning process and the development of this LHMP Update. Chris Morrison, also a professional planner with Foster Morrison, was the lead planner for the development of this LHMP Update. The Foster Morrison's team's role was to:

- Assist in establishing the Hazard Mitigation Planning Committee (HMPC) as defined by the Disaster Mitigation Act (DMA);
- Meet the DMA requirements as established by federal regulations and following FEMA's planning guidance;
- Support objectives under the National Flood Insurance Program (NFIP) and the Flood Mitigation Assistance (FMA) program;
- Facilitate the entire planning process;
- Identify the data requirements that HMPC participants could provide and conduct the research and documentation necessary to augment that data;
- Assist in facilitating the public input process;
- Produce the draft and final plan documents; and
- Coordinate with the California Office of Emergency Services (Cal OES) and FEMA Region IX Plan reviews.

3.1 Local Government Participation

Madera County and the other participating jurisdictions made a commitment to this 2026 Madera County Multi-Jurisdictional LHMP Update. The DMA planning regulations and guidance stress that each local

government (participating jurisdiction) 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 where within the Madera County Planning Area the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the Plan.

For all participating jurisdictions, "participation" meant the following:

- Attending and participating in the HMPC meetings;
- Completing and returning the Data Collection Worksheets;
- Collecting and providing other requested data (as available);
- Coordinating information sharing between internal and external agencies;
- Managing administrative details;
- Making decisions on LHMP process and content;
- Discussing their participation in the NFIP and any identified repetitive loss properties;
- Addressing changes in development since the 2018 LHMP and new development considerations;
- Providing status of 2018 actions and identifying mitigation actions for the Plan;
- Identifying opportunities for integrating the completed Plan into other planning mechanisms;
- Identifying jurisdictional capabilities to support mitigation strategy implementation;
- Making decisions on LHMP process and content;
- Identifying mitigation actions for the Plan;
- Reviewing and providing comments on Plan drafts;
- Providing Draft documents of the LHMP for public review;
- Informing the public, local officials, and other interested stakeholders about the planning process and providing opportunity for them to comment on the draft Plan; and
- Coordinating the formal adoption of the Plan by the governing boards for each jurisdiction.

The participating jurisdictions seeking FEMA approval of this LHMP Update met all of these participation requirements. Multiple representatives from participating jurisdictions attended the HMPC meetings described in Table 3-3 and also brought together an internal planning team to help collect data, identify mitigation actions and implementation strategies, and review and provide data on Plan drafts. Appendix A provides additional information and documentation of the planning process.

Individuals representing various departments and other representatives from the participating jurisdictions to this Madera County LHMP Update were actively involved throughout the Plan Update process as identified in Appendix A in the sign-in sheets for the meetings and as evident through the data, information and input provided by HMPC representatives for the development of this LHMP Update. This Chapter 3 and Appendix A provide additional information and documentation of the planning process and participants to this LHMP Update, including members of the HMPC.

3.2 The 10-Step Planning Process

Foster Morrison established the planning process for updating Madera County LHMP using the DMA planning requirements and FEMA's associated guidance. Specifically, the LHMP was developed pursuant to the requirements of DMA 2000, published at 44 CFR 201.6 and new FEMA LHMP guidance, LHMP

Policy Guide FP 206-21-0002 effective April 11, 2025, as well as applicable California laws and mitigation requirements. This guidance is structured around a four-phase process:

1. Organize Resources;
2. Assess Risks;
3. Develop the Mitigation Plan; and
4. Implement the Plan and Monitor Progress.

Into this process, Foster Morrison integrated a more detailed 10-step planning process used for FEMA's CRS and FMA programs. The modified 10-step process used for this Plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program (HMGP); Pre-Disaster Mitigation (PDM) program; CRS program; FMA Program; Severe Repetitive Loss (SRL) program; and new flood control projects authorized by the U.S. Army Corps of Engineers (USACE).

Table 3-1 shows how the modified 10-step process fits into FEMA's four-phase process. The sections that follow describe each planning step in more detail.

Table 3-1 Mitigation Planning Processes Used to Develop the 2026 Madera County Local Hazard Mitigation Plan Update

DMA Process	Modified CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	
201.6(c)(2)(i)	4) Identify the Hazards
201.6(c)(2)(ii)	5) Assess the Risks
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	6) Set Goals
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

As part of this LHMP Update, all sections of the 2018 LHMP were reviewed and updated to reflect new data, processes, and resulting mitigation strategies. Only the information and data still valid from the 2018 LHMP were carried forward as applicable into this 2026 LHMP Update.

3.2.1. Phase 1: Organize Resources

Planning Step 1: Organize the Planning Effort

With each participating jurisdiction's commitment to participate in the DMA planning process, Foster Morrison worked with Madera County's Sheriff's Office, Office of Emergency Services (County OES), as overall project lead, to establish the framework and organization for development of this LHMP. An initial meeting was held with County OES to discuss the organizational and process aspects of this 2026 LHMP Update.

The initial project kick-off meeting was held on April 22, 2025. Invitations to the kickoff meeting were extended to key county and city departments and special districts, as well as to other federal, state, and local stakeholders, including representatives from the public, which might have an interest in participating in the planning process. Representatives from the HMPC members to the 2018 LHMP and other identified stakeholders were used as a starting point for the invite list, with additional invitations extended as appropriate throughout the planning process. The list of invitees is included in Appendix A.

Hazard Mitigation Planning Committee

The HMPC was established as a result of these initial meetings, as well as through interest generated through the initial public meeting and outreach conducted for this project as detailed later in this chapter. The HMPC, comprised of county, city, special district, and other government and stakeholder representatives and the public, developed the Plan with leadership from County OES and facilitation by Foster Morrison. This list includes all HMPC members that were active participants in the Plan development process as evidenced through their attendance at one or more HMPC meetings, as well as those who provided key input into the Plan development process. The following individuals participated on the HMPC:

Table 3-2 Madera County Hazard Mitigation Planning Committee

Name	Agency
Internal Stakeholders	
Amalia Hernandez	Public Health
Amy Toler	Animal Services, Director
Annette Kephart	CED
Ashley Monk	Madera County - Social Services
Brooke Bergman	DA, Supervising DA
Chenecua Dixion	Human Resources
Chris Childers	Probation, Chief
Darin McMechan	Sheriff, Undersheriff
Dexter Marr	CED, Environmental Health, Deputy Director
Dominic Tyburski	Public Works, Director
Elfego Franco	BLTS

Name	Agency
Geraldine Lakey	Madera County - Road Department
Candelario Salas	Probation, Supervising Deputy Probation Officer
Helen Diaz	DA
Jamie Bax	CED, Deputy Director
Jared Carter	Public Works, Deputy Director
Jason Yang	Madera County - IT
Jay Varney	County Administration, Chief Administrative Officer
Jeanne Habben	Water and Natural Resources, Director Deputy Director
Jennipher Garcia	Madera County - Tax Collector/Treasurer
Joseph Wilder	Madera County Sheriff's OES
Karen Scrivner	Board of Supervisor's Office, Chief Clerk of the Board
Matt Treber	CED, Chief of Development Services
Melisa DeSilva	Board of Supervisor's Office, District 5 Chief of Staff
Monty Cos	Public Transit
Regina Garza	Madera County - County Council
Raeanne Jain	Department of Social Services
Rusty Lantsberger	Ag Commissioner
Ryan Videgain	MSO
Sandi Edwards	Human Resources
Shane Gray	Animal Services
Simon Paul	Department of Public Health, Public Health Officer
Stephanie Anagnoson	Water and Natural Resources, Director
Terrance Carter	Department of Public Health, Program Manager
Tyson Pogue	Sheriff, Elected
Victoria Cantu	Madera County - Auditor-Controller
Yvette Gomez	County Administration, Executive Assistant to CAO
Gloria Garcia	Probation, Supervising Deputy Probation Officer
External Stakeholders	
Justin Macomb	CAL-FIRE/Madera County Fire
Andrew Overbay	CAL-FIRE/Madera County Fire
Dan Mccarroll	CAL-FIRE
Larrry Pendarvis	Madera City/County Fire
B.J. Jones	CAL-OES Law Branch
Ryan Essepian	CAL-OES, ESC
Patti Orozco	Cal OES
Annette Rogers	Central Valley Regional Center

Name	Agency
Tamara Salem	Central Valley Regional Center
Fred Gaumnitz	Chowchilla Fire - Chief
Rod Pruett	City of Chowchilla
Joann McClendon	City of Chowchilla
Christian Soares	City of Chowchilla
Jason Rogers	City of Chowchilla
Denise Munoz	City of Chowchilla
Jeff Palmer	Chowchilla Police
Wendy Silva	City of Madera HR Director
Will Tackett	City of Madera
Alicia Videgain	City of Madera MPD
Eric Battles	City of Madera Admin Analyst
Joe	City of Madera
Javier Valdez	City of Madera
Arnoldo Rodriguez	City of Madera
Gary Price	City of Madera IT
Keith Helmuth	City of Madera Engineering
Ellen Bitter	City of Madera
Rafael Magallan	City of Madera Building Department
Jamie Hickman	City of Madera
John Botwright	City of Madera Public Works
Adam Romo	City of Madera Parks
Cole Scroaains	City of Madera
H Gandhi	City of Madera Public Works
Whitney Lecat	Coarsegold Resource Conservation District
Kyle Gaede	Coarsegold Resource Conservation District
Mattie Mendez	Community Action Partnership of Madera County
Ashley Nebeker	Eastern Madera County Fire Safe Council
Kevin Kirk	Eastern Madera County Fire Safe Council
Kevin Hatch	Golden Valley Unified School District
Carrie Richardson	Hensley Lake, US Army Corps
Doug Plitt	Hensley Lake, US Army Corps
Kim Linderhome	Madera County Superintendent of Schools
Gino Chiaramonte	Madera Police
Felix Castro	National Weather Service - Hanford
Lanie Suderman	Visit Yosemite-Madera County
Dave Ficklin	SAR/ Public

Name	Agency
Laura Unti	SAR/ Public

Utilizing a Common Planning Process

The County and all participating jurisdictions developed this LHMP Update utilizing a common Plan development process utilizing the "whole community" approach. This included establishing an HMPC that included key stakeholders for all jurisdictions ensuring that the five required categories of stakeholders, specific to each jurisdiction, were identified and included. Utilizing a common planning process involving all jurisdictional stakeholders promoted better stakeholder participation for all jurisdictions. This approach respected the time and availability of stakeholders, while maximizing participation of a common group of jurisdictional stakeholders by not requiring them to come to duplicate (or really 3 separate meetings) on the same Plan development element(s), which for this Plan would have resulted in 15 separate meetings to cover the 5 primary HMPC topics and meetings. It also spurred conversations between jurisdictions, as well as their public stakeholders, who were invited to come to these meetings. Additional considerations and benefits for utilizing a common planning process for the development of the LHMP Update include:

- The rural nature of Madera County and the two cities was best suited for a common plan development process.
- Common group of stakeholders to all participating jurisdictions necessitated a common plan development process.
- Several of the jurisdictions have shared or overlapping boundaries and economic ties, often work under the same authorities, and have similar needs and capabilities.
- A common plan development process brings key stakeholders together in the same meetings instead of siloing them to specific jurisdictional meetings. This adds value by getting different groups discussing key issues collectively with different experiences and perspectives to bring to the table.
- Improves stakeholder communication and coordination by increasing stakeholder attendance in support of all jurisdictions and not diluting their participation by requiring attendance at multiple, duplicate meetings that they won't be able to attend.
- Key public stakeholders invited to be part of the HMPC were better able to attend a limited set of meetings.
- All participating jurisdictions face similar threats and hazards which drive the resulting mitigation strategy that benefits the Madera County Planning Area as a whole by promoting a comprehensive and regional approach to mitigation.

Additionally, Madera County, as the project lead, has been developing successful multi-jurisdictional LHMPs and LHMP Updates for over 15 years. Utilizing this common planning process resulted in multiple entities being engaged and in the room at the same time. All of this is shown in detail throughout this chapter and in Appendix A.

Meetings

The planning process officially began with a kick-off meeting of the HMPC held on April 22, 2025, followed by a public kick-off meeting held the same day at 5:30 pm. The meetings covered the scope of work and an introduction to the DMA requirements. During the HMPC meetings, participants were provided with data collection worksheets to facilitate the collection of information necessary to support

development of the Plan. Using FEMA guidance, these worksheets were designed to capture information on past hazard events, identify hazards of concern to each of the participating jurisdictions, identify values at risk to identified hazards, inventory existing capabilities, record possible mitigation actions, and to capture information on the status of mitigation action items from the 2018 LHMP. A copy of the worksheets for this project are included in Appendix A. Each participating jurisdiction seeking FEMA approval of this LHMP Update completed and returned the worksheets to Foster Morrison for incorporation into this 2026 LHMP Update.

During the planning process, the HMPC communicated through virtual Team and Zoom meetings, email, telephone conversations, Dropbox websites, and through a County developed webpage dedicated to the Plan development process. This later website was developed to provide information to the HMPC, the public and all other stakeholders on the LHMP process. Draft documents were also posted on these websites so that the HMPC members, stakeholders, and the public could easily access and review them.

The Madera County LHMP website (as shown on Figure 3-1) can be accessed online at: https://www.maderacounty.com/government/sheriff/office-of-emergency-services/lhmp-2026-1718.

Figure 3-1 Madera County Local Hazard Mitigation Plan Update Website

Source: Madera County

The HMPC met formally five times during the planning period (December 2024 – March 2026) which adequately covers the four phases of DMA and the 10-Step CRS planning process. Internal jurisdictional meetings were held throughout the planning process to further support Plan development. The key meetings and topics discussed are described in Table 3-3. Invitations, agendas and sign-in sheets for each of the meetings are included in Appendix A.

Table 3-3 Madera County Internal and HMPC Meetings

Meeting Type	Meeting Topic	Meeting Date	Meeting Location(s)
Madera County Internal Kickoff Meeting	1) Overview of LHMP plan development process 2) Initial identification of participating jurisdictions and HMPC members 3) Discussion of GIS and other data needs	March 11, 2025	Virtual Zoom Meeting
HMPC #1 Kick-off Meeting	1) Introduction to DMA and the planning process 2) Overview of current LHMP; 3) Organize Resources (CRS Steps 1,2&3): the role of the Planning Committee, planning for public involvement, coordinating with other agencies/stakeholders 4) Introduction to Hazard Identification	April 22, 2025	Madera County Sheriff's Office, Emergency Operations Center, Madera, CA
HMPC #2 Risk Assessment Meeting	1) Risk assessment overview and work session -CRS Step 4: Assess the Hazard -CRS Step 5: Assess the Problem	July 9, 2025	Madera County Sheriff's Office, Emergency Operations Center, Madera, CA
HMPC #3 Mitigation Strategy Meeting: Goals	1) Review of risk assessment summary 2) Review and update of mitigation goals 3) Intro to Mitigation Action Strategy -CRS Step 6: Set Goals -CRS Step 7: Review possible activities	September 24, 2025	Madera County Sheriff's Office, Emergency Operations Center, Madera, CA
HMPC #4 Mitigation Strategy Meeting: Actions and Projects	1) Review of mitigation alternatives 2) Review and update of mitigation actions from the 2018 LHMP 3) Identify updated list of mitigation actions by hazard 4) Review of mitigation selection criteria 5) Update and prioritize mitigation actions 6) Mitigation Action Strategy Implementation and Draft Action Development -CRS Step 7: Review possible activities -CRS Step 8: Draft an Action Plan	September 25, 2025	Madera County Sheriff's Office, Emergency Operations Center, Madera, CA
HMPC #5 Final Meeting on Draft LHMP	1) Review of final HMPC, jurisdictional and public comments and input to Plan 2) Review and documentation of changed conditions, vulnerabilities, and mitigation priorities 3) CRS Step 8: Draft an Action Plan 4) CRS Step 9 & 10: Plan Maintenance and Implementation Procedures	February 19, 2026	Madera County Sheriff's Office, Emergency Operations Center, Madera, CA

Planning Step 2: Involve the Public

Public stakeholders for all participating jurisdictions are generally defined as any stakeholder not attached to local government in the Madera County Planning Area. Up-front coordination discussions with Madera County established the initial plan for public involvement. Public involvement activities for this LHMP Update included press releases, social media communications, stakeholder and public meetings, development of an LHMP webpage and associated website postings, and the collection of public and

stakeholder comments on the draft Plan through a variety of mechanisms. This included other public outreach activities as further described below and targeted outreach to different groups of people and other agencies throughout the Plan development process. At the internal kick-off meeting, the HMPC discussed additional strategies for public involvement and agreed to an approach using established public information mechanisms and resources within the County.

Early Public Outreach Activities

Public outreach for this LHMP Update began at the beginning of the Plan development process with the development of a 2026 LHMP Update webpage and outreach on the LHMP development process and continued throughout the process at key plan development phases through a variety of mechanisms as described below. The purpose of this outreach was to inform the public and other stakeholders of the Madera County LHMP Update project and how they could get involved. The outreach also invited the public stakeholders to the HMPC meetings for the project. Information on these outreach efforts can be seen in Appendix A to this LHMP.

Project Kickoff Outreach

- Development of a Madera County 2026 LHMP Update webpage
- Development of City of Chowchilla and City of Madera LHMP Update webpages
- Issuance of a Press Release announcing the project kickoff and HMPC and Public Kickoff Meetings
- Madera County Sheriff's Office Facebook page postings on April 22 announcing LHMP kickoff and public meetings
- City of Madera Facebook post on LHMP kickoff and project meetings
- Development and posting of an LHMP Public Information Flyer around the community.

Public Meetings

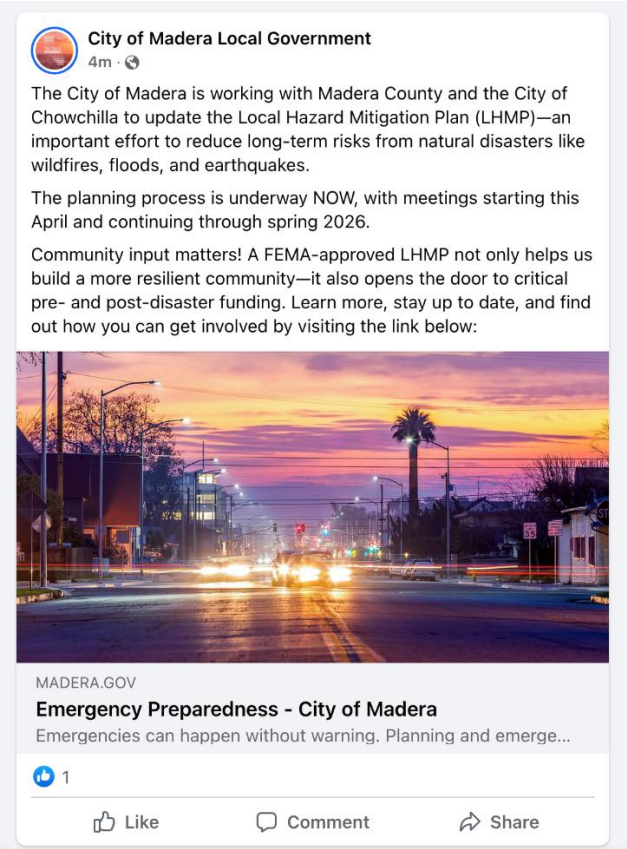
A total of seven public meetings were conducted as part of the LHMP Update, during key times of the LHMP development process. Three in-person public meetings were held and included a public kickoff meeting, a public risk assessment meeting, and a public meeting on the Draft Plan, prior to submittal to Cal OES and FEMA for review and approval. In addition, four virtual public meetings were held on the Draft Plan to provide additional opportunities for public input and comments on the Draft Plan. The seven public meetings held for this project are detailed below.

In-Person Public Meetings

Public Meeting #1: LHMP Kickoff

Public outreach for this LHMP Update began at the beginning of the Plan development process with the early public outreach activities, as described above, to inform the public of the purpose of the DMA and the hazard mitigation planning process for Madera County and all participating jurisdictions. A press release was also issued at the beginning of the project to invite the public to attend either the public meeting or HMPC meetings. Figure 3-2 captures the City of Madera's Facebook page April 2025, post.

Figure 3-2 City of Madera Facebook Page from April 2025



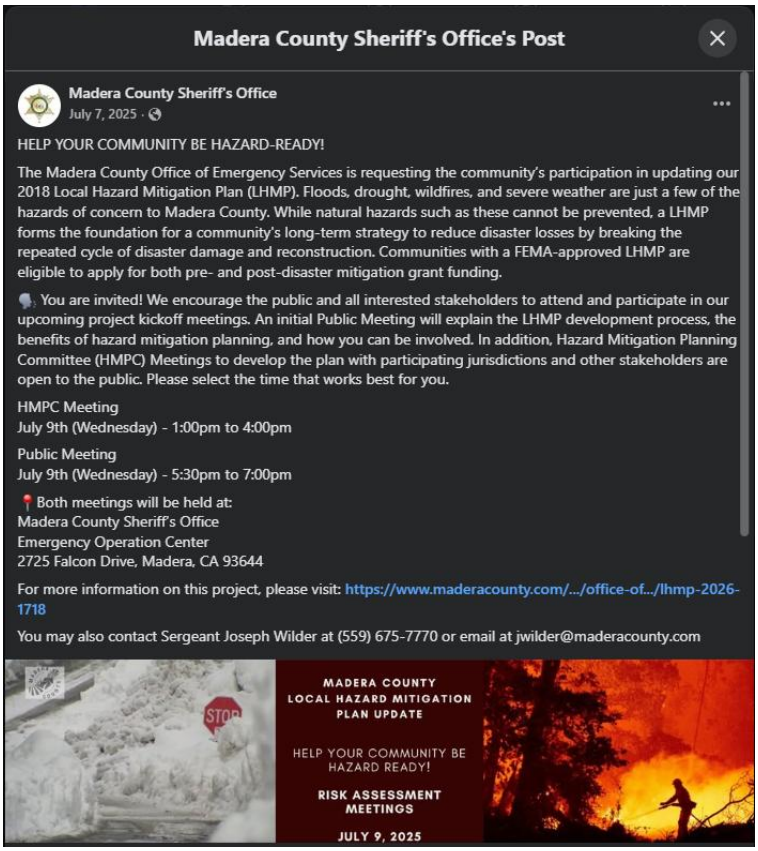
Source: City of Madera

Public Meeting #2: Hazard Risk Assessment

A second public meeting was held to provide an overview of the hazard risk assessment portion of the LHMP Update. This meeting was held in Madera County the evening of the HMPC risk assessment meeting. This meeting was advertised through the Madera County website and through other public outreach efforts mechanisms as detailed below.

- Issuance of a Press Release inviting community members to the Risk Assessment meetings
- Madera County Sheriff's Office Facebook page posting, July 7, announcing HMPC and public meetings

Figure 3-3 Madera County Facebook Post from July 7, 2025



Source: Madera County Sheriff's Office

Public Meeting #3: On the Draft LHMP

The first draft of the LHMP Update was provided to the HMPC in November 2025, with a public review draft provided in January 2026. A public meeting was held on the evening of February 18, 2026, to present the draft LHMP and to collect public comments on the public review draft prior to finalization and submittal to Cal OES/FEMA. The public meeting was advertised in a variety of ways to maximize outreach efforts to both targeted groups and to the public at large and included advertisements in two local newspapers inviting the public to attend either the formal public meetings or the HMPC meeting at their convenience. The advertisement in the local newspaper included information on the date, location, and time of the meeting; where the draft Plan could be accessed in the community; and how to provide comments on the draft LHMP Update. In addition to a copy of the public review draft being placed on the Madera County LHMP website in advance of these meetings, hard copies of the draft Plan was made available throughout Madera County in five Madera County libraries: Madera, Chowchilla Branch, Madera Ranchos Branch, North Fork Branch, and Oakhurst Branch. Documentation to support the final public meeting, including meeting outreach, can be found in Appendix A.

In addition to the advertisement for public participation, notices of meetings were sent directly to all persons on the HMPC contact list and also to other agency and key stakeholders (including the public) with an interest in the Madera County Planning Area. The majority of these people reside in the Madera County Planning Area or in surrounding communities. Because this is a multi-jurisdictional planning effort, all

public outreach activities for this LHMP Update were conducted in cooperation with and on behalf of the Madera County and the two participating jurisdictions to this 2026 LHMP Update. Additional outreach for review of the Draft LHMP and final meetings included:

- Issuing of a Press Release on the Final Meetings and how to provide comments on the Draft LHMP
- Development of an updated LHMP Flyer on the Draft Plan Final Process
- Madera County Sheriff's Office Facebook page postings on February 10 inviting participation in the final meetings and providing comments on the Draft LHMP
- An advertisement/public notice in two local Newspapers, the Madera Tribune and the Mariposa Gazette, announcing the final HMPC and Public meetings and how to provide comments on the Draft LHMP

Figure 3-4 Public Meeting #3 Invitation on the Draft Plan In Mariposa Gazette

Mariposa Gazette • Thursday, February 19, 2026 www.mariposagazette.com Page EMC3

MCSO's OHV grant request will be available for review from March 3 – May 4.

OHV grant application being sought by MCSO

The Madera County Sheriff's Office (MCSO) said it is preparing to submit the department's annual Off-Highway Vehicle (OHV) grant request.

The application will be available for a 60-day review by the public beginning March 3 and ending May 4.

MCSO said its OHV unit serves as a deterrent to illegal off-highway riding, providing extensive off-highway and on-road law enforcement throughout the county.

The unit enforces laws pertaining to off-highway vehicle operations, illegal shooting, stolen vehicles/OHVs and area searches and patrol checks at parks and other recreational areas.

The MCSO OHV unit is outfitted with specialized vehicles and equipment to respond to medical emergencies in remote and rugged terrain. The OHV unit will assist the department's Search and Rescue unit when requested.

The OHV unit additionally provides personnel and equipment to schools, county fairs and civic groups and frequently hosts public meetings and off-road events to address current state and local laws governing off-road vehicle riding.

Those who wish to participate in the Grant Request Public Review and Comment may do so by either contacting denice.mosier@maderacounty.com or logging onto the Park Service website at https://ohv.parks.ca.gov/

This information release is a requirement of the OHV Grant Application process for 2026.

OES agency seeking public's participation

The Madera County Office of Emergency Services is requesting the community's participation in updating its 2018 Local Hazard Mitigation Plan (LHMP).

Sheriff Tyson Pogue is the Director of Emergency Services pursuant to the Madera County Code.

Floods, drought, wildfires and severe weather are just a few of the hazards of concern to Madera County, said officials.

While natural hazards such as these cannot be prevented, a LHMP forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction.

Communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding.

The process began in March 2025 with the establishment of a Hazard Mitigation Planning Committee (HMPC) comprising county, city and jurisdictional staff as well as key agency and public stakeholders.

The LHMP Update is scheduled to be finalized and submitted to Cal OES and FEMA in March 2026.

You are invited

The public including all interested stakeholders are encouraged to attend and participate in the final public and planning committee meetings to review and provide comments on the Public Review Draft LHMP.

A public meeting will be held on Wednesday, Feb.18 from 5:30 – 7 p.m.

A Hazard Mitigation Planning Committee (HMPC) meeting will be held on Thursday, Feb.19, from 9 a.m. to noon.

Both meetings will be held at the Madera County Sheriff's Office Emergency Operations Center located at 2725 Falcon Drive in Madera.

For more information on this project visit www.maderacounty.com/government/sheriff/office-of-emergency-services or contact Sergeant Joseph Wilder at (559) 675-7770 or via email at jwilder@maderacounty.com.

Printed reference copies of the full draft are available for review at the Madera County libraries.

- Oakhurst Branch Library — 49044 Civic Circle Drive in Oakhurst. (559) 683-4838
- North Fork Branch Library — 32908 Road 222 in North Fork (559) 877-2387
- Madera — 121 N. G Street in Madera. (559) 675-7871
- Chowchilla Branch Library — 300 Kings Avenue in Chowchilla. (559) 665-2630
- Madera Ranchos Branch Library — 37398 Berkshire Drive in Madera. (559) 645-1214

Source: Mariposa Gazette 2/18/2026

Virtual Public Meetings: On the Draft LHMP

Four virtual public meetings were held on the Draft Plan to provide additional opportunities for all public and private stakeholders to provide input and comments prior to finalization of the LHMP Update. Outreach for these virtual meetings included:

- Madera County Sheriff's Office Facebook post announcing the public comment period has been extended to March 27 and inviting the public to participate in any of the four virtual meetings and how to provide comments on the Draft LHMP
- City of Madera Facebook post announcing the public comment period has been extended to March 27 and inviting the public to participate in any of the four virtual meetings and how to provide comments on the Draft LHMP

- A City of Madera article posted on their City website providing an overview of the project and inviting public comments and feedback on the Draft LHMP
- The Madera County LHMP webpage was updated to include information on the virtual meetings and extending the public comment period to March 27, 2026.

The formal in person and virtual public meetings for this project are summarized in Table 3-4.

Table 3-4 Schedule of Public and Stakeholder Meetings

Meeting Type	Meeting Topic	Meeting Date	Meeting Locations
Early Public Kickoff Meeting #1 (in-person)	1) Intro to DMA, CRS and mitigation planning 2) 2025 LHMP Update Process	April 22, 2025	Madera County Sheriff's Office, Emergency Operations Center, Madera, CA
Public Meeting #2 on the Risk Assessment (in-person)	1) Overview of in process risk assessment and solicitation of public and stakeholder input	July 9, 2025	Madera County Sheriff's Office, Emergency Operations Center, Madera, CA
Final Public Meeting #3 on the Draft LHMP (in-person)	1) Presentation of Draft LHMP and solicitation of public and stakeholder comments	February 18, 2026	Madera County Sheriff's Office, Emergency Operations Center, Madera, CA
Virtual Public Meeting #1	1) Overview of Draft LHMP and solicitation of public and stakeholder comments	March 12, 2026	Virtual Meeting
Virtual Public Meeting #2	1) Overview of Draft LHMP and solicitation of public and stakeholder comments	March 13, 2026	Virtual Meeting
Virtual Public Meeting #3	1) Overview of Draft LHMP and solicitation of public and stakeholder comments	March 17, 2026	Virtual Meeting
Virtual Public Meeting #4	1) Overview of Draft LHMP and solicitation of public and stakeholder comments	March 25, 2026	Virtual Meeting

Public Comments

Public and private stakeholders were invited to provide comments and input throughout the LHMP Update project as part of the public outreach efforts conducted for this project as previously described and as detailed in Appendix A.8. Although seven separate public meetings were held during key plan development timeframes, public meeting participation and comments were extremely limited. Specifically, no public comments were received as part of the 2026 LHMP Update project. It should also be noted that interested members of the public could also join the HMPC as part of the plan development process. For this LHMP Update, a couple of interested public members participated as part of the HMPC.

All press releases, newspaper advertisements and articles, website postings, and public outreach efforts are on file with County OES and are included in Appendix A. The draft Plan is currently available online on

the Madera County website at: https://www.maderacounty.com/government/sheriff/office-of-emergency-services/lhmp-2026-1718.

Planning Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and LHMP review and approval would be greatly enhanced by inviting other local, state and federal agencies and organizations to participate in the Plan development process. Based on their involvement in hazard mitigation planning, their landowner status in the Madera County Planning Area, and/or their interest as a neighboring or involved jurisdiction, representatives from the following agencies were invited to participate on the Planning Committee:

- Adult Day Health Care of Madera
- American Red Cross
- ARC Fresno
- Bass Lake Area Chamber of Commerce
- Bass Lake Joint Union Elementary School District
- CAL-FIRE/Madera County Fire
- CAL-FIRE
- Madera City/County Fire
- California American Water
- California Highway Patrol
- CAL-OES Law Branch
- CAL-OES, ESC
- Cal OES
- CAL-OES, Senior ESC
- CAL-TRANS
- Camarena Health
- Catholic Charities
- CCWF
- CDCR Fire
- Central Valley EMS Authority
- Central Valley Regional Center
- Chamber of Commerce
- Chawanakee Unified School District
- Chowchilla Elementary School District
- Chowchilla Fair
- Chowchilla Fire - Battalion Chief
- Chowchilla Fire - Chief
- City of Chowchilla
- Chowchilla Madera County Fair
- Chowchilla Memorial Healthcare District
- Chowchilla Police
- Chowchilla Skilled Nursing Facility
- Chowchilla Union High School
- Chowchilla Water District
- Chowchilla Union High School District
- Chukchansi Tribe
- City of Madera HR Director
- City of Madera

- City of Madera MPD
- City of Madera Admin Analyst
- City of Madera IT
- City of Madera Engineering
- City of Madera Building Department
- City of Madera Public Works
- City of Madera Parks
- City of Madera Public Works
- Coarsegold Area Chamber of Commerce
- Coarsegold Resource Conservation District
- Community Action Partnership Madera
- Cornerstone
- Cornerstone Church
- Davita Dialysis
- Deaf and Hard of Hearing Service Center
- Eastern Madera County Fire Safe Council
- Eastman Lake, US Army Corps
- Fairmead Community & Friends
- Family Worship Center
- Fresno County - OES
- Fresno County EMS Agency
- Fresno Madera Area Agency on Aging
- Golden Madera Care Center
- Golden Madera Home Care
- Golden Valley Unified School District
- Health Dept
- Hensley Lake, US Army Corps
- Hinds Hospice
- Jericho Care
- Kern County - Medical
- Kern County - OES
- Kings County - OES
- Lower San Joaquin Levee District
- Madera Ambulatory Endoscopy Center
- Madera Community College
- Madera Community Hospital
- Madera County Food Bank
- Madera County Mosquito & Vector Control District
- Madera County Superintendent of Schools
- Madera Irrigation District
- Madera Kidney Center
- Madera Ministerial Association
- Madera Police
- Madera Rehabilitation & Nursing Center
- Madera Unified School District
- Mariposa County - OES
- Merced County - OES
- Mono County - OES
- National Weather Service - Hanford
- North Fork Area Chamber of Commerce
- North Fork Rancheria of Mono Indians

- Oakhurst Area Chamber of Commerce
- Oakhurst Community College
- Oakhurst Healthcare
- Our House Residential Care
- Pacific Gas and Electric Company
- Palms Care Center
- Pistoresi Ambulance
- San Joaquin Valley Air Pollution Control District
- Sierra Ambulance
- Sierra Telephone
- Southern California Edison
- TFGTC
- The Golden Years Care Home
- United Way Fresno and Madera Counties
- US Bureau of Reclamation, Friant Dam
- USFS, District Ranger
- USFS, Forest Engineer
- USFS, Patrol Captain
- USFS, Sierra NF PIO
- Valley Caregiver Resource Center
- Valley Children's Hospital
- Valley State Prison
- Visit Yosemite-Madera County
- Yosemite Unified School District
- Coarsegold Resource Conservation District
- Merced County - OES
- Madera County Superintendent of Schools
- Yosemite Sequoia Resource Conservation and Development Council (YSRC&DC)

In addition, coordination with other key agencies, organizations, and advisory groups occurred throughout the planning process as needed to inform them on how to participate in the LHMP Update process and if they had any expertise or assistance, they could lend to the LHMP Update, including information on hazards, risks and vulnerability of the Madera County Planning Area, and any input on possible risk reduction measures. As part of the overall stakeholder and agency coordination effort, the HMPC coordinated with and utilized input to the LHMP Update from the following agencies:

- Cal-Adapt
- Cal Atlas
- CAL DWR
- Cal OES
- CAL FIRE
- Cal Trans
- California Department of Conservation
- California Department of Finance
- California Department of Fish and Wildlife
- California Department of Food and Agriculture
- California Department of Parks and Recreation
- California Department of Water Resources
- California Division of Mines and Geology
- California Employment Development Department

- California Geological Survey
- California Invasive Plant Council
- California Natural Resources Agency
- FEMA Region IX
- Library of Congress
- National Drought Mitigation Center
- National Levee Database
- National Inventory of Dams
- National Oceanic and Atmospheric Association
- National Performance of Dams Program
- National Register of Historic Places
- National Resource Conservation Service
- National Response Center
- National Weather Service
- Pacific Gas & Electric
- Public Policy Institute of California
- United States Army Corps of Engineers
- United States Bureau of Land Management
- United States Bureau of Reclamation
- United States Center for Disease Control
- United States Department of Agriculture
- US Department of Transportation
- United States Forest Service
- United States Geological Survey
- Western Regional Climate Center

Several opportunities were provided for the groups listed above to participate in the planning process. At the beginning of the planning process, invitations were extended to many of these groups to actively participate on the HMPC. Specific participants from these groups are detailed in Appendix A. Others assisted in the process by providing data directly as requested in the Data Worksheets or through data contained on their websites or as maintained by their offices. Further as part of the public outreach process, all groups were invited to attend the public and HMPC meetings and to review and comment on the draft LHMP prior to submittal to CAL OES and FEMA.

Other Community Planning Efforts and Hazard Mitigation Activities

Coordination with other community planning efforts is also paramount to the success of this LHMP Update. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. Madera County and the participating jurisdictions to this Plan use a variety of comprehensive planning mechanisms, such as general plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this LHMP Update establishes a credible and comprehensive Plan that ties into and supports other community programs. The development of this LHMP Update incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions. This gives a general overall list of plans, studies, and reports. More can be found in Appendix B to this Plan Update.

- 2023 State of California Hazard Mitigation Plan

- CAL FIRE Plans and data
- CAL OES plans and data
- Cal-Adapt reports and data
- California Department of Finance demographic documents
- California Department of Public Health
- California Department of Water Resources plans and information
- California DWR Division of Safety of Dams plans and information
- California Geological Survey Plans
- Capital Improvement Plans for each jurisdiction
- Climate Adaptation Plans
- Climate Change and Health Profile Report – Amador County
- CWPPs
- Dam Emergency Action Plans
- Emergency Operations Plans
- Evacuation Plans
- FEMA mitigation planning documents
- Flood Insurance Studies
- General Plans for each of the jurisdictions
- General Plan Background Reports
- Housing Elements for each of the jurisdictions
- National Weather Service documents
- Stormwater Master Plans
- US Department of Agriculture Reports
- US Department of Interior Plans
- US Fish and Wildlife reports
- USDA reports
- USGS Reports

Specific source documents are referenced at the beginning of each section of Chapter 4 and in Appendix B. These and other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment. Data from these plans and documents were incorporated into the hazard risk assessment sections of the LHMP. Where data and information from the existing studies and reports is used in this LHMP Update, the source document is referenced throughout this Plan. The information was also used to identify potential hazard mitigation strategies for inclusion in this LHMP Update and in assessing the capabilities of the participating jurisdictions in implementing the resulting mitigation strategy. Appendix B, References, provides a detailed list of references used in the preparation of this LHMP Update.

Coordination with Underserved Communities and Socially Vulnerable Populations

As detailed in FEMA's new 2025 LHMP Guidance, the LHMP development process should utilize the Whole Community approach to hazard mitigation planning. New 2025 FEMA guidance defines planning for the "Whole Community" as a focus on enabling the participation in national preparedness activities of a wider range of players from the private and nonprofit sectors, including nongovernmental organizations and the general public, in conjunction with the participation of all levels of government in order to foster better coordination and working relationships.

In consideration of these new FEMA requirements as well as applicable California state laws and LHMP requirements, the plan development process focused on key sectors of public and private entities that would enhance hazard mitigation planning for Madera County. Thus, engagement and coordination with a variety of community-based organizations that work directly with or provide support to underserved communities and socially vulnerable populations was a critical component to Madera County in addressing equity in mitigation planning and implementation.

For this LHMP project, significant efforts were made to identify and engage appropriate community members and groups to support the Plan development process. In Madera County, vulnerable populations groups primarily include seniors, children, low income, homeless populations, people with disabilities, those with lack of or limited mobility, and those with limited access to public transportation services in the more rural areas for evacuations and other hazard response needs. In addition, due to the agricultural industry in the County, there is also a large segment of the population that is Spanish speaking only, which can create challenges during hazard events.

In Madera County much of the support for these groups fell to applicable local government agencies, primarily the County, as well as supporting external agencies. As part of the planning process, efforts made to identify and engage these groups in the Madera County 2026 LHMP Update project included those internal and external stakeholders listed below. Staff and representatives from these groups were invited to be on the HMPC and to provide input into the Plan development process. Those participating in the process are included in the HMPC list included here in Chapter 3 and in Appendix A Planning Process.

- **Madera Local Government Departments**
  - ✓ Social Services
  - ✓ Public Health
  - ✓ Behavioral Health
  - ✓ Environmental Health
  - ✓ Health Department
- **Madera County Area Hospitals and Health Care**
  - ✓ Madera Community Hospital
  - ✓ Valley Children's Hospital
  - ✓ Chowchilla Memorial Healthcare District
  - ✓ Chowchilla Skilled Nursing Facility
  - ✓ Oakhurst Healthcare
  - ✓ Camerena Health
  - ✓ Adult Day Health Care of Madera
  - ✓ Kern County Medical
  - ✓ Hinds Hospice
  - ✓ Davita Dialysis
  - ✓ Madera Kidney Center
  - ✓ Madera Ambulatory Endoscopy Center
  - ✓ Madera Rehabilitation and Nursing Center
- **Madera County Area EMS/Ambulance Services**
  - ✓ Pistoresi Ambulance
  - ✓ Central Valley EMS Authority

- ✓ Fresno County EMS Agency
- ✓ Sierra Ambulance

- **Madera County Area External Agencies and Nonprofits**
  - ✓ American Red Cross
  - ✓ ARC Fresno
  - ✓ Catholic Charities
  - ✓ Family Worship Center
  - ✓ Fairmead Community and Friends
  - ✓ Central Valley Regional Center
  - ✓ Community Action Partnerships of Madera
  - ✓ Cornerstone Church
  - ✓ Deaf and Hard of Hearing Service Center
  - ✓ Fresno Madera Area Agency on Aging
  - ✓ Golden Madera Home Care
  - ✓ Madera County Food Bank
  - ✓ Madera Ministerial Association
  - ✓ Jericho Care
  - ✓ Community Action Partnership of Madera County
  - ✓ United Way Fresno and Madera counties
- **Madera County Area Housing and Care Facilities**
  - ✓ The Golden Years Care Home
  - ✓ Golden Madera Care Center
  - ✓ Palms Care Center
  - ✓ Our House Residential Care
  - ✓ Valley Caregiver Resource Center
  - ✓ Valley State Prison
- **Madera County Area Schools and Education Centers**
  - ✓ Madera County Superintendent of Schools
  - ✓ Bass Lake Joint Union Elementary School District
  - ✓ Chawanakee Unified School District
  - ✓ Chowchilla Union High School District
  - ✓ Golden Valley Unified School District
  - ✓ Madera Community College
  - ✓ Yosemite Unified School District

3.2.2. Phase 2: Assess Risks

Planning Steps 4 and 5: Identify the Hazards and Assess the Risks

Foster Morrison led the HMPC in a research effort to identify, document, and profile all the hazards that have, or could have, an impact to the Madera County Planning Area. Starting with the 2018 LHMP, natural hazards of concern were added, deleted, and modified for this LHMP Update. Data collection worksheets were developed and used in this effort to aid in determining hazards and vulnerabilities and where the risk

varies across the Madera County Planning Area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities.

The HMPC also conducted a capability assessment to review and document Madera County's and each participating jurisdictions' current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing County and Cities' programs, policies, regulations, ordinances, and emergency plans, the HMPC could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process, methodologies, and results are included in Chapter 4 Risk Assessment.

NFIP Participation

Also addressed in the risk assessment and mitigation strategy of this 2026 LHMP is an assessment of the County and two Cities' floodplain management programs and participation in the NFIP, including a discussion of their continued compliance with NFIP requirements.

3.2.3. Phase 3: Develop the Mitigation Plan

Planning Steps 6 and 7: Set Goals and Review Possible Activities

Foster Morrison facilitated brainstorming and discussion sessions with the HMPC that described the purpose and process of developing planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Chapter 5 Mitigation Strategy. Additional documentation on the process the HMPC used to develop the goals and mitigation strategy is in Appendix C.

Planning Step 8: Draft an Action Plan

Based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, a complete first draft of the LHMP Update was developed. This complete draft was provided for HMPC review and comment via a Dropbox web link. HMPC comments were integrated into the second public review draft, which was advertised and distributed to collect public input and comments. The HMPC integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for CAL OES and FEMA Region IX to review and approve, contingent upon final adoption by governing boards of all participating jurisdictions.

3.2.4. Phase 4: Implement the Plan and Monitor Progress

Planning Step 9: Adopt the Plan

In order to secure buy-in and officially implement the LHMP Update, the Plan was adopted by the governing boards of each participating jurisdiction using the sample resolutions contained in Appendix D.

Planning Step 10: Implement, Evaluate, and Revise the Plan

The true worth of any mitigation plan is in the effectiveness of its implementation. Up to this point in the planning process, the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions and projects. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. An overall implementation strategy is described in Chapter 7 Plan Implementation and Maintenance.

Finally, there are numerous organizations within the Madera County Planning Area whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is paramount to the implementation and ongoing success of this plan and mitigation in the Madera County Planning Area and is addressed further in Chapter 7.

Implementation and Maintenance Process: 2018 Madera County LHMP

The previous 2018 LHMP included a process for Plan maintenance and implementation of the mitigation strategy as well as formal updates to the LHMP. The 2018 process called for annual reviews, including a review of the status of mitigation strategy implementation. In addition, the 2018 processes called for a formal plan update as required by DMA regulations every 5 years. With respect to the 2018 LHMP, the County followed its annual review process for emergency management plans. The LHMP is reviewed annually every February by OES staff to determine whether any changes to the LHMP are needed based on the activities and events of the previous year. Recommended updates are submitted to the Sheriff's Command Staff for review of any formal changes. In the last several years, there have been no recommended changes or updates. This 2026 LHMP Update, once approved and adopted, will meet the DMA formal 5-year update requirement for all participating jurisdictions.

In addition, the 2026 LHMP was relied on and integrated into other planning mechanisms in the Madera County Planning Area. Table 3-5 lists the planning mechanism the 2018 LHMP Update was integrated into by unincorporated Madera County. Specific to other participating jurisdictions, the jurisdictional annexes identify the planning mechanisms the 2018 LHMP were integrated into by each jurisdiction.

Table 3-5 Unincorporated Madera County Incorporation of 2018 Madera County LHMP into Other Planning Mechanisms

Planning Mechanism 2018 LHMP Was Incorporated or Implemented Through	Details
General Plan Safety Element	The LHMP, including hazard information, was used to update the 2024-2023 County Safety Element.
Emergency Operations Plan	The LHMP was used as a guiding document for the update of the County's 2024 EOP. Information utilized from the LHMP included hazard data, community vulnerability information, and mitigation actions and projects. Integration of key LHMP elements into the 2024 EOP also drove the creation of additional plans and supplementals to the EOP such as Emergency Communication Plan, Evacuation and Transportation plan, Recovery Plan, Care and Shelter Plan, Mass Fatality Plan and Donations Management Plan

Planning Mechanism 2018 LHMP Was Incorporated or Implemented Through	Details
Community Wildfire Protection Plan	The LHMP, including data from the wildfire risk assessment and resulting mitigation actions and projects, were used as a guiding document for the 2023 update to the Madera County Community Wildfire Protection Plan.

The plan implementation and maintenance process as set forth in the 2018 Plan has been updated for this LHMP Update. The revised update implementation and maintenance process for the Madera County 2026 LHMP Update is set forth in Section 7 of this Plan document. A strategy for continued public involvement for this update process is also included in Chapter 7.

Chapter 4 Risk Assessment

44 CFR 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 the Federal Emergency Management Agency (FEMA), risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and 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 community's potential risk to natural 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 FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002), which breaks the assessment down into a four-step process:

1. Identify Hazards;
2. Profile Hazards;
3. Inventory Assets; and
4. Estimate Losses.

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

- **Section 4.1 Hazard Identification** identifies the natural hazards that threaten the Madera County Planning Area and unincorporated Madera County and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Madera County Planning Area Assets Inventory and Growth and Development Trends** identifies the populations; structures and values; critical facilities and community lifelines; cultural, historical, and natural resources; and economic and community activities of value. It also identifies past growth in the Madera County Planning Area and reviews future development trends. This information is not hazard specific and covers the entire Madera County Planning Area and unincorporated Madera County.
- **Section 4.3 Hazard Profiles and Vulnerability Assessment** provides an overview of each hazard, its location and extent, and discusses the risk, vulnerability, and impacts of each natural hazard to the Madera County Planning Area and unincorporated Madera County. The hazard profile also describes previous occurrences of hazard events and the likelihood of future occurrences. The vulnerability assessment evaluates the Madera County's exposure to natural hazards considering: populations; structures and values; critical facilities and infrastructure; community lifelines; natural, historic, and

cultural resources; economic assets and community activities; and future development trends, and where possible, estimates potential hazard losses.

- **Section 4.4 Capability Assessment** inventories existing mitigation activities and policies, regulations, plans, and programs that pertain to hazards and mitigation in the Madera County Planning Area and unincorporated Madera County and can affect net vulnerability.
- **Section 4.5 Natural Hazard Summary** summarizes the results of the risk assessment and whether a hazard is considered a priority for mitigation strategy planning.

This risk assessment covers the entire geographical extent of Madera County (i.e., the Madera County Planning Area) and unincorporated Madera County. And as required by FEMA, this risk assessment for the Madera County Planning Area also includes an evaluation of how the hazards and risks vary across the Planning Area.

This LHMP Update involved a comprehensive review and update of each section of the 2018 LHMP. Information from the 2018 LHMP was used in this Update, where valid and applicable. As part of the risk assessment update, new data was used, where available, and new analyses were conducted. Where data from existing studies and reports was used, the source is referenced throughout this risk assessment. Refinements, changes, and new methodologies used in the development of this risk assessment update are summarized in Chapter 2 What's New and are also detailed in this risk assessment portion of the Plan Update.

4.1 Hazard Identification

44 CFR 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 Madera County Hazard Mitigation Planning Committee (HMPC) conducted a hazard identification study to determine the hazards that threaten the Planning Area. This section details the methodology and results of this effort.

Data Sources

The following data sources were used for this Hazard Identification portion of the plan:

- 2018 Madera County Hazard Mitigation Plan
- 2023 State of California Hazard Mitigation Plan
- California Department of Water Resources
- California Office of Emergency Services
- FEMA
- FEMA Disaster Declaration Database
- National Climatic Data Center Storm Events Database
- National Oceanic and Atmospheric Administration
- HMPC input

4.1.1. Results and Methodology

Using existing hazards data and input gained through planning meetings, the HMPC agreed upon a list of hazards that could affect the Madera County Planning Area. Hazards data from the California Office of Emergency Services (Cal OES), FEMA, California Department of Water Resources (CA DWR), the National Oceanic and Atmospheric Administration (NOAA), and many other sources were examined to assess the significance of these hazards to the Planning Area.

The following hazards in Table 4-1, listed alphabetically, were identified and investigated for this Local Hazard Mitigation Plan (LHMP) Update. As a starting point, the 2018 Madera County LHMP Update and the 2023 California State Hazard Mitigation Plan were consulted to evaluate the applicability of new hazards of concern to the State to the Madera County Planning Area. Building upon this effort, hazards from the past plan were also identified, and comments explain how hazards were updated from the previous plan. Most hazards from the 2018 plan were profiled in this LHMP Update, with the exception of fog and volcano. Levee failure was placed inside the flood hazard. Winter storms were placed into the extreme cold, freeze, and snow hazard. No new hazards were added.

Table 4-1 Madera County Hazard Identification and Comparison between 2018 and 2026 LHMP

2026 Hazards	2018 Hazards	Comment
Agricultural Hazard: Severe Weather/Pests/Invasives	Ag Hazards: Severe Weather/Insect Pests	This hazard was kept.
Climate Change	Climate Change	This hazard was kept.
Dam Failure	Dam Failure	This hazard was kept.
Drought & Water shortage	Drought and Water Shortage	This hazard was kept.
Earthquake (w/subhazards)	Earthquake	This hazard was kept.
Floods: 1%/0.2% annual chance (w/levee failure)	Flood: 1% and 0.2% Annual Chance	This hazard was kept.
Floods: Localized Stormwater	Flood: Localized/Stormwater	This hazard was kept.
Hazardous Materials Transportation	Hazardous Materials Transportation	This hazard was kept.
Landslide, Mudslide, Debris Flow	Landslides, Rockfalls, and Debris Flows	This hazard was kept.
–	Levee Failure	This was added to the flood hazard.
Severe Weather: Extreme Heat	Severe Weather: Extreme Heat	This hazard was kept.
Severe Weather: Extreme Cold, Freeze, and Snow	Severe Weather: Extreme Cold and Freeze	This hazard was kept.
–	Severe Weather: Fog	This hazard was dropped from consideration.
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)	Severe Weather: Heavy Rains and Storms	This hazard was kept.
Severe Weather: High Winds and Tornadoes	Severe Weather: Wind and Tornado	This hazard was kept.

2026 Hazards	2018 Hazards	Comment
–	Severe Weather: Winter Storms/Snow	This was added to extreme cold and freeze hazard.
–	Volcano	This hazard was dropped.
Wildfire (w/smoke and air quality)	Wildfire (smoke, tree mortality)	This hazard was kept.

Certain other hazards were excluded from consideration for this Plan Update. They are shown in Table 4-2.

Table 4-2 Madera County – Excluded Hazards

Hazard Excluded	Why Excluded
Coastal Flooding, Erosion, and Sea Level Rise	The County is not on the coast.
Hurricane	The County is not on the coast.
Tsunami	The County is not on the coast.
Volcano	Given the location of active or potentially active volcanoes relative to the Planning Area, it was felt this hazard was not of concern to the County.

Table 4-3 was completed by the County and HMPC to identify, profile, and rate the significance of identified hazards. Those hazards identified as a high or medium significance in Table 4-3 are considered priority hazards for mitigation planning. Those hazards that occur infrequently or have little or no impact in Madera County were determined to be of low significance and not considered a priority hazard. Significance was determined based on the hazard profile, focusing on key criteria such as frequency, extent, and resulting damage, including deaths/injuries and property, natural and cultural resources, and economic damage. The ability of a jurisdiction to reduce losses through implementation of existing and new mitigation measures was also considered as to the significance of a hazard. This assessment was used to prioritize those hazards of greatest significance, enabling the County to focus resources where they are most needed.

Table 4-3 Madera County Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Agricultural Hazard: Severe Weather/Pests/Invasives	Extensive	Likely	Critical	High	Medium
Climate Change	Extensive	Likely	Limited	Medium	--
Dam Failure	Significant	Unlikely	Critical	High	Medium
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake (w/subhazards)	Significant	Unlikely	Critical	Medium	Low
Floods: 1%/0.2% annual chance (w/levee failure)	Significant	Occasional/ Unlikely	Critical	High	Medium
Floods: Localized Stormwater	Extensive	Highly Likely	Limited	Medium	Medium
Hazardous Materials Transportation	Limited	Occasional	Limited	Medium	Low
Landslide, Mudslide, Debris Flow	Limited	Likely	Limited	Medium	Medium
Severe Weather: Extreme Cold, Freeze, and Snow	Significant	Highly Likely	Limited	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	Medium	High
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely	Limited	Medium	Medium
Wildfire (w/smoke and air quality)	Extensive	Highly Likely	Catastrophic	High	Medium/High

Geographic Extent

Limited: Less than 10% of planning area

Significant: 10-50% of planning area

Extensive: 50-100% of planning area

Likelihood 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 10 years or less.

Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

Catastrophic: More than 50 percent of property severely damaged; 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 and/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

Climate Change Influence

Low: Minimal potential impact

Medium: Moderate potential impact

High: Widespread potential impact

4.1.2. Disaster Declaration History

One method used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the Madera County Planning Area. 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. Disaster declarations for these programs are discussed in Section 4.3.6.

Based on the disaster declaration history provided in Table 4-4, Madera County is among the many counties in California susceptible to disaster. Details on federal and state disaster declarations were obtained by the HMPC, FEMA, and Cal OES and compiled in chronological order in Table 4-4. A review of state declared disasters indicates that Madera County received 37 state declarations between 1950 and 2025. Of the 37 state declarations: 20 were associated with severe winter storms, heavy rains, or flooding; 5 were for fire; 4 were for drought; 4 from freeze, 2 were from pandemic, 1 was for wind; and 1 was from economic disaster. A review of federal disasters shows 38 federal disaster declarations from 1950 to 2025. Of these 38 federal declarations: 21 were associated with severe winter storms, heavy rains, or flooding; 9 for fire; 3 were from freeze, 2 were from pandemic, 1 for drought; 1 was for the 1964 seismic sea wave (which was declared for the entire State of California); and 1 was for hurricane (a nationwide declaration for Katrina evacuations). A summary of these events by disaster type is shown in Table 4-5.

Table 4-4 Madera County Federal and State Disaster Declarations, 1950-2025

Year	Disaster Name	Disaster Type	Disaster Cause	State Declaration # and Date	Federal Declaration # and Date
2023	California Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	Storms	Storms	3/1/2023 3/8/2023	DR-4699 4/3/2023
2023	California Severe Winter Storms, Flooding, Landslides, and Mudslides	Storms	Storms	–	EM-3592 3/10/2023
2023	California Severe Winter Storms, Flooding, Landslides, and Mudslides	Storms	Storms	2023-01 1/4/2023	DR-4683 1/14/2023
2023	California Severe Winter Storms, Flooding, and Mudslides	Storms	Storms	2023-01 1/4/2023	EM-3591 1/9/2023
2022	Extreme heat and fires	Fire	Fire	2022-08 8/31/2022 (Extreme Heat) 9/8/2022 (Mosquito Fire) 9/2/2022 (Mill Fire)	–
2021	Mono Wind Event	Wind	Storms	2021-01 6/22/2021	–
2020	California Wildfires	Fire	Fire	2020-07 9/6/2020	DR-4569 10/16/2020
2020	California Creek Fire	Fire	Fire	–	FM-5348 9/6/2020
2020	California Covid 19 Pandemic	Biological	Pandemic	3/4/2020	DR-4482
2020	California Covid 19	Biological	Pandemic	3/4/2020	EM-3428
2017	California Mission Fire	Fire	Fire	9/7/2017	FM-5204 9/4/2017
2017	California Railroad Fire	Fire	Fire	9/7/2017	FM-5202 9/2/2017
2016	Clayton Fire	Fire	Fire	2016-04 9/15/2016	–

Year	Disaster Name	Disaster Type	Disaster Cause	State Declaration # and Date	Federal Declaration # and Date
2015	Drought and Tree Mortality	Drought	Drought	2015-05 10/30/2015	–
2014	California Junction Fire	Fire	Fire	–	FM-5074 8/19/2014
2014	Drought and water shortage	Drought	Drought	2014-03 9/18/2014	–
2014	California Courtney Fire	Fire	Fire	–	FM-5078 9/14/2014
2010	December 2010 Statewide Storms	Storms	Storms	2010-17 12/21/2010, 12/23/2010, 12/24/2010, 12/30/2010	–
2008	Central Valley Drought	Drought	Drought	2008-03 6/12/2008	–
2007	2007 Severe Freeze	Freeze	Freeze	2007-02 1/12/2007-1/26/2007	DR-1689 3/13/2007
2006	California Severe Storms, Flooding, Landslides, and Mudslides	Storms	Storms	2006-03 4/10/2006	DR-1646 6/5/2006
2005	Hurricane Katrina Evacuations	Hurricane	Hurricane	–	EM-3248 9/13/2005
2005	California Quartz Fire	Fire	Fire	–	FM-2571 7/25/2005
2001	Energy Emergency	Economic	Greed	1/1/2001	–
1998	Severe Storms, Tornadoes, High Winds and Flooding in California	Freeze	Freeze	98-02 12/29/1998	DR-1267 2/9/1999
1997	California Severe Storms/flooding	Floods	Storms	97-01 1/2/1997-1/31/1997	DR-1155 1/4/1997
1997	Winter Storms	Storms	Storms	97-01 1/2/1997-1/31-1997	DR-1155 1/4/1997
1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	Flood	Storms	95-03-N 95-04-S 3/12/1995-3/24/1995	DR-1046 3/12/1995

Year	Disaster Name	Disaster Type	Disaster Cause	State Declaration # and Date	Federal Declaration # and Date
1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	Storms	Storms	95-03 03/12/95 – 03/24/95	DR-1046 3/12/1995
1995	1995 Winter Storms (Northern CA)	Storms	Storms	95-01 1/9/1995-2/17/1995	DR-1044 1/10/1995
1992	California Severe Storm, Winter Storm, Mud & Landslides, Flooding	Storms	Storms	93-01 1/7/93 -2/19/93	DR-979 2/3/1993
1990	1990 Freeze	Freeze	Freeze	12/19/1990-1/18/1991	DR-894 2/11/1991
1986	California Severe Storms, Flooding	Storms	Storms	86-01 2/18/1986-3/12/1986	DR-758 2/21/1986
1982	Rains Causing Agricultural Losses	Flood	Storms	10/26/1982	–
1982	Heavy Rains and Flooding	Flood	Storms	82-03 4/1/1982	–
1982	1982-83 Floods	Flood	Storms	82-18 12/8/1982-3/21/1983	DR-677 2/9/1983
1977	California Drought	Drought	Drought	–	EM-3023 1/20/1977
1976	1976 Drought	Drought	Drought	2/9/76, 2/13,76, 2/24/76, 3/26/76, 7/6/76	–
1972	1972 Freeze	Freeze	Freeze	4/17/72, 5/22/72, 5/31/72	–
1969	California Severe Storms, Flooding	Flood	Storms	1/23/69, 1/25,69, 1/28/69, 1/29/69, 2/8/69, 2/10/69, 2/16/69, 3/12/69	DR-253 1/26/1969
1964	Seismic Sea Wave	Other	Other	–	DR-169 4/1/1964

Year	Disaster Name	Disaster Type	Disaster Cause	State Declaration # and Date	Federal Declaration # and Date
1963	Severe Storms, Heavy Rains and Flooding	Flood	Storms	–	DR-145 2/25/1963
1963	Severe Storms and Flooding	Flood	Storms	–	DR-138 10/24/1962
1961	1961 Major Fires (Madera)	Fire	Fire	–	–
1958	1958 April Storms & Floods	Flood	Storms	4/2/1958	DR-82 4/4/1958
1955	1955 Floods	Flood	Storms	12/22/1955	DR-47 12/23/1955
1950	Flood and Erosion	Flood	Storms	50-01 11/21/1950	DR-15 2/5/1950

Source: Cal OES, FEMA. Retrieved March 2025.

Table 4-5 Madera County – Federal and State Disaster Declarations Summary 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	4	1976, 2008, 2014, 2015	1	1977
Economic	1	2001	0	–
Fire	5	2016, 2017 (twice), 2020, 2022	9	2005, 2014 (twice), 2015, 2016, 2017 (twice), 2020 (twice)
Flood (including heavy rains and storms)	20	1950, 1955, 1958, 1969, 1982 (twice), 1983, 1986, 1992, 1993, 1995 (three*), 1997 (twice), 2006*, 2010, 2023 (three*)	21	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1982, 1986, 1992, 1995 (three), 1997 (twice*), 2006*, 2010, 2023 (four*)
Freeze	4	1972, 1990, 1998, 2007	3	1990, 1999, 2007
Hurricane	0		1	2005
Other	0		1	1964
Pandemic	2	2020 (twice)	2	2020 (twice)
Wind	1	2021	0	
Totals	**37**		**38**	

Source: Cal OES, FEMA. Retrieved March 2025.

Madera County Disasters Since 2018 LHMP

- 2020 Fires (two federal and one state)
- 2020 Pandemic (two federal and two state)
- 2021 Mono Wind event (state)
- 2022 Extreme heat and fires (state)
- 2023 Severe Storms (four federal and three state)

4.2 Madera County Asset Inventory and Growth and Development Trends

As a starting point for analyzing the Madera County Planning Area's vulnerability to identified hazards, a variety of data was used to define a baseline against which all disaster impacts could be compared. If a catastrophic disaster was to occur in the Madera County Planning Area, this section describes significant lands, assets, and other resources at risk. This section is broken into two parts:

- **Asset Inventory** – The assets inventory identifies the Madera County Planning Area's and unincorporated Madera County's total assets, including the people and populations: structures; critical facilities and infrastructure, and community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. This data is not hazard specific, but is representative of total assets within the Madera County Planning Area and unincorporated Madera County, potentially at risk to identified hazards as discussed in Section 4.3 Hazard Profiles and Vulnerability Assessment.
- **Growth and Development Trends** – A discussion of growth and development trends in the Madera County Planning Area with a focus on unincorporated Madera County, both current and future, is presented.

Data Sources

- 2024 Madera County Parcel/Assessor Data
- 2024-2032 Madera County Housing Element
- CalAtlas
- California Department of Finance
- California Department of Finance E-1 Report
- California Department of Finance P-2 Report
- California Department of Fish and Wildlife Service
- California Department of Parks and Recreation Office of Historic Preservation
- California Department of Water Resources (CA DWR) Special Populations and Disadvantaged Community Mapping
- California Environmental Protection Agency (Cal EPA) Disadvantaged Communities
- California Environmental Quality Act (CEQA)
- California Natural Diversity Database
- Center for Disease Control (CDC) Social Vulnerability Index
- FEMA Community Disaster Resilience Zones
- FEMA National Risk Index
- Hazus-MH 6.1
- Madera County
- Madera County Building Department and Planning Department
- Madera County General Plan Background Report
- Madera County General Plan Land Use Element
- Madera County GIS
- Madera County Planning Team
- National Environmental Policy Act (NEPA)
- State of California Department of Conservation

- US Census Bureau
- USFWS October 2024 National Wetlands Inventory

4.2.1. Assets Inventory

If a catastrophic disaster was to occur in the Madera County Planning Area, this section describes populations, structures, critical facilities and infrastructure, and other key assets and resources at risk that comprise the existing built environment. Assets inventoried in this baseline assessment include:

- People and Populations
- Structures
- Critical Facilities and Infrastructure,
- Community Lifelines
- Natural, Historic, and Cultural Resources
- Economic Assets and Community Activities of Value

Populations

Life safety is a priority issue for hazard mitigation planning. The people that work and recreate in the Madera County Planning Area, and those that live and work in surrounding communities are also potentially at risk during a natural hazard event.

The estimated population of Madera County (both incorporated communities and the unincorporated County) for January 1, 2025, was 162,599. Populations potentially at risk are described in the Table 4-6 based on California Department of Finance estimates. The most recent estimates are dated 1/1/2025, which are shown in the table below.

Table 4-6 Madera County Planning Area – Populations

Jurisdiction	Population
Chowchilla	18,742
Madera	66,443
Unincorporated Madera County	77,414
Total	**162,599**

Source: Cal DOF E-1. 1/1/2025

Table 4-7 illustrates the pace of population growth in Madera County dating back to 1940. The data on population and housing growth shows that Madera County saw tremendous growth from 1940 to 2010. That growth continued in a more muted fashion between 2010 and 2020. In spite of the pandemic, the County has 4.1% population growth since 2020 (which is a outlier in the State of California). Details on population growth in the cities is included in their respective annexes to this LHMP Update.

Table 4-7 Madera County Planning Area – Population Growth 1940-2025

Year	Population	Percent Increase
1940	23,314	–

Year	Population	Percent Increase
1950	36,964	58.5%
1960	40,468	9.5%
1970	41,519	2.6%
1980	63,316	52.0%
1990	88,090	39.6%
2000	123,109	39.8%
2010	150,865	22.5%
2020	156,255	3.6%
2024	162,599	4.1%

Sources: California Department of Finance, US Census Bureau

Vulnerable and Underserved Populations

Vulnerable populations include those who may be disproportionately affected by hazards or may need additional help or accommodation during a hazard event or disaster. The vulnerable and underserved populations discussion for the Madera County Planning Area is based on the following sources:

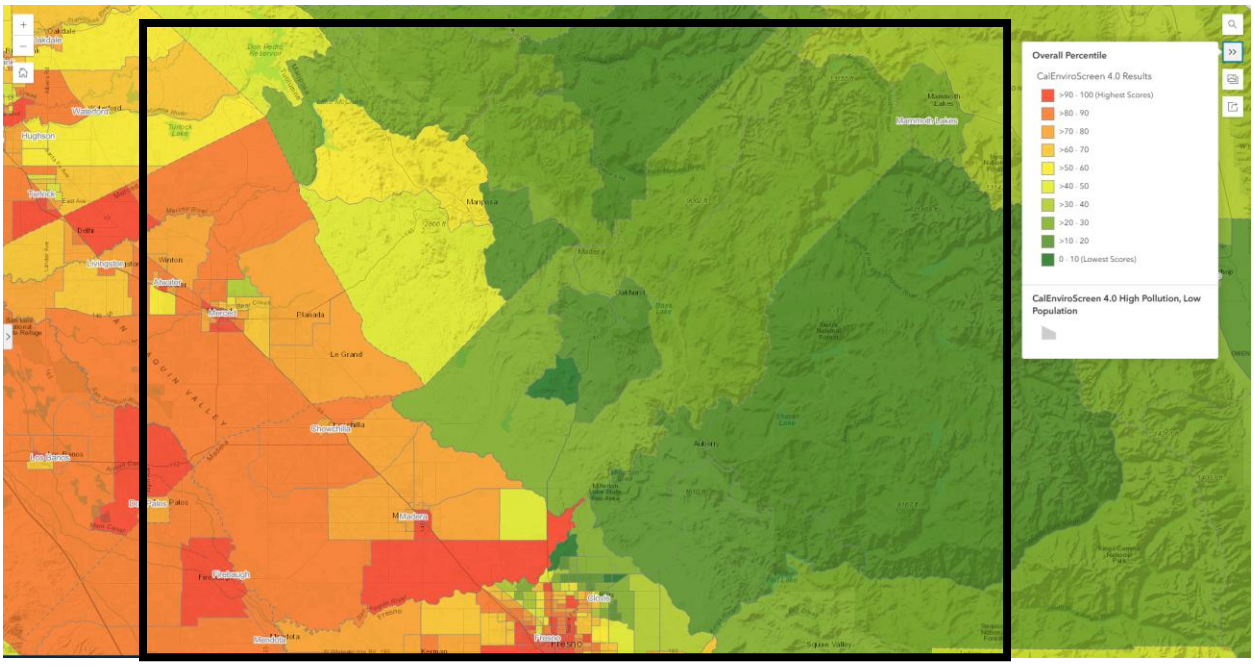
- California Environmental Protection Agency (Cal EPA) Disadvantaged Communities
- Center for Disease Control (CDC) Social Vulnerability Index
- California Department of Water Resources (CA DWR) Special Populations and Disadvantaged Community Mapping
- FEMA Community Disaster Resilience Zones
- FEMA National Risk Index
- Local Input

Note: These sources below show information for the Madera County Planning Area and unincorporated Madera County. Information on specific data for the incorporated jurisdictions can be found in their respective annexes to this Plan Update.

Cal EPA Disadvantaged Communities

Disadvantaged communities are defined by CalEPA as the top 25 percent of communities experiencing disproportionate amounts of pollution, environmental degradation, and socioeconomic and public health conditions according to the Office of Environmental Health Hazard Assessment's CalEnviroScreen tool. CalEPA is responsible for identifying disadvantaged communities for the purposes of the Cap-and-Trade funding program. This uses the CalEnviroScreen 4.0 Tool. Maps showing these areas in the Planning Area are shown on Figure 4-1.

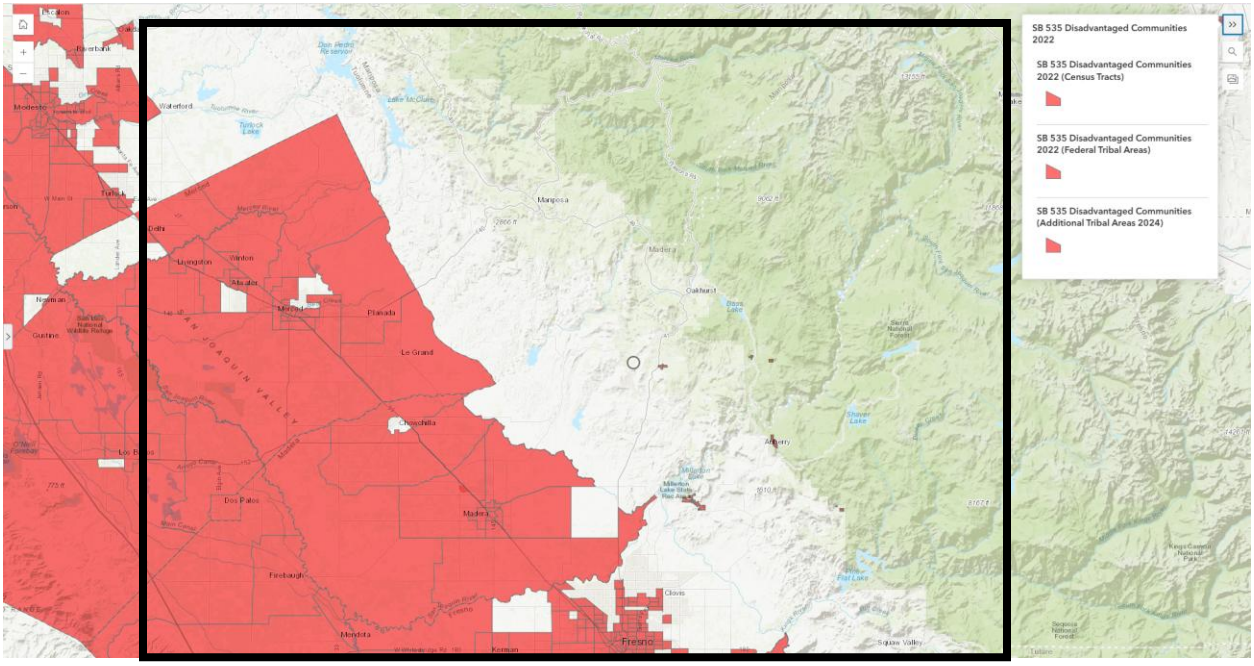
Figure 4-1 Madera County Planning Area – Cal EPA Disadvantaged Communities



Source: Cal EPA, map retrieved 01/28/2025.

Cal EPA has another way to track disadvantaged communities. California Climate Investments are funds (Greenhouse Gas Reduction Fund and appropriated by the Legislature) from the proceeds of the State's Cap-and-Trade Program specifically targeted for investment in disadvantaged communities in California. These funds must be used for programs that further reduce emissions of greenhouse gases. Senate Bill 535 directed that at least a quarter of the proceeds go to projects that provide benefit to disadvantaged communities and at least 10 percent of the funds go to projects located within those communities. Cal EPA has also mapped these communities. Those communities that fall inside this program in Madera County are shown on Figure 4-2. As shown, these areas occur in the populated areas of Madera County.

Figure 4-2 Madera County SB 535 Disadvantaged Communities (2022)



Source: Cal EPA, map retrieved 01/28/2025.

CDC Social Vulnerability Index

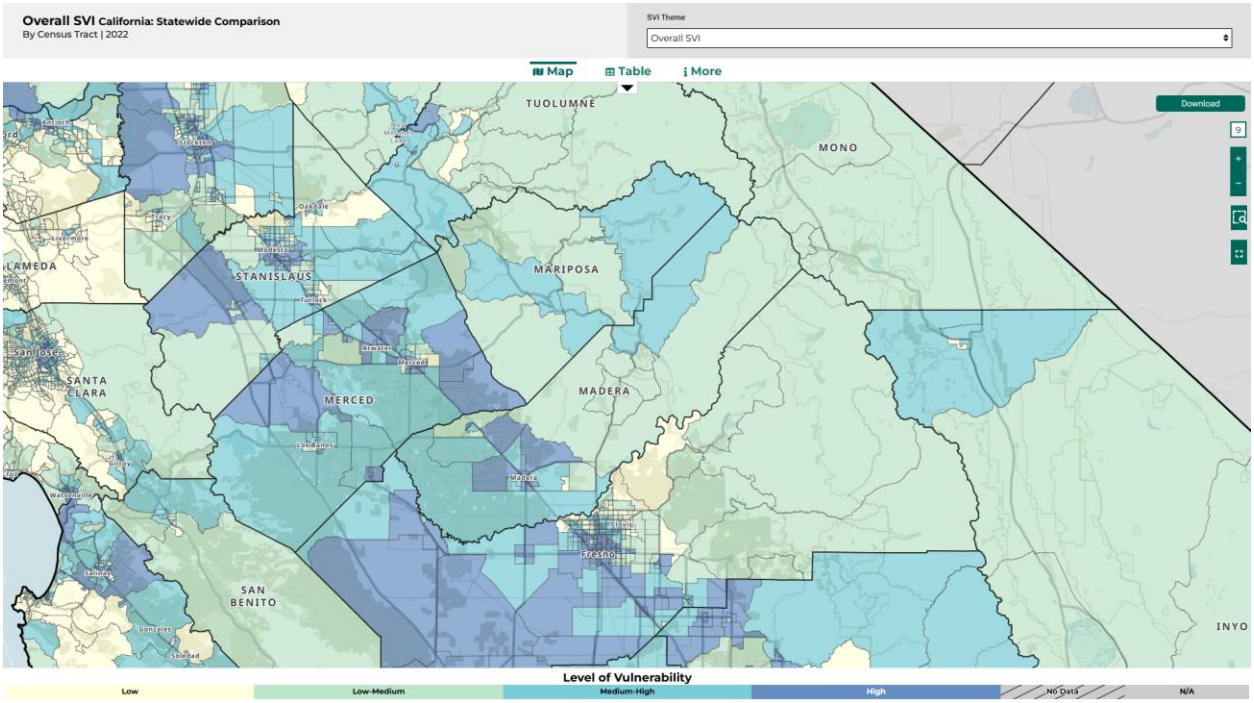
Every community must prepare for and respond to hazardous events, whether a natural disaster like a tornado or disease outbreak, or a human-made event such as a harmful chemical spill. A number of factors, including poverty, lack of access to transportation, and crowded housing may weaken a community's ability to prevent human suffering and financial loss in a disaster. These factors are known as social vulnerability.

Social vulnerability refers to the potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss. CDC Social Vulnerability Index (CDC SVI) uses 15 U.S. census variables to help local officials identify communities that may need support before, during, or after disasters.

The Agency for Toxic Substances and Disease Registry's (ATSDR) Geospatial Research, Analysis & Services Program (GRASP) created databases to help emergency response planners and public health officials identify and map communities that will most likely need support before, during, and after a hazardous event. CDC SVI uses U.S. Census data to determine the social vulnerability of every census tract. Census tracts are subdivisions of counties for which the Census collects statistical data. The CDC SVI ranks each tract on 15 social factors, including poverty, lack of vehicle access, and crowded housing, and groups them into four related themes. Each tract receives a separate ranking for each of the four themes, as well as an overall ranking. Maps of the four themes are shown in the Madera County Planning Area below. The overall SVI map is shown in Figure 4-3; the socioeconomic SVI for the Planning Area is shown in Figure 4-4; the household composition SVI is shown in Figure 4-5; the minority and language SVI is shown in Figure 4-6; and the housing and transportation SVI is shown in Figure 4-7. As shown on all of

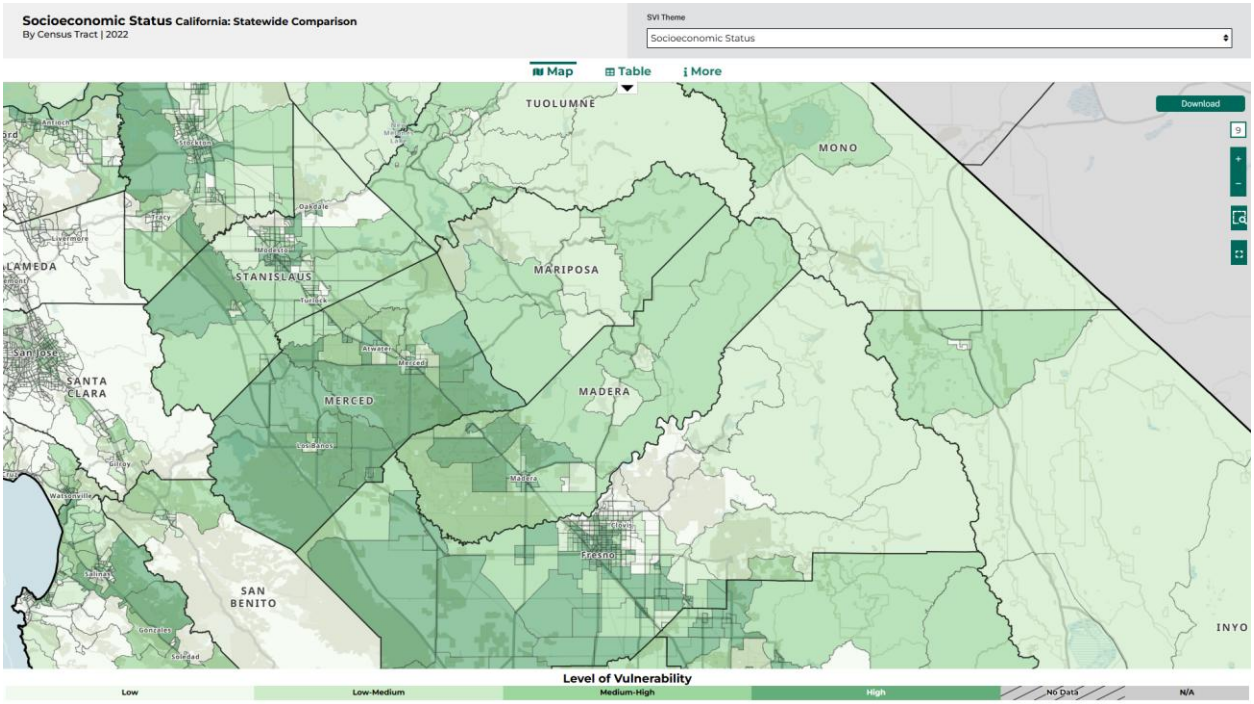
these maps, the County shows moderate changes across the County in social vulnerability, indicating that there are changes in social vulnerability in the County.

Figure 4-3 Madera County Planning Area – Overall Social Vulnerability



Source: CDC Social Vulnerability Index – map retrieved 12/16/2024.
Level of Vulnerability Rating: **Yellow** – Low; **Green** – Low/Medium; **Aqua** – Medium/High; **Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

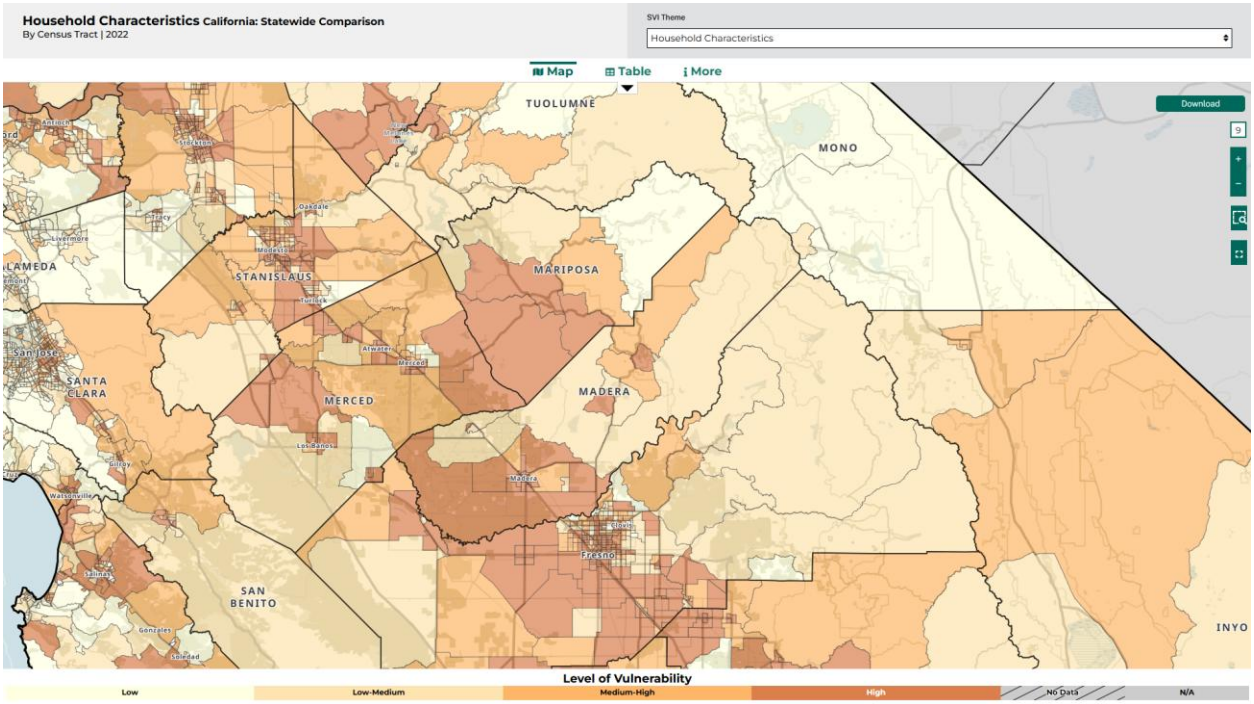
Figure 4-4 Madera County Planning Area – Socioeconomic Status Vulnerability



Source: CDC Social Vulnerability Index – map retrieved 12/16/2024.

Level of Vulnerability Rating: **Faint Green** – Low; **Light Green** – Low/Medium; **Green** – Medium/High; **Dark Green** – High; **Grey Hatched** – No Data; **Grey** – Not Available

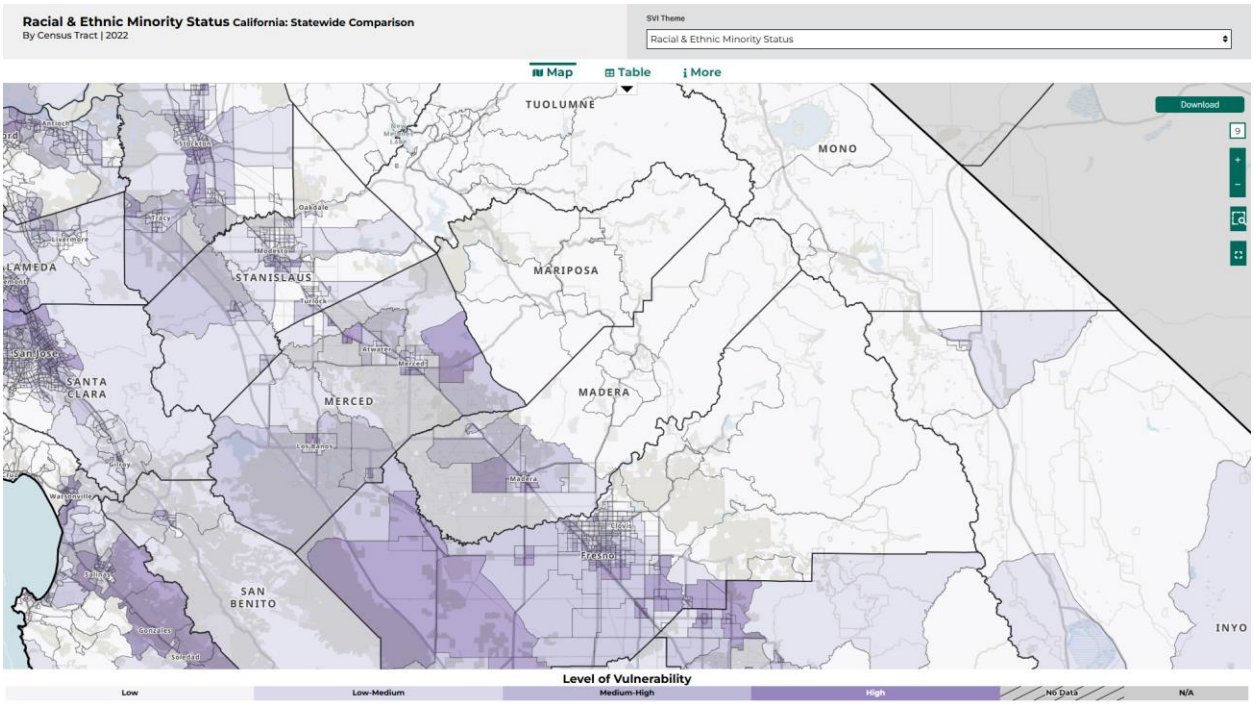
Figure 4-5 Madera County Planning Area – Household Composition and Disabilities Social Vulnerability



Source: CDC Social Vulnerability Index – map retrieved 12/16/2024.

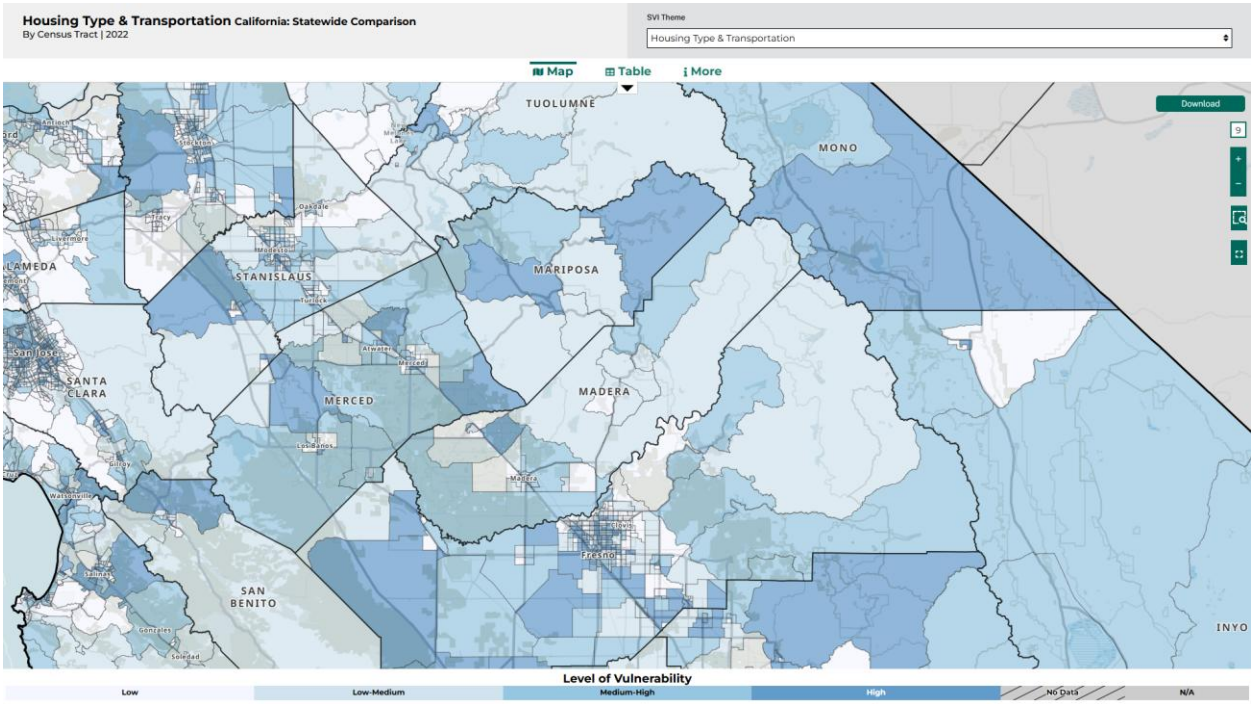
Level of Vulnerability Rating: **Faint Orange** – Low; **Light Orange**– Low/Medium; **Orange** – Medium/High; **Dark Orange** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure 4-6 Madera County Planning Area – Minority/Language Social Vulnerability



Source: CDC Social Vulnerability Index – map retrieved 12/16/2024.
Level of Vulnerability Rating: **Faint Purple** – Low; **Light Purple** – Low/Medium; **Purple** – Medium/High; **Dark Purple** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure 4-7 Madera County Planning Area – Housing/Transportation Social Vulnerability

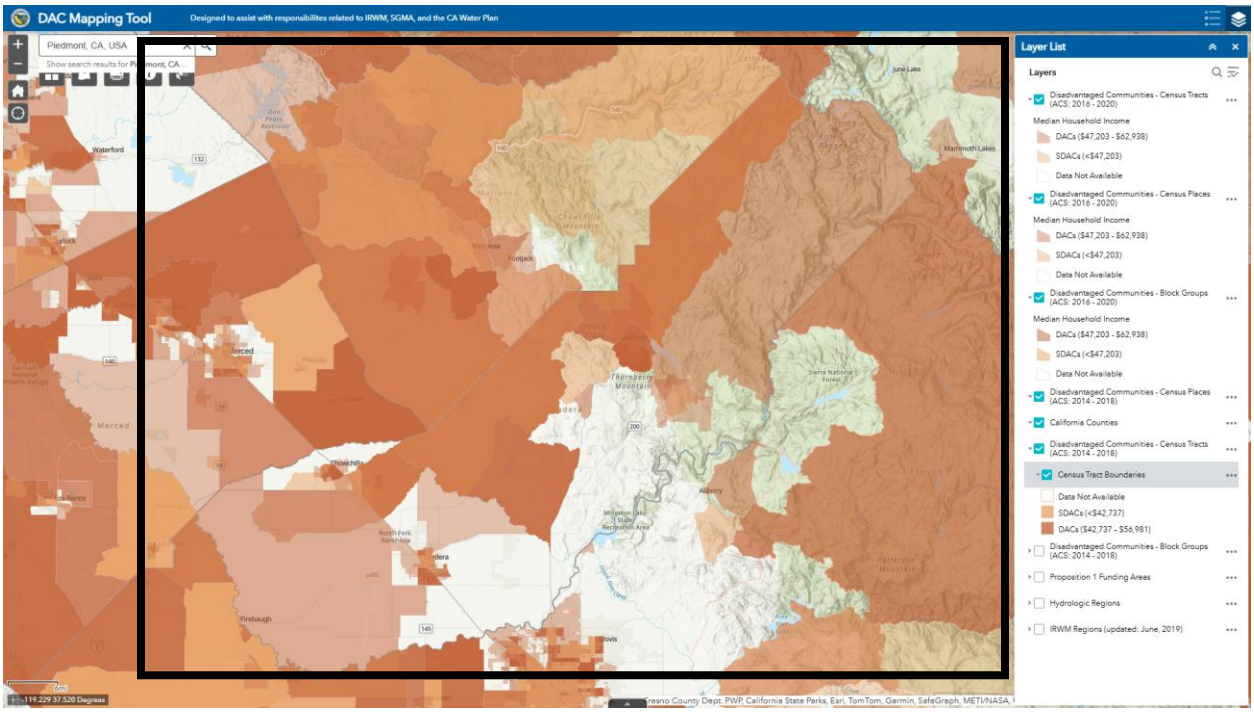


Source: CDC Social Vulnerability Index – map retrieved 12/16/2024.
Level of Vulnerability Rating: **Faint Blue** – Low; **Light Blue** – Low/Medium; **Blue** – Medium/High; **Dark Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

California DWR Disadvantaged Community Mapping Tool

The State of California's Proposition 1 Disadvantaged Community (DAC) Involvement Program is designated to ensure the involvement of DACs as well as Economically Distressed Areas and Underrepresented Communities, which DWR collectively refers to as DACs. The Cal DWR definition for a Disadvantaged Community is a community with an annual median household income (MHI) that is less than 80% of the Statewide annual MHI (PRC Section 75005(g)), and those census geographies with an annual MHI less than 60% of the Statewide annual MHI are considered "Severely Disadvantaged Communities". Those areas in the Planning Area considered disadvantaged are shown in Figure 4-8.

Figure 4-8 Madera County Planning Area – Disadvantaged Areas

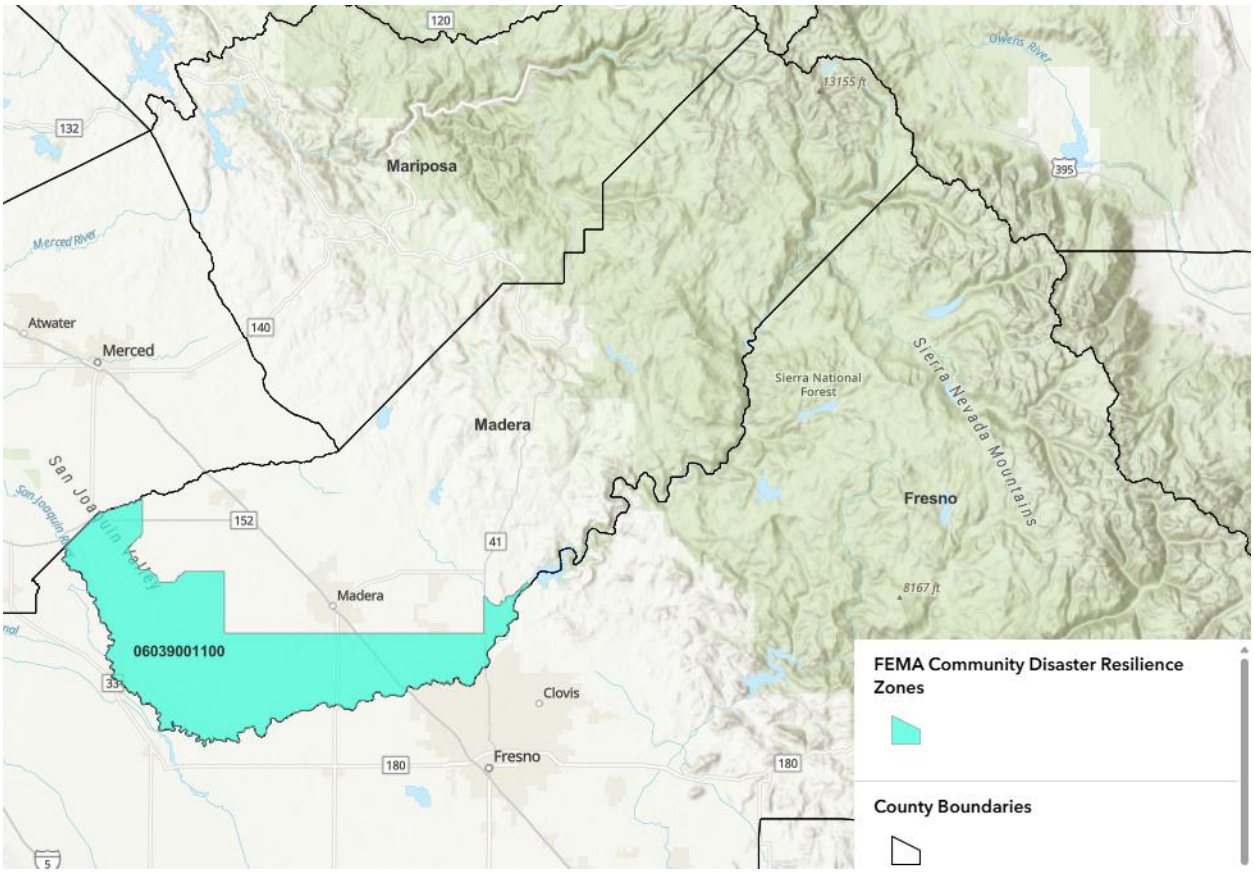


Source: Cal DWR DAC Mapping Tool – retrieved 12/16/2024.

FEMA Community Disaster Resilience Zones

Community Disaster Resilience Zones aim to build and strengthen community resilience across the nation by driving federal, public, and private resources to the most at-risk and in-need communities. The Community Disaster Resilience Zones Act uses FEMA's National Risk Index (NRI) to identify the most at-risk and in-need communities to identify resilience zones. Designated zones will be prioritized for targeted federal support, such as increased cost-share for resilience and mitigation projects, lessening the financial burden on communities to perform resilience-related activities. On September 6, 2023, FEMA announced the initial 483 designations in all 50 states and the District of Columbia. Figure 4-9 shows these zones in teal green. As shown, there are areas in the southwest portion of the County.

Figure 4-9 Madera County Planning Area – FEMA Community Disaster Resilience Zones



Source: FEMA. Map retrieved 1/29/2025.

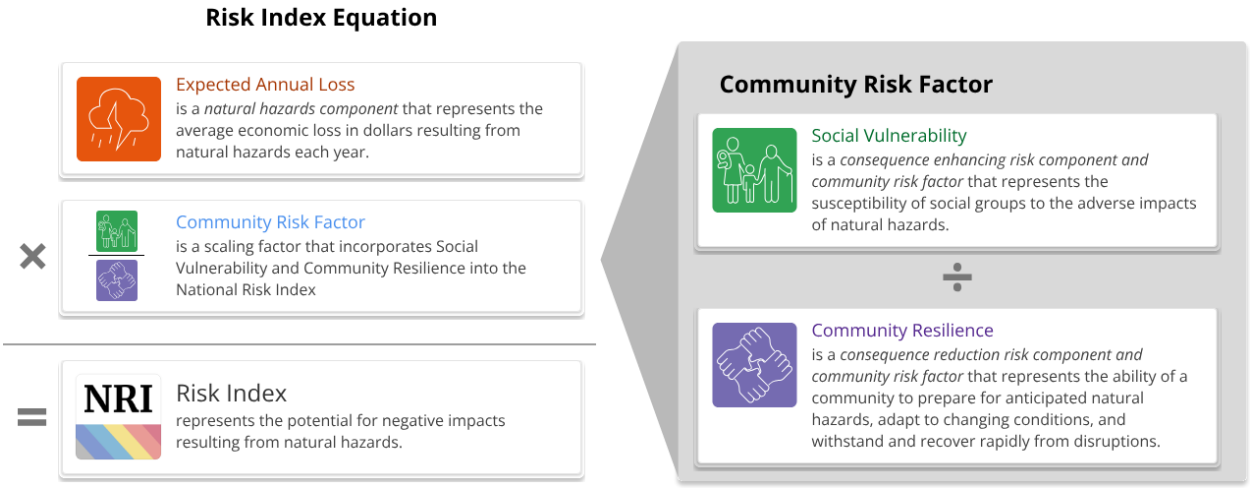
FEMA National Risk Index

Beginning in 2016, FEMA's Natural Hazards Risk Assessment Program started work on the National Risk Index by adopting an established vision for a multi-hazard view of risk that combines the likelihood and consequence of natural hazards with social factors and resilience capabilities. The goal was to take a broad, holistic view and create a nationwide baseline of natural hazard risk.

A community's susceptibility to natural hazards varies from location to location. The NRI is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards. It was designed and built by FEMA in close collaboration with various stakeholders and partners in academia; local, state, and federal government; and private industry. In the National Risk Index, risk is defined as the potential for negative impacts as a result of a natural hazard.

The risk equation behind the Risk Index includes three components (see Figure 4-10): a natural hazards component (Expected Annual Loss), a consequence enhancing component (Social Vulnerability), and a consequence reduction component (Community Resilience).

Figure 4-10 National Risk Index Equation



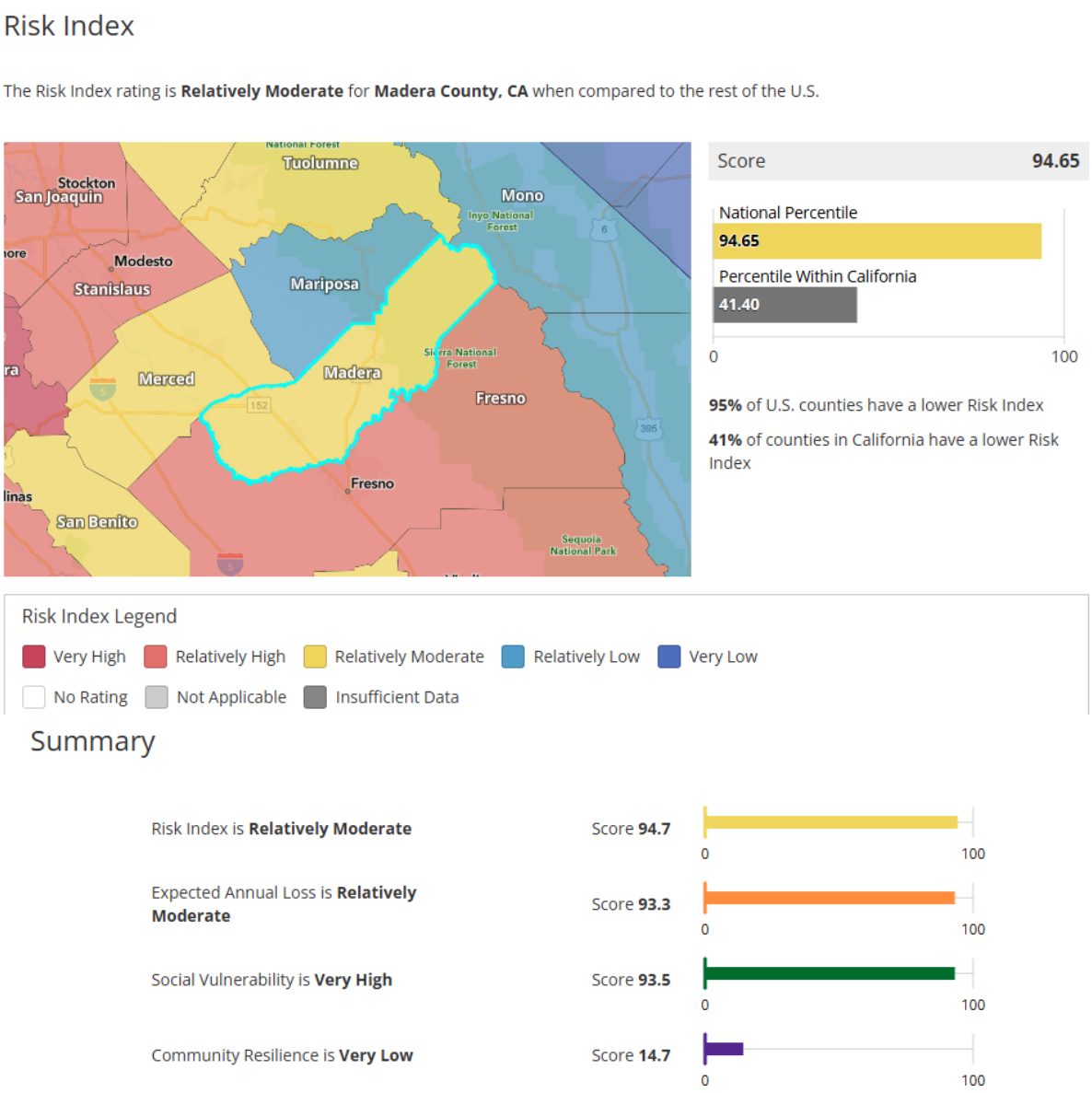
Source: FEMA National Risk Index

Using these three components, composite Risk Index values and hazard type Risk Index values are calculated for each community (county and Census tract) included in the Index. Risk Index values form an absolute basis for measuring Risk within the National Risk Index, and they are used to generate Risk Index percentiles and ratings across communities.

Data from the NRI for the Madera County Planning Area is seen below. Figure 4-11 shows a summary map and score for the County. As shown, Madera County's Risk Index rating is Relatively Moderate. Figure 4-12 shows the expected annual loss map and score. As shown, Madera County's expected annual loss rating is Relatively Moderate. Figure 4-13 shows the social vulnerability map and score. As shown, Madera County has a Very High social vulnerability. Figure 4-14 shows the community resilience map and score. As shown, communities in Madera County have a Very Low ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

The Madera County FEMA NRI Report is included in its entirety in Appendix G.

Figure 4-11 FEMA National Risk Index – Summary Map and Score for Madera County

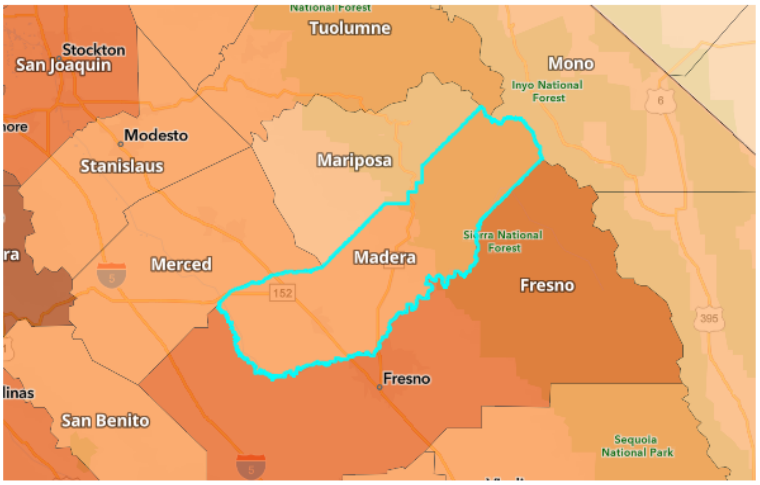


Source: FEMA National Risk Index, retrieved 01/10/2025.

Figure 4-12 FEMA National Risk Index – Expected Annual Loss Map and Score for Madera County

Expected Annual Loss

In **Madera County, CA**, expected loss each year due to natural hazards is **Relatively Moderate** when compared to the rest of the U.S.



Score **93.31**

National Percentile
93.31

Percentile Within California
39.70

0 100

93% of U.S. counties have a lower Expected Annual Loss

40% of counties in California have a lower Expected Annual Loss

Expected Annual Loss Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

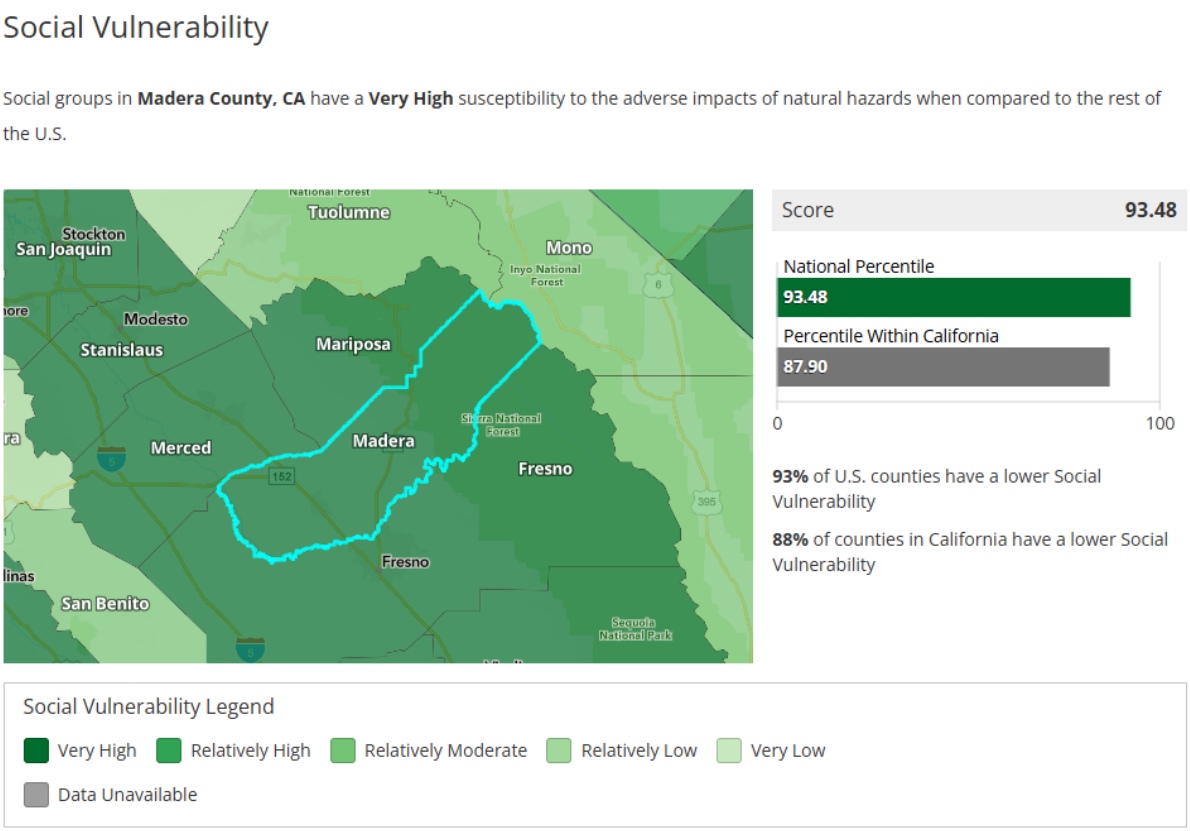
No Expected Annual Losses | Not Applicable | Insufficient Data

Composite Expected Annual Loss	**$63,720,373.04**
Composite Expected Annual Loss Rate National Percentile	**77.6**

Building EAL	**$44,594,157.22**	Population EAL	**0.94** fatalities
Building EAL Rate	**$1 per $620.44 of building value**	Population EAL Rate	**1 per 165.46K people**
Agriculture EAL	**$8,179,085.83**	Population Equivalence EAL	**$10,947,129.99**
Agriculture EAL Rate	**$1 per $209.32 of agriculture value**		

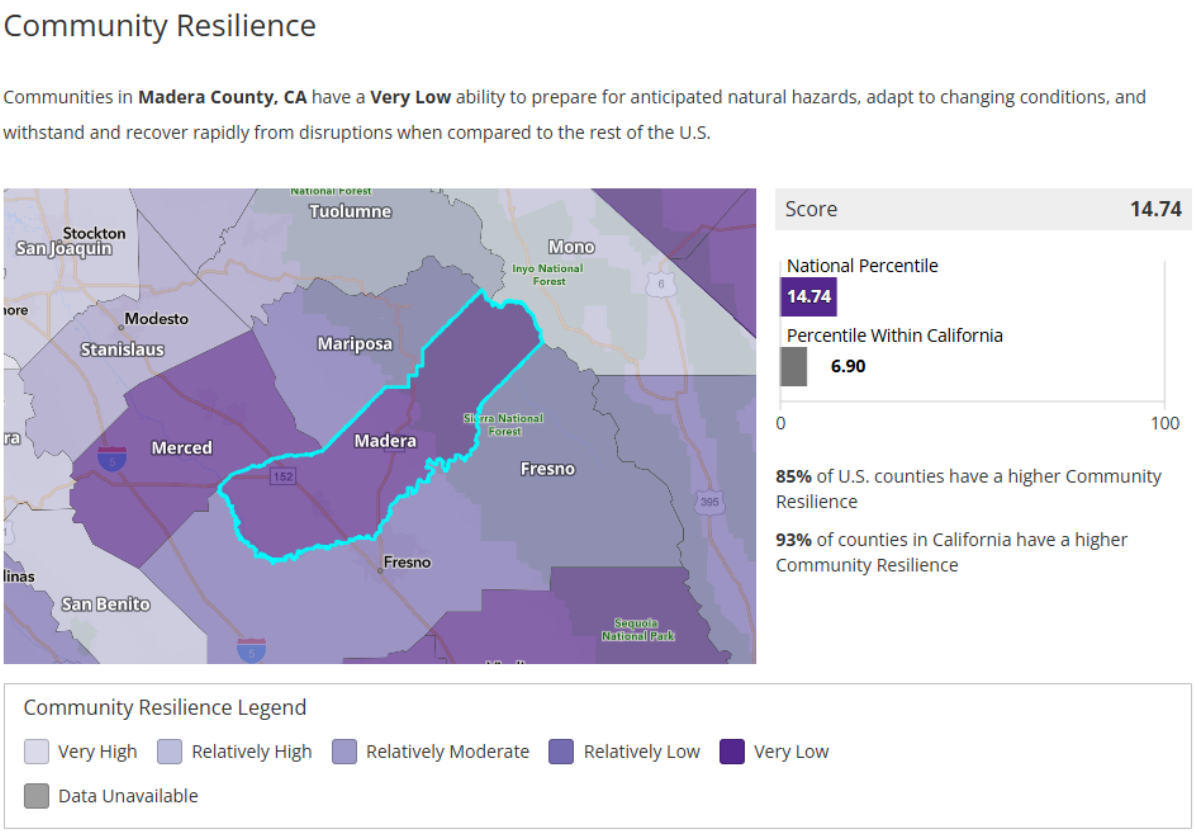
Source: FEMA National Risk Index, retrieved 01/09/2025.

Figure 4-13 FEMA National Risk Index – Social Vulnerability Map and Score for Madera County



Source: FEMA National Risk Index, retrieved 01/09/2025

Figure 4-14 FEMA National Risk Index – Community Resilience Map and Score for Madera County



Source: FEMA National Risk Index, retrieved 01/09/2025.

Local Input

The HMPC noted that the Wildwood Trailer Park near California Highway 41 and the San Joaquin River is an economically depressed area that is at risk to flooding. Additionally, the HMPC noted that due to Madera County being a largely agricultural based county, there is a large segment of the population that is Spanish speaking only. The County recognized the fact they are a special population since they only speak Spanish. The County makes efforts to reach this special population by doing messaging in Spanish language as well as English.

Housing Element Special Populations

The HMPC noted that the Madera County 2024-2032 Housing Element discusses special populations in the County. Households with special housing needs often have greater difficulty in finding decent and affordable housing. As a result, these households may experience a higher prevalence of overpaying, overcrowding, and other housing problems. These are discussed below.

Seniors

The unincorporated County areas have a higher proportion of seniors than the incorporated cities, and the majority own their homes. There are 14,613 seniors in the unincorporated County, about 20 percent of the total population. The County's senior population is 6 percent higher than incorporated cities in Madera County and the statewide senior population.

As mentioned above, seniors may have difficulty finding affordable housing that meets their needs and preferences due to fixed incomes. This is especially true for renters, as they are vulnerable to increasing rents as opposed to homeowners with fixed mortgages. In 2020, approximately 527 senior householders were renters in unincorporated Madera County (2 percent of all renters), and 5,202 senior householders were homeowners (22 percent of all homeowners). The unincorporated areas have a higher percentage of senior homeowners compared to the total households in the incorporated cities. More than half of the senior population for all of Madera County, including renter and owner households, have an income that is above 100 percent the average median income.

Seniors in unincorporated areas of Madera County have especially difficult housing challenges. They may face isolation from public health services and socialization and often have few residential options. A larger percentage of seniors in the unincorporated County areas own their homes compared to the incorporated areas and are likely facing needed home repairs more than incorporated cities.

Farmworkers

Farmworkers are residents whose primary incomes are earned through permanent or seasonal agricultural labor. Due to the seasonal nature of agricultural labor and limited income, farmworkers tend to have difficulty with securing safe and decent housing. Farmworker households tend to have high rates of poverty, live disproportionately in poor housing conditions, have high rates of overcrowding, and have low homeownership rates.

Approximately 9.5 percent of those employed in unincorporated Madera County are farmworkers compared to just two percent of the State. The unincorporated areas of Madera County have a lower percentage of residents who are farmworkers as compared to the incorporated cities. In 2020, 9.5 percent of the labor force in unincorporated Madera County residents were reported to be in the agriculture, forestry, fishing and hunting, and mining industry, which is less than half of the proportion of the agriculture labor force within incorporated cities of Madera County.

More than half of all the workers in farm operations in the county (8,765 workers) are seasonal workers, meaning income is uncertain at varying seasons of the year. Farmworkers at large-scale operations (10 or more employees) were more likely to be seasonally employed than those employed at smaller farming operations. The majority of farm operations with less than ten employees in Madera County are permanent farmworker employment, which is higher than the state average. A higher percentage of farmworkers in the County are seasonal than the state average, where half of the total laborers are seasonal.

According to the United States Bureau of Labor Statistics, in 2023, Madera County workers employed in the farming, fishing, and forestry industry earn a mean hourly wage of $17.16 per hour, which is less than the national mean of workers employed in this industry of $19.22 per hour. The mean annual income of

farming, fishing, and forestry industry workers in Madera County is $35,690. This annual salary is less than the low-income limit for Madera County in 2023.

Persons with Disabilities (including Developmental Disabilities)

Disabilities can prevent a person from taking care of household upkeep and operating a vehicle which may prevent them from accessing important services and resources. Those with severe physical or mental disabilities may require supportive housing, care facilities or home modifications for accessibility. Additionally, those with disabilities that rely on Social Security income may not be able to afford market rate housing or adaptability modifications.

In unincorporated Madera County, those with ambulatory difficulty make up the largest percentage of those with disabilities (49.6 percent) of the total population. The second largest group is those with an independent living difficulty, at 29.6 percent of the total population in the unincorporated area, which is slightly higher than the county's share 31.9 percent. A total of 15,381 residents are living with a disability in unincorporated areas, which is over half of the total number of individuals living with a disability in Madera County (29,782).

In Madera County, the most common developmental disabilities among special education students are learning disabilities (33.4 percent) and speech or language impairments (25.6 percent). Compared to the statewide average, Madera County has a higher percentage of individuals hard of hearing (0.8 percent increase), intellectually disabled (2.6 percent increase), and with a speech or language impairment (4.8 percent increase). These student demographic factors are important in understanding and projecting the future housing and support needs of persons with developmental disabilities, as they indicate a growing demand for specialized services and accessible housing options.

Large Family Households

Large households are defined as households of five or more individuals. Large households often face special challenges in the housing market because they need housing of sufficient size to prevent overcrowding and do not always have sufficient income to purchase or rent such housing, even if it is available. Large households may also result due to multiple generations and extended family members living together to share housing costs.

There are an estimated 4,021 large households in unincorporated Madera County which comprise approximately 17 percent of all occupied households. In comparison, an estimated 28 percent of incorporated County occupied households are large households. In unincorporated Madera County, 27 percent of renters are large households, which indicates a need for more affordable rental units with three or more bedrooms. As of 2020, more than three quarters of unincorporated Madera County's housing units contain three or more bedrooms. While approximately 4,000 households or 17 percent of the total households were large households, only three percent of the housing stock in unincorporated Madera County had five or more bedrooms.

Female-Headed Households

"Female-headed household" describes a household in which an adult female is the sole or main income provider. Female-headed households with children are considered a special housing needs group because household incomes tend to be lower and/or because they have supportive service needs related to housing, such as childcare.

The number and percent of female-headed households in the incorporated and unincorporated county. There are an estimated 4,200 female-headed households in unincorporated County, which is 18 percent of the total households. Of the unincorporated female-headed households, 535 households (24.4 percent percent) earn an income below the poverty level. In comparison to incorporated Madera County, unincorporated Madera County has a higher percentage of total households, but a smaller percentage of female-headed households and families under the poverty level.

In comparison, 21 percent of the total households in the incorporated County are female-headed households and 20 percent earn an income below the poverty level.

Extremely Low-Income Residents

Extremely low-income (ELI) households are defined by the California Department of Housing and Community Development as households with income less than 30 percent of AMI. ELI households have a variety of housing situations and needs. For example, most families and individuals receiving public assistance, such as social security insurance or disability insurance are considered ELI households. 2,315 households in Madera County are ELI households, earning an income below 30 percent of the AMI. More ELI households are renters (57 percent, 1,320 households) compared to owners (43 percent, 995 households). These households may require specific housing solutions such as deeper income targeting for subsidies, housing with supportive services, single-room occupancy, or rent subsidies.

ELI households in Madera County are likely to overpay housing costs, regardless of tenure. According to CHAS 2016-2020 estimates, 70 percent of ELI households that rent are cost burdened, and 83 percent of ELI homeowners are cost burdened, meaning they pay over 30 percent of their income on housing costs. This leaves most ELI residents with little income to spend on food and education, and other basic needs. Based on 2016-2020 CHAS data, households that rent and are considered extremely low-income are likely to have at least one housing problem (defined as housing cost burden greater than 30 percent of income, overcrowding, or without complete kitchen or plumbing facilities). Approximately 80 percent of ELI owner households and 70 percent of ELI renter households reported experiencing at least one housing problem.

Homeless Persons

Homeless individuals and families have perhaps the most immediate housing need of any group. They also have one of the most difficult sets of housing needs to meet, due to both the diversity and complexity of the factors that lead to homelessness, and to community opposition to the siting of facilities that serve homeless clients. According to the 2023 annual homelessness Point-in-Time (PIT) count, conducted by the Fresno-Madera Continuum of Care, homelessness is growing in the region. In 2023, 4,493 people experienced homelessness in Fresno and Madera Counties, a 6.6 percent increase from 2022. The 2023 PIT recorded a near record number of persons experiencing homelessness, a number that has been increasing in Madera

and Fresno counties since 2017. In unincorporated Madera County, 140 residents were counted as homeless, all unsheltered, representing a 155 percent increase in the number of unsheltered (and total) people over 2022 data. The number of unsheltered people in the City of Madera (541) also increased over 2022, by 181 percent. In contrast, Fresno County's unsheltered count increased by 16 percent.

Structures

Structures include buildings used for a variety of purposes and reflect the Madera County Planning Area's existing built environment. Depending on the nature and extent of a hazard event or disaster, all structures may be exposed to some level of risk, where certain buildings or concentrations of buildings are more vulnerable. This section captures the structures, associated land and contents values, and personal property values which comprise the Madera County Planning Area's and unincorporated Madera County's existing built environment.

Parcel and Structure Inventory and Assessed Values

An inventory of structures located within the Madera County Planning Area and unincorporated County was developed utilizing data from the Madera County Assessor's Office. It is based on the 2024 Assessor's data/Parcel layer provided by Madera County GIS. This data represents best available data.

While conducting an inventory of structure assets within the Madera County Planning Area is a key element of this asset inventory, understanding the total assessed value of structures and built environment is a starting point to understanding the overall value of identified assets in the Planning Area. When the total assessed values are combined with potential values associated with other community assets such as area populations, public and private critical infrastructure, historic and cultural resources, and natural resources, and other identified assets, the big picture emerges as to what is potentially at risk and vulnerable to the damaging effects of natural hazards within the Madera County Planning Area.

Methodology

The 2024 Madera County Assessor's data and County Parcel layer was utilized as the basis for the inventory of assessed values for both improved and unimproved parcels within the Madera County Planning Area. This data provides the land and improved values assessed for each parcel, along with key information such as property use. Other Geographic Information Systems (GIS) data, such as jurisdictional boundaries, roads, streams, and area features, was also obtained from Madera County and CalAtlas to support mapping and analysis of the existing built environment.

Data Limitations & Notations

Although based on best available data, the resulting information should only be used as an initial guide to overall values in the Madera County Planning Area. In the event of a disaster, structures and other infrastructure improvements are at the greatest risk of damage. Depending on the type of hazard and resulting damages, the land itself may not suffer a significant loss. For that reason, the values of structures and other improvements are of greatest concern. Also, it is critical to note a specific limitation to the assessed values data within the Madera County Planning Area, created by Proposition 13. Instead of adjusting property values annually, no adjustments are made until a property transfer occurs. As a result,

overall property value information is likely significantly low and does not reflect current market, replacement, or true potential loss values for properties within the Madera County Planning Area.

Another limitation to this data is found in the Williamson Act, also known as the California Land Conservation Act of 1965, that enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. When the County enters into a contract with the landowners under the Williamson Act, the landowner agrees to limit the use of the land to agriculture and compatible uses for a period of at least ten years and the County agrees to tax the land at a rate based on the agricultural production of the land rather than its real estate market value. This further affects the County's overall values for assessed taxable lands and structures.

Property Use Categories

The Madera County Planning Area Assessor data included property use categories which provides detailed descriptive information about how each property is generally used, such as residential, commercial, or industrial. The property use codes were refined and categorized into the following property use categories and linked back to the Assessor data. The final property use categories for the Madera County Planning Area include:

- Agricultural
- Commercial
- Government
- Industrial
- Institutional
- Recreational
- Residential
- ROW
- Utilities
- Unknown

Once property uses were grouped into categories, the number of total and improved parcels, land and improved (structure) values, and personal property values were inventoried for the Madera County Planning Area by property use.

Estimated Content Replacement Values

The Madera County Planning Area assigned property use categories were used to develop estimated content replacement values (CRVs) that are potentially at loss from hazards. FEMA's standard CRV factors, derived from Hazus, were utilized to develop more accurate loss estimates for the total assets inventory and for all mapped hazard analyses. FEMA's CRV factors estimate content values as a percent of improved structure value by property use. Table 4-8 shows the breakdown of the different property uses in the Madera County Planning Area and their estimated CRV factors.

Table 4-8 Madera County Planning Area – Content Replacement Factors by Property use

Madera County Property Use Categories	Hazus Property Use Categories	Hazus Content Replacement Values
Agricultural	Agricultural	100%
Commercial	Commercial	100%
Government	Government	100%
Industrial	Industrial	150%
Institutional	Institutional	100%
Recreational	Recreational	100%
Residential	Residential	50%
ROW	Roads	100%
Utilities	Utilities	100%
Unknown	Unknown	100%

Source: Hazus 6.1

Parcel and Structure Asset Inventory with Values Results

Values associated with land, improved structures, and personal property values were identified and summed in order to determine total assessed values at risk in the Madera County Planning Area. Together, the land and improved structure values make up the majority of assessed values associated with each identified parcel or asset. Improved parcel counts were based on the assumption that a parcel was improved if a structure value was present. Content replacement values were then added to the assessed values, as described below, to provide an estimate of total values at risk in the Planning Area.

Table 4-9 shows the total values or exposure for the entire Madera County Planning Area broken out by jurisdiction. The values for unincorporated Madera County are broken out by property use category and are provided in Table 4-10. More information on parcels and structures at risk for each jurisdiction can be found in their respective annexes.

Table 4-9 Madera County Planning Area – Total Parcels and Structures by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla	4,933	4,010	$286,291,765	$869,142,910	$96,548,624	$523,761,768	$1,775,745,067
City of Madera	17,088	15,424	$1,011,705,823	$3,385,843,467	$135,493,860	$2,164,220,371	$6,697,263,521
Unincorporated Madera County	44,030	31,082	$4,413,249,659	$8,289,786,830	$774,365,637	$5,537,188,140	$19,014,590,266
Grand Total	**66,051**	**50,516**	**$5,711,247,247**	**$12,544,773,207**	**$1,006,408,121**	**$8,225,170,279**	**$27,487,598,854**

Source: 2024 Madera County Parcel/Assessor Data

Table 4-10 Unincorporated Madera County – Total Parcels and Structures by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Agricultural	8,330	5,965	$1,790,242,244	$1,470,665,745	$221,257,851	$1,470,665,745	$4,952,831,585
Commercial	1,224	716	$309,155,425	$869,245,571	$244,257,907	$869,245,571	$2,291,904,474
Government	1,246	8	$2,180,952	$893,629	$0	$893,629	$3,968,210
Industrial	292	135	$42,098,321	$186,912,607	$295,278,647	$280,368,911	$804,658,486
Institutional	128	84	$10,571,280	$52,370,018	$953,701	$52,370,018	$116,265,017
Recreational	49	18	$3,994,969	$4,270,490	$1,361,847	$4,270,490	$13,897,796
Residential	31,864	24,081	$2,242,188,274	$5,692,109,987	$9,699,594	$2,846,054,994	$10,790,052,849
Utilities	281	60	$2,885,859	$10,628,522	$1,542,810	$10,628,522	$25,685,713
Right of Way	253		$22,559	$0	$0	$0	$22,559
Unknown	363	15	$9,909,776	$2,690,261	$13,280	$2,690,261	$15,303,578
Unincorporated Madera County Total	**44,030**	**31,082**	**$4,413,249,659**	**$8,289,786,830**	**$774,365,637**	**$5,537,188,140**	**$19,014,590,266**

Source: 2024 Madera County Parcel/Assessor Data

Critical Facilities and Infrastructure

Beyond just structures, it is important to identify the critical facilities and infrastructure that are critical for life safety and the economy. Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population.

For purposes of this plan, a critical facility is defined as:

> ***Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.***

A critical facility is classified by the following categories: (1) Essential Services Facilities, (2) At-risk Populations Facilities, (3) Hazardous Materials Facilities.

- **Essential Services Facilities** – include, without limitation, public safety, emergency response, emergency medical, designated emergency shelters, communications, public utility plant facilities and equipment, and government operations. Sub-Categories:

- ✓ Public Safety - Police stations, fire and rescue stations, emergency operations centers
- ✓ Emergency Response - Emergency vehicle and equipment storage and essential governmental work centers for continuity of government operations.
- ✓ Emergency Medical - Hospitals, emergency care, urgent care, ambulance services.
- ✓ Designated Emergency Shelters.
- ✓ Communications - Main hubs for telephone, main broadcasting equipment for television systems, radio, and other emergency warning systems.
- ✓ Public Utility Plant Facilities - including equipment for treatment, generation, storage, pumping and distribution (hubs for water, wastewater, power, and gas).
- ✓ Essential Government Operations - Public records, courts, jails, building permitting and inspection services, government administration and management, maintenance and equipment centers, and public health.

- **At Risk Population Facilities** – include, without limitation, pre-schools, public and private primary and secondary schools, before and after school care centers with 12 or more students, with 12 or more children, group homes, and assisted living residential or congregate care facilities with 12 or more residents.
- **Hazardous Materials Facilities** – include, without limitation, any facility that could, if adversely impacted, release hazardous material(s) in sufficient amounts during a hazard event that would create harm to people, the environment and property.

Note: The Hazardous Materials Facilities, while considered critical facilities for purposes of this Plan Update, are not mapped in this Plan due to the lack of an available GIS layer. In addition to the mapped critical facilities, it should further be noted that additional critical facilities, including infrastructure, utilities, and others have been identified for the Madera County Planning Area but are not included in the mapping and inventory due to privacy and security concerns.

Mapped critical facilities in the Madera County Planning Area are shown on Figure 4-15. A summary of critical facilities in the Planning Area is shown in Table 4-11 and detailed in Table 4-12. Additional details of individual critical facilities can be found in Appendix F of this Plan Update.

Figure 4-15 Madera County Planning Area – Critical Facilities

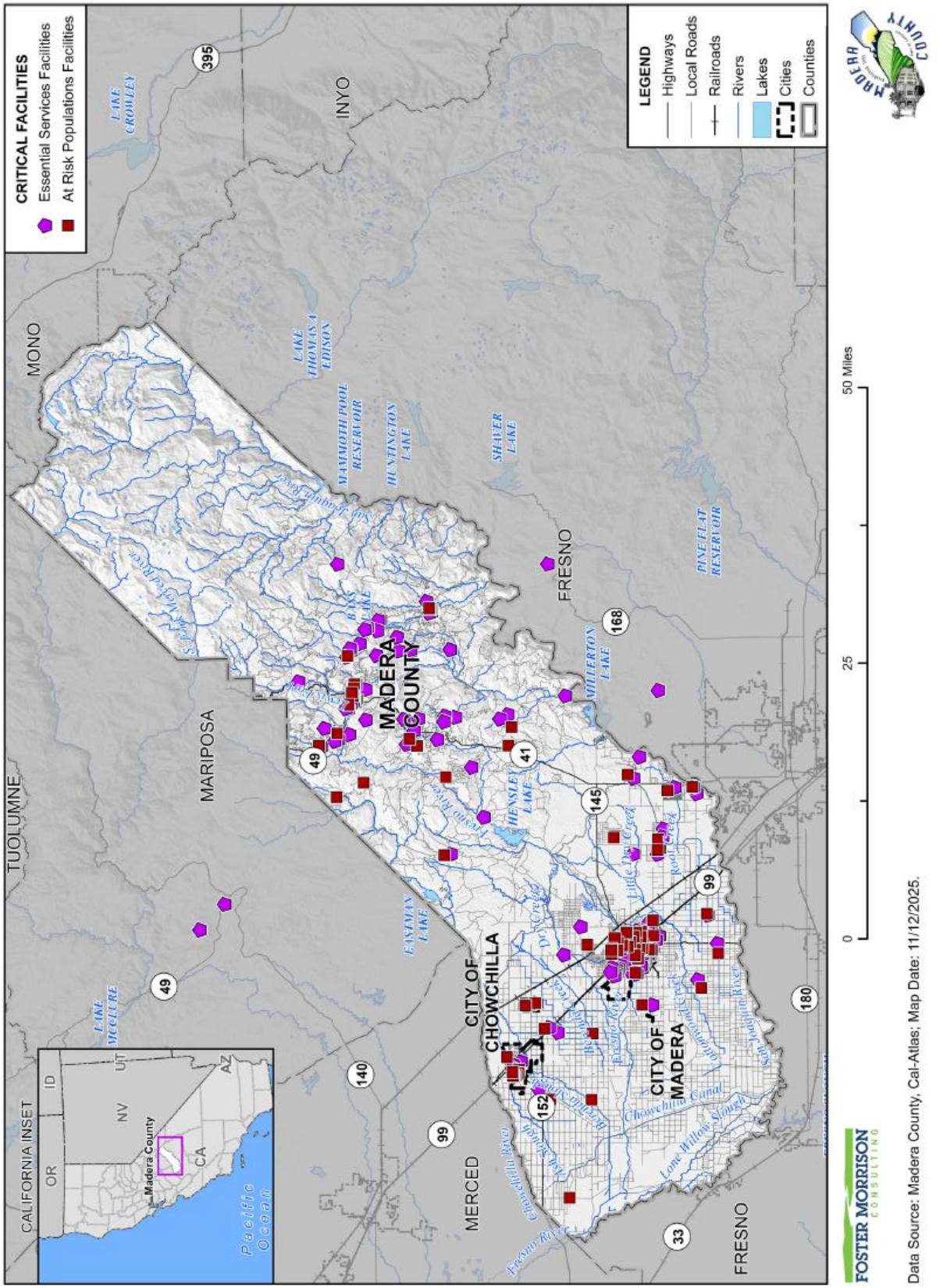


Table 4-11 Madera County Planning Area – Critical Facilities by Jurisdiction and Critical Facility Category

Jurisdiction /Critical Facility Category	Facility Count
City of Chowchilla	
Essential Services Facilities	10
At Risk Populations Facilities	9
City of Chowchilla Total	**19**
City of Madera	
Essential Services Facilities	103
At Risk Populations Facilities	29
City of Madera Total	**132**
Unincorporated Madera County	
Essential Services Facilities	81
At Risk Populations Facilities	48
Unincorporated Madera County Total	**129**
Auberry (Fresno County)	
Essential Services Facilities	2
Auberry (Fresno County) Total	**2**
Mariposa (Mariposa County)	
Essential Services Facilities	2
Mariposa (Mariposa County) Total	**2**
Grand Total	**284**

Source: Madera County GIS

Table 4-12 Madera County Planning Area – Critical Facilities by Jurisdiction, Critical Facility Category, and Facility Type

Jurisdiction /Critical Facility Category	Critical Facility Type	Facility Count
City of Chowchilla		
Essential Services Facilities	Community Services	2
	Fire Station	3
	Public Safety Facility / 911 PSAP	1
	Public Utility Plant Facilities	1
	Community Center	1
	Communications	2
	Total	**10**
At Risk Populations Facilities	School	5
	Health / Medical	2
	Jail / Prison	2

Jurisdiction /Critical Facility Category	Critical Facility Type	Facility Count
	Total	**9**
City of Chowchilla Total		**19**
City of Madera		
Essential Services Facilities	Cogeneration Power	5
	Community Services	6
	Emergency Dispatch Center	1
	Fire Command Center	1
	Fire Station	4
	Pavilion	1
	Police	3
	Wastewater Lift Station	26
	Water Treatment	49
	Health / Medical	1
	Communications	5
	Jail / Prison	1
	Total	**103**
At Risk Populations Facilities	Community Church	1
	Community Recreation Center	2
	School	26
	Total	**29**
City of Madera Total		**132**
Unincorporated Madera County		
Essential Services Facilities	Fire Station	15
	Police	1
	Rural Emergency Operations	1
	Drinking Water Infrastructure	31
	Sanitary Sewer System Infrastructure	12
	Health / Medical	1
	Community Center	9
	Communications	8
	Treatment Plant	3
	Total	**81**
At Risk Populations Facilities	School	45
	Health / Medical	3
	Total	**48**
Unincorporated Madera County Total		**129**

Jurisdiction /Critical Facility Category	Critical Facility Type	Facility Count
Auberry (Fresno County)*		
Essential Services Facilities	Communications	2
	Total	**2**
Auberry (Fresno County) Total		**2**
Mariposa (Mariposa County)*		
Essential Services Facilities	Fire Command Center / Dispatch Center	1
	Communications	1
	Total	**2**
Mariposa (Mariposa County) Total		**2**
Grand Total		**284**

Source: Madera County GIS

* While the Critical Facility Inventory includes 4 critical facilities located in adjacent counties, this data is only included in this master inventory total. These 4 facilities are not included in the critical facility hazard analyses for mapped hazards in this LHMP as they fall outside of the Planning Area and the hazard datasets utilized for Madera County.

Community Lifelines

Assessing the vulnerability of the Madera County Planning Area to natural hazards and disasters also involves reviewing and inventorying the community lifelines in place that could be affected. It is important to include these items in hazard discussions as the continuous operation of critical government and business functions is essential to human health and safety and/or economic security. Information on community lifelines include:

- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.
- FEMA has developed a construct for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.
- The integrated network of assets, services, and capabilities that provide lifeline services are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function.
- When disrupted, decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to stabilize the incident.

For this Plan, Community Lifelines includes the following (as defined by FEMA):

- **Safety and Security** – Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety
- **Food, Hydration, Shelter** – Food, Water, Shelter, Agriculture
- **Health and Medical –** Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management
- **Energy –** Power Grid, Fuel

- **Communications** – Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch
- **Transportation** – Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime
- **Hazardous Material –** Facilities, HAZMAT, Pollutants, Contaminants
- **Water Systems** – Potable Water Infrastructure, Wastewater Management

In the Madera County Planning Area, these community lifelines are all in place and functional as part of regular government operations. It should also be noted that these community lifelines collectively include many of the individual components of other community assets inventoried for this LHMP including structures and critical facilities and infrastructure.

After review of the list of hazards from Table 4-3, it was determined that most hazards that occur would not overwhelm the community lifelines in the County. A matrix was put together in Table 4-13 for the hazards of concern in the Madera County Planning Area. As shown, only earthquake and wildfire are thought be able to (temporarily) overwhelm the community lifelines in the County. Events associated with the remaining hazards would likely not overwhelm community lifelines.

Note: This inventory of community lifelines and hazard analysis only occurs in this overall asset inventory for Madera County. To limit redundancy, it is not discussed further in the hazard profiles and vulnerability assessments in Section 4.3 below.

Table 4-13 Madera County Planning Area – Hazards and their Potential to Overwhelm Community Lifelines

Hazard	Potential to Overwhelm Community Lifelines	Hazard	Potential to Overwhelm Community Lifelines
Severe Weather: Extreme Cold, Freeze, and Snow	Limited	Drought and Water Shortage	Limited
Severe Weather: Extreme Heat	Limited	Earthquake	High
Severe Weather: Heavy Rains and Storms	Limited	Flood: 1%/0.2% Annual Chance	Moderate
Severe Weather: High Winds and Tornado	Limited	Flood: Localized Flooding	Limited
Agricultural Hazards	Limited	Hazardous Materials Transport	Limited
Climate Change	Limited	Landslide, Mudslide, and Debris Flow	Limited
Dam Failure	Moderate	Wildfire	High

Source: Madera County Planning Team

Efforts to mitigate potential impacts to community lifelines are key to building resilience. These community lifelines connect to the sectors in the National Mitigation Framework and the Recovery Support Functions under the National Disaster Recovery Framework; the same agencies and departments that support these sectors also often support community lifelines and the recovery mission.

Specific information on these community lifelines in the Madera County Planning Area and how they may be affected by a hazard event or disaster are discussed in more detail in each jurisdictional annex to this Base Plan.

Natural, Historical, and Cultural Resources

Assessing the vulnerability of the Madera County Planning Area to disaster also involves inventorying the natural, historic, and cultural assets of the area. This step is important for the following reasons:

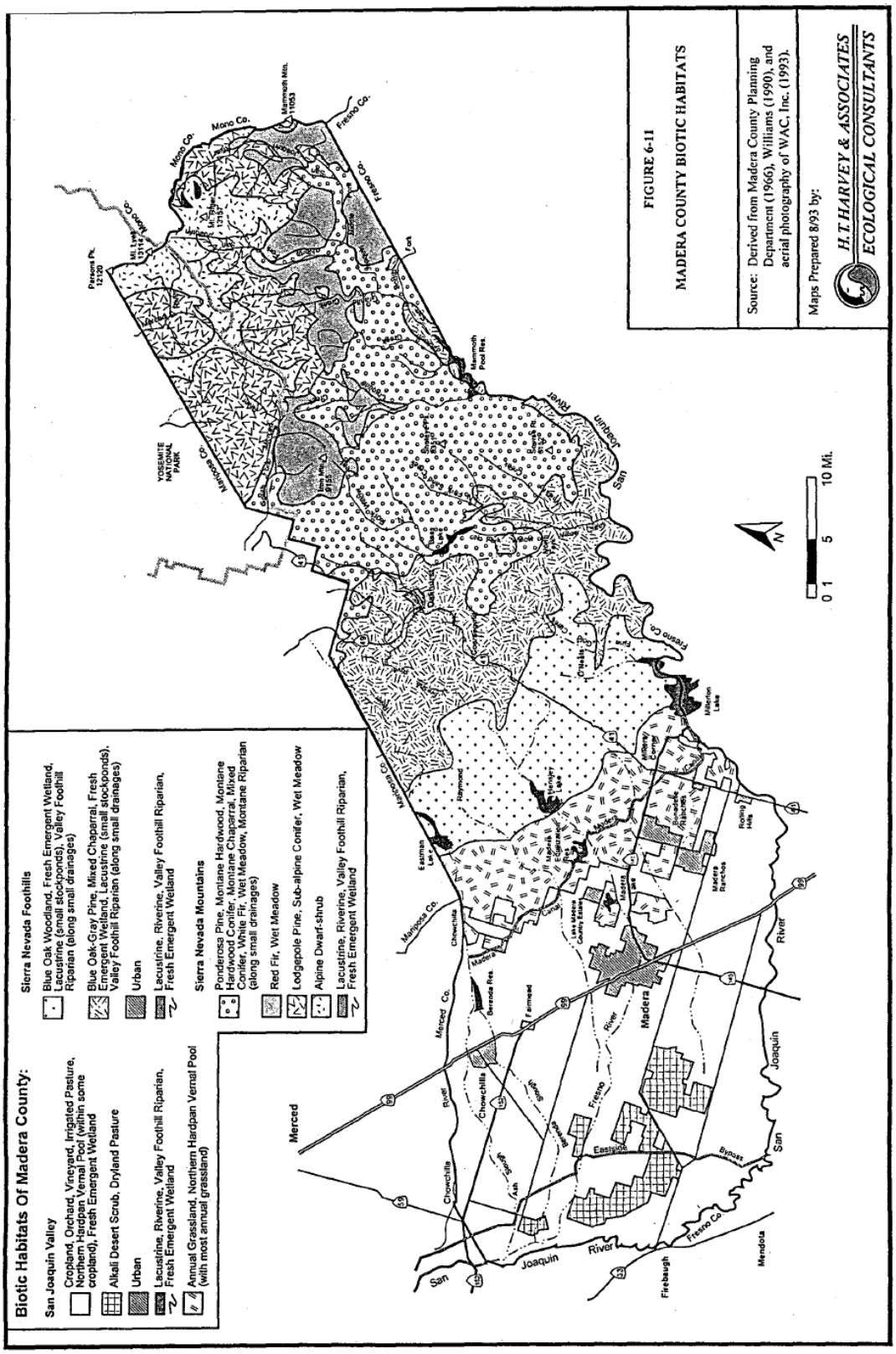
- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate 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, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

Natural resources are important to include in cost/benefit 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 resource assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as reducing the force of and storing floodwaters.

The General Plan Background Report noted that Madera County can be divided into three sections. Roughly one-third of the County lies within the San Joaquin Valley. In Madera County, this valley extends from the San Joaquin River in the west to the Sierra foothills in the east. The central third of the county lies within the foothills of the Sierra Nevada. Daulton, the Madera Equalization Reservoir, and the intersection of Highways 41 and 145 are all located at the toe of the western foothills. Ahwahnee, Oakhurst and North Fork are all located just west of the transition from foothill to the more montane terrain of the Sierra Nevada. The eastern third of the county is rugged mountainous terrain extending to the crest of the Sierra. This section describes the biotic habitats described in the General Plan Background Report that are located in Madera County, which can be seen on Figure 4-16.

Figure 4-16 Madera County Biotic Habitats



Source: Madera County General Plan Background Report

San Joaquin Valley Habitats

The biotic habitats of the San Joaquin Valley have been substantially modified by agriculture, urban development, and the diversion of water from natural drainages, particularly the three large rivers. Native habitats may still be found in scattered locations. Remnant riparian forests and woodlands may still be found along portions of the San Joaquin and Fresno Rivers. Narrow, and frequently discontinuous stands of riparian scrub may still be found along some seasonal drainages. Native scrub and alkali grassland are still associated with some alkaline soils just east of the San Joaquin River. Croplands, orchard-vineyards, pastures, and urban and suburban centers have, however, replaced most native habitats. Even so, western Madera County continues to provide important habitat for resident and migratory wildlife species. Wildlife adapted to grasslands must now make do with suitable croplands. Migratory wildlife still use remaining riparian habitats as avenues for movement through the County. Riparian woodlands and annual grasslands still provide wintering, breeding, and foraging habitat for terrestrial vertebrates, including several listed as threatened or endangered.

- **Cropland** – Leveled agricultural fields and ancillary facilities (e.g., roads, residences, corporation yards) occupy much of the western third of Madera County. In addition to cultivated crops, weedy non-native annual and biennial plants are favored by the yearly disturbance associated with ploughing, discing, harrowing, and harvesting. Common agricultural practices do not favor California's native flora.
- **Orchard – Vineyard** – Orchards and vineyards occupied approximately 157,000 acres of the county in 1992. Common crops included almonds, pistachios, nectarines, figs, and table, wine and raisin grapes. Most orchards and vineyards are kept disced during the growing season, providing little opportunity for the development of an herbaceous understory.
- Pasture – Many of the acres of the County's agricultural lands were used for pasture. Some pastures are flood, irrigated and support a mix of perennial grasses and forbs suitable for livestock. Pastures provide many of the same values for terrestrial vertebrates as annual grassland (see discussion below).
- **Annual Grassland** – Annual grasslands occur along the eastern edge of the San Joaquin Valley between the Madera Canal and a line formed by Eastman, Hensley and Millerton Lakes. This grassland continues into the Sierra foothills, forming the understory of blue oak and blue oak-digger pine woodland. A scattering of grassland habitats still remains immediately west of the Madera Canal, but most of this habitat has been converted to croplands, vineyards, orchards, and residential subdivisions. Non-native annual grasses favored by livestock grazing provide most of the vegetative cover in annual grasslands.
- **Northern Hardpan Vernal Pool** – Northern hardpan vernal pools are confined to soils with a defined iron-silica hardpan or claypan layer one to two feet below the soil surface. Vernal pools provide habitat for a flora uniquely adapted to them. Although some aquatic plants occur in them, most vascular plants are emergent or reach maturity at the very margins of gradually receding pools. The phenology (blooming period) of some vernal pool plants is such that bands or concentric rings of different blooming species may be visible around the pools in April and May.
- **Valley Foothill Riparian** – Riparian habitats are associated with the bed, banks, and floodplains of rivers and creeks. The proximity of surface and subsurface water favors the growth of mesic vegetation (vegetation adapted to moist soils or a high water table) not found in drier upland areas. A variety of trees and shrubs provide multiple vegetation layers with an overstory of cottonwoods, oaks and sycamores, and an understory of willow thickets and other shrubs. Lianas of native grape vine often grow into the highest canopy layers. The best riparian habitat now occurs along the San Joaquin River

in scattered locations below Friant Dam downstream to Firebaugh. Open stands of large valley oaks) and California sycamores occur on the river's floodplain. With the exception of a one-mile stretch immediately below Buchanan Dam, riparian vegetation is very sparse or absent along the former bed of the Chowchilla River. Riparian vegetation below the dam consists primarily of Fremont's cottonwoods and red and sandbar willows. Dense riparian woodland can be found immediately below Hensley Lake on the Fresno River. Fremont's cottonwoods, red willows, sandbar willows, and goodding's willows are species typically found within the river's bed and banks. Trees of the upper bank are largely restricted to valley oaks. Much of the former flood plain of the Fresno River still supports an open woodland of valley oaks and Fremont's cottonwoods, with red willows well established in low-flow meander channels.

- **Alkali Desert Scrub** – Also known as chenopod scrub, or alkali sink scrub, alkali desert scrub is a native habitat confined to western Madera County, primarily north of Avenue 7 between the San Joaquin River and Road 21. The alkaline soils and seasonally perched water on a shallow claypan severely limit the plants that can survive here.
- **Urban** – Urban habitats of Madera County are, for the purposes of this analysis, towns and subdivisions where native habitats have been substantially modified by homes and businesses. Such areas include towns such as Chowchilla and Madera. They also include subdivisions of relatively small lots such as Bonadelle Ranchos, Madera Ranchos, and Valley Lake Ranchos. Undeveloped lots in these subdivisions still support other habitats such as annual grassland and vernal pools.
- **Lacustrine** – Lakes, in the form of reservoirs, are a minor habitat in the San Joaquin Valley portion of Madera County. Berenda Reservoir, Madera Lake, and various small farm or stock ponds provide year-round to seasonal open water habitat. Lacustrine habitats function in a similar manner to riverine habitats in providing habitat for wildlife (see below).
- **Riverine** – The aquatic habitat associated with rivers is now confined to the San Joaquin River between Friant Dam and the Madera and Merced County line. Downstream of Firebaugh, flows in the river are greatly reduced. The river is fringed by a narrow band of riparian habitat and discontinuous stands of emergent vegetation. The San Joaquin River is home to many fish including native species. Riverine habitat is important to reptiles and amphibians occurring in adjacent riparian habitats. The San Joaquin River provides habitat for several birds. Mammals from surrounding areas utilize riverine habitat as a source of drinking water.

Sierra Nevada Foothill Habitats

The foothills of the Sierra Nevada comprise gentle rolling to rugged terrain between the elevations of 400 to 3,000 feet. Native foothill habitats have been modified by grazing and low density residential development, but, with the possible exception of riparian habitats, their structure and floristic elements remain much the same as a half century ago. Foothill habitats are used by resident native wildlife for breeding and foraging. They provide important wintering habitat for deer and various predators which summer at higher elevations. Riparian corridors, although degraded by grazing, fragmented by development, or dewatered for residential and golf course irrigation, continue to serve as important movement corridors for migratory species. Foothill habitats are, therefore, important connecting links between the San Joaquin Valley and the Sierra.

- **Blue Oak Woodland** – The low foothills of the Sierra Nevada support an open woodland of blue oaks (Quercus douglasii). This woodland is found between the elevations of 400 and 1,500 feet. Wildlife

use of blue oak woodland habitats is, in many ways, similar to that of annual grassland. Oak trees, however, provide cover, breeding and foraging habitat for a number of additional species.

- **Blue Oak-Digger Pine** – An association of blue oaks and digger pines occurs upslope of the blue oak woodland at elevations ranging from 1,500 to nearly 3,000 feet National Geodetic Vertical Datum. At the lower elevations, this association includes patchy to occasionally dense stands of blue oaks, digger pines, interior live oaks, and California buckeye. Above 2,000 feet, blue oaks may be replaced by valley oaks. In the Oakhurst Basin, valley oaks of three to four feet in diameter are not uncommon.
- **Mixed Chaparral** – Mixed chaparral is an association of various shrub species adapted to hot dry slopes at 2,000 to 3,000 feet in elevation. Typical of these shrubs are thick leathery evergreen leaves. This is a fire adapted community. Mature stands of mixed chaparral, with considerable dead wood and flammable vegetation, are very susceptible to explosively-hot, fast-moving fires. Many chaparral species have the ability to resprout from burned stumps. Extensive stands of this habitat are intermixed with blue oak-digger pine habitat in the Oakhurst Basin and south of Bass Lake, Thornberry Mountain, and Ward Mountain (near Fine Gold) on south-facing slopes.
- **Valley Foothill Riparian** – Narrow but often lush corridors of riparian trees are associated with foothill rivers and creeks. Riparian associations are found along the channels of the San Joaquin, Chowchilla, and Fresno Rivers, Coarsegold Creek, Fine Gold Creek, Miami Creek, Willow Creek, and their tributaries. The width and overall quality of these riparian corridors varies considerably. Many creek channels, such as Coarsegold Creek upstream from the town of Coarsegold, are narrow and deeply incised such that only a narrow band of riparian trees could become established on the channel banks. At greater distances from the Creek, oaks and pines are located on steep slopes too far from the water that riparian trees require. Yet Fine Gold Creek, in places, provides a broad floodplain 200 to300 feet across, on which a dense riparian forest has become established.
- **Lacustrine** – Eastman, Hensley, and Millerton Lakes are large reservoirs located in the lower foothills on the Chowchilla, Fresno, and San Joaquin Rivers respectively. Other impoundments include Kerckhoff and Redinger Lakes, small recreational lakes created in Yosemite Lakes Park and Indian Lakes Estates, and innumerable small stock ponds throughout the foothills. Though these reservoirs are all man-made, they support several important wildlife resources.
- **Riverine** – Three rivers descend from the Sierra Nevada through the foothills of Madera County. The Chowchilla and Fresno Rivers provide seasonal riverine habitat upstream of Eastman and Hensley Lakes. These rivers are reduced to negligible flows during the late summer, especially during drought years. The San Joaquin River upstream of Millerton, Kerckhoff, and Redinger Lakes drains a much larger watershed than the previous two rivers. This watershed, which encompasses the highest peaks of the Sierra Nevada, collects considerable snow during the winter. The San Joaquin River therefore sustains significant flows throughout the summer. The wildlife use of foothill riverine habitats is similar to riverine habitats on the valley floor, though many of the introduced warm-water fish species may be absent.
- **Fresh Emergent Wetland** – Fresh emergent wetlands of the foothills are much like those of the San Joaquin Valley. Emergent vegetation in the form of cattails and creeping spikerush may be found on the margins of many small farm ponds and small recreational lakes. Wildlife species using these wetlands are similar to those using the emergent wetlands of the San Joaquin Valley.
- **Urban** – Urban habitats are confined to Oakhurst, North Fork, and Coarsegold. Very small areas of urban development may be found in Raymond, O'Neals, and various small subdivisions such as Goldside.

Sierra Nevada Mountain Habitat

The Sierra Nevada is a patchwork of biotic habitats. For example, the area depicted as mixed conifer is really a mosaic of habitats including ponderosa pine, montane hardwood, montane hardwood-conifer, white fir, Sierran mixed conifer, montane chaparral, lacustrine, and riverine. The spatial relationships of these habitats has much to do with elevation, aspect (e.g., north-facing, south-facing slopes), logging, and fire history. Habitats of the Sierra are the least altered by agricultural and residential development of all the biotic habitats of Madera County. Yet, the fragmentation of movement corridors in the San Joaquin Valley and Sierra foothills, the loss of foothill wintering habitat from residential development, the damming of rivers and streams, and, potentially, the high levels of air pollution, all have adverse effects on the fish and wildlife resources of the Sierra Nevada.

- **Ponderosa Pine** – Ponderosa pine forest occurs in Madera County from 3,000 feet to 5,000 feet in elevation, or somewhat higher on favored south-facing slopes. Good examples of this habitat can be seen in the vicinity of Bass Lake, north-facing slopes of Thornberry Mountain, and the upper watershed of Little Fine Gold Creek near Teaford Meadows. In areas of frequent low-intensity forest fires, this habitat is characterized by open stands of mature ponderosa pines. In Madera County, this habitat is more frequently made up of relatively dense stands of second growth trees.
- **Montane Hardwood** – Steep-sided and rocky south-facing slopes at elevations ranging from 3,500 to 6,000 feet in elevation often support extensive stands of canyon live oak, and, at somewhat higher elevations, California black oak. One of the best examples of montane hardwood may be seen on Lewis Creek along the short trail to Corlieu Falls, where canyon live oaks provide a nearly closed canopy on a steep east-facing slope. Small stands of California black oaks may be seen in the vicinity of Sierra Sky Ranch, Mudge Ranch, and along the Beasore and Mammoth Roads.
- **Montane Hardwood Conifer** – This habitat is a closed canopy forest of the same species listed under "montane hardwood". It occurs at elevations ranging from 3,500 feet to 6,000 feet in elevation. It is differentiated from the montane hardwood by the mix of conifers (ponderosa pine, incense cedar, sugar pine, and white fir), which provide at least one-third of the canopy, to hardwoods (California black oaks and canyon live oaks) which also provide at least one-third of the canopy. This habitat is evident on the north side of Goat Mountain above Bass Lake, along portions of Highway 41 between Yosemite Forks and Fish Camp, and on both the Beasore and Mammoth Roads.
- **Montane Chaparral** – Montane chaparral, like mixed chaparral of lower elevations, is dominated by shrubs of 1 to 10 feet in height. This plant association may occur on rocky south-facing slopes unsuited to the establishment of trees, or in a variety of other habitats recently disturbed by fire or logging. Montane chaparral can form a nearly impenetrable layer of shrubby vegetation that makes it ideal cover for many species of wildlife.
- **Mixed Conifer** – Mixed conifer is a structurally diverse (many canopy layers), sometimes dense closed canopy forest which, in Madera County, occurs at elevations ranging from 4,000 feet to 6,000 feet. Overstory species are generally confined to conifers like ponderosa pine, sugar pine, incense cedar, and white fir, but scattered California black oaks are not uncommon. In open mixed conifer forest understory species may include Pacific dogwood, mountain misery, deer brush, snow bush, and chinquapin. This habitat is evident in various locations on Highway 41 between Cedar Valley and Fish Camp, along the Beasore Road, the Sky Ranch Road, and others above 4,000 feet in elevation. The structural diversity of this habitat favors a diversity of wildlife, particularly birds.
- **White Fir** – White fir forest occurs within the mixed conifer forest, frequently on north-facing slopes between 5,000 and 7,000 feet in elevation. White firs are the dominant, and in some cases only, tree

species. White firs readily regenerate in their own shade, so dense thickets of young white firs are often intermixed with mature trees where fire has been excluded for many years. Wildlife use of white fir habitats in Madera County is generally similar to that described for mixed conifer above.

- **Red Fir** – The distribution of red fir forest in Madera County is limited to elevations of 7,000 to 9,000 feet. Red fir forest may be observed along the Beasore Road between the Chilkoot Lake Road and Beasore Meadows and along much of the Scenic Road from Muglers Meadow to McCreary Meadow. As with white fir, wildlife use of this habitat is expected to be similar to that described for mixed conifer.
- **Lodgepole Pine** – In Madera County, Lodgepole pine forest is associated with meadow and creek margins, or high rocky terrain above the red fir forest. The distribution of this habitat is generally confined to elevations of 7,000 to more than 9,000 feet. Examples of this habitat may be seen along Chiquita and Granite Creeks and in Clover Meadow. Lodgepole pine forests, because of lower structural diversity, are generally lower in number of animal species than other forest types.
- **Subalpine Conifer** – Subalpine conifer, the wooded habitat of some of the highest elevations of eastern Madera County (9,500 to 11,000 feet), is an open woodland occurring in thin rocky soils. This habitat is associated with the main crest of the Sierra, the Ritter Range, the Clark Range, and the high peaks on the eastern boundary of Yosemite National Park. The subalpine conifer habitat, probably because of its harsher climatic conditions and the sparseness of the vegetation, is generally low in wildlife diversity.
- **Alpine Dwarf-shrub** – Alpine dwarf-shrub occurs above 10,000 feet in elevation. In Madera County, this habitat can be found above the subalpine conifer habitat described above. Like Subalpine conifer habitats, alpine dwarf-shrub has a harsh climate, short growing season, and sparse vegetation.
- **Wet Meadow** – Wet meadows occur in eastern Madera County between 4,000 and 10,000 feet in elevation. Trees are generally absent from these meadows. Wet meadows of Madera County can readily be observed along Willow Creek (Soquel and Texas Flat campgrounds), and along the Beasore Road at Beasore Meadow, Muglers Meadow, Jackass Meadow, and Clover Meadow. Meadows and meadow edges support a number of wildlife species. Many insects breed in this moist habitat.
- **Montane Riparian** – Most montane creeks and rivers support a narrow band of riparian trees and shrubs; This narrow band widens along slower moving creeks lacking a deeply incised channel (a condition observed in broad meadows). Though riparian areas are generally narrower in the montane portions of the county than at lower elevations, they still are important movement and migration corridors for mule deer and other wildlife.
- **Riverine** – The aquatic habitat of the many perennial creeks of Madera County may be considered riverine. Mostly, seasonal high water associated with melting snow, has sufficient velocity to transport gravels, cobbles, and, in some cases, boulders, which severely scour channel beds. Therefore, montane stream beds are usually devoid of vegetation.
- **Lacustrine** – A considerable number of lakes can be found at the higher elevations of eastern Madera County. Glacial in origin, these lakes are frozen and covered with snow during the winter and spring. Many are quite small, although the largest, such as Thousand Island and Garnet, each occupy several hundred acres. All natural lakes in Madera County are found above 7,000 feet in elevation. Numerous reservoirs, the largest of which are Bass Lake and Mammoth Pool, are located at lower elevations and usually do not freeze in the winter. Mountain lakes are important sources of water for many wildlife species.

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.

The California Natural Diversity Database, a program that inventories the status and locations of rare plants and animals in California, was queried to create an inventory of special status species in Madera County. A summary list of these species is found below in Table 4-14. Appendix E lists the name, federal status, state status, California Department of Fish and Wildlife (CDFW) status, and the California Rare Plant rank of species in Madera County.

Table 4-14 Madera County Planning Area – Summary of Special Status Species

Type	Number
Animals - Amphibians	9
Animals - Birds	34
Animals - Crustaceans	5
Animals - Fish	6
Animals - Insects	12
Animals - Mammals	26
Animals – Mollusks	2
Animals – Reptiles	5
Community – Aquatic	3
Community – Terrestrial	6
Plant – Bryophytes	7
Plants – Lichens	1
Plants – Vascular	82

Source: California Natural Diversity Database. Retrieved January 2025.

Wetlands

Wetlands are habitats in which soils are 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 considered to be waters of the United States and are subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE) as well as the CDFW. Where the waters provide habitat for federally endangered species, the U.S. Fish and Wildlife Service (FWS) may also have authority.

Wetlands are a valuable natural resource for communities providing beneficial impact 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 is 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.

Fresh emergent wetland habitats occur in Madera County on virtually all exposures and slopes, provided a basin or depression is saturated or at least periodically flooded. They are most common on level to gently rolling topography. They are found in various depressions or at the edge of rivers or lakes. Soils are predominantly silt and clay, although coarser sediments and organic material may be intermixed. In some areas organic soils (peat) may constitute the primary growth medium. Climatic conditions are highly variable and range from the extreme summer heat to winter temperatures well below freezing.

The FWS has maps of wetlands in the United States. Those wetlands that fall in Madera County are shown on Figure 4-17. They are detailed in Table 4-15 and are shown by jurisdiction. More information on the locations of wetlands in each City can be found in their respective annexes to this LHMP Update.

Figure 4-17 Madera County Planning Area – Wetlands Locations

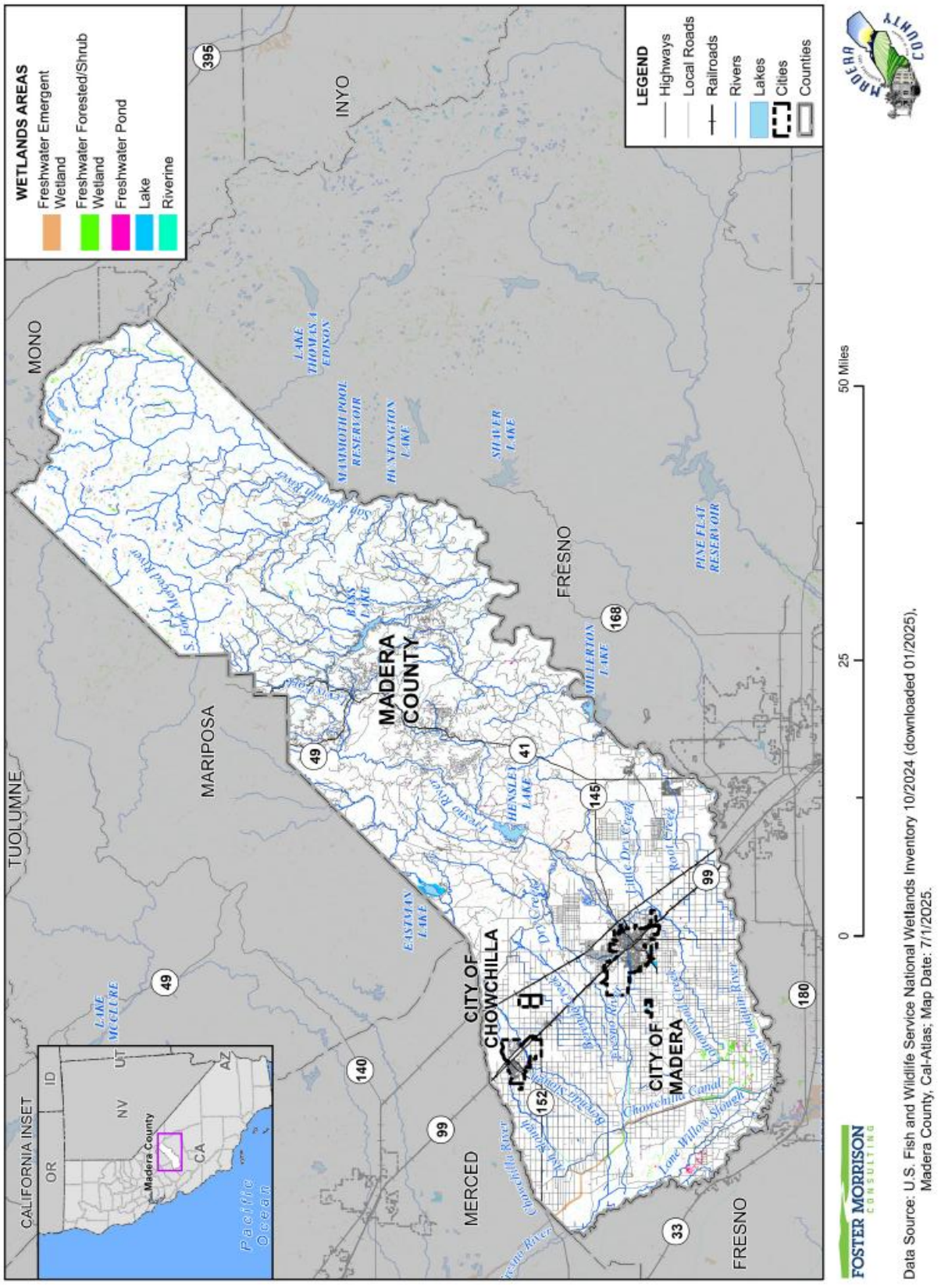


Table 4-15 Madera County Planning Area – Wetlands

Jurisdiction / Wetlands Area Type	Wetlands Count	Wetlands Area (in Acres)	% of Total Acres	% of Total Acres
City of Chowchilla				
Freshwater Emergent Wetland	25	9.65	0.02%	11.85%
Freshwater Forested/Shrub Wetland	-	0	0.00%	0.00%
Freshwater Pond	18	30.28	0.07%	37.19%
Lake	-	0	0.00%	0.00%
Riverine	69	41.48	0.10%	50.95%
City of Chowchilla Total	**112**	**81.40**	**0.19%**	**100.00%**
City of Madera				
Freshwater Emergent Wetland	45	8.99	0.02%	4.7%
Freshwater Forested/Shrub Wetland	5	1.60	0.00%	0.8%
Freshwater Pond	37	14.36	0.03%	7.5%
Lake	3	73.03	0.2%	38.2%
Riverine	191	93.37	0.2%	48.8%
City of Madera Total	**281**	**191.34**	**0.44%**	**100.0%**
Unincorporated Madera County				
Freshwater Emergent Wetland	13,918	11,512.23	26.4%	26.4%
Freshwater Forested/Shrub Wetland	2,908	5,593.07	12.8%	12.8%
Freshwater Pond	2,969	2,256.72	5.2%	5.2%
Lake	581	10,437.22	23.9%	23.9%
Riverine	22,969	13,522.66	31.0%	31.0%
Unincorporated Madera County Total	**43,345**	**43,321.89**	**99.4%**	**99.4%**
Grand Total	**43,738**	**43,594.64**	**100%**	**100%**

Source: FWS October 2024 National Wetlands Inventory

Wetlands Natural and Beneficial Functions

Wetlands are often found in floodplains and depressional areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flow. Wetlands perform a variety of ecosystem functions including food web support, habitat for insects and other invertebrates, fish and wildlife habitat, filtering of waterborne and dry-deposited anthropogenic pollutants, carbon storage, water flow regulation (e.g., flood abatement), groundwater recharge, and other human and economic benefits.

Wetlands, and other riparian and sensitive areas, provide habitat for insects and other invertebrates that are critical food sources to a variety of wildlife species, particularly birds. There are species that depend on these areas during all parts of their lifecycle for food, overwintering, and reproductive habitat. Other species use wetlands and riparian areas for one or two specific functions or parts of the lifecycle, most commonly for food resources. In addition, these areas produce substantial plant growth that serves as a food source to herbivores (wild and domesticated) and a secondary food source to carnivores.

Wetlands slow the flow of water through the vegetation and soil, and pollutants are often held in the soil. In addition, because the water is slowed, sediments tend to fall out, thus improving water quality and reducing turbidity downstream.

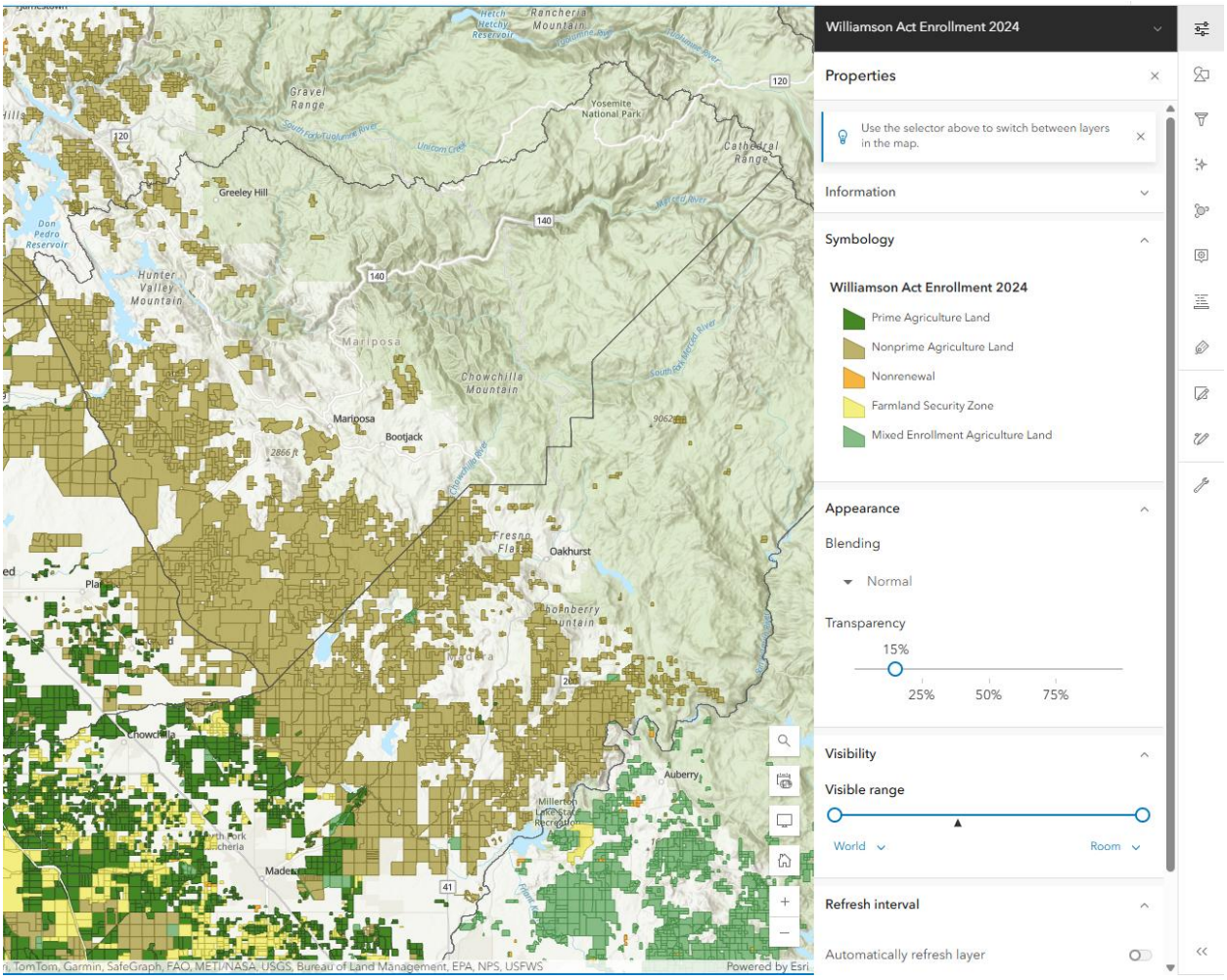
These natural floodplain functions associated with the natural or relatively undisturbed floodplain that moderates flooding, such as wetland areas, are critical for maintaining water quality, recharging groundwater, reducing erosion, redistributing sand and sediment, and providing fish and wildlife habitat. Preserving and protecting these areas and associated functions are a vital component of sound floodplain management practices for the Madera County Planning Area.

Farmlands

Williamson Act

The Williamson Act, also known as the California Land Conservation Act of 1965, enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. When the County enters into a contract with the landowners under the Williamson Act, the landowner agrees to limit the use of the land to agriculture and compatible uses for a period of at least ten years and the County agrees to tax the land at a rate based on the agricultural production of the land rather than its real estate market value. This affects the County's overall values for assessed taxable lands. The County has designated areas as agricultural preserves within which the County will enter into contracts for the preservation of the land in agriculture. Locations from the most recent map (dated 2023) can be seen on Figure 4-18 for Madera County.

Figure 4-18 Madera County – Williamson Act Lands



Source: California Department of Conservation. Retrieved 06/19/2025.

State Inventory of Important Farmland

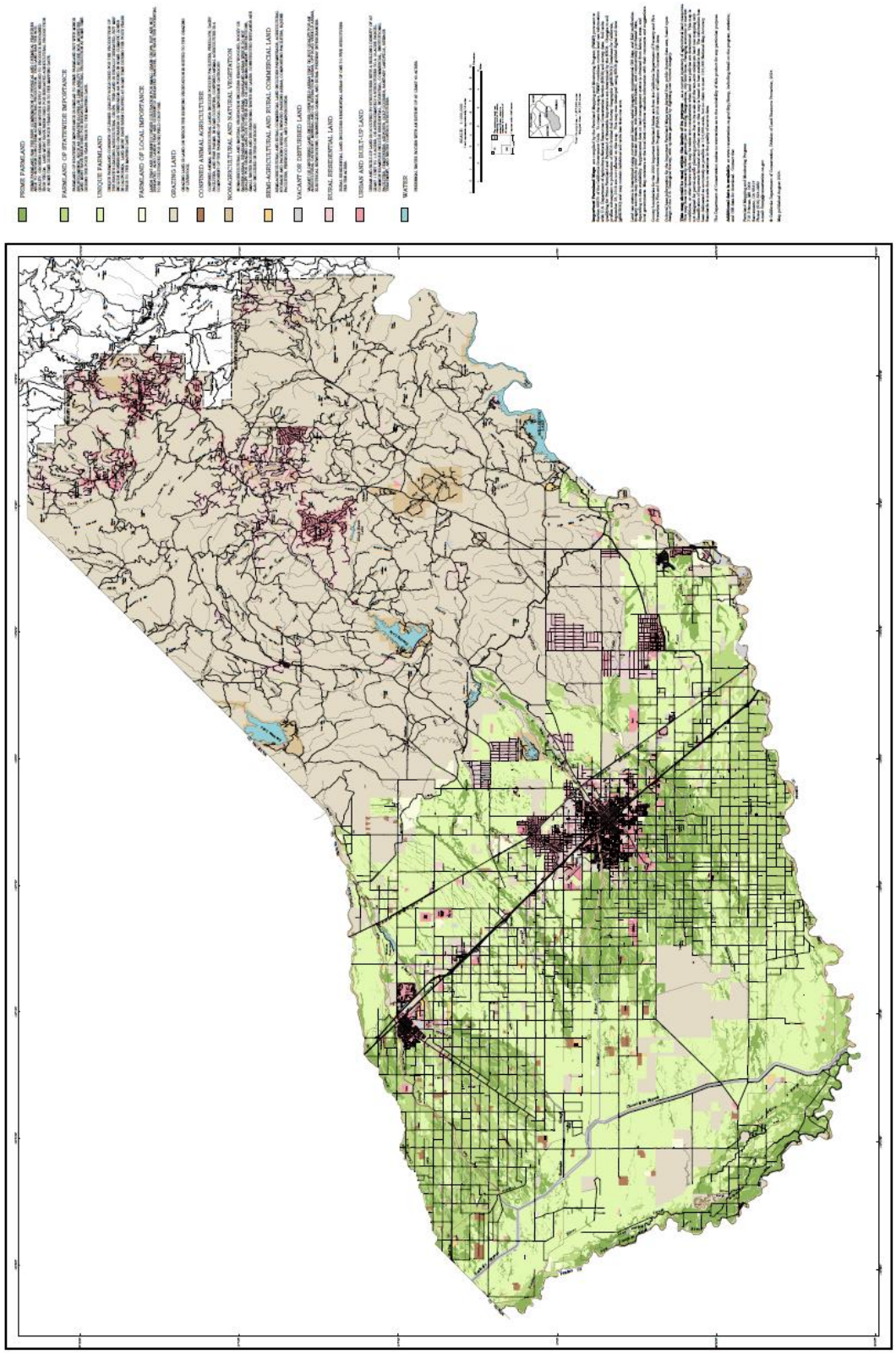
The Farmland Mapping and Monitoring Program was established in 1984 to document the location, quality, and quantity of agricultural lands and conversion of those lands over time. The program provides impartial analysis of agricultural land use changes throughout California. For inventory purposes, several categories were developed to describe the qualities of land in terms of its suitability for agricultural production. The State Department of Conservation utilizes the following classification system:

- The Prime Farmland category describes farmland with the best combination of physical and chemical features able to sustain long term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.
- Farmland of Statewide Importance is farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

- Unique Farmland is farmland of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.
- Farmland of Local Importance is either currently producing crops or has the capability of production. This farmland category is determined by each county's board of supervisors and a local advisory committee.

The 2020 maps are the most recent versions. These lands are shown in Figure 4-19.

Figure 4-19 Madera County – Map of Important Farmlands 2020



Source: State of California Department of Conservation. Retrieved 06/19/2025.

Cultural and Historical Resources

Madera County has a large stock of historically significant homes, public buildings, and landmarks. To inventory these resources, information was collected from a number of 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, 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 (NPS), 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 and 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 (CEQA). 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 or 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 or 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.

Historical resources included in the programs above are identified in Table 4-16.

Table 4-16 Madera County Planning Area – Historical Resources

Resource Name (Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City
Charles Miller / Stationmaster's House (P296)				X	4/29/2008	–
Fresno Flats Townsite (P845)				X	5/14/2002	Oakhurst
Jessie B. Ross Cabin (P751)				X	8/8/1991	North Fork
Jessie Ross Cabin (P752)				X	8/8/1991	Sierra
Laramore House (P716)				X	6/12/1989	Oakhurst

Resource Name (Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City
Little Church on the Hill and Oakhill Cemetery (P797)				X	5/31/1994	Oakhurst
Madera County Courthouse (N108)	X				9/3/1971	Madera
Madera Sugar Pine Logging Railroad Grade (P353)				X	11/19/1974	Oakhurst
Picayune Schoolhouse (C13)			X		8/3/2001	Coarsegold
Robertson Boulevard, State Highway 233 (P724)				X	11/20/1989	Chowchilla
Shay Locomotive #3315 (P352)				X	11/19/1974	Oakhurst
Taylor Log House (P837)				X	5/31/2000	Oakhurst

Source: California Department of Parks and Recreation Office of Historic Preservation. Retrieved 12/3/2024.

It should be noted that these lists may not be complete, as they may not include those currently in the nomination process and not yet listed. Additionally, as defined by the 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, in the event that 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.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the Madera County Planning Area to natural hazards and disasters also involves inventorying the economic assets and community activities of value to the Madera County Planning Area.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. These include:

- Primary Economic Sectors
- Major employers
- Commercial Centers

The primary economic drivers in the County are agriculture and tourism (from Yosemite). According to the 2023 Crop Report, gross value of all ag production in the County was $1,859,365,000. There are additional areas of recreation in the County. Madera County has an abundance of recreational opportunities including but not limited to camping, picnicking, boating, hunting, fishing, trails, biking, equestrian, swimming, ATV/Off-Road, Birding, Sight-Seeing, etc. This includes locations like Hensley Lake and other areas.

Note: This inventory of economic assets is only included in this overall asset inventory for Madera County. To limit redundancy, it is not discussed further in the hazard profiles and vulnerability assessments in Section 4.3 below.

More information on economic assets for the incorporated jurisdictions in the County can be found in the respective jurisdictional annexes to this Base Plan.

Community Activities of Value

Inventorying economic assets in the Madera County Planning Area and their vulnerability to natural hazards and disasters also involves inventorying activities that have value to the community. This includes activities that are important to a community, like long-standing traditions such as a festival or fair. Some areas rely on seasonal industries to sustain them throughout the year. Many of these activities provide economic benefits to the Planning Area. A hazard event that cancels or shortens these can affect a community's livelihood and can make disaster recovery more difficult or prolonged. This includes activities such as:

- Festivals and Fairs
- Sporting Events
- Tourism

In Madera County, there are a high number of activities that could be affected by hazard events. The list below is not exhaustive, but comprise the larger events where, if interrupted or cancelled, may impact the local economy. This includes:

- March
  - ✓ Chowchilla Stampede
- May
  - ✓ Bass Lake Fishing Derby
  - ✓ Coarsegold Rodeo
  - ✓ Bass Lake Yosemite Half Marathon
  - ✓ Chowchilla Fair
  - ✓ Bass Lake Antique & Classic Boat Show
  - ✓ Coarsegold Peddlers Fair
- June
  - ✓ Bass Lake Boat, Hot Rod & Motorcycle Show
  - ✓ Bass Lake Yosemite Triathlon
- July
  - ✓ Bass Lake 4th of July Fireworks
- August
  - ✓ North Fork Indian Fair Days & Pow Wow
- September
  - ✓ Coarsegold Peddlers Fair
  - ✓ Bass Lake Smokey Bear Run
- October
  - ✓ Sierra Art Trails (Oakhurst, Ahwahnee, Coarsegold, North Fork, Bass Lake)
  - ✓ North Fork Grizzly Gravel & Century Ride

- ✓ Coarsegold Chukchansi Pow Wow
- ✓ Oakhurst Fall Festival
- ✓ Oakhurst Yosemite Celtic Festival
- ✓ Coarsegold Tarantula Festival

➢ November

- ✓ Pomegranate Festival

Note: This inventory of community activities of value only occurs in this overall asset inventory for Madera County. To limit redundancy, it is not discussed further in the hazard profiles and vulnerability assessments in Section 4.3 below.

More information on community activities of value specific to participating jurisdictions can be found in the respective jurisdictional annexes to this Base Plan.

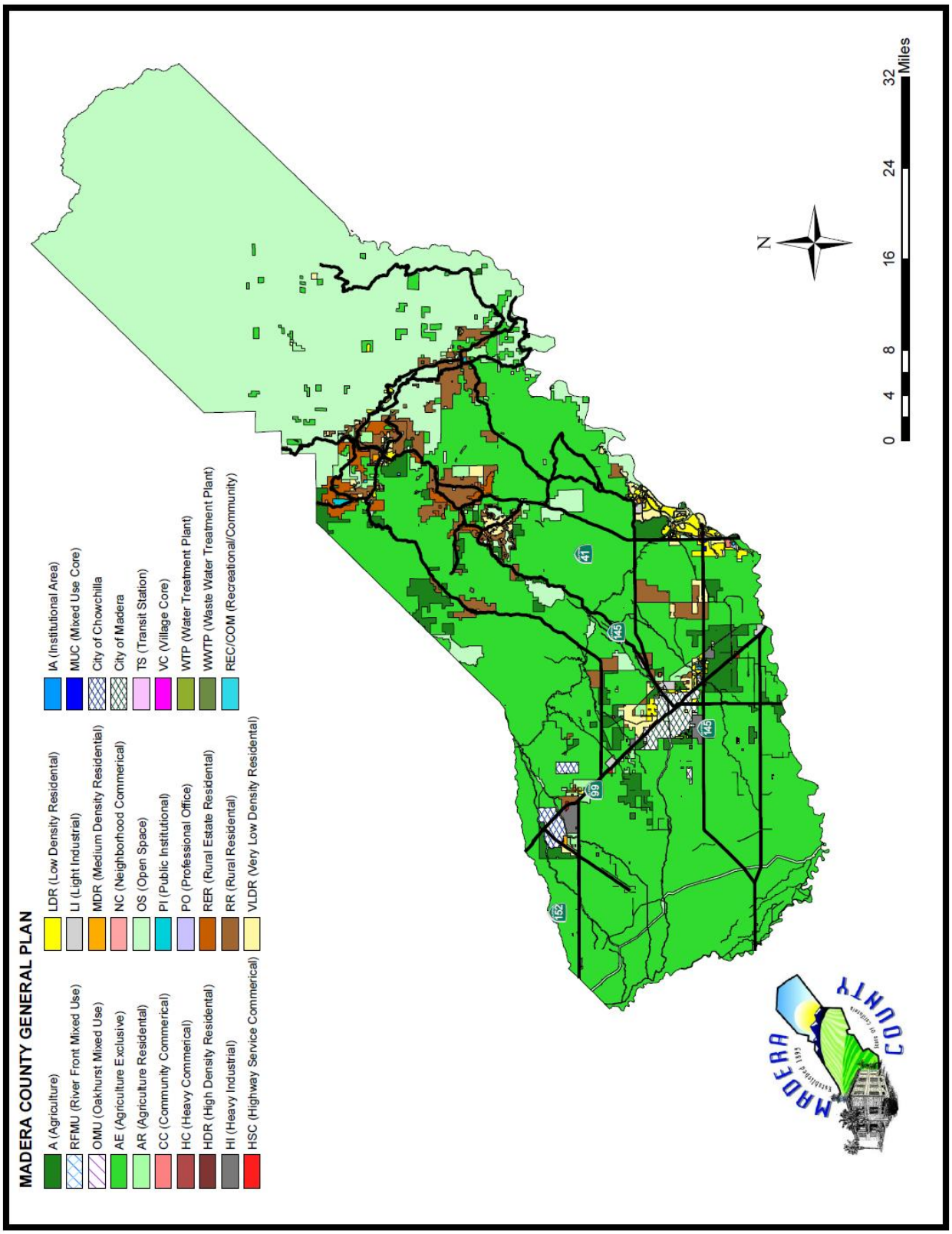
4.2.2. Growth and Development Trends

As part of the planning process, trends in growth and development, both current and future, were examined, both as a whole and in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability over time. This discussion focuses on unincorporated Madera County.

Land Use

The future use of land in the County is fundamental to attaining the vision of a balanced, self-sustaining community. A land use pattern which balances growth between rural and urban areas, as well as providing a balance between housing, employment, natural resources, and services in the County is a key element in maintaining the quality of life and unique character of the County. Descriptions of allowed uses for each classification are detailed in the Madera County General Plan Land Use Element. Figure 4-20 is sourced from the County Planning Department.

Figure 4-20 Madera County General Plan Land Use



Source: Madera County Planning Department

Population Projections

As indicated in the previous section, Madera County had been quickly growing from 1940 to 2010. Since then, population growth has continued but with smaller growth than 1940 to 2010. Long term forecasts by the California Department of Finance (DOF) project population growth in Madera County through 2070. This can be seen in Table 4-17. As shown, populations in the County are expected to grow until 2045 (where growth plateaus), and then slowly shrink through 2070 to numbers close to the 2025 population.

Table 4-17 Population Projections for the Madera County Planning Area (incorporated and unincorporated), 2025-2070

	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070
Madera County	161,017	166,189	168,646	170,504	171,293	170,539	169,230	167,330	165,223	163,316

Source: California Department of Finance, P-2 Report

Development since 2018 Plan

The Madera County Community and Economic Development Department sought to track total building permits issued since 2018 for unincorporated Madera County. A summary of this development is shown in Table 4-18. Development by known flood, fire, and landslide hazard areas is shown in Table 4-19. All development in the identified hazard areas, including the 1% annual chance floodplains, high wildfire risk areas, and areas of high susceptibility to landslides, were completed in accordance with the current and applicable development codes and standards in place at the time. Thus, with the exception of more people living in the area potentially exposed to natural hazards, this growth should not cause a significant change in vulnerability of the County to identified priority hazards.

Table 4-18 Unincorporated Madera County Development 2018–2024 Summary

Property Use	2019	2020	2021	2022	2023	2024
Residential	2	1	6	2	2	3
Commercial	2	2	3	2	5	2
Industrial	0	3	0	3	1	1
Total	**4**	**6**	**9**	**7**	**8**	**6**

Source: Madera County Community and Economic Development Department

Table 4-19 Unincorporated Madera County Development in Hazard Areas since 2018

Property Use	Moderate or Higher Fire Hazard Severity Zones	1% Annual Chance Flood	Landslide Potential Areas
Residential	7	0	7
Commercial	6	0	4
Industrial	2	0	2

Property Use	Moderate or Higher Fire Hazard Severity Zones	1% Annual Chance Flood	Landslide Potential Areas
Total	**15**	**0**	**13**

Source: Madera County Community and Economic Development Department

Future Development Areas

It is important to review future development plans for the County. Future development should be sited in areas that are away from known hazard risks. If this is not possible, mitigation should be done to ensure that future development is protected against future hazard events and disasters. The County provided multiple areas that are expected to see future development over the next five years. These are shown in Table 4-20.

Table 4-20 Unincorporated Madera County – Future Development Areas

Future Development	Future Development Type	Status	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Gunner Ranch West (Map ID 1)	Mixed Use	In Construction	53	12	41	974	394	580
Northshore at Millerton (Map ID 2)	Mixed Use	In Construction	646	0	646	1,217	0	1,217
Riverstone Development (Map ID 3)	Mixed Use	In Construction	4,053	1,771	2,282	1,770	569	1,201
Tesoro Viejo Development (Map ID 4)	Mixed Use	In Construction	2,322	843	1,479	1,417	499	918
Austin Quarry (Map ID 5)	Industrial	Approved	2	0	2	658	0	658
Avenue 7 Industrial Park (Map ID 6)	Industrial	Approved	5	3	2	296	292	4
Centerpoint Development (Map ID 7)	Mixed Use	Approved	81	34	47	307	159	148
Castellina Development (Map ID 8)	Mixed Use	Pending	2	2	0	789	789	0
Community Medical Center (Map ID 9)	Commercial	Pending	2	0	2	198	0	198
Liberty Groves Development (Map ID 10)	Residential	Pending	16	16	0	1,369	1,369	0

Future Development	Future Development Type	Status	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Madera State Center Community College (Map ID 11)	Mixed Use	Pending	67	33	34	1,881	1,442	439
Paseo Pacifico (Map ID 12)	Residential	Pending	3	1	2	285	61	223
River Hills Ranch (Map ID 13)	Mixed Use	Pending	5	3	2	934	854	80
River Pointe (Map ID 14)	Mixed Use	Pending	14	10	4	1,732	1,727	5
Grand Total				**7,271**	**2,728**	**13,826**	**8,156**	**5,671**

Source: Madera County

GIS Analysis

Madera County provided 14 future development areas which were used as the basis for the inventory of future development for unincorporated Madera County. These were mapped in GIS. Figure 4-21 show the locations of the future development areas. Table 4-21 shows the details of the future development areas by acreage and parcel count.

Figure 4-21 Unincorporated Madera County – Future Development Areas

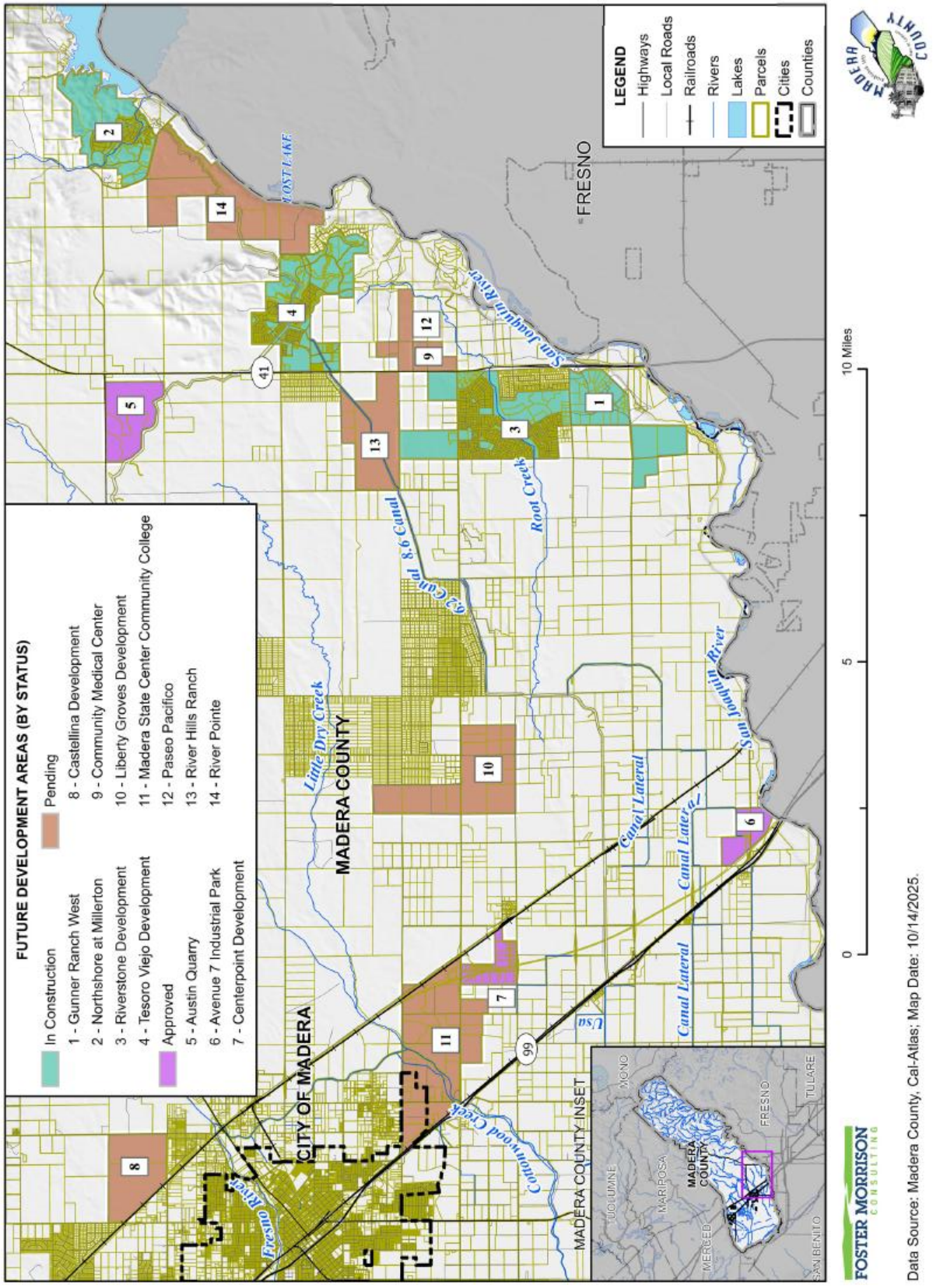


Table 4-21 Unincorporated Madera County – Future Development Areas by Status, Parcels, and Acres

Future Development Status, Type and Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use						
Gunner Ranch West (Map ID 1)	53	12	41	974	394	580
Northshore at Millerton(Map ID 2)	646	0	646	1,217	0	1,217
Riverstone Development (Map ID 3)	4,053	1,771	2,282	1,770	569	1,201
Tesoro Viejo Development (Map ID 4)	2,322	843	1,479	1,417	499	918
Mixed Use Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
In Construction Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
Approved						
Industrial						
Austin Quarry (Map ID 5)	2	0	2	658	0	658
Avenue 7 Industrial Park (Map ID 6)	5	3	2	296	292	4
Industrial Total	7	3	4	954	292	662
Mixed Use						
Centerpoint Development (Map ID 7)	81	34	47	307	159	148
Mixed Use Total	**81**	**34**	**47**	**307**	**159**	**148**
Approved Total	**88**	**37**	**51**	**1,262**	**452**	**810**
Pending						
Commercial						
Community Medical Center (Map ID 9)	2	0	2	198	0	198
Commercial Total	**2**	**0**	**2**	**198**	**0**	**198**

Mixed Use						
Castellina Development (Map ID 8)	2	2	0	789	789	0
Madera State Center Community College (Map ID 11)	67	33	34	1,881	1,442	439
River Hills Ranch (Map ID 13)	5	3	2	934	854	80
River Pointe (Map ID 14)	14	10	4	1,732	1,727	5
Mixed Use Total	**88**	**48**	**40**	**5,336**	**4,812**	**524**
Residential						
Liberty Groves Development (Map ID 10)	16	16	0	1,369	1,369	0
Paseo Pacifico (Map ID 12)	3	1	2	285	61	223
Residential Total	**19**	**17**	**2**	**1,653**	**1,430**	**223**
Pending Total	**109**	**65**	**44**	**7,188**	**6,242**	**946**
Grand Total	**7,271**	**2,728**	**4,543**	**13,826**	**8,156**	**5,671**

4.3 Hazard Profiles and Vulnerability Assessment

44 CFR 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.
44 CFR §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.
44 CFR §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.
44 CFR §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.
44 CFR §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.
44 CFR §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.

The hazards identified in Section 4.1 Hazard Identification, are profiled individually in this section. The Hazard Profiles set the stage for the Vulnerability Assessment, where the vulnerability is quantified, as data allows, for each of the identified hazards.

Hazard Profiles Methodology

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 Madera County Planning Area and unincorporated Madera County. Where known, this includes information on the hazard extent, location, seasonal patterns, speed of onset/duration, and magnitude and/or any secondary effects.
- **Past Occurrences**—This section contains information on historical incidents, including impacts where known. Hazard research, historical incident worksheets and other input from the Hazard Mitigation Planning Committee were used to capture information 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 the event happening in any given year (e.g., three droughts over a 30-year period equates to a 10 percent chance of experiencing a drought in any given year). The likelihood of future occurrences is categorized into one of the following classifications:
  - ✓ **Highly Likely**—Near 100 percent chance of occurrence in next year or happens every year.
  - ✓ **Likely**—Between 10 and 100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.

- ✓ **Occasional**—Between 1 and 10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.
- ✓ **Unlikely**—Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

➢ **Climate Change**—This section contains the effects of climate change (as applicable). The possible influence of climate change on the hazard is discussed.

Vulnerability Assessment Methodology

With the Madera County Planning Area's hazards identified and profiled, a vulnerability assessment was conducted to describe the vulnerability and impact that each hazard would have on the Madera County Planning Area and specific to each jurisdiction. The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to identified hazards and estimates potential losses. This section focuses on the vulnerabilities of the Madera County Planning Area as a whole and specific to unincorporated Madera County. The vulnerability assessment is done in the following format:

➢ **General Vulnerability Discussion** – An assessment of the vulnerability of the Madera County Planning Area to each hazard is provided in addition to the estimate of the risk of future occurrence. This is followed by a general discussion of the hazard and its vulnerability on the Madera County Planning Area and unincorporated Madera County. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into one of the following classifications:
- ✓ **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- ✓ **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. Here 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.
- ✓ **Extremely High**—Very widespread with catastrophic impact.

➢ **Local Concerns** – This includes information on how unincorporated Madera County is uniquely affected by or vulnerable to each hazard. Information contained in this section also supports the resulting mitigation strategy for the unincorporated County. Local concerns section specific to each of the other participating jurisdictions are included in their jurisdictional annexes to this Plan.

➢ **Assets at Risk** – A discussion of the assets at risk follows. This includes sections on: People and Populations; Structures; Critical Facilities and Infrastructure; and Natural, Historic, and Cultural Resources. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- ✓ **FEMA NRI Hazard Vulnerability** – For each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating.

- **Impacts** – A discussion on hazard impacts is included. Impacts describe how each hazard can affect the County and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset.
- **Future Conditions/Future Development** – A discussion of how future conditions will influence or affect the hazard over time is included here and considers factors related to climate change, changes in population patterns, and changes in land use and development. This section also discusses future development plans relative to each hazard as well as mitigating measures that should be considered in the development process. Future conditions and future development is addressed specifically for mapped hazards, and in more general terms for those hazards that are unmapped.

Existing Built Environment and Assets at Risk

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of assets subject to the identified hazard can be counted and their values tabulated. Other information can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources. Together, this information conveys the impact, or vulnerability, of the Madera County Planning Area and unincorporated Madera County to that hazard.

The vulnerability assessment identified six hazards in the Madera County Planning Area for which specific geographical hazard areas have been defined and for which sufficient data exists to support a quantifiable vulnerability analysis. These six hazards are:

- Dam Failure
- Earthquake (w/subhazards)
- Flood: 1%/0.2% Annual Chance (with levee failure)
- Hazardous Materials Transportation
- Landslide, Mudslides, and Debris Flows
- Wildfire (w/smoke and air quality)

These hazards were analyzed using GIS, Madera County data, and hazard data.

The vulnerability and potential impacts from the eight priority hazards that do not have specific mapped areas nor the data to support additional vulnerability analysis are discussed in more general terms. These include:

- Agricultural Hazard: Severe Weather/Pests/Invasives
- Climate Change
- Drought and Water Shortage
- Flood: Localized/Stormwater
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rain and Storms (Hail, Lightning, Wind)
- Severe Weather: High Winds and Tornadoes

Power Outages/Failure: A Common Vulnerability of all Hazards

An additional impact or vulnerability common to most all hazards is power outage or power failure. The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the Department of Energy, major blackouts are on the upswing. Over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. Electric power disruptions can be generally grouped into two categories: intentional and unintentional.

Intentional Disruptions

There are four types of intentional disruptions:

- **Planned**: Some disruptions are intentional and can be scheduled based on maintenance or upgrading needs.
- **Unscheduled**: Some intentional disruptions must be done "on the spot." in response to an emergency.
- **Demand-Side Management**: Some customers (i.e., on the demand side) have entered into an agreement with their utility provider to curtail their demand for electricity during periods of peak system loads.
- **Load Shedding**: When the power system is under extreme stress due to heavy demand and/or failure of critical components, it is sometimes necessary to intentionally interrupt the service to selected customers to prevent the entire system from collapsing, resulting in rolling blackouts.

The California Independent System Operator (CAISO) is tasked with managing the power distribution grid that supplies most of California, except in areas served by municipal utilities. CAISO is thus the entity that coordinates statewide flow of electrical supply. CAISO uses a series of stage alerts to the media based on system conditions. The alerts are:

- Stage 1 – reserve margin falls below 7 percent
- Stage 2 – reserve margin falls below 5 percent
- Stage 3 – reserve margin falls below 1.5 percent

Rotating blackouts become a possibility when Stage 3 is reached. Rotating outages and/or blackouts such as those experienced in 2000/2001 and 2006 can occur due to losses in transmission or generation and/or extremely severe temperatures that lead to heavy electric power consumption. Key California events include the following:

On January 17, 2001, CAISO declared a Stage 3 Emergency and notified the then Governor's Office of Emergency Services that PG&E was dropping firm load of 500 megawatts (MW) in Northern California leading to rolling blackouts. Cal OES, in turn, issued an Electrical Emergency Message to all Emergency Services Agencies to prepare for rolling blackouts. This scenario was repeated the following day, January 18, 2001, and again on March 19, 2001.

A July 2006 heat storm event affected the entire state as well as most of the West, producing record energy demand levels in California. The State was able to avoid rotating outages due to a combination of favorable

factors that included no major transmission outages, lower than typical generator outages, significant customer response to pleas for energy conservation, high imports from the Pacific Northwest despite unusually high loads, outstanding cooperation among western control area operators, and prompt response to fires that potentially threatened major interties. However, the event brought to light the vulnerability of the electric distribution system, as over 3,500 distribution transformers failed, leaving over two million customers without power at various times over the ten-day event, many for several hours and a small minority for up to three days.

In 2020, the state battled both extreme heat and wildfires. As a result of extreme heat, the CAISO declared a Stage 3 emergency. PG&E initiated rotating outages in August at the request of California's grid operator. The outages, which impacted 220,000 customers, occurred during periods of high heat. These rolling blackouts lasted less than a week.

Unintentional Disruptions

Unintentional or unplanned disruptions are outages that come with essentially no advance notice. This type of disruption can be the most problematic. The following are categories of unplanned disruptions:

- Accident by the utility, utility contractor, or others
- Malfunction or equipment failure
- Equipment overload (utility company or customer)
- Reduced capability (equipment that cannot operate within its design criteria)
- Tree contact other than from storms
- Vandalism or intentional damage
- Weather, including lightning, wind, earthquake, flood, and broken tree limbs taking down power lines
- Wildfire that damages transmission lines

Public Safety Power Shutoff

A new intentional disruption type of power shortage/failure event has recently occurred in California. In recent years, several wildfires have started as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), coordinated to prepare all Californians for the threat of wildfires and power outages during times of extreme weather. To help protect customers and communities during extreme weather events, electric power may be shut off for public safety in an effort to prevent a wildfire. This is called a Public Safety Power Shutoff (PSPS).'

PSPS are another tool that PG&E uses to help eliminate and minimize ignitions caused by objects coming in contact with electrical circuits and causing fires. Severe weather, such as high winds, low humidity, and dry vegetation are some of the key elements to trigger a PSPS event in high fire threat areas (Tier 2 & Tier 3). By proactively shutting off power in areas that are very prone and susceptible to catastrophic wildfires, PG&E can help minimize the chance of a fire caused by electrical infrastructure. PG&E doesn't take lightly the shutting off power to residents, business, and critical customers and has a strict protocol for these actions.

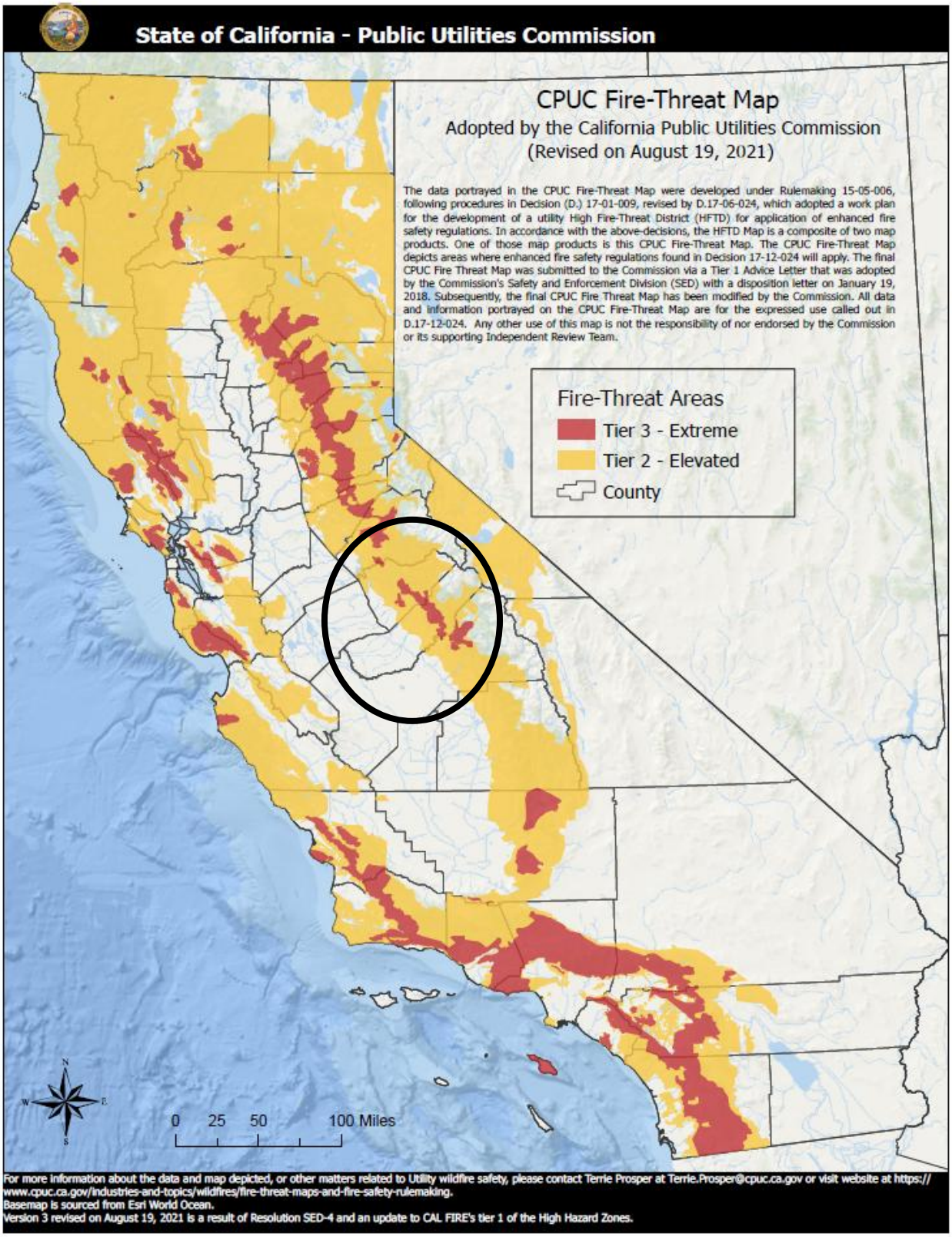
Public Safety Power Shutoff Criteria

The Wildfire Safety Operations Center (WSOC) monitors fire danger conditions across PG&E's service area, including PSPS conditions. These factors include:

- A Red Flag Warning declared by the National Weather Service
- Low humidity levels generally 20% and below
- Forecasted sustained winds generally above 25 mph and wind gusts in excess of approximately 45 mph, depending on location and site-specific conditions such as temperature, terrain and local climate
- Condition of dry fuel on the ground and live vegetation (moisture content)
- On-the-ground, real time observations from PG&E's WSOC and field observations from PG&E crews

The most likely electric lines to be considered for shutting off for safety will be those that pass through areas that have been designated by the CPUC as at elevated (Tier 2) or extreme (Tier 3) risk for wildfire (seen on Figure 4-22). This includes both distribution and transmission lines. The specific area and number of affected customers will depend on forecasted weather conditions and which circuits PG&E needs to turn off for public safety. Although a customer may not live or work in a high fire-threat area, their power may also be shut off if their community relies upon a line that passes through an area experiencing extreme fire danger conditions. This means that any customer who receives electric service from PG&E should be prepared for a possible PSPS. PSPS events, while preventative in nature, can cause a variety of issues related to the lack of power to those impacted by the PSPS. For the Madera County Planning Area, a significant concern is the impact to their communication systems as well as on other critical infrastructure and services. PSPS events also cause concerns for certain vulnerable populations. As seen on Figure 4-22, Madera County has areas inside the Tier 2 and Tier 3 areas, as well as areas outside of them.

Figure 4-22 State of California Tier 2 and 3 Areas



PG&E noted that extreme weather threats can change quickly. When possible, PG&E will provide customers with advance notice prior to turning off the power, as well as updates until power is restored. Timing of notifications (when possible) are:

- Approximately 48 hours before power is turned off
- Approximately 24 hours before power is turned off
- Just before power is turned off
- During the public safety outage
- Once power has been restored

Power outages that affect Madera County residents do happen, though these outages are becoming less frequent and are not sustained as long as past years. This is due to PG&E's hardening and undergrounding projects along with its enhanced vegetation management practices. During these outages, PG&E provides contacts and tools to assist the residents and officials with current outage information for planning purposes. PG&E works with county officials to assist and help mitigate outages affecting the residents of Madera County.

When a PSPS is forecasted, PG&E will notify County Emergency Management Agencies so they may monitor and make any plans they see needed. Customers affected will also get notified so they may also take steps to plan and make arrangements they deem necessary for the event. PG&E will support the customers with Community Resource Centers (CRC) near the affected areas of the PSPS and offer other programs to qualified customers. We will also work with the public safety agencies in the area to help mitigate any other issues related to the PSPS event. PG&E offers many tools to help assist the agencies in monitoring and planning for these events. The County noted that there have been events in the past where wildfires have not occurred, but wildfire conditions were high. During these times of high winds, high temps, and high wildfire risk, a PSPS occurred in the County. These events are discussed below and in each jurisdiction's respective annex to this Base Plan (it should be noted that "customers" in PG&E vernacular refer to both households or business addresses.):

October 2019: A PSPS event affected eastern Madera County, including areas from North Fork to Oakhurst to Yosemite Lakes Park. Power was shut off starting around 1:30–1:45 p.m. on October 27, impacting up to 16,675 PG&E customers. The outage was triggered by high winds and dry conditions, with the Madera County Sheriff's Office warning that power could be out for 12 to 48 hours. Community Resource Centers were set up at locations like the Oakhurst Substation and Oakhurst Area California Highway Patrol Office.

October 2020: PG&E scheduled a PSPS event in eastern Madera County from October 25 through October 27 or 28, prompted by expected winds of 35–45 mph in higher elevations, as forecasted by the National Weather Service. The Madera County Sheriff's Office recommended residents prepare for the shutoff. This PSPS was eventually cancelled.

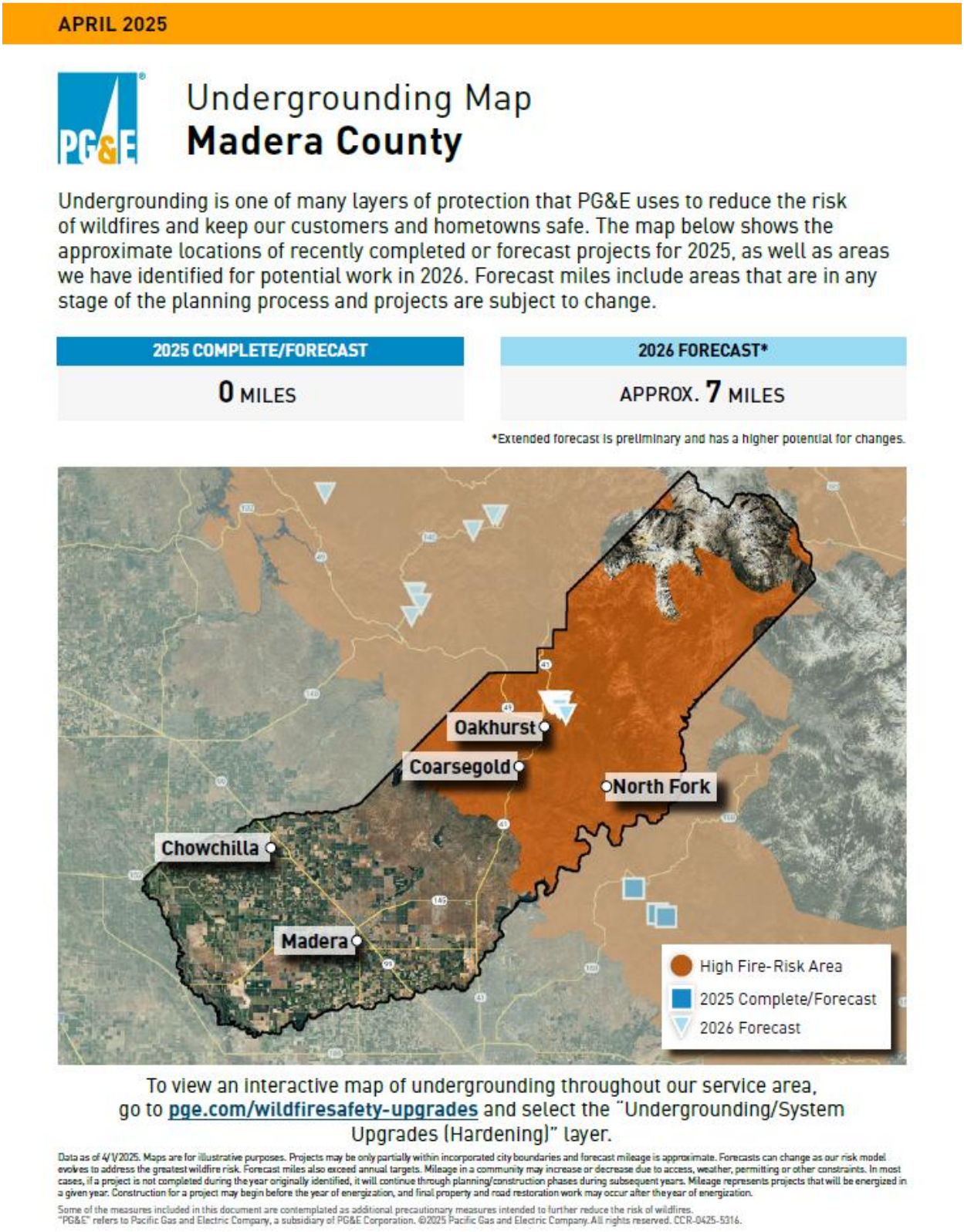
October 2021: A potential PSPS event was announced for areas including North Fork, Bass Lake, and Central Camp, but it was canceled on October 10 after PG&E determined the weather conditions no longer warranted de-energization.

October 2024: A PSPS event was planned for October 18, affecting areas such as Central Camp, The Pines, Wishon, Bass Lake Annex, North Fork, Cascadel Woods, O'Neals, and Sugar Pine. Power was expected

to be de-energized around 4:00 a.m. and restored by October 19. CRCs were available at North Fork Elementary and Oakhurst Community Center. This PSPS was eventually cancelled for all but a small area of the County.

PG&E has started to underground more power lines to reduce wildfire risks. The most recent map for Madera County showing this progress is included in Figure 4-23.

Figure 4-23 Madera County – PG&E Undergrounding



Source: PG&E – April 2025.

It was also noted that PG&E is working to enhance its power network with Enhanced Powerline Safety Settings (EPSS) capable lines. EPSS are advanced safety settings. They allow PG&E powerlines to automatically turn off power within one-tenth of a second. This can happen when there is a hazard, like a tree branch falling into a powerline, which can cause a fire. These settings are in high fire-risk and surrounding areas. These have not yet been installed in and near the Madera County area, as PG&E focuses on other very high fire hazard areas in its service territory first. It is thought these EPSS capable lines will eventually come to the Madera County Planning Area.

Climate Change and Power Outages/Failures (Energy Shortage)

Changing climate is expected to bring more frequent and intense natural disasters. Key climate parameters are starting to move outside of historically observed variability at a rate that makes historical data a poor predictor of future climate. For example, the warmest years on record in California occurred in 2014, 2015, 2016, and 2019. 2022 - 2025 were remarkably hot years as well. In addition, the 2016-2017 year broke the record as the wettest ever recorded in the northern Sierra Nevada Mountains. Recent years, including the 2023 storms, have also seen heavy precipitation, further compounded by atmospheric river events.

Changes in temperatures, precipitation patterns, extreme events, and sea level rise have the potential to decrease the efficiency of thermal power plants and substations, decrease the capacity of transmission lines, render hydropower less reliable, spur an increase in electricity demand, and put energy infrastructure at risk of flooding.

With climate warming, higher costs from increased demand for cooling in the summer are expected to outweigh the decreases in heating costs in the cooler seasons. Hotter temperatures in California will mean more energy (typically measured in "cooling-degree days") needed to cool homes and businesses both during heat waves and on a daily basis, during the daytime peak of the diurnal temperature cycle. During future heat waves, historically cooler coastal cities (e.g., San Francisco and Los Angeles) are projected to experience greater relative increases in temperature, such that areas that never before relied on air conditioning will experience new cooling demands.

Secondary impacts of energy shortages are most often felt by vulnerable populations. For example, those who rely on electric power for life-saving medical equipment, such as respirators, are extremely vulnerable to power outages. Also, during periods of extreme heat emergencies, the elderly and the very young are more vulnerable to the loss of cooling systems requiring power sources.

Additional impacts from a power disruption can also affect remote areas. This can affect evacuation messaging and coordination difficulties, and a reduction in firefighting capabilities due to lack of water access in more remote areas (especially for those on wells).

Hazard Profiles and Vulnerability Assessment by Hazard

The following sections provide the hazard profile and vulnerability assessments for each of the hazards identified in Section 4.1 Hazard Identification. ***The severe weather hazards are discussed first to paint the picture of the Madera County's Planning Area's climate and hazard environment which often lead to other hazards such as flood and wildfire. The remainder of the hazards follow alphabetically.***

Data Sources

In general, information provided by the County, participating jurisdictions, and the HMPC is integrated into this section with information from other data sources. The data sources listed below formed the basis for this Hazard Profiles portion of the plan. Where data and information from these studies, plans, reports, and other data sources were used, the source is referenced as appropriate throughout this risk assessment.

- "Wildland fire management and air quality in the southern Sierra Nevada: Using the Lion Fire as a case study with a multi-year perspective on PM2.5 impacts and fire policy" by D. Schweizer and R. Cisneros
- 2008 CWPP
- 2008 Madera County Flood Insurance Study
- 2011 California Geologic Survey Deep Seated Landslide Susceptibility
- 2014 California Natural Resources Report
- 2017 California Adaptation Planning Guide South Central Valley Region
- 2018 State of California Hazard Mitigation Plan
- 2021 California Climate Adaptation Study
- 2023 State of California Hazard Mitigation Plan
- 2023 US Census Bureau American Community Survey Average Household Size
- 2024 Climate Adaptation Study
- 2024 Madera County Parcel/Assessor Data
- 2024 review from UC Davis Health
- 2025 Madera County General Plan Safety Element
- American Society of Civil Engineers
- Bureau of Land Management
- CAL FIRE
- CAL FIRE (FHSZ SRA 2024, FHSZ FRA 2007)
- CAL FIRE (LRA 2025)
- Cal-Adapt
- Cal-Adapt – Extended Drought Scenarios
- Cal-Adapt – Number of Extreme Heat Days by Year
- Cal-Adapt – Precipitation: Decadal Averages Map
- Cal-Adapt 2017/2023
- Cal-Adapt Climate Projections
- California Climate Adaptation Strategy
- California Department of Agriculture
- California Department of Conservation's Farmland Mapping and Monitoring Program
- California Department of Public Health
- California Department of Water Resources
- California Department of Water Resources 2012-2016 California Drought: Historical Perspective
- California Department of Water Resources Best Available Maps
- California Department of Water Resources Division of Safety of Dams
- California Division of Mines and Geology
- California Geological Survey
- California Invasive Plant Council
- California Natural Resource Agency
- California Office of Emergency Services

- California Open Data Portal
- California Public Utilities Commission
- California's Adaptation Planning Guide: Understanding Regional Characteristics
- California's Fourth Climate Change Assessment
- Caltrans
- Center for Western Weather and Water Extremes
- Climate Change and Health Profile Report – Madera County
- Draft Environmental Impact Report for the California State Prison Madera County
- DSOD/Cal OES/NID Dam Status 1/25
- Environmental Protection Agency
- Federal Emergency Management Agency
- Federal Emergency Management Agency – CIS 2024
- Federal Emergency Management Agency – DFIRM 09/26/2008
- Federal Emergency Management Agency – Disaster Declaration Database
- Federal Emergency Management Agency – Flood Insurance Study
- Federal Emergency Management Agency – National Flood Hazard Layer
- Federal Emergency Management Agency – National Risk Index
- Federal Emergency Management Agency – Wind Zones in the United States
- Federal Emergency Management Agency: Building Performance Assessment: Oklahoma and Kansas Tornadoes
- Fire and Resource Assessment Program
- FirstStreet.org
- FM Global Insurance Company
- Foxweather.com
- Hazus-MH 6.1
- Intergovernmental Panel on Climate Change
- LFPS BAM 2023
- Madera County Agricultural Commissioner
- Madera County Agricultural Commissioner Crop Reports (2020-2023)
- Madera County Department of Agriculture
- Madera County General Plan
- Madera County General Plan Background Report
- Madera County Geographic Information Services
- Madera County Public Works Division
- Multi-Hazard Identification and Risk Assessment, FEMA 1997
- National Aeronautics and Space Administration
- National Center for Atmospheric Research
- National Climate Assessment
- National Climatic Data Center Storm Events Database.
- National Drought Mitigation Center
- National Earthquake Information Center
- National Fire Plan
- National Flood Insurance Program
- National Hazardous Materials Routes Registry (2025)
- National Integrated Drought Information System
- National Inventory of Dams

- National Oceanic and Atmospheric Administration
- National Oceanic and Atmospheric Administration Storm Prediction Center
- National Oceanic and Atmospheric Administration's National Climatic Data Center
- National Park Service
- National Performance of Dams Program
- National Weather Service
- National Weather Service HeatRisk
- National Weather Service XMAC site
- PHMSA Database
- Public Health Alliance
- Public Policy Institute of California
- San Joaquin Air Quality Management District
- Smoke Impacts CA: 2020 Lessons – 2021 Actions
- State of California Department of Conservation Farmland Mapping and Monitoring Program
- Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011)
- University of California, Berkeley's Department of Environmental Science, Policy, and Management
- US Army Corps of Engineers
- US Department of Agriculture
- US Department of Agriculture – Farm Service Agency Secretarial Disasters Declarations
- US Department of Transportation
- US Drought Monitor
- US Farm Service Agency
- US Fish and Wildlife Service
- US Forest Service
- US Geological Survey
- US Geological Survey Earthquake Intensity Zonation and Quaternary Deposits, Miscellaneous Field Studies Map 9093, 1977
- US Geological Survey Emergency Assessment of Post-Fire Debris Flow Hazards
- US Geological Survey National Earthquake Information Center
- US Geological Survey Open File Report 2015-3009
- US Occupational Safety and Health Administration
- USDA Forest Service Region 5
- USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Hazardous Materials Safety
- USDOT's Emergency Response Guidebook
- USGS Emergency Assessment of Post-Fire Debris Flow Hazards
- Vaisala National Lightning Detection Network
- Western Regional Climate Center

4.3.1. Severe Weather: General

Severe weather is generally any destructive weather event, and usually occurs throughout the Madera County Planning Area as temperature extremes, localized storms that bring heavy rain and strong winds, and other extreme weather events.

The NOAA's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains 2,099 severe weather events that occurred in Madera County between January 1, 1950, and July 31, 2024. Table 4-22 summarizes these events.

*Table 4-22 NCDC Severe Weather Events for Madera County 1950-7/31/2024**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Cold/Wind Chill	3	0	0	0	0	$0	$0
Debris Flows	20	0	0	0	0	$26,000	$0
Dense Fog	373	0	10	53	56	$5,073,000	$0
Drought	249	0	3	0	0	$0	$0
Dust Devil	1	0	0	0	0	$500	$0
Dust Storm	5	0	0	0	0	$100,000	$0
Excessive Heat	22	0	0	0	0	$0	$0
Extreme Cold/Wind Chill	4	0	0	0	0	$0	$0
Flash Flood	5	0	0	0	0	$25,000	$0
Flood	69	0	0	0	0	$6,118,000	$5,800,000
Frost/Freeze	190	0	0	0	0	$150,000	$402,955,000
Funnel Cloud	21	0	0	0	0	$0	$0
Hail	22	0	0	0	4	$111,000	$3,656,000
Heat	100	32	0	10	0	$170,000	$224,801,000
Heavy Rain	38	0	0	0	0	$201,000	$49,060,000
Heavy Snow	328	0	0	0	0	$0	$0
Heavy Wind	2	0	0	0	0	$0	$0
High Wind	91	0	0	0	4	$211,817,000	$150,000
Landslide	2	0	0	0	0	$28,000	$0
Lightning	7	0	0	0	0	$32,500	$0
Strong Wind	141	0	0	0	0	$2,174,900	$57,000
Thunderstorm Winds	16	0	0	0	0	$181,000	$7,800,000
Tornado	10	0	0	0	0	$147,750	$30,000
Wildfire	118	4	1	97	7	$47,328,000	$0
Winter Storm	183	2	0	0	0	$8,405,000	$0
Winter Weather	79	0	1	0	0	$282,000	$0
Total	**2099**	**38**	**15**	**160**	**71**	**$282,370,650**	**$694,309,000**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of Madera County

The NCDC table above summarizes severe weather events that occurred in Madera County. Only a few of the events actually resulted in federal and state disaster declarations. It is further interesting to note that different data sources capture different events during the same time period, and often display 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.

As previously mentioned, most all of Madera County's federal and state disaster declarations have been a result of severe weather. For this Plan Update, severe weather is discussed in the following subsections:

- Severe Weather: Extreme Cold, Freeze, and Snow
- Extreme Heat
- Heavy Rains and Storms (Hail, Lightning, Wind)
- High Winds and Tornadoes

The western third of the County is part of the nearly flat San Joaquin Valley which is oriented northwest to southeast and has a length of about 225 miles and an average width of about 50 miles. The elevation of the valley floor is approximately 180 feet and nearly flat. Elevations increase up the western slope of the Sierra Nevada to approximately 13,000 feet. Parts of Madera County are included in Yosemite National Park, Devil's Postpile National Monument, and the Sierra National Forest. Due to these elevation changes, the climates vary by season and location. Madera County experiences warmer, dryer California temperatures in the summer to colder weather in the winter. Due to size of the County and changes in elevation and climate, weather conditions can vary greatly across the County. For purposes of this hazard profile, the County will be divided into two distinct sections, as applicable: western Madera County, which is predominantly below an elevation of 2,500 feet above mean seal level (msl); and eastern Madera County, which is generally above 2,500 feet above msl ranging to above 12,000 feet above msl and receives more snowfall. The profiles that follow provide information, where possible, from two weather stations located in these two different parts of the County: Madera (elevation: 300 feet above msl) in west Madera County and Mammoth Lakes Ranger Station (elevation: 7,900 feet above msl), in eastern Madera County.

4.3.2. Severe Weather: Extreme Cold, Freeze, and Snow

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area and unincorporated Madera County. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrences; and how climate change can affect or influence this hazard.

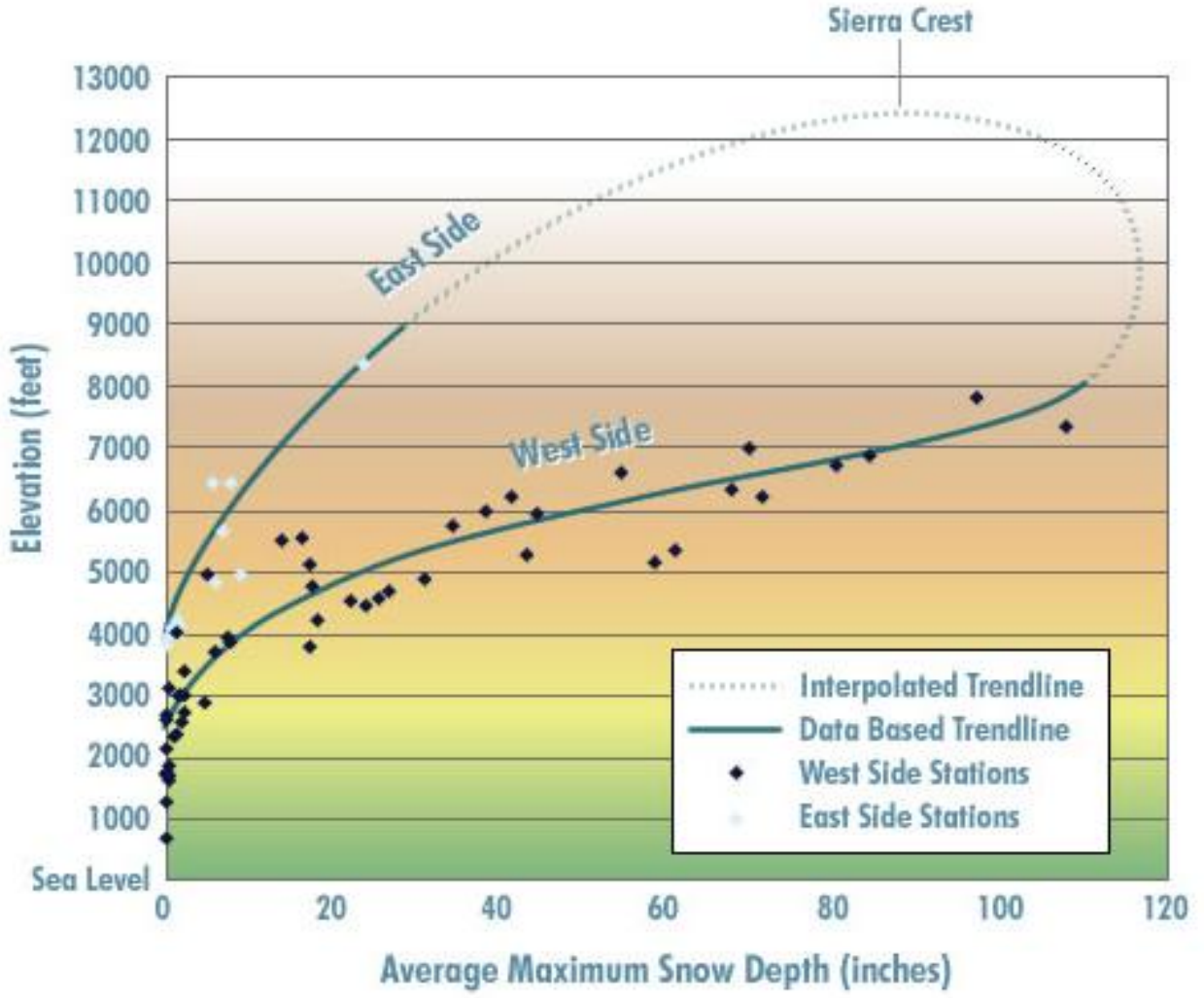
Hazard/Problem Description

According to the National Weather Service (NWS) and the Western Regional Climate Center (WRCC), extreme cold often accompanies a winter storm (and snow event) or is left in its wake. Prolonged exposure to cold can cause frostbite or hypothermia and can be life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat.

Freezing temperatures can cause significant damage to the agricultural industry. The effects of freezing temperatures on agriculture in Madera County are discussed further in Section 4.3.6 Agricultural Hazards.

Snow accumulation does not directly follow precipitation in the Sierra Nevada area. While the greatest total precipitation occurs in the northern part of the range, the greatest snow accumulation occurs in the central and high southern parts of the range, due to higher elevations and colder temperatures which inhibit snow melt. The western slope of the Sierra Nevada acts as trap for winter storms, wringing out the moisture before it can get to the east side. Weather stations located on the west side begin registering measurable snow between 2,500 and 3,000 feet elevation. On the east side, measurable snow accumulation doesn't begin until about 4,000 feet and increases more slowly with altitude. Snow depths drop dramatically on the east side of the range due to the rain shadow effect as illustrated in the comparative east side/west side snow depth chart shown on Figure 4-24.

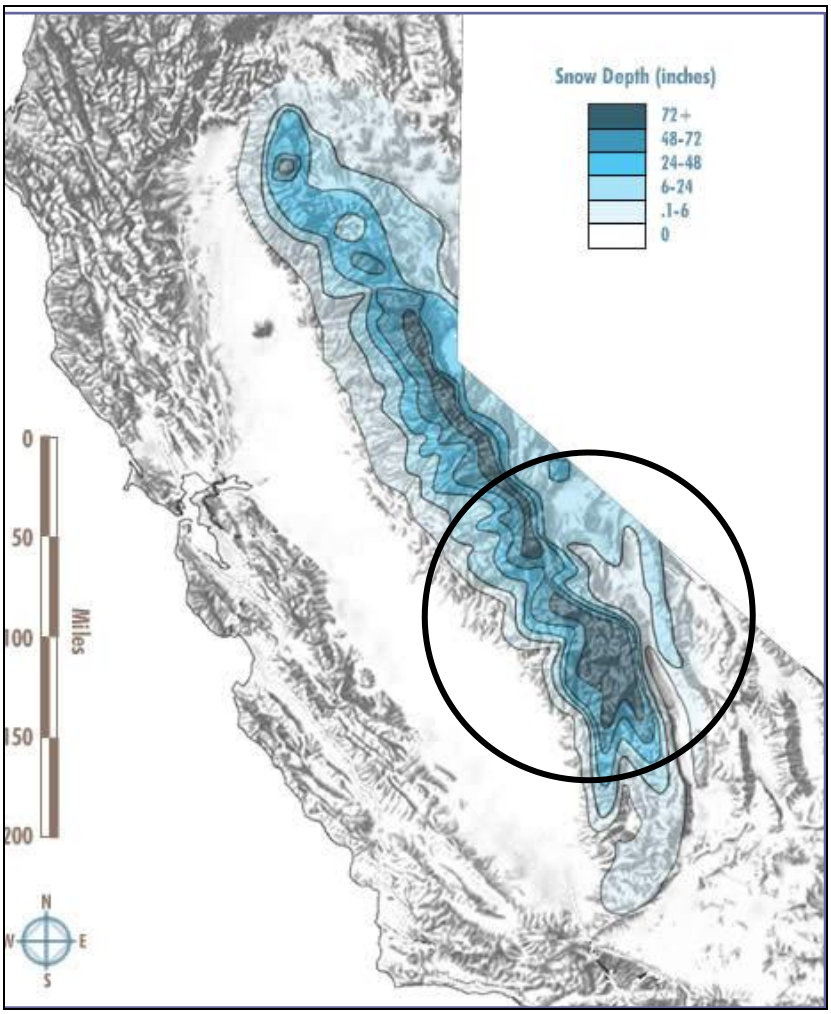
Figure 4-24 Madera County Planning Area – Snow Accumulation with Directional Variations



Source: http://www.sierranevadaphotos.com/geography/east_west_snow_depth.html. . This image is no longer available publicly. It was retrieved for the 2018 Madera County LHMP.

Figure 4-25 shows the average maximum measured snow depth in the Sierra Nevada for the month of March (the month of greatest average snow depths).

Figure 4-25 Average Maximum Snow Depths of Sierra Nevada Mountains in March



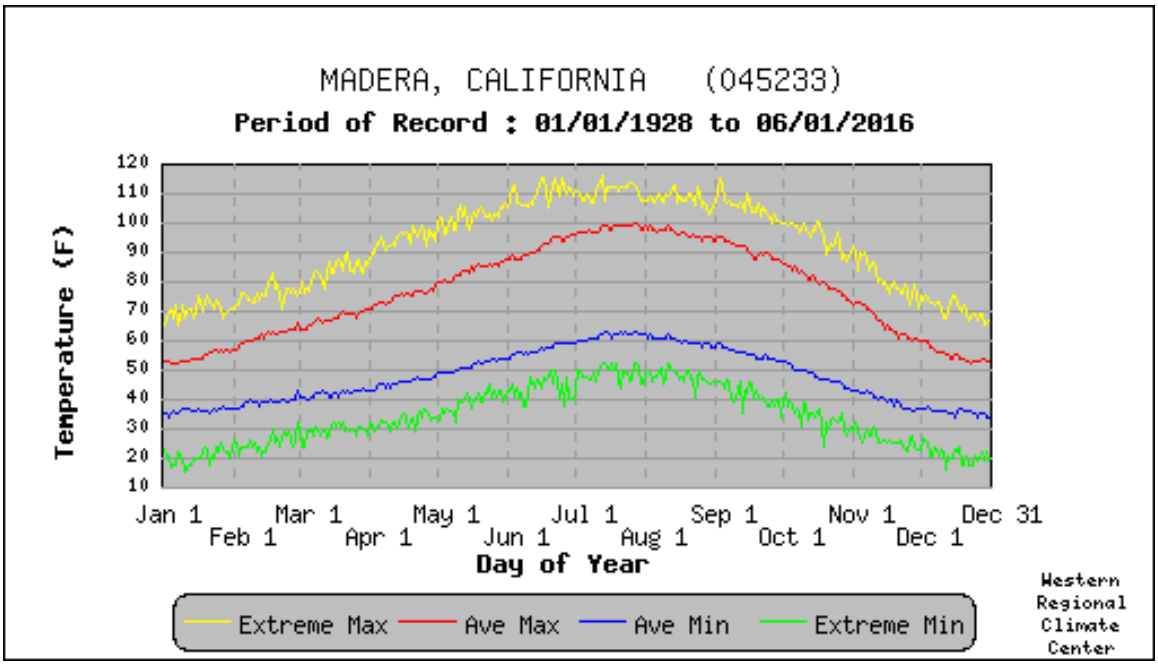
Source: http://www.sierranevadaphotos.com. This image is no longer available publicly. It was retrieved for the 2018 Madera County LHMP.

As discussed in Section 4.3.1 above, due to 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 two weather stations located in these two different parts of the County: Madera (elevation: 300 feet above msl) in west Madera County and Mammoth Lakes Ranger Station (elevation: 7,900 feet above msl), in eastern Madera County. In addition to this difference in elevation in the County, it should be noted that the WRCC and NWS maintain data on weather normal and extremes in the western United States. Data from the WRCC stopped being collected in April of 2016. NWS covers the entire time period to more recent dates (2023 for western and 2022 for eastern Madera County). Therefore, both data sets are shown below. WRCC and NWS data for both the western and eastern County is summarized below.

Western Madera County—Madera Weather Station (WRCC), Period of Record 1928 to 2016

According to the WRCC, in the western portion of Madera County, monthly average low temperatures in the coldest months (November through April) range from the mid-30s to the upper 40s. The lowest recorded daily extreme was 15°F on January 10, 1949. In a typical year, low temperatures fall below 32°F on 30.7 days.

Figure 4-26 Western Madera County— WRCC Daily Temperature Averages and Extremes 1928 to 2016



Source: Western Regional Climate Center, www.wrcc.dri.edu. Retrieved 6/23/2025.

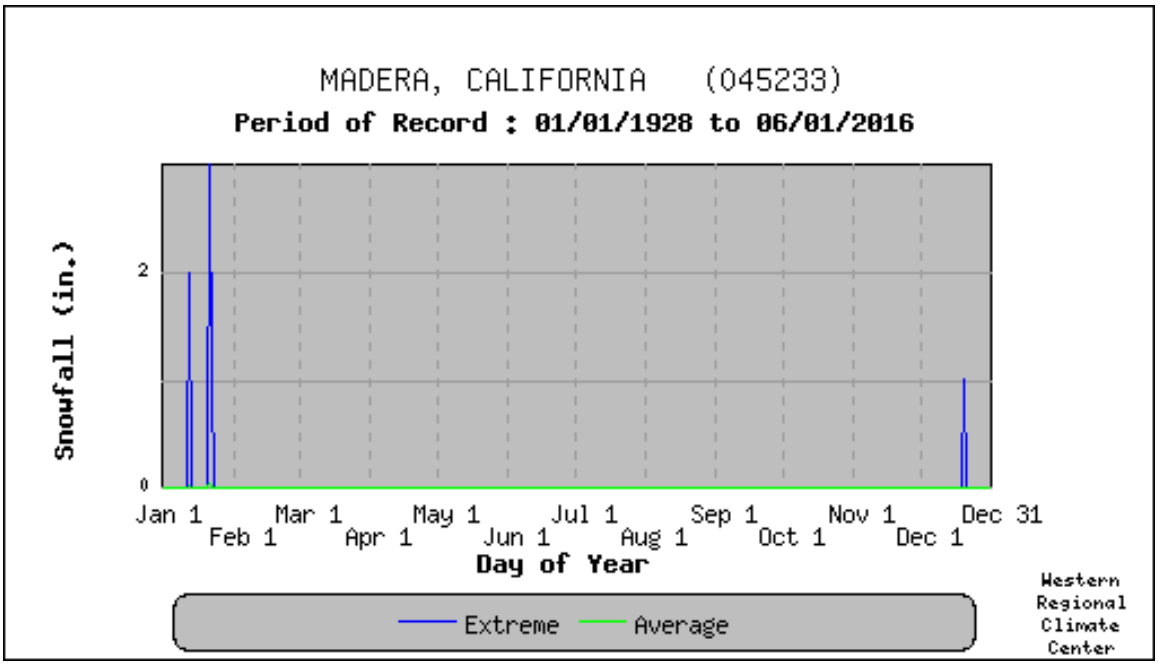
Table 4-23 Western Madera County – WRCC Record Low Temperatures 1928 to 2016

Month	Record High	Date	Month	Record High	Date
January	15°	1/10/1949	July	42°	7/1/1963
February	21°	2/13/1949	August	39°	8/11/1977
March	24°	3/3/1951	September	34°	9/30/1950
April	29°	4/3/1945	October	24°	10/19/1949
May	33°	5/2/1959	November	22°	11/25/1931
June	38°	6/26/1933	December	16°	12/12/1932

Source: Western Regional Climate Center

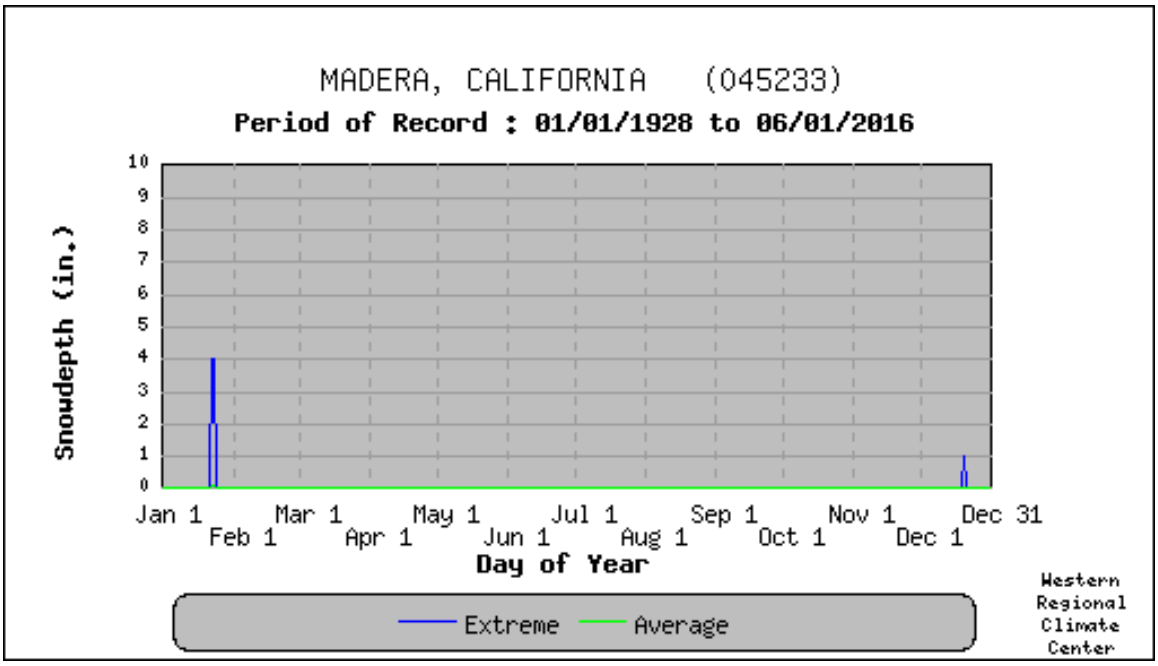
According to the WRCC, in the western portion of Madera County, average snowfall is 0.1 inches, as shown in Figure 4-27. The highest annual snowfall fell in 1962, when 4.0 inches fell. Highest monthly snowfall accumulation came in January of 1962, when 4.0 inches fell. Average snowdepths in January through March fall at 0.1 inches. This can be seen in Figure 4-28.

Figure 4-27 Western Madera County – WRCC Snowfall Averages and Extremes 1928 to 2016



Source: Western Regional Climate Center. Retrieved 6/23/2025

Figure 4-28 Western Madera County – WRCC Snowdepth Averages and Extremes 1928 to 2016



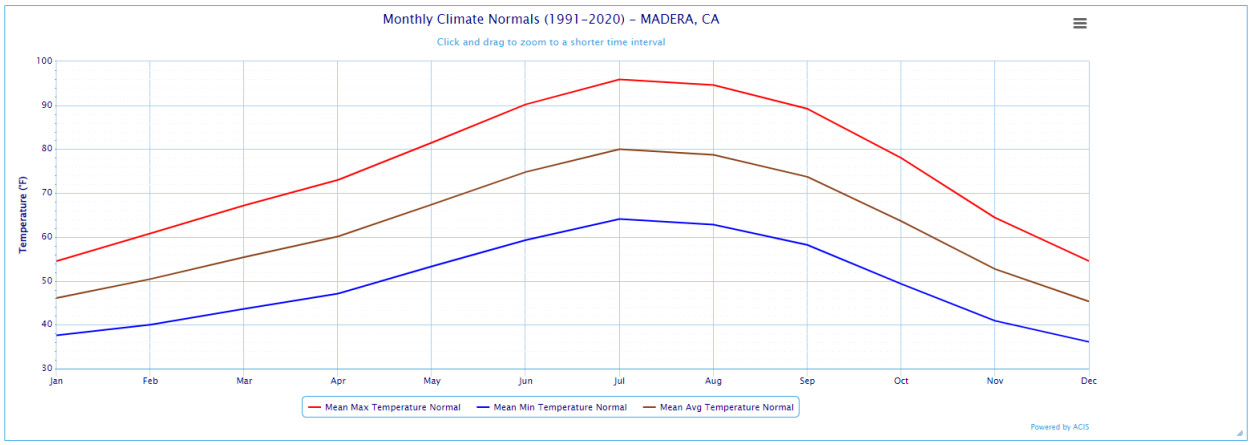
Source: Western Regional Climate Center. Retrieved 6/23/2025

Western Madera County—Madera Weather Station (NWS), Period of Record 1928 to 2023

Note: While the overall period of record for this NWS station is 1943 to 2025, not all data is recorded for those dates. Snowfall and snow depth are covered from 1928 to December 2010. Extreme temperatures are covered from 1928 to October 20, 2020.

According to the NWS, monthly average minimum temperatures in the coldest months (December through February) range from the upper-30s to mid-40s. The lowest recorded daily extreme was 15°F on January 10, 1949. Figure 4-29 shows the average daily low temperatures and extremes for the County. Table 4-24 shows the record low temperatures for the County.

Figure 4-29 Western Madera County – Madera Weather Station (NWS) Daily Temperature Averages and Extremes, 1991-2020



Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	54.5	37.6	46.1
February	60.8	40.0	50.4
March	67.2	43.6	55.4
April	73.0	47.1	60.1
May	81.5	53.3	67.4
June	90.2	59.3	74.8
July	95.9	64.1	80.0
August	94.6	62.8	78.7
September	89.2	58.2	73.7
October	78.0	49.3	63.6
November	64.4	40.9	52.7
December	54.5	36.1	45.3
Annual	75.3	49.4	62.4

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Table 4-24 Western Madera County – Madera Weather Station (NWS) Record Low Temperatures 1928 to 2020

Temperature	Date
15.0°	1/10/1949
16.0°	1/11/1949
16.0°	12/12/1932
17.0°	1/4/1976
18.0°	12/20/2012
18.0°	12/19/2012

Temperature	Date
18.0°	12/24/1990
18.0°	12/23/1990
18.0°	12/22/1990
18.0°	1/13/1963

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Table 4-25 shows historical data of the highest daily snowfall on January 26, 1957, when 3.0 inches fell. Only 4 days of snowfall fall in this database. The maximum snow depth came on January 22 and 23, 1962, with a depth of 4.0 inches. This can be seen in Table 4-26.

Table 4-25 Western Madera County – Madera Station (NWS) Highest Daily Snowfall 1928 to 2023

Snowfall in Inches	Date
3.0	1962-01-21
2.0	1930-01-12
1.0	1968-12-20
1.0	1962-01-22

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Table 4-26 Western Madera County – Madera Station (NWS) Maximum Snow Depth 1928 to 2023

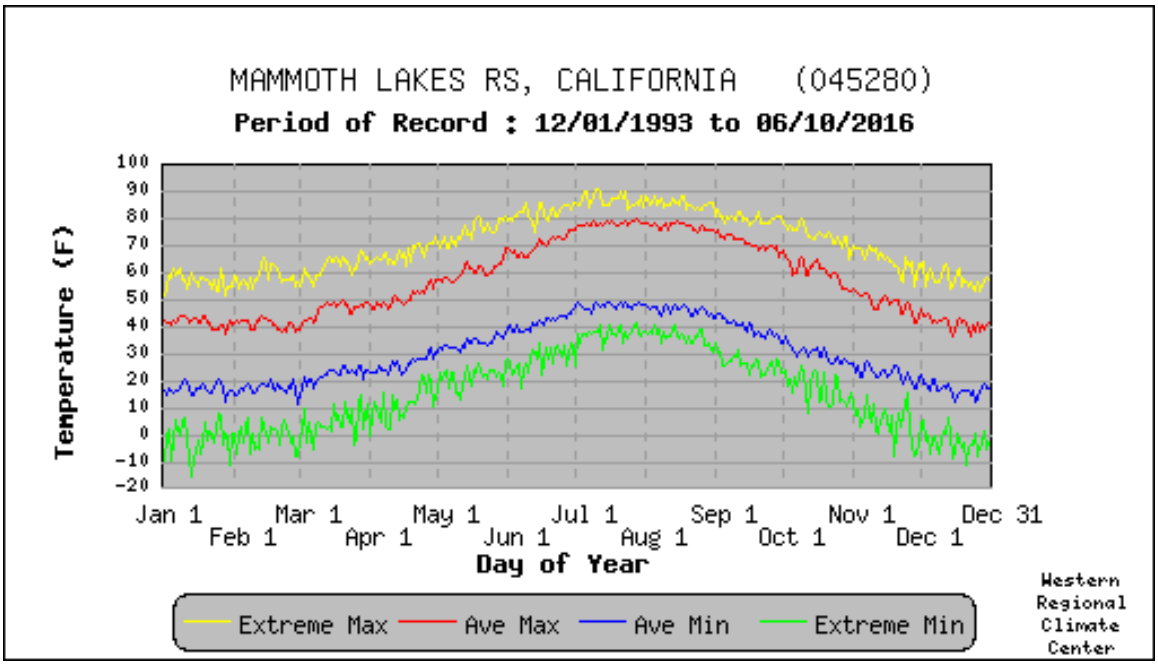
Snow Depth in Inches	Date
4.0	1/23/1962
4.0	1/22/1962
1.0	12/20/1968

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Eastern Madera County—Mammoth Lakes Ranger Station (WRCC), Period of Record 1993 to 2016

According to the WRCC, in the eastern portion of Madera County, monthly average low temperatures in the coldest months (November through April) range from the mid-30s to the upper 40s. The lowest recorded daily extreme was 15°F on January 10, 1949. In a typical year, low temperatures fall below 32°F on 30.7 days.

Figure 4-30 Madera County—East Daily Temperature Averages and Extremes 1993 to 2016



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

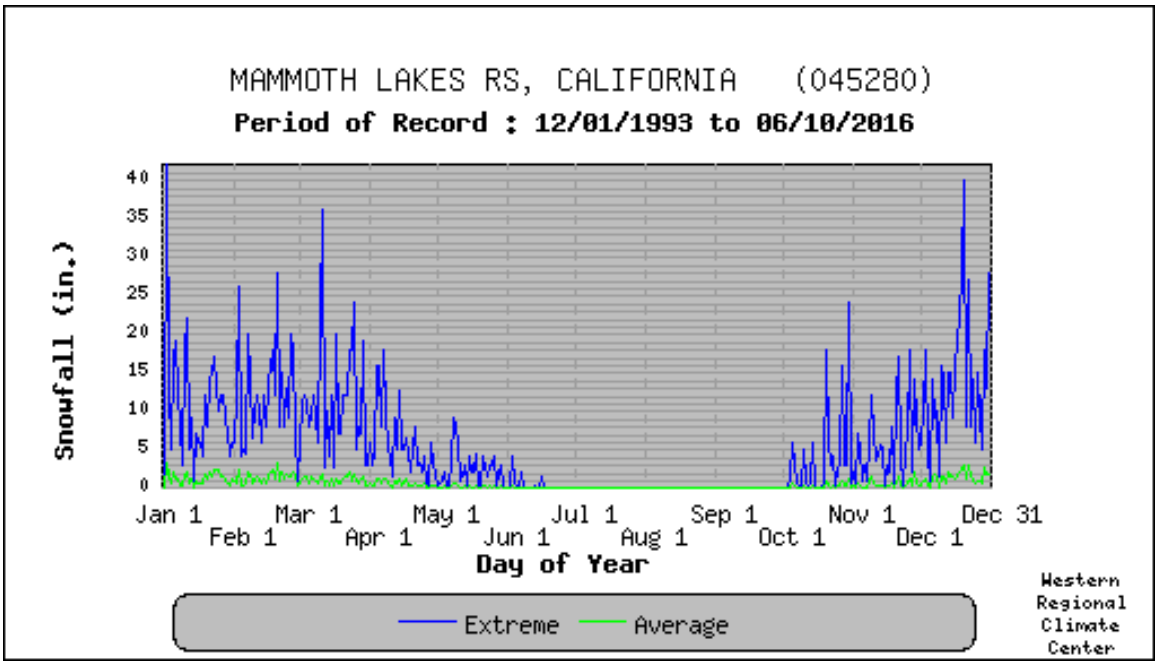
Table 4-27 Madera County – East Record Low Temperatures 1993 to 2016

Month	Record High	Date	Month	Record High	Date
January	-16°	1/13/2007	July	25°	7/1/1997
February	-7°	2/8/2001	August	30°	8/31/1999
March	-6°	3/7/1998	September	21°	9/21/2004
April	2°	4/9/1999	October	8°	10/12/2008
May	13°	5/11/2000	November	-8°	11/19/1994
June	17°	6/7/1995	December	-12°	12/21/1998

Source: Western Regional Climate Center

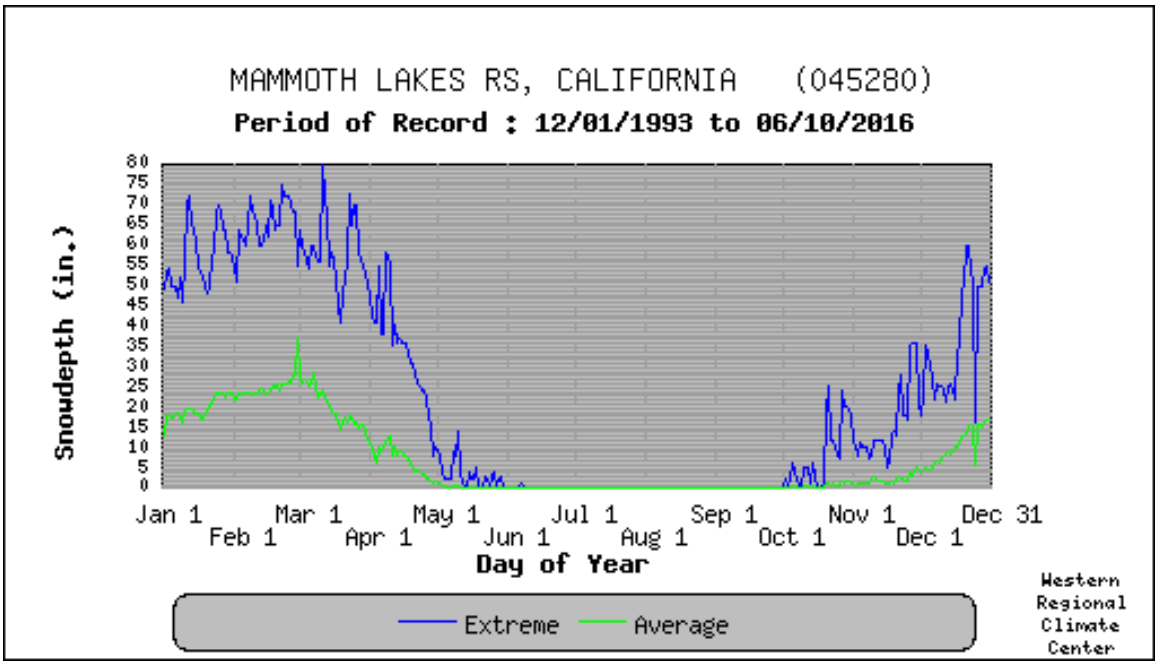
According to the WRCC, average snowfall on the eastern side of the County is 206 inches, as shown in Figure 4-31. The highest annual snowfall fell in 2010, when 303.8 inches fell. Highest monthly snowfall accumulation came in February of 1988, when 140.0 inches fell. Average snowdepths in January through March fall between 18 and 30 inches. This can be seen in Figure 4-32.

Figure 4-31 Madera County—East Snowfall Averages and Extremes 1993 to 2016



Source: Western Regional Climate Center

Figure 4-32 Madera County—East Snowdepth Averages and Extremes 1993 to 2016



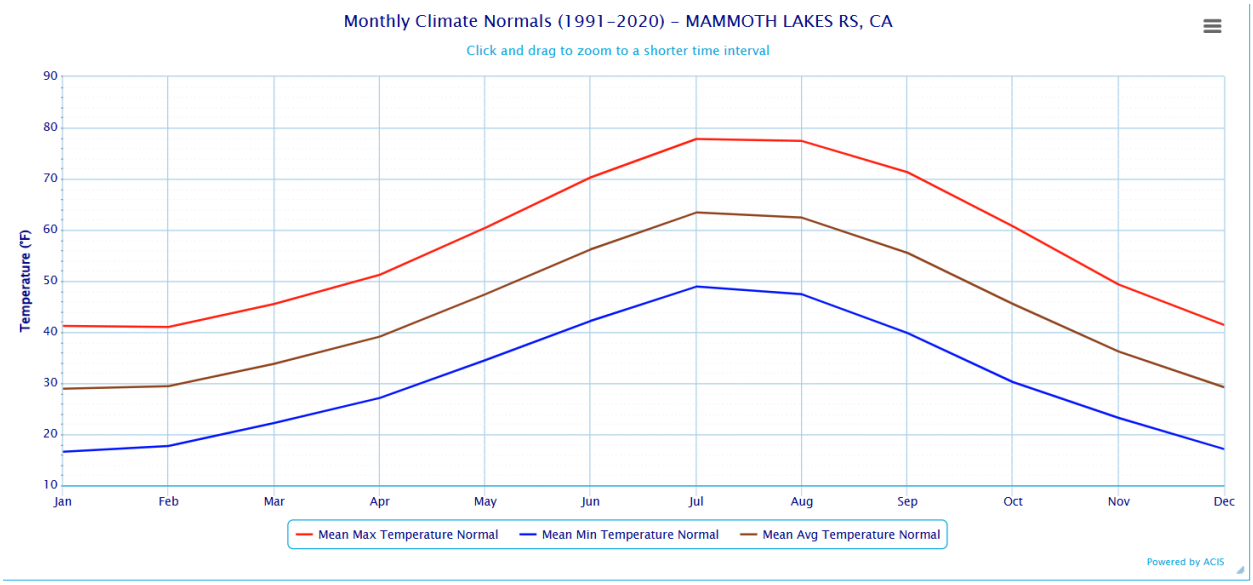
Source: Western Regional Climate Center

Eastern Madera County—NWS Mammoth Lakes Ranger Station, Period of Record 1993 to 2022

Note: While the overall period of record for this NWS station is 1993 to 2022, not all data is recorded for those dates. Snowfall and snow depth are covered from December 1993 to August 2022. Extreme temperatures are covered from December 1993 to January 18, 2021.

According to the NWS, monthly average minimum temperatures in the coldest months (December through February) range from the upper-10s to mid-20s. The lowest recorded daily extreme was -16°F on January 13, 2007. Figure 4-33 shows the average daily low temperatures and extremes for the County. Table 4-28 shows the record low temperatures for the County.

Figure 4-33 Eastern Madera County – Mammoth Lakes Weather Station (NWS) Daily Temperature Averages and Extremes, 1991-2020



Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	41.2	16.6	28.9
February	41.0	17.7	29.4
March	45.5	22.2	33.8
April	51.2	27.1	39.1
May	60.4	34.5	47.4
June	70.3	42.2	56.2
July	77.8	48.9	63.4
August	77.4	47.4	62.4
September	71.3	39.8	55.5
October	60.7	30.2	45.5
November	49.3	23.2	36.2
December	41.4	17.1	29.2
Annual	57.3	30.6	43.9

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Table 4-28 Eastern Madera County – Mammoth Lakes Weather Station (NWS) Record Low Temperatures 1993 to 2021

Temperature	Date
-16°	1/13/2007
-12°	1/30/2002
-12°	12/21/1998
-11°	2/20/2018
-10°	1/1/2016
-10°	1/4/2004
-9°	12/15/2015
-9°	1/14/1997
-8°	3/5/2018
-8°	11/28/2015

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Table 4-29 shows historical data of the highest daily snowfall on January 2, 2006, when 42.0 inches fell. The maximum snow depth came on March 11, 1995, with a depth of 80.0 inches. This can be seen in Table 4-30.

Table 4-29 Eastern Madera County – Mammoth Lakes Weather Station (NWS) Highest Daily Snowfall 1993 to 2022

Snowfall in Inches	Date
42.0	01/02/2006
40.0	12/20/2010
36.0	03/11/1995
28.0	12/19/2010
28.0	12/31/2004
28.0	02/20/1996
27.0	12/22/1996
26.0	02/03/1998
25.0	02/28/2019
24.0	03/25/2011

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Table 4-30 Eastern Madera County – Mammoth Lakes Weather Station (NWS) Maximum Snow Depth 1993 to 2022

Snow Depth in Inches	Date
80.0	03/11/1995
75.0	02/22/1998

Snow Depth in Inches	Date
73.0	03/23/1995
72.0	02/25/1998
72.0	02/24/1998
72.0	02/23/1998
72.0	02/08/1998
72.0	03/12/1995
72.0	01/12/1995
71.0	02/17/1998

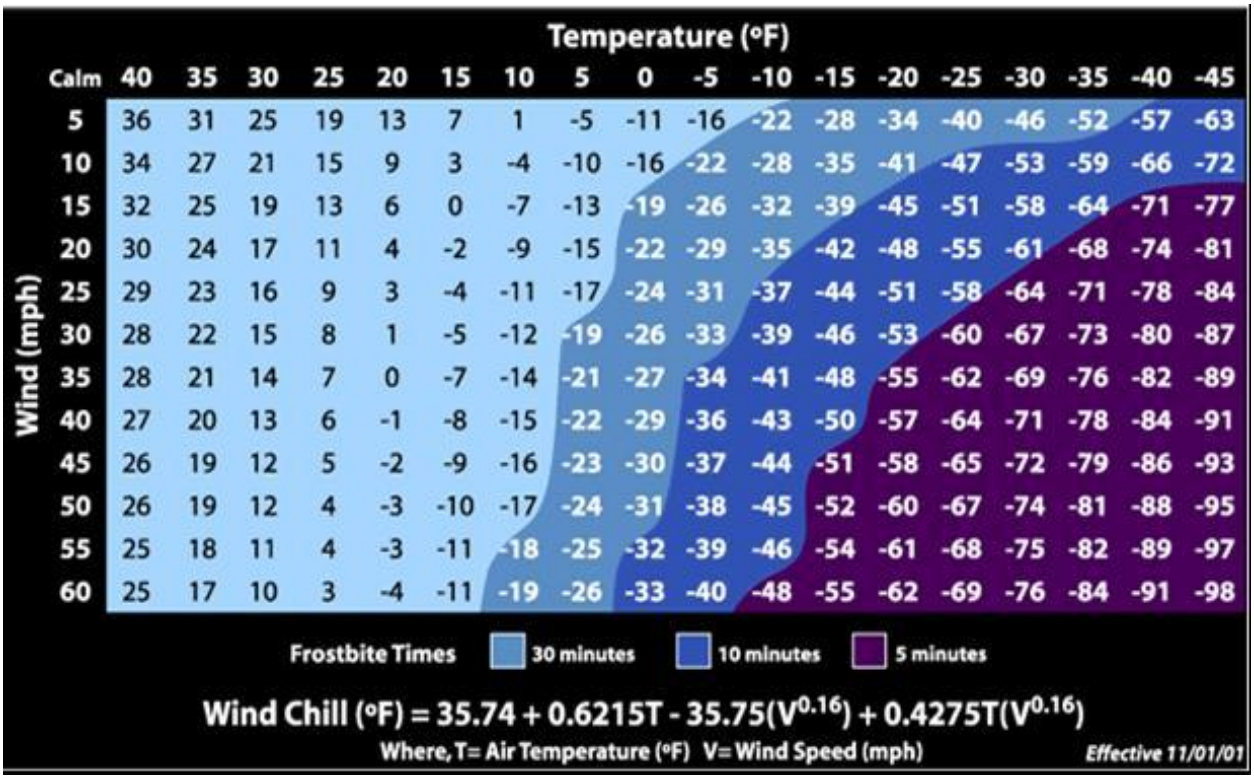
Source: National Weather Service XMAC site. Retrieved 3/12/2025

Location and Extent

Extreme cold and freeze events occur on a regional basis. Extreme cold can occur in any location of the County. All portions of the County are at risk to extreme cold, with the upper elevations of the County at greater risk. Snow can occur in most areas of the County, with the upper elevations of the County at greater risk.

In 2001, the NWS implemented an updated Wind Chill Temperature index (shown in Figure 4-34), which is reproduced below. This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

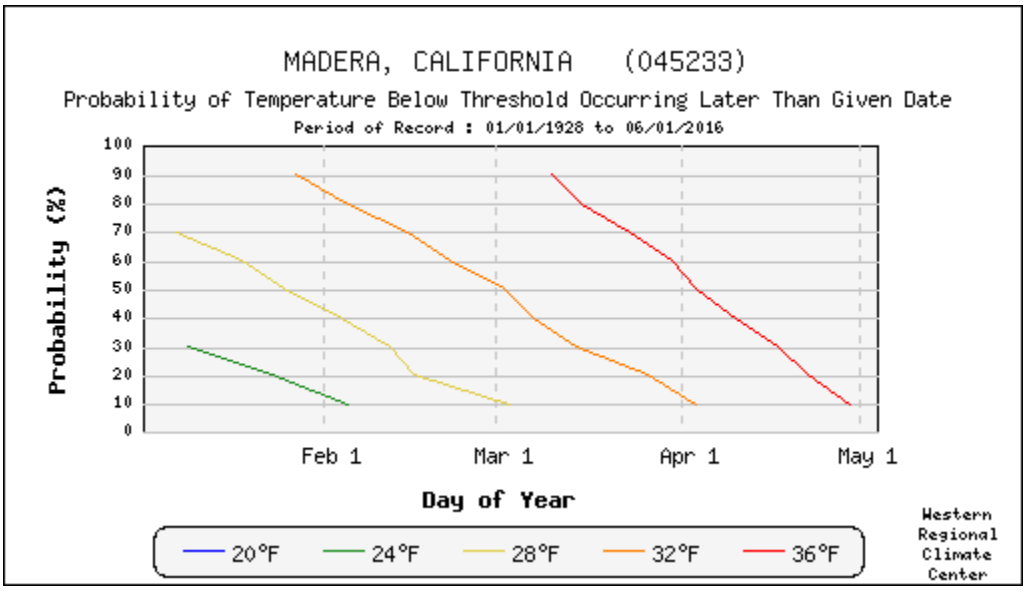
Figure 4-34 Wind Chill Temperature Chart



Source: National Weather Service

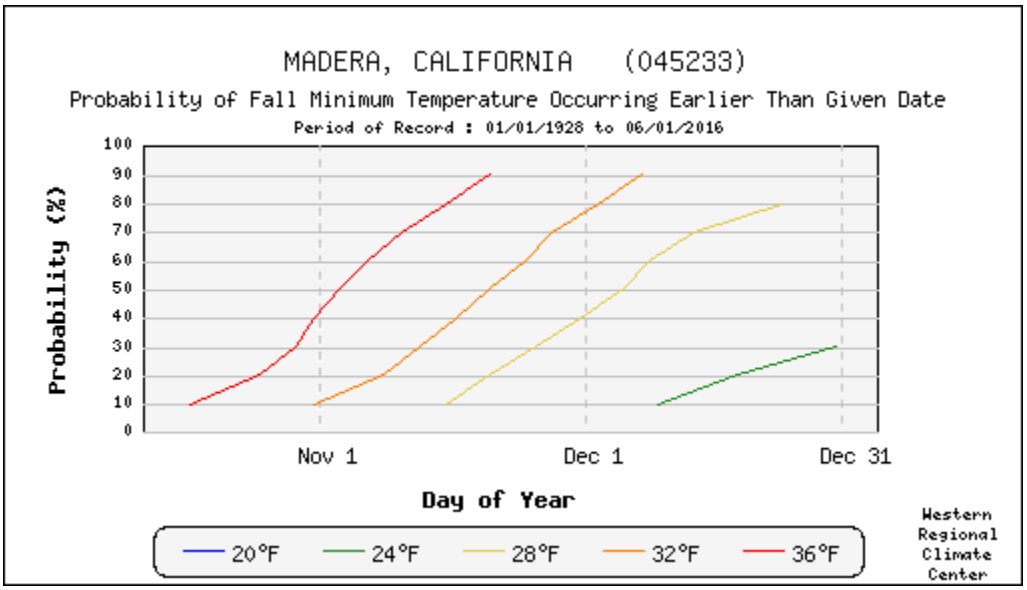
Extreme cold can affect agricultural products in the County. Freeze damages reduce the values of agricultural crops (discussed further in Section 4.3.6). While there is no scale (i.e. Richter, Enhanced Fujita) to measure the effects of freeze, temperature data from the County from the WRCC indicates that there are 25.1 days that fall below 32°F. ***Note***: there are no NWS XMAC freeze probabilities, so only the WRCC is captured below. Freeze has a slow onset and can generally be predicted in advance for the County. Freeze events can last for hours (in a cold overnight), or for days to weeks at a time. Figure 4-35 and Figure 4-36 show the probabilities in the western County of freeze for both spring and fall. There has not been a past occurrence of freeze in the months of May through September.

Figure 4-35 Western Madera County – Madera Station (WRCC) Spring Freeze Probabilities 1928 to 2016



Source: Western Regional Climate Center. Retrieved 6/25/2025

Figure 4-36 Western Madera County – Madera Station (WRCC) Fall Freeze Probabilities 1928 to 2016



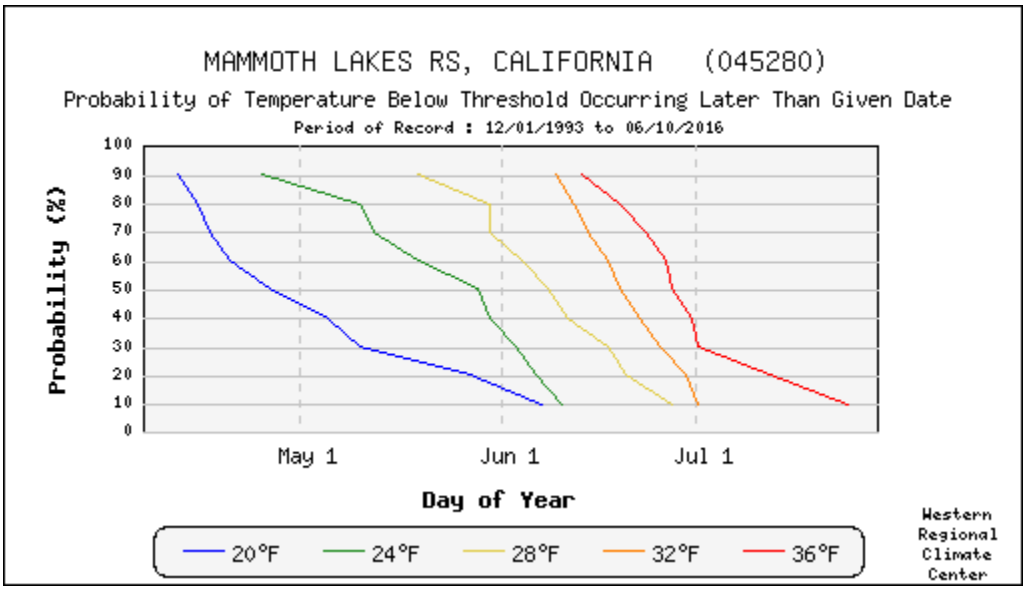
Source: Western Regional Climate Center. Retrieved 6/25/2025

Figure 4-37 and Figure 4-38 show the probabilities in the eastern County of freeze for both spring and fall. There have been multiple past occurrences of freeze in the months of May through September. Average number of days below 32° by month are:

- May – 14.4 days
- June – 3.8 days

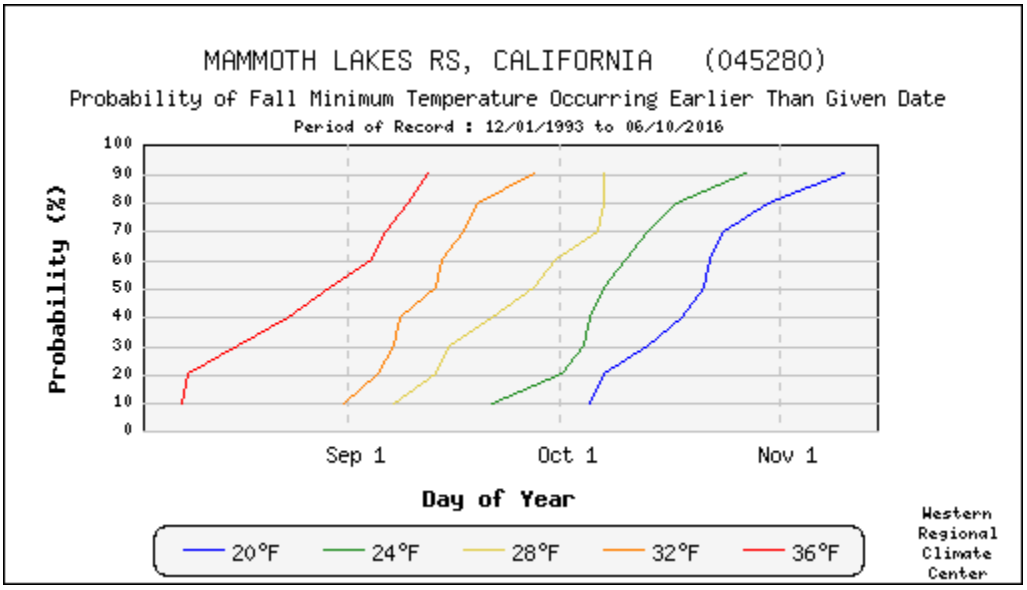
- July – 0.1 days
- August – 0.2 Days
- September – 5.6 days

Figure 4-37 Eastern Madera County – Mammoth Lakes (WRCC) Spring Freeze Probabilities 1993 to 2016



Source: Western Regional Climate Center. Retrieved 6/25/2025

Figure 4-38 Eastern Madera County – Mammoth Lakes (WRCC) Spring Freeze Probabilities 1993 to 2016



Source: Western Regional Climate Center. Retrieved 6/25/2025.

Past Occurrences

Disaster Declaration History

The County has had four past state and three past federal disaster declarations for extreme cold and freeze. Table 4-31 shows the dates of the disaster declarations. More information on USDA disaster declarations (once in 2012 and twice in 2022) from cold and freeze can be found in Table 4-53 in the Past Occurrences in Section 4.3.6.

Table 4-31 Madera County – Federal and State Disaster Declarations for Freeze 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Freeze	4	1972, 1990, 1998, 2007	3	1990, 1999, 2007

Source: Cal OES, FEMA

NCDC Events

The NCDC data shows 787 extreme cold, freeze, and snow incidents for Madera County since 1993. Information for these events is shown in Table 4-32.

*Table 4-32 NCDC Cold and Freeze Events for Madera County 1950-7/31/2024**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Cold/Wind Chill	3	0	0	0	0	$0	$0
Extreme Cold/Wind Chill	4	0	0	0	0	$0	$0
Frost/Freeze	190	0	0	0	0	$150,000	$402,955,000
Heavy Snow	328	0	0	0	0	$0	$0
Winter Storm	183	2	0	0	0	$8,405,000	$0
Winter Weather	79	0	1	0	0	$282,000	$0
Total	**787**	**2**	**1**	**0**	**0**	**$8,837,000**	**$402,955,000**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of Madera County

Hazard Mitigation Planning Committee Events

The HMPC noted that winter storms occur each year, with varying degrees of strength. Much of the eastern County is in areas that see large amounts of snow. These areas are more sparsely populated, and people who reside there are prepared for the snows. These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring prior to the 2018 LHMP.

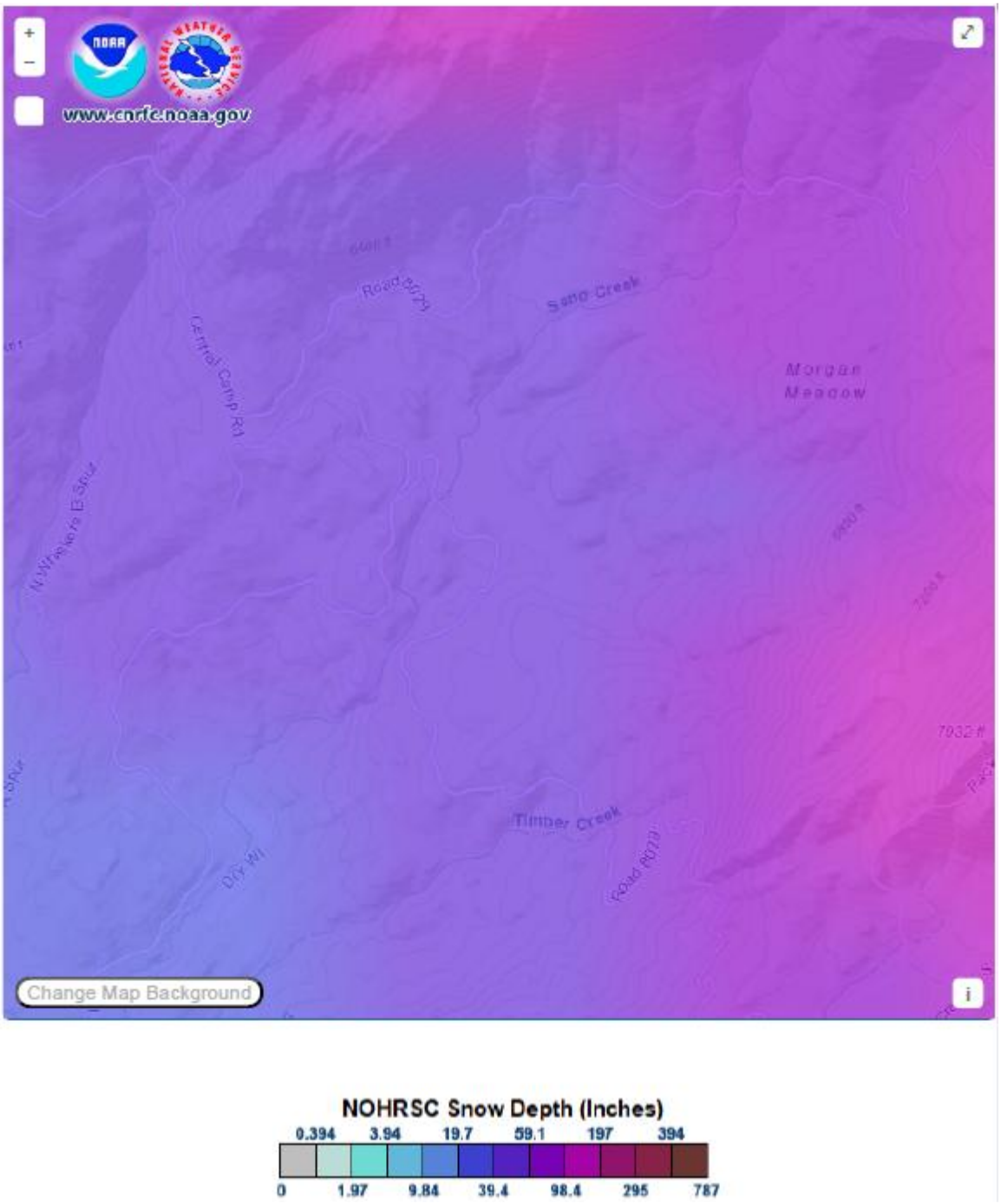
Events since 2018 LHMP

January to March 2024 – Late January, early February, and mid-March winter storms caused multiple schools to cancel classes due to weather and unsafe road conditions. Schools were closed on January 22nd, February 8th, and March 14th.

2022/2023 Winter Storms – Due to atmospheric river events in late December and early January, multiple schools were closed in the first week of January due to hazardous driving conditions. 23 schools were closed during early January.

2023 – Madera County mobilized all resources available in late **February 2023** in response to the overwhelming snowfall, produced by the severe winter weather storms, in the foothill and mountainous communities within Madera County. The recorded snow depth on February 22nd, 2023, under 1 inch for Bass Lake CA (Elevation 3,415 Feet). On February 26th, Bass Lake recorded 19.7 to 39.4 inches of snow depth. The snow depth increased 18 inches in three days (as seen on Figure 4-39). The snow depth of 19.7 to 39.4 inches maintained for the Bass Lake area until March 14, 2023, when it reduced to 9.84 to 19.7 inches. During the 2023 winter storm, the Sheriff's Office responded to a total of 425 storm related calls. There was a wide array of storm related calls, such as assisting citizens with food, water, other needs (210), medical emergencies (21) evacuated people (27), transported citizens of out of their homes to friends or family (26), house fires (7), collapsed buildings (14), search and rescues (7), and welfare checks (113). Multiple schools were closed in late February and in early March due to weather and unsafe road conditions. The County say increased costs due to snow removal and snow hauling. PG&E had many areas where electricity was out. The County assisted PG&E by removing snow so they could reach their equipment.

Figure 4-39 Snow Depths after 2023 Snowfalls



Source: NOAA. Retrieved 6/25/2025.

Events prior to 2018 LHMP

In **2011**, there was a large snowfall event on March 21st. This event occurred in many counties in California. In the Oakhurst area, 26 inches of snow were reported. This caused damages to Oak Creek Intermediate and Oakhurst Elementary School trees. North Fork Elementary lost power and had to rent a generator.

Yosemite High School needed debris removal from downed trees and had plumbing breakage. There were $22,000 in damages to the schools during this event.

In **1997**, there was a large amount snowfall. This impacted the mountain area. This required a snow response from the Sheriff's Office. The Sheriffs had an influx of welfare checks where they had to hike or snowshoe into residences to check on people.

Likelihood of Future Occurrence

Highly Likely—Extreme cold, freeze, and snow are likely to continue to occur annually in the Madera County Planning Area, especially in the eastern portion of the County. In a typical year, minimum temperatures fall below 32°F on 214.8 days in eastern Madera County. Snow falls in the County every year. There have been 787 NCDC events since 1993. This equates to a likelihood of future occurrences being considered highly likely.

It is likely that climate change will decrease the chance of future occurrence as well as future impacts. More information on climate change and extreme cold, freeze, and snow can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and Extreme Cold and Freeze

According to the 2021 California Climate Adaptation Study (CAS), freezing spells are likely to become less frequent in California as climate temperatures increase. If emissions increase, freezing events could occur only once per decade in large portion of the State by the second half of the 21st century. According to a California Natural Resources Report in 2014, it was determined that while fewer freezing spells would decrease cold related health effects, too few freezes could lead to increased incidence of disease as vectors and pathogens do not die off. Recent studies, including a 2024 review from UC Davis Health, note that shorter, warmer winters reduce natural die-off of vectors and pathogens, increasing risks of diseases like Lyme disease, malaria, and fungal infections. Warmer conditions allow vectors to remain active longer, even into winter months, and expand into new regions.

Vulnerability Assessment

Vulnerability—Medium

Extreme cold, freeze, and snow events happen in the Madera County Planning Area each year. It can impact key assets in the Planning Area. The whole of the Planning Area has some measure of vulnerability to extreme cold, freeze, and snow. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerabilities to this hazard.

Extreme Cold Concerns

The varying elevations in the County, in part, determine the extent to which a given area is affected by freeze, cold, and snow. The agricultural industry is especially vulnerable to extreme temperatures. Freezing temperatures can cause significant loss to crops. Historically, extreme cold and freeze have caused losses to agricultural crops and have resulted in USDA disaster declarations including the two noted above in the Past Occurrences section. In addition, those who are homeless during these events face a risk. There are warming shelters put in place by faith based organizations during times of extreme cold.

Temperature Inversions

Periodically Madera County experiences temperature inversions. Temperature inversion layers are areas where the normal decrease in air temperature with increasing altitude is reversed and air above the ground is warmer than the air below it. According to the NOAA, inversion layers are significant to meteorology because they block atmospheric flow which causes the air over an area experiencing an inversion to become stable. During an inversion episode, temperatures increase with increasing altitude. The warm inversion layer then acts as a cap and stops atmospheric mixing.

Topography can also play a role in creating a temperature inversion since it can sometimes cause cold air to flow from mountain peaks down into valleys. This cold air then pushes under the warmer air rising from the valley, creating the inversion. Some of the most significant consequences of temperature inversions are the extreme weather conditions they can sometimes create. One example of these is freezing rain. This phenomenon develops with a temperature inversion in a cold area because snow melts as it moves through the warm inversion layer. The precipitation then continues to fall and passes through the cold layer of air near the ground. When it moves through this final cold air mass it becomes "super-cooled" (cooled below freezing without becoming solid).

Intense thunderstorms and tornadoes (discussed in Section 4.3.4) are also associated with inversions because of the intense energy that is released after an inversion blocks an area's normal convection patterns.

Snowfall Concerns

The western portion of the Madera County Planning Area does experience rare snowfall on a seasonal basis; however, the eastern portions of the County receive an abundance of snow, mostly between the months of November through March. Winter snow storms 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, businesses, and nonessential government operations. During periods of heavy snow there is also an increase in the number and severity of traffic accidents. People can become isolated in their homes and vehicles and are unable to receive essential services. This causes issues for people who heat with propane or wood (both of which are popular in the more remote areas of the County). Many of these remote areas

also have single ingress/egress, which causes problems during large snow events. Snow removal costs can impact budgets significantly. Heavy snowfall during winter can lead to flooding or landslides during the spring if the area snowpack melts too quickly and can also create numerous challenges for emergency responders. The HMPC noted that Bass Lake can have problems with buried fire hydrants, but snow does not often remain for more than 24 hours.

Local concerns for each of the jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from extreme cold, freeze, and snow include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

People and Populations

All populations within the Madera County Planning Area are vulnerable to extreme cold and freeze, but this hazard generally affects people spending large amounts of time outside to a greater extent. Prolonged exposure to cold can cause frostbite or hypothermia and can be life-threatening. Vulnerable populations to cold, freeze, and snow include the unhoused; individuals who exercise or recreate outdoors; outdoor workers; individuals that lack the resources to afford heat; and the young, old, or medically fragile individuals that are more susceptible to cold related impacts. In addition to vulnerable populations, pets and livestock are at risk to freeze, cold, and snow.

Structures

Structures in the Madera County Planning Area have some measure of risk from extreme cold, freeze, and snow. Buildings in the upper elevations of the County can be affected directly by freeze; pipes that feed buildings can be damaged during periods of extreme cold and cause water damage and other related impacts to a structure. High snow loads that accumulate on roofs can impact structures. Structures can also be damaged by downed trees and power lines during freeze and winter storm events.

Critical Facilities and Infrastructure

Winter storms typically involve snow and ice, occasionally accompanied by high winds and cold temperatures, which can cause downed trees and power lines, power outages, accidents, and road closures. Transportation networks, communications, and utilities infrastructure are the most vulnerable physical assets in the County. Depending on the facility type and function, critical facilities and infrastructure may be affected directly by freeze and extreme cold and winter weather events. Damage to pipes that feed buildings can be damaged during periods of extreme cold. Other equipment may also be affected.

Infrastructure such as roads, highways, and bridges can become slippery, causing accidents and road closures.

Natural, Historic, and Cultural Resources

Depending on how low the temperatures go and the duration of an extreme cold, freeze or snow event, natural resources in the Madera County Planning Area may be affected. During periods of freeze, trees in the Planning Area may be damaged. This is especially true if a freeze occurs during a winter storm with winds and precipitation. Other natural resources like wildlife may be at risk during a period of freeze. While it is rare for buildings to be affected directly by freeze, damages to pipes that feed historic buildings can be damaged during periods of extreme cold and cause additional impacts to the structures.

FEMA NRI Hazard Vulnerability Assessment

The FEMA NRI was queried for additional specific data on Madera County's vulnerability to Extreme Cold, Freeze, and Snow. The NRI contains data and analysis for 18 separate natural hazards. The NRI hazards related to Madera County's Extreme Cold, Freeze, and Snow hazards are: avalanche, cold wave, ice storm, and winter weather. As shown in Table 4-33, while cold waves, and ice storms are expected to cause no expected annual losses and are given no historic loss ratio, winter weather could cause a total of $14,311 in expected annual losses, with a rating of very low. Avalanche could cause a total of $36,967 in expected annual losses, with a rating of relatively moderate. Winter weather and avalanches have a very high rating for social vulnerability and a very low community resilience, with a risk index score of 8.7 out of 100 for avalanche and 23 out of 100 for winter weather. According to the NRI, there have been 111 winter weather events on record between the years 2005-2021, with an average of 6.9 events per year and 0 avalanche events on record between the years 1960-2019, with an average of 0 events per year.

Table 4-33 Madera County Planning Area – Avalanche, Cold Wave, Ice Storm, and Winter Weather Vulnerability Ratings from FEMA NRI

NRI Hazard	Hazard Risk Index Rating*	Expected Annual Loss Values (total)**	Exposure Value (total)***	Historic Loss Ratio Rating
Avalanche	8.7	$36,967	$59,000,000	Relatively moderate
Cold Wave	0	$0	$0	No rating
Ice Storm	–	$0	$0	–
Winter Weather	23	$14,311	$315,404,147,429	Very low

Source: FEMA NRI Report. Retrieved April 1, 2025.

*Hazard Risk Index is calculated using data for only a single hazard type, and reflect a communities expected annual loss value, community risk factors, and the adjustment factor used to calculate the risk value.

**Expected annual loss represents the average economic loss in dollars resulting from natural hazards each year.

***Exposure is a natural hazard consequence factor that is the representative value of buildings, populations, or agriculture potentially exposed to a natural hazard occurrence.

Additional information on the FEMA NRI can be found in Section 4.2 and Appendix G.

Impacts from Severe Weather: Extreme Cold, Freeze, and Snow

Extreme cold, freeze, and snow can affect critical facilities and infrastructure, down trees, break pipes, and can be a life safety issue. Transportation networks, communications, and utilities infrastructure are often the most vulnerable physical assets in the Madera County Planning Area. Infrastructure such as roads and utilities are at risk to freezing temperatures and snow, causing failures and hazardous road conditions. When extreme cold is coupled with high winds and freezing storms, power lines may be downed, resulting in power outages and an interruption of utilities and critical services. During periods of extremely low or prolonged cold temperatures, other impacts to the Planning Area include can include interruption in business and school activities.

The elderly, the young, and those experiencing medical issues are often more vulnerable to temperature extremes, but anyone can be affected. Exposure to cold temperatures can cause hypothermia and frostbite. Those exercising or recreating outdoors, outdoor workers, and the unhoused may be at higher risk.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on these factors for Madera County include the following:

- Climate change is unlikely to exacerbate extreme cold, freeze, and snow and their associated impacts to the County.
- The population of Madera County is expected to slowly increase until 2045, and then slowly shrink. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-21). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the County. Changes in populations patterns should also be considered. Especially vulnerable individuals to this hazard include older adults, children, outdoor workers, those below the poverty line and the unhoused. During hazard events, existing inequities can get worse, and these groups are the most likely to be affected and may require extra assistance. Planning for population changes will help to decrease the County's overall vulnerability. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of population growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. County building codes are in effect to reduce this risk and should be updated as necessary to continue to address future freeze, extreme cold, and snow conditions. Due to adherence to protective building codes, changes in land use

and development will likely not increase the impacts and associated vulnerabilities of the County to this hazard.

Future development built to code should be able to withstand extreme cold, freeze, and heavy snow. Current building codes provide such provisions for new construction. Older buildings and infrastructure should be evaluated to ensure that extreme cold and freeze will not cause negative impacts. Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements such as building codes are followed, and varying needs for different demographic groups that reside within the County are considered can help make for a more resilient community.

4.3.3. Severe Weather: Extreme Heat

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrence; and how climate change can affect or influence this hazard.

Hazard/Problem Description

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died. Recently in California, records were set across the state during a July 2024 heat event. 2025 was considered the hottest on record. Extreme heat as it affects agriculture in Madera County is discussed further in the agricultural hazards discussion in Section 4.3.6.

Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds a level at which the body can remove it, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise, and heat-related illness may develop. Elderly persons, small children, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to extreme heat. Extreme heat can also affect the agricultural industry.

Location and Extent

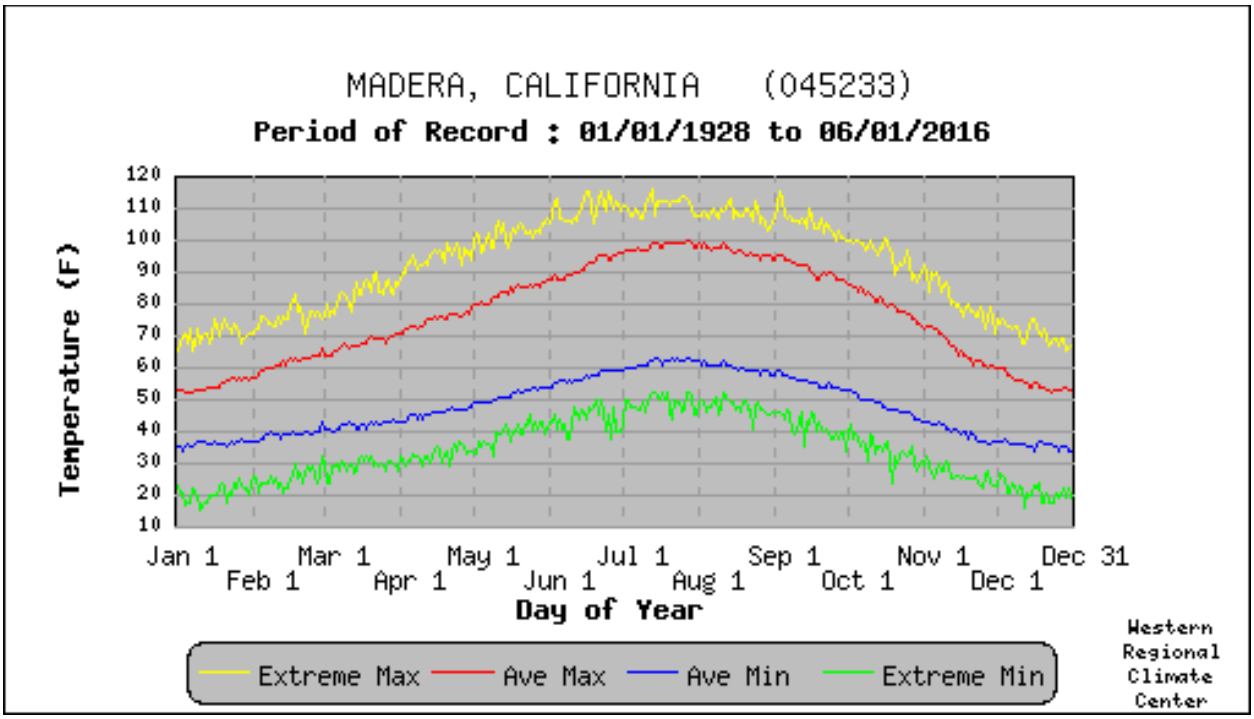
Extreme heat events occur on a regional basis. Extreme heat can occur in any location of the County. All portions of the County are at risk to extreme heat. Extreme heat occurs throughout the Planning Area primarily during the summer months. The WRCC and NWS maintain data on weather normal and extremes in the western United States. Each of these data sources maintain data in slightly different ways. Data from the WRCC stopped being collected in April of 2016. NWS covers the entire time period to more recent

dates (2023 for western and 2022 for eastern Madera County). WRCC and NWS data for the County is summarized below.

Western Madera County—Madera Station (WRCC), Period of Record 1928 to 2016

According to the WRCC, in the western portion of Madera County, monthly average maximum temperatures in the warmest months (May through October) range from the mid-80s to the upper 90s. The highest recorded daily extreme was 116°F on July 13, 1916. In a typical year, maximum temperatures exceed 90°F on 104.8 days. In a typical year, maximum temperatures exceed 90°F on 69.3 days. Figure 4-40 shows the average daily high temperatures and extremes for the western County. Table 4-34 shows the record high temperatures by month for the western County.

Figure 4-40 Western Madera County – Madera Station (WRCC) Daily Temperature Averages and Extremes 1928 to 2016



Source: Western Regional Climate Center. Retrieved 6/23/2025

Table 4-34 Western Madera County – Madera Station (WRCC) Record High Temperatures 1928 to 2016

Month	Record High	Date	Month	Record High	Date
January	79°	1/28/1981	July	116°	7/13/1961
February	83°	2/18/1920	August	113°	8/14/1933
March	90°	3/22/1960	September	115°	9/3/1955
April	99°	4/20/1934	October	101°	10/16/1961
May	107°	5/3/1950	November	92°	11/1/1949

Month	Record High	Date	Month	Record High	Date
June	115°	6/25/1957	December	75°	12/1/1958

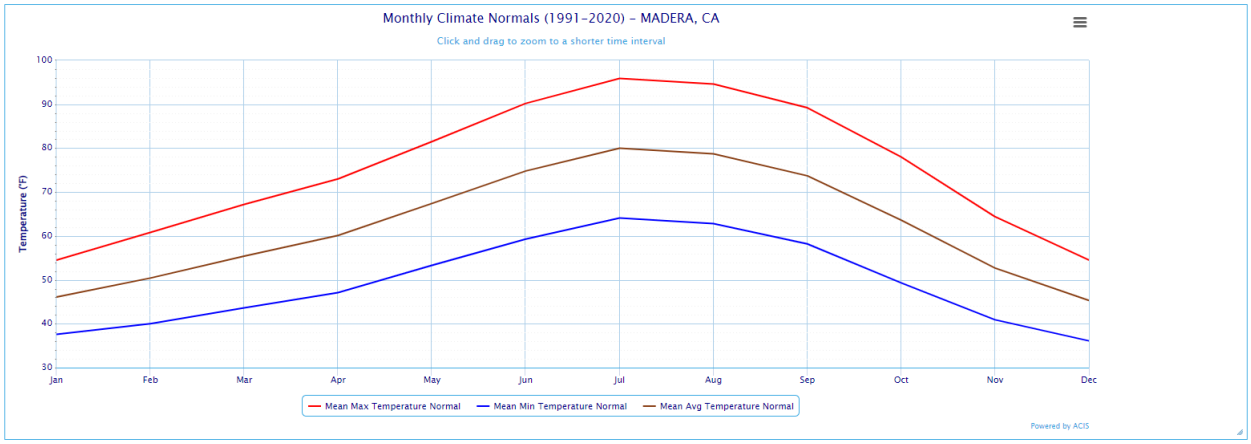
Source: Western Regional Climate Center. Retrieved 6/23/2025.

Western Madera County—Madera Weather Station (NWS), Period of Record 1928 to 2023

Note: While the overall period of record for this NWS station is 1943 to 2025, not all data is recorded for those dates. Extreme temperatures are covered from 1928 to October 20, 2020.

According to the NWS, monthly average maximum temperatures in the warmest months (May through October) range from the low 60s to the upper 90s. The highest recorded daily extreme was 116°F on July 13, 1955. Figure 4-41 shows the average daily high temperatures and extremes for the western County. Table 4-24 shows the record low temperatures for the western County.

Figure 4-41 Western Madera County – Madera Station (NWS) Daily Temperature Averages and Extremes, 1991-2020



Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	54.5	37.6	46.1
February	60.8	40.0	50.4
March	67.2	43.6	55.4
April	73.0	47.1	60.1
May	81.5	53.3	67.4
June	90.2	59.3	74.8
July	95.9	64.1	80.0
August	94.6	62.8	78.7
September	89.2	58.2	73.7
October	78.0	49.3	63.6
November	64.4	40.9	52.7
December	54.5	36.1	45.3
Annual	75.3	49.4	62.4

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Table 4-35 Western Madera County – Madera Station (NWS) Record High Temperatures 1928 to 2020

Temperature	Date
116.0°	7/13/1961
115.0°	6/22/1961
115.0°	6/17/1961

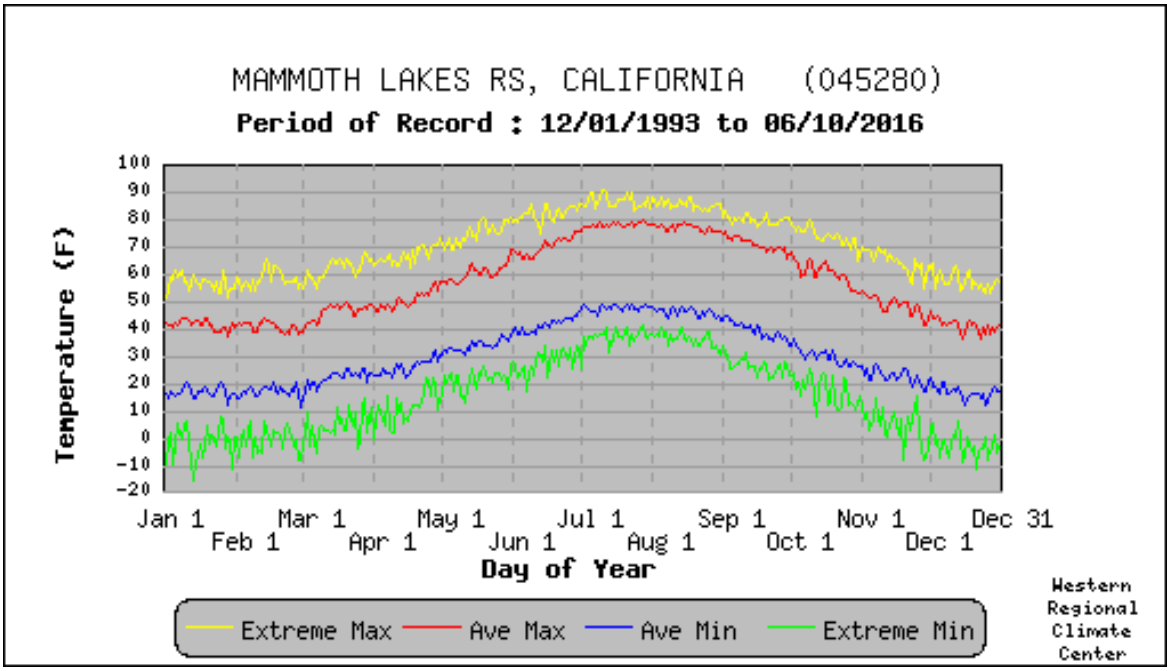
Temperature	Date
115.0°	6/16/1961
115.0°	6/25/1957
115.0°	9/3/1955
114.0°	7/12/1961
114.0°	6/25/1961
114.0°	7/26/1931
114.0°	7/25/1931

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Eastern Madera County—WRCC Mammoth Lakes Ranger Station, Period of Record 1993 to 2022

According to the WRCC, in the eastern portion of Madera County, monthly average maximum temperatures in the warmest months (May through October) range from the low 60s to the mid-70s. The highest recorded daily extreme was 91°F on July 11, 2002. In a typical year, maximum temperatures exceed 90°F on 0.3 days. Figure 4-42 shows the average daily high temperatures and extremes for the eastern portion of the County. Table 4-36 shows the record high temperatures by month for the eastern County.

Figure 4-42 Eastern Madera County – Mammoth Lakes Ranger Station (WRCC) Daily Temperature Averages and Extremes 1993-2016



Source: Western Regional Climate Center, www.wrcc.dri.edu/. Retrieved 6/23/2025

Table 4-36 Eastern Madera County – Mammoth Lakes Ranger Station (WRCC) Record High Temperatures 1993-2016

Month	Record High	Date	Month	Record High	Date
January	61°	1/21/2012	July	91°	7/11/2002
February	58°	2/28/1995	August	88°	8/28/1998
March	66°	3/31/1997	September	82°	9/14/2000
April	73°	4/11/1996	October	80°	10/9/1996
May	81°	5/29/2001	November	70°	11/2/1997
June	86°	6/30/2000	December	64°	12/2/2008

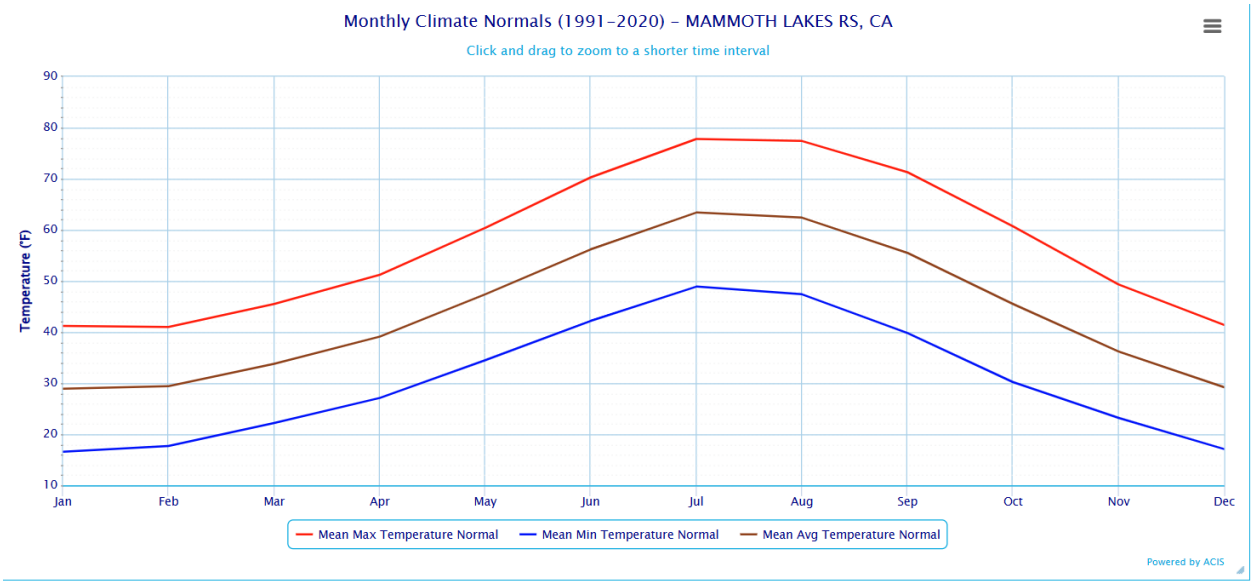
Source: Western Regional Climate Center. Retrieved 6/23/2025

Eastern Madera County—Mammoth Lakes Weather Station (NWS), Period of Record 1993 to 2022

Note: While the overall period of record for this NWS station is 1993 to 2022, not all data is recorded for those dates. Extreme temperatures are covered from December 1993 to January 18, 2021.

According to the NWS, monthly average maximum temperatures in the warmest months (May through October) range from the low to upper-70s. The highest recorded daily extreme was 91°F on July 11, 2002. Figure 4-43 shows the average daily high temperatures and extremes for the eastern County. Table 4-24 shows the record low temperatures for the eastern County.

Figure 4-43 Eastern Madera County – Mammoth Lakes Ranger Station (NWS) Daily Temperature Averages and Extremes, 1991-2020



Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	41.2	16.6	28.9
February	41.0	17.7	29.4
March	45.5	22.2	33.8
April	51.2	27.1	39.1
May	60.4	34.5	47.4
June	70.3	42.2	56.2
July	77.8	48.9	63.4
August	77.4	47.4	62.4
September	71.3	39.8	55.5
October	60.7	30.2	45.5
November	49.3	23.2	36.2
December	41.4	17.1	29.2
Annual	57.3	30.6	43.9

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Table 4-37 Western Madera County – Mammoth Lakes Station (NWS) Record High Temperatures 1993 to 2021

Temperature	Date
91°	7/11/2002
91°	7/10/2002
90°	7/21/2013
90°	7/6/2007
90°	7/5/2007
90°	7/23/2003
89°	7/30/2016
89°	7/12/2002
88°	7/29/2016

Temperature	Date
88°	8/18/2008

Source: National Weather Service XMAC site. Retrieved 3/12/2025

Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. Heat waves do not strike victims immediately, but rather their cumulative effects slowly take the lives of vulnerable populations. Heat waves do not generally cause damage or elicit the immediate response of floods, fires, earthquakes, or other more "typical" disaster scenarios. While heat waves are obviously less dramatic, they are potentially deadlier. According to the 2018/2023 California State Hazard Mitigation Plan, the worst single heat wave event in California occurred in Southern California in 1955, when an eight-day heat wave resulted in 946 deaths.

The NWS has in place a system to initiate alert procedures (advisories or warnings) when extreme heat is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. The NWS HeatRisk forecast provides a quick view of heat risk potential over the upcoming seven days. The heat risk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale which is similar in approach to the Air Quality Index (AQI) or the UV Index. This can be seen in Table 4-38.

Table 4-38 National Weather Service HeatRisk Categories

Category	Level	Meaning
Green	0	No Elevated Risk
Yellow	1	Low Risk for those extremely sensitive to heat, especially those without effective cooling and/or adequate hydration
Orange	2	Moderate Risk for those who are sensitive to heat, especially those without effective cooling and/or adequate hydration
Red	3	High Risk for much of the population, especially those who are heat sensitive and those without effective cooling and/or adequate hydration
Magenta	4	Very High Risk for entire population due to long duration heat, with little to no relief overnight

Source: National Weather Service

The NWS office in Sacramento can issue the following heat-related advisory as conditions warrant.

- **Heat Advisories** are issued during events where the HeatRisk is on the Orange/Red threshold (Orange will not always trigger an advisory)
- **Excessive Heat Watches/Warnings** are issued during events where the HeatRisk is in the Red/Magenta output

Past Occurrences

Disaster Declaration History

There have been no FEMA or Cal OES disasters related to extreme heat, as shown in Table 4-4. There have been no USDA disaster declarations for extreme heat, as shown in Table 4-53.

NCDC Events

The NCDC data shows 122 extreme heat incidents for Madera County since 1993. Information for these events are shown in Table 4-39.

*Table 4-39 NCDC Extreme Heat Events in Madera County 1993 to 7/31/2024**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Excessive Heat	22	0	0	0	0	$0	$0
Heat	100	32	0	10	0	$170,000	$224,801,000
Total	**122**	**32**	**0**	**10**	**0**	**$170,000**	**$224,801,000**

Source: NCDC

*Deaths, injuries, and damages are for the entire event, and may not be exclusive to the County.

Hazard Mitigation Planning Committee Events

These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring prior to the 2018 LHMP.

Events since 2018 LHMP

The HMPC noted that extreme heat is an annual occurrence in the County. No events where deaths or damages occurred since 2018 could be recalled.

Events prior to 2018 LHMP

The HMPC noted some extreme heat events in Madera County. These include the following events:

- **July16, 2006** – Arguably one of the hottest spells widespread across California, including interior Central California, in the last 75 years occurred during a warm period that spanned from the 16th through the 27th of the month. Fresno City had 12 days in a row where maximum temperatures were at or above 105°F. Numerous daily maximum and high minimum temperature records were both reset including the all-time high minimum temperature record for Fresno at 90°F on the 23rd from that of 86°F set in August of 1908. During the 5-day period from the 22nd through the 26th, Fresno had temperatures of 110°F+ each day. The Southwest San Joaquin Valley maximum temperatures had 110°F+ readings for a 6-day period from the 21st through the 26th. Minimum temperatures during that warmest portion of the heat spell lowered only into the 80s for much of the Central and South San Joaquin Valley. Even the high foothill areas and Kern County Mountains were impacted as Yosemite Valley in the Southern Sierra Nevada at the 4000-foot elevation had maximum temperatures of 100°F+ from the 22nd through the 27th with a 105°F high on the 26th. Peak energy use in the state hit an all-time record, 6,165 Megawatts, even though several thousand customers in Central California went without power and air conditioning for hours. Among the documented instances of power loss during the heat event, nearby Fresno had 11,000 power customers without electricity on the 22nd and 14,000 on the 23rd. With accompanying high humidities, consistent light or calm winds, and long durations of high temperatures, the heat resulted in many deaths among residents of Interior Central California as well as a tremendous toll on area agriculture and specifically the dairy and cattle industry. Up to 57 people died as a result

of the excessive heat in the Interior Central California 7-county area. Many but not all of these deaths were among the elderly and in urban areas. Milk and egg production losses were estimated at 10 to 15% during the heat spell along with an increase in livestock deaths (16,500 cows) and poultry deaths (700,000 chickens and 160,000 turkeys). Diminished yield in produce from field crops and orchards undoubtedly occurred and losses could only be estimated due to difficulties in assessing. In addition to the loss of livestock and poultry due to the heat, area counties declared local emergencies due to rendering problems caused by the high number of livestock and poultry carcasses.

- **July 9, 2002** – Strong high pressure over the Western United States coupled with subtropical moisture flowing northwestward into Central California produced near-record high temperatures, record high minimum temperatures, and Heat Index readings above 105°F from the 9th through the 15th of the month. Humidities were elevated while temperatures reached over 100°F in locations throughout the Central and Southern San Joaquin Valley during this period. As an example, on one of the hottest days, the 11th, the highest temperatures included 109°F in nearby Fresno. Two deaths occurred, but the locations of those who died were not available.

Likelihood of Future Occurrence

Highly Likely—Temperature extremes are likely to continue to occur annually in the Madera County Planning Area. Temperatures at or above 90°F are common most summer days in the western portion of the County. More information on climate change and extreme heat can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and Extreme Heat

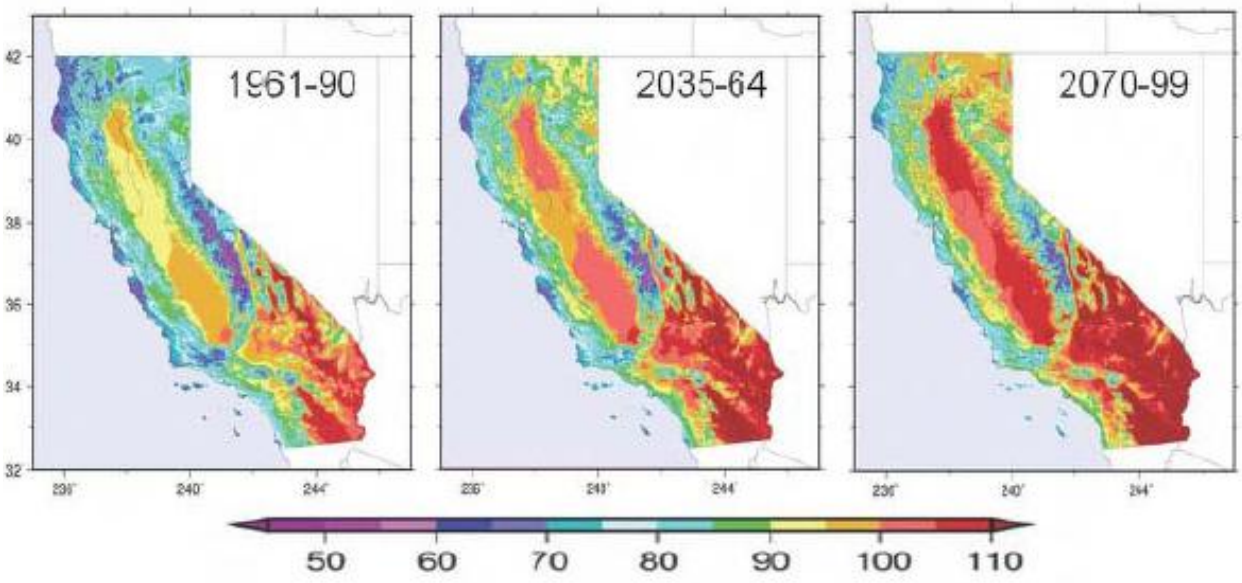
Climate change and its effect on extreme heat in the County has been discussed by three sources:

- California Climate Adaptation Strategy (CAS) – 2024
- Climate Change and Health Profile Report –Madera County
- Cal-Adapt

Climate Adaptation Strategy

The 2024 CAS, citing a California Energy Commission study, states that "over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined." This study shows that California is getting warmer, leading to an increased frequency, magnitude, and duration of heat waves. These factors may lead to increased mortality from excessive heat, as shown in Figure 4-44.

Figure 4-44 California Historical and Projected Temperature Increases – 1961 to 2099



Source: Dan Cayan; California Climate Adaptation Strategy

As temperatures increase, California and Madera County will face increased risk of death from dehydration, heat stroke, heat exhaustion, heart attack, stroke and respiratory distress caused by extreme heat. According to the 2024 CAS report and the 2023 State of California Hazard Mitigation Plan, by 2100, hotter temperatures are expected throughout the state, with projected increases of 3-5.5°F (under a lower emissions scenario) to 8-10.5°F (under a higher emissions scenario). These changes could lead to an increase in illnesses and deaths related to extreme heat in Madera County.

Climate Change and Health Profile Report (CCHPR) – Madera County

The CCHPR noted for Madera County that increased temperatures manifested as heat waves and sustained high heat days directly harm human health through heat-related illnesses (mild heat stress to fatal heat stroke) and the exacerbation of pre-existing conditions in the medically fragile, chronically ill, and vulnerable. Increased heat also intensifies the photochemical reactions that produce smog and ground level ozone and fine particulates (PM2.5), which contribute to and exacerbate respiratory disease in children and adults. Increased heat and carbon dioxide enhance the growth of plants that produce pollen, which are associated with allergies. Increased temperatures add to the heat load of buildings in urban areas and exacerbate existing urban heat islands adding to the risk of high ambient temperatures.

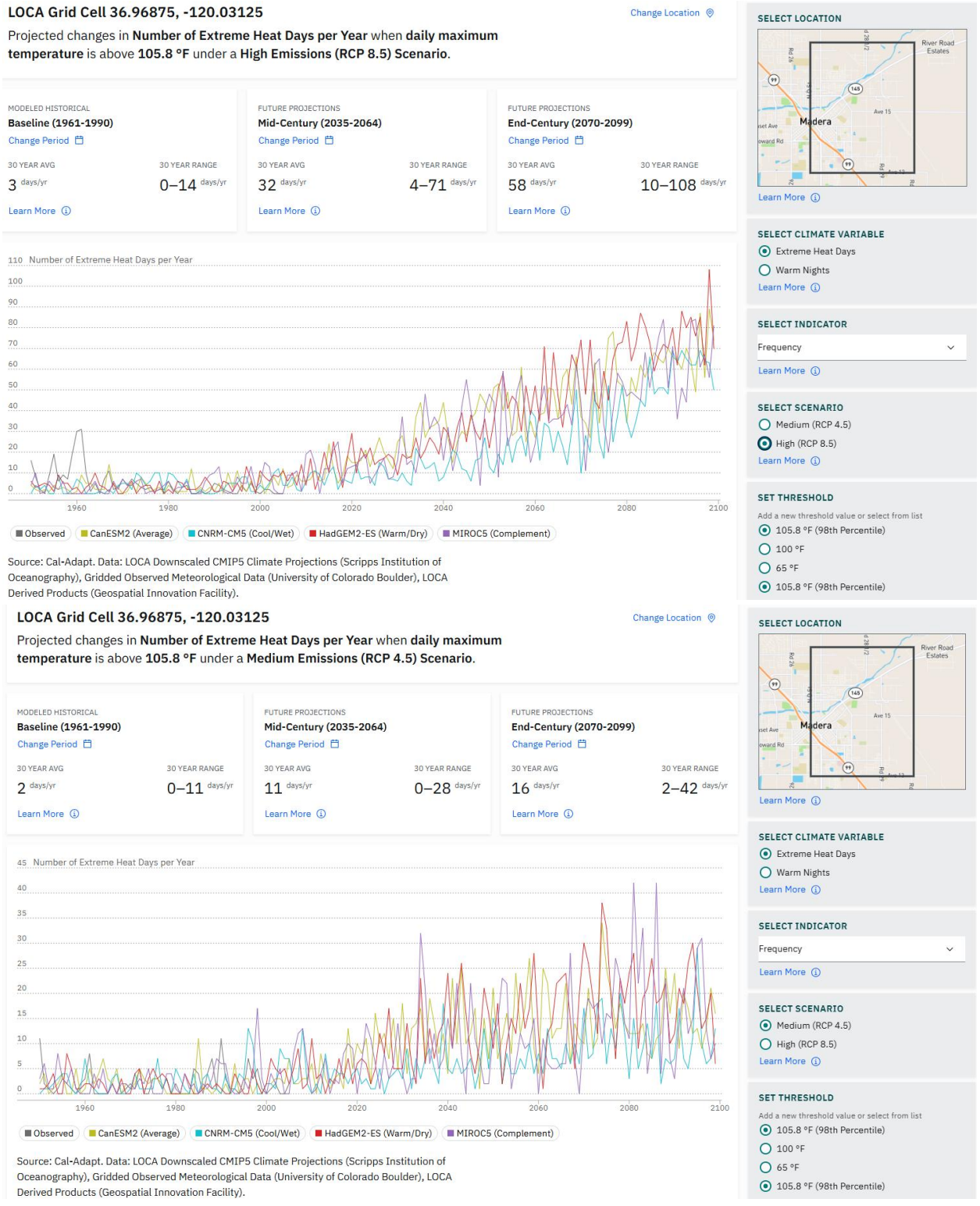
Cal-Adapt

Cal Adapt also noted that overall temperatures are expected to rise substantially throughout this century. During the next few decades, scenarios project average temperature to rise between 1 and 2.3°F; however, the projected temperature increases begin to diverge at mid-century so that, by the end of the century, the temperature increases projected in the higher emissions scenario (Representative Concentration Pathways (RCP) 8.5) are approximately twice as high as those projected in the lower emissions scenario (RCP 4.5).

These projections also differ depending on the time of year and the type of measurement (highs vs. lows), all of which have different potential effects to the state's ecosystem health, agricultural production, water use and availability, and energy demand. Future temperature estimates from Cal-Adapt for the Madera County Planning are shown in Figure 4-45. It shows the following:

- The upper chart shows the number of days in a year when daily maximum temperature is above the extreme heat threshold of 105.8°F. Data is shown for Madera County under the RCP 8.5 scenario in which emissions continue to rise through 2050 and maintain that trend into 2100.
- The lower chart shows the number of days in a year when daily maximum temperature is above the extreme heat threshold of 105.8 °F. Data is shown for Madera County under the RCP 4.5 scenario in which emissions show a slow continued rise with more erratic patterns into 2100.

Figure 4-45 Madera County – Future Temperature Estimates in Low and High Emission Scenarios



Source: Cal-Adapt – Number of Extreme Heat Days by Year. Retrieved 2/10/2025.

Vulnerability Assessment

Vulnerability—Medium

Extreme heat happens in Madera County each year. Extreme heat may overload demands for electricity to run air conditioners and other utilities 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 drought-like conditions in a temporary setting. 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, when combined with wind, can also lead to PSPS events in the County. Extreme heat also contributes to poor air quality during extended events.

The whole of the Planning Area has some measure of vulnerability to extreme heat. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerabilities to this hazard.

Vulnerable Population Concerns

The County is also worried about the effects on vulnerable populations. Vulnerable populations are at the greatest risk to the effects of extreme heat. The Public Health Alliance has developed a composite index to identify cumulative health disadvantages in California. Heat domes have settled over the County in the past, which has caused the County to open cooling centers. It was also noted that extreme heat contributes to unhealthy air quality, which can affect all populations, with vulnerable populations often the most affected.

Other Concerns

The County noted that extreme heat can cause crop damages. These can be substantial if extreme heat occurs during periods of plant susceptibility to heat. Extreme heat contributes to PSPS and wildfire issues in the County.

Local concerns for each of the jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from extreme heat include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for both the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

People and Populations

All populations within the Madera County Planning Area are vulnerable to extreme heat, but it generally affects people spending large amounts of time outside or without means of cooling indoor structures. During extended periods of high temperatures, extreme heat may overload the demands for electricity to run air conditioners and can present health concerns to individuals. When interruptions in power occur during extreme heat, the risk of heat related illnesses and deaths increase. Extreme heat is a significant concern to vulnerable populations. The unhoused; individuals who exercise or train outdoors; outdoor workers; individuals that lack the resources to afford heat; and the young, old, or medically fragile individuals that are more susceptible to heat related impacts. In addition to vulnerable populations, pets and livestock are at risk to extreme heat conditions.

Structures

Extreme heat normally does not generally impact structures, but individuals working in structures may be affected during periods of extended heat, especially in structures that might not be equipped with air conditioning or other means of cooling. In the Madera County Planning Area, extreme heat has caused interruptions to power in the past. Also depending on the structure, sensitive contents such as IT equipment can be impacted, especially if a power outage occurs.

Critical Facilities and Infrastructure

Depending on their type and function, critical facilities and infrastructure can also be affected by extreme heat. Interruptions in power caused by extreme heat can lead to system failures. Schools without air conditioning may have to close or operate on a reduced schedule.

Natural, Historic, and Cultural Resources

Park areas and natural resource assets in the Madera County Planning Area may be vulnerable during periods of extreme heat. These include turfed areas; landscapes, trees, wildlife and habitat areas, and wetlands and marsh lands. Recently, trees were lost in areas of Madera County that were weakened by drought and extreme heat. Extreme heat may also cause drought-like conditions, contributing to other issues. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability in the region for that time period, even if the

rest of the season is relatively moist. Historic and cultural resources are not expected to be affected by extreme heat.

FEMA NRI Hazard Vulnerability Assessment

The FEMA NRI was queried for additional specific data on Madera County's vulnerability to Extreme Heat. The NRI contains data and analysis for 18 separate natural hazards. The NRI hazard related to Madera County's Extreme Heat is a heat wave. As shown in Table 4-40, heatwaves could cause a total of $ 7,522,714 in expected annual losses, with a historic loss rating of relatively low. Heat waves have a very high rating for social vulnerability and a very low community resilience, with a risk index score of 99 out of 100. According to the NRI, there have been 36 events on record between the years 2005-2021, with an average of 2.2 events per year.

Table 4-40 Madera County Planning Area – Heat Wave Vulnerability Ratings from FEMA NRI

NRI Hazard	Hazard Risk Index Rating*	Expected Annual Loss Values (total)**	Exposure Value (total)***	Historic Loss Ratio Rating
Heat Wave	99	$7,522,714	$1,840,673,022,470	Relatively low

Source: FEMA NRI Report. Retrieved April 1, 2025.

*Hazard Risk Index is calculated using data for only a single hazard type, and reflect a communities expected annual loss value, community risk factors, and the adjustment factor used to calculate the risk value.

**Expected annual loss represents the average economic loss in dollars resulting from natural hazards each year.

***Exposure is a natural hazard consequence factor that is the representative value of buildings, populations, or agriculture potentially exposed to a natural hazard occurrence.

Additional information on the FEMA NRI can be found in Section 4.2 and Appendix G.

Impacts from Severe Weather: Extreme Heat

The County experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 105-115°F in rather extreme situations. Health issues are the primary concern with this hazard with vulnerable populations at greater risk, although economic impacts can also be an issue. Air quality can also be an issue during extreme heat.

During these times, drought conditions may worsen, and the Planning Area may see an increase in dry fuels contributing to wildfires. 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. Also, power outage and PSPS events may occur during these times as well. Drought is discussed further in Section 4.3.9 and wildfire in Section 4.3.15.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future extreme heat conditions and associated impacts and vulnerability of the County.
- Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the County. Population is expected to increase for Madera County through 2040 before decreasing. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-21). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. As such, the vulnerability to this hazard may increase, specifically affecting growing vulnerable populations as the senior citizen population continues to reside in and age within the communities of the County. Along with this, low income and the unhoused population are at risk to extreme heat which can put strain on emergency services and shelters. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. County building codes are in effect to reduce this risk and should be updated as necessary to continue to address future extreme heat conditions. Due to adherence to protective building codes, changes in land use and development will likely not increase the impacts and associated vulnerabilities of the County to this hazard.

Future development in the County will take extreme heat into account. Backup generators are currently in use at many County facilities, and additional generators and backup power sources are being sought for other locations. One way to reduce the negative impacts of an extreme heat event is to develop a comprehensive heat response plan that combines individual strategies into an integrated approach. The County has an extreme heat response as a part of their Emergency Operations Plan. The County EOC is opened during extreme heat events, if warranted.

In addition to a comprehensive heat response plan, local officials can help areas adapt to extreme heat in the short-term by improving the resilience of infrastructure. Transportation planners can protect or modify roads, bridges, and other structures—for example, by using materials that are more resilient and heat tolerant—to help these systems withstand higher temperatures and reduce service disruptions. They can also implement energy efficiency and conservation efforts to reduce stress on electricity systems during heat waves and help avoid power outages.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements such as building codes are followed, and varying needs for different demographic groups that reside within the County are considered can help make for a more disaster resilient community.

4.3.4. Severe Weather: Heavy Rains and Storm

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrences; and how climate change can affect or influence this hazard.

Hazard/Problem Description

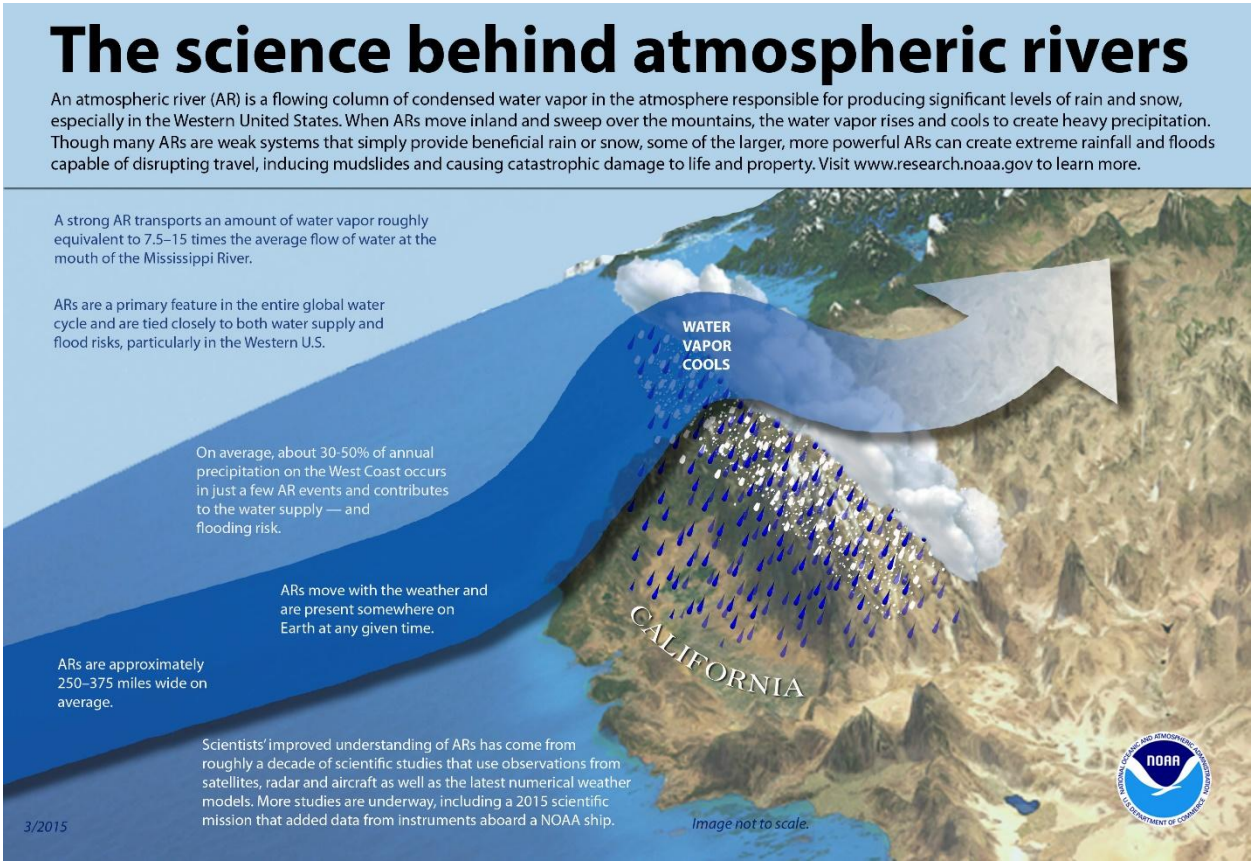
Storms in the Madera County Planning Area occur throughout the Planning Area and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the Madera County area falls mainly in the fall, winter, and spring months.

Heavy Rain and Storms

The NWS reports that storms and thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 ft. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at Earth's surface and causes strong winds associated with thunderstorms.

The County and the rest of California can also be affected by a phenomenon known as an atmospheric river. According to the NOAA, atmospheric rivers are relatively long, narrow regions in the atmosphere – like rivers in the sky – that transport most of the water vapor outside of the tropics. These columns of vapor move with the weather, carrying an amount of water vapor roughly equivalent to the average flow of water at the mouth of the Mississippi River. When the atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow. This can be seen in Figure 4-46.

Figure 4-46 Atmospheric Rivers



Source: NOAA

Although atmospheric rivers come in many shapes and sizes, those that contain the largest amounts of water vapor and the strongest winds can create extreme rainfall and floods, often by stalling over watersheds vulnerable to flooding. These events can disrupt travel, induce mudslides and cause catastrophic damage to life and property. A well-known example is the "Pineapple Express," a strong atmospheric river that is capable of bringing moisture from the tropics near Hawaii over to the U.S. West Coast.

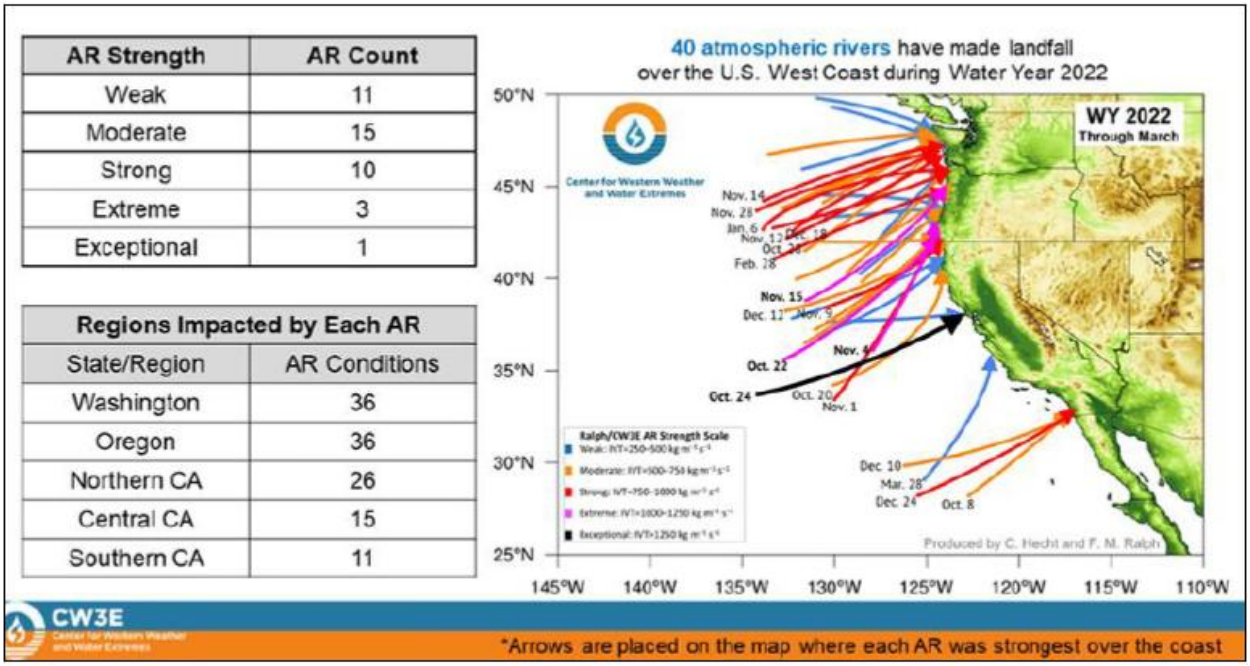
Not all atmospheric rivers cause damage; most are weak systems that often provide beneficial rain or snow that is crucial to the water supply. Atmospheric rivers are a key feature in the global water cycle and are closely tied to both water supply and flood risks — particularly in the western United States.

While atmospheric rivers are responsible for great quantities of rain that can produce flooding, they also contribute to beneficial increases in snowpack. A series of atmospheric rivers fueled the strong winter storms that battered the U.S. West Coast from western Washington to southern California from Dec. 10–22, 2010, producing 11 to 25 inches of rain in certain areas. These rivers also contributed to the snowpack in the Sierras, which received 75 percent of its annual snow by Dec. 22, the first full day of winter. Another example of this happened in 2022. Multiple atmospheric river storms occurred in the County and the rest of California. This can be seen in Figure 4-47. This also happened in the 2023, 2024, as well as in 2025, which can be seen in Figure 4-48, Figure 4-49, and Figure 4-50, respectively.

Figure 4-47 2022 Atmospheric River Events

AR Strength	AR Count
Weak	11
Moderate	15
Strong	10
Extreme	3
Exceptional	1

Regions Impacted by Each AR	
State/Region	AR Conditions
Washington	36
Oregon	36
Northern CA	26
Central CA	15
Southern CA	11

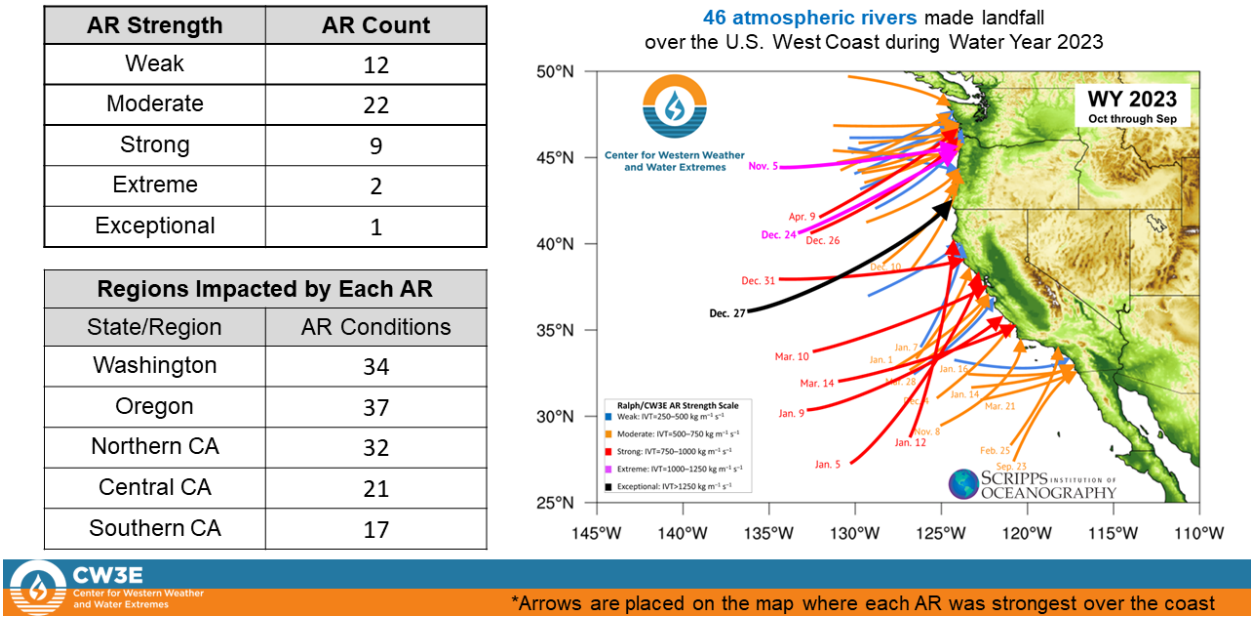


Source: Center for Western Weather and Water Extremes. Retrieved 12/18/2024.

Figure 4-48 2023 Atmospheric River Events

AR Strength	AR Count
Weak	12
Moderate	22
Strong	9
Extreme	2
Exceptional	1

Regions Impacted by Each AR	
State/Region	AR Conditions
Washington	34
Oregon	37
Northern CA	32
Central CA	21
Southern CA	17

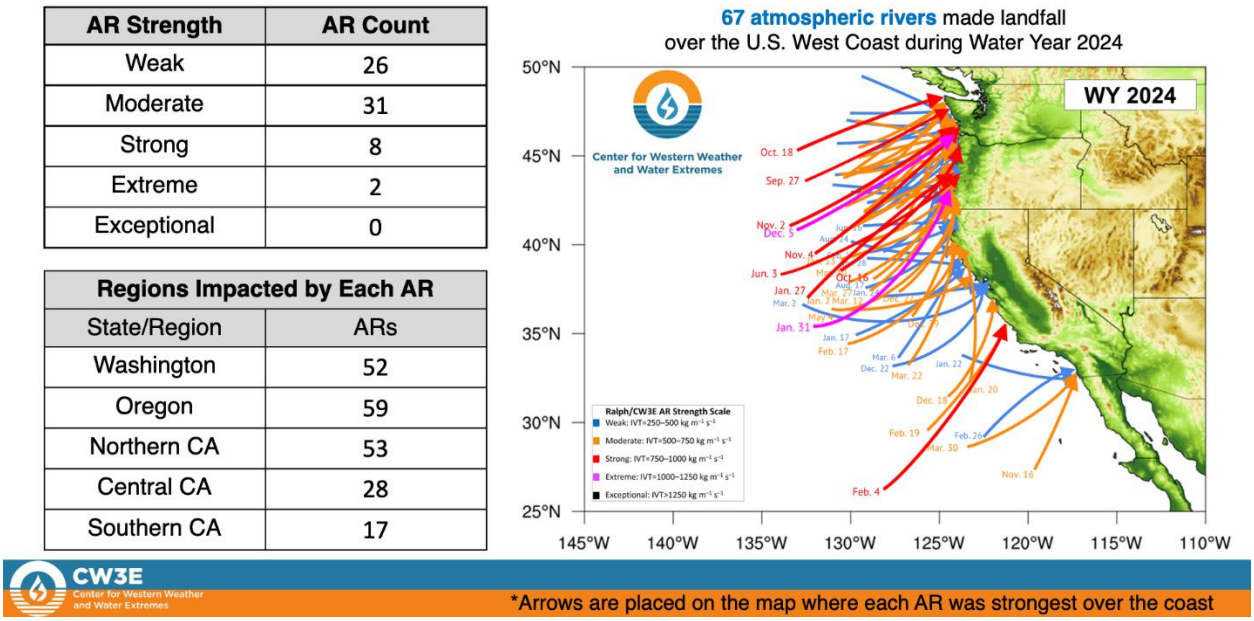


Source: Center for Western Weather and Water Extremes. Retrieved 12/18/2024.

Figure 4-49 2024 Atmospheric Rivers

AR Strength	AR Count
Weak	26
Moderate	31
Strong	8
Extreme	2
Exceptional	0

Regions Impacted by Each AR	
State/Region	ARs
Washington	52
Oregon	59
Northern CA	53
Central CA	28
Southern CA	17

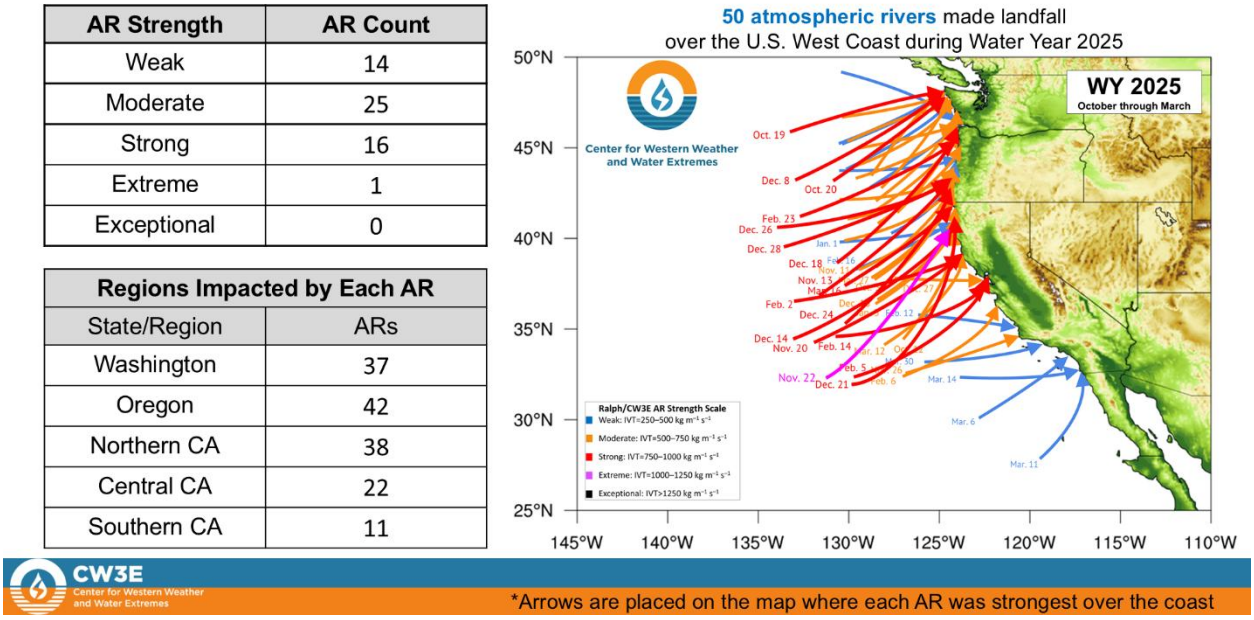


Source: Center for Western Weather and Water Extremes. Retrieved 12/29/2025.

Figure 4-50 2025 Atmospheric River Events

AR Strength	AR Count
Weak	14
Moderate	25
Strong	16
Extreme	1
Exceptional	0

Regions Impacted by Each AR	
State/Region	ARs
Washington	37
Oregon	42
Northern CA	38
Central CA	22
Southern CA	11



Source: Center for Western Weather and Water Extremes. Retrieved 12/29/2025.

Short-term, heavy storms can cause both widespread flooding as well as extensive localized drainage issues. In addition to the flooding that often occurs during these storms, strong winds, when combined with saturated ground conditions, can down very mature trees.

Location and Extent of Heavy Rains and Storms

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the County. All portions of the County are at risk to heavy rains and storms. Most of these rains occur during the winter months, as discussed below.

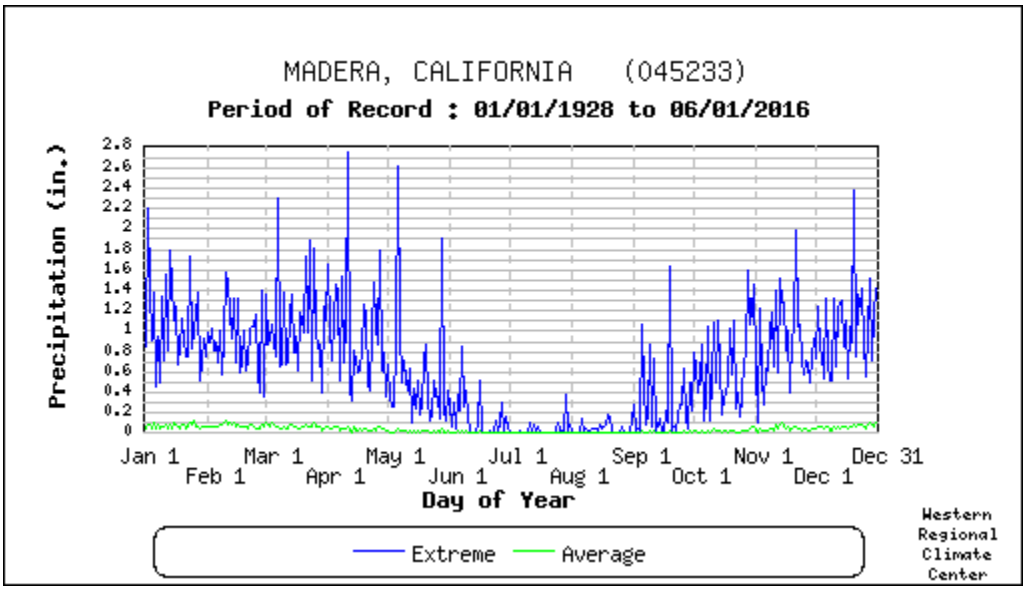
There is no scale by which heavy rains are measured – usually it is measured in terms of rainfall amounts. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of thunderstorms in California is often short, ranging from minutes to hours. This can cause localized flooding, which is discussed in more detail in Section 4.3.12.

The WRCC and NWS maintain data on weather normal and extremes in the western United States. Each of these data sources maintain data in slightly different ways. Data from the WRCC stopped being collected in April of 2016. NWS covers the entire time period to more recent dates (2023 for western and 2022 for eastern Madera County). Therefore, both data sets are shown below. WRCC and NWS data for both the western and eastern County is summarized below.

Western Madera County—Madera Station Weather Station (WRCC), Period of Record 1928 to 2016

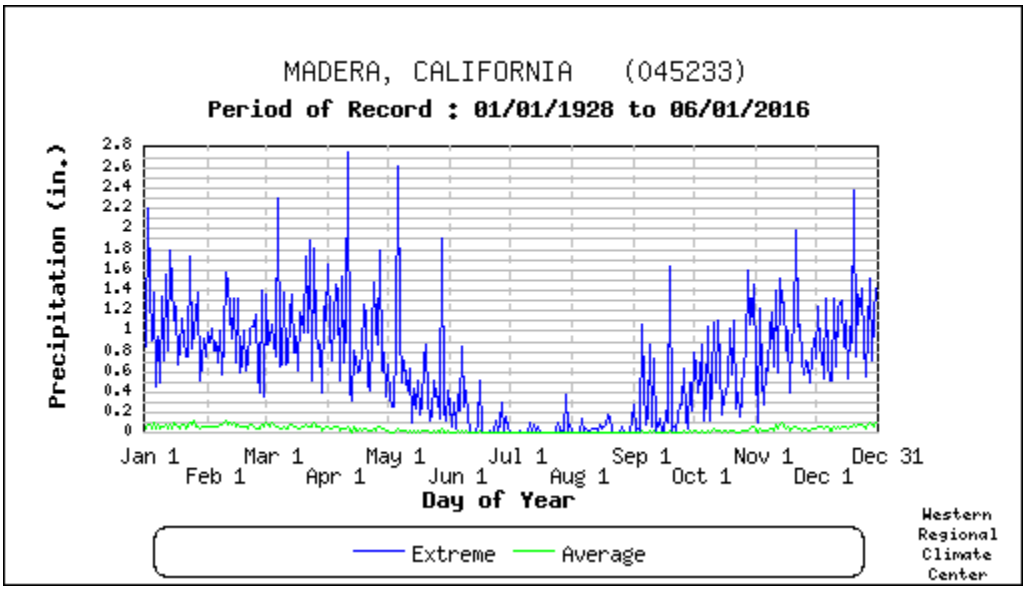
According to the WRCC, average annual precipitation in the western side of Madera County is 10.99 inches per year. The highest recorded annual precipitation is 22.13 inches in 1983; the highest recorded precipitation for a 24-hour period is 2.60 inches on May 5, 2006. The lowest recorded annual precipitation was 4.73 inches in 1932. Average monthly precipitation for western Madera County is shown in Figure 4-51. Daily average and extreme precipitations are shown in Figure 4-52.

Figure 4-51 Western Madera County – Madera Station (WRCC) Monthly Average Total Precipitation 1928 to 2016



Source: Western Regional Climate Center, www.wrcc.dri.edu/. Retrieved 3/12/2025.

Figure 4-52 Western Madera County – Madera Station (WRCC) Daily Average and Extreme Precipitation 1928 to 2016



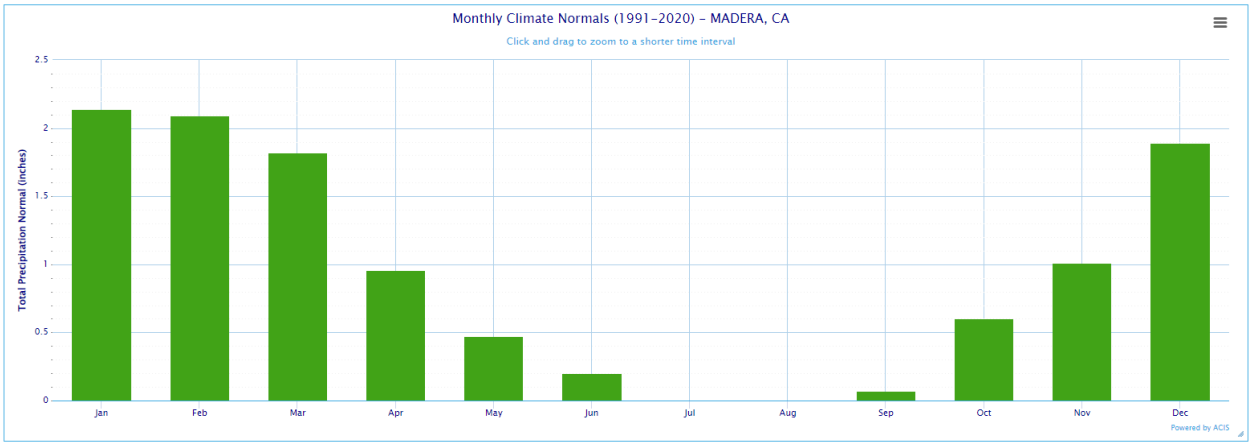
Source: Western Regional Climate Center, www.wrcc.dri.edu/. Retrieved 3/12/2025.

Western Madera County—Madera Weather Station (NWS), Period of Record 1928 to 2023

Note: While the overall period of record for this NWS station is 1943 to 2025, not all data is recorded for those dates. Snowfall and snow depth are covered from 1928 to December 2010. Precipitation is covered from 1928 to August 2023. Extreme temperatures are covered from 1928 to October 20, 2020.

According to the NWS, average annual precipitation in western Madera County is 11.25 inches per year. Average monthly precipitation for western Madera County is shown in Figure 4-53. The highest recorded precipitation for a 24-hour period is 2.74 inches on November 4, 2016. One day extreme precipitations are shown on Table 4-41.

Figure 4-53 Western Madera County— Madera Station (NWS) Monthly Average Total Precipitation 1991 to 2020



Source: National Weather Service XMAC site. Retrieved 3/12/2025.

Table 4-41 Western Madera County – Madera Station (NWS) 24 Hour Rainfall Extremes from 1928 to 2023

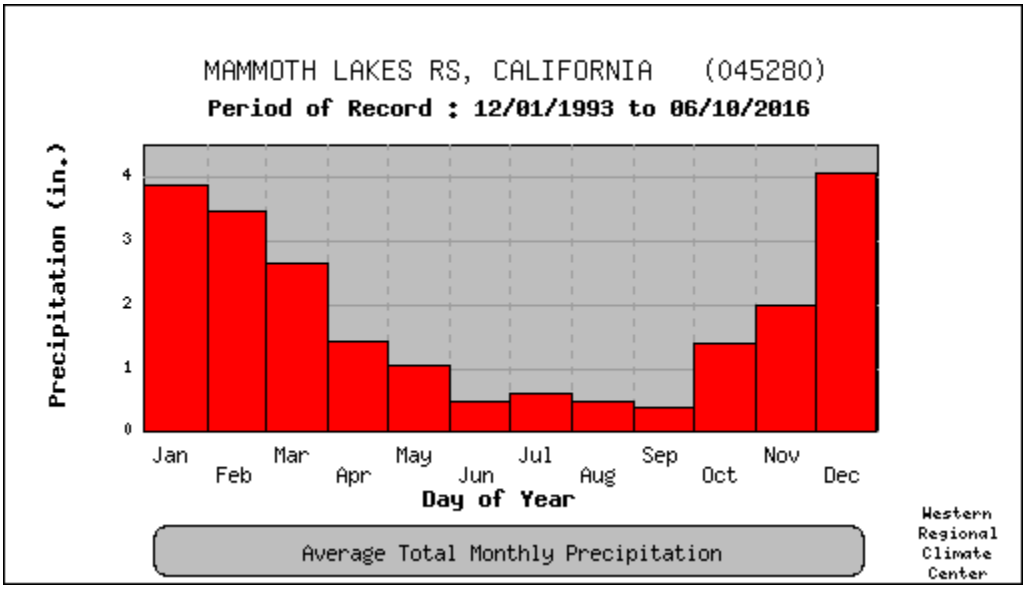
Rainfall in Inches	Date
2.74	11/4/2016
2.60	5/6/2005
2.37	12/20/2010
2.30	3/7/2016
2.20	1/2/2006
1.98	11/21/1978
1.90	5/28/1990
1.88	3/23/2005
1.81	3/25/1998
1.80	4/8/2020

Source: National Weather Service XMAC site. Retrieved 3/12/2025.

Eastern Madera County—Mammoth Lakes Ranger Station (WRCC), Period of Record 1993 to 2016

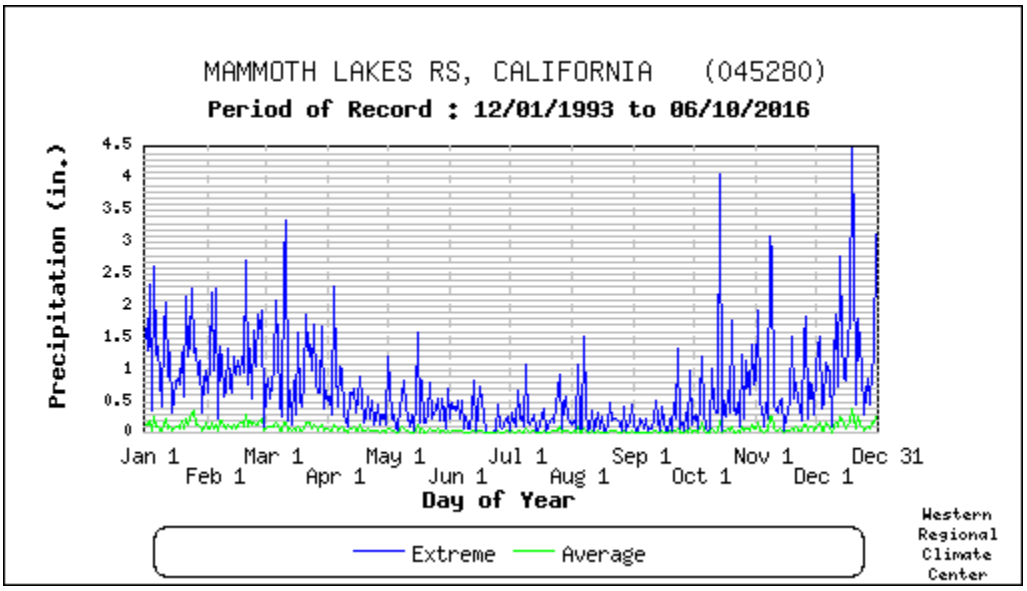
According to the WRCC, average annual precipitation in the eastern portion of Madera County is 22.95 inches per year. The highest recorded annual precipitation is 39.96 inches in 1996; the highest recorded precipitation for a 24-hour period is 4.48 inches on December 19, 2010. The lowest recorded annual precipitation is 14.34 inches in 1999. Average monthly precipitation for eastern Madera County is shown in Figure 4-54. Daily average and extreme precipitations are shown in Figure 4-55.

Figure 4-54 Eastern Madera County – Mammoth Lakes Ranger Station (WRCC) Monthly Average Total Precipitation 1993 to 2016



Source: Western Regional Climate Center, www.wrcc.dri.edu/. Retrieved 3/12/2025.

Figure 4-55 Eastern Madera County – Mammoth Lakes Ranger Station (WRCC) Daily Average and Extreme Precipitation 1993 to 2016



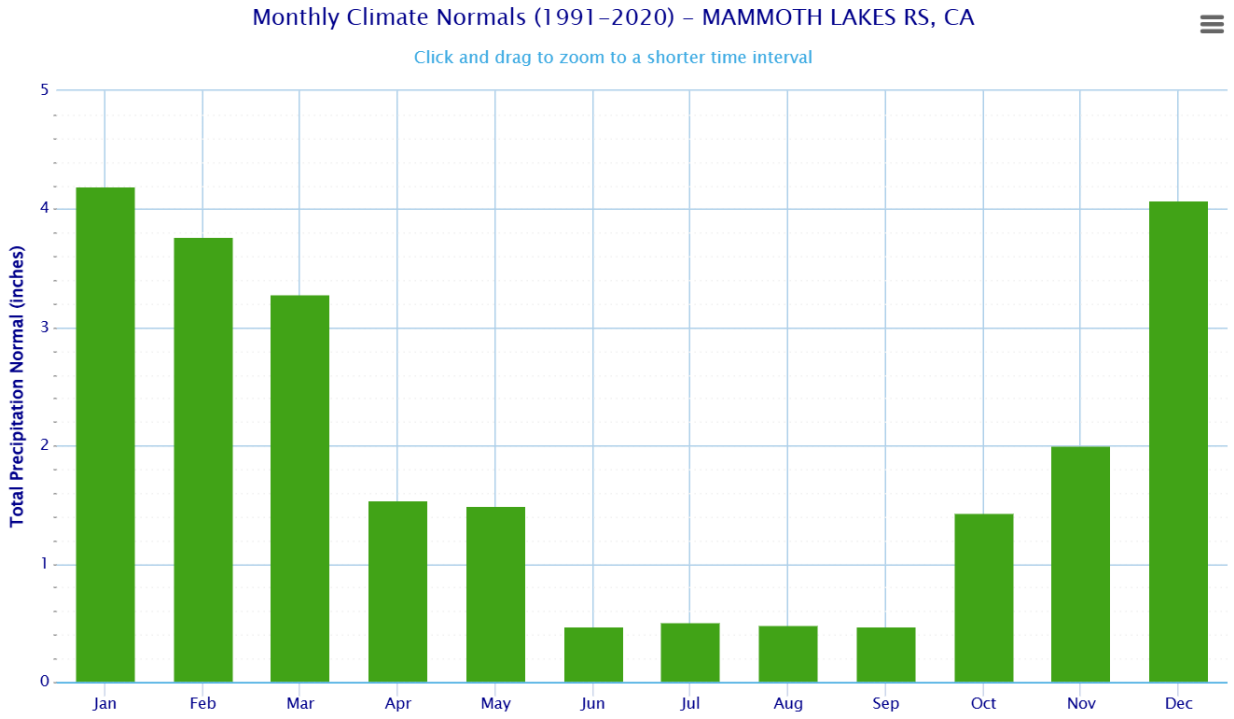
Source: Western Regional Climate Center, www.wrcc.dri.edu/. Retrieved 3/12/2025.

Eastern Madera County—NWS Mammoth Lakes Weather Station, Period of Record 1993 to 2022

Note: While the overall period of record for this NWS station is 1993 to 2022, not all data is recorded for those dates. Snowfall and snow depth are covered from December 1993 to August 2022. Precipitation is covered from January 1994 to August 2023. Extreme temperatures are covered from December 1993 to January 18, 2021.

According to the NWS, average annual precipitation in eastern Madera County is 23.72 inches per year. Average monthly precipitation for eastern Madera County is shown in Figure 4-56. The highest recorded precipitation for a 24-hour period is 4.48 inches on December 19, 2010. One day extreme precipitations are shown on Table 4-42.

Figure 4-56 Eastern Madera County— Mammoth Lakes Ranger Station (NWS) Monthly Average Total Precipitation 1991 to 2020



Source: National Weather Service XMAC site. Retrieved 3/12/2025.

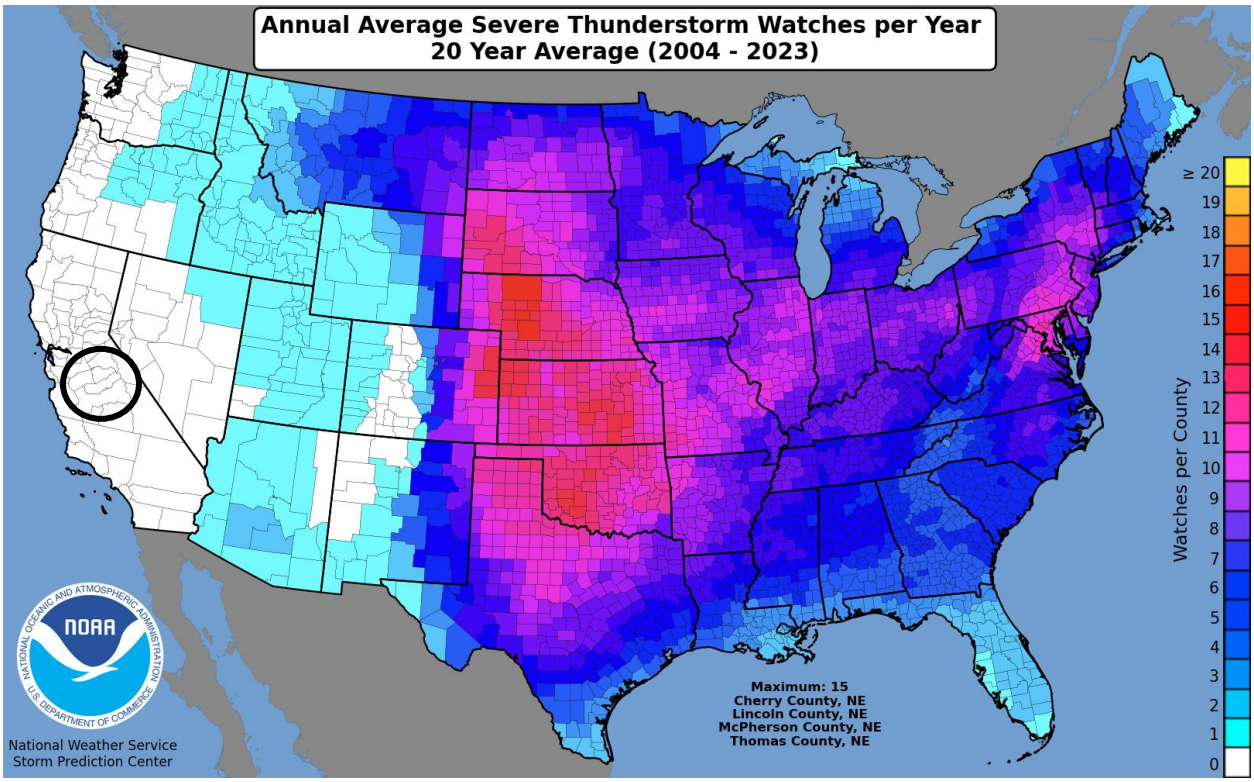
Table 4-42 Eastern Madera County – Mammoth Lakes Ranger Station (NWS) 24 Hour Rainfall Extremes from 1993 to 2021

Rainfall in Inches	Date
4.48	12/19/2010
4.05	10/14/2009
3.33	3/11/1995
3.30	5/23/2019
3.10	12/31/2004
3.07	11/8/2002
3.05	12/20/2010
2.95	3/22/2018
2.83	12/16/2016
2.79	11/9/2002

Source: National Weather Service XMAC site. Retrieved 3/12/2025.

The NOAA Storm Prediction Center tracks thunderstorm watches on a county basis. Figure 4-57 shows thunderstorm watches in Madera County and the United States for a 20-year period between 2004 and 2023.

Figure 4-57 Madera County – Average Thunderstorm Watches per Year (2004 to 2023)



Source: NOAA Storm Prediction Center. Retrieved 3/5/2025.

Hail

Hail can occur throughout the Planning Area during storm events, though it is rare in the County. 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 sometimes associated with severe storms within the Madera County Planning Area. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 miles per hour (mph). Severe hailstorms can be quite destructive, causing damage to roofs, buildings, automobiles, vegetation, and crops.

The NWS classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4-43 indicates the hailstone measurements utilized by the NWS.

Table 4-43 Hailstone Measurements

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball

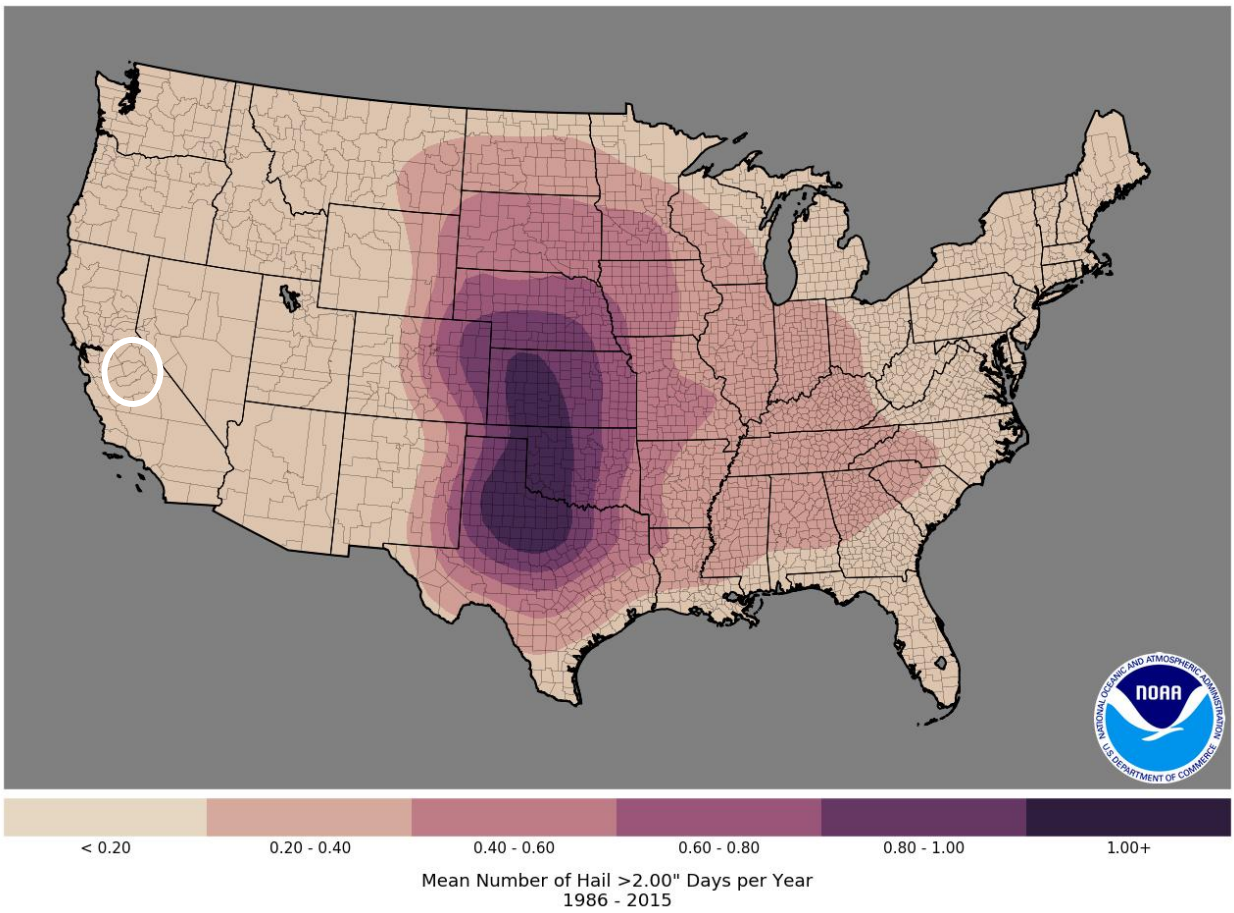
Average Diameter	Corresponding Household Object
1.75 inch	Golf-Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

Location and Extent of Hail

Hail events can occur in any location of the County. All portions of the County are at risk to hail. Hail tends to be rare in California. There is no scale in which to measure hail, other than hail stone size as detailed above. The speed of onset of hail can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of thunderstorms that can cause hail in California is often short, ranging from minutes to hours. Hail events last shorter than the duration of the total thunderstorm. The NWS tracks hail events. Figure 4-58 shows the average days each year where hail of greater than 1" in diameter occurred during a 20-year period from 1986 to 2015 (the most recent data available).

Figure 4-58 Madera County – Average Hail Days per Year (1986 to 2015)



Source: National Weather Service. Retrieved 3/5/2025.

Lightning

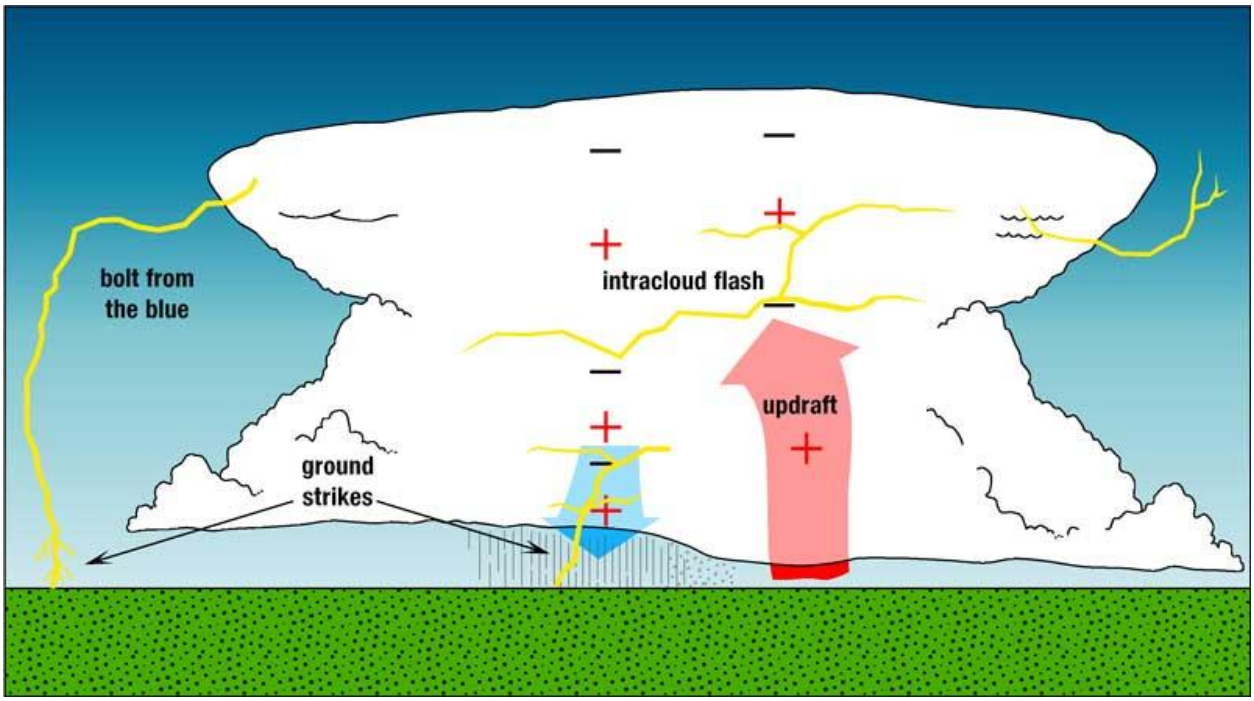
Lightning can occur throughout the County during storm events. Lightning is defined by the NWS as any and all of the various forms of visible electrical discharge caused by thunderstorms. Thunderstorms and lightning are usually (but not always) accompanied by rain. Cloud-to-ground lightning can kill or injure people by direct or indirect means. Objects can be struck directly, which may result in an explosion, burn, or total destruction. Or, damage may be indirect, when the current passes through or near an object, which generally results in less damage.

Intra-cloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel, similar to a cloud-to-ground flash, can be visible for many miles.

Cloud-to-ground lightning is the most damaging and dangerous type of lightning, though it is also less common. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage

of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat (see Figure 4-59). Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

Figure 4-59 Cloud to Ground Lightning



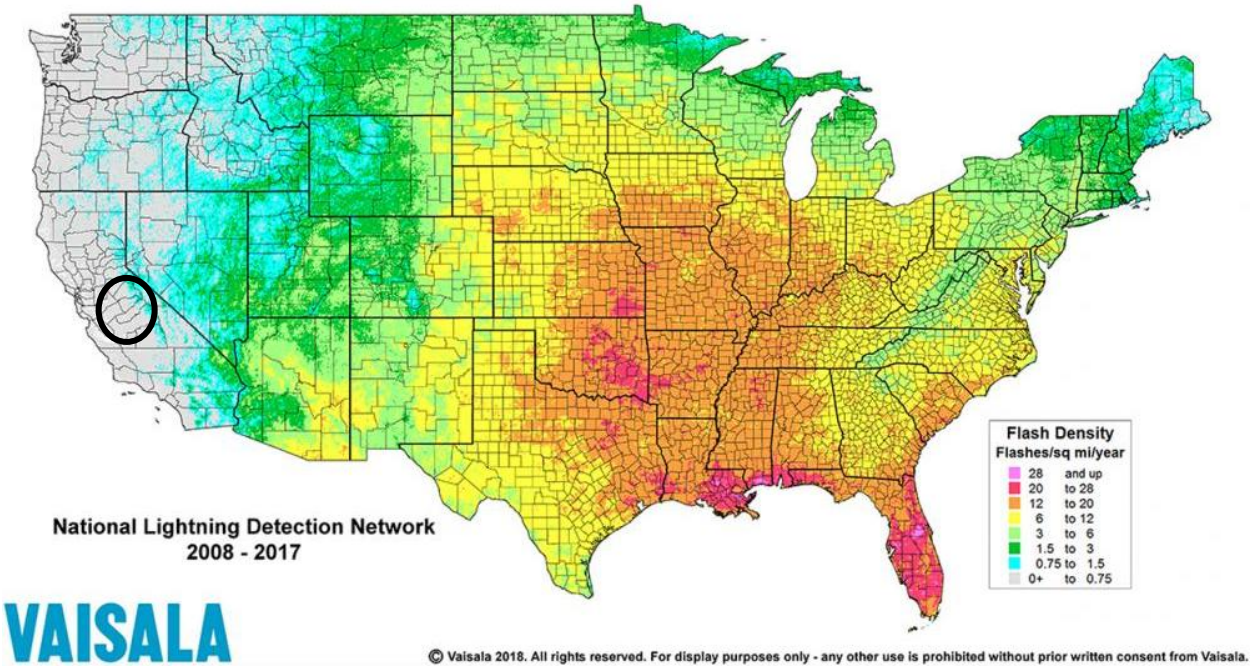
Source: National Weather Service

Location and Extent of Lightning

Lightning events can occur in any location of the County and are often associated with thunderstorms. All portions of the County are at risk to lightning. Lightning tends to be somewhat infrequent in the County, with more lightning events occurring in the higher elevations of the County, as discussed in the extent section below.

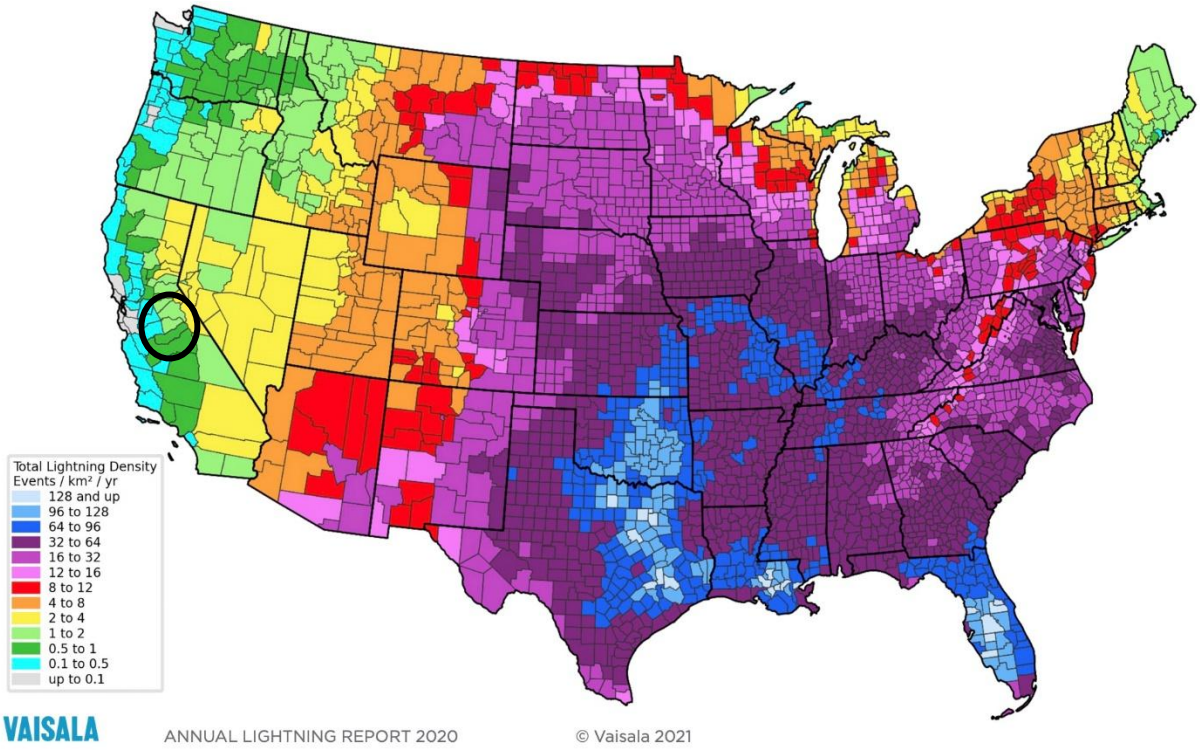
Lightning in the County can occur during thunderstorms. The speed of onset of thunderstorms that can cause lightning can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of thunderstorms in California is often short, ranging from minutes to hours. Thunderstorms and lightning are rare in the County. Lightning can also occur in the County outside of a thunderstorm event. Vaisala maintains the National Lightning Detection Network. It tracks cloud to ground lightning incidences in the United States. Figure 4-60 shows lightning incidences in the County and the rest of the United States from 2008 to 2017 (the most recent long term tracking map available). Figure 4-61 shows a more recent lightning density by county map.

Figure 4-60 Madera County – Lightning Incidence Map 2008 to 2017



Source: Vaisala National Lightning Detection Network. Retrieved 3/20/2025.

Figure 4-61 Madera County – Average US Total Lightning Density per County 2015-2019



Source: Vaisala National Lightning Detection Network. Retrieved 3/20/2025.

Past Occurrences

Disaster Declaration History

A search of FEMA and Cal OES disaster declarations turned up multiple events. Heavy rains and storms have caused flooding in the County. Events where flooding and heavy rains and storms resulted in a state or federal disaster declaration are shown in Table 4-44.

More information on USDA disaster declarations from heavy rain and storms (once in 2012 and once in 2019) can be found in Table 4-53 in the Past Occurrences in Section 4.3.6.

Table 4-44 Madera County – Disaster Declarations from Heavy Rain and Storms 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	20	1950, 1955, 1958, 1969, 1982 (twice), 1983, 1986, 1992, 1993, 1995 (three), 1997 (twice), 2006, 2010, 2023 (three)	21	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1982, 1986, 1992, 1995 (three), 1997 (twice), 2006, 2010, 2023 (four)

Source: FEMA, Cal OES

NCDC Events

The NCDC data recorded 67 hail and heavy rain weather incidents for Madera County since 1950. Winter weather events tend to be rain in the lower elevations of the County, while snow falls in the upper elevations. A summary of these events is shown in Table 4-45.

*Table 4-45 NCDC Severe Weather Events in Madera County 1950-7/31/2024**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Hail	22	0	0	0	4	$111,000	$3,656,000
Heavy Rain	38	0	0	0	0	$201,000	$49,060,000
Lightning	7	0	0	0	0	$32,500	$0
Total	**67**	**0**	**0**	**0**	**4**	**$344,500**	**$52,716,000**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of Madera County

Hazard Mitigation Planning Committee Events

These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring prior to the 2018 LHMP.

Events since 2018 LHMP

The HMPC noted some events of heavy rain and storm that caused agricultural impacts. Those are discussed in the Past Occurrences in Section 4.3.6. The HMPC also noted that Madera County experience

localized heavy rains yearly. This creates potential flooding in localized areas within the County. Additionally, the County noted many of these past events are discussed in the Section 4.3.11 Flood: 1%/0.2% Annual Chance and Section 4.3.12 Flood: Localized Stormwater Flooding.

Events prior to 2018 LHMP

No events before 2018 were recorded in the previous LHMP. Events where damages occurred could not be recalled.

Likelihood of Future Occurrence

Highly Likely – Based on NCDC data and HMPC input, 67 heavy rain and storm incidents over a 75-year period (1950-2024) equates to a severe storm event almost every year. Severe weather is a well-documented seasonal occurrence that will continue to occur often in the Madera County Planning Area.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and heavy rains and storms can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

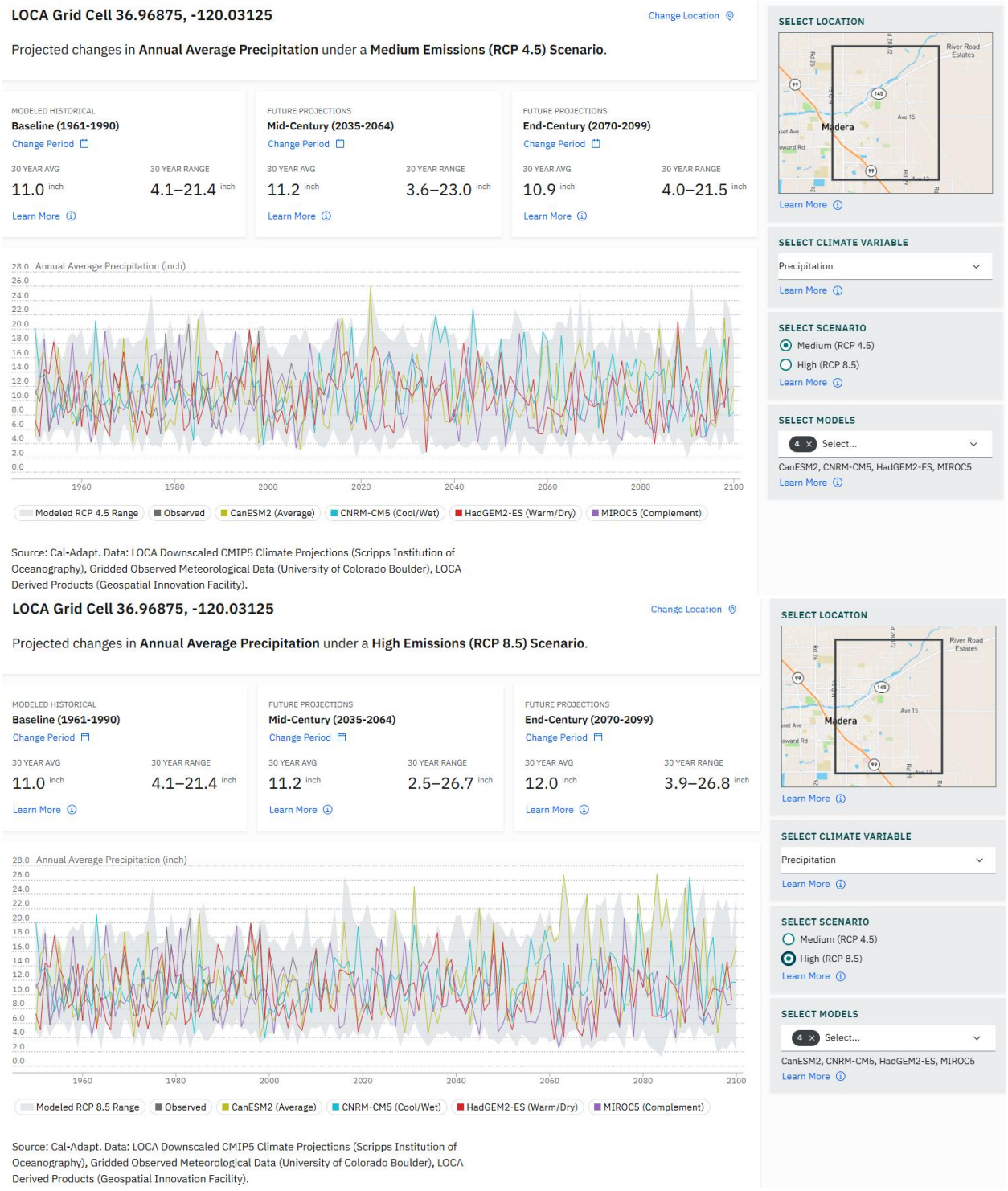
Climate Change and Heavy Rains and Storms

According to the 2024 CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is unlikely that hail will become more common in the County. The amount of lightning is not projected to change.

Cal-Adapt noted that, on average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century. The Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. One of the four climate models projects slightly wetter winters, and another projects slightly drier winters with a 10 to 20 percent decrease in total annual precipitation. However, even modest changes would have a significant impact because California ecosystems are conditioned to historical precipitation levels and water resources are nearly fully utilized. Future precipitation estimates for the County are shown in Figure 4-62.

- The upper chart shows annual averages of observed and projected Precipitation values for the selected area on map under the RCP 4.5 scenario. The gray line (1950 – 2005) is observed data. The colored lines (2006 – 2100) are projections from 10 LOCA downscaled climate models selected for California. The light gray band in the background shows the least and highest annual average values from all 32 LOCA downscaled climate models.
- The lower chart shows annual averages of observed and projected Precipitation values for the selected area on map under the RCP 8.5 scenario. The gray line (1950 – 2005) is observed data. The colored lines (2006 – 2100) are projections from 10 LOCA downscaled climate models selected for California. The light gray band in the background shows the least and highest annual average values from all 32 LOCA downscaled climate models.

Figure 4-62 Madera County– Future Precipitation Estimates: High and Low Emission Scenarios



Source: Cal-Adapt – Precipitation: Decadal Averages Map. Retrieved 2/10/2025.

Vulnerability Assessment

Vulnerability—Medium

According to historical hazard data, heavy rains and storms, including hail and lightning, are an annual occurrence in the Madera County Planning Area. Heavy rains can cause both localized flooding and flooding in the floodplains. Atmospheric river storms, which have been more frequent in recent years, are of great concern as they can dump large amounts of water in single storms, or in back-to-back storms.

The whole of the Planning Area has some measure of vulnerability to heavy rains and storms, including hail and lightning. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce the risk and vulnerabilities to this hazard.

General Concerns

One of the primary concerns of the County to heavy rains and storms is the resulting flooding that occurs during extreme storm events. These include large flood events as detailed in the Flood: 1%/0.2% annual chance flood hazard section and the localized flooding that occurs following these storms. Localized flood problem areas in the unincorporated County are shown in Table 4-118. With the increased growth of the area, the lack of adequate drainage systems has become an increasingly important issue.

Lightning and Wildfire Concerns

Lightning in the County is also a concern due to the number of fires that are started by lightning strikes. Wildfire is discussed in more detail in Section 4.3.15.

Local concerns for each of the other participating jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from heavy rain and storms include people and populations; structures; critical facilities and infrastructure and community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

People and Populations

All populations in the Madera County Planning Area have some measure of risk to heavy rains and storms. Those populations that work or recreate outside and unhoused individuals are more vulnerable to impacts from heavy storm events. Heavy rains and storms occur every year and do not generally cause significant adverse impacts to individuals; it is the secondary hazard, flooding, that poses the biggest impact to people. Populations at risk to flooding resulting from heavy rains and storm events include those who live in floodplains. (discussed in further detail in the Flood: 1%/0.2% Annual Chance in Section 4.3.11) and those who live in and near localized flooding areas floodplains (discussed in further detail in the Flood: Localized Stormwater Flooding in Section 4.3.12).

Structures

Structures in the Madera County Planning Area have some risk to heavy rains and storms. Structures built to modern building codes are built to withstand heavy rains and storms (including thunderstorm winds and lightning). During a heavy storm, localized flooding may cause water intrusion into buildings from the outside. Trees can be downed causing impacts to structures. Older homes and buildings may be at increased risk to heavy rains and storms. Lightning can damage buildings or cause power outages. Power outages during severe storm events can occur, impacting the use of structures until the power is back online.

Critical Facilities and Infrastructure

Heavy rain and storms can affect critical facilities and infrastructure, and community lifelines during large events. Power outages may occur taking facilities offline. High winds can down power lines and trees impacting facilities. Water intrusion into facilities and infrastructure can impact operations. Local roads, streets, and bridges can be impacted resulting in closures restricting traffic flow in the Planning Area. In certain areas, large storms can cause erosion and localized landslides which can impact facilities. Many critical facilities are built to modern design standards that take heavy rains and storms into account when siting and building these structures, and others may need to be retrofitted to better withstand these events.

Natural, Historic, and Cultural Resources

Large storm events and associated flooding can affect natural, historic, and cultural resources. Silt and sediment can damage natural areas. Trees can be uprooted and downed by high winds. Extended periods of rainfall can erode natural banks along waterways and degrade soil stability for terrestrial species. While some natural systems can be adversely impacted during these large storms, heavy rain events can also provide benefits. Groundwater and wetland areas can be recharged and water supplies replenished. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures affected by large storm events, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged, and lost during extreme storm and flood events.

FEMA NRI Hazard Vulnerability Assessment

The FEMA NRI was queried for additional specific data on Madera County's vulnerability to Heavy Rains and Storms. The NRI contains data and analysis for 18 separate natural hazards. The NRI hazard related to Madera County's Heavy Rains and Storms are: hail and lightning. As shown on Table 4-46, hail could cause a total of $197,348 in expected annual losses, with a historic loss rating of relatively moderate. Lightning could cause a total of $83,010 in expected annual losses with a historic loss ratio rating of relatively high. Hail and lighting have a very high rating for social vulnerability and a very low community resilience, with a risk index score of 70.4 out of 100 for hail and 53.1 out of 100 for lightning. According to the NRI, there have been 7 hail events between the years 1986-2021 with an average of 0.2 events per year and 45 lightning events on record between the years 1991-2012, with an average of 2 events per year.

Table 4-46 Madera County Planning Area – Hail and Lightning Vulnerability Ratings from FEMA NRI

NRI Hazard	Hazard Risk Index Rating*	Expected Annual Loss Values (total)**	Exposure Value (total)***	Historic Loss Ratio Rating
Hail	70.4	$197,348	$1,840,673,726,093	Relatively moderate
Lightning	53.1	$83,010	$1,838,961,698,560	Relatively high

Source: FEMA NRI Report. Retrieved April 1, 2025.

*Hazard Risk Index is calculated using data for only a single hazard type, and reflect a communities expected annual loss value, community risk factors, and the adjustment factor used to calculate the risk value.

**Expected annual loss represents the average economic loss in dollars resulting from natural hazards each year.

***Exposure is a natural hazard consequence factor that is the representative value of buildings, populations, or agriculture potentially exposed to a natural hazard occurrence.

Additional information on the FEMA NRI can be found in Section 4.2 and Appendix G.

Impacts from Heavy Rains and Storms

Impacts from heavy rains and storms include damage to property, critical facilities and infrastructure, and the natural landscape. This includes: erosion, downed trees, damaged utility structures and infrastructure; power outages; road damage and blockages; and lightning strikes to critical infrastructure and people. Lightning can also cause wildfires and urban fires to occur. Landslides occur when the soil on slopes becomes oversaturated and fails. Climate change may cause these impacts to worsen.

Actual damage associated with the primary effects of severe storms and heavy rains has been somewhat limited. It is the secondary hazards caused by these severe weather events, such as floods, landslides, and erosion that have had the greatest impact on the Planning Area. The risk and vulnerability associated with these secondary hazards are discussed in other sections of this Plan (Section 4.3.11 Flood: 100/500-year, Section 4.3.12 Flood: Localized Stormwater – specifically in the localized flood areas shown on Table 4-118, Section 4.3.8 Dam Failure, and Section 4.3.13 Landslide).

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in

population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future heavy rain and storm conditions and associated impacts and vulnerability of the County to flooding.
- Future population growth should be considered as having more or less people in a community affects the overall hazard vulnerability to the County. Population is expected to increase slowly for Madera County until 2045, then shrink. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-21). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. As such, the vulnerability may increase due to additional populations. Certain vulnerable populations, such as the unhoused, outdoor workers, and others could experience disproportional effects from this hazard. and should be addressed as the County continues to grow. Thus, changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. Changes in land use may also amplify the impacts of heavy rains and storms, as additional impervious surfaces can cause additional runoff and localized flooding throughout the County. Building codes in the County ensure that new development is built to current building standards, which should reduce the risk to future development in the County from heavy rains and storms. New critical facilities such as communications towers and others should be built to withstand hail damage, lightning, and thunderstorm winds. With adherence to development standards, changes in land use and development will not likely increase the impacts and associated vulnerabilities of the County to this hazard.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help make for a more resilient community.

4.3.5. Severe Weather: High Winds and Tornadoes

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrences; and how climate change can affect or influence this hazard.

Hazard/Problem Description

High Winds

High winds, often accompanying severe storms and thunderstorms, can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. These winds may occur as part of a seasonal climate pattern or in relation to other severe weather events such as thunderstorms.

Straight-line winds may also exacerbate existing weather conditions by increasing the effect on temperature and decreasing visibility due to the movement of particulate matters through the air, as in dust and snow storms. The winds may also exacerbate fire conditions by drying out the ground cover, propelling fuel around the region, and increasing the ferocity of exiting fires. These winds may damage crops, push automobiles off roads, damage roofs and structures, and cause secondary damage due to flying debris.

Location and Extent

The entire Planning Area is subject to significant, non-tornadic (straight-line), winds. Each area of the County is at risk to high winds. Magnitude of winds is measured often in speed and damages. These events are often part of a heavy rain and storm event, but can occur outside of storms. The speed of onset of winds can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of winds in California is often short, ranging from minutes to hours. The Beaufort scale is an empirical measure that relates wind speed to observed conditions at sea or on land. Its full name is the Beaufort wind force scale. Figure 4-63 shows the Beaufort wind scale.

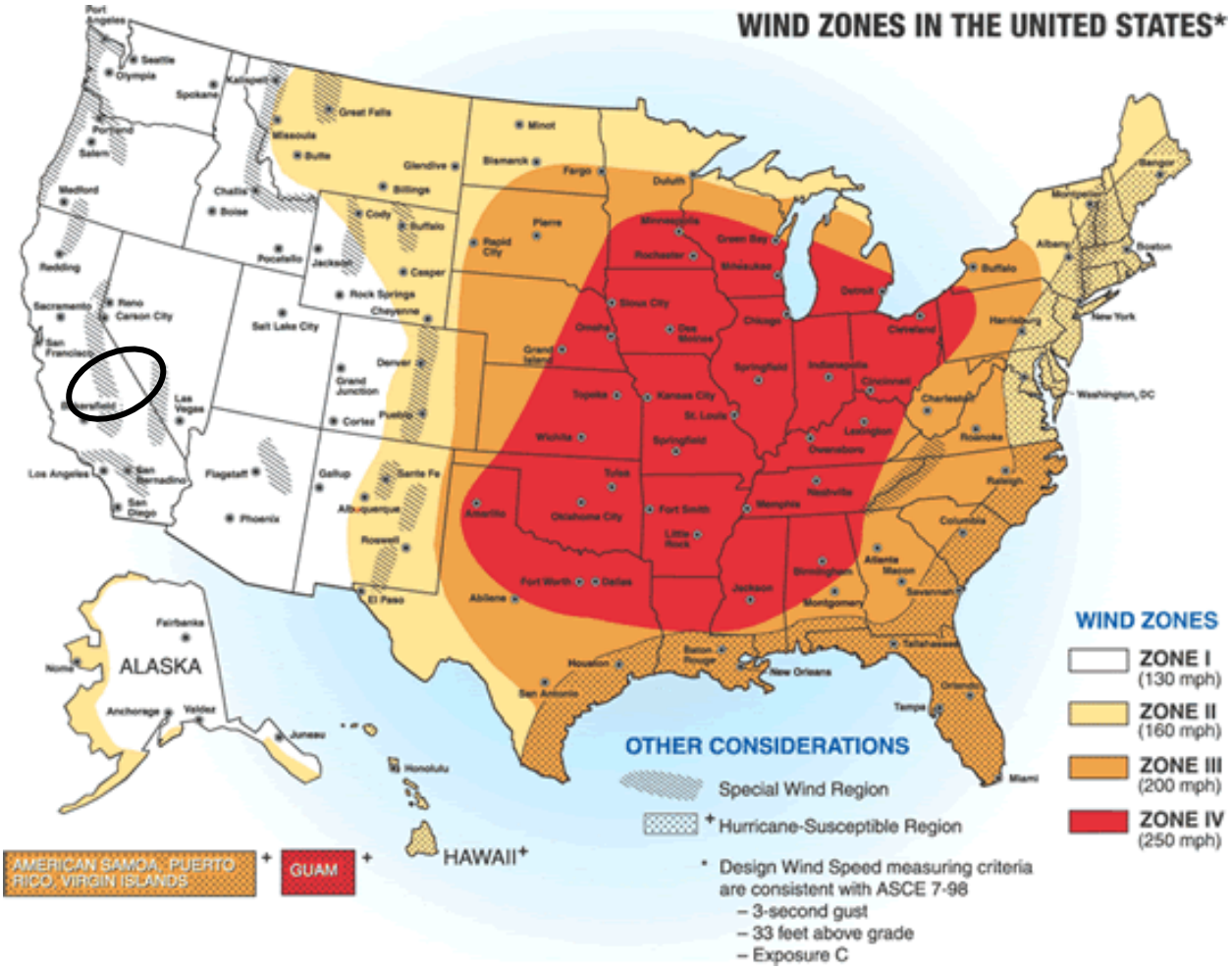
Figure 4-63 Beaufort Wind Scale

Beaufort Number	Wind Speed (miles/hour)	Wind Speed (km/hour)	Wind Speed (knots)	Description	Wind Effects on Land
0	< 1	< 1	< 1	Calm	Calm. Smoke rises vertically.
1	1-3	1-5	1-3	Light Air	Wind motion visible in smoke.
2	4-7	6-11	4-6	Light Breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	12-19	7-12	Gentle Breeze	Leaves and smaller twigs in constant motion.
4	13-18	20-28	11-16	Moderate Breeze	Dust and loose paper are raised. Small branches begin to move.
5	19-24	29-38	17-21	Fresh Breeze	Small trees begin to sway.
6	25-31	39-49	22-27	Strong Breeze	Large branches are in motion. Whistling is heard in overhead wires. Umbrella use is difficult.
7	32-38	50-61	28-33	Near Gale	Whole trees in motion. Some difficulty experienced walking into the wind.
8	39-46	62-74	34-40	Gale	Twigs and small branches break from trees. Cars veer on road.
9	47-54	75-88	41-47	Strong Gale	Larger branches break from trees. Light structural damage.
10	55-63	89-102	48-55	Storm	Trees broken and uprooted. Considerable structural damage.
11	64-72	103-117	56-63	Violent Storm	Widespread damage to structures and vegetation.
12	> 73	> 117	> 64	Hurricane	Considerable and widespread damage to structures and vegetation. Violence.

Source: National Weather Service

Figure 4-64 depicts wind zones for the United States. The map denotes that Madera County falls into Zone I, which is characterized by high winds of up to 130 mph. Portions of the County are also located in a special wind hazard region, which is a result of foehn winds. A foehn wind is a type of dry down-slope wind that occurs in the lee (downwind side) of a mountain range. Foehn winds are known locally as Mono winds. Winds of this type are called "snow-eaters" for their ability to make snow melt or sublimate rapidly. This snow-removing ability is caused not only by warmer temperatures, but also the low relative humidity of the air mass coming over the mountain(s). They are also associated with the rapid spread of wildfires, making some regions which experience these winds particularly fire prone. Burn patterns of almost all historic large wildfires in the County indicate they occurred during foehn winds. This is discussed in greater detail in the wildfire profile in Section 4.3.15.

Figure 4-64 Wind Zones in the United States

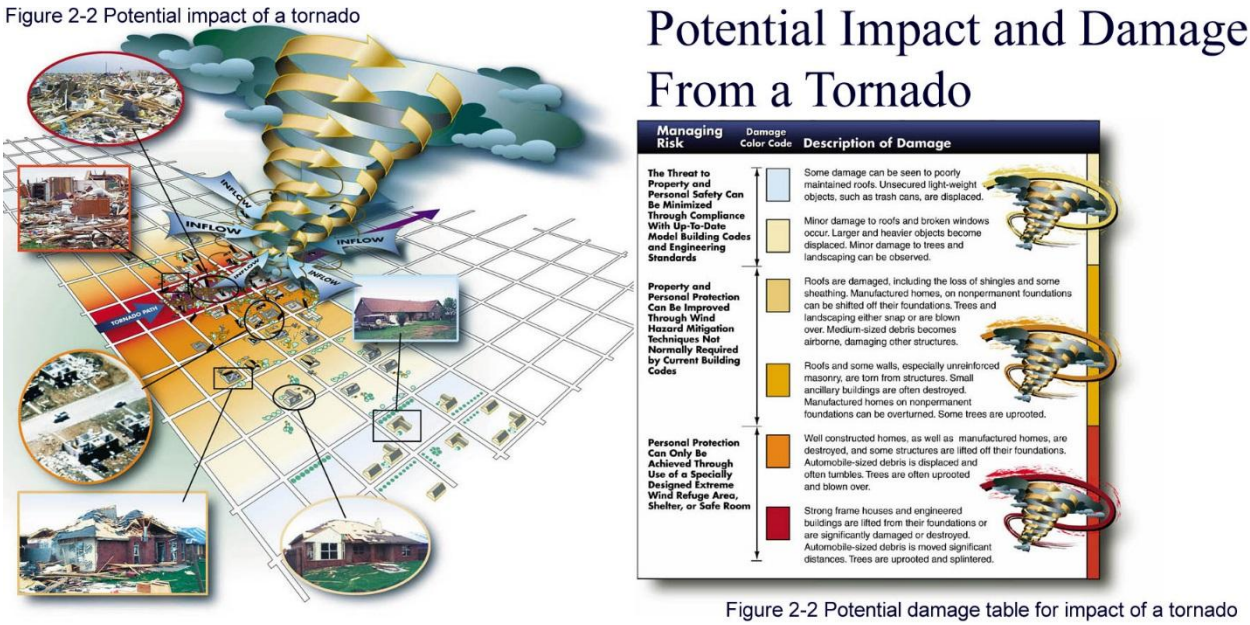


Source: FEMA – Wind Zones in the United States

Tornadoes

Tornadoes and funnel clouds can also occur during these types of severe storms. Tornadoes are another severe weather hazard that, though rare, can affect anywhere within the Madera County Planning Area, but most often in the lower elevations, and primarily occur during the storm season in the late fall and early spring. 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 across a path only 300 yards wide or less as 300-mile-wide hurricanes. Figure 4-65 illustrates the potential impact and damage from a tornado.

Figure 4-65 Potential Impact and Damage from a Tornado



Source: FEMA: Building Performance Assessment: Oklahoma and Kansas Tornadoes

Location and Extent

Tornadoes, while rare, can occur at any location in the County, but most often occur in the lower elevations. All areas of the County are at risk to tornadoes.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. Table 4-47 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at different levels of intensity. Table 4-48 shows the wind speeds associated with the Enhanced Fujita Scale ratings.

Table 4-47 Original 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.

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
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.
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 4-48 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

It is difficult to predict a tornado or the conditions that preclude a tornado far in advance. Tornadoes can strike quickly with very little warning. In California it is rare for tornadoes to exceed EF3 magnitude. Most tornadoes that touch down are not long lived and cause limited damage.

Past Occurrences

Disaster Declaration History

There have been no past federal or state disaster declarations due to high winds or tornadoes, according to Table 4-4. There have been no USDA Secretarial Disaster Declaration for high winds or tornadoes as shown in Table 4-53 in Section 4.3.6 below.

NCDC Events

The NCDC data recorded 271 high wind events (no tornado incidents) for Madera County since 1950. A summary of these events is shown in Table 4-49.

Table 4-49 NCDC High Wind and Tornado Events in Madera County 1950-7/31/2024

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Funnel Cloud	21	0	0	0	0	$0	$0
Heavy Wind	2	0	0	0	0	$0	$0

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
High Wind	91	0	0	0	4	$211,817,000	$150,000
Strong Wind	141	0	0	0	0	$2,174,900	$57,000
Thunderstorm Wind	16	0	0	0	0	$181,000	$7,800,000
Total	**271**	**0**	**0**	**0**	**4**	**$214,172,900**	**$8,007,000**

Source: NCDC

Hazard Mitigation Planning Committee Events

These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring prior to the 2018 LHMP.

Events since 2018 LHMP

March 2024 – A funnel cloud which had been previously reported by a trained spotter spawned a small tornado in northeast Madera which was on the ground for around 5 minutes and moved eastward around a half mile. The tornado damaged some portable classrooms at Berenda Elementary School in Madera. Damages were estimated at $50,000 from this EF0 event.

2018 to 2026 - The HMPC noted that winds are an annual occurrence in the County. Tornadoes may happen, but are more rare. The HMPC also noted that microbursts have caused problems in the County in the past.

Events prior to 2018 LHMP

March 2011 - High winds occurred around the 18th of March. These high winds knocked down trees and caused damages in the County. Over $100,000 in damages was reported. This includes over $21,000 in damages to Yosemite High School, North Fork Elementary, and Oakhurst Elementary. Falling trees resulted in damage to buildings, debris removal, equipment breakage, and other maintenance issues.

Likelihood of Future Occurrence

Highly Likely/Occasional – Based on NCDC data and HMPC input, 271 wind and tornado incidents over a 74-year period (1950-2024) equates to a severe wind/tornado event every year. High winds are a well-documented seasonal occurrence that will continue to occur annually in the Madera County Planning Area. Tornadoes tend to be rare in the County and warrant a likelihood of future occurrence rating of occasional.

Climate change may increase the chance of future occurrence as well as future impacts. More information on climate change and high winds and tornadoes can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and High Winds

According to the 2024 CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual thunderstorm events is likely to increase during the 21st century. This may bring stronger thunderstorm winds. The CAS does not discuss non-thunderstorm winds.

Vulnerability Assessment

Vulnerability—Medium

The Madera County Planning Area is subject to potentially destructive high winds and tornadoes. High winds are common throughout the area and can happen during most times of the entire year and outside of a severe storm event. Tornadoes are rare. High winds and tornadoes can be a significant public safety and economic concern.

The whole of the Planning Area has some measure of vulnerability to high winds and tornadoes. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

General Concerns

While there has been some scattered record keeping describing the impacts of dust storms, there is little information to indicate that straight-line winds are little more than a nuisance that causes sporadic problems. For example, while winds can blow weeds that can create an additional expense for farmers, they often cause little long term damage and there is little justification for allocating resources to combat them. Though recordkeeping may be scattered, the HMPC noted that microbursts have caused problems in the County in the past. Damages to buildings, irrigation systems, and associated air quality issues from dust storms have all occurred in the past. During the recent drought, larger areas of dirt and dust became more susceptible to the effects of winds. Trees may be downed in the County. As detailed in the wildfire discussion, one of the most significant concerns in the County is the effect of high winds in fueling wildfires. Even before a wildfire starts, high winds can cause PG&E to put PSPS events into effect.

Local concerns for each of the jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from high winds and tornadoes include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented below. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

People and Populations

All populations are at some vulnerability to high winds and tornadoes. Certain vulnerable populations are at the greatest risk to the effects of high winds and tornadoes. These include the unsheltered, residents who live in mobile homes, residents who live in older buildings not built to withstand high winds and that may not have areas to shelter, such as below ground floors, and those working or caught outdoors during a wind or tornado event.

Structures

All structures in the Madera County Planning Area have some measure of risk from high wind and tornadoes. Though most structures are built to withstand winds, high wind speeds can still cause damages in the Planning Area. Though rare, a tornado could cause damage to virtually all facilities in the tornado touchdown path. This would affect homes, businesses, commercial property, as well as government and critical facilities. During a wind or tornado event, power lines in the Planning Area can be damaged causing power outages and falling trees can cause damage to nearby structures. High winds are also a cause for PSPS events to be declared, causing power outages to occur. High winds and tornadoes could cause sparks from electric wires and other sources, which could lead to wildfire ignition. Once ignited, high winds can also cause wildfires to rapidly spread and become out of control. High wind conditions can cause wildfires to move into more urban areas destroying structures and whole subdivisions, as seen in recent wildfire events in California.

Critical Facilities and Infrastructure

Though most critical facilities are built to withstand winds, high wind speeds can still cause damage to critical facilities and infrastructure in the Madera County Planning Area. Though rare, a tornado could cause damage to virtually all facilities in the tornado touchdown path. Winds can cause PSPS events and lead to out of control wildfires, which can damage critical facilities and impact their abilities to perform their critical roles in the community.

Natural, Historic, and Cultural Resources

Natural resources, such as trees, are vulnerable to winds. Increased levee and streambank erosion can occur during periods of high water and high winds. High wave action during significant wind events can cause levee and streambank erosion and impact marsh lands, wetlands, and habitat areas. Soil erosion can also

occur during high winds. Most all natural, historic, or cultural resources are at risk to tornadoes. Tornadoes can tear apart habitats, causing fragmentation across ecosystems and can damage and destroy historic structures and cultural resources.

FEMA NRI Hazard Vulnerability Assessment

The FEMA NRI was queried for additional specific data on Madera County's vulnerability to High Winds and Tornadoes. The NRI contains data and analysis for 18 separate natural hazards. The NRI hazard related to Madera County's High Winds and Tornadoes are: strong winds and tornadoes. As shown on Table 4-50, strong winds could cause a total of $4,919 in expected annual losses, with a historic loss rating of relatively moderate. Tornadoes could cause a total of $141,258 in expected annual losses with a historic loss ratio rating of very low. Strong winds and tornadoes have a very high rating for social vulnerability and a very low community resilience, with a risk index score of 2.7 out of 100 for strong winds and 18.9 out of 100 for tornadoes. According to the NRI, there have been 2 strong wind events between the years 1986-2021 with an average of 0 events per year and 10 tornado events on record between the years 1950-2021, with an average of 0.2 events per year.

Table 4-50 Madera County Planning Area – Strong Wind and Tornado Vulnerability Ratings from FEMA NRI

NRI Hazard	Hazard Risk Index Rating*	Expected Annual Loss Values (total)**	Exposure Value (total)***	Historic Loss Ratio Rating
Strong Wind	2.7	$4,919	$1,840,673,726,093	Relatively moderate
Tornado	18.9	$141,258	$1,840,673,726,093	Very low

Source: FEMA NRI Report. Retrieved April 1, 2025.

*Hazard Risk Index is calculated using data for only a single hazard type, and reflect a communities expected annual loss value, community risk factors, and the adjustment factor used to calculate the risk value.

**Expected annual loss represents the average economic loss in dollars resulting from natural hazards each year.

***Exposure is a natural hazard consequence factor that is the representative value of buildings, populations, or agriculture potentially exposed to a natural hazard occurrence.

Additional information on the FEMA NRI can be found in Section 4.2 and Appendix G.

Impacts from Severe Weather: High Wind and Tornado

Wind and tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, the majority of injuries and deaths generally result from flying debris. Property damage can include damage to buildings, fallen trees, and power lines. Local industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response. Winds can push automobiles off roads, damage roofs and structures, cause power outages, and cause secondary damage due to flying debris and hazardous trees. High winds can also contribute to the spread and intensity of wildfires.

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, the majority of injuries and deaths generally 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.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future wind conditions and associated impacts and vulnerability of the County. Climate change is not likely to affect future tornado conditions.
- Future population growth should be considered as having more or less people in a community affects the overall hazard vulnerability to the County. Population growth in Madera County is expected to continue until 2045, when population begins to shrink. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-21). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected and could increase the vulnerability of the County to this hazard. Vulnerable populations could experience disproportional effects from this hazard and should be planned for as development of the County continues. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. Building codes in the County ensure that new development is built to current building standards to withstand high winds, which should reduce the risk to future development in the County from high winds and tornadoes. With adherence to development standards, future losses to new development should be minimal. Changes in land use and increased development may amplify the impacts of high winds and tornadoes, as additional structures in the County increase the number of buildings at risk to high winds and tornadoes.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help make for a more resilient community. Utilities at risk to high winds should be undergrounded as new facilities are improved or added. Whether high winds and tornadoes will occur, where, when, and of what intensity are all factors that evolve over the days and hours before they form and after they do. Improved weather forecasts coupled with new information technologies, including social media, has resulted in an increasingly large volume of risk information that is available to people when tornadoes and high winds threaten.

4.3.6. Agricultural Hazards: Severe Weather/Invasive Species (Pests and Weeds)

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrences; and how climate change can affect or influence this hazard.

Hazard/Problem Description

Farming and related agricultural industries are not only the backbone of Madera County's economy, they also play a central role in the way of life of County residents and help define the character of the County. Agriculture has always been an integral part of Madera County and has continually grown and changed along with the County. Today, the soils and climate of Madera County make it an ideal area to sustain many agricultural endeavors. Agriculture in Madera County is a mosaic of farm, grazing, and timber lands intermingled with other uses in the rural setting which typifies much of the County. In recent years, grape growing and the wine industry has become a key component of the agricultural industry in Madera. This agricultural hazard focuses on severe weather, as well as certain native and invasive species (insects, pests and weeds), all which can significantly affect the agricultural industry in the County.

Agricultural losses occur on an annual basis and can be affected by a variety of natural hazards, but are most often affected by severe weather events, including heavy rains, floods, freeze, heat, and drought. The 2023 State of California Multi-Hazard Mitigation Plan attributes most of the agricultural disasters statewide to drought, freeze, and insect infestations. Other agricultural hazards include fires, crop and livestock disease, insects, and noxious weeds.

In addition to severe weather, pests and weeds, including invasive species, can affect the agricultural industry in the County. Invasive species are organisms that are introduced into an area beyond their natural range and become a pest in the new environment. This hazard also addresses the issues related to pests, weeds, and invasive species including that pose a significant threat to the agricultural industry and are therefore a concern in the Madera County Planning Area. This hazard does not address pests and plants that cause impacts to human health, as those issues are addressed in other planning mechanisms in the County.

Madera County is geographically and ecologically diverse, extending from the western edge of California's Central Valley east into the Sierra Nevada Mountains. Agricultural production in Madera County remains a significant contributor to the local economy. According to the California Department of Conservation's Farmland Mapping and Monitoring Program (FMPP), as of 2020 (the most recent data available as of this LHMP Update) the County has 98,294 acres of prime farmland, 84,975 acres of farmland of statewide importance, 183,598 acres of unique farmland, 6,210 acres of farmland of local importance, and 381,026 acres of grazing land. These numbers have been reduced since 2004 due in part to increased development in the County. (see Table 4-51).

Table 4-51 Madera County Farmland Inventory – 2004, 2014, and 2020

Soil Category	2004 Acres	2014 Acres	2020
Prime Farmland	99,561	97,962	98,294
Farmland of Statewide Importance	86,040	85,056	84,975
Unique Farmland	163,888	176,042	183,598
Farmland of Local Importance	18,799	10,315	6,211
Grazing Land	399,290	389,942	381,026
Urban and Built-Up Land	24,975	28,730	29,758
Water	62,425	66,978	71,878
Other Land	6,063	6,051	5,395
Total Area Inventoried	**861,041**	**861,076**	**861,135**

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

According to the 2023 Madera County Crop Report, many commodities are grown in Madera County. The top three commodities for the County in 2022 were almonds, milk, and pistachios. According to the 2023 Crop Report, gross value of all production was $1,859,365,000; this is a decrease of $161,318,000 or 7.98% as compared to the revised 2022 production value of $2,020,683,000. Crop values can vary from year to year due to the variables of production, market and weather conditions. The top 7 leading crops in Madera County remained the same as in 2022. In the major crop areas total value increased in forest products 22.49%, livestock and poultry 24.07%, nursery products 16.87%, and vegetable crops 63.91%. Declines in total value were apiary 10.56%, field crops 21.62%, fruit and nut crops 19.34%, and livestock and poultry products 27.82%. A summation of crop production values, sourced from the Madera County Agricultural Commissioner's Annual Crop Reports, from 2019-2023 for Madera County is shown in Table 4-52.

Table 4-52 Madera County – Value of Agricultural Production 2019-2023

Crop	2019	2020	2021	2022	2023
Apiary Products	$58,413,000	$67,036,000	$68,616,000	$69,758,000	$62,389,000
Field Crops	$73,021,000	$70,304,000	$79,236,000	$105,811,000	$82,932,000
Fruit & Nut	$1,419,194	$1,342,025,000	$1,398,370,000	$1,178,902,000	$1,130,357,000
Forest Crops	$1,776,000	$1,409,000	$939,000	$925,000	$1,133,000
Livestock Productions	$111,234,000	$92,912,000	$107,051,000	$123,414,000	$153,117,000
Livestock & Poultry Products	$281,452,000	$324,923,000	$338,828,000	$489,679,000	$353,450,000
Nursery Products	$27,090,000	$27,874,000	$23,310,000	$20,330,000	$23,759,000
Vegetable Crops	$29,385,000	$23,049,000	$29,145,000	$31,864,000	$52,228,000
Total	**$583,790,194**	**$1,949,532,000**	**$2,045,495,000**	**$2,020,683,000**	**$1,859,365,000**

Source: Madera County Agricultural Commissioner Reports. Retrieved 6/12/2025.

Location and Extent

Agricultural hazards occur throughout the County where lands are used for farming, grazing, and other agricultural uses. The County has large swaths of agricultural lands in the lower elevations of the County. These are shown in the Land Use Map for the County on Figure 4-20 above. Areas not as greatly affected by severe weather, insects, pests, and weeds are the cities, with limited agricultural uses, as well as the upper elevations of the County which all contain fewer agricultural acres. However, while the cities may not be directly affected, they are indirectly affected economically when agricultural losses occur.

There is no scale that measures agricultural hazards. Agriculture in the County is at risk to many hazards: insects, weeds, severe weather, as well as downturns in commodity prices. Each of these has a different duration and speed of onset. Some, such as freeze, can have a short onset and a short duration. Drought can have a long onset and long duration. Insects, pests, and weeds can have short or long onset, and short or long durations. All agricultural losses can have a significant impact on affected communities.

Past Occurrences

Disaster Declaration History

The agricultural lands of Madera County have historically been affected by weather related events such as extreme heat, freeze, heavy rain, and drought. The severe weather events can have devastating effects leading to losses in yield and affecting quality. The US Farm Services Agency provided information on disaster declarations from 2014 through 2024. These are shown in Table 4-53. There have been 17 USDA declarations: 13 from drought, 2 from freeze, 1 from hailstorm, rain, cold temperatures, and 1 from excessive rain and hail.

Table 4-53 Madera County – USDA Disaster Declarations 2012 to 2024

Year Declared/Disaster Type	Designation Number	Primary or Contiguous
2012		
Drought-FAST TRACK	S3268	Primary
Hailstorm, rain, cold temperatures	S3320	Contiguous
Drought	S3452	Contiguous
2013		
Drought – FAST TRACK	S3491	Contiguous
2014		
Drought – FAST TRACK	S3626	Primary
Drought – FAST TRACK	S3743	Primary
2015		
Drought – FAST TRACK	S3784	Primary
Drought	S3943	Primary
2016		
Drought – FAST TRACK	S3952	Primary

Year Declared/Disaster Type	Designation Number	Primary or Contiguous
2017		
Drought – FAST TRACK	S4144	Contiguous
2018		
–	–	–
2019		
Excessive rain and hail	S4657	Contiguous
2020		
–	–	–
2021		
Drought – FAST TRACK	S4916	Primary
2022		
Drought – FAST TRACK	S5146	Primary
Freeze	S5229	Primary
Freeze	S5332	Contiguous
2023		
Drought – FAST TRACK	S5371	Primary
2024		
–	–	–
2025		
Drought – FAST TRACK	S5943	Contiguous

Source: US Farm Service Agency

In addition to these, the County provided a May 2024 declaration for a local emergency for Beet Leafhoppers/Curly Top Virus. No USDA declaration was declared, but a local proclamation was made. This allowed the use of certain pesticides to be applied in order to remove the insects.

NCDC Events

The NCDC does not track agriculture events.

Hazard Mitigation Planning Committee Events

These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring prior to the 2018 LHMP.

Events since 2018 LHMP

The HMPC noted that agriculture events occur yearly, though with varying levels of damages. This can be seen (since 2018) on Table 4-54. To be listed, losses must have been a result of a qualifying disaster event (natural disasters) such as hurricane, rain, excessive moisture, flood, qualifying drought, tornado, typhoon, volcanic activity, snowstorm, wildfire, heat, freezing temperatures, wind events, or related conditions that

occurred therefrom. ***Note***: Not all damage will result in a formal Disaster Declaration due to required minimum thresholds; however, damage/loss may still occur.

Table 4-54 Madera County – Agricultural Commissioner's Natural Disaster Events

Year	Commodity	Est. Damage Amount	Damage
2024/2025	Dairy-Milk	$unknown	Disease – Milk destruction due to dairy cows infected with HPAI
2024	Ducks (meat)	$unknown	Disease – Depopulation of meat ducks due to HPAI (Avian Influenza)
2024	Cattle	$40,000	Heat – Cattle loss from heat
2024	Dairy-Milk	$262,000	Heat – lactating cows heat stress, lower milk production
2024	Prunes	$1,338,818	Heat damage – sunburn, loss of fruit sugars (less drying tonnage)
2023	Citrus, grape, olive	$205,315	Hail, flooding, poor pollination- quality loss, tree loss, hail damage, low yields
2023	Almond	$280,186,644	Rain, hail, wind during pollination– flooding, tree loss, lower yields, quality loss
2022	Walnut	$1,852,600	Heat damage – smaller nut size, less yield
2022	Cherry	$2,723,616	Freeze damage – freeze damage during bloom – crop yield loss
2022	All	Unknown	Freeze damage – USDA Secretarial Disaster Declaration of multiple counties
2021	Unknown	Unknown	Wildfire loss – forage loss, unable to collect further data
2020	Cattle/Calves +Dairy-Milk	$204,000+$746,720	Heat – loss of cattle & calves, decrease in milk production
2020	Grazing land/Infrastructure	$55,320	Wildfire damage- grazing land, infrastructure loss
2019	Cherry	$6,183,400	Rain prior to harvest- fruit damage
2018	Cherry	$9,475,028	Freeze damage during bloom- pollination loss due to rain, crop yield loss

Events prior to2018 LHMP

Events before 2018 were not captured in the previous LHMP. It was noted that agricultural events occur yearly, with varying levels of damage.

Likelihood of Future Occurrence

Highly Likely—As long as severe weather events, insects, pests, and weeds continue to be an ongoing concern to the Madera County Planning Area, the potential for agricultural losses remains.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and agricultural hazards can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and Agricultural Hazards

According to the 2024 CAS, addressing climate change in agriculture will encompass reducing vulnerability through adapting to the ongoing and predicted impacts of climate. Agriculture in California is vulnerable to predicted impacts of climate change, including less reliable water supplies, increased temperatures, and increased pests.

The 2023 California State Hazard Mitigation Plan noted that California farmers contend with a wide range of crop-damaging invasive pests and pathogens. Continued climate change is likely to alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates. It also noted that change in climate can directly impact crop growth through new temperature patterns and northward shifts of pests and disease. Additionally, longer growing seasons may enable pest species to complete more reproductive cycles, which can increase severity of infestations.

Finally, the 2023 State Plan noted that temperature is not the only climatic influence on pests. For example, some insects are unable to cope in extreme drought, while others cannot survive in extremely wet conditions. Furthermore, while warming speeds up the life cycles of many insects, suggesting that pest problems could increase, some insects may grow more slowly as elevated carbon dioxide levels decrease the protein content of the leaves on which they feed.

Vulnerability Assessment

Vulnerability—High

According to historical hazard data, severe weather affecting agriculture and agricultural pests and weeds are an annual occurrence in the Madera County Planning Area. If left unchecked, insects, pests, and weeds, including invasive species, can threaten native species, biodiversity, ecosystem services, recreation, water resources, agricultural and forest production, cultural resources, economies and property values, public safety, and infrastructure.

The whole of the Planning Area has some measure of vulnerability to agricultural hazards. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has certain specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

General Concerns

For the County Agricultural Commissioner's Office, the chief concerns for agricultural hazards are pests and diseases that impact the agricultural industry. This can not only affect crops and livestock, but also the environment, trade, and economic welfare of the industry (sometimes long-term). State and federal designated pests and diseases are monitored proactively, and various protocols/guidance are in place when an infestation occurs. New pests and diseases are a particular threat because there may be limited information and mitigation available to be able to prevent/limit damage to crops, livestock and the environment. Depending on a confirmed pest/disease find, trade impacts can occur (usually locally, but also statewide) which can result in crop/livestock and/or economic loss.

In addition, there is concern about drought and high heat damages during certain periods of plant growth. For many commodities, damage that occurs from short term drought or high heat results in reduced income to local farmers. Scarring on the exterior of a fruit or nut can result in that commodity being less valuable to end users. During times where pollination is needed, a lack of pollinators to spread pollen is also a concern.

Other areas of concern would be wildfire smoke damage to certain crops (affects quality/taste), chemical spills/clouds (any contaminants) affecting crops/livestock, an act of agroterrorism.

Invasive and Native Species (Insects/Pests)

Madera County is threatened by a number of 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:

- Caribbean Fruit Fly
- Mediterranean Fruit Fly
- Melon Fly
- Mexican Fruit Fly
- Olive Fruit Fly
- Oriental Fruit Fly
- Apple Maggot
- Gypsy Moth
- Japanese Beetle
- Khapra Beetle
- European Corn Borer
- European Pine Shoot Moth

There are proactive monitoring programs in place for designated agricultural pest and disease detections and pressure. If/when a pest/disease is found then there are state and federal protocols/guidelines which are used by county, state and federal agricultural agencies. These help with infestation/damage assessment, mitigation, treatment and recovery assistance. When a new pest or disease is found, the County Agricultural Commissioner's Office works with their state and federal agency partners to find solutions to mitigate impacts on crops, livestock, environment, trade, economic loss, etc.

Weeds (both invasive and native)

Noxious weeds, defined as any plant that is or is liable to be troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate, are also of concern. Noxious weeds within the Planning Area include those listed on Table 4-55.

Table 4-55 Madera County Weeds of Concern

Species of Concern					
High					
Giant reed	Red brome	Downy brome	Spotted knapweed	Yellow starthistle	Jubatagrass
Pampasgrass	Scottish broom	Water hyacinth	French broom	English ivy	Perennial pepperweed
South American spongeplant	Creeping water primrose	Parrotfeather	Eurasian watermilfoil	Himalayan blackberry	Red sesbania
Spanish broom	Medusahead	Saltcedar			
Medium					
Russian knapweed	Tree of heaven	Australian saltbush	Wild oat	Black mustard	Ripgut brome
Lepidium halepense	Diffuse knapweed	Malta starthistle	Rush skeletonweed	Bull thistle	Poison hemlock
Bermudagrass	Hedgehod dogtailgrass	Common and Fuller's teasel	Stinkwort	Tasmanian blue gum	Tall fescue
Edible fig	Cutleaf geranium	Shortpod mustard	Common velvet grass	Mediterranean barley	Hare barley
Klamathweed	Rough catsear	Ox-eye daisy	Italian ryegrass	Pennyroyal	Tree tobacco
Bermuda buttercup	Hardinggrass	Curlyleaf pondweed	Red sorrel	Chinese tallowtree	London rocket
Hedgeparsely	Rose clover	Big periwinkle	Rattail fescue		

Source: California Invasive Plant Council

The Madera County Department of Agriculture uses mechanical and chemical control measures to contain these agricultural weeds.

Natural Disasters and Severe Weather

According to the USDA, every year natural disasters, such as droughts, earthquakes, extreme heat and cold, floods, fires, earthquakes, hail, landslides, and tornadoes, challenge agricultural production. Because agriculture relies on the weather, climate, and water availability to thrive, it is easily impacted by natural events and disasters. Agricultural impacts from natural events and disasters most commonly include contamination of water bodies, loss of harvest or livestock, increased susceptibility to disease, and destruction of irrigation systems and other agricultural infrastructure. These impacts can have long lasting effects on agricultural production including crops, forest growth, and arable lands, which require time to mature. Specific impacts by hazard are listed below:

- Drought's most severe effects on agriculture include water quality and quantity issues. Other impacts include decreased crop yields, impact to feed and forage, altered plant populations and tree mortality.
- Earthquakes, though rare in Madera County, can strike without warning and cause dramatic changes to the landscape of an area that can have devastating impacts on agricultural production and the environment. These impacts could include loss of harvest or livestock and destruction of irrigation systems and other agricultural infrastructure.
- Extreme cold may result in loss of livestock, increased deicing, downed power lines, and increased use of generators. Deicing can impact agriculture by damaging local ecosystems and contaminating water bodies. Downed power lines cause people to run generators more often, which can release harmful air pollutants.
- Hot weather and extreme heat can worsen ozone levels and air quality as well as leading to drought conditions. Excessive heat and prolonged dry or drought conditions can impact agriculture by creating worker safety issues for farm field workers, severely damaging crops, and reducing availability of water and food supply for livestock.
- Wildfires can spread quickly and devastate thousands of acres of land, which may include agricultural lands. This devastation could lead to large losses in crops, forestry, livestock, and agricultural infrastructure.
- Flooding causes many impacts to agricultural production, including water contamination, damage to crops, loss of livestock, increased susceptibility of livestock to disease, flooded farm machinery, and environmental damage to and from agricultural chemicals.
- Landslides and debris flow occur in all 50 states and commonly occur in connection with other major natural disasters such as earthquakes, volcanoes, wildfires, and floods. Some of the threats from landslides and debris flow include rapidly moving water and debris that can cause trauma; broken electrical, water, gas, and sewage lines; and disrupted roadways and railways. This can lead to agricultural impacts including contamination of water, change in vegetation, and harvest and livestock losses.

The Madera County Agricultural Commissioner noted that of the above, the County is most concerned with drought, freeze, and insect infestations (or any natural event that can affect crops or water delivery or conveyance of water to producers). The Ag Commissioner is also concerned with excessive rain and flooding off agricultural land.

Local concerns for each of the participating jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from agricultural hazards include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented below. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

People and Populations

Agricultural hazards (severe weather, pests and weed, and both native and invasive species) have a minimal effect on people and populations in Madera County, including vulnerable populations. However, damage to crops from invasive and nuisance species can cause significant increases in food prices and food insecurity among low-income communities.

Structures

Structures in Madera County may be indirectly affected by agricultural hazards. The effects of severe weather on structures are included in the discussions on severe weather above. This section focuses then on native and invasive species and pests and weeds. Some species can impact vegetation and can result in stream bank instability, erosion, and increased sedimentation, impacting ground stabilization and possibly causing foundation issues for nearby structures. If species cause trees and other vegetation to die, there is an increased risk of damage to roadways, powerlines, and buildings, and increased risk to wildfire. Some invasive plants have been shown to destabilize soil due to high densities and shallow root systems, negatively impacting nearby buildings and septic systems. Other nuisance plant species have been known to clog culverts and streams, increasing flooding risk.

Critical Facilities and Infrastructure

Critical facilities and infrastructure in Madera County may be affected by agricultural hazards, though these effects are expected to be limited. The effects of severe weather on critical facilities are included in the discussions on severe weather above. This section focuses then on native and invasive species and insects, pests, and weeds. The 2023 State of California Hazard Mitigation Plan noted that water treatment plants could be impacted by invasive and nuisance species. Water that becomes polluted due to increased sedimentation and erosion will require additional treatment. If the system becomes clogged with these pollutants or with nuisance aquatic species, the ability of water treatment plants to operate may become impaired. Additionally, soil that becomes unstable due to decaying vegetation can impact critical facilities that are built on or around these soils.

Natural, Historic, and Cultural Resources

Natural resources can be affected by agricultural hazards. The effects of severe weather on these resources are included in the discussions on severe weather above. This section focuses then on native and invasive

species, and insects, pests, and weeds. Negative impacts of pests and weeds to natural resources 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.

Historic and cultural resources have a more limited risk from agricultural hazards.

FEMA NRI Hazard Vulnerability Assessment

Agricultural hazards are not an NRI hazard, therefore no data is presented.

Impacts from Agricultural Hazards

According to the California Invasive Plants Council. California annually suffers over $3 billion in agricultural losses due to these invasive species. The magnitude of this problem cannot be understated, as both the United States and California Departments of Agriculture are mandated to protect against the invasion of exotic pests and diseases.

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 occur 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 both the agricultural community and the entire Madera County Planning Area.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future conditions that may impact the agricultural industry in Madera County.

- Future population growth should be considered as having more or less people in a community affects the overall hazard vulnerability to the County. Population growth in Madera County is expected to continue through 2045 and then begin to shrink. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-21). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Population changes are unlikely to affect the vulnerability of the County to this hazard unless the population growth significantly increases, displacing agricultural uses. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. This may result in limited changes to land uses that could affect the agricultural industry. As the County continues to add new development, land uses may change resulting in a reduction in agricultural uses. However, for the next five years covered by this LHMP Update, changes in land use and development will likely not increase the impacts and associated vulnerabilities of the County to this hazard.

Future development in the County is not likely to have an impact on agricultural hazards in Madera County, except to the extent that agricultural lands are taken out of production as new development occurs reducing available land for agricultural uses, including those related to farming, timber production and grazing. In addition, with additional development in the County, there may be additional competition for water resources thus possibly impacting the agricultural industry.

4.3.7. Climate Change

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrence; and how climate change can affect or influence this hazard.

Hazard/Problem Description

Climate change is the distinct change in measures of weather patterns over a long period of time, ranging from decades to millions of years. More specifically, it may be a change in average weather conditions such as temperature, rainfall, snow, ocean and atmospheric circulation, or in the distribution of weather around the average. While the Earth's climate has cycled over its 4.5-billion-year age, these natural cycles have taken place gradually over millennia, and the Holocene, the most recent epoch in which human civilization developed, has been characterized by a highly stable climate – until recently.

This LHMP Update is concerned with human-induced climate change that has been rapidly warming the Earth at rates unprecedented in the last 1,000 years. Since industrialization began in the 19th century, the burning of fossil fuels (coal, oil, and natural gas) at escalating quantities has released vast amounts of carbon dioxide and other greenhouse gases responsible for trapping heat in the atmosphere, increasing the average temperature of the Earth.

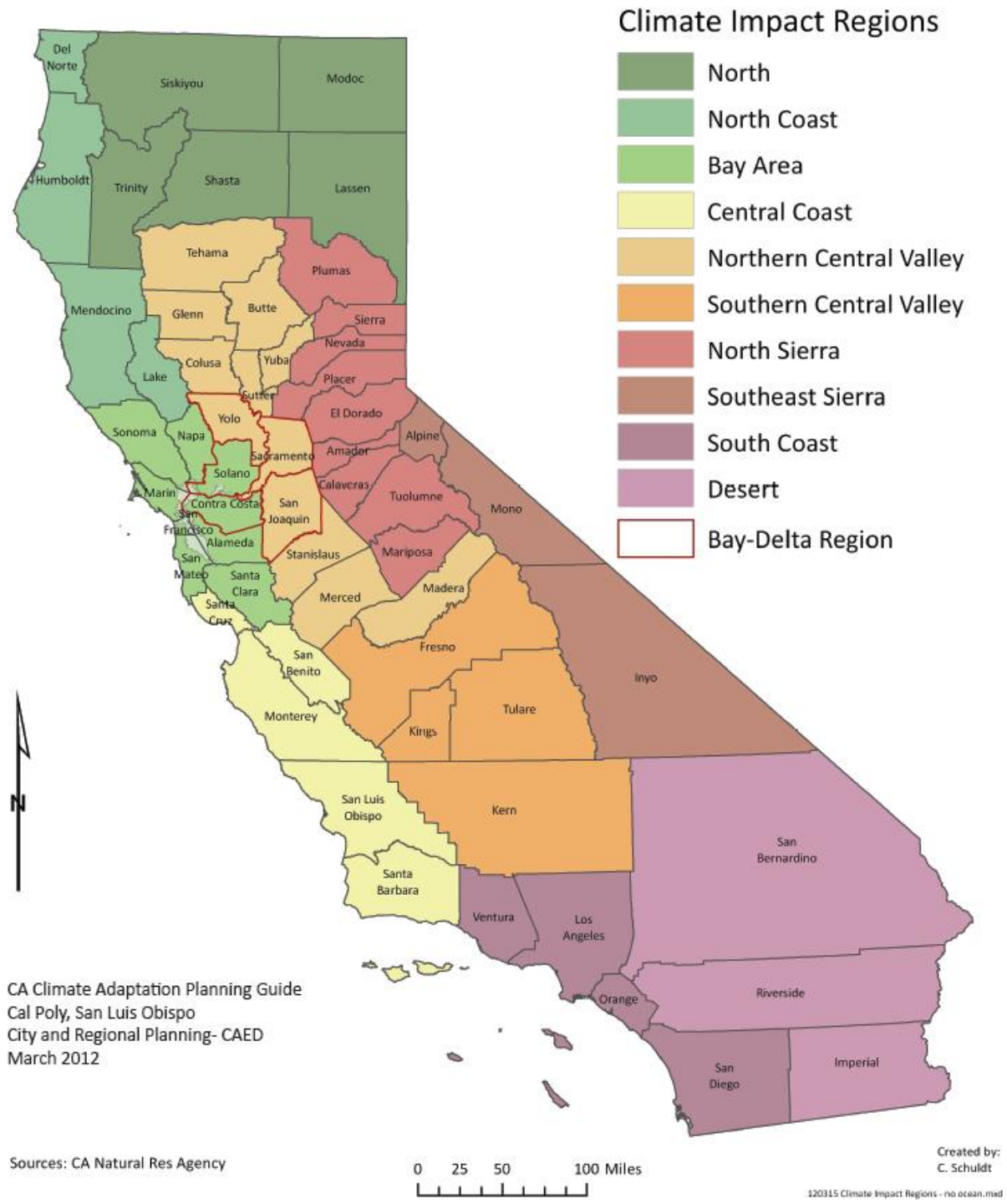
In Madera County, the HMPC noted that each year it seems to get a bit warmer and snow seems to start at higher levels. It was also noted that 2023 was one of the wettest years ever, and storms seem to occur at a greater intensity. California's Adaptation Planning Guide (APG): Understanding Regional Characteristics has divide California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. Madera County falls within the North Central Valley Region characterized as a largely agricultural, inland region. Agriculture is the predominant economic activity. The region's agricultural activity is one of the most productive in the nation. Table 4-56 provides a summary of Cal-Adapt Climate Projections for the South Central Valley Region.

Table 4-56 Madera County Planning Area –Northern Central Valley Region Cal Adapt Climate Projections

Effect	Ranges
Temperature Change, 1990-2100	January increase in average temperature of 4°F to 6°F and between 8°F and 12°F by 2100. July increase in average temperature of 6°F to 7°F in 2050 and 12°F to 15°F by 2100. (Modeled high temperatures (Modeled average temperatures; high emissions scenario)
Precipitation	Annual precipitation is projected to decline by approximately 1 to 2 inches by 2050 and 3 to 6 inches by 2100. (CCSM3 climate model; high carbon emissions scenario)
Heat wave	Heat wave is defined as five days over 102°F to 105°F, except in the mountainous areas to the east. Two to three more heat waves per year are expected by 2050 with five to eight more by 2100.
Wildfire	By 2085, the north and eastern portions of the region will experience an increase in wildfire risk, more than 4 times current levels in some areas. (GFDL climate model; high carbon emissions scenario)

Source: Cal-Adapt 2017/2023.

Figure 4-66 Madera County – Climate Impact Regions



Source: Cal-Adapt 2017/2023

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the County. There is no scale to measure the extent of climate change. Climate change exacerbates other hazard, such as drought, extreme

heat, flooding, wildfire, and others. The speed of onset of climate change is very slow. The duration of climate change is not yet known but is feared to be tens to hundreds of years.

Past Occurrences

Disaster Declaration History

Climate change has never been directly linked to any declared disasters, as shown in Table 4-4.

NCDC Events

The NCDC does not track climate change events.

Hazard Mitigation Planning Committee Events

While the HMPC noted that climate change is of concern, no specific climate change incidents could be recalled (whether since the last LHMP in 2018 or before that time). HMPC members noted that the strength of storms does seem to be increasing and the temperatures seem to be getting hotter. The HMPC also noted that snow levels seem to be higher (or larger) each year and the recent atmospheric river winter rains were more intense. In addition, it was noted that within the last five years, Madera County has experienced extreme droughts that have affected the health of the forest. The lack of rain lead to the Bark Beetle infestation, causing thousands upon thousands of trees to die. The combined effects of the drought, decline in the health of the forest, temperature changes, and wildfires in and around neighboring counties, much contributed to climate change, have also steered the way to poor air quality.

Likelihood of Future Occurrence

Highly Likely – Climate change is virtually certain to continue without immediate and effective global action. According to the National Aerospace and Science Agency (NASA), 2023 was one of the hottest years on record as was 2024. Without significant global action to reduce greenhouse gas emissions, the United Nations Intergovernmental Panel on Climate Change (IPCC) concludes in its Sixth Assessment Synthesis Report (2022) that average global temperatures are likely to exceed 1.5°C by the end of the 21st century, with consequences for people, assets, economies and ecosystems, including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges.

Climate Scenarios

The United Nations IPCC developed several greenhouse gas (GHG) emissions scenarios based on differing sets of assumptions about future economic growth, population growth, fossil fuel use, and other factors. The emissions scenarios range from "business-as-usual" (i.e., minimal change in the current emissions trends) to more progressive (i.e., international leaders implement aggressive emissions reductions policies). Each of these scenarios leads to a corresponding GHG concentration, which is then used in climate models to examine how the climate may react to varying levels of GHGs. Climate researchers use many global climate models to assess the potential changes in climate due to increased GHGs.

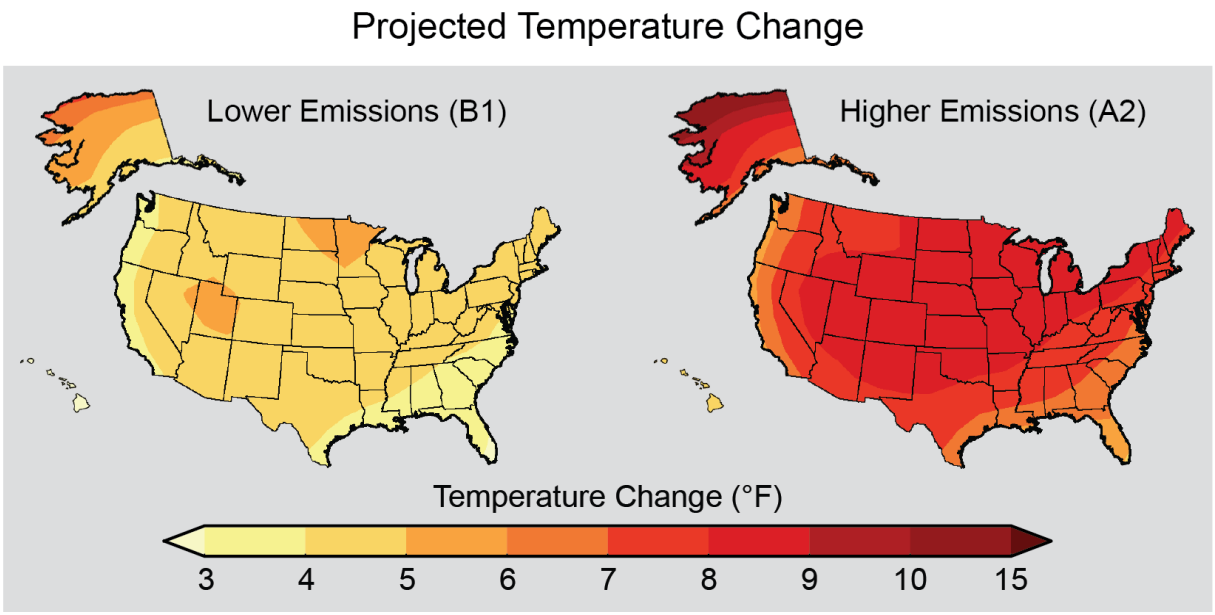
Key Uncertainties Associated with Climate Projections

- Climate projections and impacts, like other types of research about future conditions, are characterized by uncertainty. Climate projection uncertainties include but are not limited to:
  - ✓ Levels of future greenhouse gas concentrations and other radiatively important gases and aerosols,
  - ✓ Sensitivity of the climate system to greenhouse gas concentrations and other radiatively important gases and aerosols,
  - ✓ Inherent climate variability, and
  - ✓ Changes in local physical processes (such as afternoon sea breezes) that are not captured by global climate models.

Even though precise quantitative climate projections at the local scale are characterized by uncertainties, the information provided can help identify the potential risks associated with climate variability/climate change and support long term mitigation and adaptation planning.

Maps show projected change in average surface air temperature in the later part of this century (2071-2099) relative to the later part of the last century (1970-1999) under a scenario that assumes substantial reductions in heat trapping gases and a higher emissions scenario that assumes continued increases in global emissions. These are shown in Figure 4-67.

Figure 4-67 Projected Temperature Change – Lower and Higher Emissions Scenario



Source: National Climate Assessment

According to the California Natural Resource Agency (CNRA), climate change is already affecting California and is projected to continue to do so well into the foreseeable future. Current and projected changes include increased temperatures, sea level rise, a reduced winter snowpack altered precipitation patterns, and more frequent storm events. Over the long term, reducing greenhouse gases can help make these changes less severe, but the changes cannot be avoided entirely. Unavoidable climate impacts can

result in a variety of secondary consequences including detrimental impacts on human health and safety, economic continuity, ecosystem integrity and provision of basic services.

The CNRA's 2024 CAS delineated how climate change may impact and exacerbate natural hazards in the future, including wildfires, extreme heat, floods, and drought:

- Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in Madera County and the rest of California, which are likely to increase the risk of mortality and morbidity due to heat-related illness and exacerbation of existing chronic health conditions. Those most at risk and vulnerable to climate-related illness are the elderly, individuals with chronic conditions such as heart and lung disease, diabetes, and mental illnesses, infants, the socially or economically disadvantaged, and those who work outdoors.
- Higher temperatures will melt the Sierra snowpack earlier and drive the snowline higher, resulting in less snowpack to supply water to California users.
- Droughts are likely to become more frequent and persistent in the 21st century.
- Intense rainfall events, periodically ones with larger than historical runoff, will continue to affect California with more frequent and/or more extensive flooding.
- Storms and snowmelt may coincide and produce higher winter runoff from the landward side, while accelerating sea-level rise will produce higher storm surges during coastal storms. Together, these changes may increase the probability of floods and levee and dam failures, along with creating issues related to saltwater intrusion.
- Warmer weather, reduced snowpack, and earlier snowmelt can be expected to increase wildfire through fuel hazards and ignition risks. These changes can also increase plant moisture stress and insect populations, both of which affect forest health and reduce forest resilience to wildfires. An increase in wildfire intensity and extent will increase public safety risks, property damage, fire suppression and emergency response costs to government, watershed and water quality impacts, vegetation conversions and habitat fragmentation.

Vulnerability to Climate Change

Vulnerability—Medium

Climate change adaptation is a key priority of the State of California. The 2023 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

The whole of the County is at some measure of vulnerability to climate change. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating

jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

General Concerns

Climate change threatens the food security and economic viability of agriculture in Madera County. Drought, flood, and severe weather are all poised to intensify as climate change continues to impact California. Agricultural practices need updating to become resilient and can be part of the solution to climate change in the region.

Local concerns for each of the jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from climate change include people and populations; structures; critical infrastructure and vulnerable uses (with community lifelines); natural, historic, and cultural resources; and economic assets and community activities of value. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented below. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

People and Populations

Climate change affects people and populations within a community, especially those climate change issues related to increases in temperature over time. While all populations can be affected by temperature extremes, populations particularly vulnerable include the very old and very young, medically fragile people, people without means of shelter (and air conditioning) or transportation, people who are socially isolated and other socially vulnerable or underserved populations (as shown in Special Populations discussion in Section 4.2.1). Acclimatization to heat may help reduce risks from heat waves in the healthy general population but may not be sufficient to protect those with underlying issues and lack of resources.

Structures

Climate change, on its own, does not generally impact structures. However, structures in areas of increased wildfire, drought, extreme heat, or flood areas exacerbated by the effects of climate change would be at increased risk, as described throughout this LHMP. Due to the slow onset of climate change, many

structures in the County are expected to undergo improvements and adapt over time to a new climate normal.

Critical Infrastructure and Vulnerable Uses

As with structures, critical and vulnerable facilities in areas of increased wildfire, flood areas, or in other hazard areas exacerbated by climate change, would be at increased risk. Climate change is expected to increase the general vulnerability of critical and vulnerable facilities to natural hazards. Due to the slow onset of climate change, critical and vulnerable facilities and community lifelines in the County are expected to undergo improvements and adapt over time to a new climate normal.

Natural, Historic, and Cultural Resources

The rivers, streams, and open space areas of the County supports rich biodiversity, including many special-status species. These are all at risk from the effects of climate change. In addition, if heat changes wildfire patterns, all areas (on land) of the County are at increased risk from fire – including natural, historic, and cultural resources. Furthermore, if climate change exacerbates the drought hazard, areas of wetlands in the County may dry up temporarily, which could damage habitat areas for waterfowl and other species that depend on these areas.

FEMA NRI Hazard Vulnerability Assessment

Climate change is not an NRI hazard, therefore no data is presented.

Impacts from Climate Change

The 2017 APG North Central Valley Region identifies area specific impacts and vulnerabilities to the Madera County Planning Area. These impacts include:

- Increased temperatures
- Reduced precipitation
- Public health – heat and air pollution
- Reduced agricultural productivity
- Inland flooding
- Reduced tourism

Secondary impacts include changes in precipitation patterns, the global water cycle, melting glaciers and ice caps, and rising sea levels. According to the IPCC, climate change will "increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems" if unchecked.

Through changes to oceanic and atmospheric circulation cycles and increasing heat, climate change affects weather systems around the world. Climate change increases the likelihood and exacerbates the severity of extreme weather – more frequent or intense storms, floods, droughts, and heat waves. The 2023 State of California Hazard Mitigation Plan noted that there are direct and secondary impacts:

- Direct Impacts
  - ✓ Increase in average temperature

- ✓ Changes in annual precipitation
- Secondary Impacts
  - ✓ Increased frequency, intensity, and duration of extreme heat days and heat waves/events
  - ✓ Increased flooding
  - ✓ Increased wildfire
  - ✓ Loss of snowpack and decreased water supplies

Consequences for human society include loss of life and injury, damaged infrastructure, long-term health effects, loss of agricultural crops, disrupted transport and freight, and more. Climate change is not a discrete event but a long-term hazard, the effects of which communities are already experiencing.

In addition to these sources, the 2023 State of California Hazard Mitigation Plan noted that according to California's Fourth Climate Change Assessment, the state will experience the following climate impacts:

- Annual average daily high temperatures are expected to rise by 2.7 °F by 2040, 5.8°F by 2070, and 8.8°F by 2100 compared to observed and modeled historical conditions. These changes are statewide averages.
- Heat waves are projected to become longer, more intense, and more frequent.
- Warming temperatures are expected to increase soil moisture loss and lead to drier conditions. Summer dryness may become prolonged, with soil drying beginning earlier in the spring and lasting longer into the fall and winter.
- Droughts are likely to become more frequent and persistent through 2100.
- The strength of the most intense precipitation and storm events affecting California is expected to increase.
- Snowpack levels are projected to decline significantly by 2100 due to reduced snowfall and faster snowmelt.
- Marine layer clouds are projected to decrease.
- Extreme wildfires (i.e., fires larger than 24,710 acres) would occur 50 percent more frequently. The maximum area burned statewide may increase 178 percent by the end of the century.
- Sea level rise is expected to continue to increase beach, cliff, and bluff erosion.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- As climate change continues to accelerate over time, climate related impacts to the County will continue to increase.
- Climate change can influence population growth in the County over time. While the County is expected to see growth until 2040 and then decline, the County could see population fluctuations as a result of

climate impacts relative to those experienced in other regions, and these fluctuations are expected to impact demand for housing and other development. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-21). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected which may increase the vulnerability of the County to climate change. In addition, while there are currently no formal studies of specific migration patterns expected to impact the County region, climate-induced migration was recognized within the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties Paris Agreement of 2015 and is expected to be the focus of future studies. So, while changes in population and population patterns may increase the impacts associated with this hazard, climate change may also influence future population growth in the County.

- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. The increasing severity and frequency of storms and other weather events due to the changing climate should be taken into account while considering land use planning for the County. Ensuring that regulatory requirements, such as building codes, are updated and followed will help reduce future impacts and the vulnerability of the County to this hazard.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help to make for a more disaster resilient community.

4.3.8. Dam Failure

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect or influence this hazard.

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 are usually 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 or 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

In general, there are three types of dams: concrete arch or hydraulic fill, earth and rockfill, and concrete gravity. Each type of dam has different failure characteristics. A concrete arch or hydraulic fill dam can fail almost instantaneously; the flood wave builds up rapidly to a peak then gradually declines. An 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. A concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

The CA DWR Division of Safety of Dams (DSOD) has jurisdiction over impoundments that meet certain capacity and height criteria. Embankments that are less than six feet high and impoundments that can store less than 15 acre-feet are non-jurisdictional. Additionally, dams that are less than 25 feet high can impound up to 50 acre-feet without being jurisdictional. FEMA and CA DWR DSOD assign hazard potential classifications to dams within the State that provides information on the potential impact should a dam fail. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. FEMA categorizes the downstream hazard potential into three categories in increasing severity: Low, Significant, and High. DSOD adds a fourth category of Extremely High. Dams are classified in these four categories that identify the potential hazard to life and property:

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

Location and Extent

According to data provided by Cal DWR, DSOD, the US Army Corps of Engineers (USACE), and the National Inventory of Dams (NID), there are 24 dams in Madera County constructed for flood control, storage, electrical generation, and recreational purposes. Of these, 2 are rated as extremely high, 9 rated as High Hazard, 2 as Significant Hazard, and 8 as Low Hazard. In addition to these dams located within Madera County, there are 6 other dams (4 Extremely High, 1 High Hazard, 1 Significant Hazard, and 0 Low Hazard) outside the County (located in Fresno County) with the potential to affect people and property in Madera County. All 6 of the extremely high dams, 8 of the 10 high hazard dams (Big Creek No. 6 and Friant were unavailable) and, and 2 of the 3 significant hazard dams (Black Hawk was unavailable) had available inundation mapping. There is no inundation data available for any of the low hazard dams. Figure 4-68 identifies the dams that have inundation areas located in the Madera County Planning Area. Table 4-57 gives information on each of the dams in the County, and the dams outside the County that could affect areas in Madera County.

Figure 4-68 Madera County Dam Inventory (Including Dams from Outside the County)

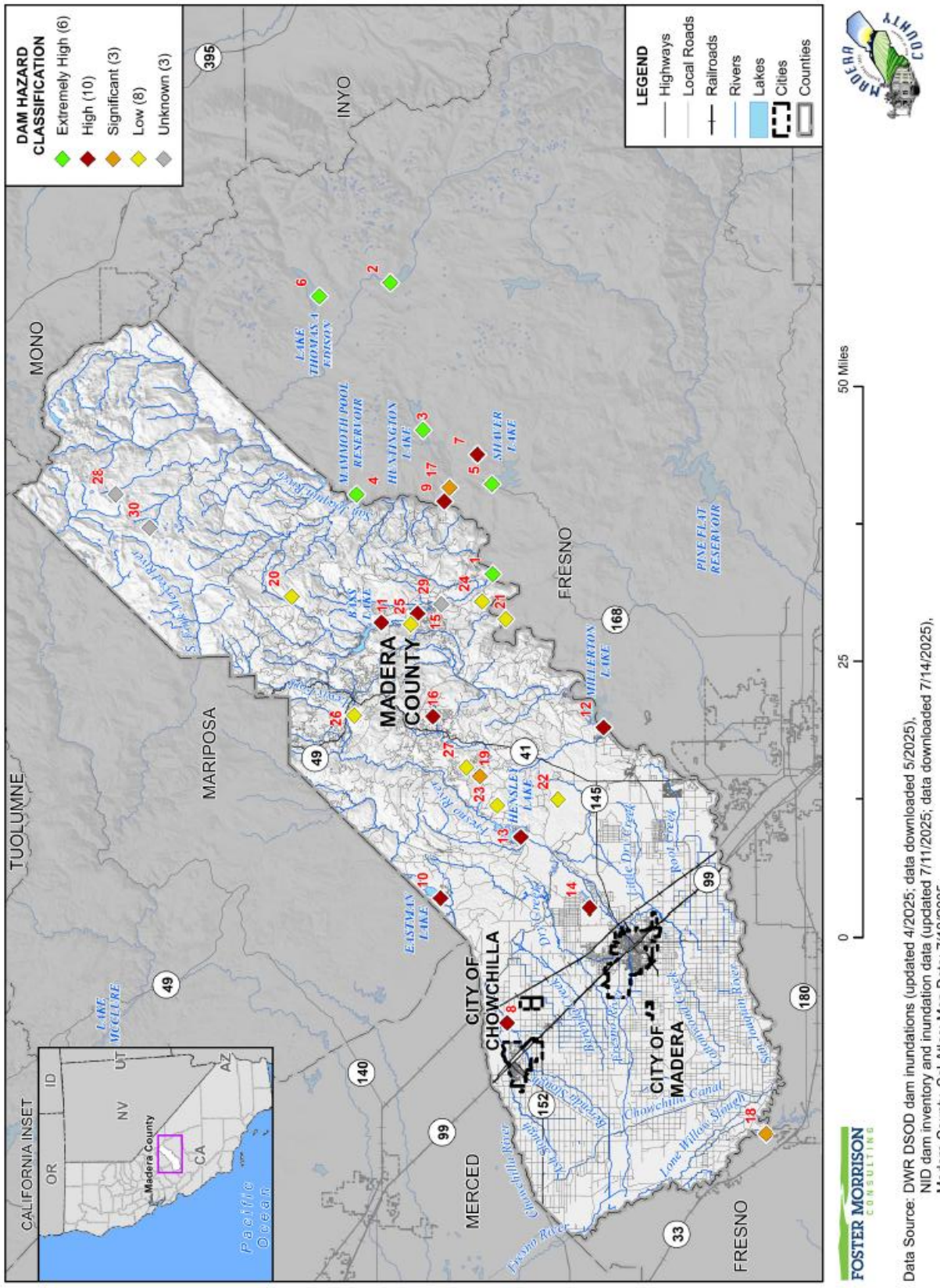


Figure 4-69 Dam Hazard Map Legend

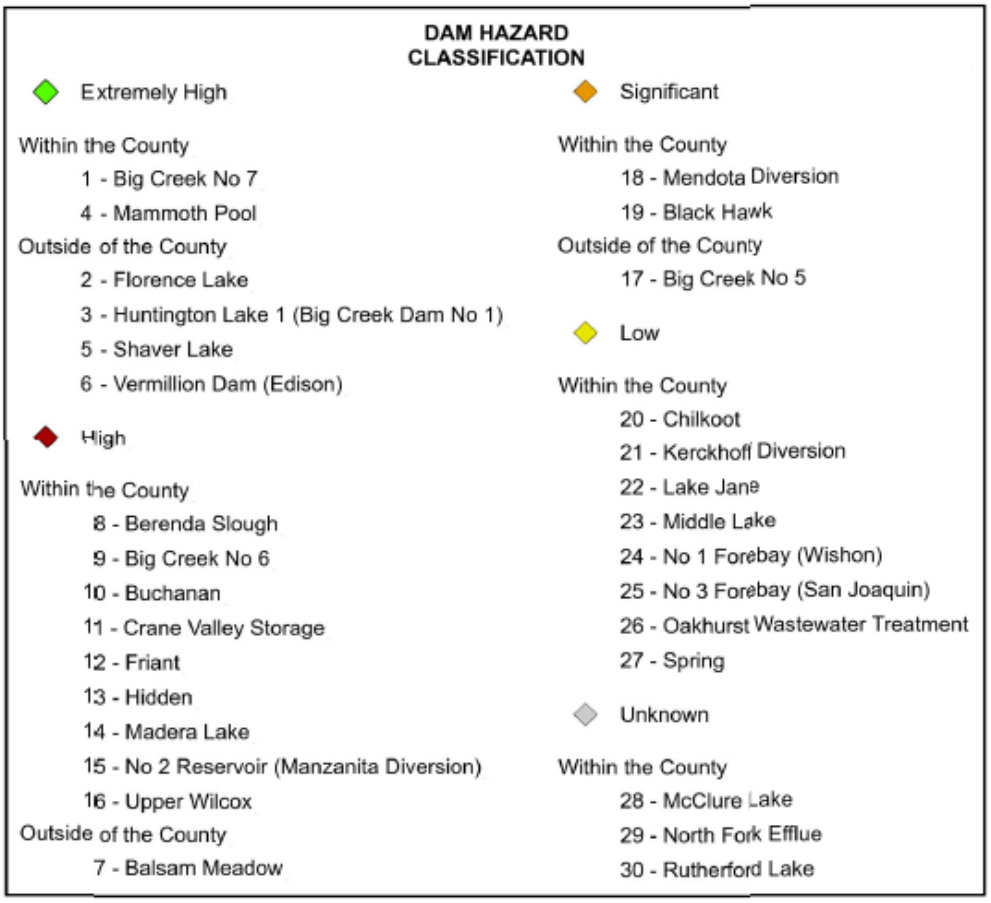


Table 4-57 Madera County – Dam Inventory (both Inside and Outside the County)

Dam Number	Name	Hazard Classification	Source County	Dam Type	Owner	Structural Height (ft)	Maximum Storage (acre-ft)	Map Location/ Mapped Inundation
1	Big Creek No 7	Extremely High	Madera	Constant Radius Arch	South California Edison	233	35,000	Y/Y
2	Florence Lake	Extremely High	Fresno	Multiple Arch	South California Edison	149	64,406	Y/Y
3	Huntington Lake 1 (Big Creek Dam No 1)	Extremely High	Fresno	Gravity	South California Edison	170	88,834	Y/Y
4	Mammoth Pool	Extremely High	Madera	Earth	South California Edison	406	123,000	Y/Y

Dam Number	Name	Hazard Classification	Source County	Dam Type	Owner	Structural Height (ft)	Maximum Storage (acre-ft)	Map Location/ Mapped Inundation
5	Shaver Lake	Extremely High	Fresno	Gravity	South California Edison	180	135,283	Y/Y
6	Vermillion Dam (Edison)	Extremely High	Fresno	Earth	South California Edison	167	125,000	Y/Y
7	Balsam Meadow	High	Fresno	Rockfill	South California Edison	127	2,040	Y/Y
8	Berenda Slough	High	Madera	Earth	Chowchilla Water District	21	2,450	Y/Y
9	Big Creek No 6	High	Madera	Concrete Arch	South California Edison	140	993	Y/N
10	Buchanan	High	Madera	Earth/ Rockfill	–	20	105	Y/Y
11	Crane Valley Storage	High	Madera	Hydraulic Fill	Pacific Gas and Electric	152	45,410	Y/Y
12	Friant	High	Madera	Concrete	US Bureau of Reclamation	319	520,528	Y/N
13	Hidden	High	Madera	Earth	USACE	184	116,727	Y/Y
14	Madera Lake	High	Madera	Earth	Madera Irrigation District	31	2,300	Y/Y
15	No 2 Reservoir (Manzanita Diversion)	High	Madera	Concrete	–	28	164	Y/Y
16	Upper Wilcox	High	Madera	Earth	Private	48	200	Y/Y
17	Big Creek No 5	Significant	Fresno	Concrete Radius Arch	South California Edison	75	100	Y/Y
18	Mendota Diversion	Significant	Madera	Flashboard and Buttress	Central California Irrigation District	23	3,000	Y/Y
19	Black Hawk	Significant	Madera	Earth	Private	45	740	Y/N
20	Chilkoot	Low	Madera	Earth	Pacific Gas and Electric	10	308	Y/N
21	Kerckhoff Diversion	Low	Madera	Earth	Pacific Gas and Electric	106	4,200	Y/N
22	Lake Jane	Low	Madera	Earth	Private	37	182	Y/N
23	Middle Lake	Low	Madera	Earth	Private	26	74	Y/N

Dam Number	Name	Hazard Classification	Source County	Dam Type	Owner	Structural Height (ft)	Maximum Storage (acre-ft)	Map Location/ Mapped Inundation
24	No 1 Forebay (Wishon)	Low	Madera	Earth	Pacific Gas and Electric	19	69	Y/N
25	No 3 Forebay (San Joaquin)	Low	Madera	Earth	Pacific Gas and Electric	39	20	Y/N
26	Oakhurst Wastewater Treatment	Low	Madera	Earth	Madera County Maintenance District 22A	60	110	Y/N
27	Spring	Low	Madera	Earth	Yosemite Lakes Owners Association	41	152	Y/N
28	McClure Lake	Unknown	Madera	–	–	–	–	Y/N
29	North Fork Effluent	Unknown	Madera	–	–	–	–	Y/N
30	Rutherford Lake	Unknown	Madera	–	–	–	–	Y/N

Source: DSOD/Cal OES/NID Dam Status 1/25, National Performance of Dams Program

*One Acre Foot=326,000 gallons

**Located outside of Madera County, but inundating areas inside Madera County

Once a list of dams was established, dam inundation layers were obtained from DSOD and Cal OES in GIS. extremely high, high, and significant hazard dams were analyzed for this LHMP due to the potential for these dams to cause loss of life and/or property damage in the Madera County Planning Area should a dam failure occur. All 6 of the extremely high dams, 8 of the 10 high hazard dams (Big Creek No. 6 and Friant were unavailable) and, and 2 of the 3 significant hazard dams (Black Hawk was unavailable) had available inundation mapping. Dams with an inundation area in the Madera County Planning Area are shown on Figure 4-70 for extremely high hazard dams, Figure 4-71 for high hazard dams, and Figure 4-72 for the significant hazard dams. As shown, only the unincorporated County has areas located in the extremely high hazard dam inundation areas. The high hazard dam inundation zones are located in the unincorporated County, as well as in Chowchilla and Madera. Significant hazard dam inundation zones are located in the unincorporated County. Geographic flood extents for the dams shown on the dam inundation maps are detailed in Table 4-58. Information on the dam hazard extents by jurisdiction can be found in their respective annexes to this Plan.

Figure 4-70 Madera County Planning Area – Extremely High Hazard Dam Inundation Areas

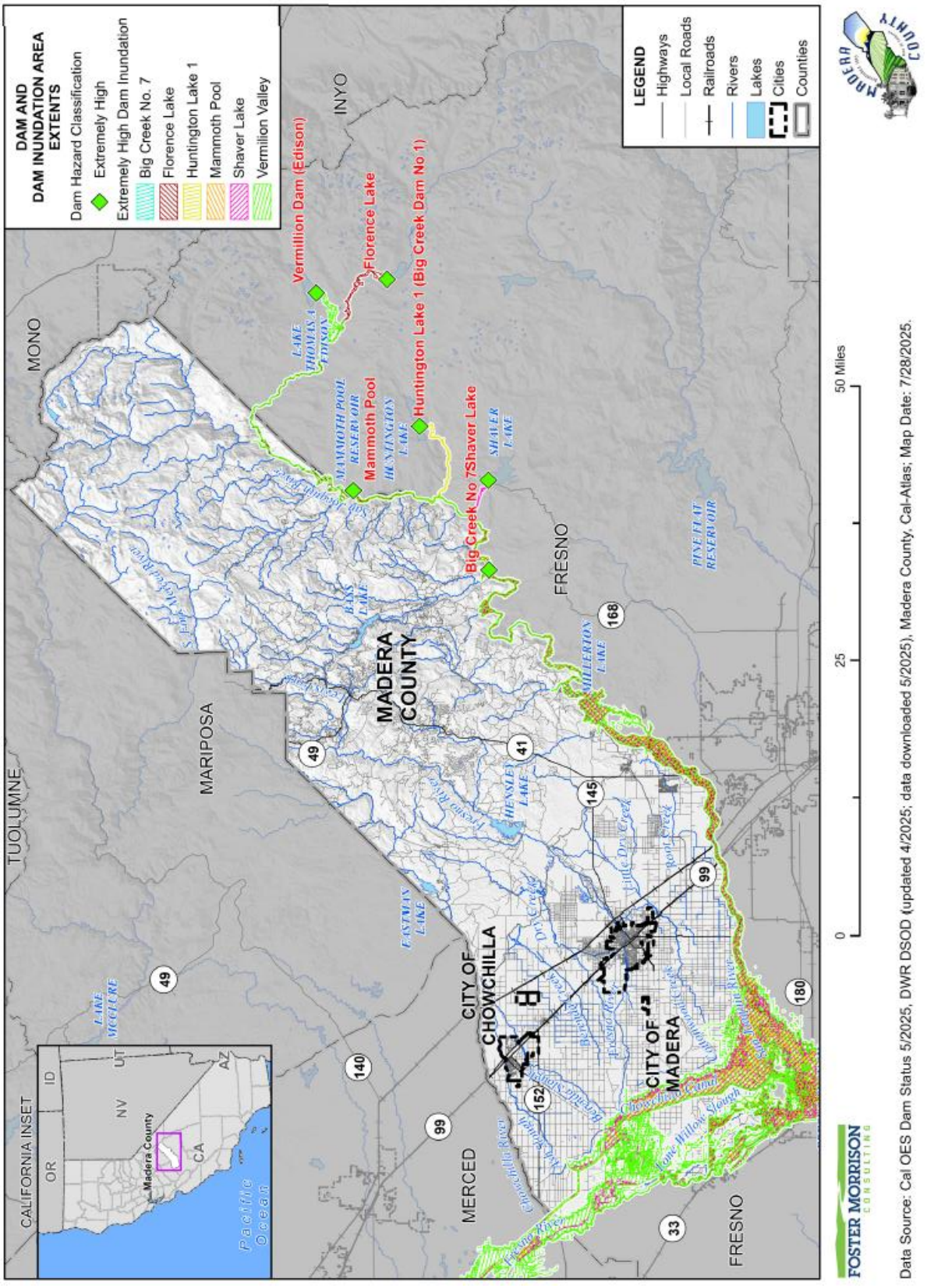


Figure 4-71 Madera Planning Area – High Hazard Dam Inundation Areas

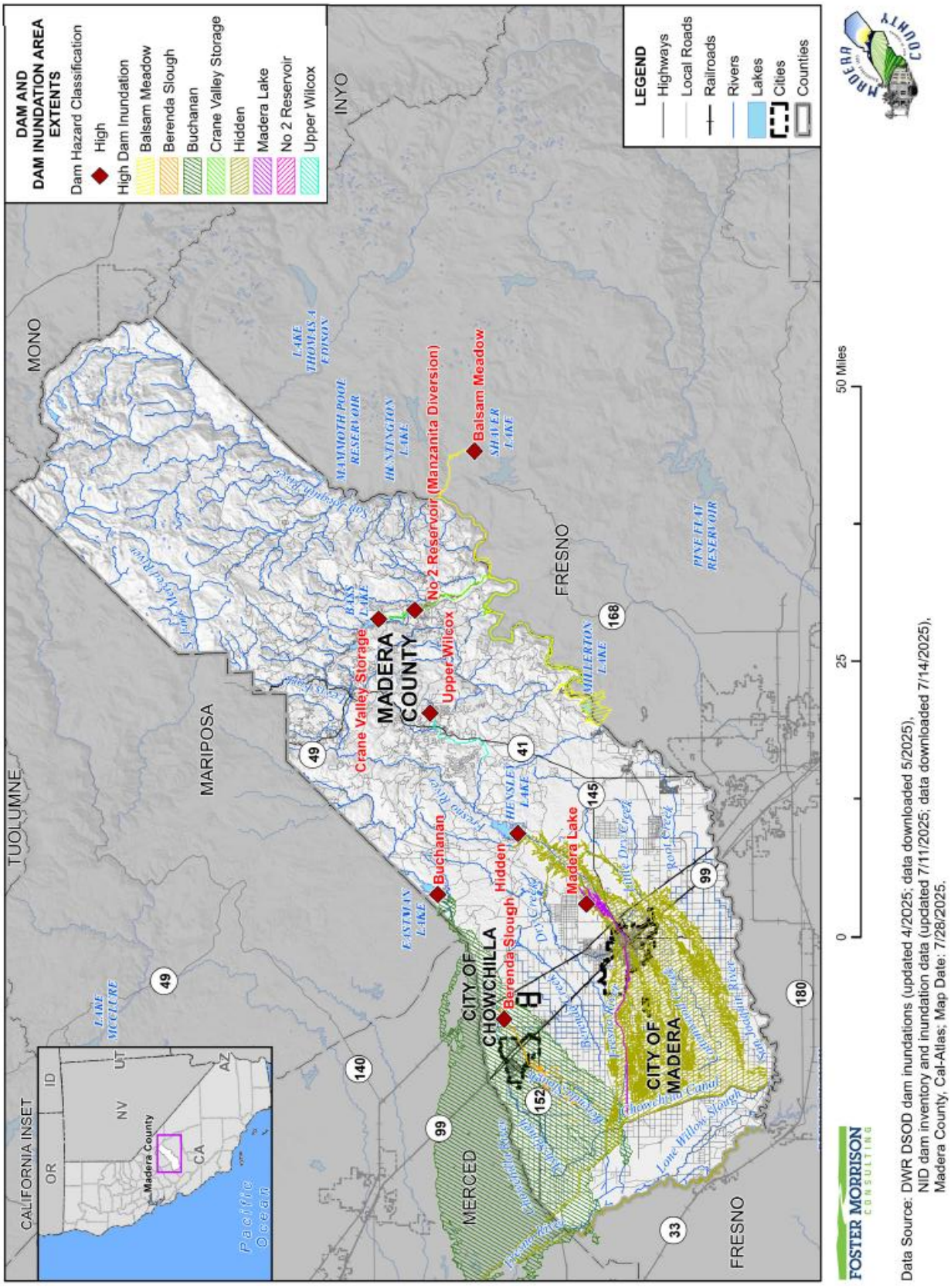


Figure 4-72 Madera Planning Area – Significant Hazard Dam Inundation Areas

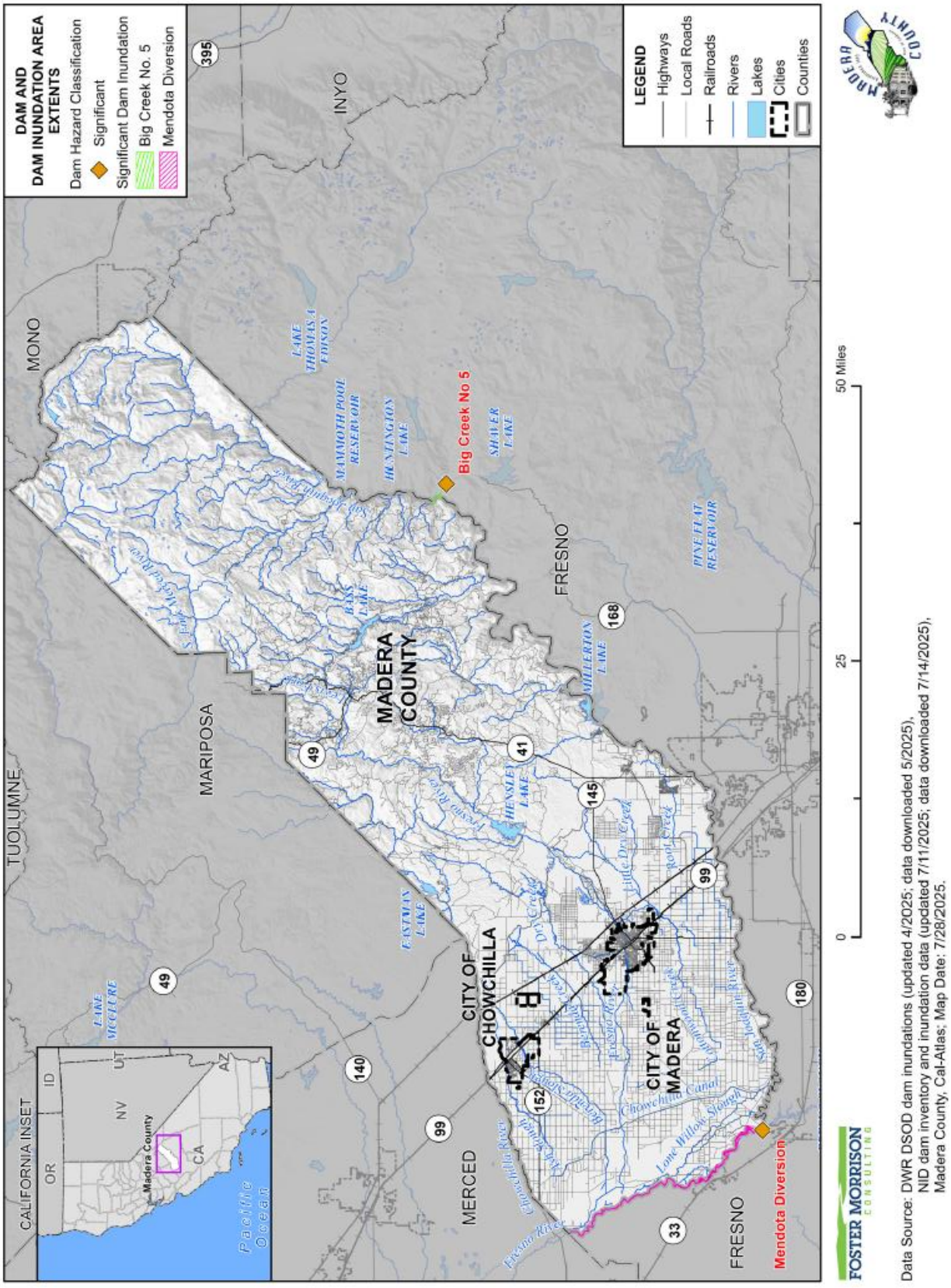


Table 4-58 Madera County Planning Area – Geographical Dam Inundation Extents

Dam Hazard Class / Jurisdiction / Dam Inundation Area	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Extremely High Hazard Dams						
Unincorporated Madera County						
Big Creek No. 7	6,538	0.5%	1,050	0.2%	5,487	0.7%
Florence Lake	10,827	0.8%	3,181	0.6%	7,646	1.0%
Huntington Lake 1	29,856	2.2%	18,992	3.5%	10,864	1.4%
Mammoth Pool	37,966	2.8%	25,285	4.7%	12,681	1.6%
Shaver Lake	40,415	3.0%	28,059	5.2%	12,356	1.5%
Vermilion Valley	65,482	4.9%	49,824	9.2%	15,658	2.0%
High Hazard Dams						
City of Chowchilla						
Berenda Slough	78	1%	52	2%	26	1%
Buchanan	5,470	81%	3,385	100%	2,086	62%
City of Madera						
Hidden	8,303	78%	5,635	87%	2,669	64%
Madera Lake	124	1%	2	0.03%	122	3%
Unincorporated Madera County						
Balsam Meadow	2,684	0.2%	1	0.0002%	2,683	0.3%
Berenda Slough	798	0.1%	713	0.1%	84	0.01%
Buchanan	98,120	7.3%	91,303	16.9%	6,817	0.9%
Crane Valley Storage	2,431	0.2%	158	0.03%	2,273	0.3%
Hidden	107,949	8.1%	88,357	16.3%	19,592	2.5%
Madera Lake	1,431	0.1%	865	0.2%	567	0.1%
No 2 Reservoir	302	0.02%	12	0.002%	289	0.04%
Upper Wilcox	183	0.01%	115	0.02%	68	0.01%
Significant Hazard Dams						
Unincorporated Madera County						
Big Creek No. 5	19	0.001%	0	0.0%	19	0.002%

Dam Hazard Class / Jurisdiction / Dam Inundation Area	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Mendota Diversion	539	0.04%	378	0.1%	161	0.02%

Source: DSOD/ NID Dam Status 01/25

There is no scale with which to measure dam failure, only a scale to measure dam failure vulnerability based on size of dam and proximity to development. Dam failure may range from a small breach to a total failure. While a dam may fill slowly with runoff from winter storms, a dam break can have a very quick speed of onset. The duration of dam failure is not long – only as long as it takes to empty the reservoir of water the dam held back.

For dam overtopping, the speed of onset is somewhat slower than that of a dam break, and the duration is longer (as evidenced in the 2017 Oroville Dam event). The Madera County Planning Area would be affected for as long as the flood waters from the dam failure take to drain downstream.

Past Occurrences

Disaster Declaration History

There have been no disaster declarations related to dam failure in Madera County, as shown in Table 4-4.

NCDC Events

There have been no NCDC dam failure events in Madera County.

National Performance of Dams Program Events

The National Performance of Dams Program at Stanford University tracks dam failures. A search of the National Performance of Dams Program database showed no past dam failure events in Madera County.

Hazard Mitigation Planning Committee Events

No events of dam failure were noted to have occurred in Madera County (either since the 2018 LHMP or before it).

Likelihood of Future Occurrence

Unlikely—No dam failure events have occurred in the County. Further, based on historical data and input from the HMPC, it is unlikely that major dam failure event will occur in Madera County. There is concern that many of the State's older dams, including those in Madera County, could start experiencing problems associated with aging infrastructure and deferred maintenance issues.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and dam failure can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and Dam Failure

The 2023 California State Hazard Mitigation Plan noted that modeling described in California's Fourth Climate Change Assessment projects less frequent but more extreme daily precipitation. Year-to-year precipitation will become more volatile, and the number of dry years will increase by mid-century. As the climate continues to warm, atmospheric rivers will carry more moisture, and extreme precipitation may increase. Climate model projections show a tendency for the northern part of the State to become wetter. Increases in both precipitation and heat causing snow melt in areas upstream of dams could increase the potential for dam failure and uncontrolled releases in Madera County.

Vulnerability Assessment

Vulnerability—High

Dam failure flooding can occur as the result of a partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall and flooding. An earthquake event can also contribute to a dam failure. The primary danger associated with dam failure is the high velocity flooding of those properties downstream of the dam. A dam failure can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to dam 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. Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding.

The whole of the Planning Area has some measure of vulnerability to dam failure. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce the risk and vulnerability to this hazard.

General Concerns

There is a concern in the County that certain dams are in proximity to burn scar areas. These burn scars can often erode, causing sedimentation behind the dams. Sediment can cause a reduction in the reservoir

flood capacity. As the flood capacity is reduced, the likelihood of overfilling increases; this can increase overtopping, spilling, and wave damage to the dam. The USACE noted that sedimentation is a concern above Buchanan Dam. In Fiscal Year 2023, there was a budget package submitted for Buchanan Dam for sedimentation removal at an expected cost of $213,000. They noted this cost increases yearly.

Rodent Concerns

Rodent control near dams is another issue. Staff can't use poison. Environmental regulations make rodent control difficult and costly. Many endangered species are located in the eastern area of the County which makes rodent/pest control more challenging. There are exemptions for rodent/pest control for both water infrastructure (such as dams) during times of emergency or of heavy infestations that can cause damage.

Local concerns for each of the jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk from Dam Failure

Assets at risk from dam failure include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented below. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

Methodology (Parcels and Structures)

In order to analyze people and populations, structures, and critical facilities at risk in dam inundation areas, GIS was used to quantify those values. The 2024 Madera County Parcel/Assessor Data was provided by Madera County and was used as the basis for the inventory of assessed values for both improved and unimproved parcels within the Madera County Planning Area. The dam inundation areas, obtained from DSOD and NID, were then overlaid on the parcel layer. For the purposes of this analysis, if the dam inundation layer intersected any portion of a parcel polygon, the entire parcel was considered to be in the dam inundation area. The parcels were segregated and analyzed in this fashion for the entire Planning Area. This analysis was performed on extremely high and high hazard dam inundation areas only. No low hazard dam analysis was performed, as low hazard dams are not likely to cause significant impacts to the County Planning Area.

People and Populations

All people and populations located in dam inundation areas are vulnerable to dam failure. Certain vulnerable populations may be at increased risk to dam failure, especially during a large event with minimal advance notice. These vulnerable populations may include: the unhoused, those with limited mobility, and those that lack the resources to leave the area.

Madera County residents that live in these dam inundation areas are often the most vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant dam failure events. To further evaluate the impact to the Madera County Planning Area's residential populations located in these hazard areas, a separate analysis was performed to determine residential populations in the dam inundation areas. The DSOD and NID dam inundation areas were overlayed on the parcel layer and linked to Assessor Data. Those residential parcel centroids that intersect the dam inundation areas were counted and multiplied by the Census Bureau average household factors for each jurisdiction. This is shown in Table 4-59.

Table 4-59 Madera County Planning Area – Improved Residential Parcels and Population by Dam Inundation Area (Extremely High and High Hazard) and Jurisdiction

Dam Hazard Class/Jurisdiction/Dam Inundation Area	Improved Residential Parcels	Population
Extremely High Hazard Dams		
Unincorporated Madera County		
Big Creek No. 7	5	17
Florence Lake	28	94
Huntington Lake 1	40	134
Mammoth Pool	40	134
Shaver Lake	41	137
Vermillion Valley	41	137
High Hazard Dams		
Unincorporated Madera County		
Balsam Meadow	2	7
Berenda Slough	29	97
Buchanan	379	1,266
Crane Valley Storage	50	167
Hidden	1,874	6,259
Madera Lake	17	57
No 2 Reservoir	9	30
Upper Wilcox	78	261
City of Chowchilla		
Berenda Slough	0	0
Buchanan	3,735	12,512
City of Madera		
Hidden	14,074	47,870
Madera Lake	25	84
Significant Hazard Dams		
Unincorporated Madera County		

Dam Hazard Class/Jurisdiction/Dam Inundation Area	Improved Residential Parcels	Population
Big Creek No. 5	0	0
Mendota Diversion	28	94

Source: NID, DSOD, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35); City of Madera (3.38); Unincorporated Madera County (3.34).

Structures

Many structures in the Madera County Planning Area have some measure of risk to dam failure. Dam failure flooding can affect the built environment of many locations in the Madera County Planning Area. Structures in dam inundation areas are at risk and depending on flood depths, can range from slight damage to total inundation. Analysis by extremely high, high hazard, and significant hazard dams follows.

Extremely High Hazard Dam Analysis

Parcel counts, land, improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values that fall within each extremely high hazard dam inundation areas in the Planning Area are presented below by dam. For the extremely high hazard dam inundation areas, only the unincorporated County is affected. Analysis is presented in the following tables.

- Table 4-60 shows the summary counts and values of parcels in all extremely high hazard dam inundation areas in the Madera County Planning Area. It should be noted that only the unincorporated County is affected by extremely high hazard dam inundations.
- Table 4-61 shows the count and value of parcels in the Big Creek #7 Dam inundation area detailed by property use for the unincorporated County.
- Table 4-62 shows the count and value of parcels in the Florence Lake Dam inundation area detailed by property use for the unincorporated County.
- Table 4-63 shows the count and value of parcels in the Huntington Lake 1 Dam inundation area detailed by property use for the unincorporated County.
- Table 4-64 shows the count and value of parcels in the Mammoth Pool Dam inundation area detailed by property use for the unincorporated County.
- Table 4-65 shows the count and value of parcels in the Shaver Lake Dam inundation area detailed by property use for the unincorporated County.
- Table 4-66shows the count and value of parcels in the Vermillion Dam inundation area detailed by property use for the unincorporated County.

Table 4-60 Madera County Planning Area– Summary Counts and Values of Parcels and Structures in Extremely High Hazard Dam Inundation Areas

Dam Inundation Areas	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Big Creek No. 7	284	109	$75,423,681	$33,644,207	$2,878,069	$31,603,631	$143,549,588

Dam Inundation Areas	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Florence Lake	460	226	$134,344,845	$153,494,021	$19,287,410	$149,175,387	$456,301,663
Huntington Lake 1	663	370	$212,528,541	$244,207,877	$28,179,442	$238,185,511	$723,101,371
Mammoth Pool	734	415	$229,813,469	$263,548,832	$28,994,913	$257,526,466	$779,883,680
Shaver Lake	755	444	$240,055,130	$294,291,523	$30,881,752	$288,232,362	$853,460,767
Vermilion Valley	902	525	$268,813,062	$319,396,755	$34,562,191	$313,337,594	$936,109,602

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-61 Unincorporated Madera County – Count and Value of Parcels and Structures in Big Creek #7 Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Big Creek No. 7							
Agricultural	163	98	$63,021,139	$29,380,480	$2,726,107	$29,380,480	$124,508,206
Commercial	8	1	$8,981,088	$52,020	$0	$52,020	$9,085,128
Government	81	2	$574,360	$32,504	$0	$32,504	$639,368
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	12	5	$2,505,822	$4,081,152	$151,962	$2,040,576	$8,779,512
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	15	3	$336,031	$98,051	$0	$98,051	$532,133
Unknown	5	0	$5,241	$0	$0	$0	$5,241
Big Creek No. 7 Total	**284**	**109**	**$75,423,681**	**$33,644,207**	**$2,878,069**	**$31,603,631**	**$143,549,588**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-62 Unincorporated Madera County – Count and Value of Parcels and Structures in Florence Lake Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Florence Lake							
Agricultural	261	192	$120,781,358	$144,674,177	$19,079,269	$144,674,177	$429,208,981

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Commercial	8	1	$8,981,088	$52,020	$0	$52,020	$9,085,128
Government	125	2	$574,360	$32,504	$0	$32,504	$639,368
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	35	28	$3,560,548	$8,637,269	$208,141	$4,318,635	$16,724,593
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	21	3	$414,953	$98,051	$0	$98,051	$611,055
Unknown	10	0	$32,538	$0	$0	$0	$32,538
Florence Lake Total	**460**	**226**	**$134,344,845**	**$153,494,021**	**$19,287,410**	**$149,175,387**	**$456,301,663**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-63 Unincorporated Madera County – Count and Value of Parcels and Structures in Huntington Lake 1 Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Huntington Lake 1							
Agricultural	408	324	$196,520,992	$231,980,570	$27,971,301	$231,980,570	$688,453,433
Commercial	8	1	$8,981,088	$52,020	$0	$52,020	$9,085,128
Government	147	2	$574,360	$32,504	$0	$32,504	$639,368
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	57	40	$5,991,273	$12,044,732	$208,141	$6,022,366	$24,266,512
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	23	3	$428,290	$98,051	$0	$98,051	$624,392
Unknown	19	0	$32,538	$0	$0	$0	$32,538
Huntington Lake Total	**663**	**370**	**$212,528,541**	**$244,207,877**	**$28,179,442**	**$238,185,511**	**$723,101,371**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-64 Unincorporated Madera County – Count and Value of Parcels and Structures in Mammoth Pool Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Mammoth Pool							
Agricultural	457	368	$213,741,662	$251,314,491	$28,786,772	$251,314,491	$745,157,416
Commercial	8	1	$8,981,088	$52,020	$0	$52,020	$9,085,128
Government	159	2	$574,360	$32,504	$0	$32,504	$639,368
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	62	40	$6,011,340	$12,044,732	$208,141	$6,022,366	$24,286,579
Right of Way	1	0	$1	$0	$0	$0	$1
Utilities	26	4	$472,480	$105,085	$0	$105,085	$682,650
Unknown	20	0	$32,538	$0	$0	$0	$32,538
Mammoth Pool Total	**734**	**415**	**$229,813,469**	**$263,548,832**	**$28,994,913**	**$257,526,466**	**$779,883,680**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-65 Unincorporated Madera County – Count and Value of Parcels and Structures in Shaver Lake Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Shaver Lake							
Agricultural	489	396	$223,933,230	$281,983,591	$30,673,611	$281,983,591	$818,574,023
Commercial	8	1	$8,981,088	$52,020	$0	$52,020	$9,085,128
Government	145	2	$574,360	$32,504	$0	$32,504	$639,368
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	64	41	$6,061,432	$12,118,323	$208,141	$6,059,162	$24,447,058
Right of Way	2	0	$2	$0	$0	$0	$2
Utilities	26	4	$472,480	$105,085	$0	$105,085	$682,650
Unknown	20	0	$32,538	$0	$0	$0	$32,538
Shaver Lake Total	**755**	**444**	**$240,055,130**	**$294,291,523**	**$30,881,752**	**$288,232,362**	**$853,460,767**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-66 Unincorporated Madera County – Count and Value of Parcels and Structures in Vermillion Valley Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Vermillion Valley							
Agricultural	587	477	$252,579,942	$307,088,823	$34,354,050	$307,088,823	$901,111,638
Commercial	8	1	$8,981,088	$52,020	$0	$52,020	$9,085,128
Government	181	2	$574,360	$32,504	$0	$32,504	$639,368
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	69	41	$6,089,201	$12,118,323	$208,141	$6,059,162	$24,474,827
Right of Way	2	0	$2	$0	$0	$0	$2
Utilities	29	4	$555,929	$105,085	$0	$105,085	$766,099
Unknown	25	0	$32,540	$0	$0	$0	$32,540
Vermillion Valley Total	**902**	**525**	**$268,813,062**	**$319,396,755**	**$34,562,191**	**$313,337,594**	**$936,109,602**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

High Hazard Dam Analysis

Parcel counts, land, improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values that fall within each high hazard dam inundation areas in the Planning Area are presented below by dam. For the high hazard dam inundation areas, both the cities of Chowchilla (Berenda Slough and Buchanan) and Madera (Hidden and Madera Lake) as well as the unincorporated County are affected. The results are presented in tables below:

- Table 4-67 shows the shows the summary counts and values of parcels in all high hazard dam inundation areas in the Madera County Planning Area. This table includes summaries for both the unincorporated County, as well as the cities of Chowchilla and Madera. Detail tables for the cities can be found in their respective annexes to this LHMP Update.
- Table 4-68 shows the count and value of parcels in the Balsam Meadow Dam inundation area detailed by property use for the unincorporated County.
- Table 4-69 shows the count and value of parcels in the Berenda Slough Dam inundation area detailed by property use for the unincorporated County.
- Table 4-70 shows the count and value of parcels in the Buchanan Dam inundation area detailed by property use for the unincorporated County.
- Table 4-71 shows the count and value of parcels in the Crane Valley Storage Dam inundation area detailed by property use for the unincorporated County.
- Table 4-72 shows the count and value of parcels in the Hidden Dam inundation area detailed by property use for the unincorporated County.

- Table 4-73 shows the count and value of parcels in the Madera Lake Dam inundation area detailed by property use for the unincorporated County.
- Table 4-74 shows the count and value of parcels in the No. 2 Reservoir Dam inundation area detailed by property use for the unincorporated County.
- Table 4-75 shows the count and value of parcels in the Upper Wilson Dam inundation area detailed by property use for the unincorporated County.

Detailed information for the cities is presented in their respective annexes to this Base Plan.

Table 4-67 Madera County Planning Area – Summary Counts and Values of Parcels and Structures in High Hazard Dam Inundation Areas by Jurisdiction

Dam Inundation Areas	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Balsam Meadow	64	3	$835,308	$1,127,671	$0	$564,910	$2,527,889
Berenda Slough*	228	207	$46,593,831	$42,185,661	$6,944,653	$39,050,622	$134,774,767
Buchanan*	7,022	5,807	718,845,432	1,310,104,634	155,823,318	930,213,788	3,114,987,172
Crane Valley Storage	211	88	$8,050,075	$16,190,465	$111,632	$13,054,612	$37,406,784
Hidden**	20,495	18,346	1,480,960,052	4,059,637,674	420,891,384	2,753,784,431	8,715,273,541
Madera Lake**	192	97	$25,507,415	$23,000,583	$414,416	$20,368,106	$69,290,520
No 2 Reservoir	66	14	$1,985,781	$2,402,841		$2,020,859	$6,409,481
Upper Wilcox	126	96	$11,076,380	$25,765,884	$241,442	$17,498,037	$54,581,743

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

* Affect the City of Chowchilla and the unincorporated County

** Affect the City of Madera and the unincorporated County

Table 4-68 Unincorporated Madera County – Count and Value of Parcels and Structures in Balsam Meadows Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Balsam Meadow							
Agricultural	14	1	$646,910	$2,149	$0	$2,149	$651,208
Commercial	0	0	$0	$0	$0	$0	$0
Government	42	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Recreational	0	0	$0	$0	$0	$0	$0
Residential	4	2	$188,398	$1,125,522	$0	$562,761	$1,876,681
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	2	0	$0	$0	$0	$0	$0
Unknown	2	0	$0	$0	$0	$0	$0
Balsam Meadow Total	**64**	**3**	**$835,308**	**$1,127,671**	**$0**	**$564,910**	**$2,527,889**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-69 Unincorporated Madera County – Count and Value of Parcels and Structures in Berenda Slough Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Berenda Slough							
Agricultural	168	162	$36,335,789	$33,757,580	$6,412,511	$33,757,580	$110,263,460
Commercial	2	2	$192,665	$665,805	$510,140	$665,805	$2,034,415
Government	5	0	$6,326	$0	$0	$0	$6,326
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	29	29	$3,367,752	$6,505,362	$0	$3,252,681	$13,125,795
Right of Way		0	$0	$0	$0	$0	$0
Utilities	1	1	$227,243	$138,984	$0	$138,984	$505,211
Unknown	1	0	$0	$0	$0	$0	$0
Berenda Slough Total	**206**	**194**	**$40,129,775**	**$41,067,731**	**$6,922,651**	**$37,815,050**	**$125,935,207**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-70 Unincorporated Madera County – Count and Value of Parcels and Structures in Buchanan Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Buchanan							
Agricultural	1,527	1,386	$389,799,417	$361,906,617	$54,403,637	$361,906,617	$1,168,016,288

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Commercial	36	26	$3,832,508	$7,800,354	$4,502,257	$7,800,354	$23,935,473
Government	70	0	$6,694	$0	$0	$0	$6,694
Industrial	1	1	$13,618	$48,841	$0	$73,262	$135,721
Institutional	4	4	$157,186	$1,998,680	$0	$1,998,680	$4,154,546
Recreational	0	0	$0	$0	$0	$0	$0
Residential	430	379	$38,517,000	$69,068,248	$368,800	$34,534,124	$142,488,172
Right of Way	3	0	$1	$0	$0	$0	$1
Utilities	4	1	$227,243	$138,984	$0	$138,984	$505,211
Unknown	16	0		$0	$0	$0	$0
Buchanan Total	**2,091**	**1,797**	**$432,553,667**	**$440,961,724**	**$59,274,694**	**$406,452,021**	**$1,339,242,106**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-71 Unincorporated Madera County – Count and Value of Parcels and Structures in Crane Valley Storage Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Crane Valley Storage							
Agricultural	25	9	$936,572	$1,009,104	$8,119	$1,009,104	$2,962,899
Commercial	36	26	$3,228,385	$8,336,124	$98,963	$8,336,124	$19,999,596
Government	62	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	3	2	$33,342	$547,847	$4,550	$547,847	$1,133,586
Recreational	1	1	$17,145	$25,684	$0	$25,684	$68,513
Residential	73	50	$3,834,631	$6,271,706	$0	$3,135,853	$13,242,190
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	8	0	$0	$0	$0	$0	$0
Unknown	3	0	$0	$0	$0	$0	$0
Crane Valley Storage Total	**211**	**88**	**$8,050,075**	**$16,190,465**	**$111,632**	**$13,054,612**	**$37,406,784**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-72 Unincorporated Madera County – Count and Value of Parcels and Structures in Hidden Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Hidden							
Agricultural	65	49	$36,306,886	$8,482,076	$34,995	$8,482,076	$53,306,033
Commercial	967	739	$167,770,672	$510,080,182	$39,225,619	$510,080,182	$1,227,156,655
Government	195	1	$4,393,793	$12,481	$0	$12,481	$4,418,755
Industrial	153	91	$31,277,156	$119,111,051	$58,301,574	$178,666,577	$387,356,358
Institutional	81	59	$3,317,957	$27,525,410	$132,915	$27,525,410	$58,501,692
Recreational	7	0	$1,705	$0	$0	$0	$1,705
Residential	14,916	14,074	$710,227,059	$2,554,544,543	$3,674,962	$1,277,272,272	$4,545,718,836
Right of Way	31	1	$83,614	$46,163	$0	$46,163	$175,940
Utilities	10	1	$96,652	$163,844	$2	$163,844	$424,342
Unknown	42	1	$1,746,582	$187,553	$0	$187,553	$2,121,688
Hidden Total	**16,467**	**15,016**	**$955,222,076**	**$3,220,153,303**	**$101,370,067**	**$2,002,436,557**	**$6,279,182,003**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-73 Unincorporated Madera County – Count and Value of Parcels and Structures in Madera Lake Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Madera Lake							
Agricultural	57	47	$18,142,869	$14,239,105	$414,414	$14,239,105	$47,035,493
Commercial	2	1	$341,658	$20,500	$0	$20,500	$382,658
Government	28	0	$4,555	$0	$0	$0	$4,555
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	22	17	$1,714,083	$2,884,389	$0	$1,442,195	$6,040,667
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	14	0	$1,460	$0	$0	$0	$1,460
Madera Lake Total	**124**	**65**	**$20,204,625**	**$17,143,994**	**$414,414**	**$15,701,800**	**$53,464,833**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-74 Unincorporated Madera County – Count and Value of Parcels and Structures in No. 2 Reservoir Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
No. 2 Reservoir							
Agricultural	57	47	$18,142,869	$14,239,105	$414,414	$14,239,105	$47,035,493
Commercial	2	1	$341,658	$20,500	$0	$20,500	$382,658
Government	28	0	$4,555	$0	$0	$0	$4,555
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	22	17	$1,714,083	$2,884,389	$0	$1,442,195	$6,040,667
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	14	0	$1,460	$0	$0	$0	$1,460
No. 2 Reservoir Total	**124**	**65**	**$20,204,625**	**$17,143,994**	**$414,414**	**$15,701,800**	**$53,464,833**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-75 Unincorporated Madera County – Count and Value of Parcels and Structures in Upper Wilson Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Upper Wilcox							
Agricultural	25	15	$3,787,110	$4,190,050	$16,238	$4,190,050	$12,183,448
Commercial	4	2	$827,029	$3,032,787	$0	$3,032,787	$6,892,603
Government	1	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	1	1	$313,776	$2,007,352	$225,204	$2,007,352	$4,553,684
Residential	93	78	$6,148,465	$16,535,695	$0	$8,267,848	$30,952,008
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	2	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
Upper Wilcox Total	**126**	**96**	**$11,076,380**	**$25,765,884**	**$241,442**	**$17,498,037**	**$54,581,743**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Significant Hazard Dam Analysis

Parcel counts, land, improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values that fall within each mapped significant hazard dam inundation areas in the Planning Area are presented below by dam. For the significant hazard dam inundation areas, only the unincorporated County is affected. The results are presented Table 4-76 and Table 4-77:

Table 4-76 Unincorporated Madera County Planning Area – Count and Value of Parcels in Significant Hazard Dam Inundation Areas

Dam Inundation Areas	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Big Creek No. 5	2	0	$0	$0	$0	$0	$0
Mendota Diversion	51	28	$12,642,946	$5,585,024	$3,184	$5,585,024	$23,816,178

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Table 4-77 Unincorporated Madera – Count and Value of Parcels in Big Creek No. 5 Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Big Creek No. 5							
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	0	0	$0	$0	$0	$0	$0
Government	2	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0	$0
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
Big Creek No. 5 Total	**2**	**0**	**$0**	**$0**	**$0**	**$0**	**$0**

Source: DSOD/NID, 2024 Madera County Parcel/Assessor Data

Critical Facilities and Infrastructure

Dam failure presents a threat to critical facilities and infrastructure. For example, transportation routes, including bridges and highways, are vulnerable to dam inundation and have the potential to be unpassable and even destroyed, creating isolation and supply chain issues. Those critical facilities that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. The following GIS analysis identifies critical facilities and infrastructure at risk to dam inundation flooding, separated out by extremely high hazard and high hazard dams.

Extremely High Hazard Dam Inundation Analysis

Dam failure presents a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the Madera County Planning Area to determine critical facilities in extremely high hazard dam inundation areas. Using GIS, the DSOD/NID extremely high hazard dam inundation areas were overlayed on the critical facility GIS layer. No critical facilities fall in the extremely hazard dam inundation areas; as such, no mapping or tabular analysis is presented.

High Hazard Dam Inundation Analysis

Dam failure presents a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the Madera County Planning Area to determine critical facilities in high hazard dam inundation areas. Using GIS, the DSOD/NID high hazard dam inundation areas were overlayed on the critical facility GIS layer. Figure 4-73 shows critical facilities, as well as the high hazard dam inundation areas. Table 4-78 details critical facilities by high hazard dam inundation areas by facility type and count for the Planning Area. Details of critical facility category, type, name and address by high hazard dam inundation areas are listed in Appendix F. As shown, critical facilities that fall in the high hazard dam inundation area are located in the City of Chowchilla, the City of Madera, or the unincorporated County.

Figure 4-73 Madera County Planning Area – Critical Facilities in High Hazard Dam Inundation Areas

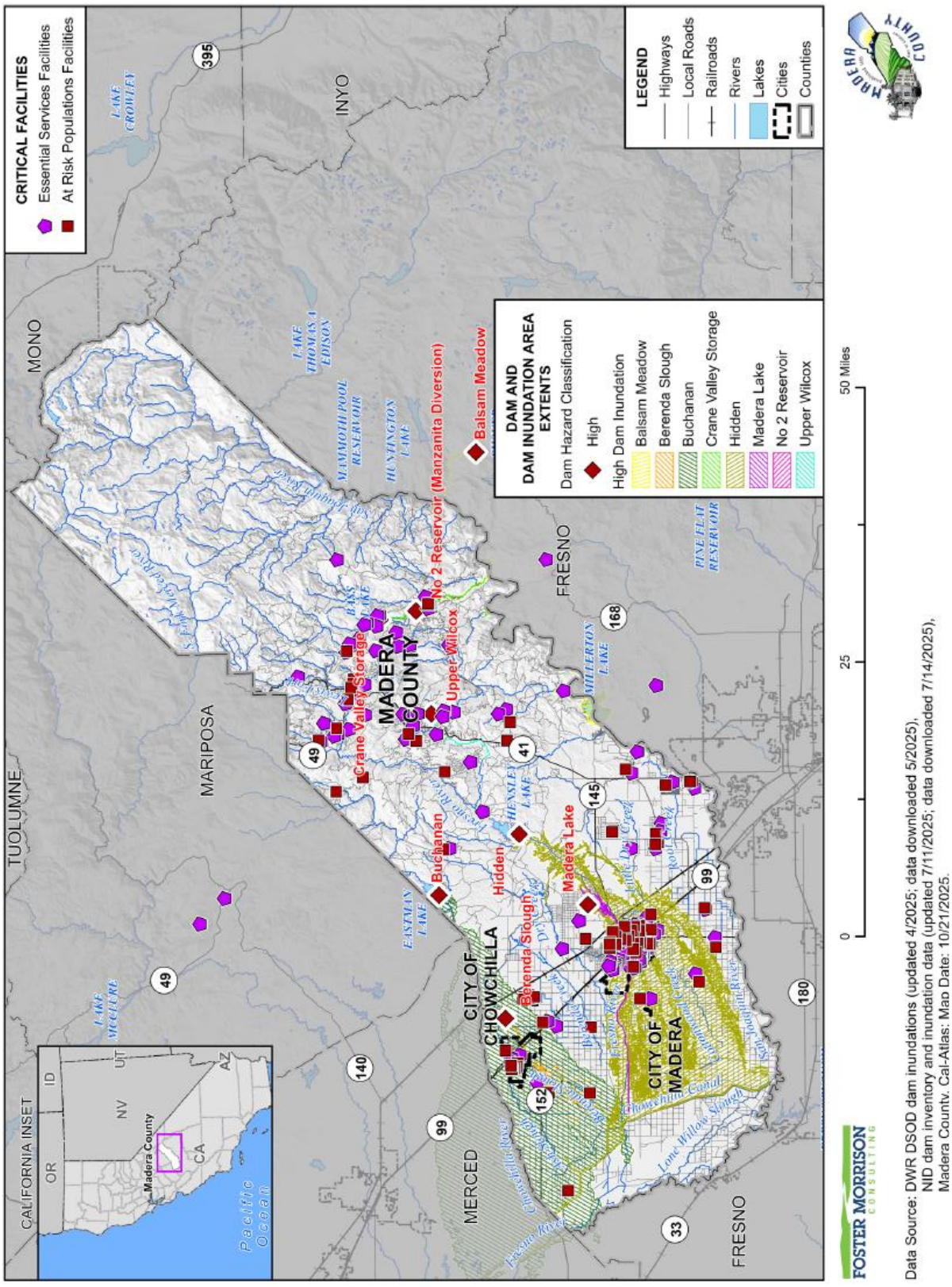


Table 4-78 Madera County Planning Area – Critical Facilities in High Hazard Dam Inundation Areas by Jurisdiction, Category, and Facility Type

Jurisdiction / High Hazard Dam Inundation Area	Jurisdiction / High Hazard Dam Inundation Area / Critical Facility Category / Type	Facility Count
City of Chowchilla		
Essential Services Facilities	Communications	2
	Community Center	1
	Community Services	2
	Fire Station	2
	Public Safety Facility / 911 PSAP	1
	Public Utility Plant Facilities	1
	Essential Services Facilities Total	**9**
At Risk Populations Facilities	Health / Medical	2
	Jail / Prison	1
	School	5
	At Risk Populations Facilities Total	**8**
City of Chowchilla Total		**17**
City of Madera		
Essential Services Facilities	Cogeneration Power	3
	Communications	5
	Community Services	6
	Fire Command Center	1
	Fire Station	3
	Health / Medical	1
	Jail / Prison	1
	Pavilion	1
	Police	3
	Wastewater Lift Station	23
	Water Treatment	42
	Essential Services Facilities Total	**89**
At Risk Populations Facilities	Community Church	1
	Community Recreation Center	2
	School	21
	At Risk Populations Facilities Total	**24**
City of Madera Total		**113**

Jurisdiction / High Hazard Dam Inundation Area	Jurisdiction / High Hazard Dam Inundation Area / Critical Facility Category / Type	Facility Count
Unincorporated Madera County		
Essential Services Facilities	Community Center	2
	Drinking Water Infrastructure	5
	Sanitary Sewer System Infrastructure	4
	Essential Services Facilities Total	**11**
At Risk Populations Facilities	School	12
	At Risk Populations Facilities Total	**12**
Unincorporated Madera County Total		**23**
Grand Total		**153**

Source: DSOD/NID; Madera County GIS

Significant Hazard Dam Inundation Analysis

Dam failure present a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the Madera County Planning Area to determine critical facilities in significant hazard dam inundation areas. Using GIS, the Cal OES/DSOD significant hazard dam inundation areas were overlayed on the critical facility GIS layer. No facilities fall in the significant hazard dam inundation areas; as such, no mapping or tabular analysis is presented.

Natural, Historic, and Cultural Resources

A major dam failure event and associated flooding could have a devastating impact on the Madera County Planning Area. Large flood events can affect all natural, historic, and cultural resources that lie in the dam inundation areas. There are a number of ways floodwaters associated with a dam failure event can impact natural resources and the environment. Wildlife habitats can be destroyed by floodwaters. Contaminated floodwater can pollute rivers and habitats. Silt and sediment can destroy natural areas. Riverbanks and natural levées can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survive the initial flood may die due to being inundated with water. Historic structures and cultural resources may also be significantly affected and even destroyed. Generally, the impacts are associated with damage to these structures within the inundated areas Other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged, and lost during extreme flood events.

FEMA NRI Hazard Vulnerability Assessment

Dam failure is not an NRI hazard and thus has no data to present.

Impacts from Dam Failure

Impacts to the Madera County Planning Area from dam failure flooding could be extensive and widespread and include loss of life and injury, flooding and damage to property and structures, damage to critical facilities and infrastructure, loss of natural resources, and all other flood related impacts. Additionally, mass evacuations and associated economic losses can also be significant.

Other impacts associated with dam failure include landslides, bank erosion, and destruction of habitat. Dam failures can cause downstream flooding and can transport large volumes of sediment and debris and contaminants from the floodwaters. Other environmental impacts can include contamination from septic system failures and releases of contaminants from hazardous materials facilities, contamination of potable water supplies; changes in configurations of streams; loss of wildlife habitats; and degradation of wetlands. A large dam failure event could have significant and catastrophic impacts.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future rain and storm conditions and associated impacts and vulnerability of the County to dam failure.
- Population growth in Madera County is expected to slowly continue until 2040 then decline slowly. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-74 and Figure 4-75 below). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Additional growth within the dam inundation areas of the County would place additional populations at risk to dam failure. Additional population growth would likely bring continued diversity to the County. Vulnerable population groups could face disproportionate effects from a dam failure and should be planned for. These changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth, continued planning for future hazard conditions, and the nature and extent of a dam failure event.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. Locating new development, structures, and critical facilities and infrastructure within or near areas of dam failure risk may put

additional development at risk. However, County building codes are in effect to partially reduce this risk and should be updated as necessary to continue to address future dam failure conditions. Thus, depending on the location of new development, the dam that fails, and the nature and extent of the dam failure event, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the County to this hazard.

Future Development

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help to make for a more resilient community. Although new growth and development corridors would fall in the area flooded by a dam failure, given the limited potential of total dam failure and the large area that a dam failure would affect, development in the dam inundation area will continue to occur.

GIS Analysis

Madera County provided 14 future development areas which were used as the basis for the inventory of future development for the unincorporated County. These were mapped in GIS for both extremely high hazard and high hazard dam inundation areas. Analysis is presented for both the extremely high hazard and high hazard dam inundation areas:

- Figure 4-74 shows the locations of the future development areas overlayed on the extremely high hazard dam inundation areas. Six dams intersect the future development areas. Future development affected by Big Creek No. 7 is detailed in Table 4-79, Florence Lake is detailed in Table 4-80, Huntington Lake 1 is detailed in Table 4-81, Mammoth Pool is detailed in Table 4-82, Shaver Lake is detailed in Table 4-83, and Vermillion Valley is detailed in Table 4-84. As shown on the figure and tables, 3 developments would be affected by an extremely high hazard dam inundation.
- Figure 4-75 shows the locations of the future development areas overlayed on the high hazard dam inundation areas. Only one dam intersects the future development areas. Future development affected by the Hidden Dam is detailed in Table 4-85. As shown, 3 developments would be affected by the Hidden dam.

Figure 4-74 Unincorporated Madera County – Future Development in Extremely High Hazard Dam Inundation Areas

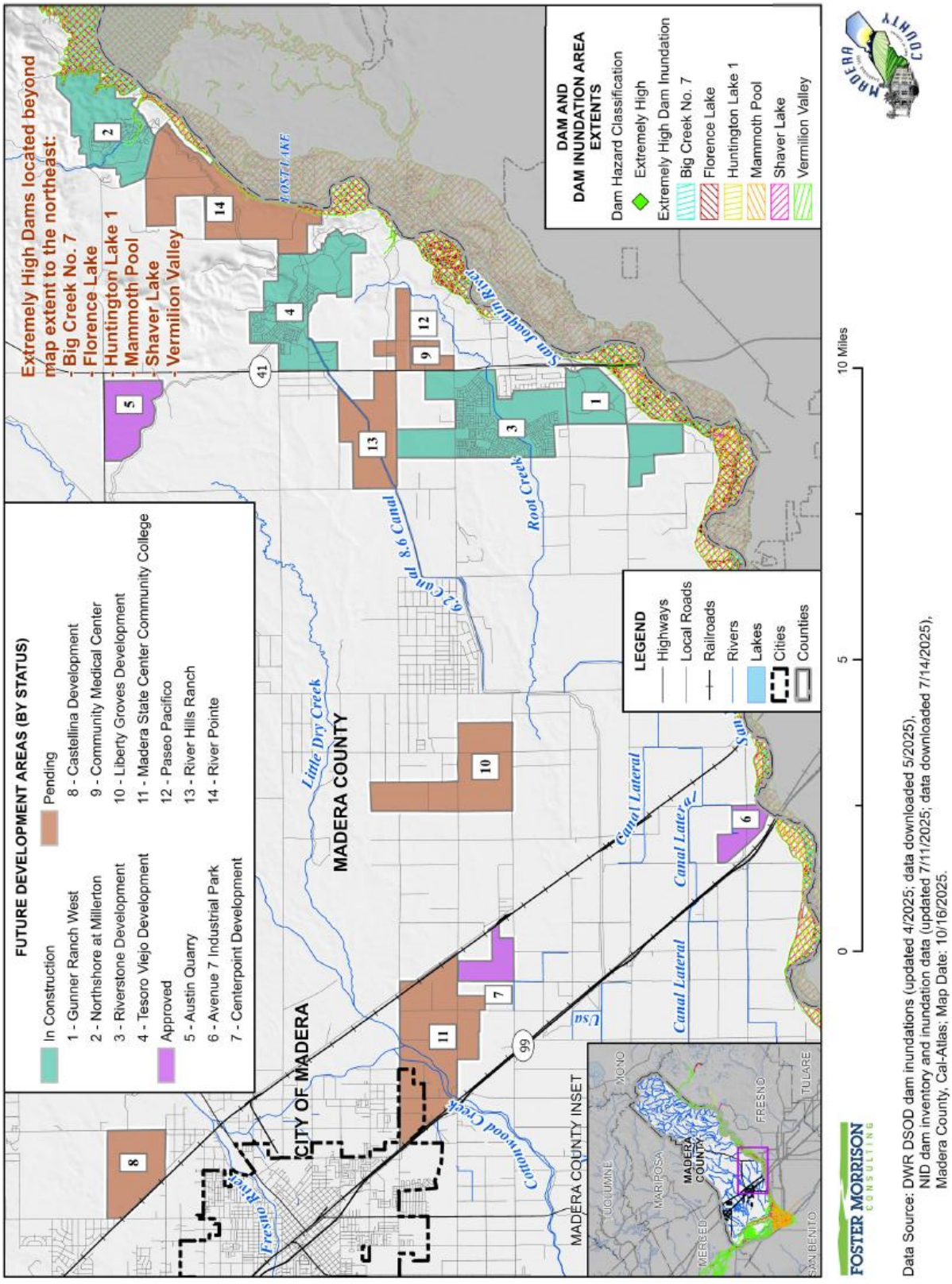


Table 4-79 Unincorporated Madera County – Future Development in Big Creek No. 7 Dam Inundation Area by Status, Parcels, and Acres

Future Development Status / Future Development Area and Map ID/ Dam Hazard Inundation Area	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use – Northshore at Millerton (Map ID 2)						
Big Creek No. 7	1	0	1	320	0	320
Northshore at Millerton Total	**1**	**0**	**1**	**320**	**0**	**320**
In Construction Total	**1**	**0**	**1**	**320**	**0**	**320**
Approved						
Industrial – Avenue 7 Industrial Park (Map ID 6)						
Big Creek No. 7	1	1	0	108	108	0
Avenue 7 Industrial Park Total	**1**	**1**	**0**	**108**	**108**	**0**
Approved Total	**1**	**1**	**0**	**108**	**108**	**0**
Pending						
Mixed Use – River Pointe (Map ID 14)						
Big Creek No. 7	3	3	0	615	615	0
River Pointe Total	**3**	**3**	**0**	**615**	**615**	**0**
Pending Total	**3**	**3**	**0**	**615**	**615**	**0**
Grand Total	**5**	**4**	**1**	**1,043**	**723**	**320**

Source: DSOD/NID; Madera County

Table 4-80 Unincorporated Madera County – Future Development in Florence Lake Dam Inundation Area by Status, Parcels, and Acres

Future Development Status / Future Development Area and Map ID/ Dam Hazard Inundation Area	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use – Northshore at Millerton (Map ID 2)						
Florence Lake	1	0	1	320	0	320
Northshore at Millerton Total	**1**	**0**	**1**	**320**	**0**	**320**
In Construction Total	**1**	**0**	**1**	**320**	**0**	**320**
Approved						
Industrial – Avenue 7 Industrial Park (Map ID 6)						
Florence Lake	1	1	0	108	108	0
Avenue 7 Industrial Park Total	**1**	**1**	**0**	**108**	**108**	**0**

Future Development Status / Future Development Area and Map ID/ Dam Hazard Inundation Area	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Approved Total	**1**	**1**	**0**	**108**	**108**	**0**
Pending						
Mixed Use – River Pointe (Map ID 14)						
Florence Lake	3	3	0	615	615	0
River Pointe Total	**3**	**3**	**0**	**615**	**615**	**0**
Pending Total	**3**	**3**	**0**	**615**	**615**	**0**
Grand Total	**5**	**4**	**1**	**1,043**	**723**	**320**

Source: DSOD/NID, Madera County

Table 4-81 Unincorporated Madera County – Future Development in Huntington Lake 1 Dam Inundation Area by Status, Parcels, and Acres

Future Development Status / Future Development Area and Map ID/ Dam Hazard Inundation Area	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use – Northshore at Millerton (Map ID 2)						
Huntington Lake 1	1	0	1	320	0	320
Northshore at Millerton Total	**1**	**0**	**1**	**320**	**0**	**320**
In Construction Total	**1**	**0**	**1**	**320**	**0**	**320**
Approved						
Industrial – Avenue 7 Industrial Park (Map ID 6)						
Huntington Lake 1	1	1	0	108	108	0
Avenue 7 Industrial Park Total	**1**	**1**	**0**	**108**	**108**	**0**
Approved Total	**1**	**1**	**0**	**108**	**108**	**0**
Pending						
Mixed Use – River Pointe (Map ID 14)						
Huntington Lake 1	3	3	0	615	615	0
River Pointe Total	**3**	**3**	**0**	**615**	**615**	**0**
Pending Total	**3**	**3**	**0**	**615**	**615**	**0**
Grand Total	**5**	**4**	**1**	**1,043**	**723**	**320**

Source: DSOD/NID, Madera County

Table 4-82 Unincorporated Madera County – Future Development in Mammoth Pool Dam Inundation Area by Status, Parcels, and Acres

Future Development Status / Future Development Area and Map ID/ Dam Hazard Inundation Area	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use Northshore at Millerton (Map ID 2)						
Mammoth Pool	1	0	1	320	0	320
Northshore at Millerton Total	**1**	**0**	**1**	**320**	**0**	**320**
In Construction Total	**1**	**0**	**1**	**320**	**0**	**320**
Approved						
Industrial – Avenue 7 Industrial Park (Map ID 6)						
Mammoth Pool	1	1	0	108	108	0
Avenue 7 Industrial Park Total	**1**	**1**	**0**	**108**	**108**	**0**
Approved Total	**1**	**1**	**0**	**108**	**108**	**0**
Pending						
Mixed Use River Pointe (Map ID 14)						
Mammoth Pool	3	3	0	615	615	0
River Pointe Total	**3**	**3**	**0**	**615**	**615**	**0**
Pending Total	**3**	**3**	**0**	**615**	**615**	**0**
Grand Total	**5**	**4**	**1**	**1,043**	**723**	**320**

Source: DSOD/NID, Madera County

Table 4-83 Unincorporated Madera County – Future Development in Shaver Lake Dam Inundation Area by Status, Parcels, and Acres

Future Development Status / Future Development Area and Map ID/ Dam Hazard Inundation Area	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use Northshore at Millerton (Map ID 2)						
Shaver Lake	1	0	1	320	0	320
Northshore at Millerton Total	**1**	**0**	**1**	**320**	**0**	**320**
In Construction Total	**1**	**0**	**1**	**320**	**0**	**320**
Approved						
Industrial – Avenue 7 Industrial Park (Map ID 6)						
Shaver Lake	1	1	0	108	108	0
Avenue 7 Industrial Park Total	**1**	**1**	**0**	**108**	**108**	**0**

Future Development Status / Future Development Area and Map ID/ Dam Hazard Inundation Area	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Approved Total	**1**	**1**	**0**	**108**	**108**	**0**
Pending						
Mixed Use – River Pointe (Map ID 14)						
Shaver Lake	3	3	0	615	615	0
River Pointe Total	**3**	**3**	**0**	**615**	**615**	**0**
Pending Total	**3**	**3**	**0**	**615**	**615**	**0**
Grand Total	**5**	**4**	**1**	**1,043**	**723**	**320**

Source: DSOD/NID, Madera County

Table 4-84 Unincorporated Madera County – Future Development in Vermillion Valley Dam Inundation Area by Status, Parcels, and Acres

Future Development Status / Future Development Area and Map ID/ Dam Hazard Inundation Area	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use – Northshore at Millerton (Map ID 2)						
Vermilion Valley	1	0	1	320	0	320
Northshore at Millerton Total	**1**	**0**	**1**	**320**	**0**	**320**
In Construction Total	**1**	**0**	**1**	**320**	**0**	**320**
Approved						
Industrial – Avenue 7 Industrial Park (Map ID 6)						
Vermilion Valley	1	1	0	108	108	0
Avenue 7 Industrial Park Total	**1**	**1**	**0**	**108**	**108**	**0**
Approved Total	**1**	**1**	**0**	**108**	**108**	**0**
Pending						
Mixed Use – River Pointe (Map ID 14)						
Vermilion Valley	3	3	0	615	615	0
River Pointe Total	**3**	**3**	**0**	**615**	**615**	**0**
Pending Total	**3**	**3**	**0**	**615**	**615**	**0**
Grand Total	**5**	**4**	**1**	**1,043**	**723**	**320**

Source: DSOD/NID, Madera County

Figure 4-75 Unincorporated Madera County – Future Development in High Hazard Dam Inundation Areas

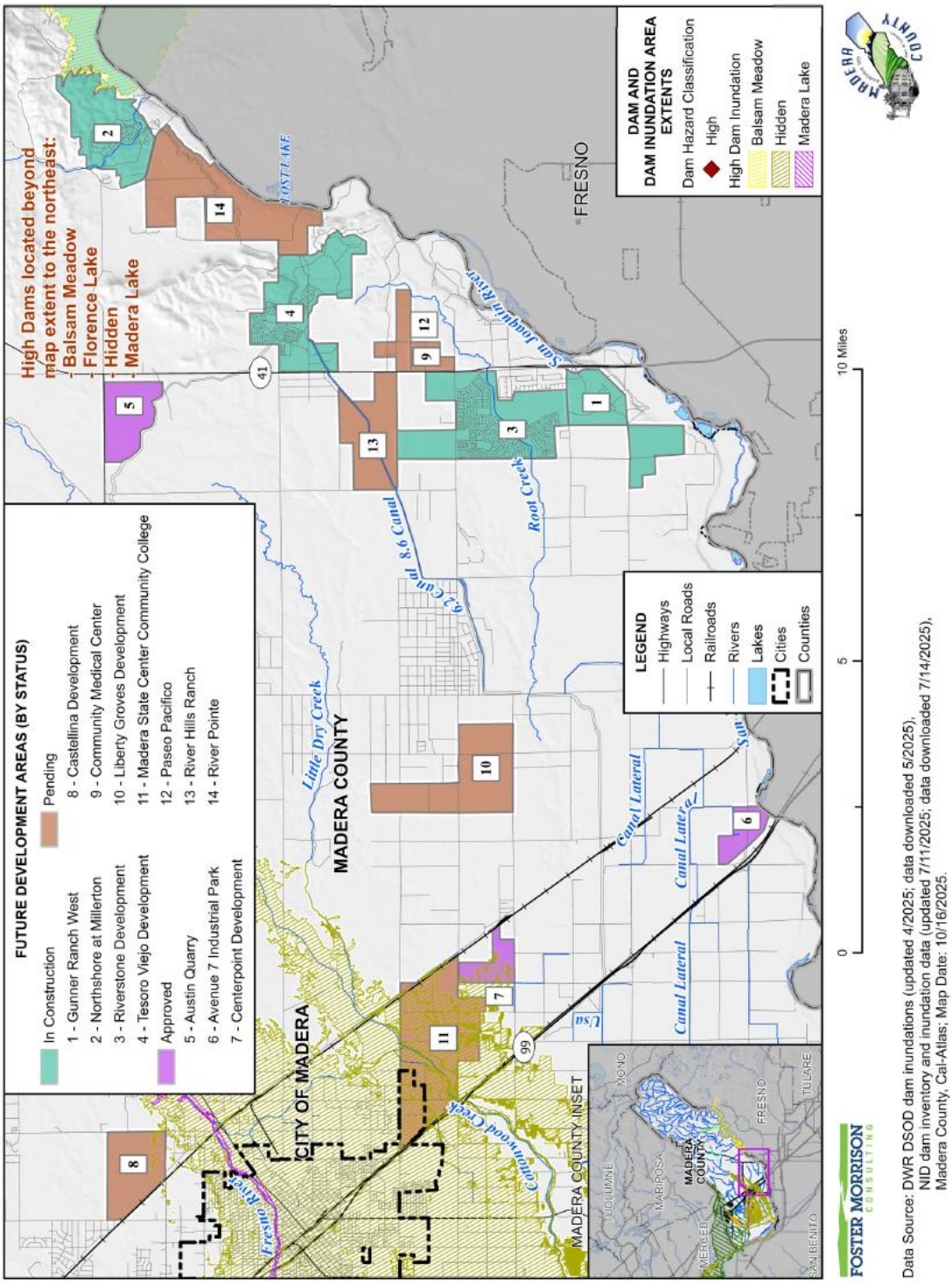


Table 4-85 Unincorporated Madera County – Future Development in Hidden Dam Inundation Area by Status, Parcels, and Acres

Future Development / Dam Hazard Inundation Areas and Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Approved						
Mixed Use – Centerpoint Development (Map ID 7)						
Hidden	39	13	26	201	75	126
Centerpoint Development Total	39	13	26	201	75	126
Mixed Use Total	**39**	**13**	**26**	**201**	**75**	**126**
Approved Total	**39**	**13**	**26**	**201**	**75**	**126**
Pending						
Mixed Use						
Castellina Development **(Map ID 8)**						
Hidden	2	2	0	789	789	0
Castellina Development Total	**2**	**2**	**0**	**789**	**789**	**0**
Madera State Center Community College **(Map ID 11)**						
Hidden	62	33	29	1,858	1,442	416
Madera State Center Community College Total	**62**	**33**	**29**	**1,858**	**1,442**	**416**
Pending Total	**64**	**35**	**29**	**2,648**	**2,231**	**416**
Grand Total	**103**	**48**	**55**	**2,848**	**2,306**	**542**

Source: DSOD/NID, Madera County

4.3.9. Drought and Water Shortage

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrences; and how climate change can affect or influence this hazard.

Hazard/Problem Description

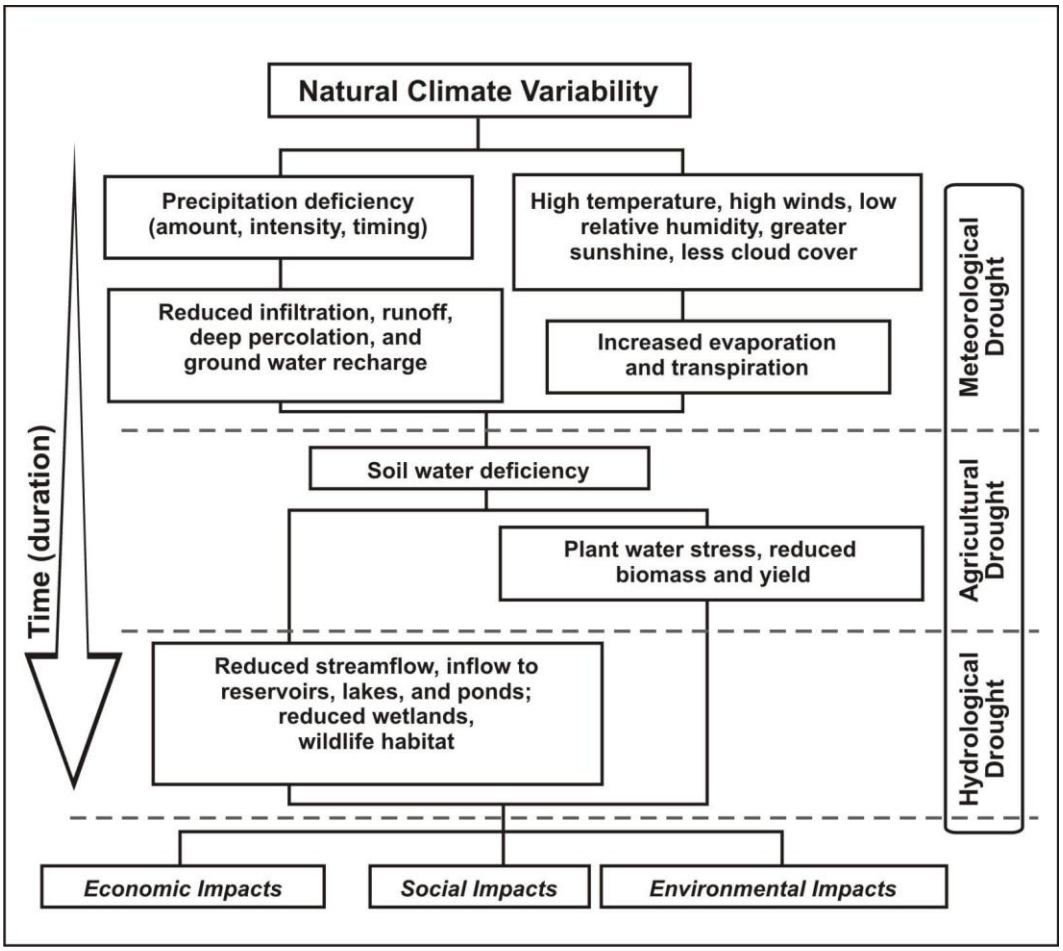
Drought

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 (see Figure 4-76) many factors—it occurs when a normal amount of precipitation and snow 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 usually defined by a period of below average water supply.
- **Agricultural drought** occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock.
- **Hydrological drought** is defined as deficiencies in surface and subsurface water supplies. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.
- **Socioeconomic drought** occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.

Figure 4-76 Causes and Impacts of Drought

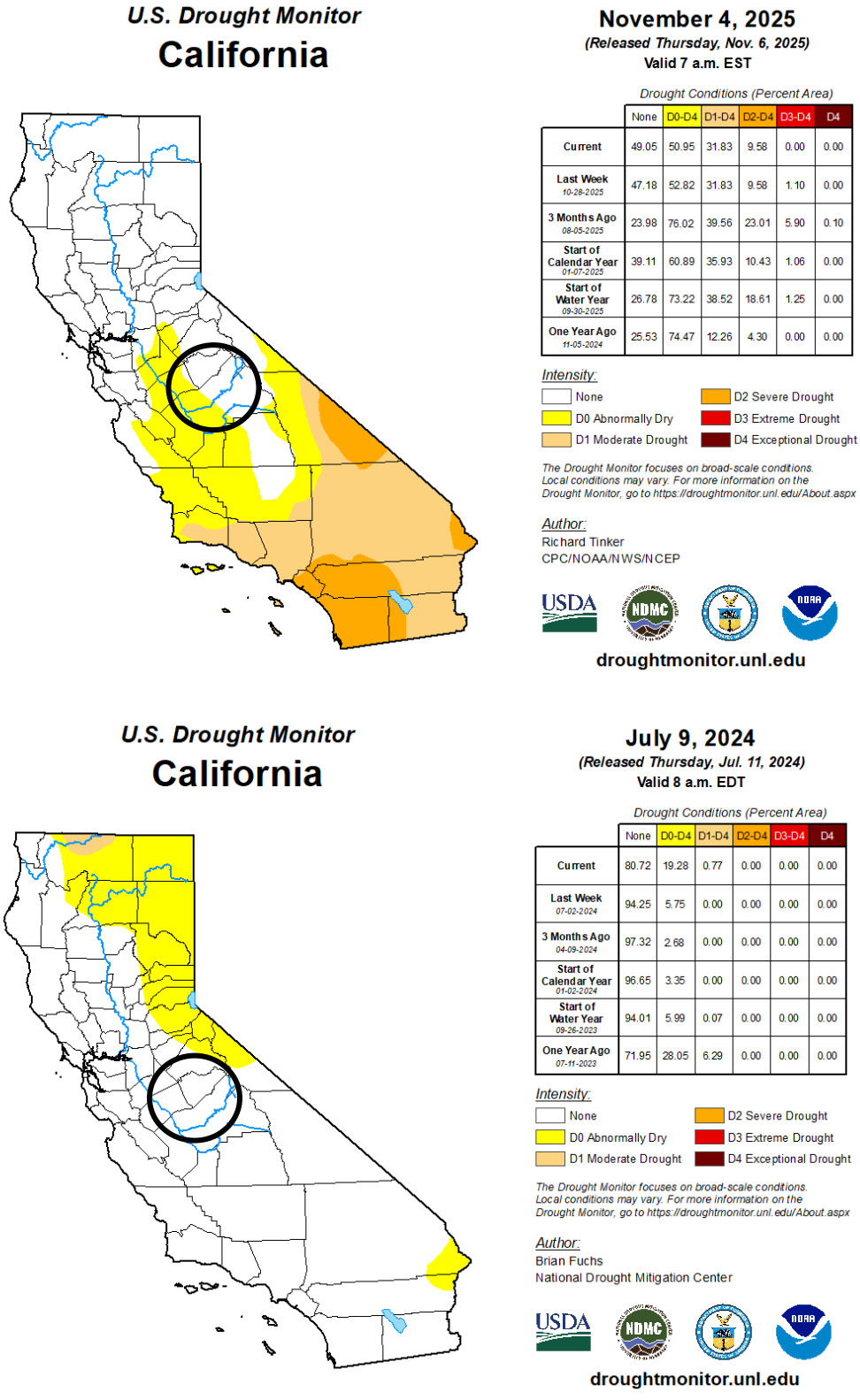


Source: National Drought Mitigation Center (NDMC)

Location and Extent of Drought

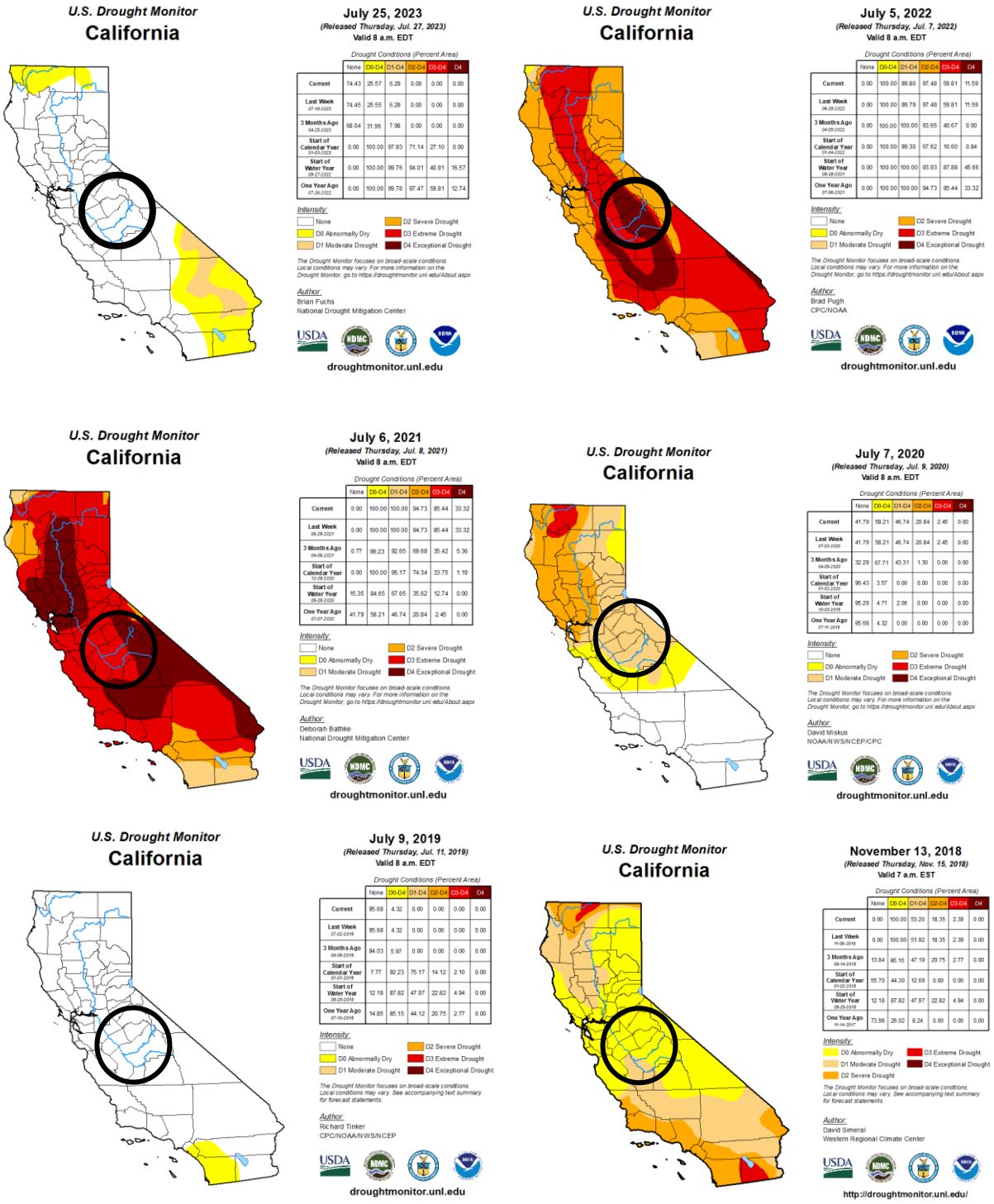
Drought is a regional phenomenon that affects the entire Madera County Planning Area. Drought in the United States is monitored by the National Integrated Drought Information System (NIDIS). A major component of this portal is the U.S. Drought Monitor. The Drought Monitor concept was developed jointly by the NOAA's Climate Prediction Center, the NDMC, and the USDA's Joint Agricultural Weather Facility in the late 1990s as a process that synthesizes multiple indices, outlooks and local impacts, into an assessment that best represents current drought conditions. The final outcome of each Drought Monitor is a consensus of federal, state, and academic scientists who are intimately familiar with the conditions in their respective regions. A snapshot of the current (and 2024) drought conditions in California and the Madera County Planning Area can be found in Figure 4-77. Snapshots from 2014 to 2023 are shown in Figure 4-78 and Figure 4-79. As seen in these figures and related data, the Planning Area has been in and out of drought over the past ten years since the last drought started in 2014.

Figure 4-77 Madera County Planning Area – Current (2025) and 2024 Drought Status



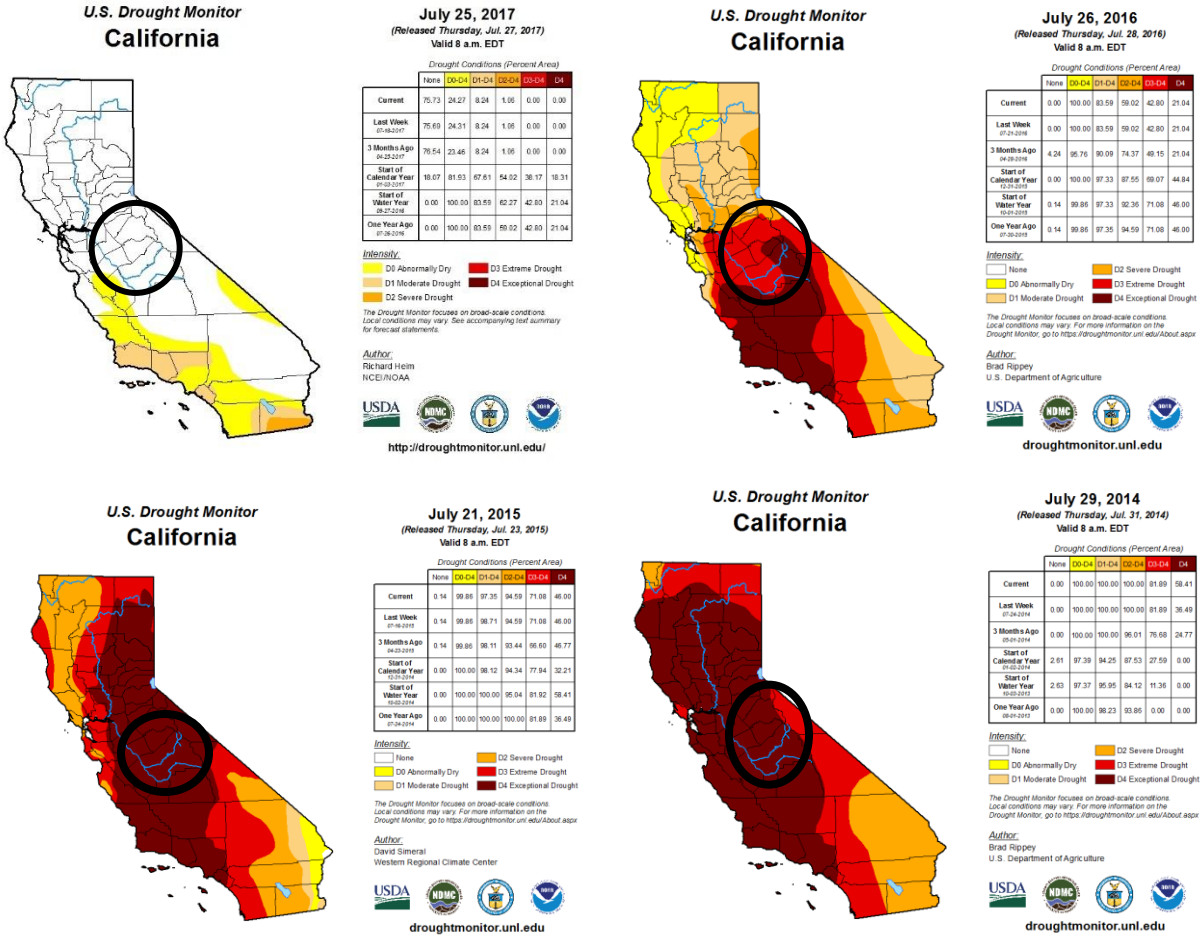
Source: US Drought Monitor

Figure 4-78 Previous Drought Status in Madera County (2018-2023)



Source: US Drought Monitor

Figure 4-79 Previous Drought Status in Madera County (2014-2017)



Source: US Drought Monitor

Cal DWR says the following about drought:

> ***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 domestic uses, farming and federally protected fish habitats in California further contributes to this issue.

As shown on the previous figures, drought is tracked by the US Drought Monitor. The Drought Monitor includes a scale to measure drought intensity:

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

Drought has a slow onset and long duration. Drought is not initially recognized as a problem because it normally originates in what is considered good weather, which typically includes a dry late spring and summer in Mediterranean climates, such as in California. This is particularly true in Northern California where drought impacts are delayed for most of the population by the wealth of stored surface and ground water. The drought complications normally appear more than a year after a drought begins. The most direct and likely most difficult drought impact to quantify is to local economies, especially agricultural economies. Drought has the potential to affect the entire Madera County Planning Area.

Water Shortage

Southern San Joaquin Valley counties, including Madera County, generally have sufficient groundwater and surface water supplies to mitigate even the severest droughts of the past century. Many other areas of the State, however, also place demands on these water resources during severe drought.

The main water source in Madera County, California, is groundwater, primarily drawn from the Madera Subbasin, part of the larger San Joaquin Valley Groundwater Basin. This aquifer supplies water for domestic, agricultural, and industrial uses across the County, including the City of Madera, which operates 20 groundwater wells to serve its residents.

Additionally, surface water from the San Joaquin River, distributed via the Madera Canal and managed by the Madera Irrigation District, plays a significant role, particularly for agricultural irrigation. The Friant Dam, constructed in the 1930s and 1940s, facilitates this supply, enabling the expansion of irrigated farmland for crops like almonds, grapes, and pistachios.

Groundwater is the dominant source due to the region's reliance on wells, but surface water supplements agriculture, which consumes the majority of water in the County. Overdrafting of groundwater has led to challenges, prompting efforts like the Sustainable Groundwater Management Act (SGMA) to balance usage.

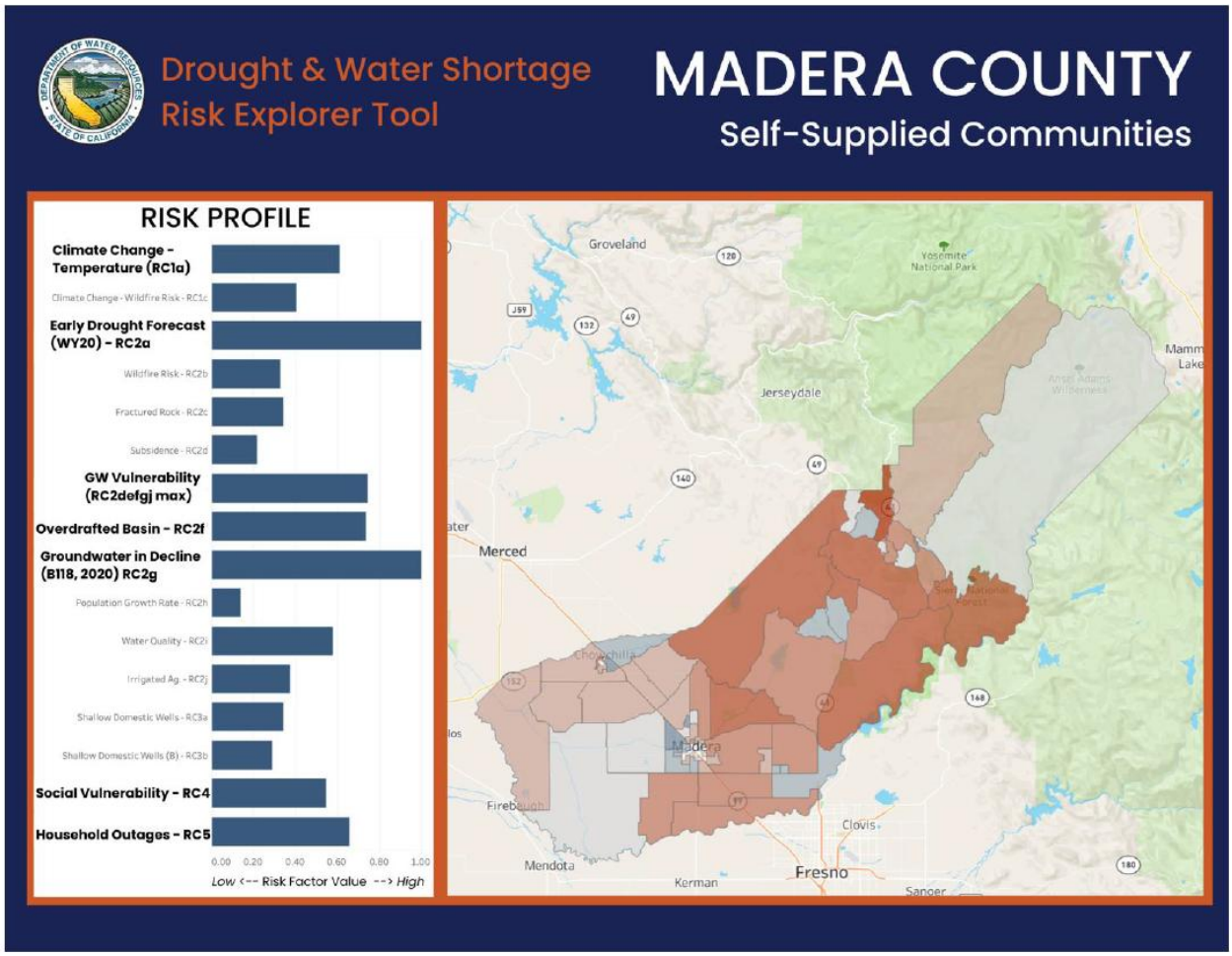
Location and Extent of Water Shortage

Since water shortage generally happens on a regional scale, the entirety of the Madera County Planning Area is at risk. There is no established scientific scale to measure water shortage. The speed of onset of water shortage tends to be lengthy. The duration of water shortage can vary, depending on the severity of the drought that accompanies it and the status of the water sources going into the drought. The extent of the drought considers several factors, including the nature, source, and reliability of water. While drought

conditions persist, the Planning Area has generally sufficient water supply from water supplies, which lessens the extent of water shortage impacts in the Planning Area.

However, the 2024 Madera County Drought Plan noted that in the Valley floor portion of the County, large alluvial aquifers have historically yielded significant quantities of groundwater for agriculture, urban, and domestic uses. The County overlies all or portions of the Madera, Delta-Mendota, and Chowchilla Subbasins of the San Joaquin Valley Groundwater Basin. All three of these Subbasins have been classified under the SGMA as in critical overdraft, due to long term declines in groundwater levels driven by groundwater use that has exceeded average recharge for many decades. The aquifer thickness in these subbasins typically increases to the west, with the aquifers thinning on their eastern margins and ultimately pinching out at their contact with the bedrock foothills. Many of the Self-Supplied Communities at greatest risk of water shortage in Madera County are threatened by declining groundwater levels in these Subbasins, especially on the eastern edges of Subbasins where aquifers are thinner. These communities and their respective risk can be seen on Figure 4-80.

Figure 4-80 Madera County – Self Supplied Communities Drought Risk



Source: 2024 Madera County Drought Plan.

Past Occurrences

Disaster Declaration History

There have been four state and one federal disaster declarations for Madera County. These are shown on Table 4-86. More information on USDA disaster declarations from drought (13 events) can be found in Table 4-53 in the Past Occurrences in Section 4.3.6.

Table 4-86 Madera County – Federal and State Drought Disaster Declarations 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	4	1976, 2008, 2014, 2015	1	1977

Source: Cal OES, FEMA

NCDC Events

There have been 249 NCDC drought events in Madera County. This is shown on Table 4-87.

*Table 4-87 NCDC Drought Events for Madera County 1993-7/31/2024**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Drought	249	0	3	0	0	$0	$0

Source: NCDC

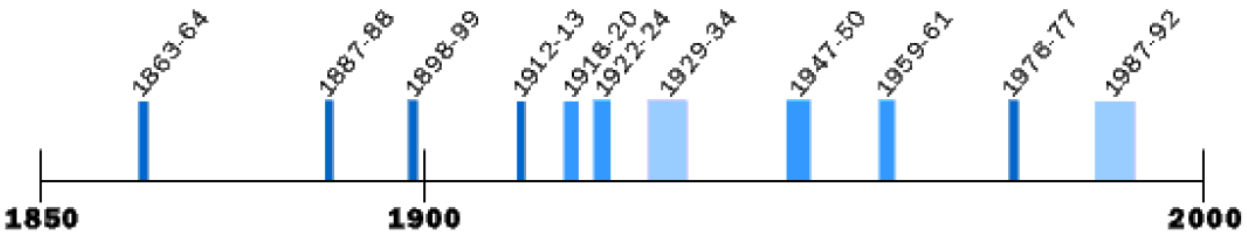
*Note: Losses reflect totals for all impacted areas, some of which fell outside of Madera County

CA DWR Events (with Hazard Mitigation Planning Committee Input)

Due to the longer term nature of drought and water shortage, a split of 2018 to current was not performed.

Historically, California has experienced multiple severe droughts. According to the DWR, droughts exceeding three years are relatively rare in Northern California, the source of much of the State's developed water supply. Figure 4-81 depicts California's Multi-Year Historical Dry Periods, 1850-2000. The 1929-34 drought established the criteria commonly used in designing storage capacity and yield of large northern California reservoirs. Figure 4-82 compares the 1929-34 drought to the 1976-77, 1987-92, 2007-09, and 2012-2016 droughts.

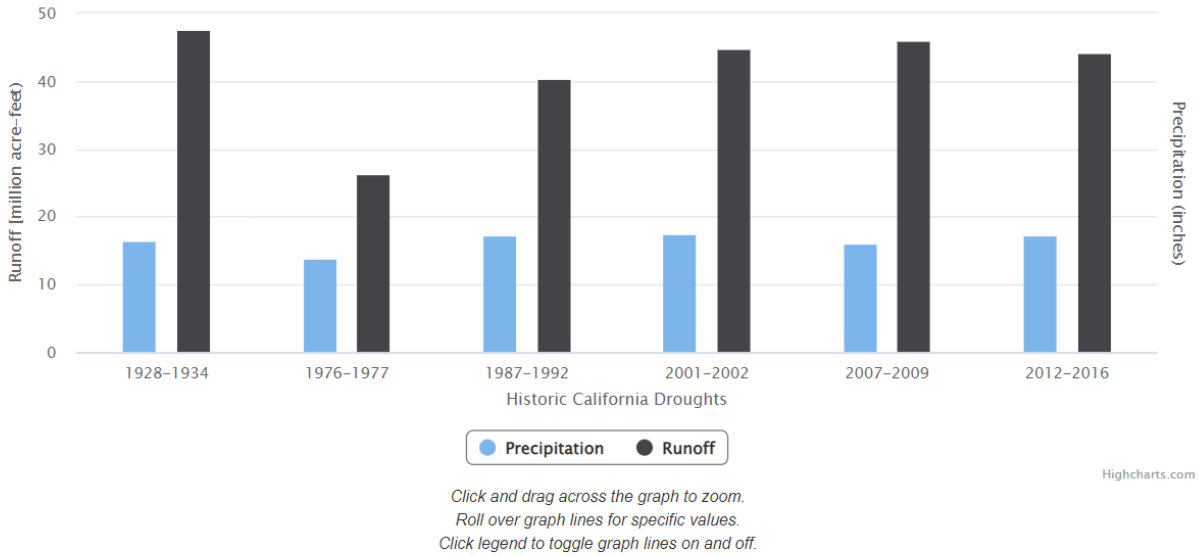
Figure 4-81 California's Multi-Year Historical Dry Periods, 1850-2000



Source: Cal DWR

Notes: Dry periods prior to 1900 estimated from limited data; covers dry periods of statewide or major regional extent

Figure 4-82 Average Annual Runoff and Precipitation for Historic Droughts



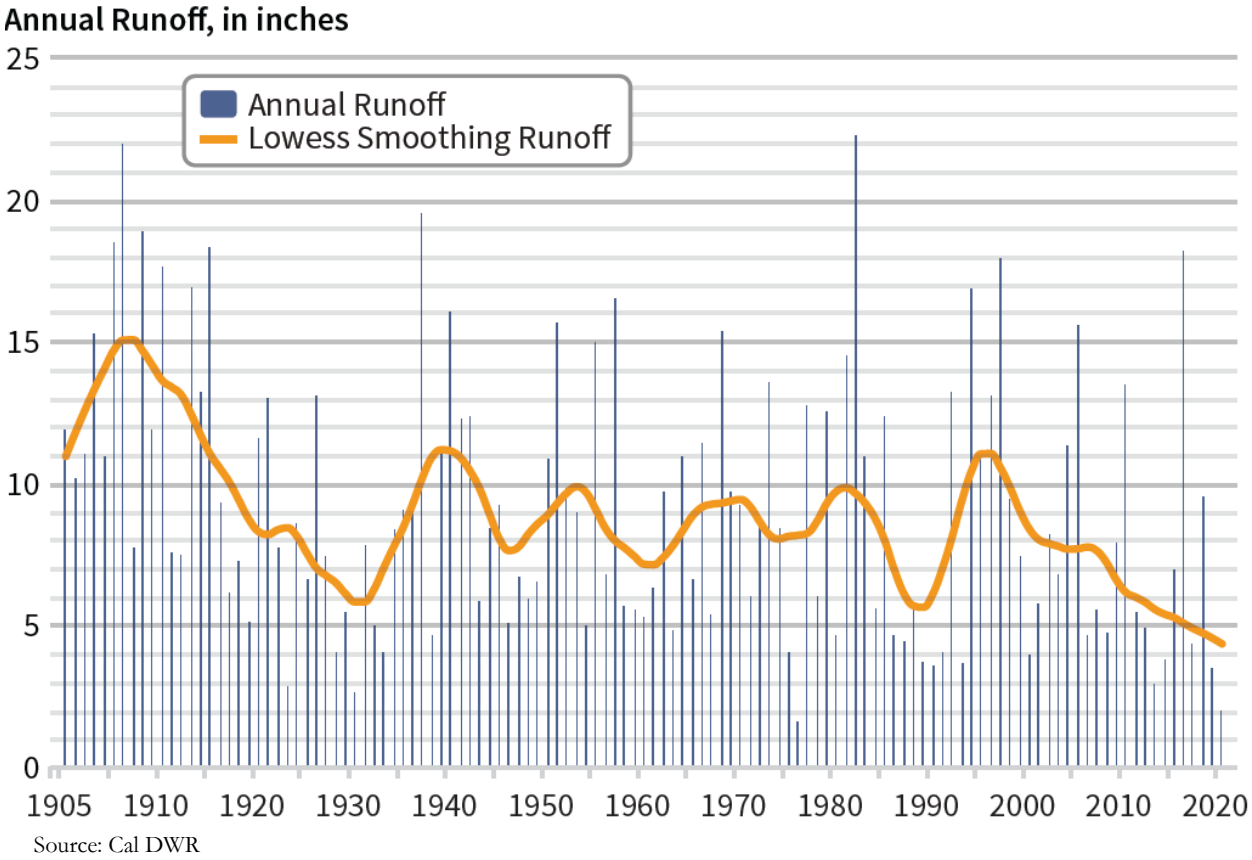
Click and drag across the graph to zoom.
Roll over graph lines for specific values.
Click legend to toggle graph lines on and off.

Runoff and precipitation conditions for California's six historical droughts. The most severe drought both in terms of precipitation and runoff was the drought of 1976-77. However, because it was just a two-year drought, the water supply impacts were not as severe as those associated with the longer duration droughts because shorter droughts can be partially mitigated by surface and groundwater storage.

Source: CA DWR – 2012-2016 California Drought: Historical Perspective (https://ca.water.usgs.gov/california-drought/california-drought-comparisons.html)

Figure 4-83 depicts runoff for the State from 1905 to 2021. This gives a historical context for the 2014-2021 drought to compare against past droughts.

Figure 4-83 Annual California Runoff –1905 to 2021



Source: Cal DWR

The 2018 and 2023 California State Hazard Mitigation Plan discussed the major droughts from 1900 to 2022. The discussion below appends to the tables and figures above.

The 1975-1977 Drought

From November 1975 through November 1977, California experienced one of its most severe droughts. Although people in many areas of the state are accustomed to very little precipitation during the growing season (April to October), they expect it in the winter. In 1976 and 1977, the winters brought only one-half and one-third of normal precipitation, respectively. Most surface storage reservoirs were substantially drained in 1976, leading to widespread water shortages when 1977 turned out to be even drier.

The 1987-1992 Drought

From 1987 to 1992, California again experienced a serious drought due to low precipitation and run-off levels. The hardest-hit region was the Central Coast, roughly from San Jose to Ventura. 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. In February 1991, DWR and Cal OES surveyed drought conditions in all 58 California counties and found five main problems: extremely dry rangeland,

irrigated agriculture with severe surface water shortages and falling groundwater levels, widespread rural areas where individual and community supplies were going dry, urban area water rationing at 25 to 50 percent of normal usage, and environmental impacts.

Storage in major reservoirs had dropped to 54 percent of average, the lowest since 1977. The shortages led to stringent water rationing and severe cutbacks in agricultural production, including threats to survival of permanent crops such as trees and vines. Fish and wildlife resources were in critical shape as well. Not since the 1928-1934 drought had there been such a prolonged dry period. In response to those conditions, the Governor established the Drought Action Team. This team almost immediately created an emergency drought water bank to develop a supply for four critical needs: municipal and industrial uses, agricultural uses, protection of fish and wildlife, and carryover storage for 1992. The large-scale transfer program, which involved over 800,000 acre-feet of water, was implemented in less than 100 days with the help and commitment of the entire water community and established important links between state agencies, local water interests, and local governments for future programs.

The 2007-2009 Drought

Water years 2007-2009 were collectively the 15th driest three-year period for DWR's eight-station precipitation index, which is a rough indicator of potential water supply availability to the State Water Project (SWP) and Central Valley Project (CVP). Water year 2007 was the driest single year of that drought and fell within the top 20 percent of dry years based on computed statewide runoff. In June 2008, a state emergency proclamation was issued due to water shortage in selected Central Valley counties. In February 2009, for the first time in its history, the State of California proclaimed a statewide drought. The state placed unprecedented restrictions on CVP and SWP diversions from the Delta to protect listed fish species, a regulatory circumstance that exacerbated the impacts of the drought for water users.

The greatest impacts of the 2007–2009 drought were observed in the CVP service area on the west side of the San Joaquin Valley, where hydrologic conditions combined with reduced CVP exports resulted in substantially reduced water supplies (50 percent supplies in 2007, 40 percent in 2008, and 10 percent in 2009) for CVP south-of Delta agricultural contractors. Small communities on the west side highly dependent on agricultural employment were especially affected by land fallowing due to lack of irrigation supplies, as well as by factors associated with current economic recession. The coupling of the drought and economic recession necessitated emergency response actions related to social services, such as food banks and unemployment assistance.

The 2012-Current Drought (which is ongoing after a pause in 2017 and 2023)

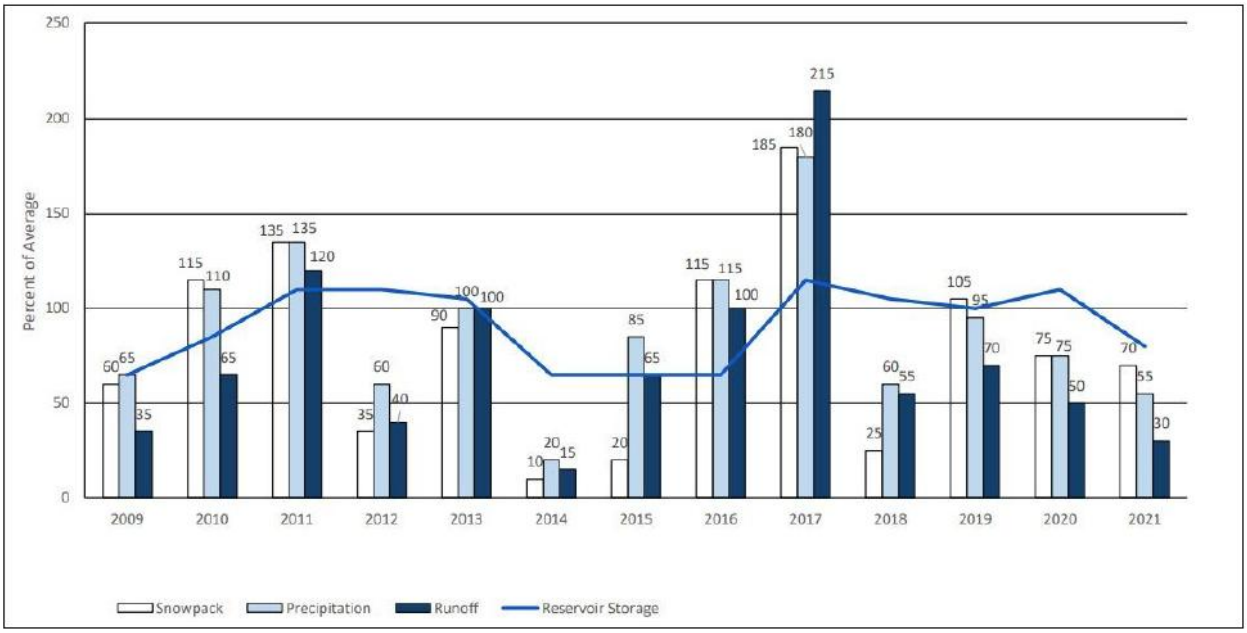
The statewide drought of 2012-2017, which is still ongoing, will be remembered as one of the most severe and costliest droughts of record in California. The drought that spanned water years 2012 through 2017 included the driest four-year statewide precipitation on record (2012-2015) and the smallest Sierra-Cascades snowpack on record (2015, with 5 percent of average). It was marked by extraordinary heat: 2014, 2015, and 2016 were California's first, second, and third warmest years in terms of statewide average temperatures. By the time the drought was declared officially over in April 2017, the state had expended $6.6 billion in drought response and mitigation programs and had been declared a federal disaster area.

With a reduction in water, water supply issues based on water rights becomes more evident. Some agricultural uses, such as grapes and almonds, are severely impacted through limited water supply.

Water Shortage

Figure 4-84 illustrates several indicators commonly used to evaluate water conditions in California. The percent of average values are determined by measurements made in each of the ten major hydrologic regions. The chart describes water conditions in California between 2009 and 2021. The chart illustrates the cyclical nature of weather patterns in California.

Figure 4-84 Water Supply Conditions, 2009 to 2021



Source: 2023 State of California Hazard Mitigation Plan

Hazard Mitigation Planning Committee Events

According to the HMPC, drought and water supply issues will continue to be a concern to the Madera County Planning Area. Given the extent of agricultural in the County, irrigation of agricultural lands continues to be a primary concern. Also noted by the HMPC, several areas within the County had ground water wells go dry affecting water supply to County residents. In the past, some of this was attributed to dewatering activities conducted by active mining operations which further depleted the already reduced ground water table in areas due to drought conditions.

Likelihood of Future Occurrence

Drought

Likely—Historical drought data for the Madera County Planning Area indicate there have been 5 significant droughts in the last 87 years. This equates to a drought every 16.4 years on average or a 6.1 percent chance of a drought in any given year. Based on this data and given the multi-year length of droughts and future climate change affects, the Madera County Planning Area determined that future drought occurrence continues to be likely.

Water Shortage

Occasional — Recent historical data for water shortage indicates that Madera County may at some time be at risk to both short and prolonged periods of water shortage. Based on this it is possible that water shortages will affect the County in the future during extreme drought conditions

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and drought and water shortage can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and Drought and Water Shortage

Climate scientists studying California find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years underscore the need to examine more closely the state's water storage, distribution, management, conservation, and use policies. The 2024 CAS stresses the need for public policy development addressing long term climate change impacts on water supplies. The CAS notes that climate change is likely to significantly diminish California's future water supply, stating that: California must change its water management and uses because climate change will likely create greater competition for limited water supplies needed by the environment, agriculture, and cities.

A 2018 report from the Public Policy Institute of California noted that thousands of Californians – mostly in rural, small, disadvantaged communities – already face acute water scarcity, contaminated groundwater, or complete water loss. Climate change would make these effects worse.

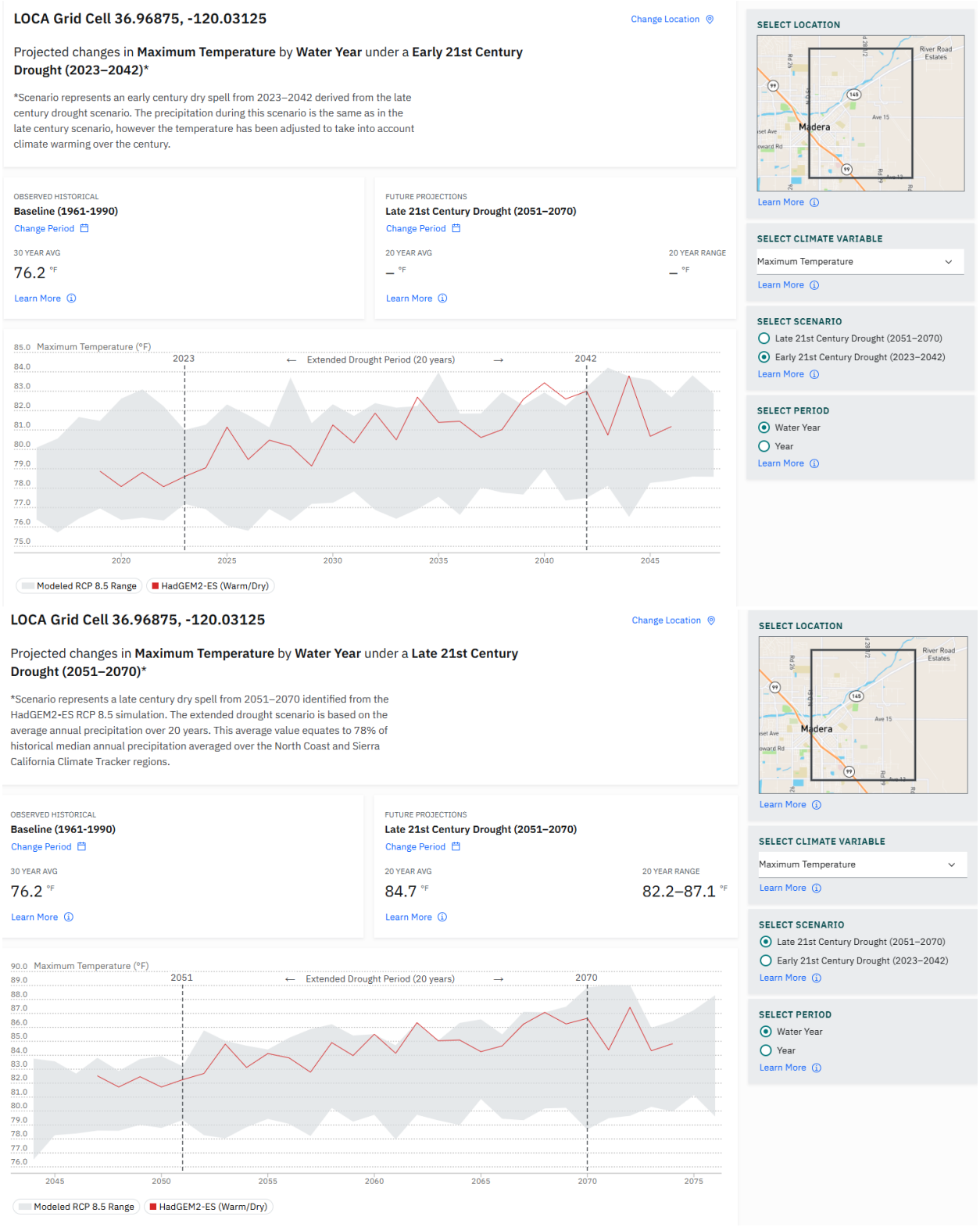
The 2024 Madera County Drought Plan noted that the majority of Madera County's local water resources ultimately originate as precipitation in the Sierra Nevada mountains, with high-elevation snowpack playing a particularly important role. According to California's Fourth Climate Change Assessment, climate change is already underway in the Sierra Nevada, affecting heat and precipitation extremes, with long-term warming trends, declining snowpacks, and changes in streamflow timing. Over the coming decades, climate change will present new challenges to all Madera County water users.

Cal-Adapt has modeled future risk of drought. Recent research suggests that extended drought occurrence ("mega-drought") could become more pervasive in future decades. This tool explores data for two 20-year drought scenarios (using the quad that contains the City of Madera in Figure 4-85) derived from LOCA

downscaled meteorological and hydrological simulations – one for the earlier part of the 21st century, and one for the latter part:

- The upper chart represents a mid-century dry spell from 2023-2042 identified from the HadGEM2-ES RCP 8.5 simulation. The extended drought scenario is based on the average annual precipitation over 20 years. This average value equates to 78% of historical median annual precipitation averaged over the North Coast and Sierra California Climate Tracker regions.
- The lower chart represents a late century dry spell from 2051–2070 identified from the HadGEM2-ES RCP 8.5 simulation. The extended drought scenario is based on the average annual precipitation over 20 years. This average value equates to 78% of historical median annual precipitation averaged over the North Coast and Sierra California Climate Tracker regions.

Figure 4-85 Madera County Planning Area – Future Extended Drought Scenarios



Source: Cal Adapt – Extended Drought Scenarios (retrieved 2/10/2025)

Vulnerability Assessment

Vulnerability—High

Based on historical information, the occurrence of drought in California, including the Madera County Planning Area, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts can be extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. The vulnerability to drought may vary and include reduction in water supply, turf losses, impacts to natural resources, and an increase in dry fuels and tree dieback.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Tree Mortality and Drought

One of the specific impacts of drought in the Madera County Planning Area is the increased risk to trees from beetle kill and other insects, pathogens and parasites, and other tree mortality and die back issues. Drought weakens trees and makes them more susceptible to insect infestation and other pathogens. Insects, such as bark beetles and others, frequently attack trees weakened by drought, disease, injuries, or other factors that may stress the tree. These insects and other pathogens can contribute to the decline and eventual death of trees throughout the Planning Area, especially in those areas on the west where the elevations increase.

The tree mortality and dieback problem are a high priority because of the issue of hazardous trees and increased wildfire hazard in the wildland areas and the potential for worsening conditions and expansion into other forested sites in future years. Fuel loading and fire potential are greater in stands as compared to healthy stands due to the higher proportion of dead and dying material. Removal of dead and dying trees near structures, powerlines, and roadways is also a high priority because of the immediate falling hazard.

University of California, Berkeley's Department of Environmental Science, Policy, and Management (ESPM) was commissioned in 2021 to investigate the symptoms and possible causes of the dieback. Preliminary results show that the dieback is driven mostly by environmental stressors, including but not limited to drought, predisposing trees to disease caused by opportunistic pathogens. The report includes best management practices to limit the spread of pathogens. It is important to continue investigating the causes of the tree mortality and dieback to help Planning Area jurisdictional staff track changes over time, recognize where other areas may potentially be susceptible to tree mortality, and apply appropriate best management practices.

Under current drought conditions, competition for resources within forested areas will likely continue to intensify with greater stress increasing tree susceptibility to insect damage and disease, and ultimately

increase mortality. In all vegetation types, drought extends the length of the fire season because of its effect on live and dead fuel moisture, with critical low fuel moisture levels occurring early in spring or summer and extending at least through the first significant rains that typically come in late fall.

Madera County has been one of the hardest-hit areas in California due to its inclusion in the Southern and Central Sierra Nevada, where an estimated 96.4 million trees died during the 2012–2016 drought, as reported by the CA Open Data portal. Since 2019, tree mortality has continued, influenced by recurring drought cycles, high temperatures, and insect activity, particularly affecting fir and pine species. The region's dense forests, a result of historical fire suppression, exacerbate competition for water, increasing tree stress and mortality.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerabilities to this hazard.

General Concerns

The drawdown of the groundwater table is one factor that has been recognized to occur during repeated dry years. Lowering of groundwater levels results in the need to deepen wells, which subsequently lead to increased pumping costs (which has happened in the recent past). These costs are a major consideration for residents relying on domestic wells and agricultural producers that irrigate with groundwater and/or use it for frost protection.

The 2024 Madera County Drought Plan noted that in the Valley floor portion of the County, large alluvial aquifers have historically yielded significant quantities of groundwater for agriculture, urban, and domestic uses. The County overlies all or portions of the Madera, Delta-Mendota, and Chowchilla Subbasins of the San Joaquin Valley Groundwater Basin. All three of these Subbasins have been classified under the SGMA as in critical overdraft, due to long term declines in groundwater levels driven by groundwater use that has exceeded average recharge for many decades. The aquifer thickness in these subbasins typically increases to the west, with the aquifers thinning on their eastern margins and ultimately pinching out at their contact with the bedrock foothills. Many of the Self-Supplied Communities at greatest risk of water shortage in Madera County are threatened by declining groundwater levels in these Subbasins, especially on the eastern edges of Subbasins where aquifers are thinner.

Dry Wells

As noted above, Madera County is considered to be in an overdraft area. Since 2017, the City of Madera has been implementing Level B water restrictions. During periods of drought, wells can go dry in the County. It was noted that Madera Water #1 and #2 domestic wells have gone dry in the past. Eastern Madera County has seen wells go dry in past droughts as well. This has occurred in the Hillview Area. American Water in Oakhurst has struggled in the past with water shortage. There are senior populations in these areas who are on fixed incomes. Trucking in water for them is very costly. Agricultural usage makes up 93% of usage in the County. Wells going dry can affect crops dependent on water. There are plans to construct a 2.5 million gallon tank for drought resilience.

Tree Mortality

Tree mortality in Madera County, CA, since 2019 has been a significant environmental concern, driven by a combination of drought, bark beetle infestations, and dense forest conditions. The county, located in the central Sierra Nevada, has been identified as part of the "High Hazard Zone" for tree mortality by the California Tree Mortality Task Force, reflecting its vulnerability to these issues. The 2020 Creek Fire, burning nearly 380,000 acres across Fresno and Madera counties, highlighted how dead trees exacerbate wildfire risks. Management strategies, including mechanical thinning and prescribed burns, are in place, but recurring droughts continue to pose challenges.

Local concerns for each of the jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from drought and water shortage include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented below. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

People and Populations

The people and populations of the Madera County Planning Area are not directly affected by general drought conditions; although, their turfed areas, trees, and other water-dependent resources can all be affected. In extreme drought conditions, however, residents and other populations within the Planning Area may be vulnerable to drought and water shortage issues. Drought and water shortage can lead to an increase in wildfires threatening Planning Area residents. Water shortages can influence all of the population in the Planning Area, but often have a greater effect on the unhoused and other vulnerable populations that may be unable to access and afford clean drinking water during shortages. During periods of drought as the costs of water usage may increase, those who are economically disadvantaged may be unable to afford the increased costs of potable water.

Structures

Structures have a limited vulnerability to drought and water shortage. It is the secondary hazard of drought (wildfire) which causes risks to structures. Drought can also stress trees, causing die off. These trees may fall on structures adjacent to them.

Critical Facilities and Infrastructure

Most critical facilities and infrastructure have a limited vulnerability to drought and water shortage. Should drought conditions be severe enough to cause water shortage reliability issues, some facilities and

infrastructure may be affected. Water and wastewater systems may be impacted during times of reduced water supply and need to employ contingencies to remain functional and fully operational. Other water-dependent systems may also be adversely affected. Further, the secondary hazards of drought (increased tree mortality and potential for spread of urban fires and wildfire) can pose a significant risk to critical facilities and infrastructure. Drought can also stress trees, causing die off and lead to increased tree mortality. Dead and weakened trees may fall on critical infrastructure adjacent to them and impact power lines and other utilities, often causing power outages. Fallen trees can also temporarily block roads and access which can impact first responders in an emergency.

Natural, Historic, and Cultural Resources

Drought and water shortage can have a significant impact on natural resources. Water levels in reservoirs and lakes may be reduced and a loss of wetlands and marsh areas may occur. Severe drought conditions can contribute to an increase in erosion of soils and lead to poor soil quality. Further, all of the trees in the Planning Area are at risk to drought impacts and a reduction in water supply. These trees provide a wealth of social and environmental benefits to Planning Area residents and visitors, from shade and beauty to air quality, carbon reduction and stormwater management. Increased tree mortality during extended droughts can be substantial and widespread. Increased tree mortality in the Planning Area can also add to the available fuel which can exacerbate the spread of wildfires. Drought can devastate crops and dry out pastures, dry out forests and critical habitat areas, and reduce food and water available for wildlife and livestock. Additionally, drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. It is unlikely that drought and water shortage would have a significant impact on historic and cultural resources in the Planning Area unless they are impacted by a drought precipitated wildfire type event.

FEMA NRI Hazard Vulnerability Assessment

The FEMA NRI was queried for additional specific data on Madera County's vulnerability to drought. The NRI contains data and analysis for 18 separate natural hazards, including drought. As shown on Table 4-88, drought could cause a total of $5,516,976 in expected annual losses, with a historic loss rating of very low. Drought, in Madera County, has a very high rating for social vulnerability and a very low community resilience, with a risk index score of 98.9 out of 100. According to the NRI, there have been 1,449 drought events between the years 2000-2021 with an average of 64.3 events per year.

Table 4-88 Madera County Planning Area – Drought Vulnerability Ratings from FEMA NRI

NRI Hazard	Hazard Risk Index Rating*	Expected Annual Loss Values (total)**	Exposure Value (total)***	Historic Loss Ratio Rating
Drought	98.9	$5,516,976	$1,324,067,118	Very low

Source: FEMA NRI Report. Retrieved April 1, 2025.

*Hazard Risk Index is calculated using data for only a single hazard type, and reflect a communities expected annual loss value, community risk factors, and the adjustment factor used to calculate the risk value.

**Expected annual loss represents the average economic loss in dollars resulting from natural hazards each year.

***Exposure is a natural hazard consequence factor that is the representative value of buildings, populations, or agriculture potentially exposed to a natural hazard occurrence.

Additional information on the FEMA NRI can be found in Section 4.2 and Appendix G.

Impacts from Drought and Water Shortage

The vulnerability to drought is Countywide, but impacts may vary and include reduction in water supply and an increase in dry fuels. The potential for a reduction in water supply during drought conditions generally leads to both mandated and voluntary conservations measures during extended droughts. During these times, the costs of water can also increase. Also of concern, the increased dry fuels and fuel loads associated with drought conditions can result in an increased fire danger. In areas of extremely dry fuels, the intensity and speed of fires can be significant. Water supply and flows for fire suppression can also be an issue during extended droughts. Drought that occurs during periods of extreme heat and high winds is a contributing factor to PSPS events to be declared in the Planning Area. More information on PSPS can be found in Section 4.3.1.

Other qualitative impacts associated with drought in the Madera County Planning Area are those related to water intensive activities such as municipal usage, commerce, tourism, and recreation use. With more precipitation likely falling as rain instead of snow and warmer temperatures causing decreased snowfall to melt faster and earlier, water supply is likely to become more unreliable. In addition, drought and water shortage is predicted to become more common. This means less water available for use over the long run, and additional challenges for water supply reliability, especially during periods of extended drought.

Drought Impact Reporter

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult. The Drought Impact Reporter from the NDMC is a useful reference tool that compiles reported drought impacts nationwide. Table 4-89 show drought impacts for County from 1850 to June 2025. The data represented is skewed, with the majority of these impacts from records within the past ten years.

Table 4-89 Madera County Drought Impacts 1850-6/1/2025

Category	Madera County Number of Impacts
Agriculture	102
Business and Industry	30
Energy	9
Fire	28
Plants & Wildlife	53.
Relief, Response, and Restrictions	123
Society and Public Health	97
Tourism and Recreation	23
Water Supply and Quality	147
Total	**612**

Source: National Drought Mitigation Center. Retrieved 6/25/2025.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future drought conditions and associated impacts and vulnerability of the County to drought and water shortage.
- Future population growth should be considered as having more or less people in a community affects the overall hazard vulnerability to the County. Population growth in Madera County is expected to slowly increase until 2045, and then shrink slowly. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-21). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Madera County has access to quantities of water through its groundwater as well as surface water. However, any future population growth in the County will add additional pressure to water companies during periods of drought and water shortage. Water companies will need to continue to plan for and add infrastructure capacity for population growth. As the population grows, the nature and makeup of populations will shift and change along with it. Vulnerable and underserved populations, such as those with low incomes and the unhoused that might not always have access to affordable, clean water, will need to be considered as future development continues, since they may experience a disproportionate impact from drought and water shortage. Potential population growth will be a challenge not only with regard to Madera County's water access for agricultural production, but state- and nation-wide with regard to food production. New population growth in the County is likely to increase the vulnerability of the County to drought and water shortage.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. As the County continues to grow, more cropland will likely be taken out of production to provide housing to accommodate for population growth. As Madera's agricultural lands are reduced, it seems likely that there would be less of a competing demand for water. However, more development will also require an increase in water supply and associated infrastructure. Changes in land use and development may or may not increase the impacts and associated vulnerabilities of the County to this hazard depending on where and how this future growth occurs.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help to make for a more resilient community.

4.3.10. Earthquake

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrence; and how climate change can affect or influence this hazard.

Hazard/Problem Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. 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. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. 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. This section briefly discusses issues related to types of seismic hazards.

Ground Shaking

Ground shaking is motion that occurs as a result of energy released during faulting. The damage or collapse of buildings and other structures caused by ground shaking is among the most serious seismic hazards. Damage to structures from this vibration, or ground shaking, is caused by the transmission of earthquake vibrations from the ground to the structure. The intensity of shaking and its potential impact on buildings is determined by the physical characteristics of the underlying soil and rock, building materials and workmanship, earthquake magnitude and location of epicenter, and the character and duration of ground motion.

Actual ground breakage generally affects only those buildings directly over or nearby the fault. Ground shaking generally has a much greater impact over a greater geographical area than ground breakage. The amount of breakage and shaking is a function of earthquake magnitude, type of bedrock, depth and type of soil, general topography, and groundwater. As with most communities in Central California near active faults, much of Madera County would be susceptible to violent ground shaking.

Seismic Structural Safety

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 [URM]) and soft story buildings 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 affect 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 formed 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.

Liquefaction during major earthquakes can cause severe damage to structures on level ground as a result of settling, titling, 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 known liquefaction areas exist in Madera County.

Landslide/Debris Flows

Landslides can occur as a result of horizontal seismic inertia induced in the slopes by the ground shaking. The most common earthquake-induced landslides include shallow, disrupted landslides such as rock falls, rockslides, and soil slides. Debris flows are created when surface soil on steep slopes becomes totally saturated with water. Once the soil liquefies, it loses the ability to hold together and can flow downhill at very high speeds, taking vegetation and/or structures with it. Slide risks increase after an earthquake during a wet winter. This is discussed in the vulnerability section below, and as a stand-alone hazard in Section 4.3.13.

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 due to ground shaking is not available.

Fire Following Earthquake

Fire ignitions and spread following a major earthquake can further compound the potentially catastrophic impacts of a large earthquake event. Fire following earthquake is a major hazard in earthquake-prone areas which are densely developed and have high inventories of wood frame buildings. The capability of fire departments to combat fires following an earthquake is impacted by the regional nature of an earthquake, damage to transportation and water supply systems, and the potential failure of telecommunications. A local fire department may suffer impacts to its personnel, buildings, equipment, and communications systems. Moreover, fewer resources are immediately available as mutual aid – due to the commitment of nearby fire departments responding to the earthquake within their own jurisdictions. Transportation system damage may adversely impact the mobilization of off-duty personnel and fire and rescue mutual aid resources from unaffected areas. Maneuvering fire crews within the affected areas of the earthquake may be impeded by debris or damage to roads and bridges. Additionally, the municipal water supply system which ordinarily supports firefighting operations is likely to be impacted.

Fire following earthquake is an issue that could impact any California community that experiences an earthquake – both urban and rural. According to the FM Global Insurance company, "Fires after earthquakes commonly initiate from electrical or fuel related sources because their use is widespread. In the US, natural gas is a factor 15 to 50 percent of the time, and electrical ignitions account for 40 percent or more of post-earthquake wildfires. Ignitable liquid spills, chemical reactions, and the contact of combustibles with heat sources have also initiated or contributed to many fires after earthquakes."

Location and Extent

California is seismically active because it sits on the boundary between two of the earth's tectonic plates. Most of the state - everything east of the San Andreas Fault (such as Madera) - is on the North American Plate. The cities of Monterey, Santa Barbara, Los Angeles, and San Diego are on the Pacific Plate, which is constantly moving northwest past the North American Plate. The relative rate of movement is about two inches per year. The San Andreas Fault is considered the boundary between the two plates, although some of the motion is taken up on faults as far away as central Utah.

Faults

A fault is defined as "a fracture or fracture zone in the earth's crust along which there has been displacement of the sides relative to one another." For the purpose of planning there are two types of faults, active and inactive. Active faults have experienced displacement in historic time, suggesting that future displacement may be expected. Inactive faults show no evidence of movement in recent geologic time, suggesting that these faults are dormant. 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.

Two types of fault movement represent possible hazards to structures in the immediate vicinity of the fault: fault creep and sudden fault displacement. Fault creep, a slow movement of one side of a fault relative to the other, can cause cracking and buckling of sidewalks and foundations even without perceptible ground shaking. Sudden fault displacement occurs during an earthquake event and may result in the collapse of buildings or other structures that are found along the fault zone when fault displacement exceeds an inch or two. The only protection against damage caused directly by fault displacement is to prohibit construction in the fault zone.

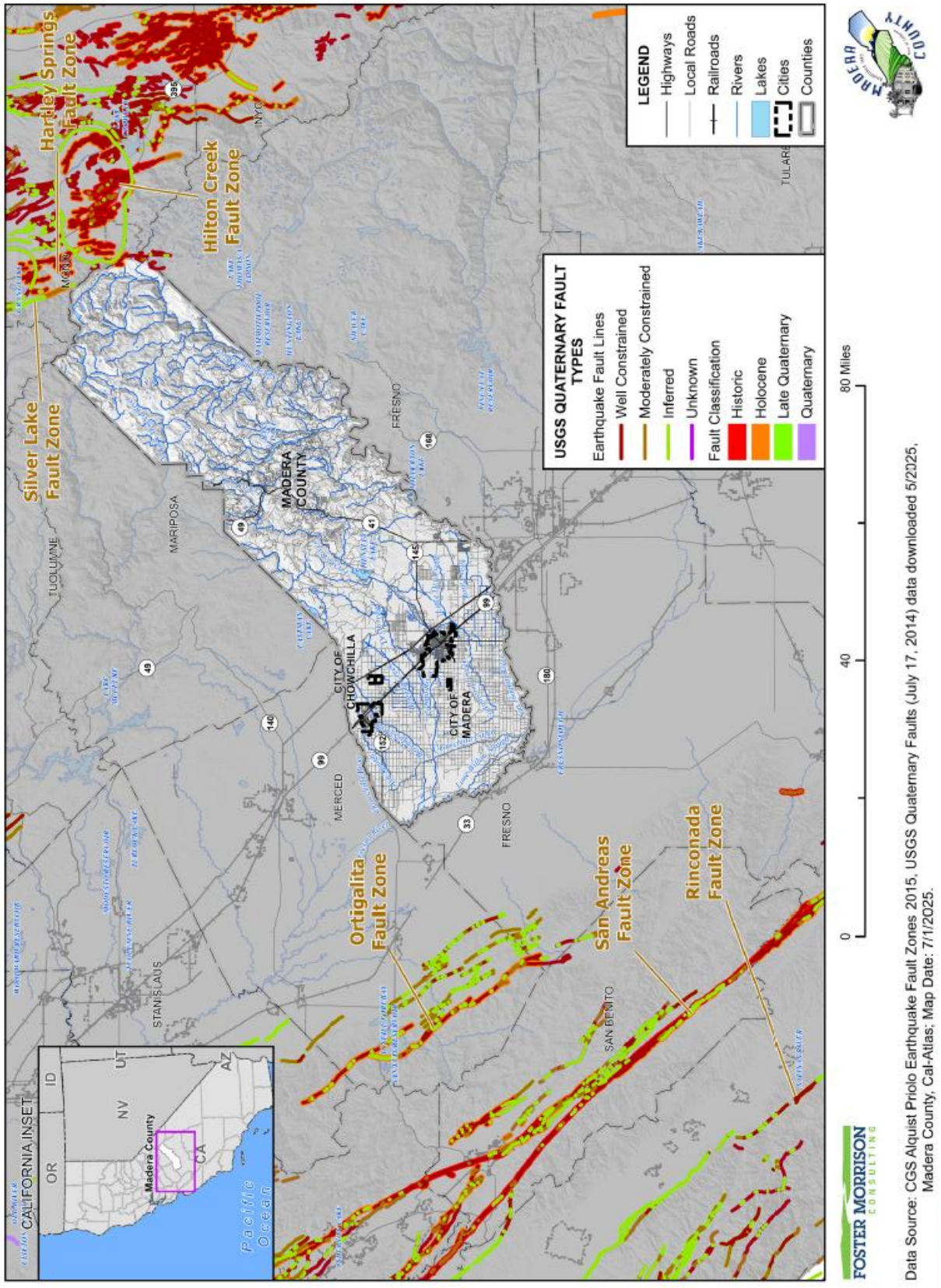
Madera County is in the Central Valley, Foothill, and Sierra Nevada regions of California, and in an area crossed by very few faults. The General Plan noted that one fault does cross through the southeastern portion of Madera County; this is an unnamed fault that is part of the Hartley Springs Fault Zone. Other major fault and fault zones nearby are described in Table 4-90. Figure 4-86 shows fault locations in and near Madera County.

Table 4-90 Faults in and near Madera County

Location to Madera County	Fault Name
Near eastern border	Hartley Springs Fault Zone
	Hilton Creek Fault
	Silver Lake Fault
Approximately 35 miles west	Ortigalita Fault Zone
Approximately 40 miles west	San Andreas Fault Zone
Approximately 50 miles west	Rinconada Fault Zone

Source: California Geological Survey

Figure 4-86 Active Faults in and near Madera County



In addition to the General Plan, the Draft Environmental Impact Report for a state prison project near Fairmead identified faults within a 100-mile radius of the project site. Since Fairmead is centrally located along Highway 99 within the County, this information provides a good indicator of the potential seismic activity which might be felt within Madera County. Fifteen active faults (including the San Andreas and Owens Valley systems) were identified in the Preliminary Geotechnical Investigation. Four of the faults lie along the eastern portion of the Sierra Nevada Range, approximately 75 miles to the northeast of Fairmead. These are the Parker Lake, Hartley Springs, Hilton Creek, and Mono Valley Faults. The remaining faults are in the western portion of the San Joaquin Valley, as well as within the Coast Range, approximately 47 miles west of Fairmead. Most of the remaining 11 faults are "associated with the San Andreas, Calaveras, Hayward, and Rinconada Fault Systems that collectively form the tectonic plate boundary" of the Central Valley. These can be seen on Table 4-91 along with the maximum probable earthquake event associated with each fault.

Table 4-91 Maximum Probable Earthquake Events in or near Madera County

Fault or Fault System	Distance and Direction from Fairmead area (miles)	Fault Length (miles)	Slip Rate (mm/year)	Recurrence Interval (years)	Maximum Credible Magnitude and Intensity		Maximum Probable Magnitude and Intensity	
					(M)	(MM)	(M)	(MM)
Calaveras	71, NW	19	7.0	150	7.00	V	6.50	V
Greenville	73, NW	17	0.7	3,585	7.00	V	5.25	IV
Hartley Springs	75, NE	10	0.2	8,424	6.75	V	4.75	III
Hayward	81, NW	31	4.0	556	7.00	V	6.75	IV
Hilton Creek Region	81, NE	10	2.0	554	7.00	V	6.50	IV
Los Positas	91, NW	8	1.6	872	6.50	IV	4.50	III
Mono Valley	81, NE	18	7.5	557	7.00	V	6.50	IV
Ortigalita	47, SW	13	0.04	10,000	6.75	VI	4.50	IV
Parker Lake	72, NE	21	0.5	3,083	6.75	V	5.75	III
Rinconada	84, SW	75	2.4	140	7.00	V	6.00	IV
San Andreas (Creep)	67, SW	22	34	140	7.00	VI	6.00	IV
San Andreas (Mojave)	95, SW	202	34	345	8.50	VI	8.25	V
San Andreas (North)	84, W	52	34	228	8.00	VI	7.50	V
San Juan	98, SW	40	NA	NA	7.25	IV	6.25	III
Sargent	76, W	24	1.0	NA	7.00	V	5.75	IV

M = magnitude, as measured by the Richter scale
MM = intensity, as measured by the Modified Mercalli scale (see Table 7-1)
NA = not available

Source: Draft Environmental Impact Report for the California State Prison Madera County

In addition, the Clovis fault (although there is no historic evidence of its activity) is considered to be active within quaternary time (within the past two million years) and is thus classified as "potentially active." This fault lies approximately six miles south of the Madera County line, in Fresno County.

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. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). 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 Richter 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 (see Table 4-92). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4-92 Modified Mercalli Intensity (MMI) Scale

MMI	Felt Intensity
I	Not felt except by a very few people under special conditions. Detected mostly by instruments.
II	Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III	Felt noticeably indoors. Standing automobiles may rock slightly.
IV	Felt by many people indoors; by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.
VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, and great in poorly built structures. Heavy furniture is overturned.
IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.

Source: Multi-Hazard Identification and Risk Assessment, FEMA 1997

Other Hazards

Earthquakes can also cause landslides and dam failures. Earthquakes may cause landslides (discussed in Section 4.3.13), particularly during the wet season, in areas of high water or saturated soils. Finally, earthquakes can cause dams to fail (see Section 4.3.7 Dam Failure). Earthquakes can also cause levees to fail (see Section 4.3.11 Flood: 1%/0.2% Annual Chance in the levee failure section).

NCDC Events

Earthquake events are not tracked by the NCDC database.

Past Occurrences

Disaster Declaration History

There have been no disaster declarations in the County related to earthquakes, as shown on Table 4-4.

USGS Events

The United States Geologic Survey (USGS) National Earthquake Information Center database contains data on earthquakes in the Madera County area. Table 4-93 shows the approximate distances earthquakes can be felt away from the epicenter. According to the table, a magnitude 5.0 earthquake could be felt up to

90 miles away. The USGS database was searched for magnitude 5.0 or greater on the Richter Scale within 90 miles of the City of Madera in Madera County. These 65 results are detailed in Table 4-94.

Table 4-93 Approximate Relationships between Earthquake Magnitude and Intensity

Richter Scale Magnitude	Maximum Expected Intensity (MM)*	Distance Felt (miles)
2.0 - 2.9	I – II	0
3.0 - 3.9	II – III	10
4.0 - 4.9	IV – V	50
5.0 - 5.9	VI – VII	90
6.0 - 6.9	VII – VIII	135
7.0 - 7.9	IX – X	240
8.0 - 8.9	XI – XII	365

*Modified Mercalli Intensity Scale.

Source: USGS Earthquake Intensity Zonation and Quaternary Deposits, Miscellaneous Field Studies Map 9093, 1977.

*Table 4-94 Magnitude 5.0 Earthquakes or greater within 90 Miles of Madera County**

Date	Richter Magnitude	Location
10/25/2022	5.06	15km ESE of Alum Rock, CA
10/21/2012	5.29	Central California
9/29/2004	5.04	7km WSW of Parkfield, California
9/28/2004	5.97	18km N of Shandon, California
5/15/1999	5.5	Central California
8/12/1998	5.1	Central California
10/24/1990	5.8	Central California
4/18/1990	5.4	Northern California
2/20/1988	5.1	Central California
2/14/1987	5.3	Central California
1/26/1986	5.5	Central California
8/4/1985	5.6	Central California
3/25/1985	5.1	Central California
11/26/1984	5.6	Central California
11/23/1984	6.1	Central California
4/24/1984	6.2	Northern California
9/9/1983	5.47	Central California
7/25/1983	5.04	Central California
7/22/1983	5.37	Central California
7/3/1983	5.3	Central California
6/11/1983	5.4	Central California
5/9/1983	5.2	Central California
5/2/1983	6.7	Central California

Date	Richter Magnitude	Location
1/7/1983	5.4	Long Valley area, California
10/25/1982	5.4	Central California
9/30/1981	5.9	Central California
8/1/1980	5.4	Central California
5/27/1980	6.2	Central California
5/26/1980	5.7	Central California
5/25/1980	6.47	21km ENE of Mammoth Lakes, CA
8/6/1979	5.8	Northern California
10/4/1978	5.1	Central California
11/28/1974	5.2	Central California
6/28/1966	5.47	8km N of Cholame, CA
4/9/1961	5.9	Central California
11/16/1956	5	28km NE of King City, CA

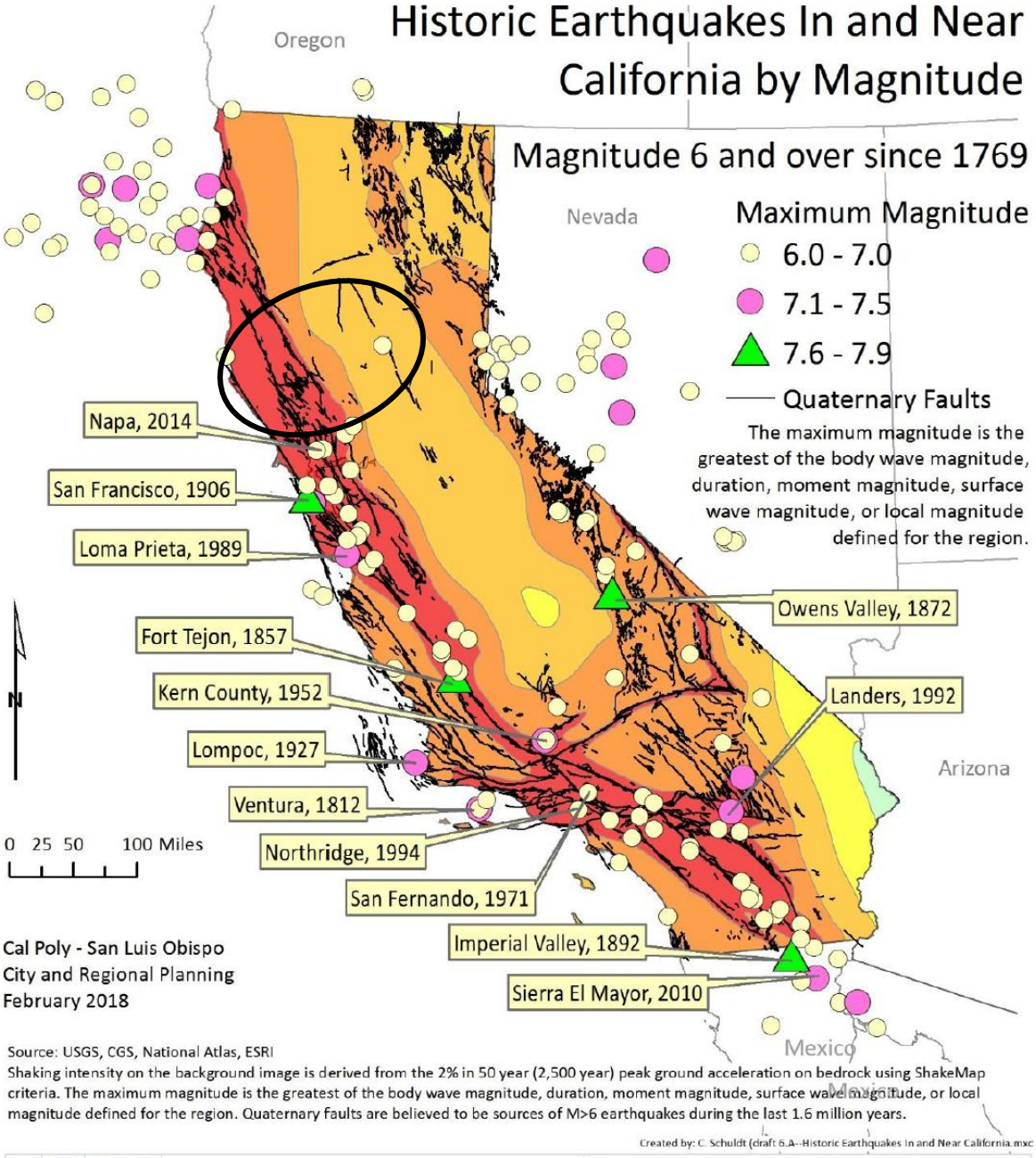
Source: USGS, National Earthquake Information Center
*Search dates 1950 – June 31, 2025

Figure 4-87 shows major historical earthquakes in California from 1769 to 2017. Since 2017, California has experienced four additional 6.0 or greater earthquakes:

- 2022 - 6.4 Ferndal
- 2021 - 6.0 Antelope Valley
- 2019 - 6.4 and 7.1 Ridgecrest

None of these earthquakes (over 6.0) since 2017 have affected the Madera County Planning Area.

Figure 4-87 Historic Earthquakes in California 1769 to 2017



	MMI	Damage	Effects
	X	Very Heavy	Some well-built, wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
	IX	Heavy	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
	VIII	Moderate to Heavy	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
	VII	Moderate	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly-built or badly designed structures; some chimneys broken.
	VI	Light	Felt by all, many frightened. Some heavy furniture moved; a few instance of fallen plaster. Damage slight.
	V	Very Light	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.

Source: 2023 State of California Multi-Hazard Mitigation Plan

Hazard Mitigation Planning Committee Events

The HMPC noted that any earthquakes in the Mammoth Basin or West side of Fresno County are felt by residents. There has been no reportable damage after incidents, just basic reports of ground rolling.

Hazard Mitigation Planning Committee Events

These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring previous to the 2018 LHMP.

Events since 2018 LHMP

In **October of 2022** there was felt shaking in the County from a distant 5.06 event. People ran outside to see what was going on during this event. No damages were reported.

The USACE noted that over the past 5 years, there have been earthquakes in the area that have triggered an activation of dam staff (though no dam events occurred due to the shaking). This includes the following:

- At 10:46 hours on June 24th, 2020, Buchanan staff felt the 5.8 magnitude earthquake that was located near Lone Pine , CA 113 miles south east of the Buchanan Dam.
- At 15:49 hours on July 8th, 2021, Buchanan staff felt the 5.9 magnitude earthquake that was located near Smith Valley NV 113 miles north east of the Buchanan Dam.
- At 21:51 hours on October 4th, 2022, a 3.0 magnitude earthquake occurred near Mariposa, CA 7 miles northeast of the Buchanan Dam and 4 miles east of the Mariposa Dam.
- At 19:09 hours on 30 Mar 2022, a 4.0 MAG earthquake occurred near Round Valley, CA 77 miles northeast of the Buchanan Dam. Then at 0316 hours, a 2.4 magnitude earthquake occurred near Cathey Valley, CA 6.2 miles northeast of the Buchanan Dam.
- On December 9th, 2024, at 16:20 hours, a5.8 magnitude earthquake occurred near Yerington NV, CA 141 miles northeast of the Buchanan Dam

Events prior to 2018 LHMP

No notable events could be recalled.

Likelihood of Future Occurrence

Unlikely (major earthquake); Likely (minor earthquake) – No major earthquakes have been recorded within the County; although the County has felt ground shaking from earthquakes with epicenters located elsewhere. However, the possibility of an earthquake is an ever-present phenomenon in California and Madera County. The combination of plate tectonics and associated California coastal mountain range building geology essentially guarantees earthquake as a result of the periodic release of tectonic stresses.

Occasional — The western half of Madera County is in the lowest Earthquake Shaking Potential for California. It is likely that the region could be impacted by future seismic activity and with the exception of the far eastern edge of the County, the magnitude of the incident is not likely to be severe.

It is likely that climate change will not affect the chance of future occurrence as well as future impacts of earthquake events. More information on climate change and earthquake can be found below the Mapping of Future Occurrences section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Mapping of Future Occurrences

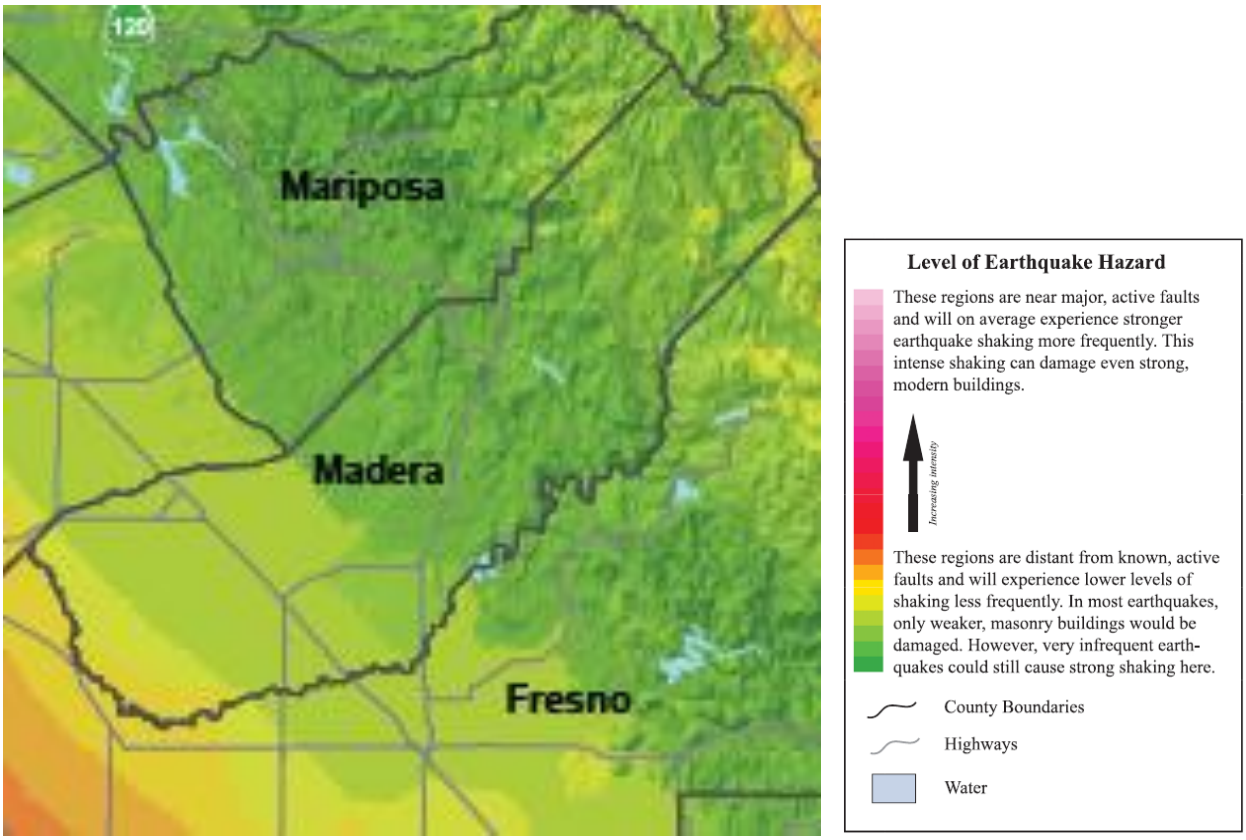
Mapping of future occurrences is presented in the following sections:

- CGS Analysis
- UCERF Analysis

California Geological Survey (CGS) Analysis

Maps indicating the maximum expectable intensity of ground shaking for the County are available through several sources. Figure 4-88, prepared in 2016 by the California Division of Mines and Geology, shows the expected relative intensity of ground shaking and damage in California from anticipated future earthquakes. The shaking potential is calculated as the level of ground motion that has a 2% chance of being exceeded in 50 years, which is the same as the level of ground-shaking with about a 2,500-year average repeat time. The County is in the low to moderate risk area. It should be noted that although the greatest hazard is in areas of highest intensity as shown on the map, no region is immune from potential earthquake damage.

Figure 4-88 Maximum Expectable Earthquake Intensity – 2% Chance in 50 Years

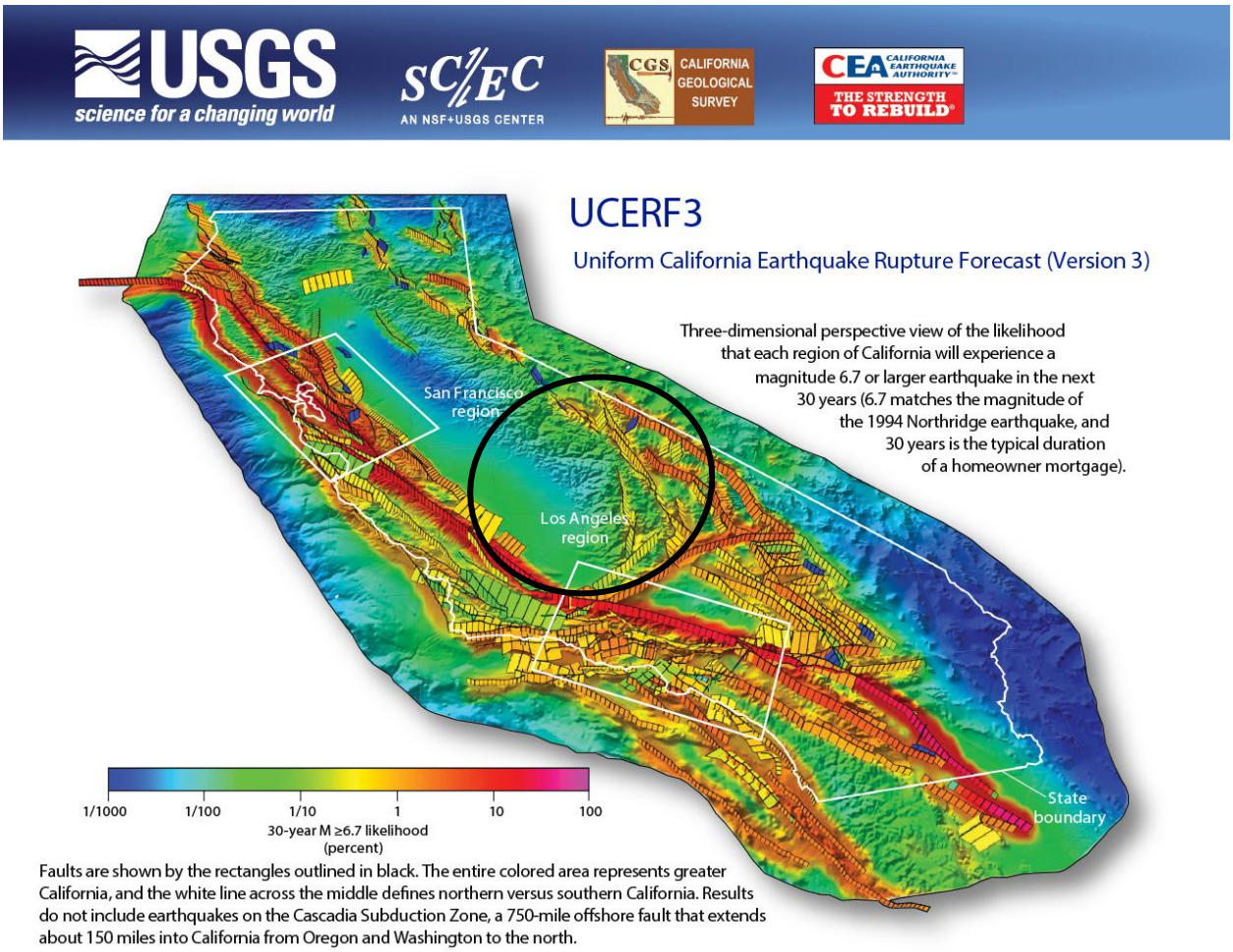


Source: California Division of Mines and Geology (2016)

UCERF Analysis

In 2014, the USGS and the CGS released the time-dependent version of the Uniform California Earthquake Rupture Forecast (UCERF III) model. The UCERF III results have helped to reduce the uncertainty in estimated 30-year probabilities of strong ground motions in California. The UCERF map is shown in Figure 4-89 and indicates that Madera County has a low to moderate risk of earthquake occurrence.

Figure 4-89 Probability of Earthquake Magnitudes Occurring in 30 Year Time Frame



Source: United States Geological Survey Open File Report 2015-3009

Climate Change and Earthquake

Climate change is unlikely to increase earthquake frequency or strength.

Vulnerability Assessment

Vulnerability—Medium/High

Earthquake vulnerability is primarily based on population and the built environment. Urban areas in high seismic hazard zones are the most vulnerable, while more rural areas, such as much of Madera County are less vulnerable. The primary impacts of concern are life safety and property damage. Several faults are in and near the Madera County Planning Area, and seismic hazard mapping indicates that the Planning Area has low to moderate seismic hazard potential. Depending on the location and magnitude of an earthquake event, some degree of structural damage due to stronger seismic shaking could be expected.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has certain specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce the risk and vulnerability to this hazard.

General Concerns

Seismic events can have particularly negative effects on older buildings constructed of URM, including materials such as brick, concrete and stone. The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. Madera County is within the less hazardous Zone 3. Madera County noted there are no URM or soft story buildings in the unincorporated County.

The County noted that the valley portion of Madera County is located on alluvium deposits, which tend to experience greater groundshaking intensities than areas located on hard rock. Therefore, structures located in the valley will tend to suffer greater damage from groundshaking than those located in the foothill and mountain areas. However, there are alluvium valleys and weathered or decomposed zones scattered throughout the mountainous portion of the County which could also experience stronger intensities than the surrounding solid rock areas. The geological characteristics of an area can thus be a greater hazard than its distance to the epicenter of the quake.

The County noted that the Clovis fault (although there is no historic evidence of its activity) is considered to be active within quaternary time (within the past two million years) and is thus classified as "potentially active." Activity along this fault could potentially generate more seismic activity in Madera County than the San Andreas or Owens Valley fault systems. In particular, a strong earthquake on the Clovis fault could affect southern and western Madera County. However, because of the lack of historic activity along the Clovis fault, there is inadequate evidence for assessing maximum earthquake impacts.

Local concerns for each of the jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from earthquake include people and populations; structures; critical facilities and infrastructure and community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented below. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

People and Populations

All people and populations are at risk from earthquake shaking and other subhazards related to an earthquake event. Those at heightened risk include:

- The unsheltered
- Infants and children under age five and their caregivers
- Seniors (65 and older)
- Individuals with disabilities
- Individuals dependent on medical equipment
- Individuals with impaired mobility

The greatest risk to people and populations from earthquake is death and injury. More information on people and populations at risk to earthquake shaking events can be seen in the Hazus scenarios developed for this LHMP and described in the Hazus Analysis section below.

Structures

All structures in the Madera County Planning Area are vulnerable to earthquakes, depending on the severity and location of the shake. Older buildings, URM, and soft story buildings are at a much greater risk to earthquakes. More information on structures at risk can be seen in the Hazus scenarios below.

Critical Facilities and Infrastructure

Earthquakes present a tremendous threat to critical facilities and infrastructure. More information on structures at risk can be seen in the Hazus scenarios below.

Natural, Historic, and Cultural Resources

The 2023 State Hazard Mitigation Plan noted that environmental problems from earthquakes can be numerous. Earthquakes can significantly damage surrounding habitats. It is also possible for earthquakes to reroute streams, which can change the water quality, possibly damaging habitat and feeding areas. Streams fed by groundwater and/or springs may dry up because of changes in underlying geology. Another threat to the environment from earthquakes is the potential release of hazardous materials. Historical and cultural resources are at risk, often due to their age and construction types. The Hazus scenarios below are relatively silent on the vulnerability to natural, historic, and cultural resources, but impacts to these resources could be long lasting.

Hazus Analysis

Earthquake losses will vary across the Madera County Planning Area depending on the source and magnitude of the event. To further evaluate potential losses associated with earthquake activity in the Planning Area, four Hazus-MH earthquake scenarios were run for this 2026 LHMP Update as detailed below.

FEMA's Hazus model, utilizing GIS technology, estimates potential losses from earthquakes by analyzing the built environment, including buildings, infrastructure, and population, along with hazard data and damage functions. The model incorporates inventory information about buildings, infrastructure (roads, utilities, etc.), and population to assess the potential impact of a hazard. It uses hazard-specific data, such as earthquake intensity and employs damage functions that relate the intensity of the hazard to the level of damage to buildings and infrastructure based on research and historical data. By combining the inventory, hazard, and damage function data, HAZUS estimates the potential losses in terms of direct physical damage, induced damage, and direct losses (e.g., building damage, debris generation, casualty rates, economic impacts). The results of HAZUS analysis can be used to identify vulnerable areas, prioritize mitigation actions, and develop disaster preparedness plans.

Hazus-MH 6.1 was utilized to model earthquake losses for the County. Level 1 analyses were run, meaning that the default data was used and was not supplemented with local building inventory or hazard data. This is a planning level analysis.

HAZUS Level 1 Runs

General Description of the Region: Madera County, California

- The geographical size of the region is 2,154.20 square miles and contains 34 census tracts.
- There are over 45,000 households in the region which has a total population of 156,255 people.
- There are an estimated 50,000 buildings in the region with a total building replacement value (excluding contents) of 27,667 (millions of dollars). Approximately 90.00 % of the buildings (and 65.00% of the building value) are associated with residential housing.
- The replacement value of the transportation and utility lifeline systems is estimated to be 2,656 and 3,290 (millions of dollars), respectively.

Hazus Scenarios

These events were chosen from data gathered from the Madera County General Plan Safety Element and the USGS' seismic scenarios catalog. For deterministic Hazus scenarios, a single scenario event is selected based on a specific fault, the epicenter location, and the potential magnitude of the event.

Table 4-95 Hazus Scenario Data from the USGS Earthquake Hazards Program Catalog

Earthquake Fault	**Hartley Springs**
Epicenter	37.760°N 118.943°W
Epicenter Location Description	Approximately 4 miles to the northeast of the county boundary
Scenario	Hartley Springs
Ruptures	Hartley Springs

Magnitude	6.77
MMI	8.39
Event ID	bssc2014hartleysprings2011cf_m6p77_se
URL	https://earthquake.usgs.gov/scenarios/eventpage/bssc2014hartleysprings2011cf_m6p77_se/executive
Earthquake Fault	**Ortigalita (South)**
Epicenter	36.870°N 120.976°W
Epicenter Location Description	Approximately 30 miles to the west of the county boundary
Scenario	Ortigalita (South)
Ruptures	Ortigalita (South)
Magnitude	7.01
MMI	8.63
Event ID	bssc2014ortigalitasouthshaw0_m7p01_se
URL	https://earthquake.usgs.gov/scenarios/eventpage/bssc2014ortigalitasouthshaw0_m7p01_se/executive
Earthquake Fault	**Owens Valley**
Epicenter	36.777°N 118.121°W
Epicenter Location Description	Approximately 75 miles to the southeast of the county boundary
Scenario	Owens Valley
Ruptures	Owens Valley
Magnitude	7.38
MMI	8.82
Event ID	bssc2014owensvalleyshaw09mod_m7p38_se
URL	https://earthquake.usgs.gov/scenarios/eventpage/bssc2014owensvalleyshaw09mod_m7p38_se/executive
Earthquake Fault	**San Andreas (Santa Cruz Mts)**
Epicenter	36.981°N 121.749°W
Epicenter Location Description	Approximately 65 miles to the west of the county boundary
Scenario	San Andreas (Santa Cruz Mts)
Ruptures	San Andreas (Santa Cruz Mts)
Magnitude	7.15
MMI	8.72
Event ID	bssc2014sanandreassantacruzm_m7p15_se
URL	https://earthquake.usgs.gov/scenarios/eventpage/bssc2014sanandreassantacruzm_m7p15_se/executive

Source: Hazus MH 6.1

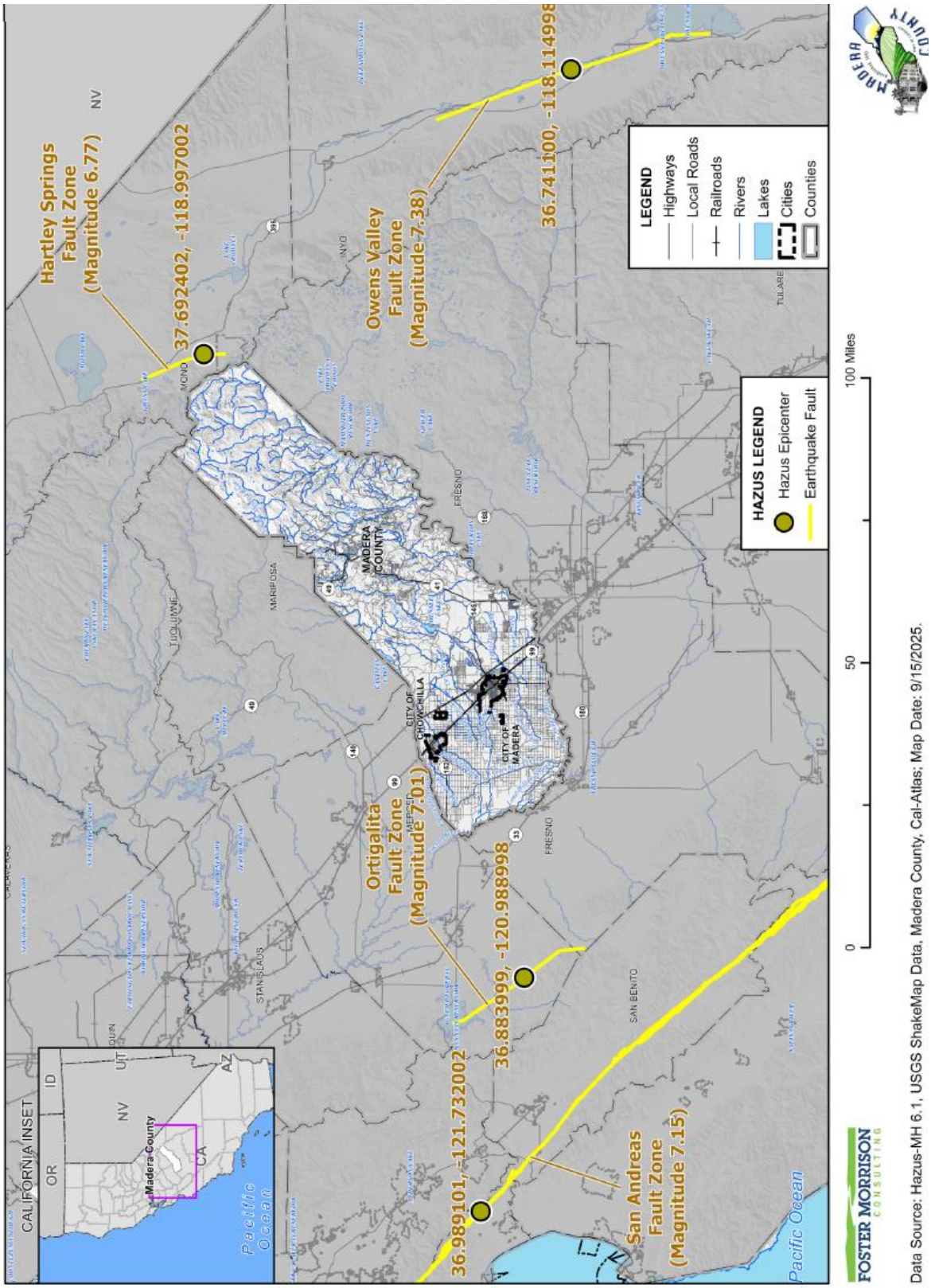
* Hazus analyses are performed on the Deterministic Source Event Scenarios

The earthquake scenarios are selected for analysis based on the earthquake fault availability in the FEMA Hazus-MH 6.1 Tool and the corresponding earthquake scenario availability through the USGS Earthquake Hazards Program Data Catalog.

Some earthquake faults of concern noted in the 2020 Madera County LHMP and the County Safety Element were NOT available in either the USGS Catalog or in Hazus, and therefore were not available for analysis. These faults include: San Joaquin and Melones Faults.

These Hazus scenarios can be seen on Figure 4-90 and are captured in totality in Appendix H. Summary Hazus results follow the Figure, and include summary tables of all Hazus scenario runs and a Hazus scenario comparison table.

Figure 4-90 Madera County Planning Area – Hazus Earthquake Faults and Epicenter Locations



Hartley Springs Fault 6.77 Hazus Scenario

The Hartley Springs Fault deterministic scenario was developed utilizing data from the County General Plan and based on a seismic scenario obtained from the USGS seismic scenario catalog.

The results of the deterministic scenario are captured in Table 4-96. Key losses included the following:

- 44 buildings in the County were at least moderately damaged. No buildings were completely destroyed.
- Before the earthquake, the region had 462 hospital beds available for use. On the day of the earthquake, the model estimates that only 460 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake.
- No households experienced a loss of potable water the first day after the earthquake.
- No households experienced a loss of electricity the first day after the earthquake.
- Regardless of the time of earthquake, none had casualties.
- Total economic loss estimated for the earthquake was $50,090,000, which includes building losses and lifeline losses based on the Hazus-MH inventory.
- The total building-related losses were $6,740,000; 14 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 61 % of the total loss.

Table 4-96 Madera County Planning Area – Hartley Springs Fault 6.77 Magnitude Deterministic Scenario Results

Type of Impact	Hartley Springs 6.77 Deterministic Scenario	
Total Buildings Damaged (based on 50,334 buildings)	Slight: 252 Moderate: 42 Extensive: 2 Complete: 0	
Damage to Essential Facilities	None with at least moderate damage	
Damage to Transportation Systems	None with at least moderate damage	
Damage to Utility Systems	No facilities with at least moderate damage. 3 potable water line breaks, 2 wastewater line breaks, and 0 natural gas line breaks.	
Households without Power/Water Service (Based on 45,607 total households)	Power loss, Day 1: 0 Power loss, Day 3: 0 Power loss, Day 7: 0 Power loss, Day 30: 0 Power loss, Day 90: 0	Water loss, Day 1: 0 Water loss, Day 3: 0 Water loss, Day 7: 0 Water loss, Day 30: 0 Water loss, Day 90: 0
Debris Generation	1,000 tons	
Displaced Households	0 displaced households	
Shelter Requirements	0 persons	
Casualties (Based on 2 a.m. time of occurrence)	Without requiring hospitalization: 1 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	
Casualties (Based on 2 p.m. time of occurrence)	Without requiring hospitalization: 1 Requiring hospitalization: 0 Life threatening: 0	

Type of Impact	Hartley Springs 6.77 Deterministic Scenario
	Fatalities: 0
Casualties (Based on 5 p.m. time of occurrence)	Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Total Economic Losses (Includes building, income and lifeline losses)	$51,090,000
Building and Income Related Losses	$6,740,000

Source: Hazus 6.1

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.). The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Figure 4-91 shows the peak ground acceleration due to the Hartley Springs Fault 6.77 earthquake. Figure 4-92 shows the total losses by census tract in Madera County due to the Hartley Springs Fault 6.77 earthquake.

Figure 4-91 Madera County Planning Area – Hartley Springs Fault 6.77 Magnitude Peak Ground Accelerations

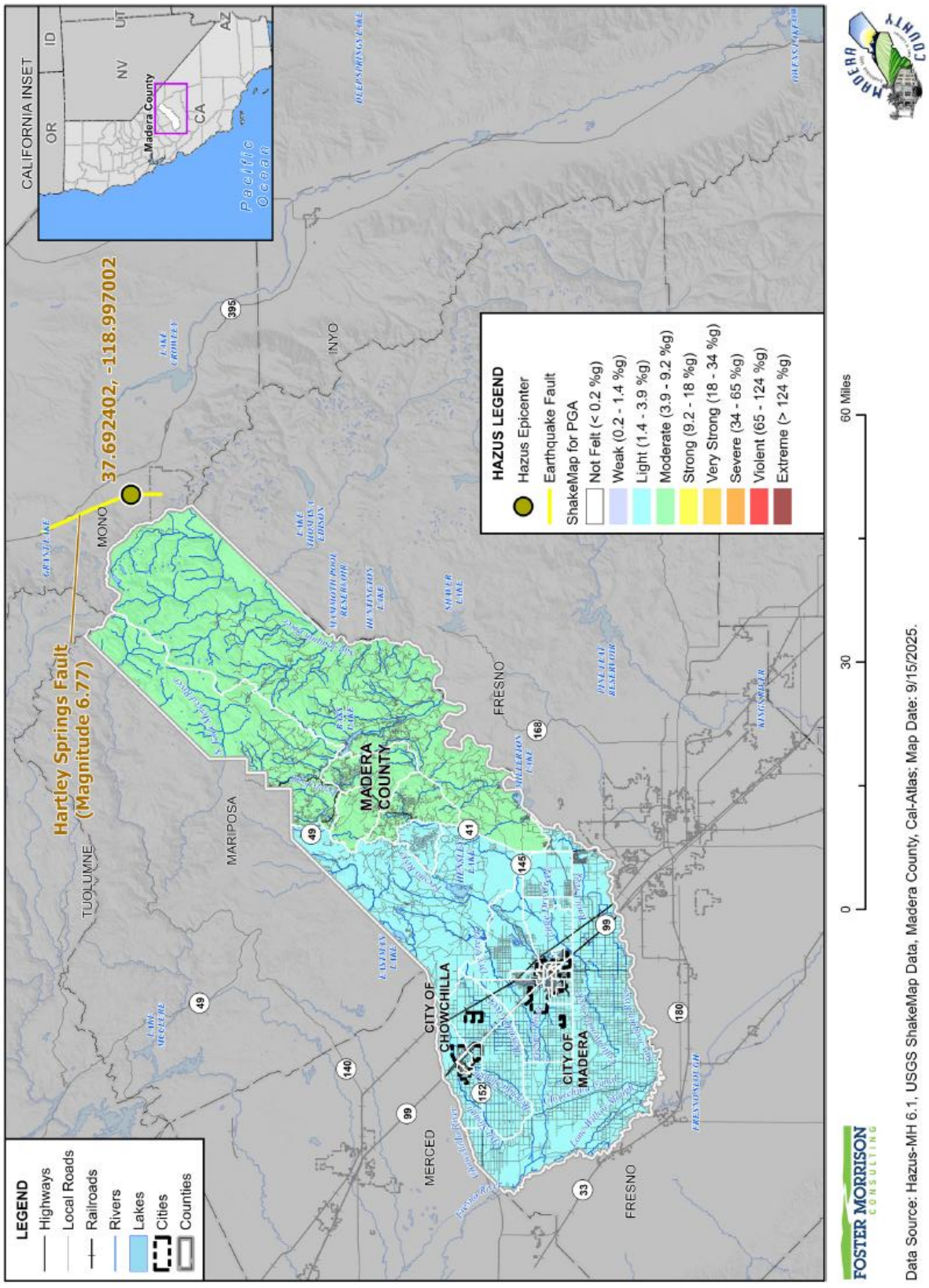
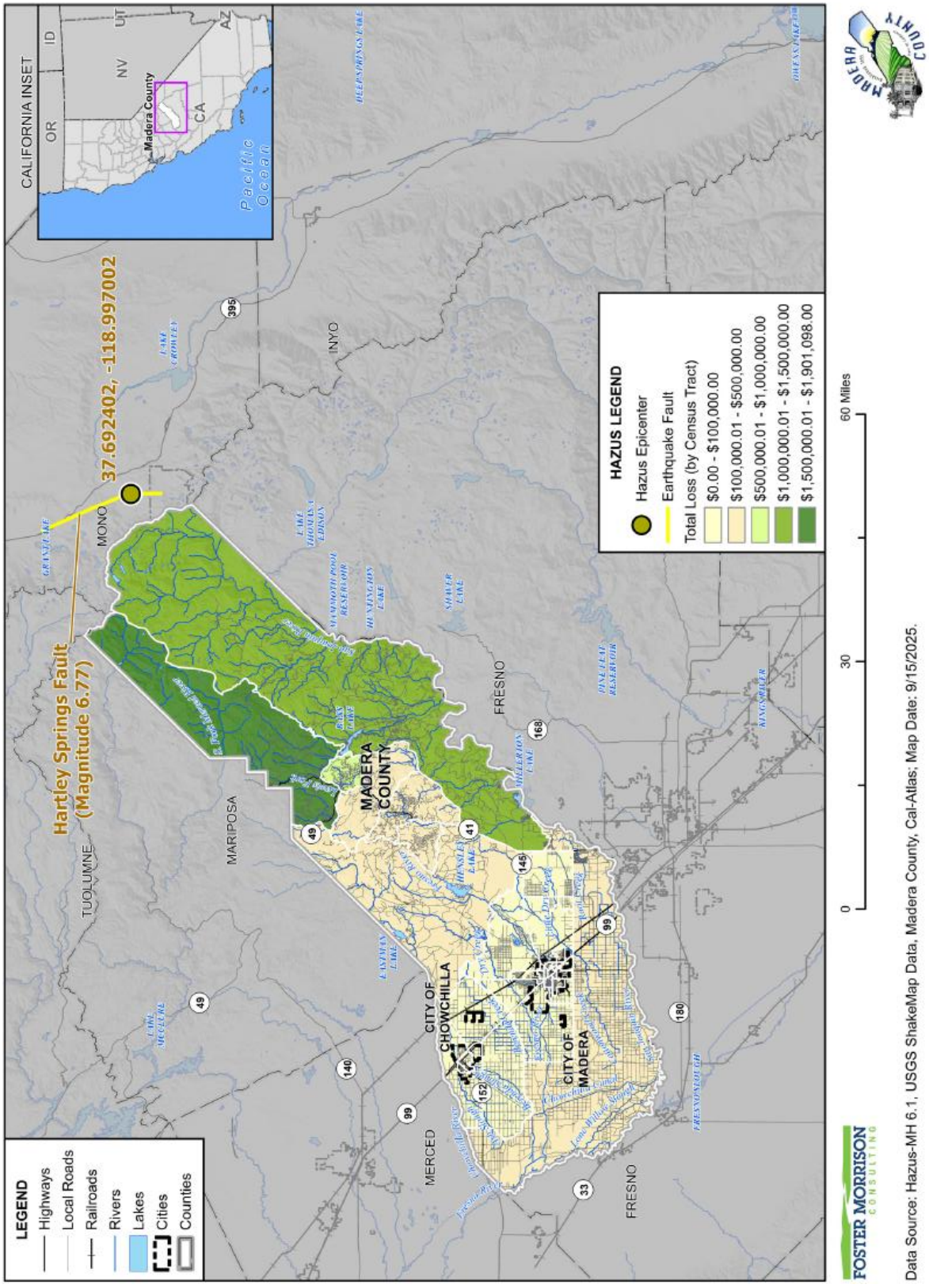


Figure 4-92 Madera County Planning Area – Hartley Springs Fault 6.77 Magnitude Hazus Total Loss



Orgalita Fault 7.01 Hazus Scenario

The Orgalita Fault deterministic scenario was developed utilizing data from the County General Plan and based on a seismic scenario obtained from the USGS seismic scenario catalog.

The results of the deterministic scenario are captured in Table 4-97. Key losses included the following:

- 91 buildings in the County were at least moderately damaged. No buildings were completely destroyed.
- Before the earthquake, the region had 462 hospital beds available for use. On the day of the earthquake, the model estimates that only 455 hospital beds (99.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service.
- No households experienced a loss of potable water the first day after the earthquake.
- No households experienced a loss of electricity the first day after the earthquake.
- The mid-afternoon model had the largest number of estimated casualties with 3.
- Total economic loss estimated for the earthquake was $38,660,000, which includes building losses and lifeline losses based on the Hazus-MH inventory.
- The total building-related losses were 30,300,000; 12 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up over 47 % of the total loss.

Table 4-97 Madera County Planning Area – Orgalita Fault 7.01 Magnitude Deterministic Scenario Results

Type of Impact	Orgalita 7.01 Deterministic Scenario	
Total Buildings Damaged (based on 50,334 buildings)	Slight: 706 Moderate: 87 Extensive: 4 Complete: 0	
Damage to Essential Facilities	None with at least moderate damage	
Damage to Transportation Systems	None with at least moderate damage	
Damage to Utility Systems	No facilities with at least moderate damage. 9 potable water line breaks, 4 wastewater line breaks, and 0 natural gas line breaks.	
Households without Power/Water Service (Based on 45,607 total households)	Power loss, Day 1: 0 Power loss, Day 3: 0 Power loss, Day 7: 0 Power loss, Day 30: 0 Power loss, Day 90: 0	Water loss, Day 1: 0 Water loss, Day 3: 0 Water loss, Day 7: 0 Water loss, Day 30: 0 Water loss, Day 90: 0
Debris Generation	4,000 tons	
Displaced Households	1 displaced households	
Shelter Requirements	1 persons	
Casualties (Based on 2 a.m. time of occurrence)	Without requiring hospitalization: 2 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	
Casualties (Based on 2 p.m. time of occurrence)	Without requiring hospitalization: 3 Requiring hospitalization: 0	

Type of Impact	Orgalita 7.01 Deterministic Scenario
	Life threatening: 0 Fatalities: 0
Casualties (Based on 5 p.m. time of occurrence)	Without requiring hospitalization: 2 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Total Economic Losses (Includes building, income and lifeline losses)	$38,660,000
Building and Income Related Losses	$30,300,000

Source: Hazus 6.1

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.). The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Figure 4-93 shows the peak ground acceleration due to the Orgalita 7.01 earthquake. Figure 4-94 shows the total losses by census tract in Madera County due to the Orgalita 7.01 earthquake.

Figure 4-93 Madera County Planning Area – Orgalita 7.01 Magnitude Hazus Peak Ground Acceleration

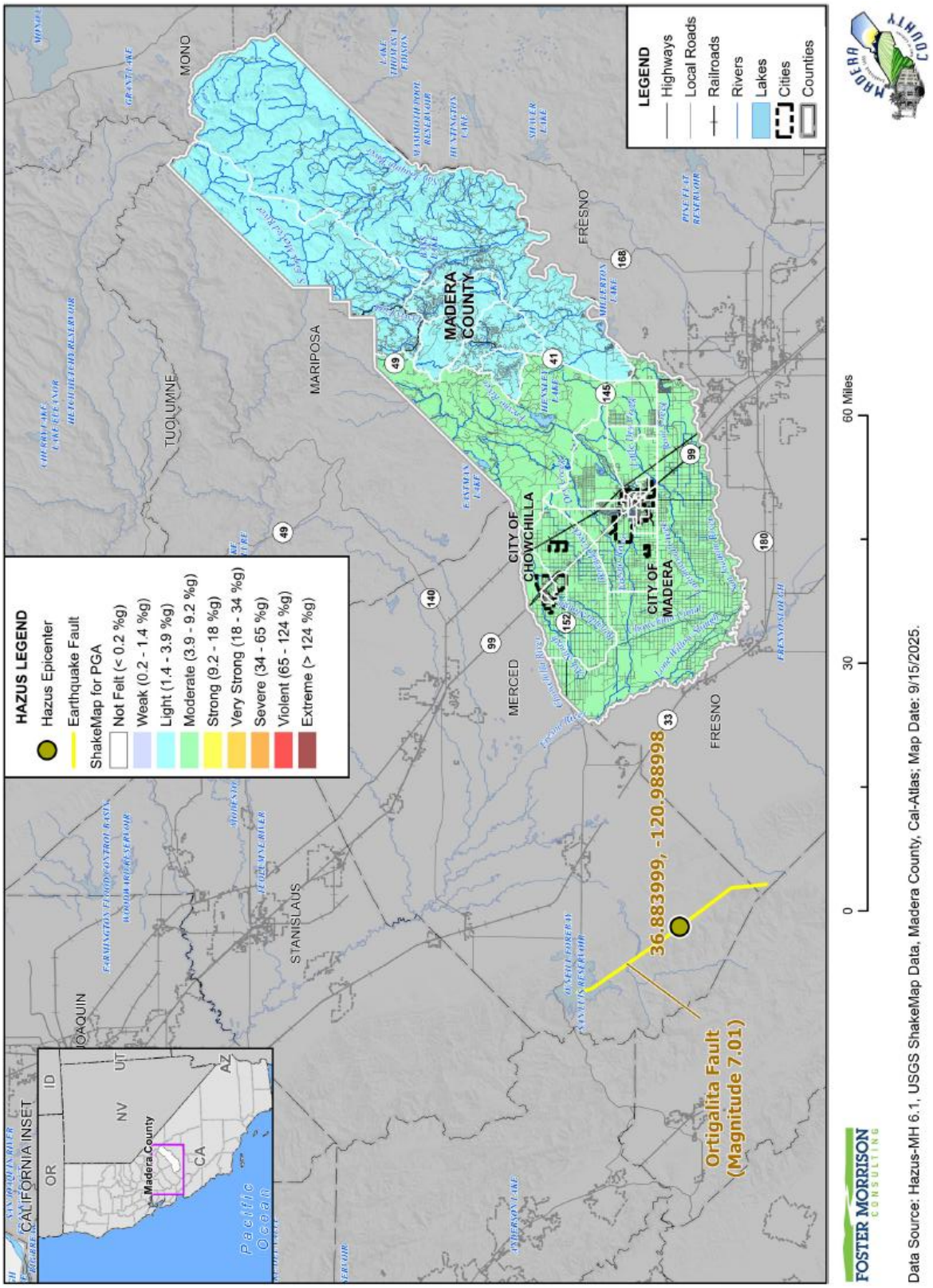
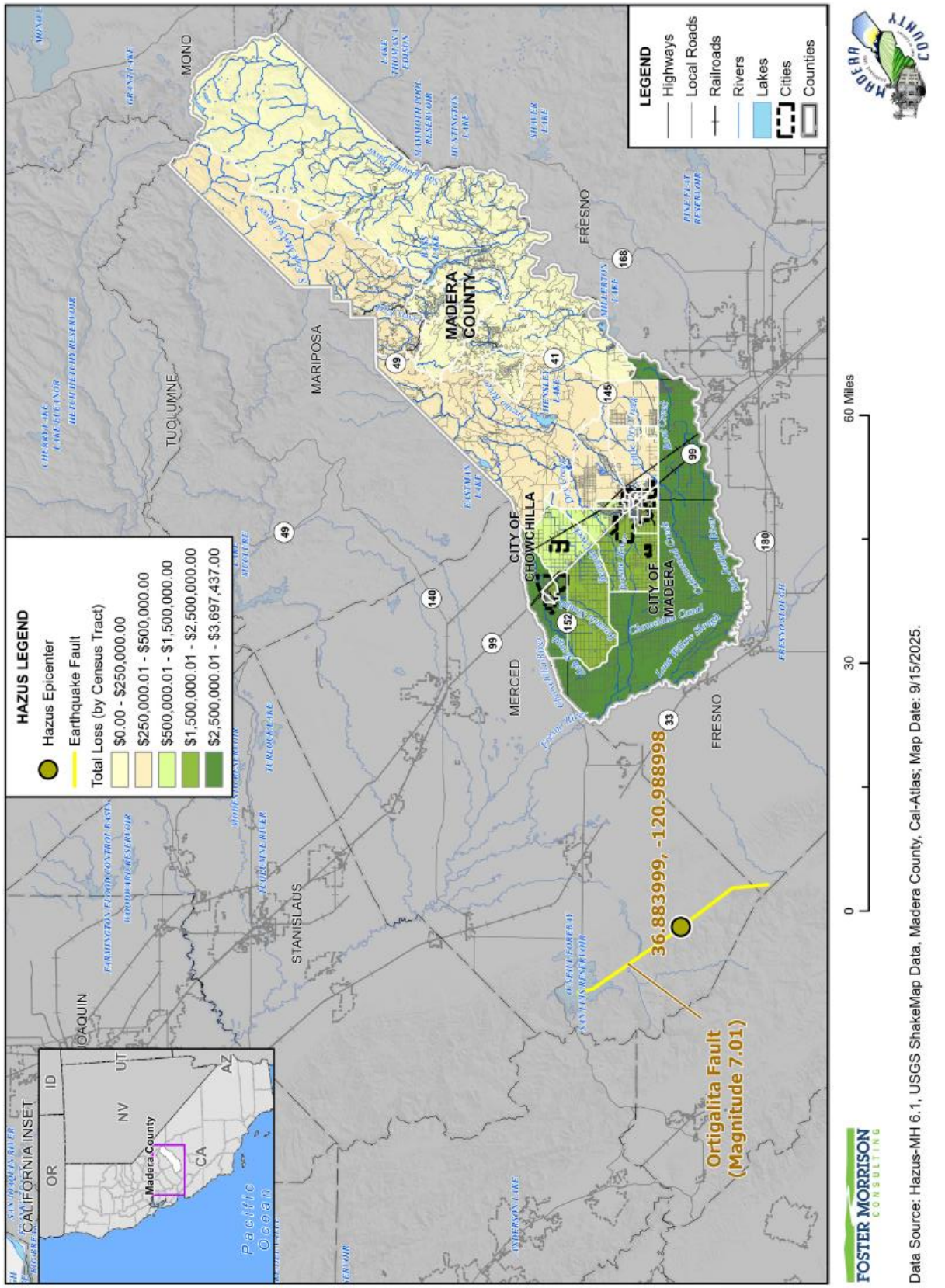


Figure 4-94 Madera County Planning Area – Orgalita 7.01 Magnitude Hazus Total Loss



Owens Valley 7.38 Hazus Scenario

The Owens Valley Fault deterministic scenario was developed utilizing data from the County General Plan and based on a seismic scenario obtained from the USGS seismic scenario catalog.

The results of the probabilistic scenario are captured in Table 4-98. Key losses included the following:

- 22 buildings in the County were at least moderately damaged. No buildings were completely destroyed.
- Before the earthquake, the region had 462 hospital beds available for use. On the day of the earthquake, the model estimates that only 460 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake.
- No households experienced a loss of potable water the first day after the earthquake.
- No households experienced a loss of electricity the first day after the earthquake.
- Regardless of the time of earthquake, none had casualties.
- Total economic loss estimated for the earthquake was $28,070,000, which includes building losses and lifeline losses based on the Hazus-MH inventory.
- The total building-related losses were $3,390,000; 14 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 60% of the total loss.

Table 4-98 Madera County Planning Area – Owens Valley 7.38 Deterministic Scenario Results

Type of Impact	Owens Valey 7.38 Deterministic Scenario	
Total Buildings Damaged (based on 50,334 buildings)	Slight: 140 Moderate: 21 Extensive: 1 Complete: 0	
Damage to Essential Facilities	None with at least moderate damage	
Damage to Transportation Systems	None with at least moderate damage	
Damage to Utility Systems	No facilities with at least moderate damage. 5 potable water line breaks, 3 wastewater line breaks, and 0 natural gas line breaks.	
Households without Power/Water Service (Based on 45,607 total households)	Power loss, Day 1: 0 Power loss, Day 3: 0 Power loss, Day 7: 0 Power loss, Day 30: 0 Power loss, Day 90: 0	Water loss, Day 1: 0 Water loss, Day 3: 0 Water loss, Day 7: 0 Water loss, Day 30: 0 Water loss, Day 90: 0
Debris Generation	0 tons	
Displaced Households	0 displaced households	
Shelter Requirements	0 persons	
Casualties (Based on 2 a.m. time of occurrence)	Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	
Casualties (Based on 2 p.m. time of occurrence)	Without requiring hospitalization: 1 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	

Type of Impact	Owens Valey 7.38 Deterministic Scenario
Casualties (Based on 5 p.m. time of occurrence)	Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Total Economic Losses (Includes building, income and lifeline losses)	$28,070,000
Building and Income Related Losses	$3,390,000

Source: Hazus 6.1

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.). The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Figure 4-95 shows the peak ground acceleration due to the Owens Valley 7.38 earthquake. Figure 4-96 shows the total losses by census tract in Madera County due to the Owens Valley 7.38 earthquake.

Figure 4-95 Madera County Planning Area – Owens Valley 7.38 Magnitude Hazus Peak Ground Acceleration

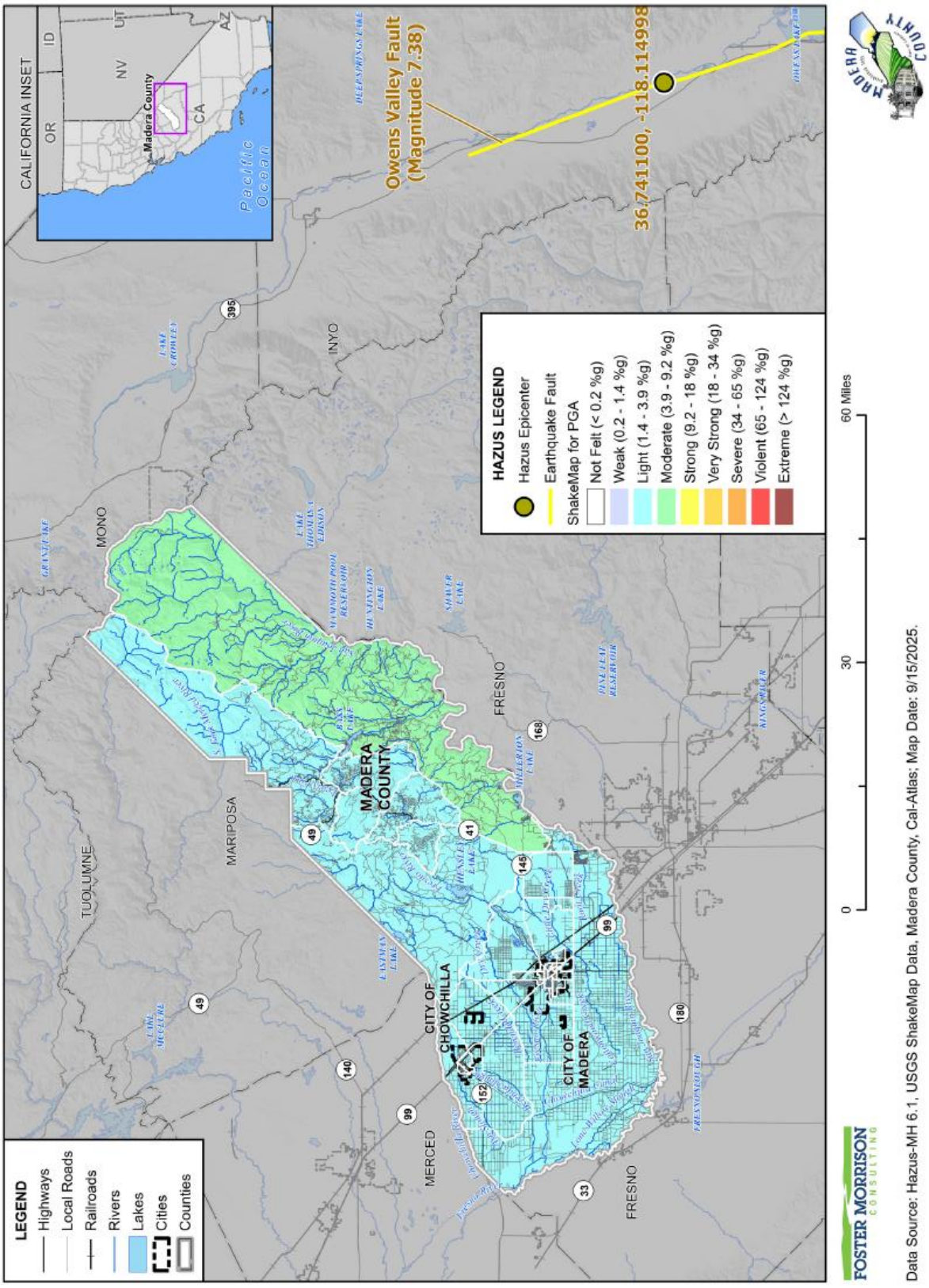
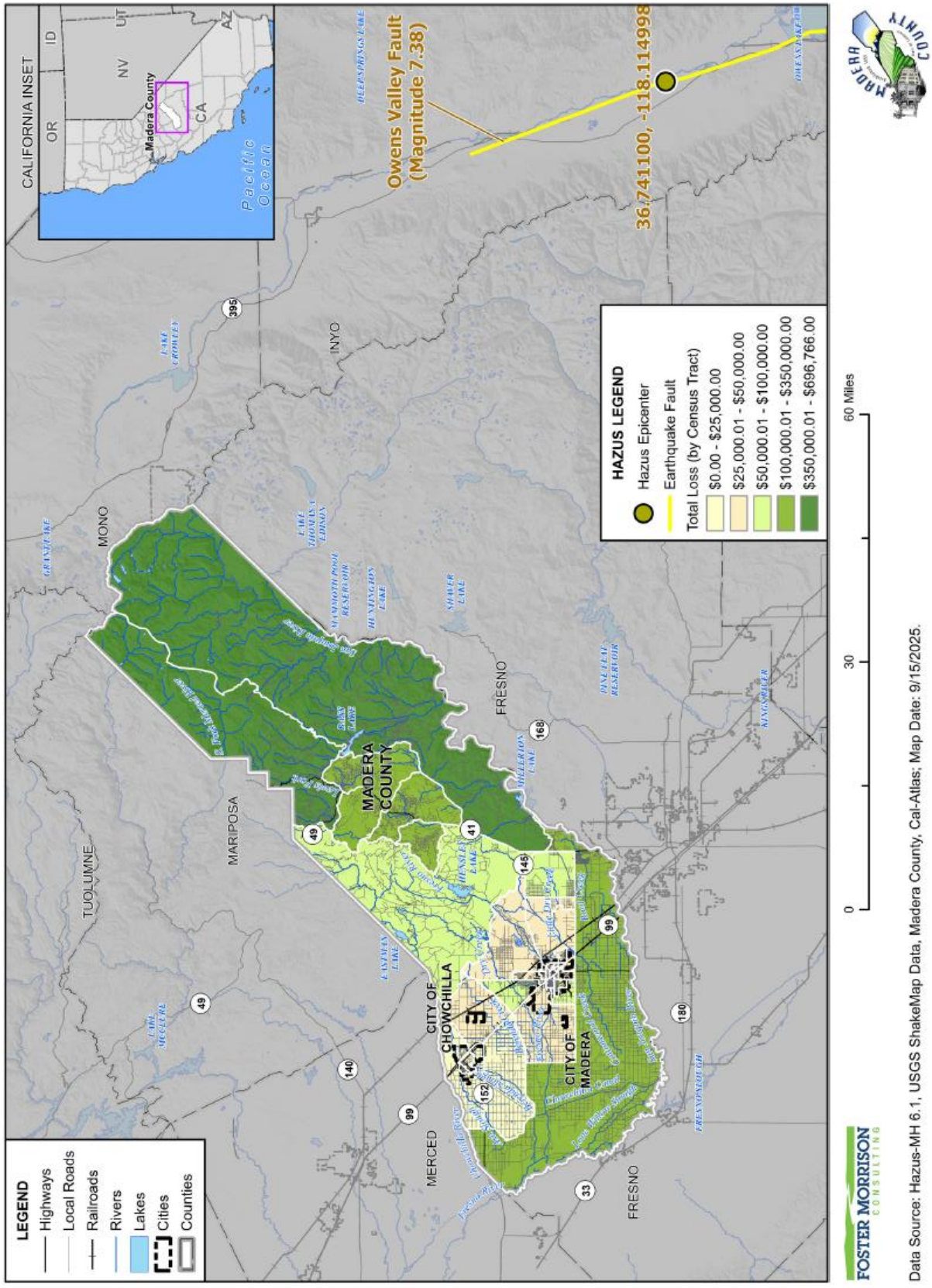


Figure 4-96 Madera County Planning Area – Owens Valley 7.38 Magnitude Hazus Total Loss



San Andreas 7.15 Hazus Scenario

The San Andreas Fault deterministic scenario was developed utilizing data from the County General Plan and based on a seismic scenario obtained from the USGS seismic scenario catalog.

The results of the probabilistic scenario are captured in Table 4-99. Key losses included the following:

- 11 buildings in the County were at least moderately damaged. No buildings were completely destroyed.
- Before the earthquake, the region had 462 hospital beds available for use. On the day of the earthquake, the model estimates that only 460 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake.
- No households experienced a loss of potable water the first day after the earthquake.
- No households experienced a loss of electricity the first day after the earthquake.
- Regardless of the time of earthquake, none had casualties.
- Total economic loss estimated for the earthquake was $4,430,000, which includes building losses and lifeline losses based on the Hazus-MH inventory.
- The total building-related losses were $3,860,000; 14 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 47% of the total loss.

Table 4-99 Madera County Planning Area – San Andreas 7.15 Deterministic Scenario Results

Type of Impact	San Andreas 7.15 Deterministic Scenario	
Total Buildings Damaged (based on 50,334 buildings)	Slight: 113 Moderate: 11 Extensive: 0 Complete: 0	
Damage to Essential Facilities	None with at least moderate damage	
Damage to Transportation Systems	None with at least moderate damage	
Damage to Utility Systems	No facilities with at least moderate damage. 4 potable water line breaks, 21 wastewater line breaks, and 0 natural gas line breaks.	
Households without Power/Water Service (Based on 45,607 total households)	Power loss, Day 1: 0 Power loss, Day 3: 0 Power loss, Day 7: 0 Power loss, Day 30: 0 Power loss, Day 90: 0	Water loss, Day 1: 0 Water loss, Day 3: 0 Water loss, Day 7: 0 Water loss, Day 30: 0 Water loss, Day 90: 0
Debris Generation	0 tons	
Displaced Households	0 displaced households	
Shelter Requirements	0 persons	
Casualties (Based on 2 a.m. time of occurrence)	Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	
Casualties (Based on 2 p.m. time of occurrence)	Without requiring hospitalization: 1 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	

Type of Impact	San Andreas 7.15 Deterministic Scenario
Casualties (Based on 5 p.m. time of occurrence)	Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Total Economic Losses (Includes building, income and lifeline losses)	$4,430,000
Building and Income Related Losses	$3,860,000

Source: Hazus 6.1

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.). The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Figure 4-97 shows the peak ground acceleration due to the San Andreas 7.15 earthquake. Figure 4-98 shows the total losses by census tract in Madera County due to the San Andreas 7.15 earthquake.

Figure 4-97 Madera County Planning Area – San Andreas 7.15 Magnitude Hazus Peak Ground Acceleration

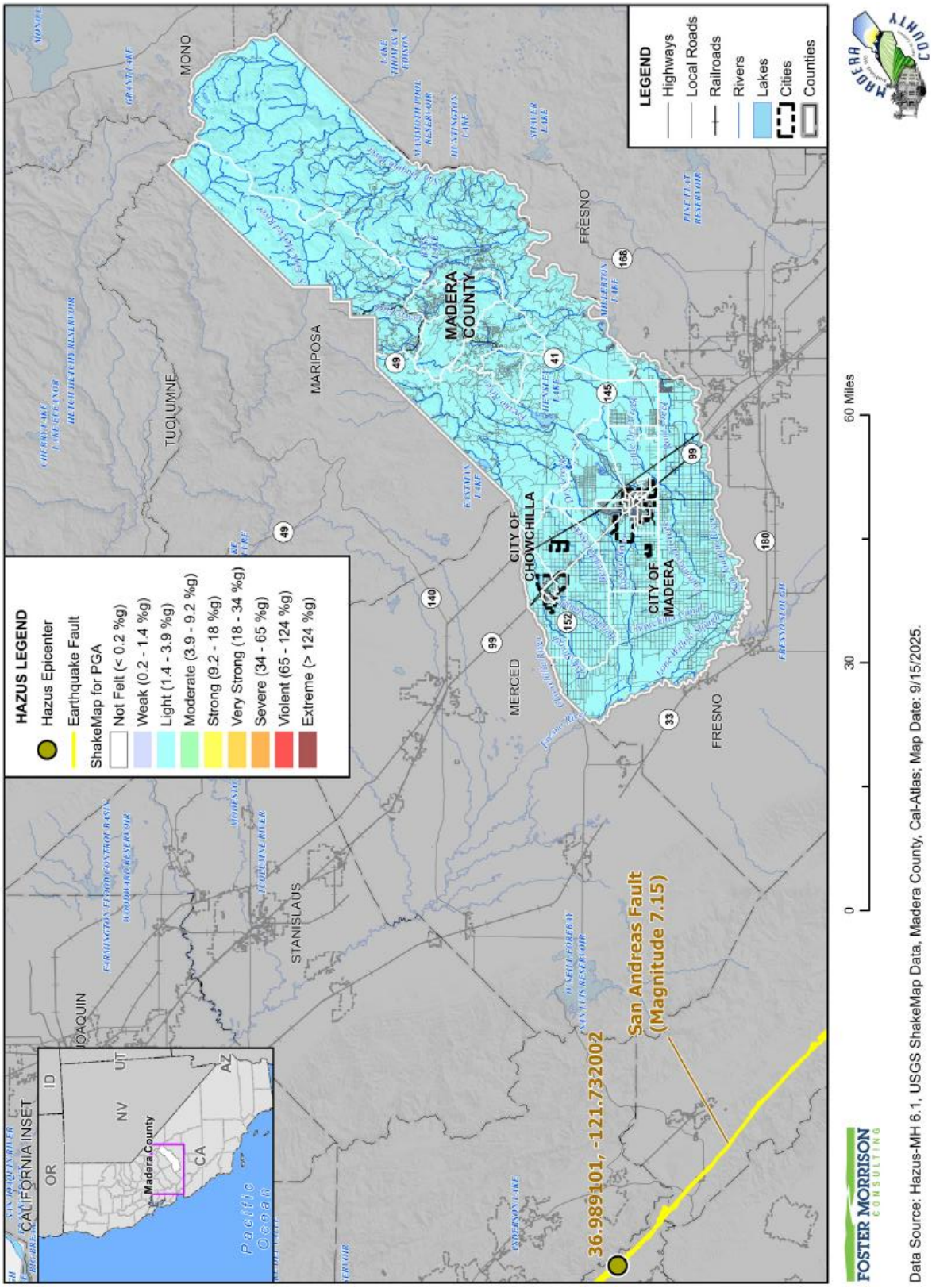
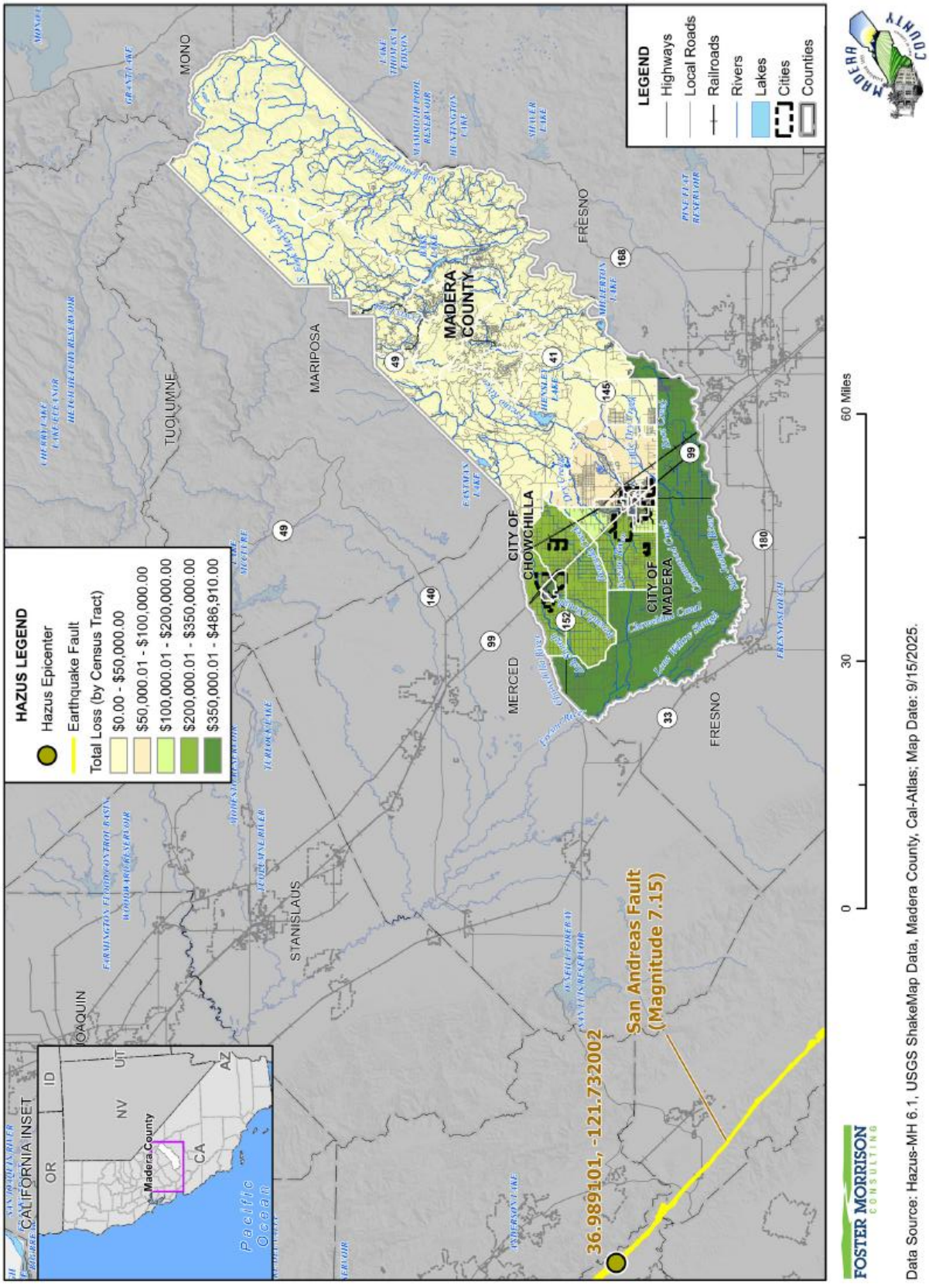


Figure 4-98 Madera County Planning Area – San Andreas 7.15 Magnitude Hazus Total Loss



Hazus Scenario Comparisons

A comparison of the results of the four Hazus scenarios is shown on Table 4-100. Each of these reports are shown in their totality in Appendix H.

Table 4-100 Madera County – Comparison of Hazus Scenarios

Type of Impact	Hartley Springs 6.77 Deterministic Scenario		Orgalita 7.01 Deterministic Scenario		Owens Valey 7.38 Deterministic Scenario		San Andreas 7.15 Deterministic Scenario	
Total Buildings Damaged (based on 50,334 buildings)	Slight: 252 Moderate: 42 Extensive: 2 Complete: 0		Slight: 706 Moderate: 87 Extensive: 4 Complete: 0		Slight: 140 Moderate: 21 Extensive: 1 Complete: 0		Slight: 113 Moderate: 11 Extensive: 0 Complete: 0	
Damage to Essential Facilities	None with at least moderate damage		None with at least moderate damage		None with at least moderate damage		None with at least moderate damage	
Damage to Transportation Systems	None with at least moderate damage		None with at least moderate damage		None with at least moderate damage		None with at least moderate damage	
Damage to Utility Systems	No facilities with at least moderate damage. 3 potable water line breaks, 2 wastewater line breaks, and 0 natural gas line breaks.		No facilities with at least moderate damage. 9 potable water line breaks, 4 wastewater line breaks, and 0 natural gas line breaks.		No facilities with at least moderate damage. 5 potable water line breaks, 3 wastewater line breaks, and 0 natural gas line breaks.		No facilities with at least moderate damage. 4 potable water line breaks, 21 wastewater line breaks, and 0 natural gas line breaks.	
Households without Power/Water Service (Based on 45,607 total households)	Power loss, Day 1: 0 Power loss, Day 3: 0 Power loss, Day 7: 0 Power loss, Day 30: 0 Power loss, Day 90: 0	Water loss, Day 1: 0 Water loss, Day 3: 0 Water loss, Day 7: 0 Water loss, Day 30: 0 Water loss, Day 90: 0	Power loss, Day 1: 0 Power loss, Day 3: 0 Power loss, Day 7: 0 Power loss, Day 30: 0 Power loss, Day 90: 0	Water loss, Day 1: 0 Water loss, Day 3: 0 Water loss, Day 7: 0 Water loss, Day 30: 0 Water loss, Day 90: 0	Power loss, Day 1: 0 Power loss, Day 3: 0 Power loss, Day 7: 0 Power loss, Day 30: 0 Power loss, Day 90: 0	Water loss, Day 1: 0 Water loss, Day 3: 0 Water loss, Day 7: 0 Water loss, Day 30: 0 Water loss, Day 90: 0	Power loss, Day 1: 0 Power loss, Day 3: 0 Power loss, Day 7: 0 Power loss, Day 30: 0 Power loss, Day 90: 0	Water loss, Day 1: 0 Water loss, Day 3: 0 Water loss, Day 7: 0 Water loss, Day 30: 0 Water loss, Day 90: 0
Debris Generation	1,000 tons		4,000 tons		0 tons		0 tons	
Displaced Households	0 displaced households		1 displaced households		0 displaced households		0 displaced households	
Shelter Requirements	0 persons		1 persons		0 persons		0 persons	
Casualties (Based on 2 a.m. time of occurrence)	Without requiring hospitalization: 1 Requiring hospitalization: 0 Life threatening: 0		Without requiring hospitalization: 2 Requiring hospitalization: 0 Life threatening: 0		Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0		Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0	

Type of Impact	Hartley Springs 6.77 Deterministic Scenario	Orgalita 7.01 Deterministic Scenario	Owens Valey 7.38 Deterministic Scenario	San Andreas 7.15 Deterministic Scenario
	Fatalities: 0	Fatalities: 0	Fatalities: 0	Fatalities: 0
Casualties (Based on 2 p.m. time of occurrence)	Without requiring hospitalization: 1 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	Without requiring hospitalization: 3 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	Without requiring hospitalization: 1 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	Without requiring hospitalization: 1 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Casualties (Based on 5 p.m. time of occurrence)	Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	Without requiring hospitalization: 2 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0	Without requiring hospitalization: 0 Requiring hospitalization: 0 Life threatening: 0 Fatalities: 0
Total Economic Losses (Includes building, income and lifeline losses)	$51,090,000	$38,660,000	$28,070,000	$4,430,000
Building and Income Related Losses	$6,740,000	$30,300,000	$3,390,000	$3,860,000

Source: Hazus 6.1

FEMA NRI Hazard Vulnerability Assessment

The FEMA NRI was queried for additional specific data on Madera County's vulnerability to earthquakes. The NRI contains data and analysis for 18 separate natural hazards, including earthquakes. As shown on Table 4-101, earthquakes could cause a total of $13,095,612 in expected annual losses, with a historic loss rating of relatively moderate. Earthquakes have a very high rating for social vulnerability and a very low community resilience, with a risk index score of 96.5 out of 100. According to the NRI, there have been 0 earthquake events during the 2021 dataset with a 0.53% annual chance per year.

Table 4-101 Madera County Planning Area – Earthquake Vulnerability Ratings from FEMA NRI

NRI Hazard	Hazard Risk Index Rating*	Expected Annual Loss Values (total)**	Exposure Value (total)***	Historic Loss Ratio Rating
Earthquake	96.5	$13,095,612	$1,840,225,739,000	Relatively moderate

Source: FEMA NRI Report. Retrieved April 1, 2025.

*Hazard Risk Index is calculated using data for only a single hazard type, and reflect a communities expected annual loss value, community risk factors, and the adjustment factor used to calculate the risk value.

**Expected annual loss represents the average economic loss in dollars resulting from natural hazards each year.

***Exposure is a natural hazard consequence factor that is the representative value of buildings, populations, or agriculture potentially exposed to a natural hazard occurrence.

Additional information on the FEMA NRI can be found in Section 4.2 and Appendix G.

Impacts from Earthquake

Earthquakes can strike without warning and cause dramatic changes to the landscape of an area that can have devastating impacts on the built environment. The greatest impact is to life safety of Madera County residents and visitors. Earthquakes can cause loss of life and injuries in affected areas. Other impacts to the Madera County Planning Area would include damages to infrastructure such as roads, bridges, and dams; damages and loss of services to utilities and critical infrastructure, including those related to gas, power, water, wastewater and communication systems; and damages to structures and other development.

Earthquakes can also cause failure of dams, levees, and reservoirs. Facilities and land downslope from dams or water reservoirs or behind levees might be subject to flooding, if the dams, reservoirs, or levees fail as a result of an earthquake. The County has locations with significant flood risk that include facilities downslope from dams or reservoirs or behind levees.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to have no effect on future earthquake conditions and associated impacts and vulnerability of the County.
- Population growth in Madera County is expected to continue until 2045, and then begin to shrink. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-21). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Any additional growth in the County would place additional populations at risk to earthquake. Additional population growth would likely bring continued diversity to the County. Vulnerable population groups could face disproportionate effects from an earthquake and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.

- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. County building codes are in effect to reduce structure damage, including damage to critical facilities and infrastructure, and should be updated as necessary to continue to address future earthquake conditions. Depending on the location of new development and adherence to protective building codes, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the County to this hazard.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help to make for a more resilient community. Although new growth and development corridors would fall in the area affected by earthquake, given the small chance of major earthquake and the building codes in effect, development in the earthquake area will continue to occur.

4.3.11. Flood: 1%/0.2% Annual Chance (w/levee failure)

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrence, and how climate change can affect or influence this hazard.

Hazard/Problem Description

Flooding is the rising and overflowing of a body of water onto normally dry land. Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities and can cause life safety issues. Floods can be extremely dangerous. Six inches of moving water can knock over a person given a strong current. A car will float in less than two feet of moving water and can be swept downstream into deeper waters. Floods kill more people trapped in vehicles than anywhere else.

During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream which can damage or remove stationary structures, such as dam spillways. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. 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 from any type of flooding.

There are three primary types of freshwater flood events in the Madera County Planning Area: riverine and lake, flash flooding, and urban stormwater. Regardless of the type of flood, the cause is often the result of severe weather and excessive rainfall, either in the flood area or upstream reaches.

- **Riverine flooding** – Riverine flooding, defined as when a watercourse exceeds its "bank-full" capacity, generally occurs as a result 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 Madera County Planning Area, riverine flooding is largely caused by heavy and continued rains, sometimes combined with snowmelt, 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.
- The term "**flash flood**" describes localized floods of great volume and short duration. In contrast to riverine flooding, 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.
- **Stormwater/Urban** flood events have increased as land has been converted from fields or woodlands to roads and parking lots and lost its ability to absorb rainfall. Urbanization increases runoff by two to six times that of natural terrain. This is discussed in the Section 4.3.12 below.

In addition to the three types of flood events, there are two other types of flooding in Madera County: levee failure flooding (discussed below in this section) and dam failure flooding (in Section 4.3.8). The potential for flooding can change and increase through various land use changes and changes to land surface, resulting in a change to the floodplain. Environmental changes can create localized flooding problems in and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

Levee Failure

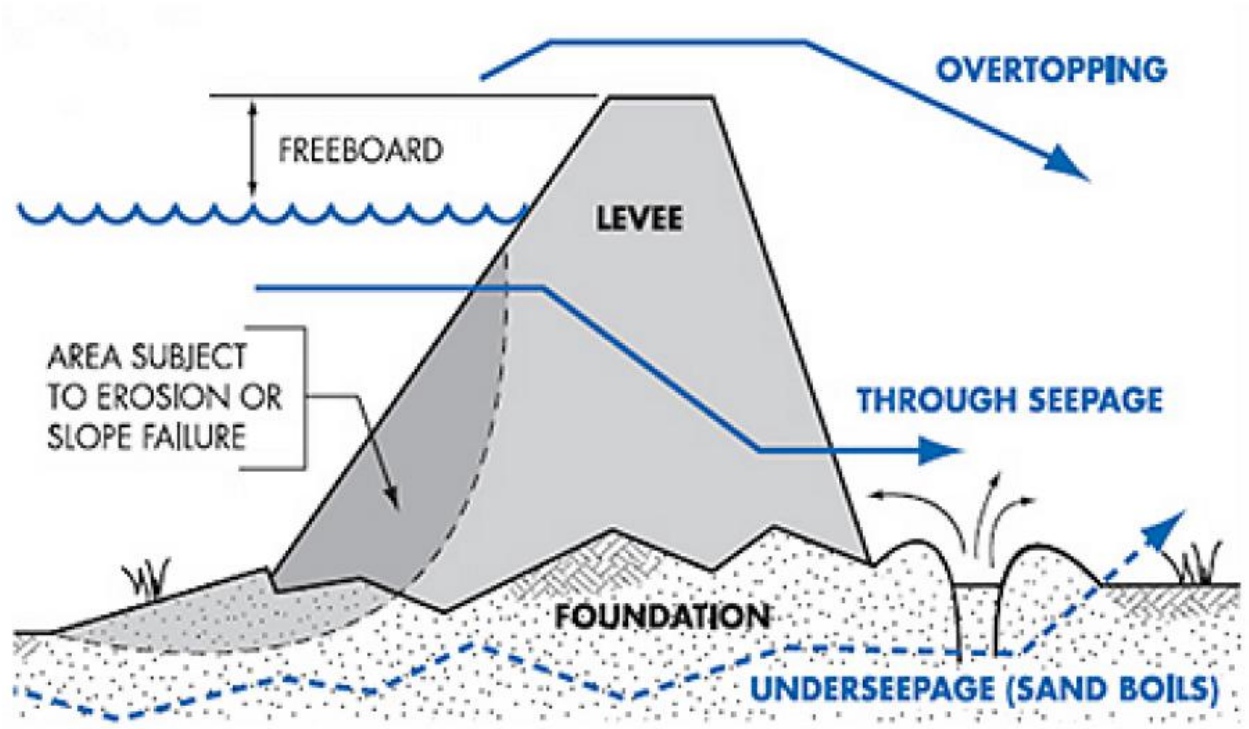
A type of riverine flooding in Madera County is levee failure flooding. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower steam channel, levees can also increase the speed of the water. Levees can be natural or man-made. A natural levee is formed when sediment settles on the stream bank, raising the level of the land around the stream. 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 or dam failure. Levees reduce, not eliminate, the risk to individuals and structures located behind them.

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

In addition to overtopping, levee systems can fail or be compromised in a variety of ways. Under-seepage refers to water flowing under the levee through the levee 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. Rodents can burrow into and compromise the levee system. Erosion can also lead to levee failure. Figure 4-99 depicts many causes of levee failure.

Figure 4-99 Potential Causes of Levee Failure



Source: USACE

Location and Extent

Hydrologic Regions

According to CA DWR, California has 10 hydrologic regions. Madera County sits in the San Joaquin hydrologic region.

- The San Joaquin River hydrologic region is surrounded on the west by the Coast Ranges, on the south by the San Emigdio and Tehachapi Mountains, on the east by the Sierra Nevada and on the north by the Sacramento-San Joaquin Delta and Sacramento Valley. The northern portion of the San Joaquin Valley drains toward the Delta by the San Joaquin River and its tributaries, the Fresno, Merced, Tuolumne, and Stanislaus Rivers. The southern portion of the valley is internally drained by the Kings, Kaweah, Tule, and Kern Rivers that flow into the Tulare drainage basin including the beds of the former Tulare, Buena Vista, and Kern Lakes. The Madera subbasin consists of lands overlying the alluvium in Madera County. The subbasin is bounded on the south by the San Joaquin River, on the west by the eastern boundary of the Columbia Canal Service area, on the north by the south boundary of the Chowchilla subbasin, and on the east by the crystalline bedrock of the Sierra Nevada foothills. Major streams in the area include the San Joaquin and Fresno Rivers. Average annual precipitation is 11 inches throughout the majority of the subbasin and 15 inches in the Sierra foothills.

A map of California's hydrological regions is provided in Figure 4-100.

Figure 4-100 California Hydrologic Regions

Source: California Department of Water Resources

The Madera County Waterway System

Madera County encompasses multiple rivers, streams, creeks, and associated watersheds. The County is situated in a region that dramatically drops in elevation from the eastern portion (Sierra Nevada) to the western portion, where excess rain on snow can contribute to downstream flooding. Damaging floods in Madera County occur primarily in the developed areas of the County. Flood flows generally follow defined stream channels, drainages, and watersheds. Various flood protection measures are either in place or

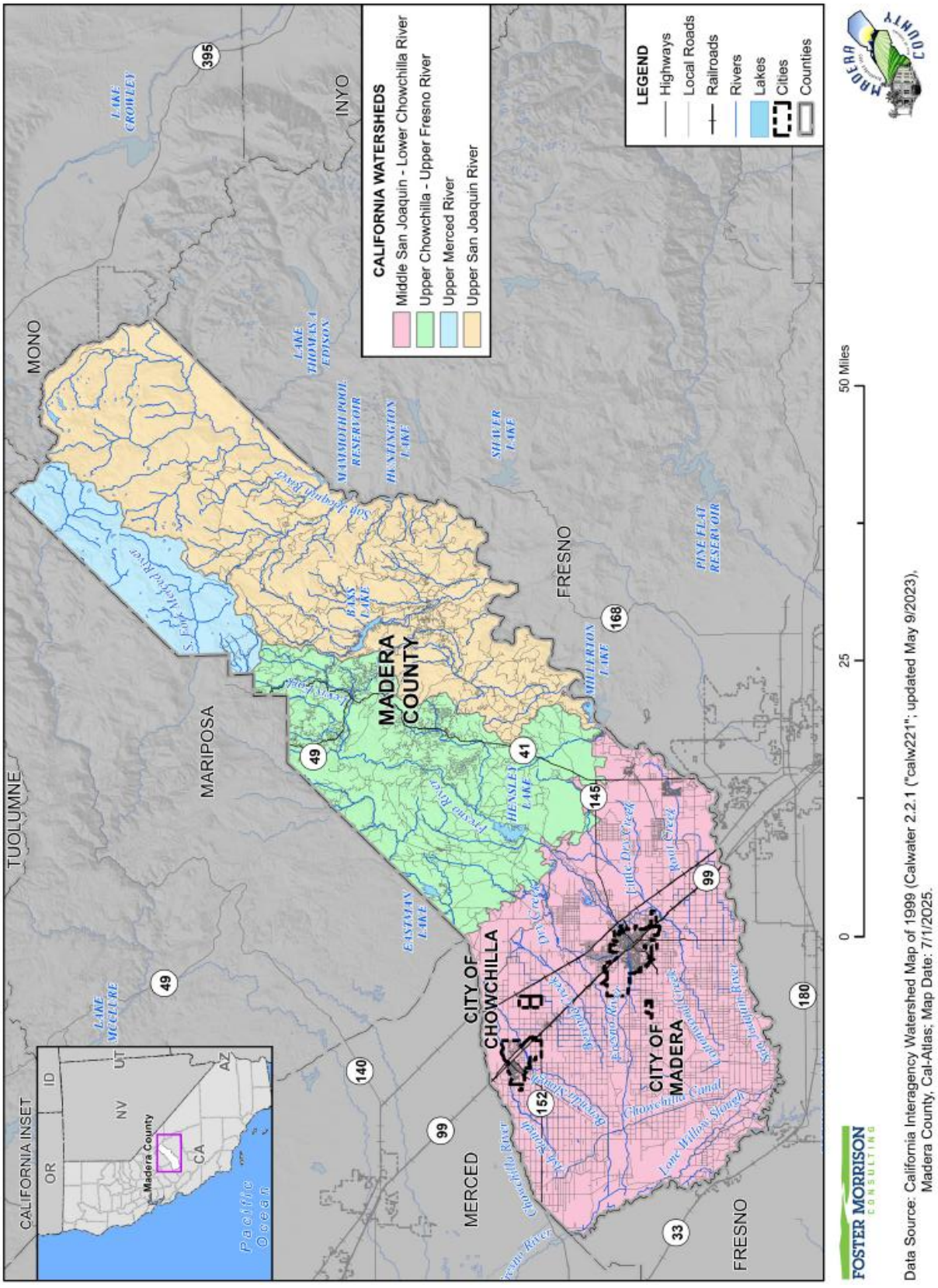
planned to protect Madera County from future flood events. Existing flood protection measures include a system of dams, pumping plants, channel improvements, floodway bypasses, detention and retention structures, and other improvements.

Madera County crosses 4 watersheds. These include the following watersheds:

- Middle San Joaquin-Lower Chowchilla River Watershed
- Upper Chowchilla-Upper Fresno River Watershed
- Upper Merced River Watershed
- Upper San Joaquin River Watershed

Figure 4-101 illustrates the primary watersheds of Madera County, as well as the primary waterways in the County.

Figure 4-101 Primary Watersheds and Waterways of Madera County



The General Plan and the FEMA FIS noted that entire county generally has excellent drainage. The eastern side of the San Joaquin Valley is a series of overlapping alluvial fans, each with a large mass of coarse, permeable deposits spread outward beneath the valley floor from the point where the stream leaves the foothills. These alluvial fans are deposits of well sorted sand and gravel which were deposited outside the major stream channels on the alluvial plain. The areas between the major alluvial fans are characterized by poorly sorted, fine grained sands and gravels that were deposited by creeks between major streams.

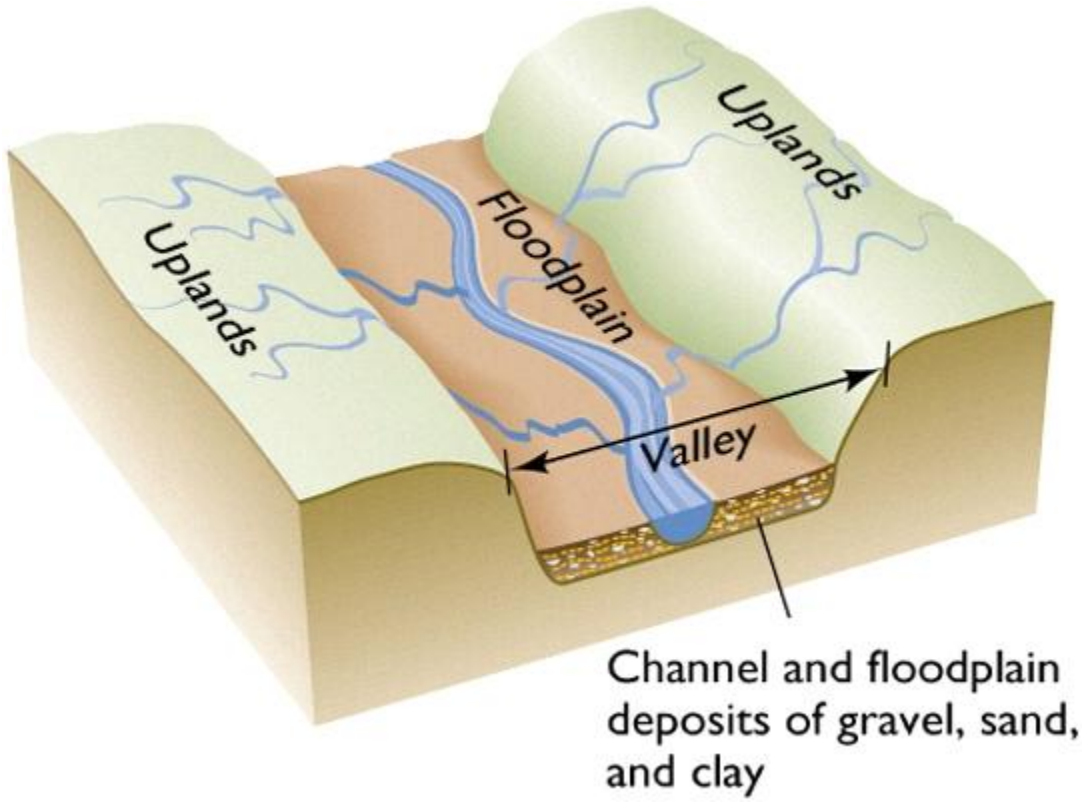
The San Joaquin River watershed, which drains a large area on the western slope of the Sierra Nevada in Fresno and Madera Counties, is bounded on the north by the Merced and Fresno Rivers' watershed and on the south by the Kings River watershed. Its upper reach has several main forks. The North and Middle Forks originate in Madera County near Devils Postpile National Monument, and the South Fork begins in northern Kings Canyon National Park in Fresno County. The forks join at an elevation of approximately 3,600 feet to form the main stem, which flows southwesterly to the valley floor then northwesterly down the valley trough to the Delta. At the Delta, the San Joaquin River and its tributaries drain over 16,700 square miles.

The San Joaquin and Fresno Rivers are regulated. Water supplies for irrigation are assured by the Friant Dam, on the San Joaquin River, and the 37-mile-long Madera Canal. Both are features of the Central Valley Project. In the late 1920s, farmers in Madera County formed their own irrigation district.

Floodplains

The area adjacent to a channel is the floodplain (see Figure 4-102). 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 that area that is inundated by the 1% annual chance (or 100-year) flood, the flood that has a one percent chance in any given year of being equaled or exceeded. The 1% annual chance flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program. The 500-year flood is the flood that has a 0.2% chance of being equaled or exceeded in any given year.

Figure 4-102 Floodplain Schematic



Source: FEMA

Madera County Flood Mapping

As part of the County's ongoing efforts to identify and manage their flood prone areas, Madera County relies on a variety of different mapping and related efforts. What follows is a brief description of FEMA and DWR mapping efforts covering the Madera County Planning Area.

FEMA 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 the County is detailed in the Vulnerability Assessment below.

Flood Insurance Study (FIS)

The FIS develops flood-risk data for various areas of the community that will be used to establish flood insurance rates and to assist the community in its efforts to promote sound floodplain management. The current Madera County FIS is dated September 26, 2008. 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 1% and 0.2% annual chancer floodplains, floodways, and the locations of selected cross sections used in the hydraulic analysis and local floodplain regulation. The County FIRMs have been replaced by digital flood insurance rate maps (DFIRMs) as part of FEMA's Map Modernization program, which is discussed further below.

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.

Levee Considerations in Floodplain Mapping

Also, as part of FEMA's Map Modernization program, FEMA is mapping levees within communities, with a primary focus on maps determined to provide a 1% annual chance level of flood protection.

In August of 2005, FEMA Headquarters' issued Memo 34 Interim Guidance for Studies Including Levees. This memo recognizes the risk and vulnerability of communities with levees. The memo mandates the inclusion of levee evaluations for those communities that are undergoing map changes such as the conversion to DFIRMs. No maps can become effective without an evaluation of all levees within a community against the criteria set forth in 44 CFR 65.10 Mapping of Areas Protected by Levee Systems. Generally, these levee certification requirements include evaluations of freeboard, geotechnical stability and seepage, bank erosion potential due to currents and waves, closure structures, operations and maintenance, and wind wet and wave run-up. In short, these guidelines require certification of levees before crediting any levee with providing protection from the 1 percent annual event (e.g., the 100-year flood).

In Madera 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 reclamation, irrigation and flood control districts, other state and local agencies, and private interests. Many of these facilities were constructed with flood control as secondary or incidental to their primary purpose, so are not considered as providing protection from the 1% annual chance or greater flood.

Digital Flood Insurance Rate Maps (DFIRM)

As part of its 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 basemaps;
- 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.

DFIRMs for Madera County have been developed and most current Effective DFIRMs for Madera County are dated September 26, 2008, and are being used for the flood analysis for this LHMP Update. The DFIRM is shown in Figure 4-103, and DFIRM flood zones are shown on Table 4-102.

Figure 4-103 Madera County – DFIRM Flood Zones

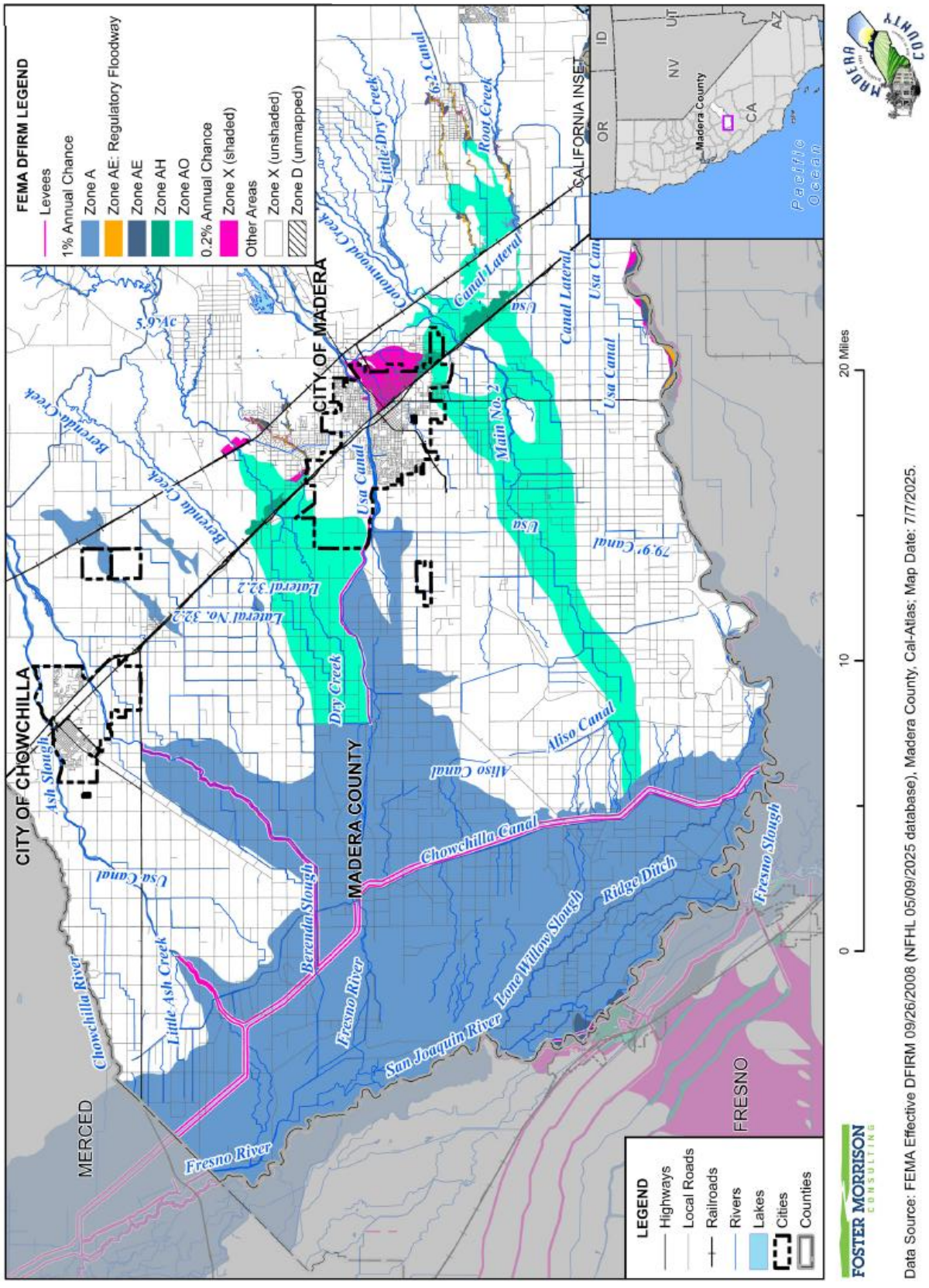


Table 4-102 Madera County – FEMA DFIRM Flood Zones by Jurisdiction

Flood Zone	Description	Present in Unincorporated Madera County	Present in the City of Chowchilla	Present in the City of Madera
Zone A	1% annual chance flooding: No base flood elevations provided	X		
Zone AE	1% annual chance flooding: Base flood elevations provided	X	X	X
Zone AE Floodway	1% annual chance flood: Regulatory floodway; Base flood elevations provided	X		X
Zone AH	1% annual chance flood areas of shallow flooding between one to three feet deep. Regulatory floodway; Base flood elevations provided	X		X
Zone AO	1% annual chance flooding: sheet flow areas. BFEs derived from detailed hydraulic analyses are shown in this zone.	X		X
Zone X (shaded)	0.2% annual chance flooding: The areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	X		X
Zone X (unshaded)	No flood hazard	X	X	X

Source: FEMA DFIRM 09/26/2008

Flood extents are usually measured in depths of flooding and area flooded. Expected flood depths in the Madera County Planning Area vary. Flood durations in the County tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Geographical extents of DFIRM flood zones for the unincorporated Madera County are detailed in Table 4-103. Details on each jurisdiction's DFIRM flood extents can be found in their respective annexes to this LHMP Update.

Table 4-103 Madera County Planning Area –Geographical DFIRM Flood Zone Extents

Jurisdiction / Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla						
1% Annual Chance Flood Hazard	403	0.03%	68	0.01%	336	0.04%
0.2% Annual Chance Flood Hazard	0	0.0%	0	0.0%	0	0.0%
Other Areas	6,354	0.5%	3,317	0.6%	3,037	0.38%

Jurisdiction / Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla Total	**6,758**	**0.5%**	**3,385**	**0.6%**	**3,373**	**0.42%**
City of Madera						
1% Annual Chance Flood Hazard	2,119	0.2%	1,776	0.32%	343	0.04%
0.2% Annual Chance Flood Hazard	897	0.07%	482	0.09%	415	0.05%
Other Areas	7,677	0.6%	4,240	0.77%	3,436	0.43%
City of Madera Total	**10,692**	**0.79%**	**6,498**	**1.18%**	**4,194**	**0.52%**
Unincorporated Madera County						
1% Annual Chance Flood Hazard	183,620	13.5%	156,653	28.4%	26,968	3.3%
0.2% Annual Chance Flood Hazard	1,450	0.11%	1,198	0.22%	252	0.03%
Other Areas	1,155,276	85.1%	383,749	69.6%	771,527	95.7%
Unincorporated Madera County Total	**1,340,347**	**98.7%**	**541,600**	**98.2%**	**798,747**	**99.1%**
Grand Total	**1,357,797**	**100.00%**	**551,483**	**100.00%**	**806,314**	**100.00%**

Source: FEMA DFIRM 09/26/2008

California Floodplain Mapping

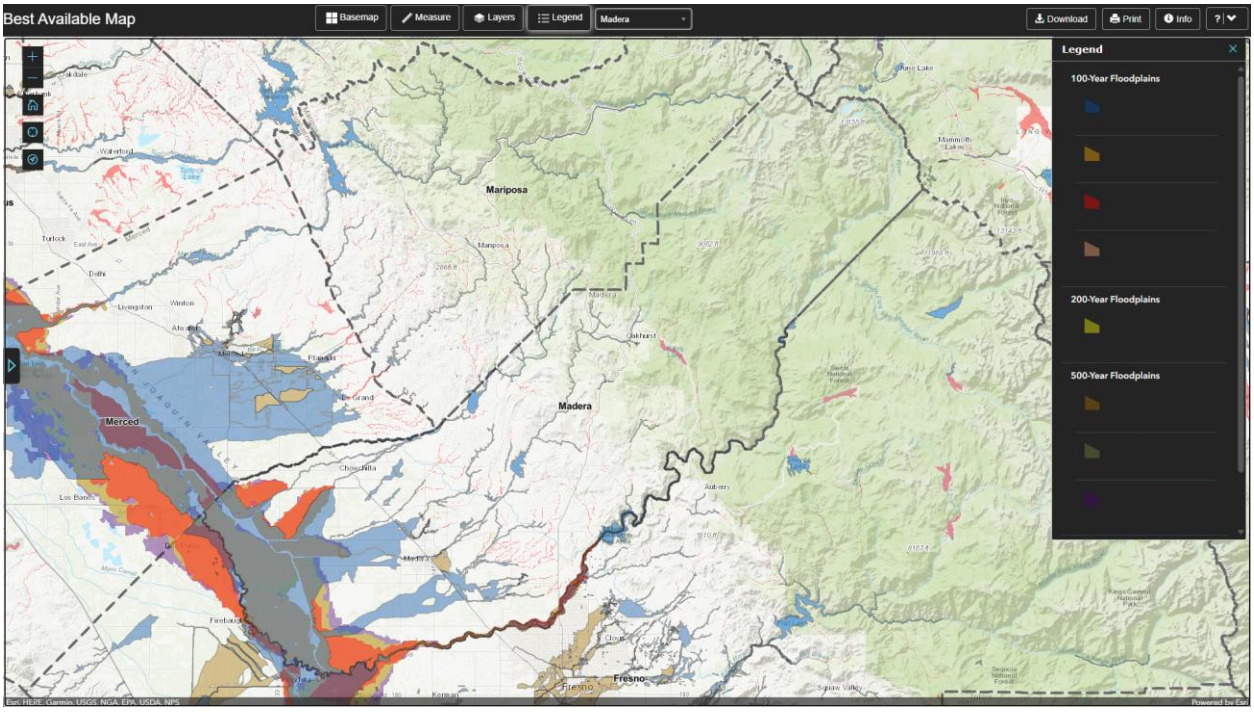
Also to be considered when evaluating the flood risks in Madera County are various floodplain maps developed by the California DWR for various areas throughout California, and in the Sacramento-San Joaquin Valley cities and counties. The FEMA regulatory maps provide just one perspective on flood risks in Madera County. Senate Bill 5 (SB 5), enacted in 2007, authorized Cal-DWR to develop the Best Available Maps (BAM) displaying 1% and 0.5% (200-year) annual chance floodplains for areas located within the Sacramento-San Joaquin (SAC-SJ) Valley watershed. This effort was completed by DWR in 2008. DWR has expanded the BAM to cover all counties in the State and to include 0.2% annual chance flood zones.

Different than the FEMA DFIRMs which have been prepared to support the NFIP and generally reflect only the 1% and 0.2% annual chance flood risks, the BAMs are provided for informational purposes and are intended to reflect current 1%, 0.5% (200-year) as applicable, and 0.2% annual chance flood risks using the best available data. The 100-year floodplain limits on the BAM are a composite of multiple 1% annual

chance floodplain mapping sources. It is intended to show all currently identified areas at risk for a 100-year flood event, including FEMA's 1% annual chance flood zones. The BAM are comprised of different engineering studies performed by FEMA, Corps, and DWR for assessment of potential 1%, 0.5%, and 0.2% annual chance floodplain areas. These studies are used for different planning and/or regulatory applications, and for each flood frequency may use varied analytical and quality control criteria depending on the study type requirements.

The value in the BAMs is that they provide a bigger picture view of potential flood risk to the County than that provided in the FEMA DFIRMs. This provides the community and residents with an additional tool for understanding potential flood hazards not currently mapped as a regulated floodplain. Improved awareness of flood risk can reduce exposure to flooding for new structures and promote increased protection for existing development. Informed land use planning will also assist in identifying levee maintenance needs and levels of protection. By including the FEMA 1% annual chance flood zone, it also supports identification of the need and requirement for flood insurance. Figure 4-104 shows the BAM for the Madera County Planning Area.

Figure 4-104 Madera County– Flood Awareness (Best Available) Map



Source: California DWR. Retrieved 3/5/2025

Legend explanation: **Blue** - FEMA 100-Year, Orange – Local 100-Year (developed from local agencies), **Red** – DWR 100-year (Awareness floodplains identify the 100-year flood hazard areas using approximate assessment procedures.), **Pink** – USACE 100-Year (2002 Sac and San Joaquin River Basins Comp Study), **Yellow** – USACE 200-Year (2002 Sac and San Joaquin River Basins Comp Study), **Tan** – FEMA 500-Year, **Grey** – Local 500-Year (developed from local agencies), **Purple** – USACE 500-Year (2002 Sac and San Joaquin River Basins Comp Study).

Flood Protection Measures

Madera County (Unincorporated Areas)

San Joaquin River drains an area of 1,680 square miles at Friant Dam, which forms the 520,500 acre-foot Millerton Lake. The dam is operated by the U.S. Bureau of Reclamation (USBR) as part of the Central Valley Project's Friant Unit, including Friant Dam, Millerton Lake, Friant-Kern Canal and Madera Canal. Friant Dam is operated for water supply and flood management. Several dams upstream of Friant are owned and operated by Southern California Edison and Pacific Gas and Electric Company for power generation. The combined storage capacity of the upstream dams is 609,530 acre-feet. Though this storage has a considerable ability to reduce rain and snowmelt floods, it does not include any flood management reservation.

Major releases from Friant Dam to San Joaquin River occur from March to May to maintain capacity in Millerton Lake for rainfall and snowmelt. Up to 170,000 acre-feet of the available storage in Millerton Lake may be reserved for rainfall runoff, while 390,000 acre-feet are available for snowmelt. During flood flows, the dam can also divert water to the Friant-Kern Canal and Madera Canal when capacity is available and there is a place to release the flood flows. Cottonwood Creek and Little Dry Creek, which enter into the San Joaquin River below Friant Dam, can add to the Friant Dam releases in the river. Friant Dam maintains a flow of 8,000 cfs, the design-flow capacity of the river from Friant Dam to the Chowchilla Bypass, or less below Little Dry Creek.

No existing flood protection measures have been undertaken on Cottonwood, Root, Dry, and Schmidt Creeks, Schmidt Creek Tributary, and Madera Ranchos North and South. A master drainage plan has been prepared for the Madera Ranchos-Root Creek area.

City of Madera

The FIS noted that Hidden Dam, completed in September 1976, regulates flood flows in the Fresno River. Under normal operation, the 1-percent annual-chance discharge is low enough that flooding is largely contained in the stream channel. However, regarding flooding of the 0.2-percent annual-chance magnitude Hidden Dam does not provide adequate protection.

A flood barrier at the Cottonwood Creek overflow channel, in the form of a highway embankment, was constructed in approximately 1975. This embankment serves to limit any spills to Cottonwood Creek to the capacity of the 96-inch diameter culvert through the embankment. Such spills cannot exceed a few hundred cubic feet per second (cfs) even during rare uncontrolled flows from Hidden Reservoir, and thus are not a significant factor in the City of Madera's flood control program.

Oakhurst Community

There are no major flood-protection measures in the study area. Road crossings appear to be adequately elevated and the bridge and culverts are generally of sufficient size that they do not significantly increase the flood hazard for the area. The stream restoration and maintenance activities included in the Oakhurst River Parkway project may result in some lessening of the flood-hazard potential in the area.

Levee Failure Extents

There are numerous levees located throughout the Madera County Planning Area as shown in the DFIRM map, Figure 4-103 above. In addition to the map showing detailed flood zones within the County Planning Area, it also includes levee centerlines included in FEMA's DRIRM layer. While it should be noted that while levees can provide some measure of protection from flooding, none of these identified levees are accredited as providing protection against the 1% annual chance flood.

Levee failure location and extents are further discussed in the following sections:

- 2008 FIS
- National Levee Database
- Levee Flood Protection Zones

2008 FIS

The 2008 Flood Insurance Study (FIS) noted that it was determined that:

> ***Levees exist in portions of Madera County that provide the community with some protection from flooding. However, the levees on the Chowchilla Canal/East Side Bypass, and portions of Ash and Berenda Sloughs, the Fresno and San Joaquin Rivers, Buttonwillow Drain, and Columbia Canal may not protect the community from rare events such as the 1-percent annual-chance flood. The criteria used to evaluate protection from the 1-percent annual-chance (1) adequate design, including freeboard, (2) structural stability, and (3) proper operation and maintenance. The levees on Ash and Berenda Sloughs and the Fresno River were designed and constructed by the USACE to provide protection from the 2-percent annual-chance and are maintained by the Madera County Flood Control and Water Conservation District. The levees on Chowchilla Canal/East Side Bypass were constructed by the California Reclamation Board and are maintained by the Lower San Joaquin Levee District. The design level of protection is unknown. No design, construction, or maintenance information was available for the other levees in question.***

The Public Works Department of the County noted that project levees were levees built in the 70s by the USACE and turned over to the County through agreements. The County therefore became the Local Maintenance Agency (LMA) for these project levees:

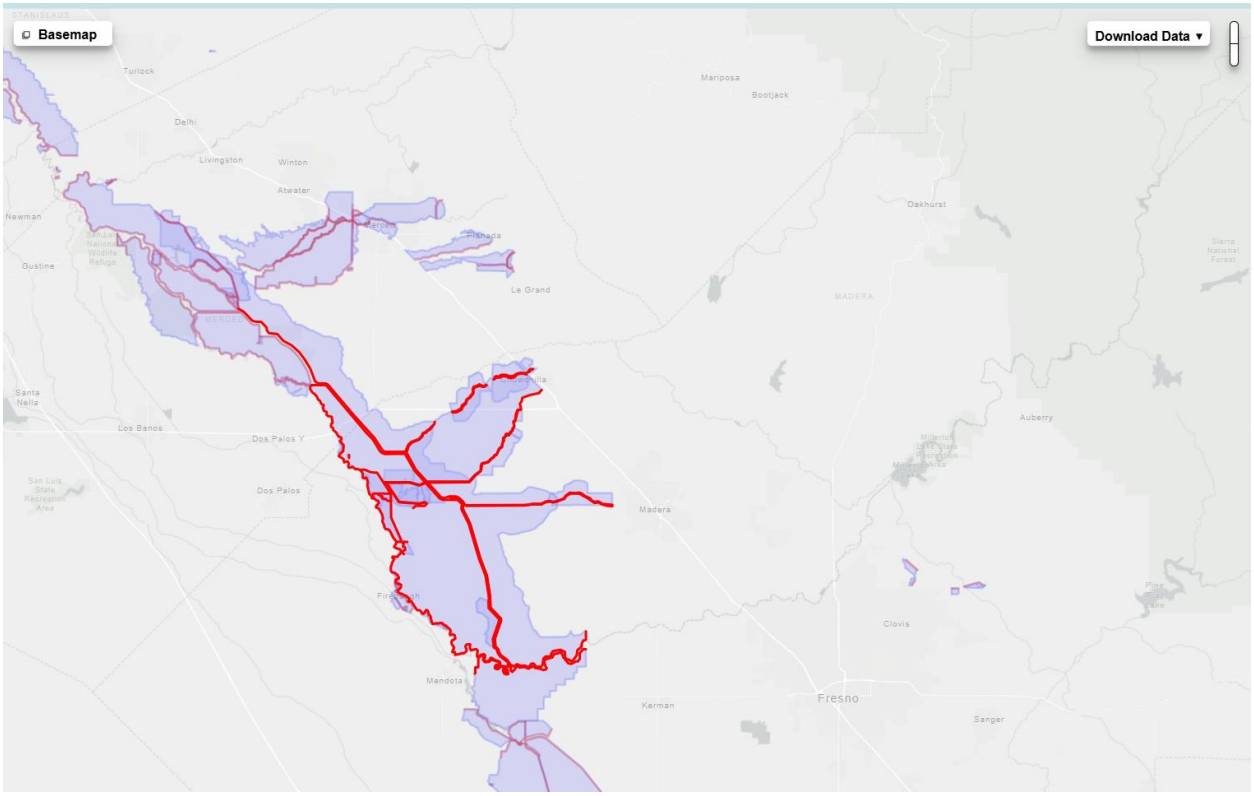
- Unit 1 Ash Slough
- Unit 2 Ash Slough
- Unit 3 Berenda Slough
- Unit 4 Berenda Slough
- Unit 5 Fresno River
- Unit 6 Fresno River
- Non-project Levees are those levees not included in Units 1-6.

Basically the County is the responsible jurisdiction for the maintenance and operation (O/M) of these facilities from the dams down to the Bypass, which include channel, levee, and structures. For the most part, approximately 90% of the levees are adjacent to agriculture. There is limited residential or commercial development occurring in or near these project levees. The County does want to pursue certification of these project levees. Working with USACE, PL84-99 is the rehabilitation program that the County would utilize to initiate the recertification process.

National Levee Database

The DFIRM and FIS above shows the levees in the County summarized by area, more detailed information on levees in the County can be found in the National Levee Database. The National Levee Database contains the location of levees in Madera County. These levees are located in the western portion of the County. The National Levee Database was queried to show the location of these levees. Levee locations from the National Levee Database are shown on Figure 4-105. A table of these levees, with levee mileage, leveed area, and FEMA accreditation rating is shown on Table 4-104. Similar to the DFIRM data, while the map shows areas protected by levee (in the light purple color), none of these levees are accredited as protecting against a 1% annual flood event. The levee data from the National Levee Database shows that these levees primarily affect the unincorporated County and the City of Chowchilla. More information on how the levees affect the cities can be found in its respective annexes to this LHMP.

Figure 4-105 Madera County – National Levee Database Levees and Protected Areas



Source: National Levee Database. Retrieved 3/4/2026.

Table 4-104 Madera County – Levees Reported in National Levee Database

System Name	Levee Miles	Leveed Area Square Miles	Location	USACE Levee?	Waterway	FEMA Accreditation Rating	Segment Count
Ash Slough left bank - Berenda Slough right bank	9.89	8.20	Chowchilla, Madera County, California	Yes	Ash Slough, Berenda Slough, Deep Slough-Mariposa Slough-Eastside Bypass	Non-Accredited Levee System	5
Ash Slough right bank	23.50	41.83	El Nido, Merced County, California	Yes	Ash Slough, Deep Slough-Mariposa Slough-Eastside Bypass	Non-Accredited Levee System	3
Berenda Slough left bank - Fresno River right bank	16.36	11.80	Madera, Madera County, California	Yes	Berenda Slough, Deep Slough-Mariposa Slough-Eastside Bypass, Fresno River	Non-Accredited Levee System	4
Berenda Slough Levee	11.64	51.01	Chowchilla, Madera County, California	No	Berenda Slough	Non-Accredited Levee System	3
BERENDA SLOUGH LEVEE	0.57	0.52	Chowchilla, Madera County, California	No	Berenda Slough	Non-Accredited Levee System	1
BERENDA SLOUGH LEVEE	1.26	0.46	Chowchilla, Madera County, California	No	Berenda Slough	Non-Accredited Levee System	1
BERENDA SLOUGH LEVEE	5.11	4.16	Chowchilla, Madera County, California	No	Berenda Slough	Non-Accredited Levee System	1
Fresno River left bank	35.35	50.78	Madera, Madera County, California	Yes	Eastside Bypass, Fresno River, San Joaquin River	Non-Accredited Levee System	3
LSJLD-Unit 24	16.69	34.03	Mendota, Madera County, California	No	San Joaquin River	Non-Accredited Levee System	1

System Name	Levee Miles	Leveed Area Square Miles	Location	USACE Levee?	Waterway	FEMA Accreditation Rating	Segment Count
LSJLD-Units 3, 6, 18 - Eastside-Chowchilla Bypass	34.48	113.65	Firebaugh, Madera County, California	No	Deep Slough-Mariposa Slough-Eastside Bypass, Eastside Bypass, San Joaquin River	Non-Accredited Levee System	3
Madera County Levee 11	5.28	4.25	Madera, Madera County, California	No	FRESNO RIVER	Non-Accredited Levee System	1
Madera County Levee 18	4.82	0.95	Firebaugh, Madera County, California	No	FRESNO RIVER	Non-Accredited Levee System	1
Madera County Levee 19	3.07	4.79	Chowchilla, Madera County, California	No	ASH SLOUGH	Non-Accredited Levee System	1
Madera County Levee 21	1.73	0.55	Firebaugh, Madera County, California	No	STREAM	Non-Accredited Levee System	1
Madera County Levee 29	3.38	5.19	Firebaugh, Madera County, California	No	BERENDA SLOUGH	Non-Accredited Levee System	1
Madera County Levee 32	4.30	3.03	Chowchilla, Madera County, California	No	ASH SLOUGH	Non-Accredited Levee System	1
Madera County Levee 36	4.29	3.50	Chowchilla, Madera County, California	No	ASH SLOUGH	Non-Accredited Levee System	1
Madera County Levee 39	4.31	3.18	Mendota, Madera County, California	No	CHOWCHILLA CANAL	Non-Accredited Levee System	1
Madera County Levee 40	3.46	3.04	Chowchilla, Madera County, California	No	ASH SLOUGH	Non-Accredited Levee System	1
Madera County Levee 42	8.17	6.29	Firebaugh, Madera County, California	No	FRESNO RIVER	Non-Accredited Levee System	1

System Name	Levee Miles	Leveed Area Square Miles	Location	USACE Levee?	Waterway	FEMA Accreditation Rating	Segment Count
Madera County Levee 44	4.35	4.10	Firebaugh, Madera County, California	No	FRESNO RIVER	Non-Accredited Levee System	1
Madera County Levee 45	0.27	0.03	Dos Palos Y, Madera County, California	No	FRESNO RIVER	Non-Accredited Levee System	1
Madera County Levee 46	3.59	3.02	Firebaugh, Madera County, California	No	BERENDA SLOUGH	Non-Accredited Levee System	1
Madera County Levee 5	1.98	0.58	Firebaugh, Madera County, California	No	LONE WILLOW SLOUGH	Non-Accredited Levee System	1
Madera County Levee 52	0.43	0.12	Chowchilla, Madera County, California	No	ASH SLOUGH	Non-Accredited Levee System	1
Madera County Levee 6	2.42	0.41	Firebaugh, Madera County, California	No	SAN JOAQUIN RIVER	Non-Accredited Levee System	1
Madera County Levee 7	0.82	0.10	Firebaugh, Madera County, California	No	SAN JOAQUIN RIVER	Non-Accredited Levee System	1
Madera County Levee 9	5.24	2.53	Madera, Madera County, California	No	FRESNO RIVER	Non-Accredited Levee System	1
Ventura County Levee 10 East	42.49	0.09	Moorpark, Ventura County, California	No		Non-Accredited Levee System	1

Source: National Levee Database. Retrieved 3/4/2026.

Levee Flood Protection Zones

In addition to the map above, CA DWR has put together Levee Flood Protection Zone (LFPZ) maps. The LFPZ maps were developed by the State of California Department of Water Resources as required by Water Code Section 9130 to increase awareness of flood risks associated with State-Federal levees. LFPZ maps estimate the maximum area that may be flooded if a State-Federal levee fails with flows at maximum capacity that may reasonably be conveyed. These maps specifically focus on flood risks associated with State-Federal levees. Lands within the LFPZ may also be subject to flooding due to other factors including,

but not limited to, levee failure at flows less than design capacity, overtopping of a levee, drainage problems, or other types of flooding from sources on the land side of the levee. Lands not mapped within an LFPZ may also be subject to flood risk. LFPZs in Madera County are shown in Figure 4-106. Geographical extents of the LFPZs are shown in Figure 4-106.

Figure 4-106 Madera County – Levee Flood Protection Zones

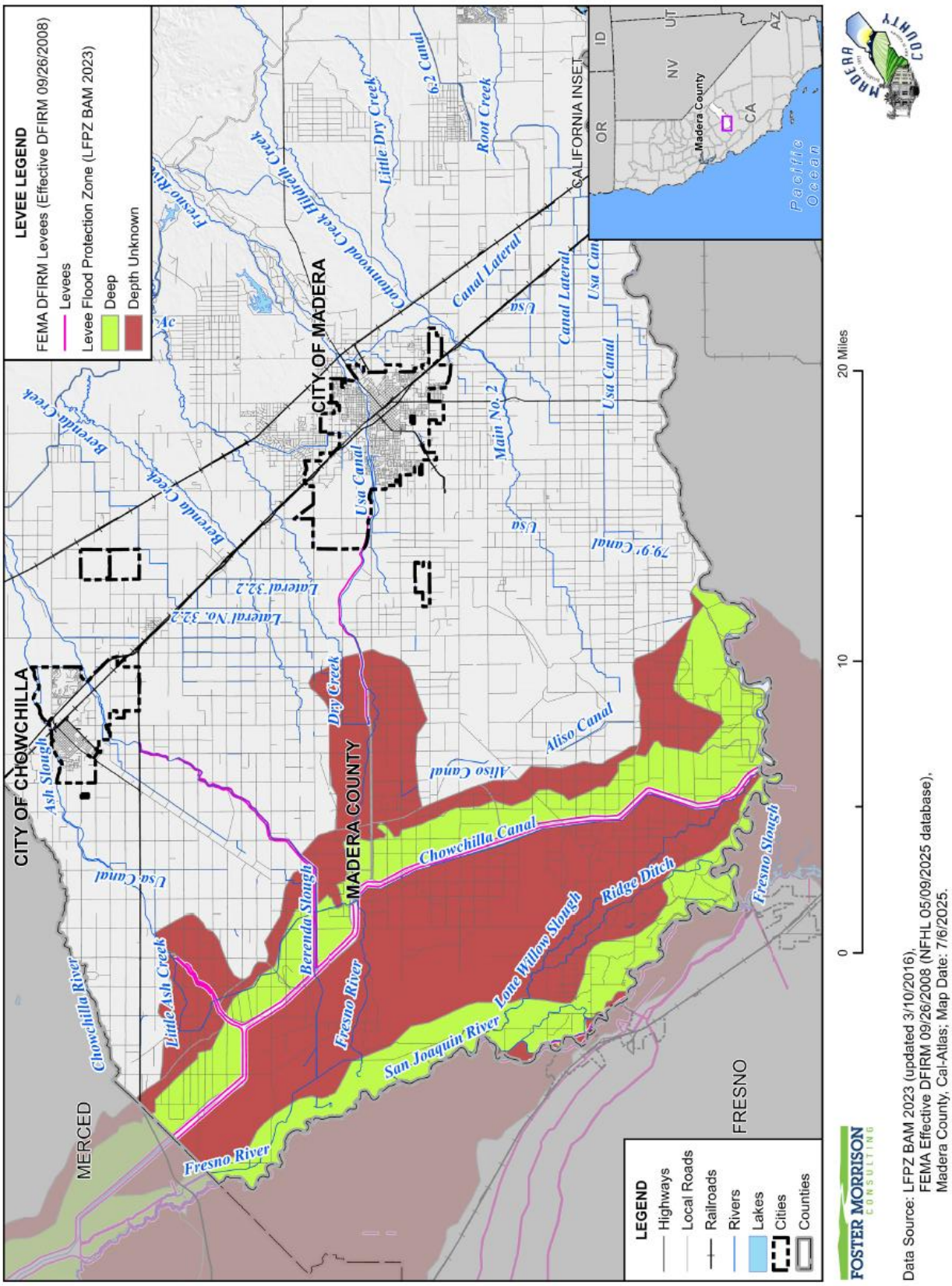


Table 4-105 Madera County Planning Area – Geographical Extent of Levee Flood Protection Zone

Jurisdiction / Levee Flood Protection Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Unincorporated Madera County						
Deep	43,799	3.3%	39,591	7.3%	4,208	0.5%
Depth Unknown	81,223	6.1%	75,005	13.8%	6,218	0.8%
Unincorporated Madera County Total	**125,022**	**9.3%**	**114,596**	**21.2%**	**10,426**	**1.3%**
Grand Total	**125,022**	**9%**	**114,596**	**21%**	**10,426**	**1%**

Source: LFPZ BAM 2023

Note: No vulnerability analysis for the LFPZ zones for levee failure is presented in the vulnerability assessment below. As stated above, there is limited residential or commercial development occurring in or near these project levees.

Past Occurrences

Disaster Declaration History

A list of federal and state disaster declarations for Madera County from flooding, (including heavy rains and storms) is shown on Table 4-106.

Table 4-106 Madera County – Federal and State Disaster Declaration from Flood 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	20	1950, 1955, 1958, 1969, 1982 (twice), 1983, 1986, 1992, 1993, 1995 (three*), 1997 (twice), 2006*, 2010, 2023 (three*)	21	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1982, 1986, 1992, 1995 (three), 1997 (twice*), 2006*, 2010, 2023 (four*)

Source: Cal OES, FEMA
*included a landslide component.

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Table 4-107 shows events in Madera County since 1993.

*Table 4-107 NCDC Flood Events in Madera County 1993 to 7/31/2024**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Flash Flood	5	0	0	0	0	$25,000	$0

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Flood	69	0	0	0	0	$6,118,000	$5,800,000
Total	**74**	**0**	**0**	**0**	**0**	**$6,143,000**	**$5,800,000**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, much of which fell outside of Madera County

FIS Events

The FIS noted the following:

Madera County (Unincorporated Areas)

Cottonwood, Root, Dry, and Schmidt Creeks, Schmidt Creek Tributary, and Madera Ranchos North and South do not have perennial flow. They are all dry from May through October. All of the channels of these streams are poorly defined. Floods produce high flows and large volumes of water that exceed channel capacities and spread overland. In the developed area in the upper reaches of Madera Ranchos North and South, significant flooding occurred in the winter storm of 1983. There was no record made of flow amounts during that storm. Significant flooding in 1997 revealed new flood plains. A restudy of the San Joaquin River from SH-99 to SH-145 within the unincorporated areas of Madera County was conducted after floods along the river indicated a significant increase in the river's hydrology. This created a need to update the existing floodplain maps. DWR provided estimated high-water marks from the 1997 flooding of the San Joaquin River from Gravelly Ford to SH-99.

City of Madera

The Madera area is known to have experienced many floods in the past. Historical data available indicate that floods occurred in the study area in 1861-62, 1867-68, 1911, and 1914. Records show that floods occurred in 11 of the past 38 years prior to the construction of Hidden Dam in September of 1976. Flooding occurred in 1938, 1943, 1945, 1950, 1952, 1955, 1956, 1958, 1962, 1963, and 1969. Since the operation of Hidden Dam in September of 1976, no floods have occurred in the study area.

The floods that occurred in December 1955 and February 1969 were of about equal magnitude and the most severe known in the study area. During the January 1969 storm, the levee system at the head of Cottonwood Creek overflow channel was overtopped and floodwater from Fresno River spilled into Cottonwood Creek at the rate of about 1,000 cfs. This overflow was considerably less than that which occurred during the December 1955 flood when the levees were breached. Consequently, Fresno River flood flow through the City of Madera in January 1969 (about 15,000 cfs) was considerably greater than in December 1955. However, flooding in January 1969 was minor compared to the February 1969 flooding, which was characterized in newspaper accounts as “five times the waters and ten times the damage” of the January 1969 event.

Oakhurst Community

There are no known documented significant flood problems in the community of Oakhurst. Anecdotal information from local residents indicated that there has been localized flooding, including an area along the north side of China Creek approximately 3,000 feet upstream of the Fresno River.

Hazard Mitigation Planning Committee Events

These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring prior to the 2018 LHMP.

Events since 2018 LHMP

The HMPC noted the following events that occurred since the 2018 LHMP:

January 2024 to March 2024 – Atmospheric river storms caused flooding in many areas of Madera County. These brough heavy rain, flooding, strong winds, falling debris, downed trees, and widespread power outages to the County. On January 22nd, 13 schools were closed due to unsafe road conditions. On February 8th, 13 schools were closed due to unsafe road conditions. On March 14th, 5 schools were closed due to unsafe road conditions.

December 2022 to March 2023 – Atmospheric river storms caused flooding in many areas of Madera County. These brought heavy rain, flooding, strong winds, falling debris, downed trees, and widespread power outages to the County. On January 10th, 24 schools were closed due to unsafe road conditions. On February 24th, 25 schools were closed due to unsafe road conditions.

Events prior to 2018 LHMP

February 8, 2017 – Water billowed through the town of North Fork Tuesday, overrunning creek beds, crushing trees, and threatening all in its path. At Bass Lake Mobile Home Park the water came just feet away from submerging belongings. As the downpour continued mandatory evacuation orders started to come down. The following areas were affected by the evacuation: East Side of Church Street; and the Bass Lake Mobile Home Park.

During the winter storms of **2017** (exact date could not be recalled), there was some localized flooding along the Fresno River near Road 426. A Local RV Resort along the river allowed some Yurts to be placed close to the river which flowed down stream. The Yurts ended up blocking the water flow under a bridge cross which caused county staff to remove them to increase water flows.

In **January 2017** Berenda had a few breaks. All breaks were due to the excess flows traveling down from the uncontrolled waters. The main break was at Avenue 18 and Road 18 (see Figure 4-107). Madera Irrigation District helped assisted in maintaining stability of the banks by providing hard pan material. Cottonwood Creek also had several breaks. The cause was the same, uncontrolled released flows from the dams. All breaks were between Road 23 and Rd 24 ½. The bridge that crosses Avenue 13, just west of Road 30 was closed due to flooding. Water flowing through the canal was spilling over the street, making it too dangerous to drive (see Figure 4-107).

Figure 4-107 2017 Levee Erosion and Road Closures

Source: Madera County Public Works

2011 – Flood event damaged mainly the Fresno River (near the bypass – see Figure 4-108). At least 7 sites were identified to have seepage (boils). Several entities helped out and built temporary boil sack rings in all areas which alleviated the damages at least temporarily. In 2014, the County obtained a $2.5 million grant to repair these critical sites. This grant was under Proposition 1E.

Figure 4-108 2011 Fresno River Levee Boils

Source: Madera County Public Works

Likelihood of Future Occurrence

1% Annual Chance Flood

Occasional— The 1% annual chance flood (100-year) is the flood that has a 1 percent chance of being equaled or exceeded in any given year. This, by definition, makes the likelihood of future occurrence occasional. However, the 100-year flood could occur more than once in a relatively short period of time.

0.2% Annual Chance Flood

Unlikely—The 0.2% annual chance flood (500-year) is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. This, by definition, makes the likelihood of future occurrence unlikely.

Levee Failure

Unlikely—Given the lack of past events, future levee failures are considered unlikely.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and flood can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and Flood

Climate change and its effect on flooding (and related levee failure) is discussed using three sources:

- 2024 CAS
- Cal-Adapt
- National Center for Atmospheric Research

California Climate Adaptation Strategy

According to the 2024 CAS, climate change may affect flooding in California and the Planning Area. While average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is possible that average soil moisture and runoff could decline, however, due to increasing temperatures, evapotranspiration rates, and spacing between rainfall events. Reduced snowpack and increased number of intense rainfall events are likely to put additional pressure on water infrastructure which could increase the chance of flooding associated with breaches or failures of flood control structures such as levees and dams.

Cal Adapt

Cal Adapt future precipitation projections were shown in Figure 4-62 in the Severe Weather Heavy Rains and Storms in Section 4.3.4. These could affect future flooding in the Madera County Planning Area.

National Center for Atmospheric Research

Also, according to the National Center for Atmospheric Research in Boulder, Colorado, atmospheric rivers are likely to grow more intense in coming decades, as climate changes warms the atmosphere enabling it to hold more water.

Vulnerability Assessment

Vulnerability—High

Historically, the Madera County Planning Area has always been at risk to flooding during the rainy season from November through April. The Madera County FIS noted that floods result from prolonged heavy rainfall and are characterized by high peak flows of moderate duration and by a large volume of runoff. Flooding is more severe when antecedent rainfall has resulted in saturated ground conditions. Several areas of the Planning Area are subject to flooding by the overtopping of rivers and creeks, levee failures, and the failure of urban drainage systems that cannot accommodate large volumes of water during severe rainstorms. In addition to the major rivers, there are many streams, channels, canals, and creeks that serve the drainage needs of the Planning Area and communities surrounding it. There is significant threat of flooding in areas of the Planning Area from several of these streams. These streams can be prone to rapid flooding with little notice.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that,

vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce the risk and vulnerability to this hazard.

General Concerns

Flooding is the most likely natural hazard to occur in the County, although many physical and management systems are in place to limit risks of flooding or damage when it periodically occurs. Western Madera County has a location and topography that is naturally subject to flooding. Before levees and other flood protection infrastructure were constructed, water would seasonally cover the western areas of the County. The San Joaquin River forms most of the southern and western borders of the county. In addition, several other river corridors flow from the Sierra Nevada foothills across the County from east to west (e.g., Fresno River and Chowchilla River). Arundo removal needs to continue to occur in the County to ensure water flows fully in river canals. This is done regularly. Flood hazards in Madera County can result from intense rain and snowmelt and/or failure of flood control facilities, such as dams, levees, or drainage channels.

Levee Concerns

As stated above, before levees and other flood protection infrastructure were constructed, water would seasonally cover the western areas of the County. If these levees were to fail, water would be able to affect these areas of the County.

Local concerns for each of the jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from 1% and 0.2% annual chance floods include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented below. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

The Planning Area has mapped FEMA DFIRMs with flood hazard areas. GIS was used to determine the possible impacts of flooding within the Planning Area and how the risk varies across the Madera County

Planning Area. The following methodology was utilized in determining assets at risk to the 1% annual chance flood event and 0.2% annual chance flood event.

Methodology (Parcel and Structures)

In order to analyze people and populations, structures, and critical facilities at risk in DFIRM flood zones, GIS was used to quantify those values. The 2024 Madera County Parcel/Assessor Data was provided by Madera County and was used as the basis for the inventory of assessed values for both improved and unimproved parcels within the Madera County Planning Area. Madera County has a FEMA effective DFIRM dated 9/26/2008, which was obtained from FEMA's National Flood Hazard Layer to perform the flood analysis. The DFIRM flood zones, were then overlaid on the parcel layer. In some cases, there are parcels in multiple flood zones, such as Zone A, Zone X, or Shaded X. For the purposes of this analysis, if the DFIRM flood zone intersected any portion of a parcel polygon, the entire parcel was considered to be in the highest detailed flood zone category. The parcels were segregated and analyzed in this fashion for the entire Planning Area.

Once the DFIRM flood zones were intersected, land, improved (structure), and personal property values from the Assessor data were included for each parcel and estimated content replacement values were added to the analysis. Improved parcels include those with improved structure values identified in the Madera County Assessor's database.

Methodology (Loss Estimate)

The loss estimate for flood is based on the total of improved, personal property, and content replacement values. Only improved parcels and the value of their structure improvements and personal property values were included in the flood loss analysis. The value of land is not included in the loss estimates as generally the land is not at loss to floods, just the value of improvements, personal property, and structure contents. The land value is represented in the detailed flood tables but is primarily present to show the value of the land associated with each flood zone.

Once the potential value of affected parcels was calculated, a damage factor was applied to obtain loss estimates by flood zone. When a flood occurs, seldom does the event cause total loss of an area or building. Potential losses from flooding are related to a variety of factors including flood depth, flood velocity, building type, and construction. The percentage of damage is primarily related to the flood depth. FEMA's flood benefit/cost module uses a simplified approach to model flood damage based on building type and flood depth. The values at risk in the flood analysis tables were refined by applying an average damage estimation of 20% of the total building value. The 20% damage estimate utilized FEMA's Flood Building Loss Table based on an assumed average flood depth of 2 feet. The end result of this more refined flood hazard loss estimate analysis is an inventory of the numbers, types, and values of parcels subject to the flood hazard.

People and Populations

All people and populations located in the 1% and 0.2% annual chance floodplains are at some risk to flooding. Certain vulnerable populations located within areas prone to flooding may be at increased risk to

this hazard, especially during a large event with minimal advance notice. These vulnerable populations include: the unhoused, those with limited mobility, and those that lack the resources to leave the area.

Madera County Planning Area residents that live in the 1% and 0.2% annual chance floodplains are often the most vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events. To further evaluate the impact to the Planning Area's residential population residing within these hazard areas, the DFIRM flood zones were overlayed on the parcel layer and linked to the County Assessor Data. Those residential parcel centroids that intersect the flood zones were counted and multiplied by the 2023 Census Bureau average household factors for each jurisdiction. This is shown in Table 4-108.

Table 4-108 Madera County Planning Area – Improved Residential Parcels and Populations in FEMA DFIRM Flood Zones by Jurisdiction

Jurisdiction	1% Annual Chance		0.2% Annual Chance	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Chowchilla	14	47	0	0
City of Madera	517	1,747	2,282	7,713
Unincorporated County	2,286	7,635	326	1,092

Source: FEMA DFIRM 09/06/2008, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35); City of Madera (3.38); Unincorporated Madera County (3.34).

Structures

Results are presented here first for the Madera County Planning Area and secondly for unincorporated County.

Madera County Planning Area

Certain structures in the Madera County Planning Area are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. GIS was used to determine the possible impacts of flooding on parcels and structures within the Planning Area as described in the methodology above. Table 4-109 shows parcel counts, land, improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values in the Planning Area. This is shown for the 1% and 0.2% annual chance flood zones, as well as for those properties that fall outside of the mapped FEMA DFIRM flood zones.

Table 4-109 Madera County Planning Area – Count and Value of Parcels and Structures in FEMA DFIRM 1% and 0.2% Annual Chance Flood Zones by Jurisdiction

Jurisdiction / Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla							
1% Annual Chance Flood Hazard	63	34	$13,421,666	$7,566,284	$533,832	$6,799,375	$28,321,157
0.2% Annual Chance Flood Hazard	0	0	$0	$0	$0	$0	$0
Other Areas	4,870	3,976	$272,870,099	$861,576,626	$96,014,792	$516,962,393	$1,747,423,910
City of Chowchilla Total	**4,933**	**4,010**	**$286,291,765**	**$869,142,910**	**$96,548,624**	**$523,761,768**	**$1,775,745,067**
City of Madera							
1% Annual Chance Flood Hazard	678	558	$66,746,126	$112,888,323	$199,372	$62,934,518	$242,768,339
0.2% Annual Chance Flood Hazard	3,010	2,504	$131,435,759	$428,038,984	$5,738,999	$253,097,832	$818,311,574
Other Areas	13,400	12,362	$813,523,938	$2,844,916,160	$129,555,489	$1,848,188,022	$5,636,183,609
City of Madera Total	**17,088**	**15,424**	**$1,011,705,823**	**$3,385,843,467**	**$135,493,860**	**$2,164,220,371**	**$6,697,263,521**
Unincorporated Madera County							
1% Annual Chance Flood Hazard	5,885	4,582	$994,735,548	$1,262,257,948	$155,790,246	$1,063,075,374	$3,475,859,116
0.2% Annual Chance Flood Hazard	438	388	$27,686,691	$62,356,738	$13,944,668	$40,929,748	$144,917,845
Other Areas	37,707	26,112	$3,390,827,420	$6,965,172,144	$604,630,723	$4,433,183,019	$15,393,813,306
Unincorporated Madera County Total	**44,030**	**31,082**	**$4,413,249,659**	**$8,289,786,830**	**$774,365,637**	**$5,537,188,140**	**$19,014,590,266**
Grand Total	**66,051**	**50,516**	**$5,711,247,247**	**$12,544,773,207**	**$1,006,408,121**	**$8,225,170,279**	**$27,487,598,854**

Source: FEMA DFIRM 9/26/2008; 2024 Madera County Parcel/Assessor Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Table 4-110 shows Planning Area loss estimates and improved values at risk by FEMA 1% and 0.2% annual chance flood zones. More detailed tables and discussions can be found in each jurisdiction's respective annex to this Base Plan.

Table 4-110 Madera County Planning Area – FEMA DFIRM Flood Loss Estimates

Flood Zone	Total Parcel Count	Imp. Parcel Count	Total Land Value	Improved Structure Value	Personal Property Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance Flood Hazard	6,626	5,174	$1,074,903,340	$1,382,712,555	$156,523,450	$1,132,809,266	$2,672,045,271	$534,409,054	2.93%
0.2% Annual Chance Flood Hazard	3,448	2,892	$159,122,450	$490,395,722	$19,683,667	$294,027,580	$804,106,969	$160,821,394	0.88%
Total	**10,074**	**8,066**	**$1,234,025,790**	**$1,873,108,277**	**$176,207,117**	**$1,426,836,846**	**$3,476,152,240**	**$695,230,448**	**3.81%**

Source: FEMA DFIRM 9/26/2008; 2024 Madera County Parcel/Assessor Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

According to the information in Table 4-109 and Table 4-110, the Madera County Planning Area has 5,174 improved parcels and roughly $2.67 billion of structure, personal property, and contents value in the 1% annual chance floodplain. There are an additional 2,892 improved parcels and roughly $804.1 million of structure, personal property, and contents value in the 0.2% annual chance flood event. A loss ratio of 2.93% and 0.88% indicates that while the Madera County Planning Area does have structural assets at risk to flood, the County should be able to effectively recover from a major flood event.

Unincorporated Madera County

Numerous structures in unincorporated Madera County are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. GIS was used to determine the possible impacts of flooding on parcels and structures within the unincorporated County. Table 4-111 shows parcel counts, land, improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values in the unincorporated County. This is shown, by property use, for the detailed flood zones by the 1% and 0.2% annual chance flood zones, as well as for those properties that fall outside of the mapped FEMA DFIRM flood zones.

Table 4-111 Unincorporated Madera County – Count and Value of Parcels and Structures in Detailed FEMA DFIRM 1% and 0.2% Annual Chance Flood Zones by Property Use

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard							
Zone AE							
Agricultural	1,803	1,410	$510,341,026	$557,062,792	$93,817,357	$557,062,792	$1,718,283,967
Commercial	59	35	$21,414,442	$29,260,695	$1,944,465	$29,260,695	$81,880,297
Government	229	1	$363,929	$43,434	$0	$43,434	$450,797
Industrial	3	1	$617,348	$78,354	$0	$117,531	$813,233
Institutional	9	5	$658,427	$4,319,560	$47,662	$4,319,560	$9,345,209
Recreational	1	0	$992,351	$0	$0	$0	$992,351
Residential	1,224	1,028	$97,923,084	$226,088,581	$378,554	$113,044,291	$437,434,510
Right of Way	4	0	$264	$0	$0	$0	$264
Utilities	45	7	$1,273,024	$313,863	$1,199,730	$313,863	$3,100,480
Unknown	38	0	$27,297	$0	$0	$0	$27,297
Zone AE Total	**3,415**	**2,487**	**$633,611,192**	**$817,167,279**	**$97,387,768**	**$704,162,166**	**$2,252,328,405**
Zone AE: Regulatory Floodway							
Agricultural	101	78	$66,537,304	$23,351,092	$2,331,873	$23,351,092	$115,571,361
Commercial	33	20	$8,656,219	$10,608,912	$1,072,240	$10,608,912	$30,946,283
Government	36	2	$539,538	$32,504	$0	$32,504	$604,546
Industrial	3	1	$579,329	$1,846,092	$0	$2,769,138	$5,194,559
Institutional	5	5	$438,108	$3,976,677	$94,214	$3,976,677	$8,485,676
Recreational	1	0	$4,507	$0	$0	$0	$4,507
Residential	460	407	$29,289,679	$93,768,279	$297,074	$46,884,140	$170,239,172
Utilities	7	1	$134,562	$244,062	$253,440	$244,062	$876,126
Unknown	3	0	$5,241	$0	$0	$0	$5,241
Zone AE: Regulatory Floodway Total	**649**	**514**	**$106,184,487**	**$133,827,618**	**$4,048,841**	**$87,866,525**	**$331,927,471**
Zone AH							
Agricultural	26	26	$5,499,195	$2,653,751	$469,564	$2,653,751	$11,276,261
Commercial	10	5	$5,504,071	$650,019	$2,042,646	$650,019	$8,846,755
Government	1	0	$0	$0	$0	$0	$0
Industrial	3	3	$2,395,380	$14,557,633	$5,517,876	$21,836,450	$44,307,339
Residential	72	65	$3,247,929	$8,551,875	$0	$4,275,938	$16,075,742
Zone AH Total	**112**	**99**	**$16,646,575**	**$26,413,278**	**$8,030,086**	**$29,416,157**	**$80,506,096**

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Zone AO							
Agricultural	655	628	$175,215,259	$137,661,066	$25,799,829	$137,661,066	$476,337,220
Commercial	110	32	$21,459,516	$32,505,297	$13,832,219	$32,505,297	$100,302,329
Government	25	0	$0	$0	$0	$0	$0
Industrial	37	31	$5,529,474	$12,659,460	$5,959,922	$18,989,190	$43,138,046
Institutional	10	4	$432,357	$1,377,732	$8,912	$1,377,732	$3,196,733
Residential	850	786	$33,616,900	$99,097,953	$722,669	$49,548,977	$182,986,499
Right of Way	5	0	$0	$0	$0	$0	$0
Utilities	6	0	$0	$0	$0	$0	$0
Unknown	11	1	$2,039,788	$1,548,265	$0	$1,548,265	$5,136,318
Zone AO Total	**1,709**	**1,482**	**$238,293,294**	**$284,849,773**	**$46,323,551**	**$241,630,527**	**$811,097,145**
1% Annual Chance Flood Hazard Total	**5,885**	**4,582**	**$994,735,548**	**$1,262,257,948**	**$155,790,246**	**$1,063,075,374**	**$3,475,859,116**
0.2% Annual Chance Flood Hazard							
Zone X (shaded)							
Agricultural	59	49	$8,955,990	$8,826,931	$327,821	$8,826,931	$26,937,673
Commercial	9	8	$1,023,044	$1,975,235	$253,822	$1,975,235	$5,227,336
Government	6	1	$334,966	$699,536	$0	$699,536	$1,734,038
Industrial	4	3	$1,039,001	$3,985,030	$12,876,137	$5,977,545	$23,877,713
Institutional	2	1	$7,184	$30,996	$0	$30,996	$69,176
Residential	355	326	$16,124,183	$46,839,010	$486,888	$23,419,505	$86,869,586
Utilities	1	0	$0	$0	$0	$0	$0
Unknown	2	0	$202,323	$0	$0	$0	$202,323
Zone X (shaded) Total	**438**	**388**	**$27,686,691**	**$62,356,738**	**$13,944,668**	**$40,929,748**	**$144,917,845**
0.2% Annual Chance Flood Hazard Total	**438**	**388**	**$27,686,691**	**$62,356,738**	**$13,944,668**	**$40,929,748**	**$144,917,845**
Other Areas							
Zone X (unshaded)							
Agricultural	5,477	3,694	$1,010,014,569	$731,282,922	$98,476,620	$731,282,922	$2,571,057,033
Commercial	813	482	$224,444,200	$751,858,059	$223,704,015	$751,858,059	$1,951,864,333
Government	417	3	$254,814	$102,859	$0	$102,859	$460,532
Industrial	190	55	$29,708,250	$151,214,036	$270,924,712	$226,821,054	$678,668,052
Institutional	75	56	$6,745,272	$35,297,547	$345,523	$35,297,547	$77,685,889
Recreational	38	11	$2,302,613	$3,936,930	$1,361,847	$3,936,930	$11,538,320

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Residential	25,390	18,589	$1,630,222,203	$4,573,248,653	$6,738,644	$2,286,624,327	$8,496,833,827
Right of Way	237		$20,844	$0	$0	$0	$20,844
Utilities	172	48	$1,370,765	$10,047,859	$89,640	$10,047,859	$21,556,123
Unknown	291	14	$7,635,127	$1,141,996	$13,280	$1,141,996	$9,932,399
Zone X (unshaded) Total	**33,100**	**22,952**	**$2,912,718,657**	**$6,258,130,861**	**$601,654,281**	**$4,047,113,553**	**$13,819,617,352**
Zone D (unmapped)							
Agricultural	209	80	$13,678,901	$9,827,191	$34,787	$9,827,191	$33,368,070
Commercial	190	134	$26,653,933	$42,387,354	$1,408,500	$42,387,354	$112,837,141
Government	532	1	$687,705	$15,296	$0	$15,296	$718,297
Industrial	52	41	$2,229,539	$2,572,002	$0	$3,858,003	$8,659,544
Institutional	27	13	$2,289,932	$7,367,506	$457,390	$7,367,506	$17,482,334
Recreational	9	7	$695,498	$333,560	$0	$333,560	$1,362,618
Residential	3,513	2,880	$431,764,296	$644,515,636	$1,075,765	$322,257,818	$1,399,613,515
Right of Way	7	0	$1,451	$0	$0	$0	$1,451
Utilities	50	4	$107,508	$22,738	$0	$22,738	$152,984
Unknown	18	0	$0	$0	$0	$0	$0
Zone D (unmapped) Total	**4,607**	**3,160**	**$478,108,763**	**$707,041,283**	**$2,976,442**	**$386,069,466**	**$1,574,195,954**
Other Areas Total	**37,707**	**26,112**	**$3,390,827,420**	**$6,965,172,144**	**$604,630,723**	**$4,433,183,019**	**$15,393,813,306**
Unincorporated Madera County Total	**44,030**	**31,082**	**$4,413,249,659**	**$8,289,786,830**	**$774,365,637**	**$5,537,188,140**	**$19,014,590,266**

Source: FEMA DFIRM 1/20/2016 2024 Madera County Parcel/Assessor Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Table 4-112 shows unincorporated Madera County loss estimates and improved values at risk by FEMA 1% and 0.2% annual chance flood zones.

Table 4-112 Unincorporated Madera County – FEMA DFIRM Flood Loss Estimates

Flood Zone	Total Parcel Count	Imp. Parcel Count	Total Land Value	Improved Structure Value	Personal Property Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance Flood Hazard	5,885	4,582	$994,735,548	$1,262,257,948	$155,790,246	$1,063,075,374	$2,481,123,568	$496,224,714	2.72%
0.2% Annual Chance Flood Hazard	438	388	$27,686,691	$62,356,738	$13,944,668	$40,929,748	$117,231,154	$23,446,231	0.13%
Unincorporated Madera County Total	**6,323**	**4,970**	**$1,022,422,239**	**$1,324,614,686**	**$169,734,914**	**$1,104,005,122**	**$2,598,354,722**	**$519,670,945**	**2.85%**

Source: FEMA DFIRM 9/26/2008; 2024 Madera County Parcel/Assessor Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

According to the information in Table 4-111 and Table 4-112, the unincorporated Madera County has 4,582 improved parcels and roughly $2.48 billion of structure, personal property, and content replacement values in the 1% annual chance floodplain. There are an additional 388 improved parcels and roughly $117.2 million of structure, personal property, and content replacement values in the 0.2% annual chance flood event. A loss ratio of 2.72% and 0.13% indicates that while the County does have structural assets at risk to flood, the County should be able to effectively recover from a major flood event.

Insurance Coverage, Claims Paid, and Repetitive Losses

Standard property insurance does not include flood coverage because of the relatively high risk. The NFIP provides flood insurance to residents in those communities that participate in the NFIP. Federal financial assistance requires the purchase of flood for structures located within a 1% annual chance floodplain – a requirement that affects nearly all mortgages financed through commercial lending institutions. Flood insurance is also recommended for all structures protected by levees, even if not mapped within a floodplain. Flood insurance promotion and outreach will be important moving forward to ensure vulnerable structures are adequately insured and protected.

Unincorporated Madera County joined the NFIP on August 4, 1987. The County does not participate in the Community Rating System (CRS) program, but may consider joining. According to FEMA's Community Information System (CIS) data obtained from Cal DWR, NFIP insurance data indicates that as of December 2, 2024, there were 440 policies in force in the unincorporated County, resulting in $91,460,000 of insurance in force and $340,228 in annual premiums paid. Of these, 364 are for residential properties and 76 are nonresidential. 278 of these are in A zones; 2 are in D zones, and 56 policies are for parcels in the B, C, & X zones.

There have been 55 closed paid losses totaling $585,296.50; 38 of these were for residential properties and 17 were for nonresidential. Of these 55 paid losses, 31 were parcels in A zones, 16 parcels were in B, C, & X zones, and 8 had no data attached to them. Of the 55 claims, 36 claims were associated with pre-FIRM

structures, 11 with post-FIRM structures, and 8 had no data attached to them. There have been no substantial damage claims since 1978. There have been 0 Increased Cost of Compliance (ICC) losses. There has also been 6 repetitive loss (RL) property in the unincorporated County. The losses occurred pre-FIRM in A zones, with payments totaling $138,878.22. There are 0 severe repetitive loss (SRL) property in the unincorporated County.

Based on the flood analysis, the Madera County Planning Area and unincorporated Madera County have significant values at risk to the 1% and 0.2% annual chance and greater floods. In many instances, the impact to the community from those structures falling within the special flood hazard zone (i.e., the 1% annual chance flood zone) can be lessened by those individuals that maintain flood insurance. Within the Planning Area, of the 5,174 improved parcels within the 1% annual chance flood zone, only 280 (or 5.4 percent) of those parcels maintain flood insurance. For the unincorporated County, of the 4,582 parcels within the 1% annual chance flood zone, only 278 (or 6.1 percent) of these parcels maintain flood insurance. This can be seen on Table 4-113, along with insurance information from the incorporated communities in the County.

Table 4-113 Madera County Planning Area – Percentage of Policy Holders to Improved Parcels in the 1% Annual Chance Floodplain by Jurisdiction

Jurisdiction	Improved Parcels in SFHA (1% Annual Chance) Floodplain*	Insurance Policies in the SFHA (1% Annual Chance) Floodplain	Percentage of 1% Annual Chance Floodplain Parcels Currently Insured
City of Chowchilla	34	0	0.0%
City of Madera	558	2	0.4%
Unincorporated Madera County	4,582	278	6.1%
Total	**5,174**	**280**	**5.4%**

Source: FEMA DFIRM 9/26/2008, FEMA CIS 2024, 2024 Madera County Parcel/Assessor's Data

FEMA also supplied data from their PIVOT database, which provides property use information specific to the RL and SRL properties. However, according to FEMA, there is a discrepancy between CIS and the PIVOT database on numbers of RL and SRL properties based on how information is captured and tracked between systems. According to the PIVOT database, there is 1 RL property and 1 SRL property in the unincorporated County and no RL or SRL properties in either of the two incorporated communities. This can be seen for all communities on Table 4-114. According to data provided by PIVOT, the 1 RL property in the unincorporated County is residential and the 1 SRL property in the unincorporated County is non-residential.

Table 4-114 Madera County Planning Area – RL and SRL Properties by property use

Jurisdiction	RL Properties	SRL Properties
City of Chowchilla	0	0
City of Madera	0	0
Unincorporated Madera County		
Other Residential Building	1	0

Jurisdiction	RL Properties	SRL Properties
Non-Residential Building	0	1

Source: FEMA, PIVOT, 3/24/2025

Critical Facilities and Infrastructure

Flooding presents a threat to critical facilities and infrastructure, and community lifelines. Critical facilities and infrastructure plays an immensely important role in our communities. As previously noted, communities rely on roads, rail corridors, and related biking and pedestrian routes for transportation, and on critical infrastructure for drinking water, wastewater service, and draining streets of rainwater. Other utilities play an important role in providing critical services to area residents. Fire, police and other emergency response facilities and functions are also critical to the well being of the community and the ability to respond and recover from hazard events, such as floods. Damage to any one of these systems can threaten public safety, wreak havoc on daily life, impact properties far from flood zones, and result in economic impacts that cascade throughout California. The following GIS analysis identifies critical facilities and infrastructure at risk to 1% and 0.2% annual chance flooding, followed by a discussion on vulnerability of community lifelines.

A separate analysis was performed on the critical facility inventory in the Madera County Planning Area to determine critical facilities in the 1% and 0.2 annual chance flood zones. Using GIS, the DFIRM flood zones were overlayed on the critical facility GIS layer. Figure 4-109 shows critical facilities and the detailed DFIRM flood zones. Table 4-115 details critical facilities in detailed DFIRM flood zones by facility type and count for the Madera County Planning Area broken out by jurisdiction. Details of critical facilities by type, name, and address by flood zone are listed in Appendix F.

Figure 4-109 Madera County Planning Area – Critical Facilities in DFIRM Flood Zones

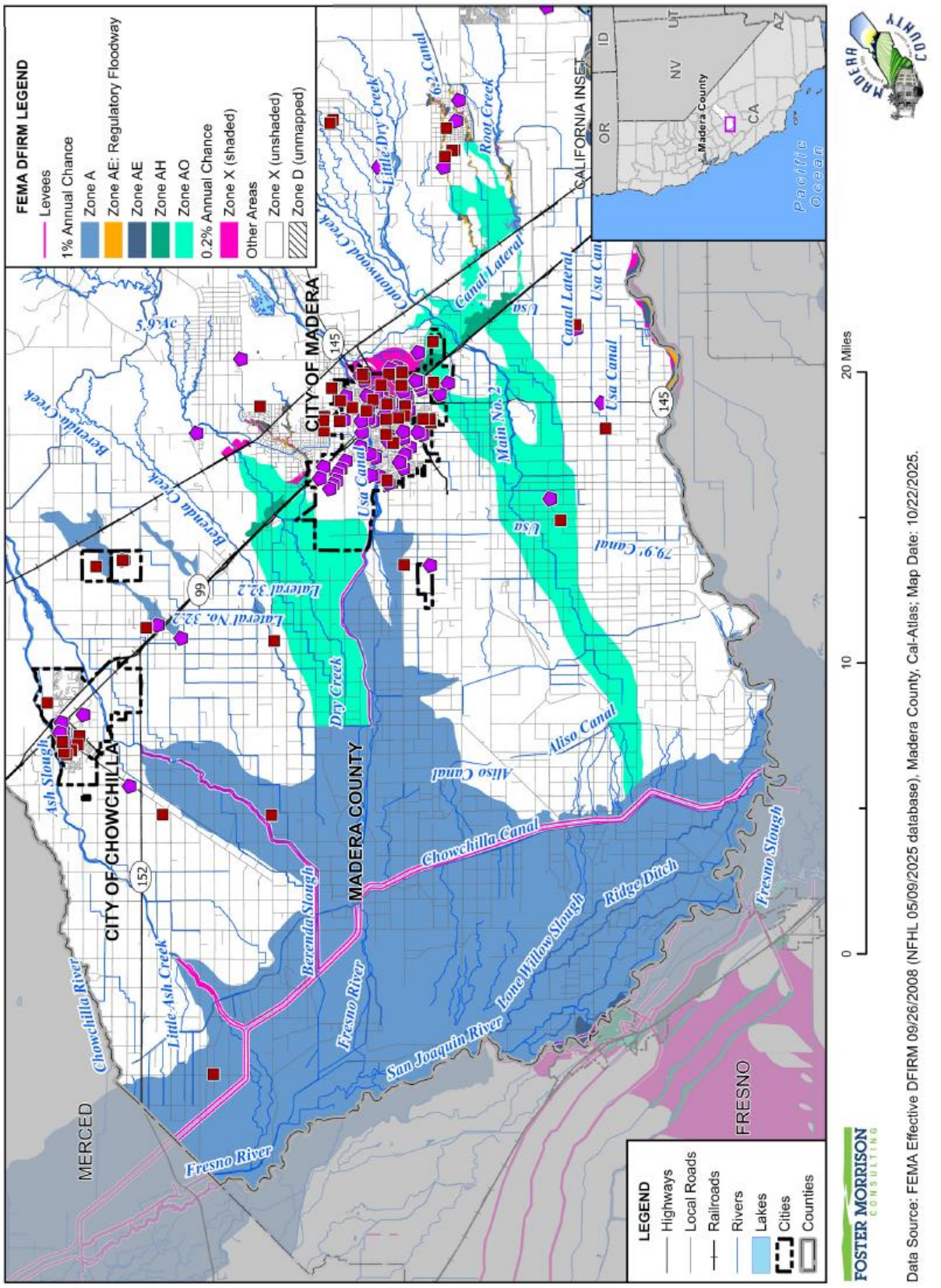


Table 4-115 Madera County Planning Area – Critical Facilities in Detailed DFIRM Flood Zones by Jurisdiction, Category, and Type

Jurisdiction / Flood Zone	Critical Facility Category	Facility Count
City of Chowchilla		
1% Annual Chance Flood Hazard		
Zone AE	Essential Services Facilities	1
	At Risk Populations Facilities	2
1% Annual Chance Flood Hazard Total		**3**
Other Areas		
Zone X (unshaded)	Essential Services Facilities	9
	At Risk Populations Facilities	7
Other Areas Total		**16**
City of Chowchilla Total		**19**
City of Madera		
1% Annual Chance Flood Hazard		
Zone AE	Essential Services Facilities	1
Zone AE: Regulatory Floodway	Essential Services Facilities	3
	At Risk Populations Facilities	1
Zone AH	Essential Services Facilities	3
Zone AO	Essential Services Facilities	3
	At Risk Populations Facilities	2
1% Annual Chance Flood Hazard Total		**13**
0.2% Annual Chance Flood Hazard		
Zone X (shaded)	Essential Services Facilities	20
	At Risk Populations Facilities	7
0.2% Annual Chance Flood Hazard Total		27
Other Areas		
Zone X (unshaded)	Essential Services Facilities	73
	At Risk Populations Facilities	19
Other Areas Total		**92**
City of Madera Total		**132**
Unincorporated Madera County		
1% Annual Chance Flood Hazard		
Zone AE	Essential Services Facilities	1
	At Risk Populations Facilities	5
Zone AE: Regulatory Floodway	Essential Services Facilities	3
	At Risk Populations Facilities	6
Zone AO	Essential Services Facilities	4

Jurisdiction / Flood Zone	Critical Facility Category	Facility Count
	At Risk Populations Facilities	1
1% Annual Chance Flood Hazard Total		**20**
Other Areas		
Zone X (unshaded)	Essential Services Facilities	50
	At Risk Populations Facilities	29
Zone D (unmapped)	Essential Services Facilities	22
	At Risk Populations Facilities	7
Other Areas Total		**108**
No Data Available		
No Data Available	Essential Services Facilities	1
No Data Available Total		**1**
Unincorporated Madera County Total		**129**
Grand Total		**280**

Source: FEMA 09/26/2008 DFIRM, Madera County GIS

Natural, Historic, and Cultural Resources

Large flood events can affect natural, historic, and cultural resources. There are a number of ways floodwaters can impact natural resources and the environment: Wildlife habitats can be destroyed by floodwaters. Contaminated floodwater can pollute rivers and habitats. Silt and sediment can destroy natural areas. Riverbanks and natural levées can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survive the initial flood may die due to being inundated with water. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures within the flooded areas, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme flood events. Any of these resources that fall in the flood zones would be vulnerable.

FEMA NRI Hazard Vulnerability Assessment

The FEMA NRI was queried for additional specific data on Madera County's vulnerability to Flood: 1%/0.2% annual chance and Flood: Localized Flooding. The NRI contains data and analysis for 18 separate natural hazards. The NRI hazard related to Madera County's Flood: 1%/0.2% annual chance and Flood: Localized Flooding is riverine flooding. As shown on Table 4-116, riverine flooding could cause a total of $16,775,085 in expected annual losses, with a historic loss rating of relatively low. Riverine flooding has a very high rating for social vulnerability and a very low community resilience, with a risk index score of 98.8 out of 100. According to the NRI, there have been 40 riverine flooding events between the years 1996-2019 with an average of 1.7 events per year.

Table 4-116 Madera County Planning Area – Riverine Flooding Vulnerability Ratings from FEMA NRI

NRI Hazard	Hazard Risk Index Rating*	Expected Annual Loss Values (total)**	Exposure Value (total)***	Historic Loss Ratio Rating
Riverine Flooding	98.8	$16,775,085	$136,332,743,514	Relatively low

Source: FEMA NRI Report. Retrieved April 1, 2025.

*Hazard Risk Index is calculated using data for only a single hazard type, and reflect a communities expected annual loss value, community risk factors, and the adjustment factor used to calculate the risk value.

**Expected annual loss represents the average economic loss in dollars resulting from natural hazards each year.

***Exposure is a natural hazard consequence factor that is the representative value of buildings, populations, or agriculture potentially exposed to a natural hazard occurrence.

Additional information on the FEMA NRI can be found in Section 4.2 and Appendix G.

Impacts from Flood: 1% and 0.2% Annual Chance Flood

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Large flood events, including those associated with 1% and 0.2% annual chance floods, can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. People may be swept away in floodwaters, causing injuries or deaths. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Structures can be damaged directly from floodwaters and can also be damaged from trees falling as a result of water-saturated soils. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services causing power outages. The interruption of power causes major problems and can result in the closure of governmental offices and community businesses. Public schools may also be required to close or be placed on a delayed start schedule. Roads can be damaged and closed, causing safety and evacuation issues.

Standing water can cause damage to crops, roads, foundations, and electrical circuits. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Health Hazards from Flooding

Certain health hazards are also common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where cattle and hogs are kept or their wastes are stored can contribute polluted waters to the receiving streams.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as e. coli and other disease-causing agents.

The second type of health problems arise after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If a city or county water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future flood conditions (and possible levee failure) and associated impacts and vulnerability of the County to 1% and 0.2% annual chance flooding.
- Population growth in Madera County is expected to slowly continue until 2045, after which it will shrink. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-110. This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Additional growth within the DFIRM flood zones in the County would place additional populations at risk to flooding. Additional population growth would likely bring continued diversity to the County. Vulnerable population groups could face disproportionate effects from a flood and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. Locating new development, structures and critical facilities and infrastructure within or near areas of flood risk may put additional development at risk. However, County building codes and the County's floodplain ordinance are in effect to reduce this risk and should be updated as necessary to continue to address future flood conditions. Depending on the location of new development and adherence to protective building codes and the floodplain ordinance, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the County to this hazard.

Future Development

This section provides an analysis of the flood hazard and proposed future development within the County based on FEMA floodplains and also discusses considerations in evaluating future flooding conditions.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help to make for a more resilient community.

Future Development: General Considerations

Communities that participate in the NFIP adopt regulations and codes that govern development in special flood hazard areas (SFHAs) and enforce those requirements through their local floodplain management ordinances through the issuance of permits. Madera County's floodplain management ordinance provides standards for development, subdivision of land, construction of buildings, and improvements and repairs to buildings that generally meet the minimum requirements of the NFIP.

The International Residential Code (IRC) and International Building Code (IBC), by reference to ASCE 24, include requirements that govern the design and construction of buildings and structures in flood hazard areas. FEMA has determined that the flood provisions of the I-Codes are consistent with the requirements of the NFIP (the I-Code requirements shown either meet or exceed NFIP requirements). ASCE 24, a design standard developed by the American Society of Civil Engineers, expands on the minimum NFIP requirements with more specificity, additional requirements, and some limitations.

With the adoption of the International Codes, communities will be moving towards a more stringent approach to regulatory floodplain management, beyond the minimum requirements of the NFIP. The adoption and enforcement of disaster-resistant building codes is a core community action to promote effective mitigation. When communities ensure that new buildings and infrastructure are designed and constructed in accordance with national building codes and construction standards, they significantly increase local resilience now and in the future. With continued advancements in building codes, local ordinances should be reviewed and updated to meet and exceed standards as practicable to protect new development from future flood events and to further promote disaster resiliency.

One of the most effective ways to reduce vulnerability to potential flood damage is through careful land use planning that fully considers applicable flood management information and practices. Master planning will also be necessary to assure that open channel flood flow conveyances serving the smaller internal streams and drainage areas are adequately prepared to accommodate the flows. Preservation and maintenance of natural and riparian areas should also be an ongoing priority to realize the flood control benefits of the natural and beneficial functions of these areas.

Future development in the County may be built in the floodplain, in conformance to the standards of the floodplain ordinance. The County enforces the floodplain ordinance on new development in unincorporated Madera County. Future development areas and their vulnerability to DFIRM flooding is discussed further in the below GIS analysis.

Future Development: GIS Analysis

Madera County provided 14 future development areas which were used as the basis for the inventory of future development for the unincorporated County. These were mapped in GIS. Where multiple parcels are listed, the parcels are merged to form one polygon, and the hazards are assigned to the highest annual chance flood zone category. Figure 4-110 shows the locations of the future development areas and FEMA DFIRM flood zones as. As shown, some of these areas fall inside of the 1% and 0.2% annual chance flood zones, as shown on Table 4-117.

Figure 4-110 Unincorporated Madera County – Future Development in FEMA DFIRM Flood Zones

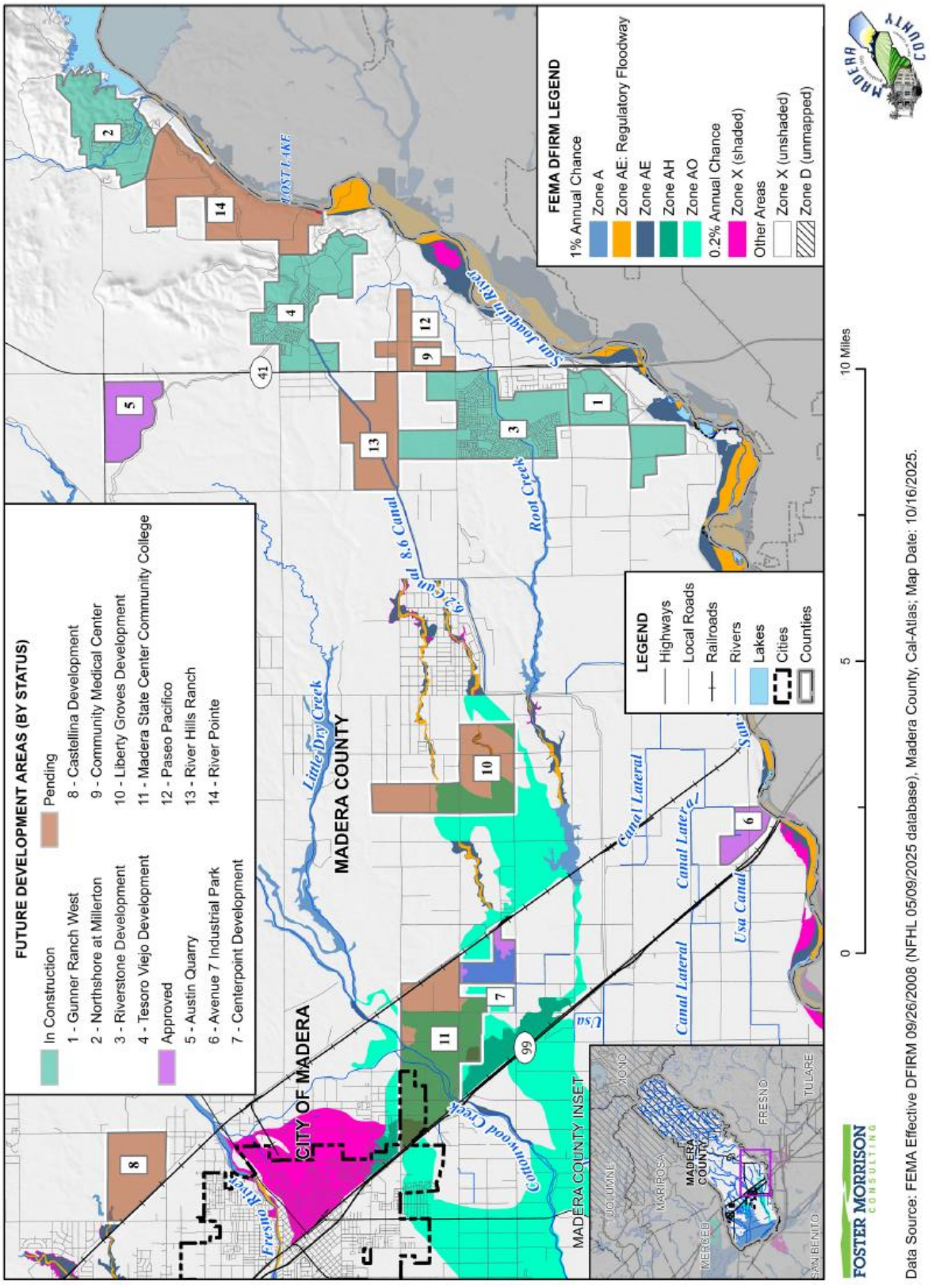


Table 4-117 Unincorporated Madera County – Future Development in DFIRM Flood Zones by Status, Parcels, and Acres

Future Development Status and Type/ Future Development Map ID/Flood Zone	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use						
Gunner Ranch West (Map ID 1)						
Other Areas	53	12	41	974	394	580
Gunner Ranch West Total	**53**	**12**	**41**	**974**	**394**	**580**
Northshore at Millerton (Map ID 2)						
1% Annual Chance Flood Hazard	1	0	1	320	0	320
Other Areas	645	0	645	897	0	897
Northshore at Millerton Total	**646**	**0**	**646**	**1,217**	**0**	**1,217**
Riverstone Development (Map ID 3)						
Other Areas	4,053	1,771	2,282	1,770	569	1,201
Riverstone Development Total	**4,053**	**1,771**	**2,282**	**1,770**	**569**	**1,201**
Tesoro Viejo Development (Map ID 4)						
Other Areas	2,322	843	1,479	1,417	499	918
Tesoro Viejo Development Total	**2,322**	**843**	**1,479**	**1,417**	**499**	**918**
Mixed Use Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
In Construction Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
Approved						
Industrial						
Austin Quarry (Map ID 5)						
Other Areas	2	0	2	658	0	658
Austin Quarry Total	**2**	**0**	**2**	**658**	**0**	**658**
Avenue 7 Industrial Park (Map ID 6)						
1% Annual Chance Flood Hazard	1	1	0	108	108	0
Other Areas	4	2	2	188	184	4
Avenue 7 Industrial Park Total	**5**	**3**	**2**	**296**	**292**	**4**
Industrial Total	**7**	**3**	**4**	**954**	**292**	**662**
Mixed Use						
Centerpoint Development (Map ID 7)						

Future Development Status and Type/ Future Development Map ID/Flood Zone	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
1% Annual Chance Flood Hazard	73	27	46	293	145	148
Other Areas	8	7	1	15	15	0
Centerpoint Development Total	**81**	**34**	**47**	**307**	**159**	**148**
Mixed Use Total	**81**	**34**	**47**	**307**	**159**	**148**
Approved Total	**88**	**37**	**51**	**1,262**	**452**	**810**
Pending						
Commercial						
Community Medical Center (Map ID 9)						
Other Areas	2	0	2	198	0	198
Community Medical Center Total	**2**	**0**	**2**	**198**	**0**	**198**
Commercial Total	**2**	**0**	**2**	**198**	**0**	**198**
Mixed Use						
Castellina Development (Map ID 8)						
1% Annual Chance Flood Hazard	1	1	0	473	473	0
Other Areas	1	1	0	317	317	0
Castellina Development Total	**2**	**2**	**0**	**789**	**789**	**0**
Madera State Center Community College (Map ID 11)						
1% Annual Chance Flood Hazard	52	33	19	1,708	1,442	267
Other Areas	15	0	15	173	0	173
Madera State Center Community College Total	**67**	**33**	**34**	**1,881**	**1,442**	**439**
River Hills Ranch (Map ID 13)						
Other Areas	5	3	2	934	854	80
River Hills Ranch Total	**5**	**3**	**2**	**934**	**854**	**80**
River Pointe (Map ID 14)						
1% Annual Chance Flood Hazard	3	3	0	615	615	0
Other Areas	11	7	4	1,117	1,112	5
River Pointe Total	**14**	**10**	**4**	**1,732**	**1,727**	**5**
Mixed Use Total	**88**	**48**	**40**	**5,336**	**4,812**	**524**
Residential						
Liberty Groves Development (Map ID 10)						

Future Development Status and Type/ Future Development Map ID/Flood Zone	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
1% Annual Chance Flood Hazard	14	14	0	1,169	1,169	0
Other Areas	2	2	0	199	199	0
Liberty Groves Development Total	**16**	**16**	**0**	**1,369**	**1,369**	**0**
Paseo Pacifico (Map ID 12)						
Other Areas	3	1	2	285	61	223
Paseo Pacifico Total	**3**	**1**	**2**	**285**	**61**	**223**
Residential Total	**19**	**17**	**2**	**1,653**	**1,430**	**223**
Pending Total	**109**	**65**	**44**	**7,188**	**6,242**	**946**
Grand Total	**7,271**	**2,728**	**4,543**	**13,826**	**8,156**	**5,671**

Source: FEMA DFIRM 9/26/2008, Madera County

4.3.12. Flood: Localized Flooding

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrence; and how climate change can affect or influence this hazard.

Hazard/Problem Description

Flooding occurs in areas other than the FEMA mapped floodplains. Flooding may be from drainages not studied by FEMA, lack of or inadequate drainage infrastructure, or inadequate maintenance. Localized, stormwater flooding occurs throughout the Madera County Planning Area during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration. Flooding is more severe when previous rainfall has created saturated ground conditions. Urban storm drainpipes and pump stations have a finite capacity. When rainfall exceeds this capacity, or the system is clogged, water accumulates in the street until it reaches a level of overland release. This type of flooding may occur when intense storms occur over areas of development.

Location and Extent

There is no established scientific scale or measurement system for localized flooding. Localized flooding is generally measured by depth of flooding and the area affected. Localized flooding often happens quickly and has a short speed of onset. In the County this happens more often during the winter months, as was shown on Figure 4-52 above. Localized flooding often has a short duration. Specific locations in the County can be seen in the Local Concerns section below in Table 4-118.

Past Occurrences

Disaster Declarations

There are no identified state or federal disaster declarations for localized flooding, as shown in Table 4-4. However, localized flooding was likely an issue during previous declarations for severe storms, heavy rains and floods.

NCDC Events

The past occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile in Section 4.3.11.

Hazard Mitigation Planning Committee Events

These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring prior to the 2018 LHMP.

Events since 2018 LHMP

The HMPC noted no specific events of localized flooding, but they noted that localized flooding does occur with some regularity in those locations denoted in Table 4-118 below. This occurred during the atmosphere river events in 2023 and 2024.

Events prior to 2018 LHMP

2017 winter storms, including significant snow and heavy rains, resulted in more localized flooding throughout the Planning Area. The greatest evidence of localized flooding during the 2017 storms included the North Fork region, especially within the areas of the RV park, which is a fairly typical occurrence.

Likelihood of Future Occurrence

Highly Likely—Natural drainage systems located throughout the Madera County Planning Area have a finite capacity to convey water. Likewise, storm drainage systems have a finite capacity generally based on the design criteria. When rainfall exceeds the capacity of natural and storm drainage systems or systems clog, water accumulates until it reaches a level of overland release. Due to aging and often undersized infrastructure, this type of flooding will continue to occur annually during heavy rains.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and localized flood can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and Localized Flood

Even if average annual rainfall may decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century, increasing the likelihood of overwhelming stormwater systems built to historical rainfall averages. This makes localized flooding more likely.

Vulnerability Assessment

Vulnerability—Medium

Flood vulnerability and their impacts vary by location and severity of any given flood event and will likely only affect certain areas of the Madera County Planning Area during specific times. Based on the risk assessment, it is evident that floods will continue to have potentially significant economic impacts to certain areas of the Madera Planning Area. However, while flooding can cause significant impacts depending on the duration and volume of precipitation and the drainage in any given area, many of the floods in the Planning Area are minor, localized flood events that are more of a nuisance than a disaster.

Many areas of the Planning Area are at some measure of vulnerability to localized flooding. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

General Concerns

According to Madera County, numerous parcels and roads throughout the County not included in the FEMA 1% and 0.2% annual chance floodplains are subject to flooding in heavy rains. In addition to flooding, damage to these areas during heavy storms includes pavement deterioration, washouts, mudslides, debris areas, and downed trees. The frequency and type of damage or flooding that occurs varies from year to year, depending on the quantity of runoff. Outdated and undersized drainage systems also contribute to a greater vulnerability to localized stormwater flooding.

The primary areas of localized flooding and the types of damage are presented in Table 4-118.

Table 4-118 Madera County Localized Flooding Areas

Road Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris
Church St	Y			Y		
Road 225 at Redinger Lake	Y	Y	Y	Y	Y	Y
Ash Slough	Y	Y	Y	Y		
Berenda Slough	Y		Y	Y		Y
Road 621 at High Point Court	Y	Y	Y			
Cottonwood Creek			Y			Y
Berenda Creek			Y			Y

Source: Madera County

In addition to the areas identified in the above table, the County has experienced documented flooding issues in the following locations:

- The confluences of China Creek and Fresno River and half a mile above the confluences
- The pond in Cedar Valley which flows into Lewis Creek
- Within the downtown core of the community of Oakhurst where the Fresno River and China Creek drainages pose flooding risks to infrastructure and property during continuous heavy rain events
- North Fork along Church Street
- Wildwood Mobile Home Park along the San Joaquin River

The County needs to understand the root causes of each of these areas and develop appropriate mitigation actions to reduce flooding in these areas.

Additionally, the County noted that localized flood issues have (in the past) resulted in homeowners being dropped from their homeowners insurance.

Local concerns for each of the participating jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from localized flood include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA National Risk Index in Madera County, the relevant portions of the hazard analysis done by FEMA is presented below. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

People and Populations

People and populations are traditionally not highly vulnerable to localized flooding, but their structures and contents can be at risk. Localized flooding may also cause transportation issues as roads and lanes are impacted or closed and affect the ability for people to travel throughout the Planning Area.

Structures

Structures in areas with localized flooding can be affected if floodwaters intrude into the structure. Structures in low lying areas, or those with basements can be at greater risk. Buildings with older foundations that are prone to water intrusion are also at greater risk. Once water finds its way into a structure, it tends to continue to do so until the path that brings water into a structure is mitigated. Ground saturation can result in instability, collapse, or other damage to structures. Trees can also be compromised and uprooted falling on structures causing damage.

Critical Facilities and Infrastructure

Localized flooding, while often more of a nuisance, can cause damage to critical facilities and infrastructure during a heavy rain and storm event. Any facility that experiences localized flooding can be impacted. Utilities and other critical infrastructure can all be affected, causing interruptions in service until repairs can be made. For example, water and wastewater systems can be vulnerable to heavy rains and flood events. Rainfall creates a high water table, surging streams and creeks, and saturates soil. Infiltration of stormwater into water and wastewater systems may occur and presents a threat to public health and safety, when the infrastructure is no longer able to meet operational needs and local demands.

Natural, Historic, and Cultural Resources

Natural resource assets may have some vulnerabilities to localized flood during major storm events, but can benefit from floodwaters, often by design. Many parks and green spaces are designed to take overflow water and release it into the underlying soils and natural areas. Wetlands areas in the Planning Area actually help reduce the risk of flooding, as they can absorb excess rainfall that would have to be drained away from impervious surfaces. Flooding can provide many benefits to the natural environment, including recharging wetlands and groundwater, increasing fish production, creating wildlife habitat, and rejuvenating soil fertility. These smaller localized flooding events often provide more benefits to the environment in comparison to negative impacts associated with large flood events. Historic and cultural resources may be at some measure of vulnerability if they are located in areas subject to repeated localized flooding.

FEMA NRI Hazard Vulnerability Assessment

Localized flooding is not an NRI hazard; as such, no data is presented.

Impacts from Localized Flood

Primary concerns associated with stormwater flooding include impacts to infrastructure that provides a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Objects can also

be buried or destroyed through sediment deposition. Floodwaters can break utility lines and interrupt services. Standing water can cause damage to crops, roads, and foundations. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

Life safety issues from localized flooding would be more limited. The amount and type of damage or flooding that occurs varies from year to year and from storm to storm, depending on the quantity of precipitation and runoff.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future heavy rain conditions and associated impacts and vulnerability of the County to localized flood.
- Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the County. Population growth in Madera County is expected to continue until 2045 and then start to shrink. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-21). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Additional population growth would likely bring continued diversity to the County. Vulnerable population groups such as low-income individuals and households living in floodprone areas could face disproportionate effects from localized flood and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. Much of the growth in Madera County is occurring through expansion of the more urbanized areas, causing an increase in peak flow and stormwater runoff. Such growth will consume previously undeveloped acres, and the impacts may overwhelm existing drainage and flood control facilities. Locating new development, structures and critical facilities and infrastructure within or near areas of localized flooding risk may put additional development at risk. County building codes are in effect to reduce this risk and should be updated as necessary to continue to address future localized flood conditions. Depending on the location of new development and adherence to protective building codes, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the County to this hazard.

The potential for flooding may increase as stormwater is channeled due to land development. Such changes can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. Mitigating the root causes of the localized stormwater flooding or choosing not to develop in areas that often are subject to localized flooding will reduce future risks of losses due to stormwater/localized flooding. Floodplain modeling and master planning should be based on build out property conditions to ensure that all new development remains safe from future flooding.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help to make for a more resilient community.

The HMPC noted that the Madera County Public Works Department is making sure new and future development will not divert any storm runoff to the facilities. The County is making sure that developments contain/retain and mitigate for storm water through catch basins. The County, unlike the cities, does not have a master plan and therefore every new development must retain their runoff. All designs must meet and withstand the 100-year storms.

4.3.13. Hazardous Materials Transport

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrence; and how climate change can affect or influence this hazard.

Hazard/Problem Description

According to the Environmental Protection Agency (EPA), a hazardous material is any item or agent (biological, chemical, physical) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Hazardous materials can be present in any form; gas, solid, or liquid. Environmental or atmospheric conditions can influence hazardous materials if they are uncontained.

The U.S. Occupational Safety and Health Administration's (OSHA) definition of hazardous material includes any substance or chemical which is a "health hazard" or "physical hazard," including: chemicals which are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents which act on the hematopoietic system; agents which damage the lungs, skin, eyes, or mucous membranes; chemicals which are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive or water-reactive; and chemicals which in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists or smoke which may have any of the previously mentioned characteristics.

The EPA incorporates the OSHA definition and adds any item or chemical which can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging,

injecting, escaping, leaching, dumping or disposing into the environment. The EPA maintains a list of 366 chemicals that are considered extremely hazardous substances (EHS). This list was developed under the Superfund Amendments and Reauthorization Act. The presence of EHSs in amounts in excess of a threshold planning quantity requires that certain emergency planning activities be conducted.

A release or spill of bulk hazardous materials could result in fire, explosion, toxic cloud or direct contamination of water, people, and property. The effects may involve a local area or many square miles. Health problems may be immediate, such as corrosive effects on skin and lungs, or be gradual, such as the development of cancer from a carcinogen. Damage to property could range from immediate destruction by explosion to permanent contamination by a persistent hazardous material.

Location and Extent

Highways and railways constitute a major threat due to the myriad chemicals and hazardous substances, including radioactive materials, transported in vehicles, trucks, and rail cars. Much of the hazardous materials transported through Madera County are carried by truck on the State Highway or on railway systems. The General Plan Background Report noted that there are four major state highways in the County: Highways 33, 41, 99, 145, and 152. In terms of the current transport situation, the major routes are Highway 99 and the two railroads (Union Pacific [UPRR] and Burlington Northern Santa Fe [BNSF]), which transport thousands of tons of hazardous materials each year. Most of the suitable sites for future treatment, storage, or disposal facilities are on or near Highways 99 or 152. In addition, UP and BNSF Railroads cross most of the site areas. Highway 145, which links Highways 41 and 99, crosses the city of Madera before intersecting Highway 99; as such. the potential for spills caused by accidents to affect large numbers of people is great.

Figure 4-111 shows the hazardous materials transportation corridors (for roadways and rail) in the County as well as the one-mile buffer zone (on each side of the corridor for a two-mile total buffer) used for this analysis as detailed further in the methodology below. Geographic hazardous materials buffer zones for the Madera County Planning Area are detailed by highway in Table 4-119 and by railroad in Table 4-120.

Figure 4-111 Madera County Planning Area – Hazardous Materials Transportation Routes and Buffer Zones

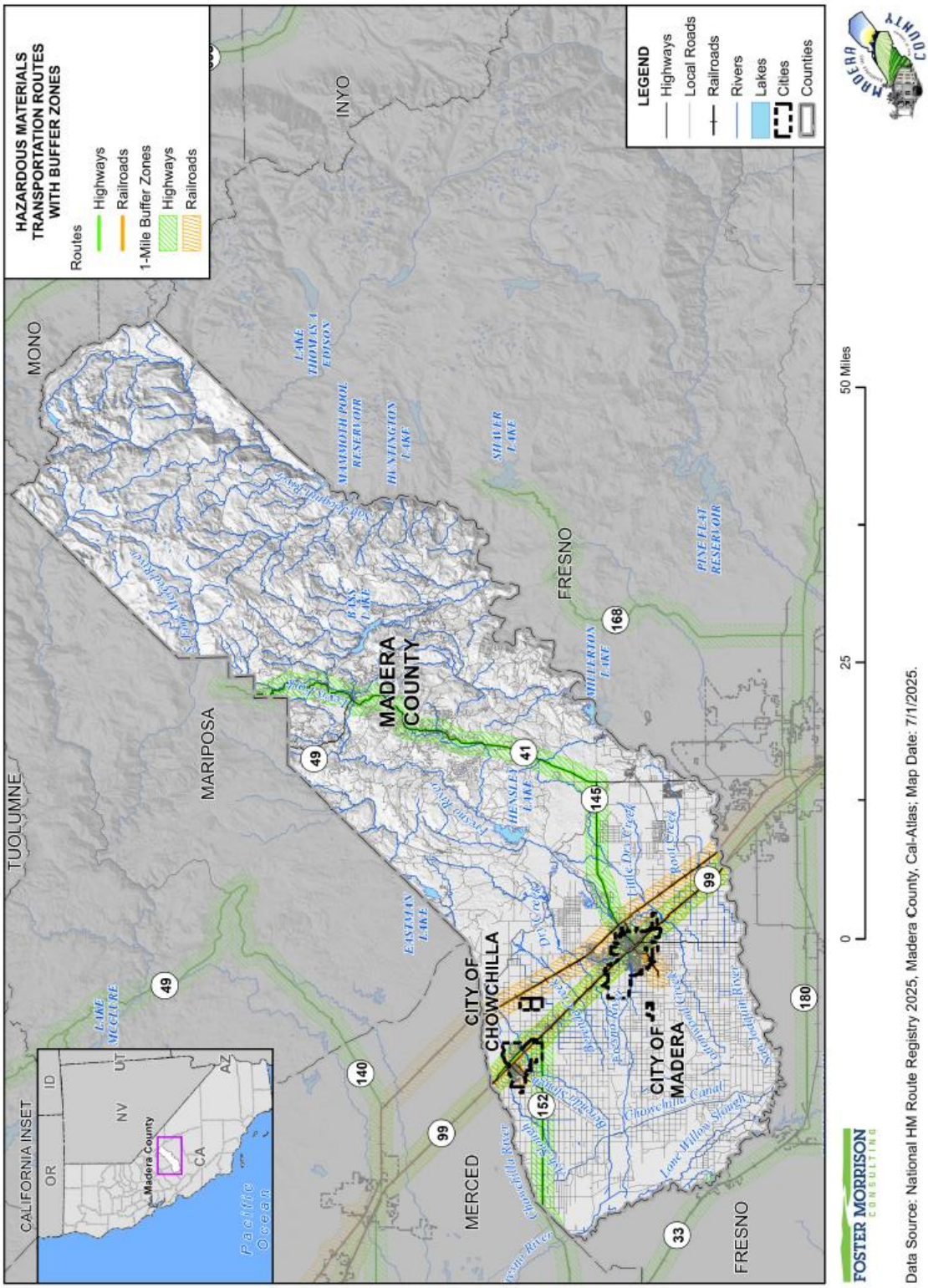


Table 4-119 Madera County Planning Area – Geographical Extent of Hazardous Materials Transportation Buffer Zones for Highways

Jurisdiction / Hazardous Materials Routes	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla						
HWY 152	1,006	0.1%	997	0.2%	9	0.001%
HWY 99	3,177	0.2%	1,856	0.3%	1,321	0.2%
City of Madera						
HWY 145	2,613	0.2%	1,734	0.3%	879	0.1%
HWY 99	5,422	0.4%	3,031	0.5%	2,391	0.3%
Unincorporated Madera County						
HWY 145	18,434	1.4%	10,984	2.0%	7,450	0.9%
HWY 152	19,669	1.4%	18,821	3.4%	848	0.1%
HWY 33	555	0.04%	469	0.1%	86	0.01%
HWY 41	45,681	3.4%	17,633	3.2%	28,047	3.5%
HWY 99	25,002	1.8%	22,372	4.1%	2,630	0.3%
Grand Total						

Source: National Hazardous Materials Routes Registry (2025)

Table 4-120 Madera County Planning Area – Geographical Extent of Hazardous Materials Transportation Buffer Zones for Railroads

Jurisdiction / Hazardous Materials Routes	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla						
BNSF	381	0.0%	-		381	0.0%
UP	4,303	0.3%	2,691	0.5%	1,613	0.2%
City of Madera						
BNSF	898	0.1%	514	0.1%	384	0.0%
UP	6,695	0.5%	3,860	0.7%	2,835	0.4%
Unincorporated Madera County						
BNSF	31,565	2.3%	27,025	4.9%	4,540	0.6%
UP	28,492	2.1%	25,237	4.7%	3,255	0.4%

Source: National Hazardous Materials Routes Registry (2025)

In addition, while most routes are known, Madera County has not quantified the amount of hazardous materials that are transported through it en route to local deliveries or to adjoining counties. Accidents

involving the transportation of hazardous materials could be just as catastrophic as accidents involving stored chemicals, possibly more so, since the location of a transportation accident is not predictable. The U.S. Department of Transportation (USDOT) divides hazardous materials into nine major hazard classes. A hazard class is a group of materials that share a common major hazardous property, i.e., radioactivity, flammability, etc. These hazard classes include:

- Class 1—Explosives
- Class 2—Compressed Gases
- Class 3—Flammable Liquids
- Class 4—Flammable Solids; Spontaneously Combustible Materials; Dangers When Wet Materials/Water-Reactive Substances
- Class 5—Oxidizing Substances and Organic Peroxides
- Class 6—Toxic Substances and Infectious Substances
- Class 7—Radioactive Materials
- Class 8—Corrosives
- Class 9—Miscellaneous Hazardous Materials/Products, Substances, or Organisms

The speed of onset of a hazardous materials spill is generally short. The duration is typically short as well, though certain chemicals can pollute earth and groundwater for long periods of time. The actual extent of any given incident will depend on the type of release, location, and nature and extent of any release.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations for hazardous materials in the County, as shown on Table 4-4.

NCDC Events

The NCDC does not track hazardous materials events.

Pipeline and Hazardous Materials Safety Administration Events

The USDOT Pipeline and Hazardous Materials Safety Administration's (PHMSA) Office of Hazardous Materials Safety performs a range of functions to support the safe transport of hazardous materials. One of these functions is the tracking of hazardous materials incidents in the United States. The database was searched for hazardous materials incidents in the County. A summary of rail and highway incidents since 1970 in the Madera County Planning Area are shown in Table 4-121. 20 separate events were contained in the database. As shown, only 2 of these events occurred since 2018.

Table 4-121 Madera County Planning Area – Hazardous Materials Transportation Incidents Since 1970

Date of Incident	Incident City	Incident Route	Mode of Transportation	Transportation Phase	Commodity Short Name	Quantity Released	Amount of Damages
9/1/2022	Madera	36.8814, -119.9765	Rail	In Transit	Petroleum Gases, Liquefied Or Liquefied Petroleum Gas	5 gal.	$2,990
5/12/2021	Madera	1628 Howard Road	Highway	In Transit	Corrosive Liquid, Acidic, Organic, N.O.S.	2 gal.	$4000
5/24/2017	Fairmead	SR 99 at 152	Highway	In Transit	Corrosive Liquid, Acidic, Inorganic, N.O.S.	25 gal.	$5000
5/24/2017	Fairmead	SR 99 at 152	Highway	In Transit	Hypochlorite Solutions	50 gal,	$5000
5/24/2017	Fairmead	SR 99 at 152	Highway	In Transit	Corrosive Liquid, Basic, Inorganic, N.O.S.	100 gal.	$5000
6/22/2007	Madera	31740 Avenue 12	Highway	Unloading	Sulfuric Acid	3 gal.	$8,005
11/11/2006	Madera	Milepost: 183.30	Rail	In Transit Storage	Ferric Chloride Solution	50 gal.	$27,224
7/13/2006	Madera	Unknown	Highway	In Transit	Resin Solution Flammable	0.25 gal.	$0
8/14/1995	Madera	Falcon Drive	Highway	N/A	Resin Solution Flammable	0.5 gal.	$0
6/30/1995	Madera	2980 Falcon Drive	Highway	Unloading	Resin Solution Flammable	31.25 gal.	$0
6/13/1988	Madera	Unknown	Highway	N/A	Sodium Hydroxide	4 gal.	$0
2/16/1988	Chowchilla	Unknown	Highway	N/A	Ammonia Anhydrous	1,875 gal.	$0
3/13/1984	Madera	Unknown	Highway	N/A	Ammonia Solution	1,200 gal.	$0
9/19/1980	Madera	Unknown	Highway	N/A	Gasoline	50 gal.	$0
10/10/1978	Chowchilla	Unknown	Highway	N/A	Sodium Chlorate	1,013 gal.	$0
9/24/1978	Madera	Unknown	Highway	N/A	Toluene Diisocyanate	5 gal.	$0
4/12/1977	Chowchilla	Unknown	Highway	N/A	Organic Phosphate	100 lbs	$0
6/1/1976	Madera	Unknown	Rail	N/A	Dinitrophenol Solutions	0 gal.	$0
2/8/1976	Madera	Unknown	Highway	N/A	Ammonium Nitrate	29,580 lbs	$0

Date of Incident	Incident City	Incident Route	Mode of Transportation	Transportation Phase	Commodity Short Name	Quantity Released	Amount of Damages
11/5/1974	Chowchilla	Unknown	Highway	N/A	Nitro Carbo Nitrate	100 lbs	$0
Totals							**$542,732**

Source: PHMSA Database – Search dates 01/01/1970 – 06/01/2025

Hazard Mitigation Planning Committee Events

The HMPC noted no other events (whether since the 2018 LHMP or before). They also stated that there may be underreporting of these events due to not having a State recognized hazmat team in the County. Madera County depends on neighboring counties to fill this need.

Likelihood of Future Occurrence

Occasional – Given that 20 minor hazardous materials incidents have happened in transport through the County in the past 55 years, a hazardous materials incident will occur in the County occasionally. It should be noted, however, that small hazardous materials spills happen often and are cleaned up locally and go unreported to national databases. According to Caltrans, most incidences are related to releases during loading and unloading of cargo, and the release of fluids/materials from the transporting vehicles themselves and not the cargo.

Climate Change and Hazardous Materials

Climate change is unlikely to affect hazardous materials transportation incidents.

Vulnerability Assessment

Vulnerability—Medium

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 values will vary from event to event and depend on the type, location, and nature of a specific hazardous material incident. The most significant impact from hazardous materials transport is life safety and public health. Given the difficulty in quantifying the losses associated with technological hazards, this section focuses on analyzing key Planning Area values relative to the hazardous materials transportation corridors identified above.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the City jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

General Concerns

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 hazardous material incident. The County has specific concerns with hazardous materials transport:

- Increase of crude oil on railroad lines through populated areas of the County and City.

Concerns from the General Plan

The Madera County General Plan noted that there are four major state highways in the county: Highways 99, 152, 145, and 41. In terms of the current transport situation, the major routes are Highway 99 and the two railroads, which transport thousands of tons of hazardous materials each year. Most of the suitable sites for future facilities are on or near Highways 99 or 152. In addition, Southern Pacific and Santa Fe Railroads cross most of the site areas. Highway 145, which links Highways 41 and 99, has limitations, because it crosses the city of Madera before intersecting Highway 99; the potential for spills caused by accidents to affect large numbers of people is great. The General Plan identifies Avenue 12 as a more feasible link, although this route crosses a residential subdivision, which would be at risk for hazardous waste spills. The area along all of these routes is at risk of being affected by spills during transport, and this should be a consideration in terms of future development along the roadways.

The main concerns with hazardous material transport would be the two main transportation infrastructures and their proximity to population areas. These major transportation routes such as Highway 99 and the BNSF rail line run through Madera County's densely populated areas.

Local concerns for each of the participating jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk from Hazardous Materials Transportation

Assets at risk from hazardous materials transportation release include: people and populations; structures; critical facilities; and natural, historic, and cultural resources. These are discussed in the following sections. The methodology used to analyze hazardous materials transportation for the population, structures, and critical facilities is discussed in the section below.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented below. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

Methodology: Transportation Release and Buffer Zone

An analysis of the potential vulnerability of the Planning Area to a transportation-related hazardous materials release was conducted using GIS within identified transportation corridors. To evaluate the areas most vulnerable, a one-mile buffer was applied to both sides of Highways 33, 41, 99, 145, and 152, as well as the UPRR and BNSF Railroad lines. The result is a two-mile buffer zone around each transportation corridor that is included in this analysis. The buffer distance was based on guidelines in the USDOT's Emergency Response Guidebook that suggest distances useful to protect people from vapors resulting from spills involving dangerous goods considered toxic if inhaled. The recommended buffer distance referred to in the guide as the "protective action distance" is the area surrounding the incident in which people are at risk of harmful exposure. Actual buffer distances will vary depending on the nature and quantity of the release, whether the release occurred during the night or daytime, and prevailing weather conditions.

People and Populations

All populations are at some vulnerability to a hazardous materials transportation release. Certain vulnerable populations are at the greatest risk to the effects of hazardous materials. Vulnerable populations include:

- The unsheltered
- Those with breathing difficulties or other underlying health conditions
- Infants and children under age five and their caregivers
- Seniors (65 and older)
- Individuals with disabilities
- Individuals dependent on medical equipment
- Individuals who work, exercise, or physically train outdoors
- Individuals with impaired mobility

To determine the overall populations at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS to determine the residential population that resides within the two-mile buffer zone of the highway and railroad corridors. Using GIS, the buffered corridor was overlaid on the improved residential parcel and structure data and results tabulated for the Planning Area, as found in Table 4-122 for highways and Table 4-123 for railways. Those residential parcel centroids that intersect the buffered corridor were counted and multiplied by the 2023 Census Bureau average household factors for each City and the unincorporated County. There are no totals on these tables, as it would result in double counting in many areas where these hazardous materials buffer zones overlap.

Table 4-122 Madera County Planning Area–Improved Residential Parcels and Populations at Risk in Highway Hazardous Materials Buffer Zones

Jurisdiction/Highway	Improved Residential Parcels	Population
City of Chowchilla		
Highway 52	0	0
Highway 99	1,988	6,660
Highway 99 and Highway 152	4	13

Jurisdiction/Highway	Improved Residential Parcels	Population
City of Madera		
Highway 145	2,988	10,099
Highway 99 and Highway 145	5,836	19,726
Unincorporated County		
Highway 145	1,083	3,617
Highway 152	179	598
Highway 33	81	271
Highway 41	2,919	9,749
Highway 41 and Highway 145	0	0
Highway 99	1,850	6,179
Highway 99 and Highway 145	2	7
Highway 99 and Highway 152	211	705

Source: National Hazardous Materials Route Registry 2025, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35); City of Madera (3.38); Unincorporated Madera County (3.34).

Table 4-123 Madera County Planning Area – Improved Residential Parcels and Populations in Railroad Hazardous Material Transport Buffer Zones by Jurisdiction

Jurisdiction/Railroad	Improved Residential Parcels	Population
City of Chowchilla		
BNSF	0	0
UP	3,192	10,693
City of Madera		
BNSF	1,126	3,806
BNSF and UP	1,241	4,157
UP	9,861	33,034
Unincorporated County		
BNSF	22,188	74,108
BNSF and UP	8	27
UP	2,167	7,238

Source: National Hazardous Materials Route Registry 2025, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35); City of Madera (3.38); Unincorporated Madera County (3.34).

Structures

Structures in the City have some measure of risk to hazardous materials which can affect the built environment of the City. During a hazardous materials transportation spill, it is generally the people that are at risk to the effects of the spill. During a spill, buildings, property, and their values are at a lessor risk; however, given the location and breadth of hazardous materials routes in the County, an analysis is

performed here. Parcel counts, land, improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values that fall within the hazardous materials buffer zones. Analysis results for the County are summarized in Table 4-124. This analysis is broken down in in Table 4-125 for highways and in Table 4-126 for railroads.

Table 4-124 Madera County Planning Area – Count and Value of Parcels and Structures in All (Railroad and Highway) Hazardous Materials Transportation Buffer Zone by Jurisdiction

Jurisdiction / Hazardous Materials Routes	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla							
Hazardous Materials Route	3,767	3,428	$177,525,524	$642,224,184	$657,896	$321,112,092	$1,141,519,696
Not in a Hazardous Materials Route	336	307	$15,587,311	$77,643,810	$0	$38,821,905	$132,053,026
City of Chowchilla Total	**4,103**	**3,735**	**$193,112,835**	**$719,867,994**	**$657,896**	**$359,933,997**	**$1,273,572,722**
City of Madera							
Hazardous Materials Route	13,399	12,631	$617,572,205	$2,152,031,411	$3,133,138	$1,076,015,706	$3,848,752,460
Not in a Hazardous Materials Route	1,970	1,808	$112,082,823	$474,646,862	$618,612	$237,323,431	$824,671,728
City of Madera Total	**15,369**	**14,439**	**$729,655,028**	**$2,626,678,273**	**$3,751,750**	**$1,313,339,137**	**$4,673,424,188**
Unincorporated Madera County							
Hazardous Materials Route	9,546	8,194	$587,132,843	$1,538,847,961	$3,375,130	$769,423,981	$2,898,779,915
Not in a Hazardous Materials Route	22,318	15,887	$1,655,055,431	$4,153,262,026	$6,324,464	$2,076,631,013	$7,891,272,934
Unincorporated Madera County Total	**31,864**	**24,081**	**$2,242,188,274**	**$5,692,109,987**	**$9,699,594**	**$2,846,054,994**	**$10,790,052,849**
Grand Total	**51,336**	**42,255**	**$3,164,956,137**	**$9,038,656,254**	**$14,109,240**	**$4,519,328,127**	**$16,737,049,758**

Source: National Hazardous Materials Routes Registry (2025), Madera County 2024 Parcel/Assessor's Data

Table 4-125 Madera County Planning Area – Count and Value of Parcels and Structures in Highway Hazardous Materials Transportation Buffer Zone by Jurisdiction and Route

Jurisdiction / Hazardous Materials Routes	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla							
Highway 99	2,272	1,988	$118,546,621	$412,176,775	$138,680	$206,088,388	$736,950,464
Highway 99 and Highway 152	4	4	$525,002	$611,503		$305,752	$1,442,257
City of Chowchilla Total	**2,276**	**1,992**	**$119,071,623**	**$412,788,278**	**$138,680**	**$206,394,139**	**$738,392,720**
City of Madera							
Highway 145	2,028	1,756	$91,410,908	$257,504,510	$365,983	$128,752,255	$478,033,656
Highway 99	3,157	2,988	$167,872,651	$620,524,760	$506,902	$310,262,380	$1,099,166,693
Highway 99 and Highway 145	6,095	5,836	$243,054,126	$867,411,719	$1,920,273	$433,705,860	$1,546,091,978
City of Madera Total	**11,280**	**10,580**	**$502,337,685**	**$1,745,440,989**	**$2,793,158**	**$872,720,495**	**$3,123,292,327**
Unincorporated Madera County							
Highway 145	1,263	1,083	$81,126,858	$232,084,290	$84,533	$116,042,145	$429,337,826
Highway 152	200	179	$17,939,144	$37,275,164	$141,060	$18,637,582	$73,992,950
Highway 33	82	81	$3,257,632	$11,095,263		$5,547,632	$19,900,527
Highway 41	3,589	2,919	$277,998,460	$625,496,322	$1,505,147	$312,748,161	$1,217,748,090
Highway 99	2,080	1,850	$90,790,221	$265,897,494	$1,072,328	$132,948,747	$490,708,790
Highway 99 and Highway 145	3	2	$99,349	$219,739		$109,870	$428,958
Highway 99 and Highway 152	290	211	$11,904,793	$22,745,244	$181,055	$11,372,622	$46,203,714
Unincorporated Madera County Total	**7,507**	**6,325**	**$483,116,457**	**$1,194,813,516**	**$2,984,123**	**$597,406,758**	**$2,278,320,854**
Grand Total	**21,063**	**18,897**	**$1,104,525,765**	**$3,353,042,783**	**$5,915,961**	**$1,676,521,392**	**$6,140,005,901**

Source: National Hazardous Materials Routes Registry (2025), Madera County 2024 Parcel/Assessor's Data
To avoid duplication of parcel count, the parcels located in areas where multiple haz-mat route buffers overlap were assigned the route grouping listed above.

Table 4-126 Madera County Planning Area – Count and Value of Parcels and Structures in Railroad Hazardous Materials Transportation Buffer Zone by Jurisdiction and Railway

Jurisdiction / Hazardous Materials Routes	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla							
UP	3,456	3,192	$158,337,913	$578,884,377	$657,896	$289,442,189	$1,027,322,375
City of Chowchilla Total	**3,456**	**3,192**	**$158,337,913**	**$578,884,377**	**$657,896**	**$289,442,189**	**$1,027,322,375**
City of Madera							
BNSF	1,282	1,126	$56,016,365	$178,153,582	$255,643	$89,076,791	$323,502,381
BNSF and UP	1,443	1,241	$59,988,839	$157,025,055	$196,328	$78,512,528	$295,722,750
UP	10,253	9,861	$483,346,738	$1,746,354,121	$2,681,167	$873,177,061	$3,105,559,087
City of Madera Total	**12,978**	**12,228**	**$599,351,942**	**$2,081,532,758**	**$3,133,138**	**$1,040,766,379**	**$3,724,784,217**
Unincorporated Madera County							
BNSF	2,432	2,188	$119,215,214	$380,754,492	$396,429	$190,377,246	$690,743,381
BNSF and UP	8	8	$433,058	$621,515		$310,758	$1,365,331
UP	2,501	2,167	$112,872,873	$312,156,831	$1,333,525	$156,078,416	$582,441,645
Unincorporated Madera County Total	**4,941**	**4,363**	**$232,521,145**	**$693,532,838**	**$1,729,954**	**$346,766,419**	**$1,274,550,356**
Grand Total	**21,375**	**19,783**	**$990,211,000**	**$3,353,949,973**	**$5,520,988**	**$1,676,974,987**	**$6,026,656,948**

Source: National Hazardous Materials Routes Registry (2025), Madera County 2024 Parcel/Assessor's Data
To avoid duplication of parcel count, the parcels located in areas where multiple haz-mat route buffers overlap were assigned the route grouping listed above.

Table 4-127 and Table 4-128 show additional analysis for the unincorporated County. Table 4-127 shows the specific hazardous materials routes for highways, and then separates by property use, the total parcel counts, improved parcel and structure counts, land and structure values, personal property values, and the estimated contents replacement values. Table 4-128 shows the specific hazardous materials routes for railways, and then separates by property use the total parcel counts, improved parcel and structure counts, land and structure values, personal property values, and the estimated CRVs.

Table 4-127 Unincorporated Madera County – Count and Value of Parcels and Structures in Highway Hazardous Materials Transportation Buffer Zone by Route and Property Use

Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Highway 145							
Agricultural	189	161	$44,456,183	$38,443,655	$970,992	$38,443,655	$122,314,485
Commercial	19	14	$2,806,055	$4,361,625	$166,698	$4,361,625	$11,696,003
Government	66	0	$4,618	$0	$0	$0	$4,618
Industrial	16	11	$3,491,912	$7,091,937	$14,102,936	$10,637,906	$35,324,691
Institutional	4	3	$83,634	$201,687	$0	$201,687	$487,008
Recreational	0	0	$0	$0	$0	$0	$0
Residential	1,263	1,083	$81,126,858	$232,084,290	$84,533	$116,042,145	$429,337,826
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	2	0	$0	$0	$0	$0	$0
Unknown	11	0	$206,999	$0	$0	$0	$206,999
Highway 145 Total	**1,570**	**1,272**	**$132,176,259**	**$282,183,194**	**$15,325,159**	**$169,687,018**	**$599,371,630**
Highway 152							
Agricultural	344	320	$89,341,335	$88,061,601	$10,820,930	$88,061,601	$276,285,467
Commercial	21	17	$2,627,449	$6,282,790	$4,441,098	$6,282,790	$19,634,127
Government	4	0	$0	$0	$0	$0	$0
Industrial	1	1	$13,618	$48,841	$0	$73,262	$135,721
Institutional	3	3	$116,569	$1,904,675	$0	$1,904,675	$3,925,919
Recreational	0	0	$0	$0	$0	$0	$0
Residential	200	179	$17,939,144	$37,275,164	$141,060	$18,637,582	$73,992,950
Right of Way	1	0	$1	$0	$0	$0	$1
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
Highway 152 Total	**574**	**520**	**$110,038,116**	**$133,573,071**	**$15,403,088**	**$114,959,910**	**$373,974,185**
Highway 33							
Agricultural	15	12	$3,239,694	$2,188,492	$70,353	$2,188,492	$7,687,031
Commercial	2	1	$78,371	$142,309	$0	$142,309	$362,989
Government	1	0	$34,824	$0	$0	$0	$34,824
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	2	1	$31,691	$98,073	$0	$98,073	$227,837

Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Recreational	0	0	$0	$0	$0	$0	$0
Residential	82	81	$3,257,632	$11,095,263	$0	$5,547,632	$19,900,527
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	6	1	$62,295	$33,635	$0	$33,635	$129,565
Unknown	0	0	$0	$0	$0	$0	$0
Highway 33 Total	**108**	**96**	**$6,704,507**	**$13,557,772**	**$70,353**	**$8,010,141**	**$28,342,773**
Highway 41							
Agricultural	297	105	$32,057,042	$27,638,278	$862,429	$27,638,278	$88,196,027
Commercial	416	269	$99,940,729	$255,725,255	$17,077,737	$255,725,255	$628,468,976
Government	89	0	$3	$0	$0	$0	$3
Industrial	16	10	$3,010,673	$5,314,015	$32,243	$7,971,023	$16,327,954
Institutional	44	28	$5,160,993	$23,305,934	$268,143	$23,305,934	$52,041,004
Recreational	21	2	$513,639	$2,040,562	$225,204	$2,040,562	$4,819,967
Residential	3,589	2,919	$277,998,460	$625,496,322	$1,505,147	$312,748,161	$1,217,748,090
Right of Way	37	0	$21,414	$0	$0	$0	$21,414
Utilities	63	11	$574,114	$2,854,543	$0	$2,854,543	$6,283,200
Unknown	9	3	$391,865	$520,439	$13,280	$520,439	$1,446,023
Highway 41 Total	**4,581**	**3,347**	**$419,668,932**	**$942,895,348**	**$19,984,183**	**$632,804,195**	**$2,015,352,658**
Highway 41 and Highway 145							
Agricultural	25	2	$2,850,236	$194,322	$3	$194,322	$3,238,883
Commercial	3	0	$563,587	$0	$0	$0	$563,587
Government	0	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0	$0
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
Highway 41 and Highway 145 Total	**28**	**2**	**$3,413,823**	**$194,322**	**$3**	**$194,322**	**$3,802,470**
Highway 99							
Agricultural	488	419	$138,164,496	$97,278,921	$21,439,813	$97,278,921	$354,162,151

Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Commercial	155	79	$48,002,984	$49,217,776	$16,148,167	$49,217,776	$162,586,703
Government	60	1	$369,122	$699,536	$0	$699,536	$1,768,194
Industrial	59	40	$12,483,726	$51,533,384	$26,253,758	$77,300,076	$167,570,944
Institutional	14	9	$687,155	$3,213,644	$54,160	$3,213,644	$7,168,603
Recreational	0	0	$0	$0	$0	$0	$0
Residential	2,080	1,850	$90,790,221	$265,897,494	$1,072,328	$132,948,747	$490,708,790
Right of Way	8	0	$0	$0	$0	$0	$0
Utilities	10	1	$3,148	$18,901	$0	$18,901	$40,950
Unknown	16	0	$161,437	$0	$0	$0	$161,437
Highway 99 Total	**2,890**	**2,399**	**$290,662,289**	**$467,859,656**	**$64,968,226**	**$360,677,601**	**$1,184,167,772**
Highway 99 and Highway 145							
Agricultural	1	0	$0	$0	$0	$0	$0
Commercial	0	0	$0	$0	$0	$0	$0
Government	0	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	1	$7,184	$30,996	$0	$30,996	$69,176
Recreational	0	0	$0	$0	$0	$0	$0
Residential	3	2	$99,349	$219,739	$0	$109,870	$428,958
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
Highway 99 and Highway 145 Total	**5**	**3**	**$106,533**	**$250,735**	**$0**	**$140,866**	**$498,134**
Highway 99 and Highway 152							
Agricultural	111	95	$19,449,383	$10,497,205	$234,421	$10,497,205	$40,678,214
Commercial	9	4	$1,084,147	$374,937	$58,249	$374,937	$1,892,270
Government	18	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	2	2	$54,133	$509,715	$0	$509,715	$1,073,563
Recreational	0	0	$0	$0	$0	$0	$0
Residential	290	211	$11,904,793	$22,745,244	$181,055	$11,372,622	$46,203,714
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	1	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0

Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Highway 99 and Highway 152 Total	**431**	**312**	**$32,492,456**	**$34,127,101**	**$473,725**	**$22,754,479**	**$89,847,761**
Unincorporated Madera County Total	**10,187**	**7,951**	**$995,262,915**	**$1,874,641,199**	**$116,224,737**	**$1,309,228,530**	**$4,295,357,381**

Source: National Hazardous Materials Routes Registry (2025), Madera County 2024 Parcel/Assessor's Data

Table 4-128 Unincorporated Madera County – Count and Value of Parcels and Structures in Railroad and Highway Hazardous Materials Transportation Buffer Zone by Property Use

Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
BNSF							
Agricultural	693	541	$160,371,112	$103,683,157	$24,125,488	$103,683,157	$391,862,914
Commercial	76	20	$6,903,629	$24,482,554	$9,447,940	$24,482,554	$65,316,677
Government	191	0	$60,377	$0	$0	$0	$60,377
Industrial	18	13	$4,732,634	$20,541,391	$40,132,336	$30,812,087	$96,218,448
Institutional	11	9	$558,855	$3,603,719	$19,656	$3,603,719	$7,785,949
Recreational	1	1	$12,466	$9,694	$0	$9,694	$31,854
Residential	2,432	2,188	$119,215,214	$380,754,492	$396,429	$190,377,246	$690,743,381
Right of Way	1	0	$0	$0	$0	$0	$0
Utilities	9	2	$107,621	$247,520	$253,440	$247,520	$856,101
Unknown	15	1	$245,572	$89,217	$0	$89,217	$424,006
BNSF Total	**3,447**	**2,775**	**$292,207,480**	**$533,411,744**	**$74,375,289**	**$353,305,194**	**$1,253,299,707**
BNSF and UP							
Agricultural	54	50	$26,434,350	$10,654,704	$1,775,563	$10,654,704	$49,519,321
Commercial	1	1	$422,367	$80,667	$66,724	$80,667	$650,425
Government	11	1	$334,966	$699,536	$0	$699,536	$1,734,038
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	4	2	$127,152	$54,340	$0	$54,340	$235,832
Recreational	0	0	$0	$0	$0	$0	$0
Residential	8	8	$433,058	$621,515	$0	$310,758	$1,365,331
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	2	0	$0	$0	$0	$0	$0

Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Unknown	0	0	$0	$0	$0	$0	$0
BNSF and UP Total	**80**	**62**	**$27,751,893**	**$12,110,762**	**$1,842,287**	**$11,800,005**	**$53,504,947**
UP							
Agricultural	683	594	$164,376,728	$122,270,746	$18,516,678	$122,270,746	$427,434,898
Commercial	174	91	$50,342,003	$53,598,647	$19,167,003	$53,598,647	$176,706,300
Government	71	0	$27,462	$0	$0	$0	$27,462
Industrial	83	48	$22,374,297	$130,100,372	$227,081,335	$195,150,558	$574,706,562
Institutional	15	12	$702,766	$5,300,864	$54,160	$5,300,864	$11,358,654
Recreational	0	0	$0	$0	$0	$0	$0
Residential	2,501	2,167	$112,872,873	$312,156,831	$1,333,525	$156,078,416	$582,441,645
Right of Way	8	0	$0	$0	$0	$0	$0
Utilities	9	1	$3,148	$18,901	$0	$18,901	$40,950
Unknown	16	0	$161,437	$0	$0	$0	$161,437
UP Total	**3,560**	**2,913**	**$350,860,714**	**$623,446,361**	**$266,152,701**	**$532,418,132**	**$1,772,877,908**
Unincorporated Madera County Total	**7,087**	**5,750**	**$670,820,087**	**$1,168,968,867**	**$342,370,277**	**$897,523,330**	**$3,079,682,561**

Source: National Hazardous Materials Routes Registry (2025), Madera County 2024 Parcel/Assessor's Data

Critical Facilities and Infrastructure

A separate analysis was performed on the critical facility inventory in the Madera County Planning Area to determine critical facilities in the hazardous materials buffer zones. Using GIS, the hazardous material buffer zones were overlayed on the critical facility GIS layer. Figure 4-112 shows critical facilities and the highway and railroad hazardous material buffer zones. Table 4-129 and Table 4-130 detail critical facilities in highway and railroad (respectively) hazardous material buffer zone zones by facility type and count for the Madera County Planning Area broken out by jurisdiction. Details of critical facilities by type, name, and address by flood zone are listed in Appendix F.

Figure 4-112 Unincorporated Madera County – Critical Facilities in Highway and Railroad Hazardous Materials Buffer Zones

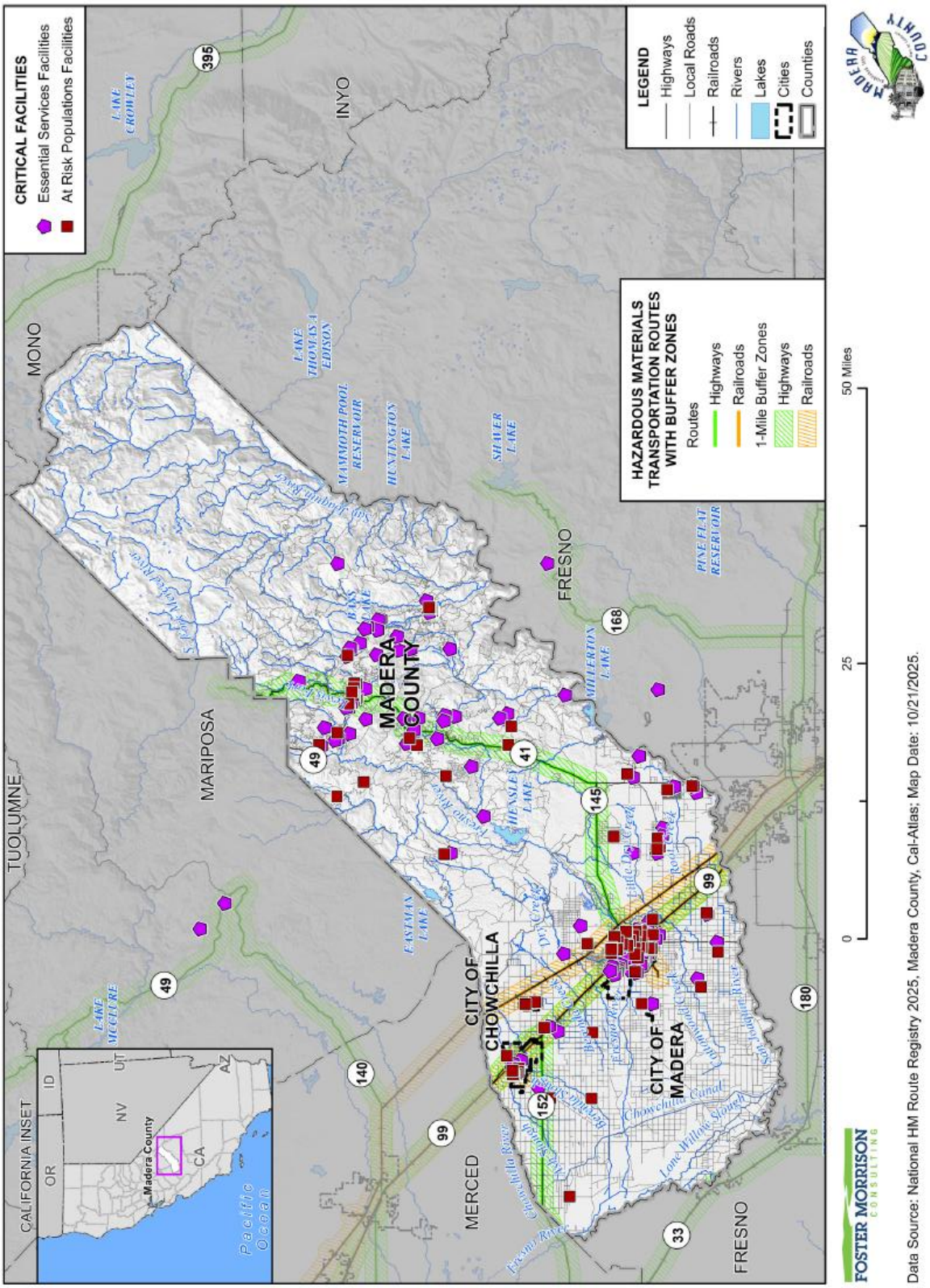


Table 4-129 Unincorporated Madera County – Critical Facilities in Highway Hazardous Materials Buffer Zones by Jurisdiction and Category

Jurisdiction / Hazardous Materials Routes	Critical Facility Category	Facility Count
City of Chowchilla		
Highway 99	Essential Services Facilities	9
	At Risk Populations Facilities	5
	Highway 99 Total	**14**
City of Chowchilla Total		**14**
City of Madera		
Highway 99	Essential Services Facilities	34
	At Risk Populations Facilities	6
	Highway 99 Total	**40**
Highway 145	Essential Services Facilities	4
	At Risk Populations Facilities	3
	Highway 145 Total	**7**
Highway 99 and Highway 145	Essential Services Facilities	44
	At Risk Populations Facilities	17
	Highway 99 and Highway 145 Total	**61**
City of Madera Total		**108**
Unincorporated Madera County		
Highway 41	Essential Services Facilities	15
	At Risk Populations Facilities	9
	Highway 41 Total	**24**
Highway 99	Essential Services Facilities	4
	Highway 99 Total	**4**
Highway 99 and Highway 152	Essential Services Facilities	2
	At Risk Populations Facilities	1
	Highway 99 and Highway 152 Total	**3**
Highway 145	At Risk Populations Facilities	1
	Highway 145 Total	**1**
Highway 152	Essential Services Facilities	1
	At Risk Populations Facilities	1
	Highway 152 Total	**2**
Unincorporated Madera County Total		**34**
Grand Total		**156**

Source: National Hazardous Materials Route Registry, Madera County GIS

Table 4-130 Unincorporated Madera County – Critical Facilities in Railroad Hazardous Materials Buffer Zones by Jurisdiction and Category

Jurisdiction / Hazardous Materials Routes	Critical Facility Category	Facility Count
City of Chowchilla		
BNSF	Essential Services Facilities	1
	At Risk Populations Facilities	2
	BNSF Total	**3**
UP	Essential Services Facilities	9
	At Risk Populations Facilities	7
	UP Total	**16**
City of Chowchilla Total		**19**
City of Madera		
BNSF	Essential Services Facilities	2
	At Risk Populations Facilities	4
	BNSF Total	**6**
BNSF and UP	Essential Services Facilities	12
	At Risk Populations Facilities	4
	BNSF and UP Total	**16**
UP	Essential Services Facilities	78
	At Risk Populations Facilities	20
	UP Total	**98**
City of Madera Total		**120**
Unincorporated Madera County		
BNSF	At Risk Populations Facilities	2
	BNSF Total	**2**
UP	Essential Services Facilities	6
	At Risk Populations Facilities	1
	UP Total	**7**
Unincorporated Madera County Total		**9**
Grand Total		**148**

Source: National Hazardous Materials Route Registry, Madera County GIS

Natural, Historic, and Cultural Resources

Any natural, historic, or cultural resource that falls in the buffer zone shown on Figure 4-111 has some measure of vulnerability. If a release caused a fire, it could affect historic and cultural resources in the City. Natural resources can be more greatly affected by a hazardous materials spill. Clean up of a spill into a natural resource (such as a creek, stream, or river) may be difficult to complete. Hazardous releases can

significantly harm wildlife and habitat areas. The contamination also can make its way up the food chain, affecting the food supply. Open water and wetland environments experience significant exposure to hazardous materials events, which may result in further loss of ecosystem functions.

FEMA NRI Hazard Vulnerability Assessment

Hazardous materials are not an NRI hazard; as such, no data is presented.

Impacts from Hazardous Materials Transportation

Impacts from hazardous materials transportation incidents vary by location and severity of any given event and will likely only affect certain areas of the County during specific times. Based on the risk assessment, it a hazardous materials transportation release could have potential adverse impacts to affected areas of the County as described below. However, the majority releases in the County are minor, localized 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;
- Contaminated water supplies
- Contaminated buildings
- Soil contamination that results in mass die-off of vegetation
- Fire and explosions
- Public health impacts
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure and services;
- Damage to roads/bridges resulting in loss of mobility;
- Business closures and significant economic impact (jobs, sales, tax revenue) to the community;
- Negative impact on commercial and residential property values; and
- Impact on the overall mental health of the community.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is unlikely to exacerbate future hazardous material transportation events and associated impacts and vulnerability of the County.
- Population in Madera County is expected to increase until 2040, then slowly decrease. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-113 below). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Vulnerable population groups could face disproportionate effects from a hazardous materials release and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. However, it is difficult to locate development outside of the hazardous materials buffer zones, due to the location of rail lines and highways in the County. Building codes do not account for hazardous materials spills or incidents. More development within the hazardous materials buffer zones is likely to increase the vulnerability of the County to this hazard.

Future Development

Development will continue to happen within hazardous materials transportation corridors due to the large area within the County located within these corridors. Those who choose to develop in these areas should be made aware of the risks associated with living within close proximity to a hazardous materials transportation route. Future development areas and their vulnerability to hazardous materials transport are discussed further in the below GIS analysis.

GIS Analysis

Madera County provided 14 future development areas which were used as the basis for the inventory of future development for the unincorporated County. These were mapped in GIS. Many facilities fall in either the highway or railroad hazardous materials buffer zone. Figure 4-113 show the locations of the future development areas and both the highway and railroad hazardous materials buffer zone. Table 4-131 shows the details of the future development areas that are located in the highway hazardous materials buffer zone. Table 4-132 shows the details of the future development areas that are located in the railroad hazardous materials buffer zone. As shown, 5 developments fall in the highway and 3 developments fall in the railroad hazardous materials buffer zones.

Figure 4-113 Unincorporated Madera County – Future Development Areas in Highway and Railroad Hazardous Materials Buffer Zones

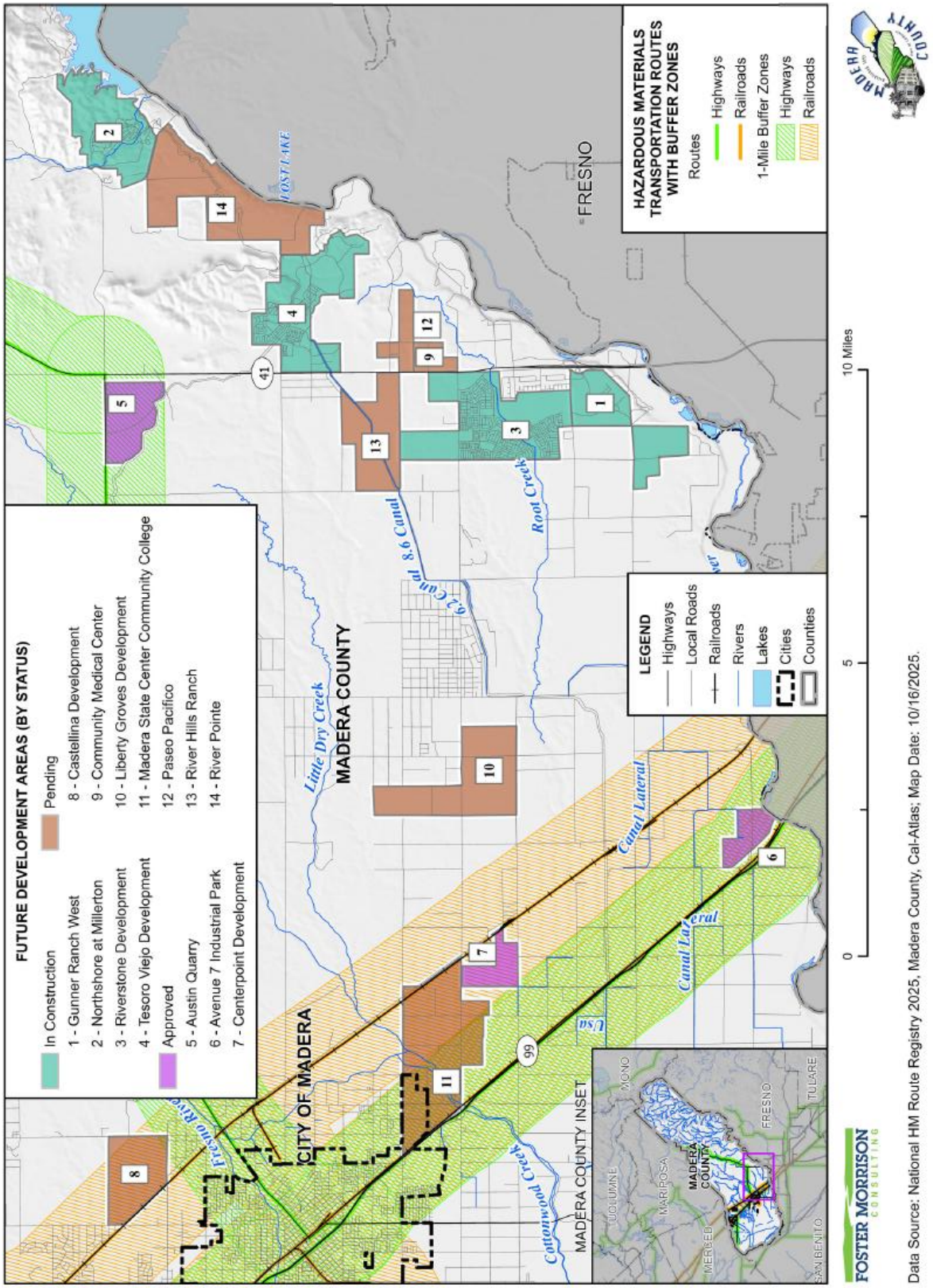

FUTURE DEVELOPMENT AREAS (BY STATUS)
In Construction
1 - Gunner Ranch West
2 - Northshore at Millerton
3 - Riverstone Development
4 - Tesoro Viejo Development
Approved
5 - Austin Quarry
6 - Avenue 7 Industrial Park
7 - Centerpoint Development
Pending
8 - Castellina Development
9 - Community Medical Center
10 - Liberty Groves Development
11 - Madera State Center Community College
12 - Paseo Pacifico
13 - River Hills Ranch
14 - River Pointe
HAZARDOUS MATERIALS TRANSPORTATION ROUTES WITH BUFFER ZONES
Routes
Highways
Railroads
1-Mile Buffer Zones
Highways
Railroads
LEGEND
Highways
Local Roads
Railroads
Rivers
Lakes
Cities
Counties
MADERA COUNTY
CITY OF MADERA
FRESNO
MADERA COUNTY INSET
Little Dry Creek
Root Creek
Cottonwood Creek
Fresno River
Canal Lateral
Lateral
Lateral
8.6 Canal
Lateral
Lateral
Lateral

Table 4-131 Unincorporated Madera County – Future Development Areas in Highway Hazardous Materials Buffer Zones by Status, Parcels, and Acres

Future Development Status and Type / Hazardous Materials Routes / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Approved						
Industrial						
Austin Quarry (Map ID 5)						
Highway 41 and Highway 145	2	0	2	658	0	658
Avenue 7 Industrial Park (Map ID 6)						
Highway 99	5	3	2	296	292	4
Mixed Use						
Centerpoint Development (Map ID 7)						
Highway 99	2	2	0	22	22	0
Pending						
Mixed Use						
Castellina Development (Map ID 8)						
Highway 145	1	1	0	317	317	0
Madera State Center Community College (Map ID 11)						
Highway 99	47	26	21	1,263	995	268

Source: National Hazardous Materials Route Registry, Madera County

Table 4-132 Unincorporated Madera County – Future Development Areas in Railroad Hazardous Materials Buffer Zones by Status, Parcels, and Acres

Future Development Status and Type / Hazardous Materials Routes / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Approved						
Industrial						
Avenue 7 Industrial Park (Map ID 6)						
UP	1	0	1	0	0	0
BNSF and UP	4	3	1	296	292	4
Mixed Use						

Future Development Status and Type / Hazardous Materials Routes / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Centerpoint Development (Map ID 7)						
BNSF	77	31	46	282	135	147
BNSF and UP	4	3	1	26	24	1
Pending						
Mixed Use						
Castellina Development (Map ID 8)						
BNSF	2	2	0	789	789	0
Madera State Center Community College (Map ID 11)						
BNSF	20	7	13	618	446	172
UP	38	20	18	807	649	158
BNSF and UP	9	6	3	456	347	109

Source: National Hazardous Materials Route Registry, Madera County

4.3.14. Landslides, Mudslides, and Debris Flows

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; the likelihood of future occurrence; and how climate change can affect or influence this hazard.

Hazard/Problem Description

Like its earthquake-generating faults, California's mountainous terrain is a consequence of dynamic geologic processes in operation as the North American Plate grinds past the Pacific Plate. According to the CGS, a landslide is a general term for a variety of mass-movement processes that generate a down-slope movement of mud, soil, rock, and/or vegetation. Landslides are classified into many different types based on form and type of movement. They range from slow-moving rotational slumps and earth flows, which can slowly distress structures but are less threatening to personal safety, to fast-moving rock avalanches and debris flows that are a serious threat to structures and have been responsible for most fatalities during landslide events. For the purposes of this LHMP Update, the term landslide includes mudslides, debris flows, and rockfalls that tend to occur suddenly; as well as hillside erosion, which is a similar process that tends to occur on smaller scales and more gradually but can exacerbate landslide events.

Landslides, debris flows and mudslides are closely related to flooding, as both processes are related to precipitation, runoff, and the saturation of ground by water. In addition, landslides, mud flows, and debris flows can occur on small, steep stream channels and are often mistaken for floods. However, landslide

events may be much more destructive than floods because of their higher densities, high debris loads, and high velocities.

Soil erosion is another common form of soil instability. Erosion is a function of soil type, slope, rainfall intensity, and groundcover. It accounts for a loss in many dollars of valuable soil, is aesthetically displeasing, and often induces even greater rates of erosion and sedimentation. Sedimentation is simply the accumulation of soil as a result of erosion. Construction activities often contribute greatly to erosion and sedimentation. Besides being a pollutant in its own right, sediment acts as a transport medium for other pollutants, especially nutrients, pesticides, and heavy metals, which adhere to the eroded soil particles. As the sediment drains into watercourses, the combination of these pollutants adversely affects water quality and can eventually impact stream flows and contribute to flooding potential. Conditions that contribute to landslide, mudslides, debris flows, hillside and streambank erosion include the following:

- Degree of slope
- Water (heavy rain, river flows, or wave action)
- Unconsolidated soil or soft rock and sediments
- Lack of vegetation (no stabilizing root structure)
- Previous wildfires and other forest disturbances (discussed in Section 4.3.15)
- Road building, excavation, and grading
- Earthquake

The 2023 State of California Hazard Mitigation Plan noted that more than one third of California is mountainous terrain that generally trends parallel to the coast, forming a barrier that captures moisture from offshore storms originating in the Gulf of Alaska and Mexico. Steep topography, weak rocks, heavy winter rains, and occasional earthquakes all lead to slope failures more frequently than would otherwise occur under gravity alone. This is true in the mountainous, sloped areas within the Planning Area where the topography is characterized by substantial elevation changes.

Location and Extent

Landslides can be expected in areas with steep slopes and weak soils. It can also occur in areas where erosion has previously occurred. Both winter storms (precipitation-induced) and earthquake triggered landslides tend to occur in or near places that have experienced previous landslides. However, landslides may also occur in other locations over time.

Figure 4-114 shows the CGS areas at susceptible to deep seated landslides. The legend on Figure 4-114 shows the susceptibility scale (from 0-X with 0 being the least and X being the most susceptible) that the CGS uses to show the susceptibility of landslides. It is a primarily a combination of slope class and rock strength. Geographic extents of these classes for the unincorporated Madera County are shown on Table 4-133. Details on each participating jurisdiction's CGS deep-seated landslide extents can be found in their respective annexes to this LHMP Update.

According to the 2023 State Hazard Mitigation Plan, the susceptibility classes were further categorized into Very High (susceptibility class X) and High (susceptibility classes VII, VIII, & IX) for exposure analysis. The rest of the classes were not categorized. CGS mapping indicates that the eastern portions of the County

Planning Area and surrounding area have areas at high to very high susceptibility areas for landslides. The western portion of the County, while much more limited, also includes some areas at high to very high landslide susceptibility. This can be seen in the darker orange and red colors. The speed of onset of landslide is often short, especially in post-wildfire burn scar areas, but it can also take years for a slope to fail. Landslide duration is usually short, though digging out and repairing landslide areas can take some time. In Madera County, landslides generally occur where there is very little population or infrastructure.

Figure 4-114 Madera County Planning Area – Susceptibility to Deep Seated Landslides

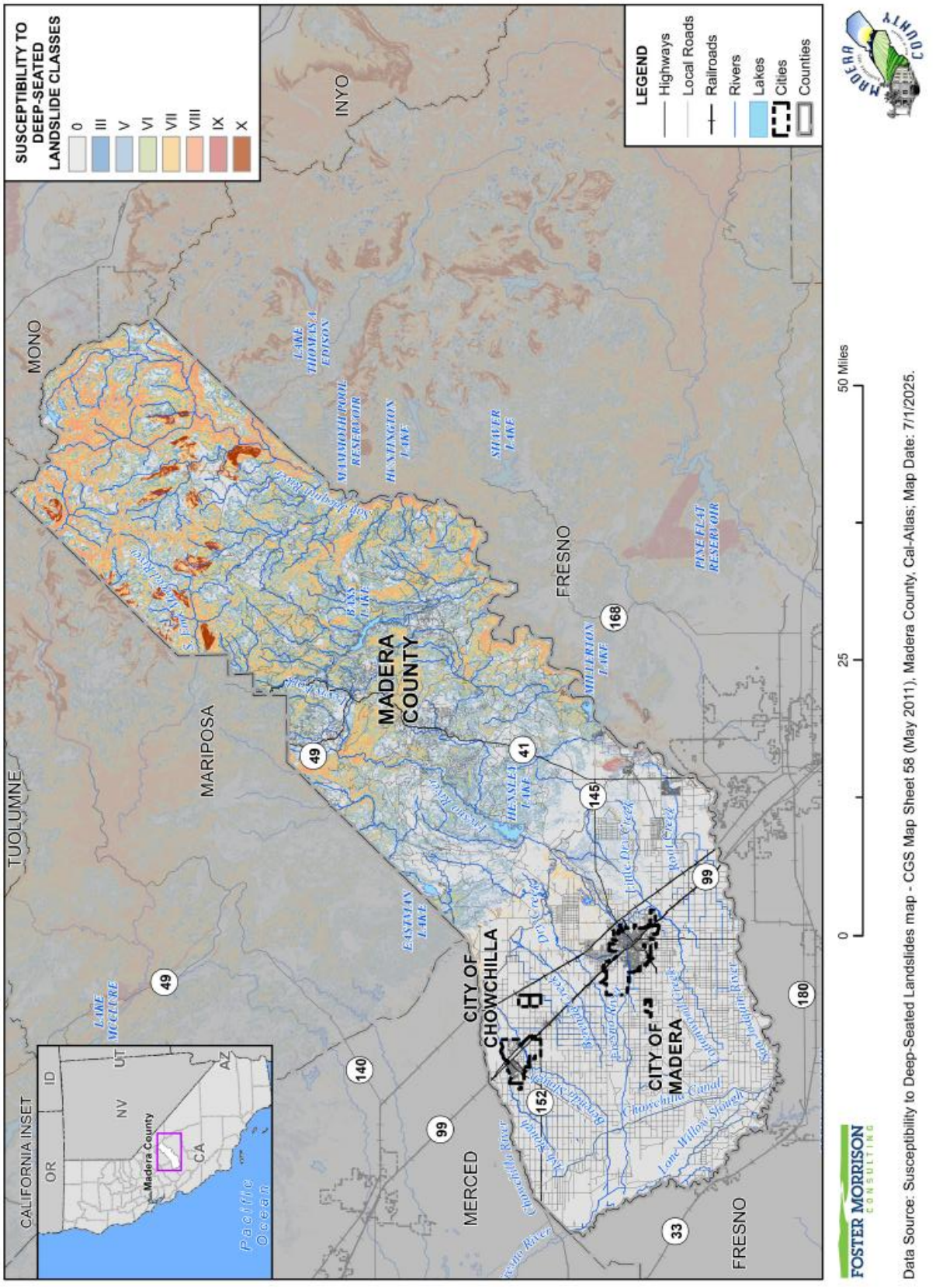


Table 4-133 Madera County Planning Area – Geographical Deep Seated Landslide Classes Extent

Jurisdiction / Susceptibility to Deep-Seated Landslide Class	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla						
0	6,725	0.5%	3,364	0.6%	3,361	0.5%
VII	32	0.003%	20	0.004%	12	0.002%
IX	0.0004	0.00000003%	0.0004	0.0000001%	-	
City of Chowchilla Total	**6,758**	**0.5%**	**3,385**	**0.6%**	**3,373**	**0.5%**
City of Madera						
0	10,646	0.9%	6,485	1.2%	4,161	0.6%
VII	46	0.004%	13	0.002%	34	0.005%
City of Madera Total	**10,692**	**0.9%**	**6,498**	**1.2%**	**4,194**	**0.6%**
Unincorporated Madera County						
0	747,235	60.4%	473,487	85.9%	273,748	40.0%
III	150,114	12.1%	29,058	5.3%	121,056	17.7%
V	12,955	1.0%	7,040	1.3%	5,914	0.9%
VI	111,961	9.1%	14,219	2.6%	97,742	14.3%
VII	136,404	11.0%	15,040	2.7%	121,364	17.7%
VIII	50,398	4.1%	2,060	0.4%	48,338	7.1%
IX	4,457	0.4%	439	0.1%	4,018	0.6%
X	5,559	0.4%	191	0.03%	5,367	0.8%
Unincorporated Madera County Total	**1,219,083**	**98.6%**	**541,535**	**98.2%**	**677,547**	**98.9%**
Grand Total	**1,236,533**	**100%**	**551,418**	**100%**	**685,115**	**100%**

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011)

Past Occurrences

Disaster Declaration History

There have been no disaster declarations associated with solely landslides in Madera County; however, as shown in Table 4-134, there have been 7 state and 7 federal disaster declarations for flood which included landslides as a component.

Table 4-134 Madera County – Federal and State Disaster Declarations Summary 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (events that included landslide)	7	1995 (three), 2006, 2023 (three)	7	1997 (twice), 2006, 2023 (four)

Source: Cal OES, FEMA. Retrieved March 2025.

NCDC Events

The NCDC contains no records for landslides in Madera County. There has, however, been 20 debris flow recorded in the County. This can be seen in Table 4-135.

*Table 4-135 NCDC Landslide and Debris Flow Events for Madera County 1950-7/31/2024**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Debris Flows	20	0	0	0	0	$26,000	$0

Source: NCDC

Hazard Mitigation Planning Committee Events

These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring prior to the 2018 LHMP.

Events since 2018 LHMP

The HMPC noted that a small slide-prone area along Highway 41 between Coarsegold and Oakhurst exists, and occurs in a mountain pass. This is in addition to Road 200 between Road 201 and the town of North Fork. There have been landslides in this area because it is also a mountain pass. There have been slides in each location in the past, but specific dates and damages were unknown.

In the early morning hours of **March 11th, 2023**, Sheriff's Office Dispatch Center received reports of a "mudslide" from the area of Mattie Fhy Road, Holly Lane and Cavin Lane. Deputy Sheriff's responded to the area and located three separate slides from the mountain above the community. Mattie Fhy Road is a County Maintenance District (CMD) and is the Counties legal responsibility to maintain and repair. Mattie Fhy Road has the spur roads of Mattie Fhy Court and Winners Circle Drive as well. This area has 25 structures within the area. Holly Lane is a private road and not the legal responsibility of the County. Holly Lane has no spur roads and has 7 structures on it. Cavin Lane is a CMD and is the Counties legal responsibility. Cavin Lane has the spur roads of Vinnard Drive, Venado Drive, Venado Court, and Quail Mountain Way. The CMD has 61 structures inside of it. The community sits at an elevation of 2800 to 3200 feet. This area is a collective referred to by the Sheriff's Office as Evacuation Zone 431. The community is at the base of Thornberry Mountain which at its highest point is about 3800 feet. Thornberry Mountain has been impacted by fire and the tree die off. The area was impacted by the Serpa Fire in 2016 which burned a larger portion of the top of the mountain above the community. The ridge line of Thornberry Mountain was also impacted by the extreme tree death that occurred starting in 2015.

When Deputy Sheriff's responded, they were able to safely evacuate the homes impacted by the debris flow. During the initial assessments, sections of Cavin Lane, sections of Matty Fhy Road and all of Holly Lane were impacted. County Public Works tasked an on-call outside contractor to make emergency access to the homes. The depth of the debris was between 1 to 2 feet in sections. Six homes were directly impacted by the debris flow. 1 on Holly Lane and 5 on Mattie Fhy Court were directly impacted by the debris flow (see Figure 4-115). 43 structures that had access issues due to the road being covered by debris flow.

Figure 4-115 2023 Landslide Damage

Source: Madera County Public Works

Events prior to 2018 LHMP

The 2018 LHMP noted no past occurrences. No damaging events before 2018 could be recalled.

Likelihood of Future Occurrence

Likely— 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. Many landslides in Madera County happen in uninhabited locations. With significant rainfall, additional failures are likely to occur within identified landslide hazard areas. Given the topography within the County, landslides will likely continue to impact the area when heavy precipitation occurs, as they have in the past.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and landslide and debris flow can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and Landslide and Debris Flows

According to the 2024 CAS, climate change may result in precipitation extremes (i.e., wetter wet periods and drier dry periods). More information on precipitation increases can be found in Section 4.3.3. While total average annual rainfall may decrease only slightly, rainfall is predicted to occur in fewer, more intense precipitation events. The combination of a generally drier climate in the future, which will increase the chance of drought and wildfires, and the occasional extreme downpour is likely to cause more mudslides, landslides, and debris flows.

Vulnerability Assessment

Vulnerability—Medium

According to historical hazard data and landslide hazard mapping, landslides can occur in the Madera County Planning Area. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

General Concerns

The General Plan Background Report noted that although slope movements can occur in any type of rock material, certain bedrock formations exhibit a high susceptibility to such movement. Areas of minimal risk are mainly flatlands, valley bottoms, and areas of minimal topographic relief; and areas consisting of hillside and mountainous terrain of competent igneous and metamorphic rocks and sedimentary rocks with avorable bedding and composition (a relatively stable category that includes much of the Sierras). Risk zones in the County include dip slopes (natural slopes parallel to bedding in sedimentary rocks), complexly folded metamorphic rocks, and zones of fractured rock; and several areas of the Sierras which consist of weak, landslide-prone rock and existing landslides. In summary, landslide hazards within the county are confined to the foothills and mountainous terrain, and the steep banks of the rivers which pass through the valley floor.

There are landslide concerns along 600, Highway 41, and Cavin Lane. Cameras have been installed in some of these areas to monitor conditions.

Local concerns for each of the other participating jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Assets at Risk

Assets at risk from landslide include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Additionally, for each hazard in the FEMA NRI in Madera County, the relevant portions of the hazard analysis done by FEMA is presented. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

Methodology (Parcels and Structures)

In order to analyze people and populations, structures, and critical facilities at risk in DFIRM flood zones, GIS was used to quantify those values. The 2024 Madera County Parcel/Assessor Data was provided by Madera County and was used as the basis for the inventory of assessed values for both improved and unimproved parcels within the Madera County Planning Area. The 2011 California Geologic Survey Deep Seated Landslide Susceptibility data was obtained for the Madera County Planning Area. The landslide hazard layer was then overlaid on the parcel layer. In some cases, there are parcels in multiple deep seated landslide classes. For the purposes of this analysis, if the deep seated landslide classes intersected any portion of a parcel polygon, the entire parcel was considered to be in the highest risk class. The parcels were segregated and analyzed in this fashion for the entire Planning Area.

Once the deep-seated landslide susceptibility classes were intersected, land, improved (structure), and personal property values from the Assessor data were included for each parcel and estimated content replacement values were added to the analysis. Improved parcels include those with improved structure values identified in the Madera County Assessor's database.

People and Populations

All populations located within areas of landslide susceptibility, especially in the High to Very High hazard areas (i.e., Classes VII to X) are at some vulnerability to landslide. This includes those people residing in these landslide potential areas as well as those that might reside or work within the landslide run out areas. People residing in these areas may also be cut off from transportation routes if roads and streets providing a means of ingress and egress are impacted. Certain vulnerable populations may be at greater risk due to the often sudden onset of a landslide event and include: the unsheltered, those with limited mobility, and those that lack the resources to leave the area.

Madera County Planning Area residents that live in the High and Very High landslide susceptibility areas are often the most vulnerable, but those who live in in the landslide run out areas (which are not mapped) are also vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events. To further evaluate the impact to Planning Area's residential population residing within these hazard areas, an analysis was conducted of those who physically reside in the mapped landslide susceptibility areas. The CGS Susceptibility to Deep Seated Landslide maps were overlayed on the parcel layer and linked to the assessor data. Those residential parcel centroids that intersect the High or Very High risk areas (Class VII or higher) were counted and multiplied by the 2020 Census Bureau average household factors each jurisdiction in the Planning Area. Analysis results are shown in Table 4-136.

Table 4-136 Madera County Planning Area – Improved Residential Parcels and Population in Susceptibility to Deep Seated Landslides (Classes VII, VIII, IX, and X) by Jurisdiction

Deep Seated Landslide Class/Jurisdiction	Improved Residential Parcels	Population
VII		
City of Chowchilla	21	70
City of Madera	115	389
Unincorporated County	3,051	10,190
Total	**3,167**	**10,649**
VIII		
City of Chowchilla	0	0
City of Madera	0	0
Unincorporated County	396	1,323
Total	**396**	**1,323**
IX		
City of Chowchilla	0	0
City of Madera	0	0
Unincorporated County	54	180
Total	54	**180**

Deep Seated Landslide Class/Jurisdiction	Improved Residential Parcels	Population
X		
City of Chowchilla	0	0
City of Madera	0	0
Unincorporated County	10	34
Total	**10**	**34**

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011), 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35); City of Madera (3.38); Unincorporated Madera County (3.34).

Structures

Landslides can affect the built environment of the Madera County Planning Area and those structures located within the high to very high hazard areas (i.e., Classes VII to X) are especially vulnerable, as are the structures located within the landslide run out areas. The CGS Deep Seated Landslide Susceptibility layer was overlaid with the County parcel (structure) layer in GIS and linked to the assessor data. The mapped landslide areas are shown on Figure 4-114 above. Table 4-137 summarizes parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values in the Planning Area for deep seated landslide classes. Table 4-138 summarizes parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values by property use for the unincorporated County for deep seated landslide classes. More information on property use and landslide classes for the incorporated jurisdictions can be found in their respective annexes to this LHMP Update. As shown, very few improved parcels fall in Classes VII to X in the cities, while there are many improved parcels in Classes VII to X in the unincorporated County.

Table 4-137 Madera County Planning Area – Count and Value of Parcels and Structures Susceptible to Deep Seated Landslide by Class and Jurisdiction

Jurisdiction / Susceptibility to Deep-Seated Landslide Class	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla							
0	4,859	3,968	$271,071,471	$861,523,606	96,209,888	$517,585,454	$1,746,390,419
III	0	0	$0	$0	$0	$0	$0
V	0	0	$0	$0	$0	$0	$0
VI	0	0	$0	$0	$0	$0	$0
VII	73	41	$15,071,130	$7,417,400	338,736	$5,974,410	$28,801,676
VIII	0	0	$0	$0	$0	$0	$0
IX	1	1	$149,164	$201,904	$0	$201,904	$552,972
X	0	0	$0	$0	$0	$0	$0

Jurisdiction / Susceptibility to Deep-Seated Landslide Class	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla Total	**4,933**	**4,010**	**$286,291,765**	**$869,142,910**	**96,548,624**	**$523,761,768**	**$1,775,745,067**
City of Madera							
0	16,867	15,288	$981,896,368	$3,348,769,838	135,365,363	$2,137,754,066	$6,603,785,635
III	0	0	$0	$0	$0	$0	$0
V	0	0	$0	$0	$0	$0	$0
VI	0	0	$0	$0	$0	$0	$0
VII	221	136	$29,809,455	$37,073,629	128,497	$26,466,305	$93,477,886
VIII	0	0	$0	$0	$0	$0	$0
IX	0	0	$0	$0	$0	$0	$0
X	0	0	$0	$0	$0	$0	$0
City of Madera Total	**17,088**	**15,424**	**$1,011,705,823**	**$3,385,843,467**	**135,493,860**	**$2,164,220,371**	**$6,697,263,521**
Unincorporated Madera County							
0	22,404	16,491	$2,203,498,367	$4,019,395,056	515,578,576	$2,826,511,499	$9,564,983,498
III	4,405	3,426	$365,577,473	$837,040,660	6,618,404	$475,945,281	$1,685,181,818
V	4,268	3,008	$472,337,725	$1,023,028,212	15,306,002	$550,782,053	$2,061,453,992
VI	3,945	2,918	$334,394,054	$729,263,570	5,788,800	$422,233,650	$1,491,680,074
VII	6,079	4,176	$680,648,337	$1,398,102,111	209,476,384	$1,048,104,726	$3,336,331,558
VIII	2,326	764	$187,332,675	$183,630,650	12,853,585	$129,589,824	$513,406,734
IX	353	169	$88,926,491	$65,061,618	6,760,747	$51,841,780	$212,590,636
X	250	130	$80,534,537	$34,264,953	1,983,139	$32,179,329	$148,961,958
Unincorporated Madera County Total	**44,030**	**31,082**	**$4,413,249,659**	**$8,289,786,830**	**774,365,637**	**$5,537,188,140**	**$19,014,590,266**
Grand Total	**66,051**	**50,516**	**$5,711,247,247**	**$12,544,773,207**	**1,006,408,121**	**$8,225,170,279**	**$27,487,598,854**

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011), 2024 Madera County Parcel/Assessor Data

Table 4-138 Unincorporated Madera County – Count and Value of Parcels and Structures Susceptible to Deep Seated Landslide by Class and Property use

Susceptibility to Deep-Seated Landslide Class / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
0							
Agricultural	4,304	3,833	$1,008,807,442	$1,027,422,136	$182,817,339	$1,027,422,136	$3,246,469,053

Susceptibility to Deep-Seated Landslide Class / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Commercial	819	478	$175,468,180	$249,686,336	$53,172,510	$249,686,336	$728,013,362
Government	361	5	$908,002	$845,829	$0	$845,829	$2,599,660
Industrial	257	120	$33,575,677	$163,073,239	$272,778,081	$244,609,859	$714,036,856
Institutional	74	50	$4,027,278	$22,525,529	$287,752	$22,525,529	$49,366,088
Recreational	13	3	$72,927	$103,558	$0	$103,558	$280,043
Residential	16,191	11,959	$976,564,251	$2,548,840,354	$5,323,164	$1,274,420,177	$4,805,147,946
Right of Way	67	0	$1,553	$0	$0	$0	$1,553
Utilities	165	39	$1,550,567	$5,045,837	$1,199,730	$5,045,837	$12,841,971
Unknown	153	4	$2,522,490	$1,852,238	$0	$1,852,238	$6,226,966
0 Total	**22,404**	**16,491**	**$2,203,498,367**	**$4,019,395,056**	**515,578,576**	**$2,826,511,499**	**$9,564,983,498**
III							
Agricultural	177	93	$18,784,403	$20,334,067	$135,592	$20,334,067	$59,588,129
Commercial	136	83	$22,721,732	$75,596,274	$5,959,783	$75,596,274	$179,874,063
Government	41	0	$654,042	$0	$0	$0	$654,042
Industrial	9	5	$1,588,278	$4,893,962	$5,100	$7,340,943	$13,828,283
Institutional	9	9	$1,422,564	$7,240,937	$0	$7,240,937	$15,904,438
Recreational	14	3	$103,398	$47,061	$0	$47,061	$197,520
Residential	3,881	3,223	$319,531,687	$727,084,721	$415,009	$363,542,361	$1,410,573,778
Right of Way	65	0	$18,108	$0	$0	$0	$18,108
Utilities	44	6	$443,757	$1,445,216	$89,640	$1,445,216	$3,423,829
Unknown	29	4	$309,504	$398,422	$13,280	$398,422	$1,119,628
III Total	**4,405**	**3,426**	**$365,577,473**	**$837,040,660**	**$6,618,404**	**$475,945,281**	**$1,685,181,818**
V							
Agricultural	333	242	$165,877,017	$40,113,406	$3,742,309	$40,113,406	$249,846,138
Commercial	52	15	$23,016,285	$38,048,720	$11,035,611	$38,048,720	$110,149,336
Government	23	0	$0	$0	$0	$0	$0
Industrial	6	0	$0	$0	$0	$0	$0
Institutional	1	1	$55,860	$195,430	$0	$195,430	$446,720
Recreational	1	1	$1	$1	$0	$1	$3
Residential	3,738	2,744	$278,529,845	$944,492,318	528,082	$472,246,159	$1,695,796,404
Right of Way	23	0	$21	$0	$0	$0	$21
Utilities	5	0	$17,082	$0	$0	$0	$17,082
Unknown	86	5	$4,841,614	$178,337	$0	$178,337	$5,198,288
V Total	**4,268**	**3,008**	**$472,337,725**	**$1,023,028,212**	**15,306,002**	**$550,782,053**	**$2,061,453,992**

Susceptibility to Deep-Seated Landslide Class / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
VI							
Agricultural	332	183	$22,731,601	$38,816,858	$166,828	$38,816,858	$100,532,145
Commercial	91	65	$24,474,551	$68,168,847	$3,380,460	$68,168,847	$164,192,705
Government	41	0	$2	$0	$0	$0	$2
Industrial	4	2	$242,956	$453,680	$269,999	$680,520	$1,647,155
Institutional	9	5	$300,361	$1,568,165	$21,570	$1,568,165	$3,458,261
Recreational	10	6	$1,467,547	$1,919,603	$1,136,643	$1,919,603	$6,443,396
Residential	3,362	2,644	$284,673,547	$614,513,520	$813,300	$307,256,760	$1,207,257,127
Right of Way	52	0	$2,046	$0	$0	$0	$2,046
Utilities	26	12	$382,559	$3,746,343	$0	$3,746,343	$7,875,245
Unknown	18	1	$118,884	$76,554	$0	$76,554	$271,992
VI Total	**3,945**	**2,918**	**$334,394,054**	**$729,263,570**	**$5,788,800**	**$422,233,650**	**$1,491,680,074**
VII							
Agricultural	1,770	1,043	$318,110,987	$222,751,090	$24,627,250	$222,751,090	$788,240,417
Commercial	96	57	$41,795,481	$424,648,237	$170,568,203	$424,648,237	$1,061,660,158
Government	206	0	$45,706	$0	$0	$0	$45,706
Industrial	7	4	$3,450,950	$16,763,297	$11,586,326	$25,144,946	$56,945,519
Institutional	26	14	$3,642,887	$14,623,236	$522,159	$14,623,236	$33,411,518
Recreational	8	4	$958,944	$2,167,057	$225,204	$2,167,057	$5,518,262
Residential	3,878	3,051	$312,092,878	$716,758,068	$1,693,802	$358,379,034	$1,388,923,782
Right of Way	26	0	$812	$0	$0	$0	$812
Utilities	29	3	$491,894	$391,126	$253,440	$391,126	$1,527,586
Unknown	33	0	$57,798	$0	$0	$0	$57,798
VII Total	**6,079**	**4,176**	**$680,648,337**	**$1,398,102,111**	**209,476,384**	**$1,048,104,726**	**$3,336,331,558**
VIII							
Agricultural	1,068	341	$110,771,054	$55,689,459	$1,141,406	$55,689,459	$223,291,378
Commercial	23	16	$9,878,603	$10,080,280	$141,340	$10,080,280	$30,180,503
Government	493	1	$33,664	$15,296		$15,296	$64,256
Industrial	8	3	$2,946,935	$1,664,661	$10,543,912	$2,496,992	$17,652,500
Institutional	9	5	$1,122,330	$6,216,721	$122,220	$6,216,721	$13,677,992
Recreational	3	1	$1,392,152	$33,210	$0	$33,210	$1,458,572
Residential	680	396	$59,338,708	$109,746,313	$904,707	$54,873,157	$224,862,885
Right of Way	11	0	$11	$0	$0	$0	$11
Utilities	9	0	$0	$0	$0	$0	$0
Unknown	22	1	$1,849,218	$184,710	$0	$184,710	$2,218,638

Susceptibility to Deep-Seated Landslide Class / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
VIII Total	**2,326**	**764**	**$187,332,675**	**$183,630,650**	**$12,853,585**	**$129,589,824**	**$513,406,734**
IX							
Agricultural	185	114	$74,588,536	$38,494,405	$6,643,988	$38,494,405	$158,221,334
Commercial	3	0	$3,768,106	$0	$0	$0	$3,768,106
Government	18	0	$20,205	$0	$0	$0	$20,205
Industrial	1	1	$293,525	$63,768	$95,229	$95,652	$548,174
Residential	121	54	$10,046,261	$26,503,445	$21,530	$13,251,723	$49,822,959
Right of Way	9	0	$8	$0	$0	$0	$8
Utilities	2	0	$0	$0	$0	$0	$0
Unknown	14	0	$209,850	$0	$0	$0	$209,850
IX Total	**353**	**169**	**$88,926,491**	**$65,061,618**	**$6,760,747**	**$51,841,780**	**$212,590,636**
X							
Agricultural	161	116	$70,571,204	$27,044,324	$1,983,139	$27,044,324	$126,642,991
Commercial	4	2	$8,032,487	$3,016,877	$0	$3,016,877	$14,066,241
Government	63	2	$519,331	$32,504	$0	$32,504	$584,339
Residential	13	10	$1,411,097	$4,171,248	$0	$2,085,624	$7,667,969
Utilities	1	0	$0	$0	$0	$0	$0
Unknown	8	0	$418	$0	$0	$0	$418
X Total	**250**	**130**	**$80,534,537**	**$34,264,953**	**$1,983,139**	**$32,179,329**	**$148,961,958**
Unincorporated Madera County Total	**44,030**	**31,082**	**$4,413,249,659**	**$8,289,786,830**	**$774,365,637**	**$5,537,188,140**	**$19,014,590,266**

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011), 2024 Madera County Parcel/Assessor Data

Critical Facilities and Infrastructure

Landslides present a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the Madera County Planning Area to determine critical facilities by deep-seated landslide class. Using GIS, the landslide classes were overlayed on the critical facility GIS layer. Figure 4-116 shows critical facilities, as well as the deep-seated landslide classes. Table 4-139 details critical facilities by deep seated landslide class by facility type and count for the Planning Area. Details of critical facility category, type, name and address by deep-seated landslide classes are listed in Appendix F. As shown, 44 critical facilities fall in the Classes VII to X, 34l of which are in the unincorporated County.

Figure 4-116 Madera County Planning Area – Critical Facilities in Deep-Seated Landslide Class

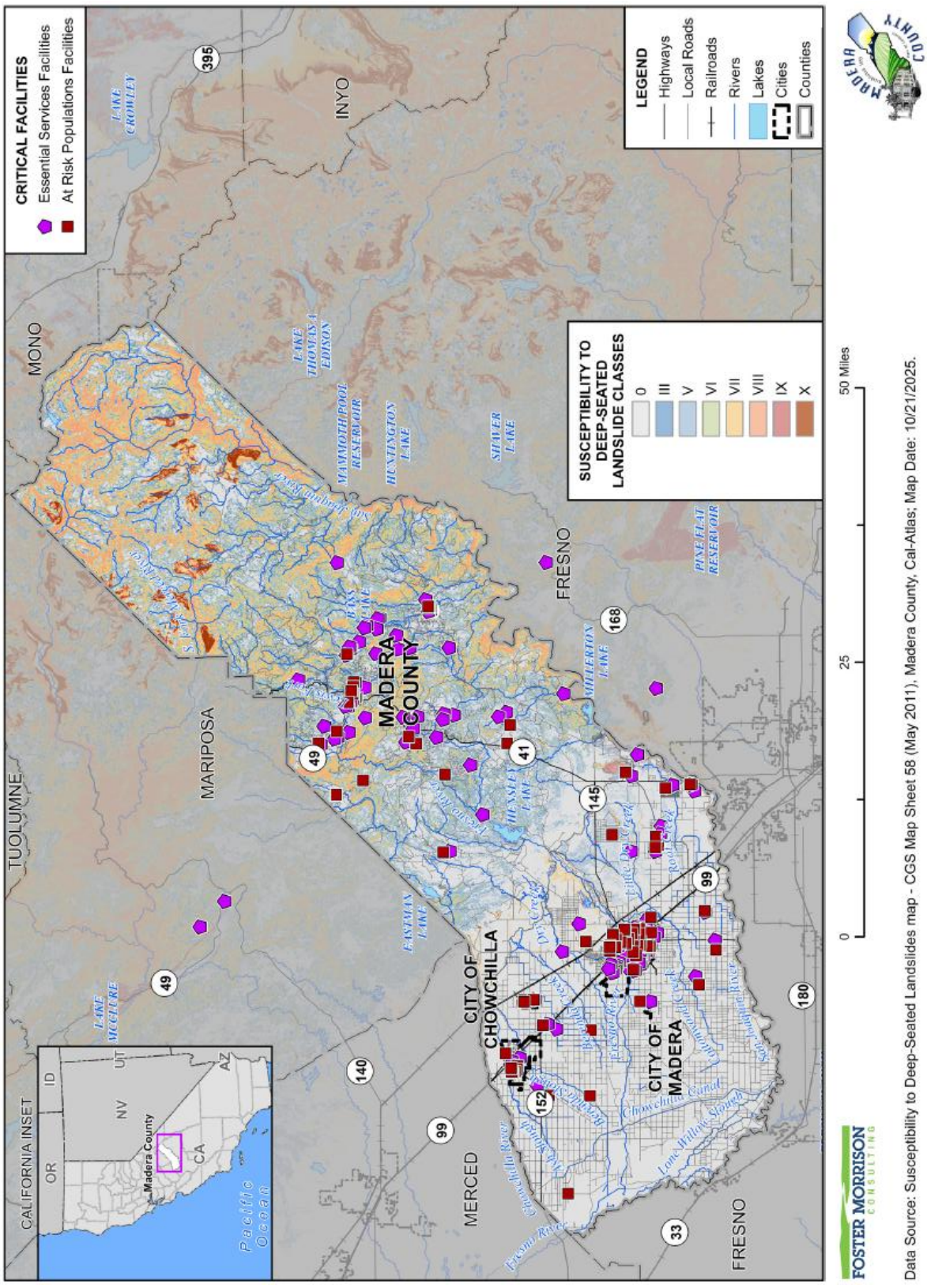


Table 4-139 Madera County Planning Area – Critical Facilities in Deep-Seated Landslide Class by Jurisdiction and Category

Jurisdiction / Susceptibility to Deep-Seated Landslide Class	Critical Facility Category	Facility Count
City of Chowchilla		
0	Essential Services Facilities	9
	At Risk Populations Facilities	8
	0 Total	**17**
VII	Essential Services Facilities	1
	At Risk Populations Facilities	1
	VII Total	**2**
City of Chowchilla Total		**19**
City of Madera		
0	Essential Services Facilities	96
	At Risk Populations Facilities	28
	0 Total	**124**
VII	Essential Services Facilities	7
	At Risk Populations Facilities	1
	VII Total	**8**
City of Madera Total		**132**
Unincorporated Madera County		
0	Essential Services Facilities	30
	At Risk Populations Facilities	21
	0 Total	**51**
III	Essential Services Facilities	12
	At Risk Populations Facilities	5
	III Total	**17**
V	Essential Services Facilities	4
	At Risk Populations Facilities	4
	V Total	**8**
VI	Essential Services Facilities	9
	At Risk Populations Facilities	9
	VI Total	**18**
VII	Essential Services Facilities	15
	At Risk Populations Facilities	5
	VII Total	**20**
VIII	Essential Services Facilities	8
	At Risk Populations Facilities	4
	VIII Total	**12**

Jurisdiction / Susceptibility to Deep-Seated Landslide Class	Critical Facility Category	Facility Count
IX	Essential Services Facilities	2
	IX Total	**2**
No Data Available	Essential Services Facilities	1
	No Data Available Total	**1**
Unincorporated Madera County Total		**129**
Grand Total		**280**

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011), Madera County GIS

Natural, Historic, and Cultural Resources

Landslides can affect natural, historic, and cultural resources that lie in the landslide area, or the landslide run out area. Landslides can destroy large tracts of forest and open space areas, destroy wildlife habitat, and remove productive soils and vegetation from slopes. It can also fill in waterways, impact water quality, and potentially affect flooding potential. Natural resources that fall in the High or Very High susceptibility classes shown on Figure 4-114 would be most vulnerable, as well as those in the run out areas. As shown on the map, this would include a relatively small area of the developed area, since most of the higher risk areas occur in the undeveloped areas of the Planning Area.

FEMA NRI Hazard Vulnerability Assessment

The FEMA NRI was queried for additional specific data on Madera County's vulnerability to Landslides, Mudslides, and Debris Flow. The NRI contains data and analysis for 18 separate natural hazards. The NRI hazard related to Madera County's Landslides, Mudslides, and Debris Flow is only landslide. As shown on Table 4-140, landslides could cause a total of $104,901 in expected annual losses, with a historic loss rating of very low. Landslides have a relatively very high rating for social vulnerability and a very low community resilience, with a risk index score of 82.1 out of 100. According to the NRI, there have been 3 landslide events between the years 2010-2021 with an average of 0.1 events per year.

Table 4-140 Madera County Planning Area – Landslide Vulnerability Ratings from FEMA NRI

NRI Hazard	Hazard Risk Index Rating*	Expected Annual Loss Values (total)**	Exposure Value (total)***	Historic Loss Ratio Rating
Landslide	92.1	$233,919	$98,349,856,746	Very low

Source: FEMA NRI Report. Retrieved April 1, 2025.

*Hazard Risk Index is calculated using data for only a single hazard type, and reflect a communities expected annual loss value, community risk factors, and the adjustment factor used to calculate the risk value.

**Expected annual loss represents the average economic loss in dollars resulting from natural hazards each year.

***Exposure is a natural hazard consequence factor that is the representative value of buildings, populations, or agriculture potentially exposed to a natural hazard occurrence.

Additional information on the FEMA NRI can be found in Section 4.2 and Appendix G.

Impacts from Landslide

Any type of landslide may result in damages or complete destruction of buildings in their path, as well as deaths and injuries. Landslides can cause road blockages by depositing debris on road surfaces or road damage if the road surface itself slides downhill. Utility lines and pipes are also prone to breakage in slide areas.

Landslides can collapse into water bodies, causing tsunamis or seiches. In 1958, a magnitude 8 earthquake collapsed a hillside into Lituya Bay, Alaska, causing a water splash wave that reached 1,720 feet up a mountain slope, stripping all vegetation. A massive landslide into the Vaoint Reservoir in Italy in 1963 caused a water splash wave that swept 800 feet over the top of a dam, causing a major flood that killed an estimated 2,600 people below. Landslides can relocate river channels, as occurred during the Oso mudslide in Washington State in March 2014. This occurred in an area not considered landslide prone on local maps. Landslides and debris flows can relocate river channels, impact water quality and the storage capacity of surface water reservoirs used to store potable water.

Landslides, debris flows, and mud flows impacts vary by location and severity of any given event and will likely only affect certain areas of the Planning Area susceptible to landslide. Based on the risk assessment, there is limited potential for significant landslides to occur in the Planning Area in the more developed areas. Most, but not all, of the historic landslides in the Madera County Planning Area have been minor, localized 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 and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future landslide conditions and associated impacts and vulnerability of the County to landslides. This is especially true in burn scar areas that are at greater risk to landslides.
- Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the County. Population growth in Madera County is expected to continue slowly until 2045 when it begins to shrink slowly. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-117). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Additional population growth would likely bring continued diversity to the County. Vulnerable population groups could face disproportionate effects from a landslide, though it would be unlikely for these or any populations to build in the landslide risk areas. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. Locating new development, structures and critical facilities and infrastructure within or near areas of landslide risk may put additional development at risk. However, County building codes are in effect to reduce this risk and should be updated as necessary to continue to address future landslide conditions. It should be noted that most of the growth in the County is occurring in areas outside the landslide risk areas. Thus, depending on the location of new development and adherence to protective building codes, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the County to this hazard.

Future Development

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help to make for a more resilient community. Although new growth and development corridors would fall in the area affected by moderate risk of landslide, given the small chance of a major landslide and the building codes and erosion ordinance in effect, development in the landslide areas will continue to occur.

GIS Analysis

Madera County provided 14 future development areas which were used as the basis for the inventory of future development for the unincorporated County. These were mapped in GIS. Figure 4-117 show the locations of the future development areas and deep-seated landslide classes. Table 4-141 shows the details of the future development areas that are located in each deep-seated landslide class. As shown, there are 7 future development areas that have portions that fall in the high or very high risk landslide classes.

Figure 4-117 Unincorporated Madera County – Future Development in Deep-Seated Landslide Classes

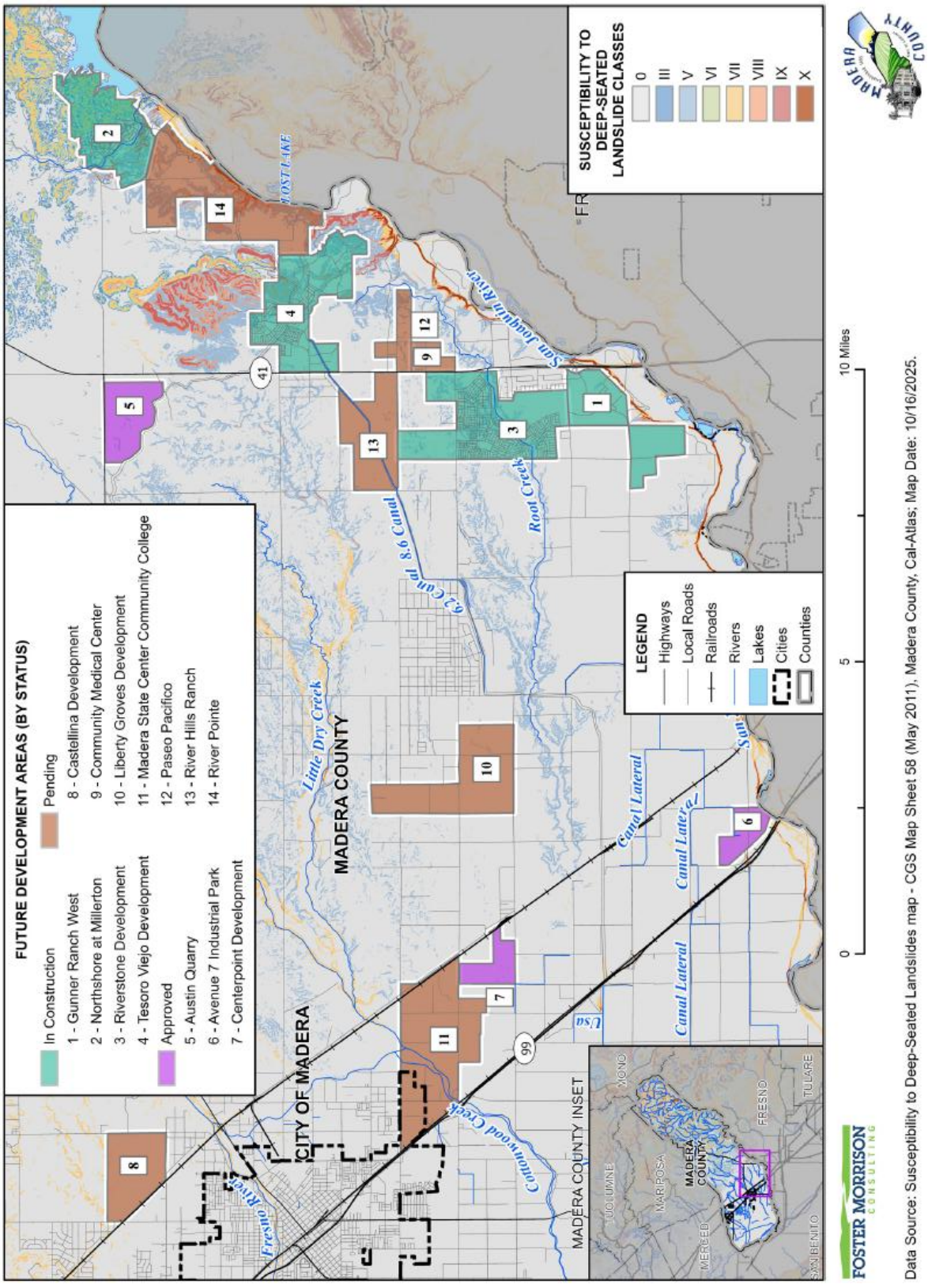


Table 4-141 Unincorporated Madera County – Future Development in Deep-Seated Landslide Classes by Status, Parcels, and Acres

Future Development Status and Type / Susceptibility to Deep-Seated Landslide Class / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use						
Gunner Ranch West (Map ID 1)						
0	39	7	32	549	21	528
V	4	3	1	174	168	7
VII	6	2	4	229	206	24
VIII	1	0	1	7	0	7
IX	3	0	3	14	0	14
Gunner Ranch West Total	**53**	**12**	**41**	**974**	**394**	**580**
Northshore at Millerton (Map ID 2)						
0	119	0	119	25	0	25
III	93	0	93	41	0	41
V	50	0	50	23	0	23
VI	164	0	164	78	0	78
VII	103	0	103	206	0	206
VIII	54	0	54	650	0	650
IX	63	0	63	194	0	194
Northshore at Millerton Total	**646**	**0**	**646**	**1,217**	**0**	**1,217**
Riverstone Development (Map ID 3)						
0	2,334	723	1,611	501	88	413
V	1,699	1,033	666	1,015	346	669
VIII	20	15	5	254	134	120
Riverstone Development Total	**4,053**	**1,771**	**2,282**	**1,770**	**569**	**1,201**
Tesoro Viejo Development (Map ID 4)						
0	1,709	562	1,147	265	90	175
V	531	271	260	437	118	319
VIII	50	6	44	316	117	199

Future Development Status and Type / Susceptibility to Deep-Seated Landslide Class / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
IX	32	4	28	399	174	225
Tesoro Viejo Development Total	**2,322**	**843**	**1,479**	**1,417**	**499**	**918**
Mixed Use Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
In Construction Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
Approved						
Industrial						
Austin Quarry (Map ID 5)						
V	2	0	2	658	0	658
Austin Quarry Total	**2**	**0**	**2**	**658**	**0**	**658**
Avenue 7 Industrial Park (Map ID 6)						
0	4	2	2	188	184	4
X	1	1	0	108	108	0
Avenue 7 Industrial Park Total	**5**	**3**	**2**	**296**	**292**	**4**
Industrial Total	**7**	**3**	**4**	**954**	**292**	**662**
Mixed Use						
Centerpoint Development (Map ID 7)						
0	70	27	43	182	74	108
V	11	7	4	125	85	40
Centerpoint Development Total	**81**	**34**	**47**	**307**	**159**	**148**
Mixed Use Total	**81**	**34**	**47**	**307**	**159**	**148**
Approved Total	**88**	**37**	**51**	**1,262**	**452**	**810**
Pending						
Commercial						
Community Medical Center (Map ID 9)						
V	2	0	2	198	0	198

Future Development Status and Type / Susceptibility to Deep-Seated Landslide Class / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Community Medical Center Total	**2**	**0**	**2**	**198**	**0**	**198**
Commercial Total	**2**	**0**	**2**	**198**	**0**	**198**
Mixed Use						
Castellina Development (Map ID 8)						
VII	2	2	0	789	789	0
Castellina Development Total	**2**	**2**	**0**	**789**	**789**	**0**
Madera State Center Community College (Map ID 11)						
0	50	28	22	1,221	1,005	216
V	8	1	7	271	131	140
VII	9	4	5	389	305	83
Madera State Center Community College Total	**67**	**33**	**34**	**1,881**	**1,442**	**439**
River Hills Ranch (Map ID 13)						
0	1	0	1	39	0	39
V	4	3	1	895	854	40
River Hills Ranch Total	**5**	**3**	**2**	**934**	**854**	**80**
River Pointe (Map ID 14)						
VII	3	0	3	1	0	1
VIII	1	1	0	160	160	0
IX	8	7	1	1,337	1,334	4
X	2	2	0	232	232	0
River Pointe Total	**14**	**10**	**4**	**1,732**	**1,727**	**5**
Mixed Use Total	**88**	**48**	**40**	**5,336**	**4,812**	**524**
Residential						
Liberty Groves Development (Map ID 10)						
0	7	7	0	872	872	0

Future Development Status and Type / Susceptibility to Deep-Seated Landslide Class / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
V	9	9	0	496	496	0
Liberty Groves Development Total	**16**	**16**	**0**	**1,369**	**1,369**	**0**
Paseo Pacifico (Map ID 12)						
0	1	1	0	61	61	0
V	2	0	2	223	0	223
Paseo Pacifico Total	**3**	**1**	**2**	**285**	**61**	**223**
Residential Total	**19**	**17**	**2**	**1,653**	**1,430**	**223**
Pending Total	**109**	**65**	**44**	**7,188**	**6,242**	**946**
Grand Total	**7,271**	**2,728**	**4,543**	**13,826**	**8,156**	**5,671**

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011), Madera County

4.3.15. Wildfire

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Madera County Planning Area. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; likelihood of future occurrence; and how climate change can affect or influence this hazard.

Hazard/Problem Description

California is recognized as one of the most fire-prone and consequently fire-adapted landscapes in the world. The combination of complex terrain, Mediterranean climate, and productive natural plant communities, along with ample natural and aboriginal ignition sources, has created conditions for extensive wildfires. Wildland fire is an ongoing concern for the Madera County Planning Area. Historically, the fire season extends from early spring through late fall of each year during the hotter, dryer months. However, in recent years, wildfire season is more of a year around event. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, an accumulation of vegetation, and high winds.

Potential losses from wildfire include human life, structures and other improvements, natural and cultural resources, quality and quantity of water supplies, cropland, timber, and recreational opportunities.

Economic losses could also result. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides and mudflows, and erosion during the rainy season. Additional losses could occur if PG&E initiates a power shutdown during extreme fire weather conditions. This is discussed in greater detail at the beginning of Section 4.3.

Wildfire Smoke and Air Quality

Smoke from wildfires is made up of gas and particulate matter, which can be easily observed in the air. Air quality standards have been established to protect human health with the pollutant referred to as PM2.5 which consists of particles 2.5 microns or less in diameter. These smaller sizes of particles are responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract.

Wildfire smoke can have negative effects to those who live in or near a fire burn area. Smoke and air pollution from wildfires can be a severe health hazard. Significant wildfires occurring in nearby northern California communities since the 2018 LHMP Update have created significant air pollution affecting area residents. County residents have been affected by wildfire smoke and poor air quality, from fires both within the Planning Area and from those much further away. The County has seen air quality impacts from smoke from wildfires since the 2018 LHMP. During these times, air sensors in the County showed periods of very poor air quality in Madera County. This was especially a concern during Covid. A document titled Smoke Impacts CA: 2020 Lessons – 2021 Actions that was published by the US Forest Service noted that wildfire smoke exposure could result in greater susceptibility to COVID-19 and other viruses/bacteria (decrease in local and systemic immune function).

According to FirstStreet.org, a climate risk data organization, elderly individuals are at an adversely high risk of experiencing negative health impacts from poor air quality, like worsening of heart disease and stroke, reduced lung capacity, and increase in lung disease.

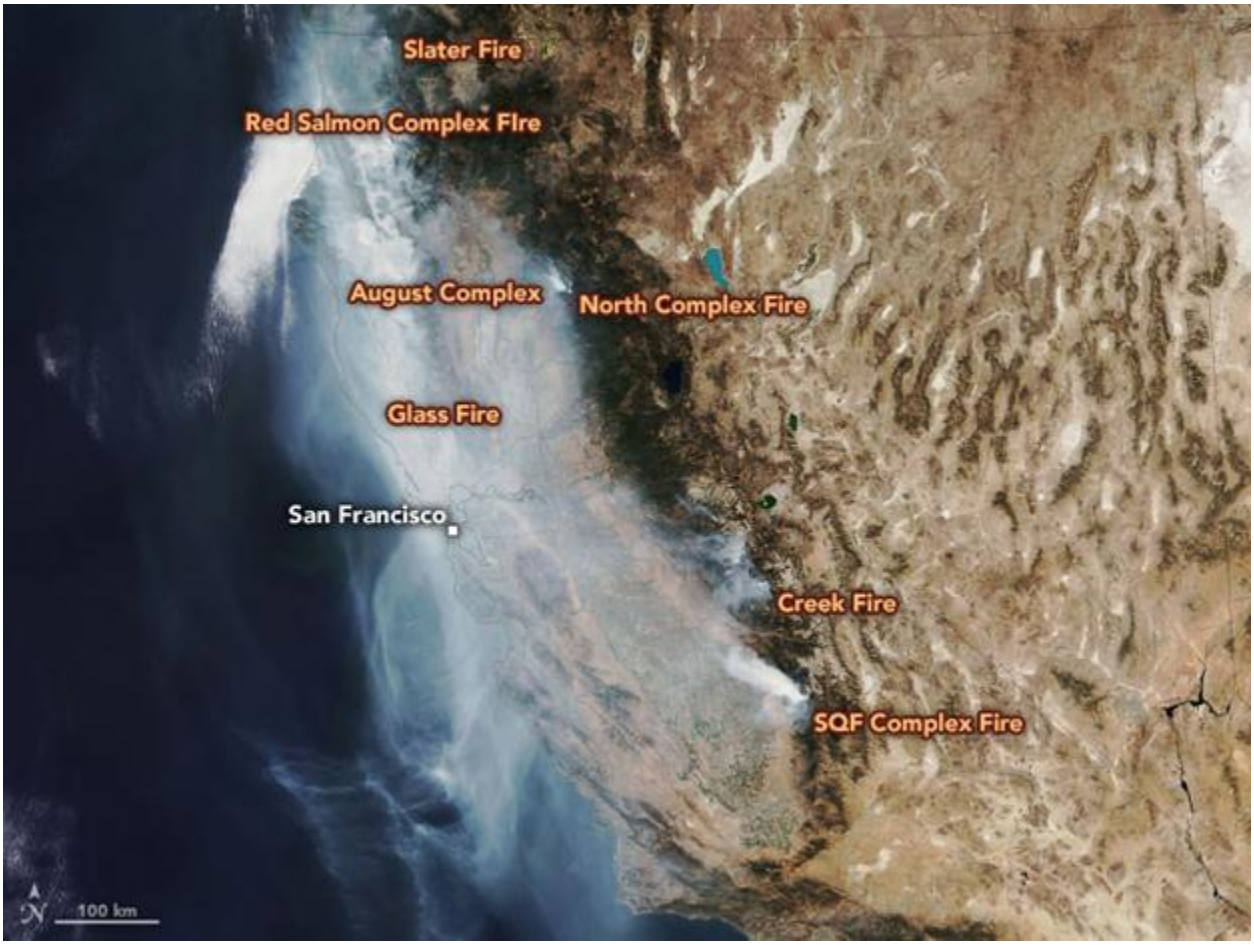
The paper “Wildland fire management and air quality in the southern Sierra Nevada: Using the Lion Fire as a case study with a multi-year perspective on PM2.5 impacts and fire policy” by D. Schweizer and R. Cisneros explores the impacts of smoke from high-intensity, stand replacing fires versus lower intensity fires in the Sierra Nevada and explains that while smoke and fire mitigation is important with any fire, the extreme effects of smoke from large wildfires can be prevented by managing forests and allowing low intensity fires to burn.

The summer of 2015 brought terrible wildfires along with severe smoke impacts to numerous locations in California. During the 2015 summer wildfire season, the San Joaquin Valley Air Pollution Control District issued eight health cautionary statements and press releases advising Valley residents to protect themselves from wildfire smoke. Staff also fielded 178 public calls and responded to 43 media inquiries regarding wildfire activity this year. Additionally, District staff worked closely with county health officials to communicate potential impacts to the public and actions to be taken to minimize exposure.

In the summer of 2020, a record number of large wildfires (see Figure 4-118) occurred on the West Coast creating hazardous air quality conditions. Within California, the northern portion of the state, the coast, and the Sierra Nevada all experienced numerous, large fires including the SCU Lightning Complex, CZU

August Lightning Complex, LNU Lightning Complex, SQF Complex and the Creek Fire. These fires caused massive amounts of smoke and ash to fall upon the City of Madera. The mixture of the smoke and typical Central Valley summer heat resulted in dangerous levels of air pollution. Outdoor events were cancelled and people were encouraged to stay inside for long periods of time.

Figure 4-118 2020 Wildfires and Smoke Causing Air Quality Issues



Source: City of Madera

Location and Extent

This section is broken down into two parts: a discussion on the wildland urban interface in Madera, and the Madera County wildfire setting.

Wildland Urban Interface

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. The WUI is a general term that applies to development adjacent to landscapes that support wildland fire. The WUI defines the

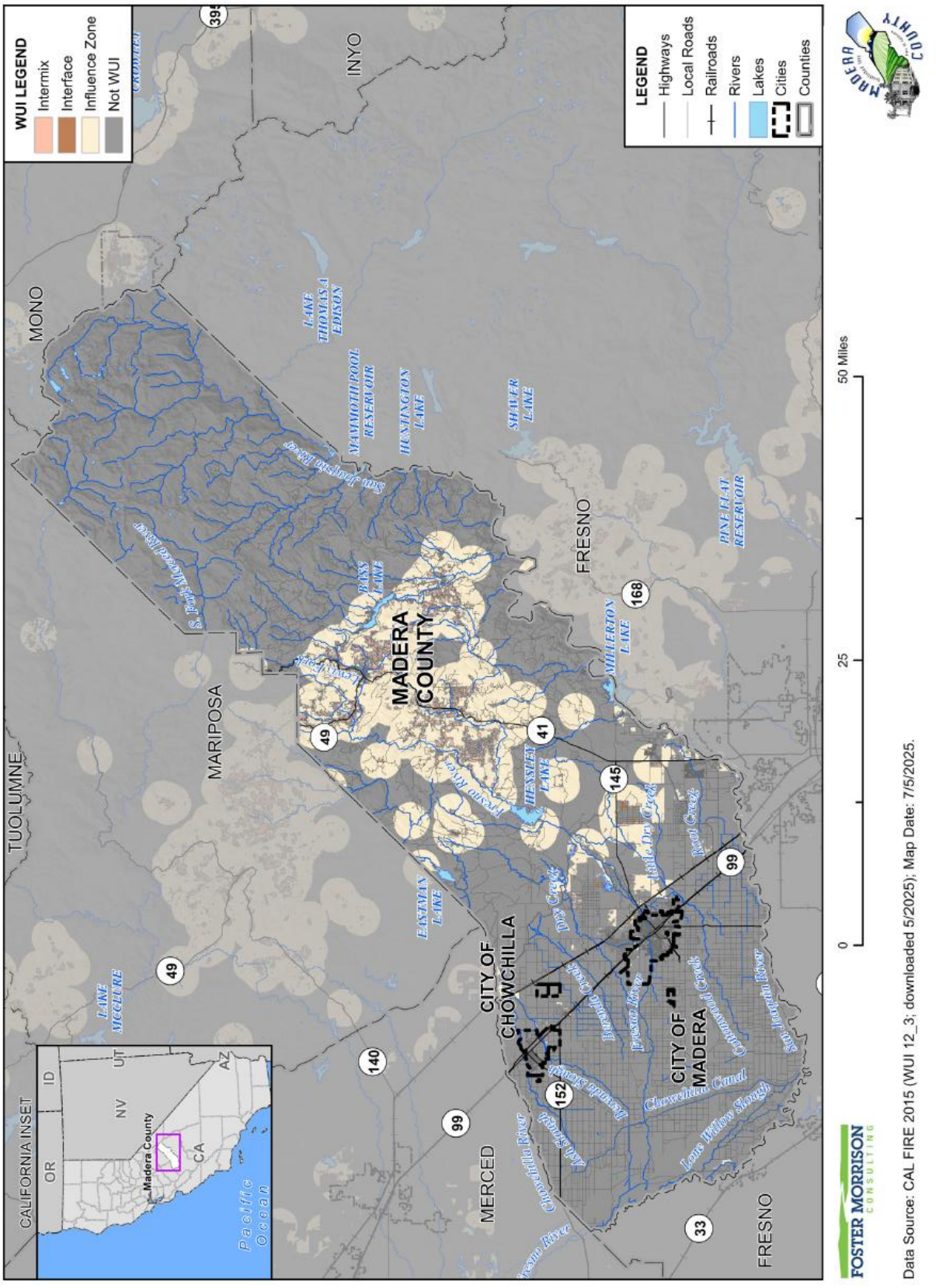
community development into the foothills and mountainous areas of California. The WUI describes those communities that are mixed in with grass, brush and timbered covered lands (wildland). These are areas where wildland fire once burned only vegetation but now burns homes as well. The WUI for Madera County consists of communities at risk (shown in the Local Concerns discussion below) as well as the area around the communities that pose a fire threat.

There are two types of WUI environments. The first is the true urban interface where development abruptly meets wildland. The second WUI environment is referred to as the wildland urban intermix. Wildland urban intermix communities are rural, low density communities where homes are intermixed in wildland areas. Wildland urban intermix communities are difficult to defend because they are sprawling communities over a large geographical area with wild fuels throughout. This profile makes access, structure protection, and fire control difficult as fire can freely run through the community.

WUI fires are often the most damaging. WUI fires occur where the natural forested landscape and urban-built environment meet or intersect. Even relatively small acreage fires may result in disastrous damages. WUI fires occur where the natural forested landscape and urban-built environment meet or intermix. The damages are primarily reported as damage to infrastructure, built environment, loss of socio-economic values and injuries to people.

The WUI map for the County is shown on Figure 4-119.

Figure 4-119 Madera County Planning Area – Wildland Urban Interface Areas



Madera County Wildfire Setting

As previously stated, there are areas in the County that are prone to wildfire. Wildland fires affect grass, forest, and brushlands, as well as any structures located within them. Where there is human access to wildland areas, the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Generally, there are four major factors that contribute to and sustain wildfires and allow for predictions of a given area's potential to burn. These factors include fuel, topography, weather, and human actions.

- **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. As a result of effective fire suppression since the 1930s, vegetation throughout the County has continued to grow and accumulate, and hazardous fuels have increased. As such, certain areas in and surrounding Madera County are extremely vulnerable to fires as a result of dense vegetation combined with a growing number of structures being built near and within rural lands. These high fuel hazards, coupled with a greater potential for ignitions, increases the susceptibility of the County to a catastrophic wildfire. The 2008 Community Wildfire Preparedness Plan (CWPP) noted that fuel types begin with annual grasses in the lower elevations and at about 1,000' elevation change to oak-woodlands. At about 2,000' elevation the brush fields start intermixing with the oak-woodlands and brush becomes the more prominent natural vegetation as you approach 3,000' elevation. From 3,000' to 4,500', brush and timber become mixed. Above 4,500', the predominant fuel is mixed conifer timber. Fuel loading varies from about 2 tons per acre in grass to over 100 tons per acre in timber fuels.
- **Topography** – An area's terrain and land 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 of vegetation throughout a hillside can also contribute to increased fire activity on slopes. The 2008 CWPP noted that the County consists of elevations ranging from 350 feet above sea level at the western end of the Madera Canal to 13,157 feet at the crest of the Sierra Nevada Mountains. Major river drainages and their tributaries traverse the county and sharply divide terrain in foothill and mountainous portions of the county into valleys with steep canyon walls. Slopes are greater than 100% over a large portion of the area and slopes of 35% to 50% are common over the remainder. The rivers drain to the gently rolling lower foothills until they reach the flat valley floor.
- **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 ignite more readily and burn more intensely. Thus, during periods of drought, the threat of wildfire increases. Wind is the most treacherous weather factor. The greater a wind, the faster a fire will spread and the more intense it will be. Winds can be significant at times in Madera County. Santa Ana winds in Madera County are especially conducive to hot, dry conditions, which can lead to "red flag" days indicating extreme fire danger. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Lightning also ignites wildfires, often in difficult to reach terrain for firefighters. The 2008 CWPP noted that the valley and the lower foothill temperatures average close to 100 degrees in the daytime and 62 degrees at night in July with the humidity averaging between 17 to 22%. The temperature lowers and the humidity slightly increases as the elevation increases. At 4,000

feet, average summer daytime temperatures are in the mid 90's with the humidity averaging between 25 to 35%. Temperatures at night can cool off to a comfortable mid 50's and humidity ranging from 50 to 80%. Rainfall is generally non-existent from May until mid October except for an occasional thunderstorm. During the fire season the diurnal surface winds are up canyon by day and down canyon by night. Prevailing upper level winds are out of the west to northwest. These winds are more intense and when they surface at the higher elevations can have a negative impact on fire behavior. The most dangerous winds for firefighters are associated with thunderstorms. Winds within the vicinity of a storm cell are extremely gusty, erratic and unpredictable.

- **Human Actions** – Most wildfires are ignited by human action, the result of direct acts of arson, carelessness, or accidents. Many fires originate in populated areas along roads and around homes, and are often the result of arson or careless acts such as the disposal of cigarettes, use of equipment or debris burning. Recreation areas that are located in high fire hazard areas also result in increased human activity that can increase the potential for wildfires to occur.

Fires can have a quick speed of onset, especially during periods of drought. Fires can burn for a short period of time, or may have durations lasting for a week or more. Wildfire can affect any area of the Planning Area; however, California Department of Forestry and Fire Protection (CAL FIRE) has mapped areas in California that are at risk to wildfire. Methodologies for this analysis and maps showing the various Fire Hazard Severity Zones (FHSZ), which range from Non-Wildland/Non-Urban to Very High, can be found in the Vulnerability Assessment below. CAL FIRE Fire Hazard Severity Zones have been developed based on Fire Responsibility Areas located in the County which details the responsible fire agency for each area of the County; specifically, federal, state, and local responsibility areas. Figure 4-120 shows the Fire Responsibility Area mapping for Madera County. Geographic extents of wildfire in the State Responsibility Area (SRA) and Federal Responsibility Area (FRA) for the unincorporated Madera County be seen on Figure 4-121 and is detailed in Table 4-142. Geographic extents of wildfire in the Local Responsibility Area (LRA) for the unincorporated Madera County be seen on Figure 4-122 and is detailed in Table 4-143. Details on each jurisdiction's Fire Hazard Severity Zone extents (for both SRA/FRA and LRA) can be found in their respective annexes to this LHMP Update.

Figure 4-120 Madera County Planning Area – Fire Responsibility Areas

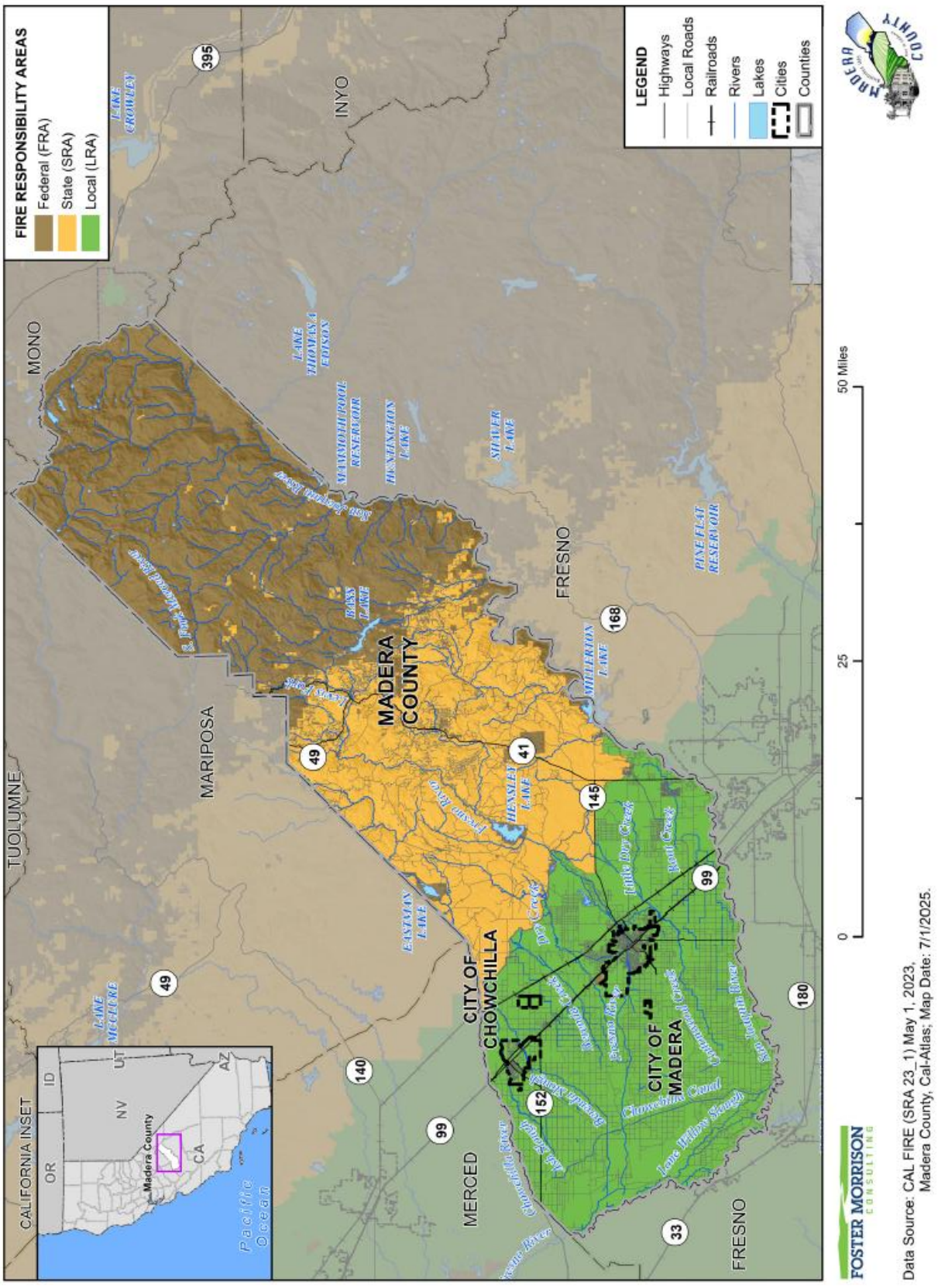


Figure 4-121 Madera County Planning Area – CAL FIRE SRA/FRA Fire Hazard Severity Zones

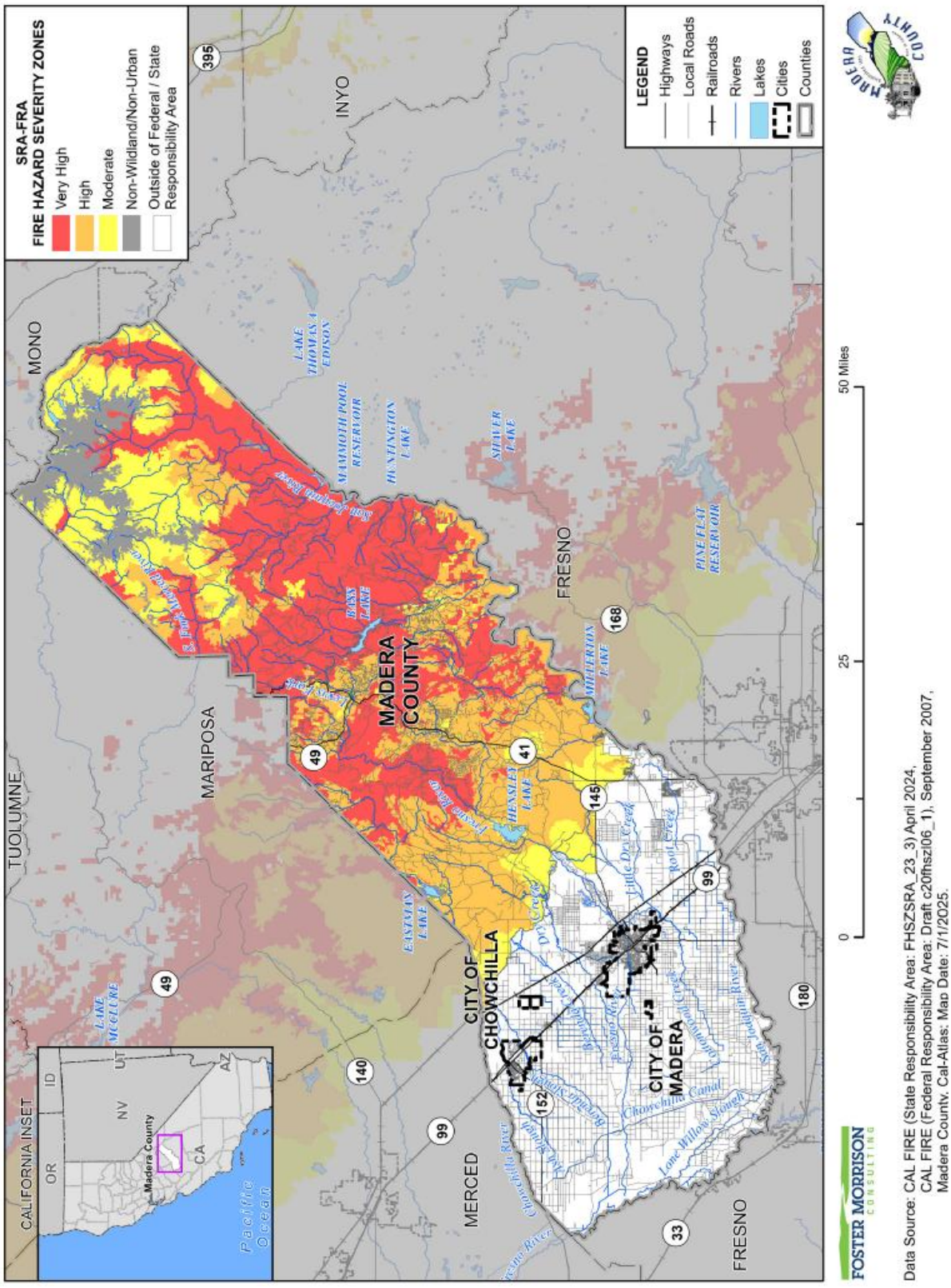


Table 4-142 Madera County Planning Area – CAL FIRE SRA/FRA Fire Hazard Severity Zones Geographical Extents

Jurisdiction / Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla						
Outside of State and Federal Responsibility Area	6,758	0.5%	3,385	0.6%	3,373	0.4%
City of Chowchilla Total	**6,758**	**0.5%**	**3,385**	**0.6%**	**3,373**	**0.4%**
City of Madera						
Non-Wildland/Non-Urban	1	0.0001%	1	0.0002%	0	0.0%
Outside of State and Federal Responsibility Area	10,692	0.8%	6,497	1.2%	4,194	0.5%
City of Madera Total	**10,692**	**0.8%**	**6,498**	**1.2%**	**4,194**	**0.5%**
Unincorporated Madera County						
Very High	389,691	28.7%	45,098	8.2%	344,593	42.8%
High	289,870	21.4%	92,648	16.8%	197,222	24.5%
Moderate	150,598	11.1%	12,623	2.3%	137,975	17.1%
Non-Wildland/Non-Urban	58,027	4.3%	85	0.02%	57,942	7.2%
Outside of State and Federal Responsibility Area	451,161	33.3%	390,972	70.9%	60,189	7.5%
Unincorporated Madera County Total	**1,339,348**	**98.7%**	**541,426**	**98.2%**	**797,922**	**99.1%**
Grand Total	**1,356,798**	**100%**	**551,309**	**100%**	**805,489**	**100%**

Source: CAL FIRE (FHSZ SRA 2024, FHSZ FRA 2007)

Figure 4-122 Madera County Planning Area – CAL FIRE LRA Fire Hazard Severity Zones

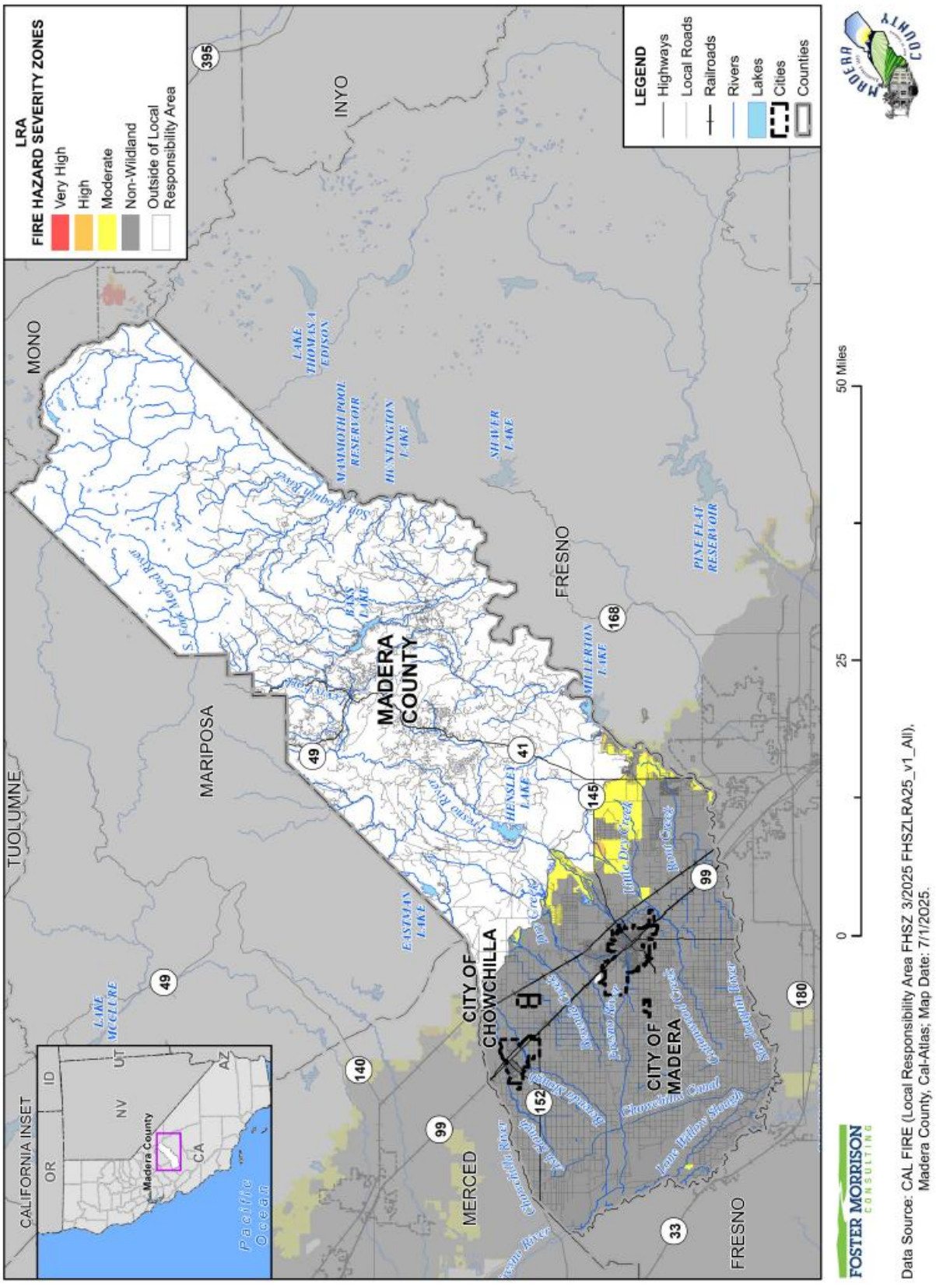


Table 4-143 Madera County Planning Area– CAL FIRE LRA Fire Hazard Severity Zones Geographical Extents

Jurisdiction / Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla						
Non-Wildland	6,758	0.5%	3,385	0.6%	3,373	0.4%
City of Chowchilla Total	**6,758**	**0.5%**	**3,384.591**	**0.6%**	**3,373**	**0.4%**
City of Madera						
Non-Wildland	10,692	0.8%	6,497	1.2%	4,194	0.5%
Outside of Local Responsibility Area	1	0.0001%	1	0.0002%	-	0.0%
City of Madera Total	**10,692**	**0.8%**	**6,498**	**1.2%**	**4,194**	**0.5%**
Unincorporated Madera County						
High	1,289	0.1%	1,064	0.2%	225	0.03%
Moderate	31,850	2.3%	14,036	2.5%	17,814	2.2%
Non-Wildland	418,857	30.9%	376,051	68.2%	42,805	5.3%
Outside of Local Responsibility Area	888,215	65.4%	150,450	27.3%	737,765	91.5%
Unincorporated Madera County Total	**1,340,211**	**98.7%**	**541,602**	**98.2%**	**798,609**	**99.1%**
Grand Total	**1,357,661**	**100%**	**551,484**	**100%**	**806,176**	**100%**

Source: CAL FIRE (LRA 2025)

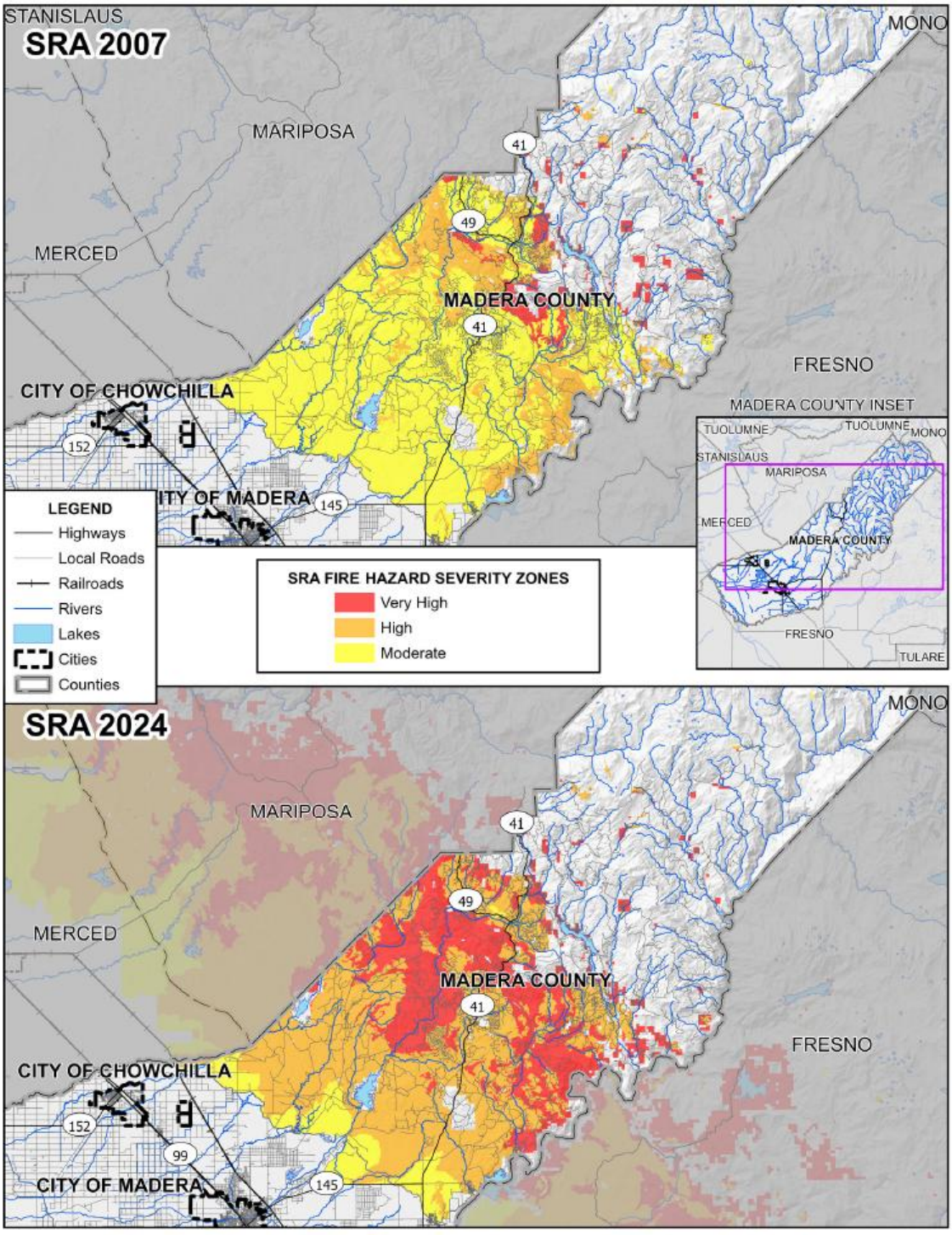
CAL FIRE Fire Hazard Severity Zone Comparison

Given the new CAL FIRE Fire Hazard Severity Zone mapping for the SRA (2024) and the LRA (2025), a comparison of the previous CAL FIRE FHSZ mapping from 2007 was conducted. Figure 4-123 and Table 4-144 shows the 2007 FHSZ data compared to the 2024 FHSZ data for the SRA within the Madera County Planning Area. As shown, the only changes lay in the unincorporated County. Figure 4-124 and Table 4-145 shows the FHSZ data comparison for the LRA datasets. As shown, this affected all jurisdictions in the County.

Based on this comparative analysis, while many of the FHSZs have changed within the two (SRA and LRA) analyses, much of the change can be contributed to mapped areas being reallocated to new State and Local Fire Responsibility Areas. As such, the risk and vulnerability of the County Planning Area to wildfire remains significant. Further given the topography and fuels located throughout the Planning Areas, and the

history of devastating wildfires in and around Madera County, wildfire continues to be one of the County's most significant hazard of concern.

Figure 4-123 Madera County Planning Area – SRA FHSZ Comparison



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2007 Data Source: CAL FIRE (State Responsibility Area: fhszs06_3_20) November 2007, Madera County, Cal-Atlas; Map Date: 04/2017.

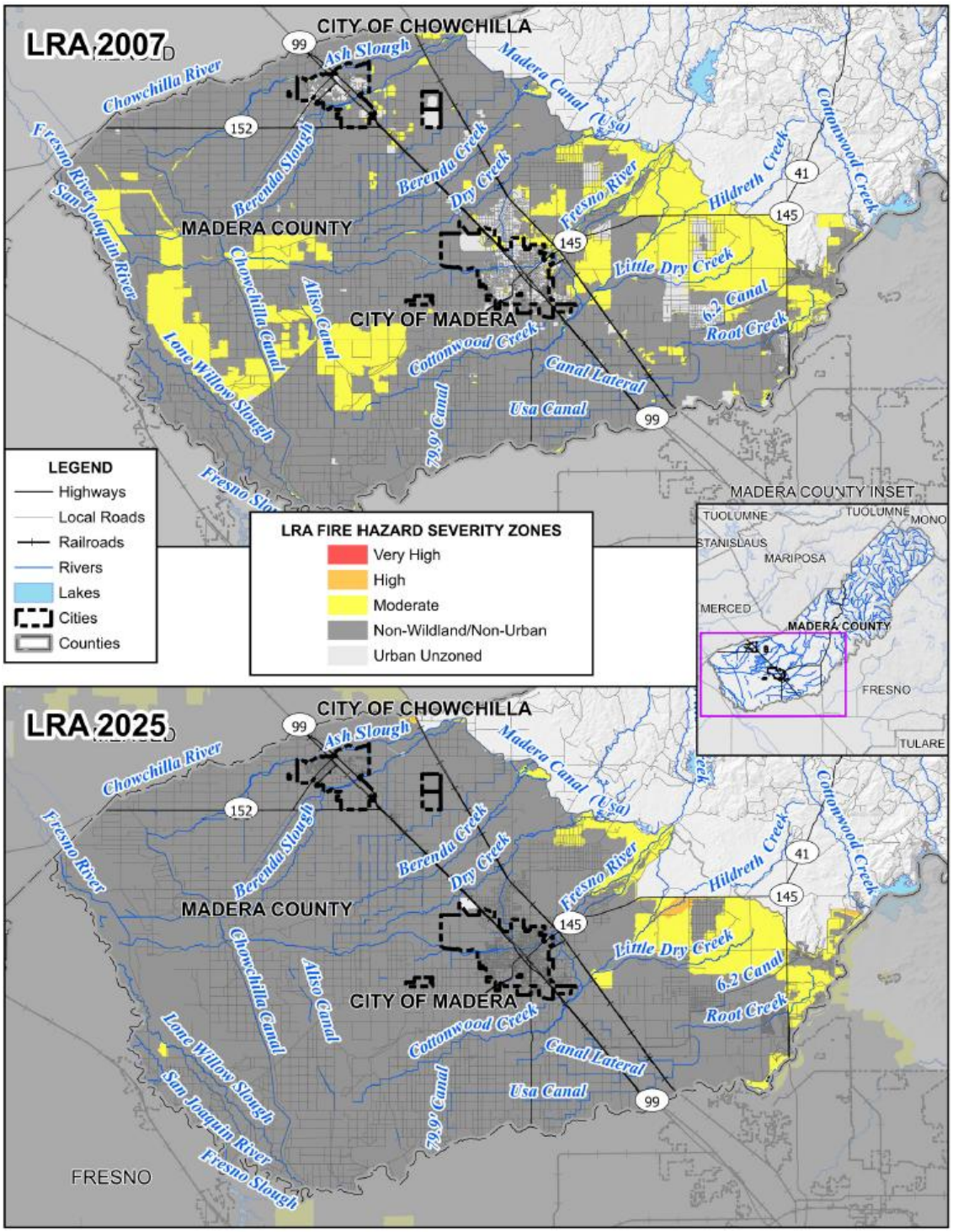
2024 Data Source: CAL FIRE (State Responsibility Area: FHSZSRA_23_3) April 2024, Madera County, Cal-Atlas; Map Date: 10/13/2025.

Table 4-144 Madera County Planning Area – SRAFHSZ Comparisons by Jurisdiction

Jurisdictions / Fire Hazard Severity Zones	Overall Acre Change			% Acre Change		
	Total Acres in 2007	Total Acres in 2025	Overall Change in Total Acres	% of Total Acres in 2007	% of Total Acres in 2025	Overall Change in % Total Acres
Unincorporated Madera County						
Very High	23,936	122,841	98,905	6%	33%	26%
High	65,902	216,214	150,312	18%	58%	40%
Moderate	281,494	35,124	-246,370	76%	9%	-66%
Unincorporated Madera County Total	**371,332**	**374,180**	**2,848**	**100%**	**100%**	**0%**

Source: CAL FIRE

Figure 4-124 Madera County Planning Area – LRA FHSZ Comparison



2007 Data Source: CAL FIRE (Local Responsibility Area: c20fhszl06_1) September 2007, Madera County, Cal-Atlas; Map Date: 04/2017.

2025 Data Source: CAL FIRE (Local Responsibility Area: FHSZLRA25_v1_All) March 2025, Madera County, Cal-Atlas; Map Date: 10/9/2025.

Table 4-145 Madera County Planning Area – LRA FHSZ Comparisons by Jurisdiction

Jurisdictions / Fire Hazard Severity Zones	Overall Acre Change			% Acre Change		
	Total Acres in 2007	Total Acres in 2025	Overall Change in Total Acres	% of Total Acres in 2007	% of Total Acres in 2025	Overall Change in % Total Acres
City of Chowchilla						
High	168	0	-168	0.0%	0%	-0.03%
Moderate	3,893	6,758	2,865	0.8%	1.4%	0.63%
Non-Wildland/Non-Urban	2,831	-	-2,831	0.6%	0%	-0.59%
Urban Unzoned	6,891	6,758	-134	1.4%	1.4%	0.01%
City of Chowchilla Total	**168**	**0**	**-168**	**0.0%**	**0%**	**-0.03%**
City of Madera						
High	0	0	0	0%	0%	0%
Moderate	482	0	-482	0.1%	0.0%	-0.1%
Non-Wildland/Non-Urban	2,567	10,692	8,124	0.5%	2.3%	1.7%
Urban Unzoned	5,545	0	-5,545	1.2%	0%	-1.2%
City of Madera Total	**8,594**	**10,692**	**2,097**	**1.8%**	**2.3%**	**0.5%**
Unincorporated Madera County						
High	0	1,289	1,289	0%	0.3%	0.3%
Moderate	87,522	31,850	-55,672	18%	6.8%	-11.4%
Non-Wildland/Non-Urban	365,044	418,857	53,813	76%	89.2%	13.3%
Urban Unzoned	12,714	-	-12,714	3%	0%	-2.6%
Unincorporated Madera County Total	**465,280**	**451,996**	**-13,284**	**97%**	**96.3%**	**-0.5%**

Source: CAL FIRE

Post-Wildfire Landslides and Debris Flows

Post-wildfire landslides and debris flows are a concern in Madera County, though the fires and associated post fire landslides often occur in areas that are less populated. Fires that burn in hilly areas, which comprise the eastern portion of Madera County, remove vegetation that holds hillsides together during rainstorms. Once that vegetation is removed, the hillside may be compromised, resulting in landslides and debris flows. Mapping of these areas has been ongoing on a case-by-case basis since 2012. A search of the USGS Emergency Assessment of Post-Fire Debris Flow Hazards showed no events in Madera County.

Past Occurrences

Disaster Declaration History

A search of FEMA and Cal OES disaster declarations shows three state and two federal disaster declarations. These are shown in Table 4-146.

Table 4-146 Madera County – Federal and State Disaster Declaration from Wildfire 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Fire	5	2016 – Clayton Fire, 2017 (twice) – Mission Fire and Railroad Fire), 2020 – Creek Fire, 2022 – Mosquito Fire	9	2005 – Quartz Fire, 2014 – Junction Fire and Courtney Fire (twice), 2015, 2016 – Clayton Fire, 2017 – Mission Fire and Railroad Fire (twice), 2020 – California Creek Fires (twice – once as FMAG, and once as DR)

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked wildfire events in the County dating back to 1993. The 118 events in Madera County in the database are shown in Table 4-147.

*Table 4-147 NCDC Wildfire Events in Madera County 1993 to 7/31/2024**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Wildfire	118	4	1	97	7	$47,328,000	$0

Source: NCDC

*Deaths, injuries, and damages are for the entire event, and may not be exclusive to the County.

CAL FIRE Events

CAL FIRE, USDA Forest Service Region 5, Bureau of Land Management (BLM), the NPS, Contract Counties and other agencies jointly maintain a comprehensive fire perimeter GIS layer for public and private lands throughout the state. The data covers fires back to 1878 (though the first recorded incident for the County was in 1917). For the NPS, BLM, and US Forest Service, fires of 10 acres and greater are reported. For CAL FIRE, timber fires greater than 10 acres, brush fires greater than 50 acres, grass fires greater than 300 acres, and fires that destroy three or more residential dwellings or commercial structures are reported. CAL FIRE recognizes the various federal, state, and local agencies that have contributed to this dataset, including USDA Forest Service Region 5, BLM, NPS, and numerous local agencies.

Fires may be missing altogether or have missing or incorrect attribute data. Some fires may be missing because historical records were lost or damaged, fires were too small for the minimum cutoffs, documentation was inadequate, or fire perimeters have not yet been incorporated into the database. Also,

agencies are at different stages of participation. For these reasons, the data should not be used for statistical or analytical purposes.

The data provides a reasonable view of the spatial distribution of past large fires in California. Using GIS, fire perimeters that intersect Madera County were extracted and are listed in Table 4-148. There are 111 fires recorded in this database for Madera County. Each of them was tracked by CAL FIRE. Many more small fires likely have occurred, but were not included in the analysis.

Figure 4-125 shows fire history for the Madera County Planning Area, colored by the size of the acreage burned. This map contains fires from 1950 to 2024, while the detailed tables of wildfire shown in Table 4-148 contain fires from 1910 to 2024, with the first recorded wildfire in this database (for Madera County) in 1934.

Figure 4-125 Madera County Wildfire History – CAL FIRE 1910 to 2024

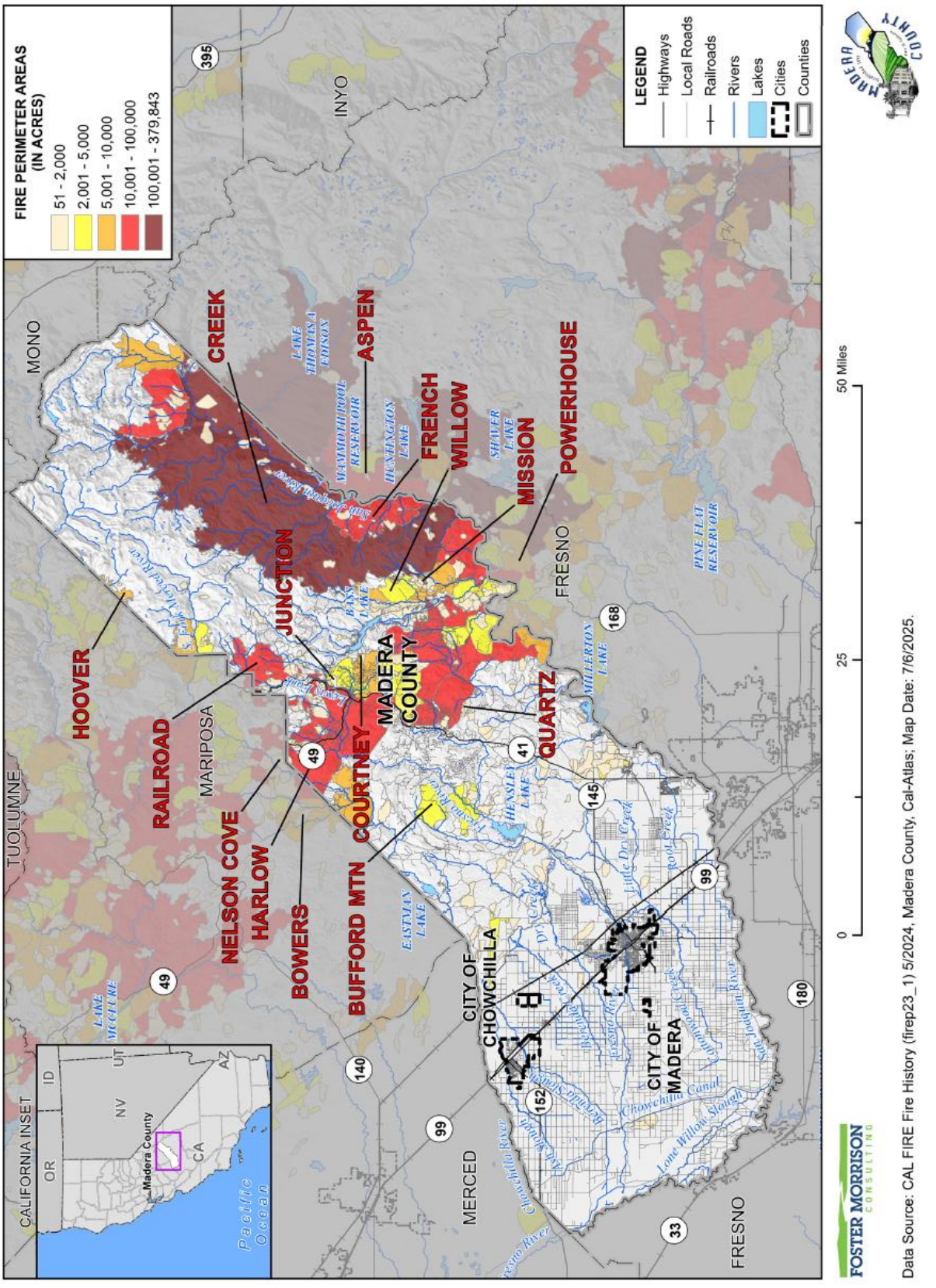


Table 4-148 Madera County – CAL FIRE Wildfire History Summary 1910-2024 by Acres Burned

Wildfire Name	Year	Date	Cause Description	Cause Code	Total Wildfire Acres	Wildfire Acres Within County
200fire	2003	8/26/2003	Lightning	1	72	72
210	2004	4/30/2004	Vehicle	10	56	56
400	2004	5/11/2004	Arson	7	45	45
41	2008	6/10/2008	Vehicle	10	2,592	2,582
600	2005	6/1/2005	Unknown / Unidentified	14	49	43
800	2005	6/30/2005	Unknown / Unidentified	14	44	44
810	2005	7/1/2005	Equipment Use	2	52	52
Adam	1996	7/27/1996	Lightning	1	248	193
Arnold Sallaberry	1951	6/4/1951	Unknown / Unidentified	14	368	363
Aspen	2013	7/22/2013	Lightning	1	22,938	650
Bailey	2005	7/2/2005	Unknown / Unidentified	14	1,025	1,024
Bates	2005	9/26/2005	Lightning	1	23	23
Bates	1951	5/28/1951	Unknown / Unidentified	14	140	140
Ben Hur	2004	6/26/2004	Structure	15	34	34
Biledo	2011	12/16/2011	Campfire	4	20	20
Bissett	1957	8/19/1957	Unknown / Unidentified	14	647	646
Black Hawk Mt.	1954	7/24/1954	Escaped Prescribed Burn	18	483	483
Bowers	1962	8/27/1962	Unknown / Unidentified	14	7,738	202
Bowler	2019	7/22/2019	Lightning	1	37	37
Broken	2016	7/4/2016	Equipment Use	2	101	101
Brown	1982	6/4/1982	Unknown / Unidentified	14	263	252
Browncone	1973	6/26/1973	Lightning	1	60	42
Buck	2014	7/20/2014	Lightning	1	0	0
Buck	1985	8/9/1985	Lightning	1	348	348
Buckhorn	2010	8/7/2010	Lightning	1	942	471

Wildfire Name	Year	Date	Cause Description	Cause Code	Total Wildfire Acres	Wildfire Acres Within County
Buena Vista	2014	7/4/2014	Campfire	4	0	0
Bufford Mtn	1954	8/7/1954	Escaped Prescribed Burn	18	4,939	4,936
Butte	2017	8/7/2017	Lightning	1	611	611
C.C. Cook	1951	5/31/1951	Unknown / Unidentified	14	356	274
Canal	1996	(blank)	Unknown / Unidentified	14	1,506	745
Canal	1998	7/3/1998	Arson	7	660	659
Canal	2024	5/30/2024	Equipment Use	2	900	897
Cascadel	2008	9/11/2008	Miscellaneous	9	277	277
Cedarbrook	1973	6/27/1973	Arson	7	38	38
Chawanakee	1987	6/22/1987	Miscellaneous	9	1,487	4
China	2012	6/19/2012	Campfire	4	10	10
Chiquito	2013	5/11/2013	Miscellaneous	9	40	40
Chiquito	2008	6/21/2008	Lightning	1	145	145
Chow	1986	(blank)	Unknown / Unidentified	14	538	538
Circle	2024	7/23/2024	Equipment Use	2	46	46
Clark	2001	7/3/2001	Lightning	1	40	40
Coarsegold Creek	1954	6/17/1954	Unknown / Unidentified	14	477	477
Cold	2011	8/20/2011	Campfire	4	10	10
Corral Wfu	2005	8/14/2005	Lightning	1	256	256
Corrine	2015	6/18/2015	Electrical Power	11	922	919
Courtney	2014	9/14/2014	Debris	5	291	284
Cow	2012	8/5/2012	Lightning	1	11	11
Creek	2020	9/4/2020	Unknown / Unidentified	14	379,842	189,443
Curran	1950	6/18/1950	Unknown / Unidentified	14	456	456
Dam	2004	4/29/2004	Equipment Use	2	39	37
Damet	2004	4/30/2004	Unknown / Unidentified	14	33	33

Wildfire Name	Year	Date	Cause Description	Cause Code	Total Wildfire Acres	Wildfire Acres Within County
Daulton	1996	(blank)	Unknown / Unidentified	14	724	1,225
Daulton	1986	(blank)	Unknown / Unidentified	14	243	243
Desmond	1959	7/9/1959	Unknown / Unidentified	14	413	413
Desmond-Gill	1966	8/30/1966	Unknown / Unidentified	14	616	616
Dump	2005	8/1/2005	Miscellaneous	9	23	21
Eastmam	2017	9/18/2017	Electrical Power	11	482	482
Eucalyptus Resort	1961	7/18/1961	Unknown / Unidentified	14	326	123
Fish	2019	7/15/2019	Equipment Use	2	77	77
Fork	2022	9/7/2022	Vehicle	10	818	816
French	2014	7/27/2014	Campfire	4	13,832	13,830
Friant/Pg&E 9	2004	5/6/2004	Equipment Use	2	11	11
Fuller	2008	6/29/2008	Lightning	1	68	68
Fuller	1971	8/11/1971	Lightning	1	20	20
Fuller	1997	5/17/1997	Lightning	1	11	11
Gold	2013	4/30/2013	Unknown / Unidentified	14	184	182
Grayling Lake	1934	(blank)	Lightning	1	9	5
Grub	2016	8/4/2016	Miscellaneous	9	170	85
Harlow	1961	7/10/1961	Miscellaneous	9	43,331	32,425
Hells	1997	5/17/1997	Miscellaneous	9	18	18
Hensley	2020	8/30/2020	Arson	7	398	398
Hensley	2005	6/20/2005	Arson	7	19	19
Highway 41/ Rd 209 3	2007	5/20/2007	Unknown / Unidentified	14	329	329
Hoover	2001	(blank)	Lightning	1	7,231	1,279
Hoover	1990	8/8/1990	Lightning	1	76	76
Hoover	1998	(blank)	Lightning	1	10	10
Horseshoe	1973	6/27/1973	Lightning	1	835	829
Hwy 145	2004	5/15/2004	Unknown / Unidentified	14	6	6
J.L.	1978	8/8/1978	Lightning	1	248	138

Wildfire Name	Year	Date	Cause Description	Cause Code	Total Wildfire Acres	Wildfire Acres Within County
Jamison	1958	7/24/1958	Unknown / Unidentified	14	282	282
Johnson	2008	10/27/2008	Campfire	4	24	24
Johnson	1983	6/6/1983	Lightning	1	1,363	1,363
Junction	1974	5/22/1974	Lightning	1	70	70
Junction	2014	8/18/2014	Unknown / Unidentified	14	612	607
King	2023	10/14/2023	Miscellaneous	9	119	119
Kingsman	1980	10/7/1980	Equipment Use	2	254	254
Lakes	2016	6/26/2016	Lightning	1	1,001	6
Lambertson	1953	6/24/1953	Unknown / Unidentified	14	1,102	1,080
Lightning #1	1978	8/11/1978	Unknown / Unidentified	14	333	333
Lightning #2	1973	6/27/1973	Unknown / Unidentified	14	619	619
Lightning #2	1962	9/26/1962	Unknown / Unidentified	14	313	313
Lightning #36	1969	9/7/1969	Unknown / Unidentified	14	4,662	4,629
Lightning #58	1973	6/27/1973	Unknown / Unidentified	14	472	472
Lilly	1990	8/5/1990	Campfire	4	101	101
Lions	2018	6/19/2018	Lightning	1	13,461	13,460
Long Ridge	1970	5/18/1970	Miscellaneous	9	598	598
Lost	2018	10/3/2018	Lightning	1	46	46
Lyell	2014	7/12/2014	Campfire	4	0	0
Magness	1988	2/16/1988	Debris	5	28	28
Mammoth	1977	4/16/1977	Debris	5	98	98
Mammoth	1985	7/2/1985	Arson	7	764	764
Manzanita	2021	1/19/2021	Debris	5	22	22
Manzanita	1977	4/17/1977	Campfire	4	104	103
Mariani	1971	6/26/1971	Unknown / Unidentified	14	363	363
Marquerite	1971	10/21/1971	Unknown / Unidentified	14	732	26
Martin	1970	7/5/1970	Unknown / Unidentified	14	682	669

Wildfire Name	Year	Date	Cause Description	Cause Code	Total Wildfire Acres	Wildfire Acres Within County
Mcalister	1961	8/8/1961	Unknown / Unidentified	14	590	583
Mckinney	1967	7/20/1967	Unknown / Unidentified	14	794	790
Mile	1997	(blank)	Unknown / Unidentified	14	1,059	1,055
Millerton	2008	6/18/2008	Unknown / Unidentified	14	175	173
Millerton	2005	11/26/2005	Lightning	1	29	29
Minnow	2014	10/25/2014	Unknown / Unidentified	14	0	0
Mission	2017	9/3/2017	Electrical Power	11	988	986
Mocchi	1951	8/5/1951	Unknown / Unidentified	14	474	472
Moraine	2014	7/16/2014	Lightning	1	0	0
Mormon	1987	8/30/1987	Lightning	1	27	27
Nehouse	2004	9/11/2004	Miscellaneous	9	254	254
Nelson Cove	1959	(blank)	Equipment Use	2	22,153	2,007
Nelson Cove	1968	9/10/1968	Unknown / Unidentified	14	356	37
Noble	2005	7/21/2005	Lightning	1	156	156
North Fork	2001	8/20/2001	Equipment Use	2	4,131	4,122
North Fork	1994	8/27/1994	Miscellaneous	9	31	30
Northfork	2003	7/8/2003	Equipment Use	2	472	472
Oak	2018	9/22/2018	Playing With Fire	8	359	359
Oakhurst	1951	8/4/1951	Unknown / Unidentified	14	1,366	1,353
Oakwood	2017	6/10/2017	Miscellaneous	9	1,429	1,418
Olivia	2004	5/22/2004	Equipment Use	2	61	61
O'neal	1953	6/12/1953	Unknown / Unidentified	14	649	649
Oneals	2018	6/4/2018	Equipment Use	2	433	433
Ottoway	2002	7/11/2002	Lightning	1	63	63

Wildfire Name	Year	Date	Cause Description	Cause Code	Total Wildfire Acres	Wildfire Acres Within County
Pg&E 11	2004	5/15/2004	Equipment Use	2	10	10
Pole Line	1975	6/17/1975	Unknown / Unidentified	14	2,949	2,932
Powderhouse	1989	7/28/1989	Arson	7	11,800	2,477
Power	2020	7/11/2020	Electrical Power	11	152	152
Pumice	2020	6/15/2020	Lightning	1	43	1
Quartz	2017	8/7/2017	Lightning	1	80	80
Quartz	2005	7/25/2005	Unknown / Unidentified	14	1,095	547
Quitin Time	1985	8/3/1985	Lightning	1	12	12
Rabbit Hill	1981	8/6/1981	Unknown / Unidentified	14	821	821
Railroad	2017	8/29/2017	Miscellaneous	9	12,371	10,099
Rainbow	1992	8/12/1992	Lightning	1	8,358	8,357
Ranch	2000	9/22/2000	Unknown / Unidentified	14	284	277
Ranch		9/23/2000	Unknown / Unidentified	14	147	147
Randall	1980	8/8/1980	Unknown / Unidentified	14	277	491
Rattlesnake	2005	9/26/2005	Lightning	1	23	23
Raymond	2006	7/26/2006	Smoking	3	475	475
Rd 400	2004	6/19/2004	Equipment Use	2	90	90
Rd_26	2003	6/23/2003	Miscellaneous	9	526	525
Red	2015	6/21/2015	Debris	5	134	134
Red	2014	7/20/2014	Lightning	1	0	0
Red	2022	8/4/2022	Lightning	1	8,432	741
Redinger	1999	9/15/1999	Miscellaneous	9	24	24
Ridge	1988	7/23/1988	Lightning	1	63	63
Rivas	1953	7/10/1953	Unknown / Unidentified	14	363	357
River	2021	7/11/2021	Unknown / Unidentified	14	9,655	8,489
River	2017	9/1/2017	Miscellaneous	9	10	10
Road 600	2008	6/21/2008	Lightning	1	2	2
Roadside #5	1962	8/8/1962	Unknown / Unidentified	14	901	893

Wildfire Name	Year	Date	Cause Description	Cause Code	Total Wildfire Acres	Wildfire Acres Within County
Rock	2007	8/26/2007	Lightning	1	171	86
Rock	1984	5/19/1984	Miscellaneous	9	27	27
Rock Creek 2	2002	11/25/2002	Debris	5	402	402
Rolling	2013	6/16/2013	Vehicle	10	482	478
Rose	1977	7/26/1977	Lightning	1	15	15
Royal	2014	7/20/2014	Lightning	1	0	0
Rube	2006	10/10/2006	Lightning	1	233	111
Serpa	2016	7/21/2016	Unknown / Unidentified	14	64	64
Shaler	1986	8/17/1986	Equipment Use	2	14	14
Sky	2015	6/18/2015	Equipment Use	2	499	499
Snake/Cargyle2	2003	9/3/2003	Lightning	1	826	826
Source	2007	8/26/2007	Lightning	1	13	13
Source	2004	6/16/2004	Miscellaneous	9	384	384
South Fork	2017	8/13/2017	Lightning	1	7,560	3,655
South Fork Cany	1953	(blank)	Lightning	1	18	18
Spring	2016	5/27/2016	Debris	5	39	38
Star	2008	6/21/2008	Lightning	1	268	268
Stevenson	1980	9/2/1980	Equipment Use	2	457	0
Strathearn	1952	6/5/1952	Unknown / Unidentified	14	1,504	1,495
Summit	2012	9/4/2012	Debris	5	15	15
Table	1993	(blank)	Unknown / Unidentified	14	573	573
Table		6/23/1993	Unknown / Unidentified	14	523	523
Temperance Flat	1982	7/31/1982	Unknown / Unidentified	14	7,802	3,246
Thomas Gregory	1950	7/5/1950	Unknown / Unidentified	14	523	523
Thornberry #2	1968	7/20/1968	Unknown / Unidentified	14	3,131	3,130
Tripel	2014	8/27/2014	Unknown / Unidentified	14	0	0
Twin 2	1990	10/13/1990	Lightning	1	14	14

Wildfire Name	Year	Date	Cause Description	Cause Code	Total Wildfire Acres	Wildfire Acres Within County
Urrotia	2005	9/15/2005	Unknown / Unidentified	14	420	420
Urrutia	1992	(blank)	Unknown / Unidentified	14	232	232
Urrutia	1995	(blank)	Unknown / Unidentified	14	251	247
Urrutia #2	1959	6/25/1959	Unknown / Unidentified	14	1,556	1,542
Urruttia #2	1958	7/16/1958	Unknown / Unidentified	14	173	173
Walker	2004	7/17/2004	Unknown / Unidentified	14	84	84
Washburn	2022	7/7/2022	Arson	7	4,886	2,304
Whiskey	2023	7/3/2023	Equipment Use	2	83	83
Willow	2015	7/25/2015	Playing With Fire	8	5,701	5,701
Willow	2024	6/22/2024	Vehicle	10	213	209
Willow Glen	1976	8/11/1976	Unknown / Unidentified	14	409	406
Wishon	1999	5/25/1999	Miscellaneous	9	10	10
Wood-Schaubach	1964	7/25/1964	Escaped Prescribed Burn	18	492	476
Wylie	1970	8/17/1970	Miscellaneous	9	340	335
Yosemite Lakes	1981	7/4/1981	Unknown / Unidentified	14	455	455
Grand Total					667,016	372,166

Source: CAL FIRE (May 2024)

Hazard Mitigation Planning Committee Events

These sections first show historic hazard events occurring since the 2018 LHMP and then those occurring prior to the 2018 LHMP.

Events since 2018 LHMP

The County researched areas where wildfires occurred in the County. These can be seen in summary in Table 4-149. More detail on the major events follows the table.

Table 4-149 Madera County Planning Area – Fires Since 2018

Year	Fire Name	Fire Size	Date	Response/ Extended*	Additional Comments
2025	Willow Fire	31.5 Acres	7-19-25	Response	–
2025	Chowchilla Fire	13 Acres	7-13-25	Response	–
2025	Pickup Fire	10 Acres	7-9-25	Response	–
2025	Chow 1	11 Acres	7-4-25	Response	–
2025	Blanca Fire	12.4 Acres	6-30-25	Response	–
2025	Red Fire	53.8 Acres	6-26-25	Level 3 EOC Activation	Evacuated about 10 homes. The fire was in mop up for about five days.
2025	Raymond 2 Fire	30 Acres	6-16-25	Response	–
2025	River Fire	20 Acres	6-11-25	Response	–
2025	Windy Fire	12 Acres	6-9-25	Response	–
2025	Hensley Fire	24 Acres	5-30-25	Response	–
2025	Eastman Fire	9.8 Acres	5-2-25	Response	–
2024	Canal Fire	34 Acres	11-22-24	Response	–
2024	Highway 152 East / Road 13 Fire	40 Acres	9-2-24	Response	–
2024	Hills Fire	172 Acres	8-18-24	Response	–
2024	Valley Fire	55 Acres	8-8-24	Response	–
2024	Circle Fire	49 Acres	7-23-24	Response	–
2024	Acres Fire	10 Acres	7-23-24	Response	–
2024	Lookout Fire	11 Acres	7-19-24	Response	–
2024	Storey Fire	10 Acres	7-4-24	Response	–
2024	Road 18.75 / Avenue 24 Fire	10 Acres	7-4-24	Response	–
2024	Willow Fire	213 Acres	6-22-24	Response	–
2024	Gulch Fire	11 Acres	6-21-24	Response	–
2024	Railroad Fire	13 Acres	6-17-24	Response	–
2024	Slough Fire	33 Acres	6-17-24	Response	–
2024	Sioux Fire	15 Acres	6-15-24	Response	–
2024	Raymond Fire	27.2 Acres	6-1-24	Response	–
2024	Tesoro Fire	109 Acres	5-31-24	Response	–
2024	Canal Fire (2)	827 Acres	5-30-24	Response	–
2024	Firebaugh Fire	1300 Acres	5-30-24	Response	–
2024	Millerton Fire	47 Acres	5-26-24	Response	–

Year	Fire Name	Fire Size	Date	Response/ Extended*	Additional Comments
2023	King Fire	118 Acres	10-16-23	Level 3 EOC Activation	County evacuated about 10 homes. It was a short fire wrapped up within 48 hours
2023	Whiskey Fire	83 Acres	7-3-23	Level 3 EOC Activation	County had one fatality from a tractor which started the fire. A few evacuation warning and small amount of evacuation warnings. (see article)
2022	Fork Fire	819 Acres	9-7-2022 –	Level 1 EOC Activation	The County had about 400 people evacuated at the peak of the incident. The County lost about 28 homes.
2022	Red Fire	8,364 Acres	8-4-2022	Level 3 EOC Activation.	This fire contained to Yosemite National Park and Sections of Sierra National Forest with in Madera County. The EOC was activated at duty officer status for coordination purposes.
2022	Oak Fire – (Mariposa County)	19,244 Acres	7-22-2022	Level 2 EOC Activation.	Mariposa County had over 6,000 residents under evacuations orders. Most of the evacuees came to Oakhurst in Madera County. The EOC was set up to support shelter operations.
2022	Washburn Fire	4,886 Acres	7-7-2022	Level 3 EOC Activation	Contained to Yosemite National Park and Sections of Sierra National Forest within Madera County. The EOC was activated at duty officer status for coordination purposes.
2021	Children's Fire	42 Acres	9-19-2021	Response	–
2021	River Fire	9,656 Acres	7-11-2021	Level 2 EOC Activation	12 house destroyed – 4 damaged (see article)
2021	Smalley Fire	45 Acres	5-31-2021	Response	–
2021	Manzanita Fire	23 Acres	1-19-2021(Mono Wind Event Fire)	Level 1 EOC Activation	This was the fire during the Mono Wind Event. There was an evacuation warning issued but that was for about 30 homes.
2020	Power Fire	108 Acres	9-11-2020	Response	–
2020	Creek Fire	379,895 Acres	9-4-2020	Level 1 EOC Activation	County lost about 10 homes during the event. Helicopter Rescues of trapped people occurred (see article). No fatalities occurred
2020	Hensley Fire	400 Acres	8-30-2020	Extended	–
2020	Rabbit Fire	135 Acres	7-20-2020	Response	–
2020	Bonadelle Fire	500 Acres	7-2-2020	Response	–

Year	Fire Name	Fire Size	Date	Response/ Extended*	Additional Comments
2020	Acres Fire	152 Acres	5-21-2020	Response	–
2019	Madera Fire	213 Acres	7-15-19	Response	–
2018	Oak Fire	360 Acres	9-22-18	Extended	–
2018	Redinger Fire	88 Acres	8-27-18	Response	–
2018	Eastman Fire	289 Acres	8-23-18	Extended	–
2018	School Fire	12 Acres	7-10-18	Response	–
2018	Cornerstone Fire	11 Acres	7-9-18	Response	–
2018	Raymond Fire	60 Acres	6-15-18	Response	–
2018	Lions Fire	4,064 Acres	6-11-18	Level 3 EOC Activation	EOC Monitored the event. There were closures in the Sierra National Forest due to the fire. Just Trail Closures
2018	O'Neals Fire	300 Acres	6-4-18	Response	–
2018	Experimental Fire	56 Acres	5-23-18	Response	–

Source: Madera County OES

*Response is where first responders responded to the scene and managed the incident. Extended is where the County sends resources past the initial response. This is where County staff were on scene with road blocks and fire equipment for a few days after the initial response.

2025 Acres Fire – This fire occurred in May of 2025 near Road 602 and Madera Canal. Over 600 acres burned but no reported structure damage, injuries, or fatalities. Much of this is due to the quick response. A crew of 70, including 11 engines, two water tenders, three helicopters, and two dozers, was deployed. Cause under investigation. Air tankers from across California supported suppression efforts.

2022 Fork Fire –The Fork Fire in Madera County, California, was a significant wildfire that occurred in September 2022. It started on Wednesday, September 7, 2022, near the junction of Road 222 and Road 200 in the North Fork area, and quickly grew to 400 acres within hours, with no containment reported initially. The fire prompted widespread evacuation orders and warnings, affecting several roads and neighborhoods, including areas like Road 225, Road 222, and the Cascadel subdivision. Mountain Oaks High School and Nort Fork Elementary were closed during this fire. The fire was contained on September 11, 2022. The fire burned over 819 acres with 26 structures destroyed.

2020 Creek Fire – This fire burned almost 380,000 acres in September and October of 2020. It burned in Fresno and Madera Counties, primarily in the Sierra National Forest, including areas like Cascadel Woods, North Fork, and Bass Lake. The fire destroyed 850 structures, caused significant evacuations in Madera County (e.g., Bass Lake, North Fork), and was one of California's largest wildfires in 2020. 26 injuries, including 12 campers and 14 firefighters were attributed to the fire. Numerous roads were closed, including portions of Highway 168. Several schools were closed in the affected evacuation zones due to the fire. The fire caused extensive environmental damage to the Sierra National Forest, destroying large sections of forest, wildlife habitat, and recreational areas. Insurance claims for the Creek Fire have not been fully quantified, but it is expected that the insured losses are in the tens of millions due to the destruction of homes, businesses, and other properties. A Fire Management Assistance Grant (FMAG) was approved by

FEMA, which provided financial assistance to manage the costs of fighting the fire. Additional federal and state relief funds were allocated to assist with recovery efforts. It was likely caused by a mix of lightning strikes, arson, and careless smoking (cause listed as undetermined). The fire was exacerbated by dead trees from prior drought and bark beetle infestations. The Creek Fire has highlighted the vulnerability of Madera County to wildfires, especially in forested and rural areas. Efforts toward better forest management, fire prevention, and preparedness are essential to reducing future risks.

Events prior to 2018 LHMP

The HMPC and Madera County CWPP noted that fire has played a significant historical role in defining the current vegetative strata in Madera County. The following provides details on notable fires within the County.

The **2015 Willow Fire** caused the evacuation of a small residential community of 400 homes. No damage to the community came about but evacuations were in place for about three days.

2015 Corrine Fire. The 2015 Corrine Fire (912 acres burned) was related to noted as being related to drought conditions.

2014 Junction and Courtney Fires. The 2016 Madera-Mariposa-Merced Unit Fire plan noted more recent large fires. The March 21st, 2014 snow storm damaged a significant number of trees in the Oakhurst and surrounding areas. The damage primarily affected the large oak trees that were not able to accommodate 14" of snowfall in a few, short hours. Nearly 100% of the properties in the Oakhurst Basin, Ahwahnee and Nipinnawasee communities lost trees in this storm. This storm and the wind events of November 30th 2014 and December 3rd 2014 resulted in a significant 'blow down' of oak and large pine trees and are a continuing cause for concern. With the exception of Oakhurst which has smaller parcels and neighborhoods and around structures and small parcels in the outlying areas most of the dead and down trees caused by these storms in the open wildland has not been removed. This dead and down along with the worst drought in recent history triggered the most destructive fire season in Eastern Madera County since the Harlow Fire in 1961. 35 residences and three commercial structures were destroyed on the Junction and Courtney Fires. Reports from Firefighters on the Junction and Courtney fires clearly showed the dry fuels, and dead and down vegetation, contributed to the long-range spotting and overall control issues on both fires. Many residents were evacuated from their homes while the fire was being fought.

2013 Aspen Fire and **2014 French Fire**. Both fires were with in the Sierra National Forest but both had impacts to the North Fork Community due to smoke.

2005 Quartz Mountain Fire. The Quartz Mountain Fire started in August of 2005. The fire occurred on Quartz Mountain in the area of Indian Lakes Estates, burned several hundred acres of grass and heavy brush, threatened numerous structures and caused the evacuation of numerous families. The fire started in the late morning and burned through the hot part of the day but because of an aggressive initial attack, fuel reduction projects, and "defensible space" provided by homeowners the fire caused minimal damage. Although small on a scale of large and damaging fires, it still brought home to the residents of a community in Eastern Madera County the fear that an uncontrolled wildland fire can create.

2001 North Fork Fire. The North Fork fire started between the communities of North Fork and Bass Lake at approximately 12:25 pm on August 20th, 2001. The fire resulted in the loss of two homes and burned 4,132 acres of brush and timber. Many people suffered property damage and endured the inconvenience of evacuation, road closures, poor air quality and the disruption of routine living for several days.

1961 Harlow Fire. The residents living in the foothills and mountains of Eastern Madera County unfortunately are no strangers to being exposed to wildland fire. Even though the population in 1961 was a fraction of what it is today, people are constantly reminded of the devastating results of the Harlow Fire that started in Mariposa County and burned through all of Nipinnawasee, Ahwahnee and a good portion of the Oakhurst basin. In just three days, July 10th thru July 12th, the fire burned 41,200 acres of grass, brush and timber, destroyed 106 structures and claimed the lives of two people who were trapped while driving through the flames. More recently, residents of Eastern Madera County experienced the reality of the consequences of residing in a wildland fire environment.

Likelihood of Future Occurrence

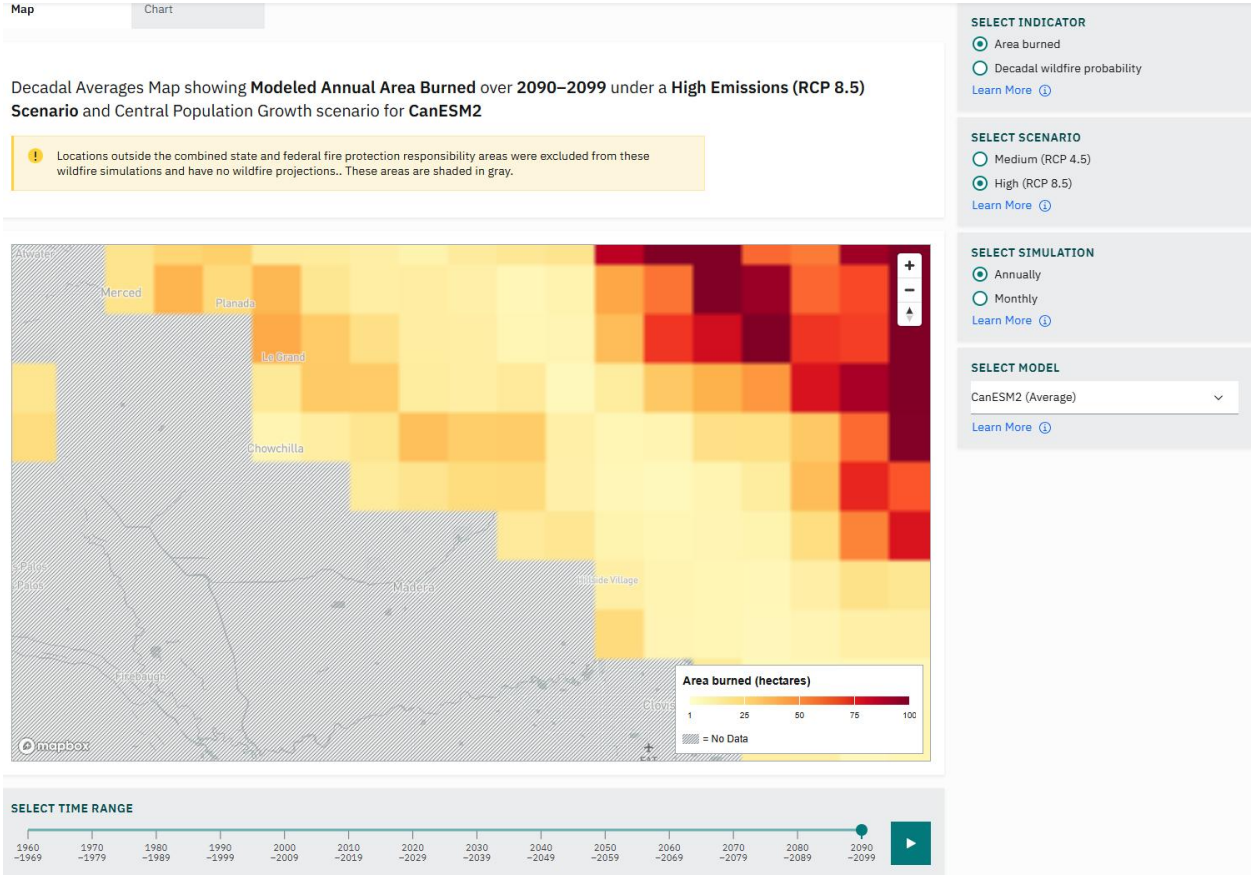
Highly Likely —Madera County faces a serious wildland fire threat every year. While often limited to the sparsely populated, forested areas in the western portion of the County, fires will continue to occur on an annual basis throughout the Madera County Planning Area. The threat of wildfire and potential losses are constantly increasing as human development and population increase and the wildland urban interface areas expand. Due to its high fuel load and long, dry summers, portions of Madera County continue to be at risk from wildfire.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and wildfire can be found in the next section. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate Change and Wildfire

Warmer temperatures can exacerbate drought conditions. Drought often kills plants and trees, which serve as fuel for wildfires. Warmer temperatures could increase the number of wildfires and pest outbreaks, such as the western pine beetle. Cal-Adapt's wildfire tool predicts the potential increase in the amount of burned areas for the year 2090-2099, as compared to (2010) conditions. This is shown in Figure 4-126. Based on this model, Cal-Adapt predicts that wildfire risk in Madera County will increase moderately by the end of the century. However, wildfire models can vary depending on the parameters used. Cal-Adapt does not take landscape and fuel sources into account in their model. In all likelihood, in the Madera County Planning Area, precipitation patterns, high levels of heat, topography, and fuel load will determine the frequency and intensity of future wildfire.

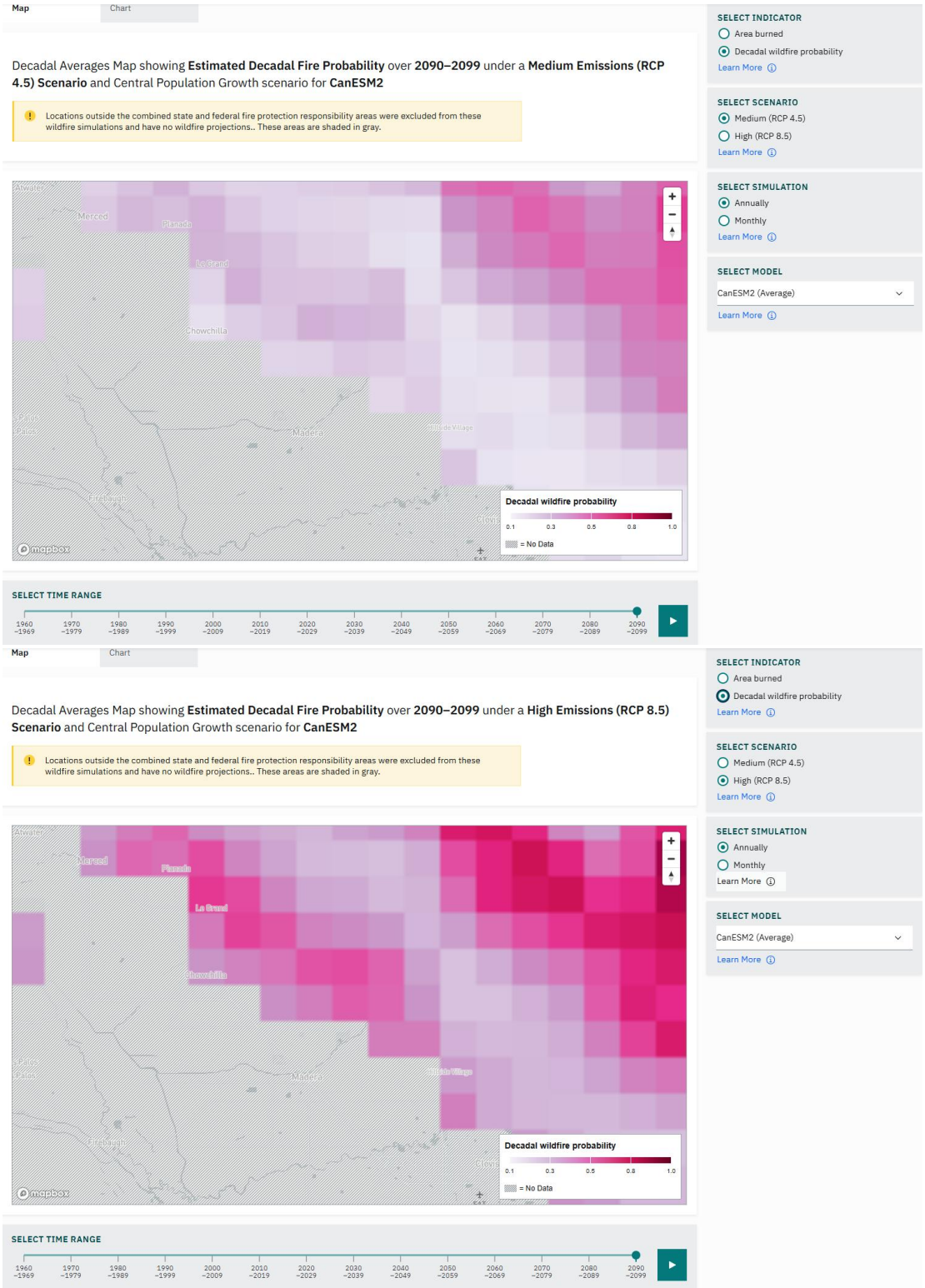
Figure 4-126 Madera County Planning Area – Projected Increase in Wildfire Burn Areas



Source: Cal-Adapt. Retrieved 2/10/2025.

Wildfire scenario projections were done by Cal-Adapt, based on statistical modeling from historical data of climate, vegetation, population density, and fire history. The fire modeling ran simulations on five variables on a monthly time step - Large fire presence/absence, Number of fires given presence, Area burned in a grid cell given a fire, High severity burned area given a fire and emissions. These are shown on Figure 4-127. The upper chart shows modeled annual averages of area burned for the Planning Area under the RCP 4.5 scenario, while the lower chart shows modeled annual averages of area burned for the Planning Area under the RCP 8.5 scenario.

Figure 4-127 Madera County Planning area – Future Annual Averages of Acres Burned under RCP 4.5 and 8.5 Scenarios



Source: Cal-Adapt. Retrieved 2/10/2025.

Vulnerability Assessment

Vulnerability—Extremely High

Risk and vulnerability to the County from wildfire is of significant concern. Wildfires that occur in the County occur from a variety of both natural and manmade causes. The County can be affected both by fires that start on or near County lands as well as those that start elsewhere and move into the County. In addition to burning large areas of land, air quality can be affected in the County by fires occurring inside the County as well as those from many miles away. As growth continues and populations increase in the County, the potential for catastrophic wildfires will also increase.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Madera County. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect both the entire Madera County Planning Area as well as the unincorporated portions of Madera County. How the hazard affects the other participating jurisdictions can be found in their respective annexes to this LHMP Update. These sections below include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns (unincorporated Madera County)

The unincorporated County has specific concerns regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce the risk and vulnerability to this hazard.

General Concerns

The County noted that increasingly frequent and severe wildfires throughout California pose a major threat. Limited road networks and dispersed rural communities mean that the vulnerable populations mentioned below may struggle to evacuate quickly and safely. Wildland fires that burn in natural settings with little or no development are part of a natural ecological cycle and may actually be beneficial to the landscape. Century old policies of fire exclusion and aggressive suppression have given way to better understanding of the importance fire plays in the natural cycle of certain forest types.

Factors contributing to the wildfire risk in Madera County include:

- Overstocked forests, severely overgrown vegetation, and lack of defensible space around structures;
- Excessive vegetation along roadsides and hanging over roads, fire engine access, and evacuation routes;
- Drought and overstocked forests with increased beetle infestation or kill in weakened and stressed trees;
- Narrow and often one-lane and/or dead-end roads complicating evacuation and emergency response as well as the many subdivisions that have only one means of ingress/egress;
- A large percentage of the residential properties located in Eastern Madera County are parcels of one acre or larger and require a driveway to access the house. Many of these homes are built away from a roadway and require driveways that extend several hundred feet or longer.
- Inadequate or missing street signs on private roads and house address signage;
- Nature and frequency of lightning ignitions; and
- Increasing population density leading to more ignitions.

Additionally, there are CEQA issues for wildfire mitigation are difficult to navigate. Need a team on site during work that drives costs (i.e. archaeologist on site and others) and also results in significant delays in executing fuels management projects throughout the County.

Insurance Concerns

The HMPC noted that in the WUI areas, there has been increased difficulty in obtaining home insurance and the cost of insurance premiums. Some residents have experienced cancellations of their policies due to catastrophic and recent wildfires occurring throughout California which has reduced the risk tolerance of many insurance companies. This increases costs to those who live in the WUI, and in some circumstances limits where people choose to live.

Air Quality Concerns

In addition to wildfires in the County, air quality from distant fires often causes issues in the County. In addition, wood burning to heat homes in the County compounds air quality issues. The eastern side of the County burns significantly for a heat source.

Homeless Concerns

It was noted that there have been multiple ignitions of wildfire from homeless encampments.

Madera County Communities at Risk to Wildfire

The National Fire Plan is a cooperative, long-term effort between various government agency partners with the intent of actively responding to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future. For purposes of the National Fire Plan, the CAL FIRE generated a list of California communities at risk for wildfire. The intent of this assessment was to evaluate the risk to a given area from fire escaping off federal lands. Three main factors were used to determine the wildfire threat in the wildland-urban interface areas of California: fuel hazards, probability of fire, and areas of suitable housing density that could create wildland urban interface fire protection strategy situations. The preliminary criteria and methodology for evaluating wildfire risk to communities is published in the Federal Register, January 4, 2001. The National Fire Plan identifies 7 "Communities at Risk" in Madera County. These are shown in Table 4-150.

Table 4-150 Madera County Communities at Risk to Wildfire

Communities at Risk		
Ahwahnee	Nipinnawasee	Yosemite Lakes
Bass Lake	North Fork	
Cascadel Woods	Oakhurst	

Source: CAL FIRE (using 2001 data)

Local concerns for each of the participating jurisdictions can be found under the Local Concerns heading in each respective jurisdictional annex to this LHMP Update.

Additionally, for each hazard in the FEMA National Risk Index in Madera County, the relevant portions of the hazard analysis done by FEMA is presented. This includes the Hazard Risk Index Rating, Expected Annual Loss Values, Exposure Values, and the Historic Loss Ratio Rating. These are presented for the Madera County Planning Area as a whole.

Assets at Risk

Assets at risk from wildfire include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections for the Madera County Planning Area and unincorporated Madera County.

Methodology (Parcels and Structures)

As part of the Fire and Resource Assessment Program (FRAP), the State Fire Marshall was mandated to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors, including areas where winds have been identified as a major cause of wildfire spread. These zones, referred to as FHSZs, include non-wildland, moderate, high, and very high FHSZs. The FHSZ map evaluates hazard, not risk. Hazard is based on the physical conditions that create a likelihood and expected fire behavior over a 30-50 year period without considering mitigation measures such as home hardening, recent wildfire, or fuel reduction efforts. Risk is the potential damage a fire can do to an area under existing conditions, accounting for any modification such as fuel reduction projects, defensible space, and ignition resistant building construction.

Effective April 1, 2024, CAL FIRE updated its FHSZ maps for the SRA to provide updated map zones based on new science in local climate data and improved fire assessment modeling. The FHSZ model for wildland fire has two key elements: probability of an area burning and expected fire behavior under extreme fuel and weather conditions. The factors considered in determining fire hazard within wildland areas are fire history, flame length, terrain, local weather, and the potential fuel over a 50-year period. Outside of wildlands, the model considers factors that might lead to buildings being threatened, including terrain, weather, urban vegetation cover, blowing embers, proximity to wildland, fire history and fire hazard in nearby wildlands. FHSZs are not a structure loss model, as key information regarding structure ignition (such as roof type, etc.) is not included.

The new FHSZ mapping will create more accurate zone designations that can direct the implementation of mitigation strategies in areas where hazards warrant these investments. Note: the FHSZ data for the FRA has not been updated since 2007.

For the Madera County Planning Area, two separate analyses were performed: one for the combined SRA/FRA datasets and one for the LRA dataset. Specifically, the following datasets were utilized for the SRA/FRA analysis and contained all FHSZ hazard classes from Non-Wildland to Very High: CAL FIRE State Responsibility Area (FHSZSRA_23_3) April 2024 and CAL FIRE Federal/ Areas: (Adopted FRA FHSZ 11/2007 - fhszs06_3_6). The following LRA dataset was used for the LRA FHSZ analysis: CAL FIRE Local Responsibility Area (FHSZLRA25_Phase3_v1) released in March 2025.

In many cases, there are parcels in multiple fire hazard severity zones. For the purposes of this analysis, if any fire hazard zone intersected any portion of a parcel polygon, the entire parcel was considered to be in

the highest fire risk category. The parcels were segregated and analyzed in this fashion for the entire Planning Area.

Once the CAL FIRE fire hazard severity zones were intersected, land, improved (structure), and personal property values from the Assessor data were included for each parcel and estimated content replacement values were added to the analysis. Improved parcels include those with improved structure values identified in the Madera County Assessor's database.

This methodology is used below for the FHSZ analysis of people and populations, structures, and critical facilities at risk as well as with respect to future development areas.

People and Populations

All populations are at some vulnerability to wildfire. Certain vulnerable populations are at greater risk to the effects of wildfire as well as smoke and air quality issues that wildfires bring. Vulnerable populations include:

- Unhoused
- Infants and children under age five and their caregivers
- Seniors (65 and older)
- Individuals with disabilities
- Individuals' dependent on medical equipment
- Individuals who exercise or recreate outdoors
- Individuals who work outdoors
- Individuals with impaired mobility

Madera County Planning Area residents that live in CAL FIRE FHSZs are often the most vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events. To further evaluate the impact to the residential population within the Planning Area, CAL FIRE's FHSZ layers were overlayed on the parcel layer and linked to the Assessor data. Those residential parcel centroids that intersect the mapped SRA and FRA layers were counted and multiplied by the 2020 Census Bureau average household factors for each jurisdiction. These are shown by jurisdiction in Table 4-151. Those residential parcel centroids that intersect the mapped LRA layers were counted and multiplied by the 2020 Census Bureau average household factors for each jurisdiction. These are shown by jurisdiction in Table 4-152.

Table 4-151 Madera County Planning Area – Improved Residential Parcels and Population by CAL FIRE SRA/FRA Fire Hazard Severity Zone by Jurisdiction

Jurisdiction	Very High		High		Moderate	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Chowchilla	0	0	0	0	0	0
City of Madera	0	0	0	0	0	0

Jurisdiction	Very High		High		Moderate	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
Unincorporated County	4,823	16,109	6,703	22,388	808	2,699

Source: CAL FIRE, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35); City of Madera (3.38); Unincorporated Madera County (3.34).

Table 4-152 Madera County Planning Area – Improved Residential Parcels and Population by CAL FIRE LRA Fire Hazard Severity Zone by Jurisdiction

Jurisdiction	Very High		High		Moderate	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Chowchilla	0	0	0	0	0	0
City of Madera	0	0	0	0	0	0
Unincorporated County	0	0	67	224	776	2,592

Source: CAL FIRE, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35); City of Madera (3.38); Unincorporated Madera County (3.34).

Structures

This section is presented in two sections: SRA/FRA Fire Hazard Severity Zone Analysis and LRA Fire Hazard Severity Zone Analysis.

For the following analysis, the SRA/FRA and LRA fire responsibility area layers were overlaid with the parcel data as described above and further broken out by property use and included information on both land and improved (structure) values, personal property values, and content replacement values. It should be noted that fire does not just affect structural values, fire can also affect land values. As such the Assessor's land values and all parcels were accounted for in this analysis to represent total County values at risk. However, it is highly unlikely the whole County will ever be on fire at once.

SRA/FRA Fire Hazard Severity Zone Analysis

All structures in the Madera County Planning Area have some risk to wildfire. The Madera County Planning Area parcel inventory and associated values by SRA and FRA are provided in Table 4-153. This is broken down further for the unincorporated County in Table 4-153. Table 4-153 shows SRA and FRA parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values in the unincorporated County. ***Note***: while most SRA/FRA mapped areas fall within the unincorporated County areas, due to differing boundaries in mapped datasets, a few SRA/FRA mapped areas are found in the incorporated communities as shown below. Details on each jurisdiction's SRA/FRA FHSZ and property use types can be found in their respective annexes to this LHMP Update.

Table 4-153 Madera County Planning Area – Count and Value of Parcels and Structures by CAL FIRE SRA/FRA Fire Hazard Severity Zones by Jurisdiction

Jurisdiction / Fire Hazard Severity Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla							
Outside of State and Federal Responsibility Area	4,933	4,010	$286,291,765	$869,142,910	$96,548,624	$523,761,768	$1,775,745,067
City of Chowchilla Total	**4,933**	**4,010**	**$286,291,765**	**$869,142,910**	**$96,548,624**	**$523,761,768**	**$1,775,745,067**
City of Madera							
Non-Wildland/Non-Urban	1	1	$219,661	$5,307	$0	$5,307	$230,275
Outside of State and Federal Responsibility Area	17,087	15,423	$1,011,486,162	$3,385,838,160	$135,493,860	$2,164,215,064	$6,697,033,246
City of Madera Total	**17,088**	**15,424**	**$1,011,705,823**	**$3,385,843,467**	**$135,493,860**	**$2,164,220,371**	**$6,697,263,521**
Unincorporated Madera County							
Very High	8,370	5,586	$795,628,588	$1,346,061,373	$20,043,419	$765,703,119	$2,927,436,499
High	10,952	7,567	$784,117,574	$1,781,108,003	$25,544,113	$1,070,067,767	$3,660,837,457
Moderate	1,287	952	$135,078,574	$389,480,679	$7,772,495	$226,042,823	$758,374,571
Non-Wildland/Non-Urban	48	27	$10,568,040	$5,426,399	$50,000	$4,886,911	$20,931,350
Outside of State and Federal Responsibility Area	23,373	16,950	$2,687,856,883	$4,767,710,376	$720,955,610	$3,470,487,521	$11,647,010,390
Unincorporated Madera County Total	**44,030**	**31,082**	**$4,413,249,659**	**$8,289,786,830**	**$774,365,637**	**$5,537,188,140**	**$19,014,590,266**
Grand Total	**66,051**	**50,516**	**$5,711,247,247**	**$12,544,773,207**	**$1,006,408,121**	**$8,225,170,279**	**$27,487,598,854**

Source: CAL FIRE (FHSZ SRA 2024, FRA 2007), 2024 Madera County Parcel/Assessor's Data

Table 4-154 Unincorporated Madera County – Count and Value of Parcels and Structures by CAL FIRE SRA/FRA Fire Hazard Severity Zones by Property Use

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Very High							
Agricultural	1,361	504	$107,768,389	$91,610,114	$843,558	$91,610,114	$291,832,175
Commercial	259	181	$45,068,532	$71,633,159	$9,424,983	$71,633,159	$197,759,833
Government	599	0	$654,041	$0	$0	$0	$654,041
Industrial	54	47	$2,631,530	$4,769,841	$6,171,273	$7,154,762	$20,727,406
Institutional	25	13	$3,028,952	$10,937,399	$499,230	$10,937,399	$25,402,980
Recreational	19	6	$2,253,721	$277,323	$0	$277,323	$2,808,367
Residential	5,895	4,823	$633,880,649	$1,165,486,350	$3,014,735	$582,743,175	$2,385,124,909
Right of Way	59	0	$2,111	$0	$0	$0	$2,111
Utilities	67	12	$325,522	$1,347,187	$89,640	$1,347,187	$3,109,536
Unknown	32	0	$15,141	$0	$0	$0	$15,141
Very High Total	**8,370**	**5,586**	**$795,628,588**	**$1,346,061,373**	**$20,043,419**	**$765,703,119**	**$2,927,436,499**
High							
Agricultural	1,299	559	$123,876,295	$118,127,853	$4,763,685	$118,127,853	$364,895,686
Commercial	319	204	$73,985,986	$193,831,418	$11,955,766	$193,831,418	$473,604,588
Government	158	3	$198,433	$97,952	$0	$97,952	$394,337
Industrial	23	10	$4,960,639	$3,868,524	$4,742,967	$5,802,786	$19,374,916
Institutional	52	35	$5,046,827	$26,008,772	$240,973	$26,008,772	$57,305,344
Recreational	28	10	$1,728,781	$3,983,472	$1,361,847	$3,983,472	$11,057,572
Residential	8,735	6,703	$572,359,717	$1,425,948,997	$2,465,595	$712,974,499	$2,713,748,808
Right of Way	119	0	$20,386	$0	$0	$0	$20,386
Utilities	128	37	$1,021,725	$8,557,843	$0	$8,557,843	$18,137,411
Unknown	91	6	$918,785	$683,172	$13,280	$683,172	$2,298,409
High Total	**10,952**	**7,567**	**$784,117,574**	**$1,781,108,003**	**$25,544,113**	**$1,070,067,767**	**$3,660,837,457**
Moderate							
Agricultural	182	72	$31,083,613	$14,995,761	$3,523,266	$14,995,761	$64,598,401
Commercial	105	68	$19,248,752	$43,038,142	$4,025,489	$43,038,142	$109,350,525
Government	26	0	$0	$0	$0	$0	$0
Industrial	2	1	$579,329	$1,846,092	$0	$2,769,138	$5,194,559
Institutional	3	3	$118,317	$878,880	$0	$878,880	$1,876,077
Recreational		0	$0	$0	$0	$0	$0
Residential	910	808	$83,964,966	$328,721,804	$223,740	$164,360,902	$577,271,412
Right of Way	6	0	$4	$0	$0	$0	$4

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Utilities	7	0	$83,551	$0	$0	$0	$83,551
Unknown	46	0	$42	$0	$0	$0	$42
Moderate Total	**1,287**	**952**	**$135,078,574**	**$389,480,679**	**$7,772,495**	**$226,042,823**	**$758,374,571**
Non-Wildland/Non-Urban							
Agricultural	28	24	$10,283,035	$4,347,423	$50,000	$4,347,423	$19,027,881
Commercial	4	0	$0	$0	$0	$0	$0
Government	8	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	6	3	$285,003	$1,078,976	$0	$539,488	$1,903,467
Right of Way	2	0	$2	$0	$0	$0	$2
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
Non-Wildland/Non-Urban Total	**48**	**27**	**$10,568,040**	**$5,426,399**	**$50,000**	**$4,886,911**	**$20,931,350**
Unincorporated County Total	**20,657**	**14,132**	**$1,725,392,776**	**$3,127,169,376**	**$53,410,027**	**$2,066,700,620**	**$7,367,579,877**

Source: CAL FIRE (FHSZ SRA 2024, FRA 2007), 2024 Madera County Parcel/Assessor's Data

LRA Fire Hazard Severity Zone Analysis

All structures in the Madera County Planning Area have some risk to wildfire. The Madera County Planning Area parcel inventory and associated values by LRA are provided in Table 4-155. This is broken down further for the unincorporated County in Table 4-156. Table 4-156 shows LRA parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values in the unincorporated County. Details on each jurisdiction's LRA FHSZ and property use types can be found in their respective annexes to this LHMP Update.

Table 4-155 Madera County Planning Area – Count and Value of Parcels and Structures by CAL FIRE LRA Fire Hazard Severity Zones by Jurisdiction

Jurisdiction / Fire Hazard Severity Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla							
Non-Wildland	4,933	4,010	$286,291,765	$869,142,910	$96,548,624	$523,761,768	$1,775,745,067

City of Chowchilla Total	**4,933**	**4,010**	**$286,291,765**	**$869,142,910**	**$96,548,624**	**$523,761,768**	**$1,775,745,067**
City of Madera							
Non-Wildland	17,088	15,424	$1,011,705,823	$3,385,843,467	$135,493,860	$2,164,220,371	$6,697,263,521
City of Madera Total	**17,088**	**15,424**	**$1,011,705,823**	**$3,385,843,467**	**$135,493,860**	**$2,164,220,371**	**$6,697,263,521**
Unincorporated Madera County							
High	107	91	$16,564,556	$23,354,293	$102,770	$13,861,574	$53,883,193
Moderate	2,139	980	$266,346,396	$651,058,781	$168,696,815	$542,690,460	$1,628,792,452
Non-Wildland	21,237	15,939	$2,437,568,166	$4,106,247,454	$556,613,647	$2,926,346,152	$10,026,775,419
Outside of Local Responsibility Area	20,547	14,072	$1,692,770,541	$3,509,126,302	$48,952,405	$2,054,289,955	$7,305,139,203
Unincorporated Madera County Total	**44,030**	**31,082**	**$4,413,249,659**	**$8,289,786,830**	**$774,365,637**	**$5,537,188,140**	**$19,014,590,266**
Grand Total	**66,051**	**50,516**	**$5,711,247,247**	**$12,544,773,207**	**$1,006,408,121**	**$8,225,170,279**	**$27,487,598,854**

Source: CAL FIRE (FHSZ LRA 2025), 2024 Madera County Parcel/Assessor Data

Table 4-156 Madera County Planning Area – Count and Value of Parcels and Structures by CAL FIRE LRA Fire Hazard Severity Zone by Jurisdiction

Jurisdiction / Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
High							
Agricultural	28	23	$10,675,811	$4,222,854	$93,330	$4,222,854	$19,214,849
Commercial	2	1	$46,755	$146,000	$0	$146,000	$338,755
Government	0	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	75	67	$5,841,990	$18,985,439	$9,440	$9,492,720	$34,329,589
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	2	0	$0	$0	$0	$0	$0
High Total	**107**	**91**	**$16,564,556**	**$23,354,293**	**$102,770**	**$13,861,574**	**$53,883,193**
Moderate							
Agricultural	336	181	$151,191,926	$35,344,152	$5,209,468	$35,344,152	$227,089,698
Commercial	63	20	$36,011,773	$398,225,428	$163,273,786	$398,225,428	$995,736,415

Jurisdiction / Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Government	27	0	$0	$0	$0	$0	$0
Industrial	10	0	$0	$0	$0	$0	$0
Institutional	2	2	$175,406	$741,831		$741,831	$1,659,068
Recreational	0	0	$0	$0	$0	$0	$0
Residential	1,671	776	$78,897,486	$216,736,643	$213,561	$108,368,322	$404,216,012
Right of Way	17	0	$17	$0	$0	$0	$17
Utilities	5	1	$68,897	$10,727	$0	$10,727	$90,351
Unknown	8	0	$891	$0	$0	$0	$891
Moderate Total	**2,139**	**980**	**$266,346,396**	**$651,058,781**	**$168,696,815**	**$542,690,460**	**$1,628,792,452**
Non-Wildland							
Agricultural	5,178	4,659	$1,387,700,399	$1,213,888,764	$211,232,166	$1,213,888,764	$4,026,710,093
Commercial	478	242	$134,793,627	$162,371,424	$55,577,883	$162,371,424	$515,114,358
Government	434	5	$1,328,478	$795,677	$0	$795,677	$2,919,832
Industrial	203	77	$33,926,823	$176,428,150	$284,364,407	$264,642,225	$759,361,605
Institutional	46	31	$2,201,778	$13,803,136	$213,498	$13,803,136	$30,021,548
Recreational	2	2	$12,467	$9,695	$0	$9,695	$31,857
Residential	14,584	10,904	$867,243,472	$2,536,230,754	$3,772,523	$1,268,115,377	$4,675,362,126
Right of Way	52	0	$41	$0	$0	$0	$41
Utilities	74	10	$1,386,164	$712,765	$1,453,170	$712,765	$4,264,864
Unknown	186	9	$8,974,917	$2,007,089	$0	$2,007,089	$12,989,095
Non-Wildland Total	**21,237**	**15,939**	**$2,437,568,166**	**$4,106,247,454**	**$556,613,647**	**$2,926,346,152**	**$10,026,775,419**
Outside of Local Responsibility Area							
Agricultural	2,788	1,102	$240,674,108	$217,209,975	$4,722,887	$217,209,975	$679,816,945
Commercial	681	453	$138,303,270	$308,502,719	$25,406,238	$308,502,719	$780,714,946
Government	785	3	$852,474	$97,952	$0	$97,952	$1,048,378
Industrial	79	58	$8,171,498	$10,484,457	$10,914,240	$15,726,686	$45,296,881
Institutional	80	51	$8,194,096	$37,825,051	$740,203	$37,825,051	$84,584,401
Recreational	47	16	$3,982,502	$4,260,795	$1,361,847	$4,260,795	$13,865,939
Residential	15,534	12,334	$1,290,205,326	$2,920,157,151	$5,704,070	$1,460,078,576	$5,676,145,123
Right of Way	184	0	$22,501	$0	$0	$0	$22,501
Utilities	202	49	$1,430,798	$9,905,030	$89,640	$9,905,030	$21,330,498
Unknown	167	6	$933,968	$683,172	$13,280	$683,172	$2,313,592
Outside of Local	**20,547**	**14,072**	**$1,692,770,541**	**$3,509,126,302**	**$48,952,405**	**$2,054,289,955**	**$7,305,139,203**

Jurisdiction / Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Responsibility Area Total							
Unincorporated Madera County Total	**44,030**	**31,082**	**$4,413,249,659**	**$8,289,786,830**	**$774,365,637**	**$5,537,188,140**	**$19,014,590,266**

Source: CAL FIRE (FHSZ LRA 2025), 2024 Madera County Parcel/Assessor Data

Critical Facilities and Infrastructure

Wildfire present a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the Madera County Planning Area to determine critical facilities in FHSZs. This was done for both SRA/FRA and LRA fire hazard severity zones. Using GIS, the SRA/FRA and LRA fire hazard severity zones were overlayed on the critical facility GIS layer. Figure 4-128 shows critical facilities, as well as the SRA/FRA FHSZ. Table 4-157 details critical facilities by SRA/FRA fire hazard severity zone by facility type and count for the Planning Area. Figure 4-129 shows critical facilities, as well as the LRA fire hazard severity zones. Table 4-158 details critical facilities by LRA fire hazard severity zone by facility type and count for the Planning Area. Details of critical facility category, type, name and address by SRA/FRA and LRA fire hazard severity zones are listed in Appendix F.

Figure 4-128 Madera County Planning Area – Critical Facilities in SRA/FRA Fire Hazard Severity Zones

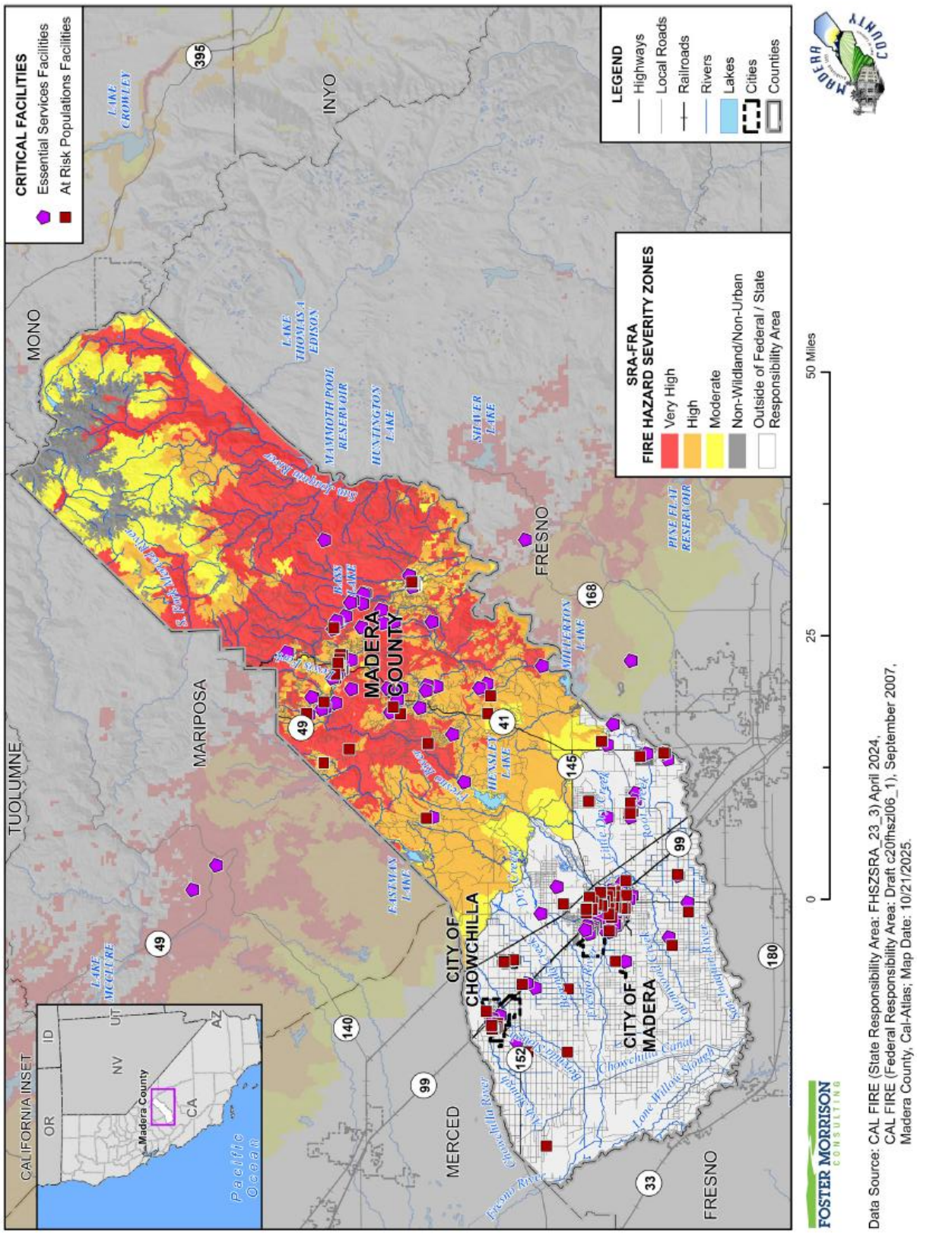


Table 4-157 Madera County Planning Area – Critical Facilities in SRA/FRA Fire Hazard Severity Zones by Jurisdiction and Category

Jurisdiction / Fire Hazard Severity Zones	Critical Facility Category	Facility Count
City of Chowchilla		
Outside of State and Federal Responsibility Area		
Outside of State and Federal Responsibility Area Total		19
City of Chowchilla Total		**19**
City of Madera		
Outside of State and Federal Responsibility Area		
Outside of State and Federal Responsibility Area Total		132
City of Madera Total		**132**
Unincorporated Madera County		
Very High	Essential Services Facilities	25
	At Risk Populations Facilities	4
	Very High Total	**29**
High	Essential Services Facilities	25
	At Risk Populations Facilities	21
	High Total	**46**
Moderate	Essential Services Facilities	5
	At Risk Populations Facilities	1
	Moderate Total	**6**
No Data Available	Essential Services Facilities	1
	No Data Available Total	**1**
Outside of State and Federal Responsibility Area	Essential Services Facilities	25
	At Risk Populations Facilities	22
	Outside of State and Federal Responsibility Area Total	**47**
Unincorporated Madera County Total		**129**

Source: CAL FIRE, Madera County GIS

Figure 4-129 Madera County Planning Area – Critical Facilities in LRA Fire Hazard Severity Zones

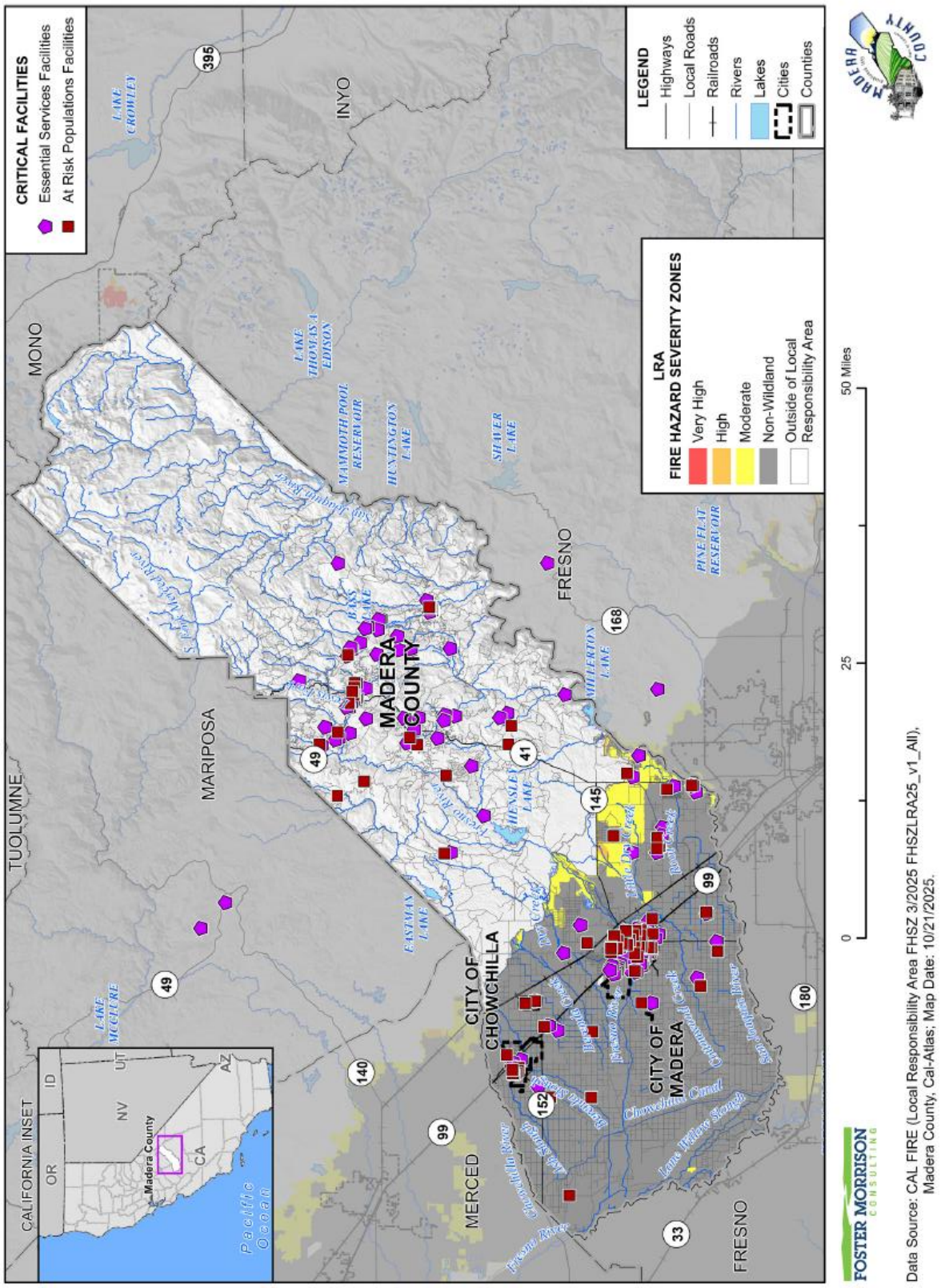


Table 4-158 Madera County Planning Area – Critical Facilities in LRA Fire Hazard Severity Zones by Jurisdiction and Category

Jurisdiction / Fire Hazard Severity Zones	Critical Facility Category	Facility Count
City of Chowchilla		
Non-Wildland	Essential Services Facilities	10
	At Risk Populations Facilities	9
	Non-Wildland Total	**19**
City of Chowchilla Total		**19**
City of Madera		
Non-Wildland	Essential Services Facilities	103
	At Risk Populations Facilities	29
	Non-Wildland Total	**132**
City of Madera Total		**132**
Unincorporated Madera County		
Moderate	Essential Services Facilities	3
	At Risk Populations Facilities	1
	Moderate Total	**4**
Non-Wildland	Essential Services Facilities	22
	At Risk Populations Facilities	21
	Non-Wildland Total	**43**
Outside of Local Responsibility Area	Essential Services Facilities	55
	At Risk Populations Facilities	26
	Outside of Local Responsibility Area Total	**81**
No Data Available	Essential Services Facilities	1
	No Data Available Total	**1**
Unincorporated Madera County Total		**129**
Grand Total		**280**

Source: CAL FIRE, Madera County GIS

Natural, Historic, and Cultural Resources

Natural, historic, and cultural resources located within areas at risk to wildfire would be vulnerable. Should a wildfire occur in the Planning Area, the impacts to natural, historic, and cultural resources could be extensive and include loss of forested areas, air pollution, contamination from water runoff containing toxic products, and other environmental discharges or releases from burned materials affecting soils, habitat areas, wildlife, and aquatic resources. Historic and cultural resources can be affected and are often more vulnerable due to their older age, construction type, and lack of fire prevention infrastructure such as sprinklers.

FEMA NRI Hazard Vulnerability Assessment

The FEMA NRI was queried for additional specific data on Madera County's vulnerability to Wildfire. The NRI contains data and analysis for 18 separate natural hazards, including wildfire. Wildfires could cause a total of $20,122,138 in expected annual losses, with a historic loss rating of relatively moderate. As shown on Table 4-159, wildfire has a very high rating for social vulnerability and a very low community resilience, with a risk index score of 99.6 out of 100. According to the NRI, there have been 0 wildfire events during the 2021 data set with 0.79% annual chance per year.

Table 4-159 Madera County Planning Area – Wildfire Vulnerability Ratings from FEMA NRI

NRI Hazard	Hazard Risk Index Rating*	Expected Annual Loss Values (total)**	Exposure Value (total)***	Historic Loss Ratio Rating
Wildfire	99.6	$20,122,138	$279,242,420,215	Relatively moderate

Source: FEMA NRI Report. Retrieved April 1, 2025.

*Hazard Risk Index is calculated using data for only a single hazard type, and reflect a communities expected annual loss value, community risk factors, and the adjustment factor used to calculate the risk value.

**Expected annual loss represents the average economic loss in dollars resulting from natural hazards each year.

***Exposure is a natural hazard consequence factor that is the representative value of buildings, populations, or agriculture potentially exposed to a natural hazard occurrence.

Additional information on the FEMA NRI can be found in Section 4.2 and Appendix G.

Impacts from Wildfire

Potential impacts from wildfire include loss of life and injuries; damage to structures (commercial, industrial, and residential) and other improvements, natural and cultural resources, croplands, and timber; and loss of recreational opportunities. Wildfires can cause short-term and long-term disruption to the Madera County Planning Area. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the Planning Area by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires can also affect air quality in the Planning Area; smoke and air pollution from wildfires can be a severe health hazard.

Although the physical damages and casualties arising from wildland-urban interface fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Schools and businesses can be forced to close for extended periods of time. Recently, the threat of wildfire, combined with the potential for high winds, heat, and low humidity, has caused PG&E to initiate a PSPS which can also significantly impact a community through loss of services, business closures, and other impacts associated with loss of power for an extended period. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

The impacts of a fire are felt long after the fire is extinguished. In addition to the loss of property in fires, the loss in vegetation and changes in surface soils alters the environment. When supporting vegetation is burned, hillsides become destabilized and prone to erosion. The burnt surface soils are harder and absorb less water. When winter rains come, this leads to increased runoff, erosion, and landslides in hilly areas.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Wildfire smoke can also have negative effects to those who live in or near a fire burn area. Smoke and air pollution from wildfires can be a severe health hazard. Significant wildfires occurring in nearby northern California communities since the previous LHMP Update have created significant air pollution affecting area residents. Planning Area residents have been affected by wildfire smoke and poor air quality, from fires both within the County and from those much further away.

The San Joaquin Air Quality Management District (SJAQMD) noted that wildfire smoke impacts populations for days and weeks at a time. The County has no control on what wildfires burn or for how long. Poor air quality poses a health risk to all individuals. However, children, adolescents, pregnant women, the elderly, the immunocompromised and those with pre-existing chronic diseases and lung conditions are especially vulnerable to the compounding detrimental health impacts of poor air quality events. Wildfire smoke creates and often exacerbates poor air quality situations. Of the many harmful components that exist in wildfire smoke, one of the most dangerous is PM, specifically fine PM2.5. The microscopic particles of PM2.5 are so fine that they are inhaled deep into the lungs and cross the blood-air barrier to enter the bloodstream. Short-term exposure over hours or days can lead to increased asthma attacks, acute bronchitis, increased susceptibility to respiratory infections and can lead to an increased risk of heart attack for individuals with lung disease.

Ground-level ozone was note by SJAQMD as another air pollutant of concern because it is a strong irritant that can cause constriction of the airways, forcing the respiratory system to work harder to provide oxygen. It can also cause other health problems including aggravated respiratory disease such as emphysema, bronchitis and asthma, lung damage, wheezing, chest pain, dry throat, headache, nausea, reduced resistance to infection, increased fatigue and weakened athletic performance. While ozone is typically seen at its highest levels during the summer, wildfire plumes can increase ozone formation. With an increased number of prolonged wildfire smoke events impacting populations near and far from fire epicenters, it has become imperative to understand the health impact from acute and extended exposure to wildfire smoke.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for Madera County include the following:

- Climate change is likely to exacerbate future wildfire conditions and associated impacts and vulnerability of the County to wildfire.
- Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the County. Population growth in Madera County is expected to slowly continue until 2045 when it starts to slowly shrink. The County noted 14 different locations where future development may occur over the next 5 years (as shown in Figure 4-130 and Figure 4-131 below). This development includes over 7,000 parcels of industrial, mixed use, residential, and commercial property. Should this development occur, additional populations in the County would be expected. Additional growth within the WUI and other high fire hazard severity areas of the County would place additional populations at risk to wildfire. Additional population growth would likely bring continued diversity to the County. Vulnerable population groups could face disproportionate effects from wildfire and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the County to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. The 14 developments that may occur over the next 5 years will have some effect on future land uses. Locating new development, structures and critical facilities and infrastructure within or near areas of wildfire risk may put additional development at risk. However, County building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions. It should be noted that some of the growth in the County is occurring in areas outside the moderate or higher fire hazard severity zones. Thus, depending on the location of new development and adherence to protective building codes, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the County to this hazard.

Future Development

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the County are considered can help to make for a more resilient community.

GIS Analysis

Madera County provided 14 future development areas which were used as the basis for the inventory of future development for the unincorporated County. These were mapped in GIS. Figure 4-130 show the

locations of the future development areas and SRA/FRA FHSZs. Table 4-160 shows the details of the future development areas that are located in each SRA/FRA FHSZ. Figure 4-131 shows the locations of the future development areas in the LRA FHSZ. Table 4-161 shows the details of the future development areas that are located in the LRA FHSZ. As shown, 4 of the future development areas in the County fall in the moderate or higher FHSZ.

Figure 4-130 Unincorporated Madera County – Future Development in CAL FIRE SRA/FRA Fire Hazard Severity Zones

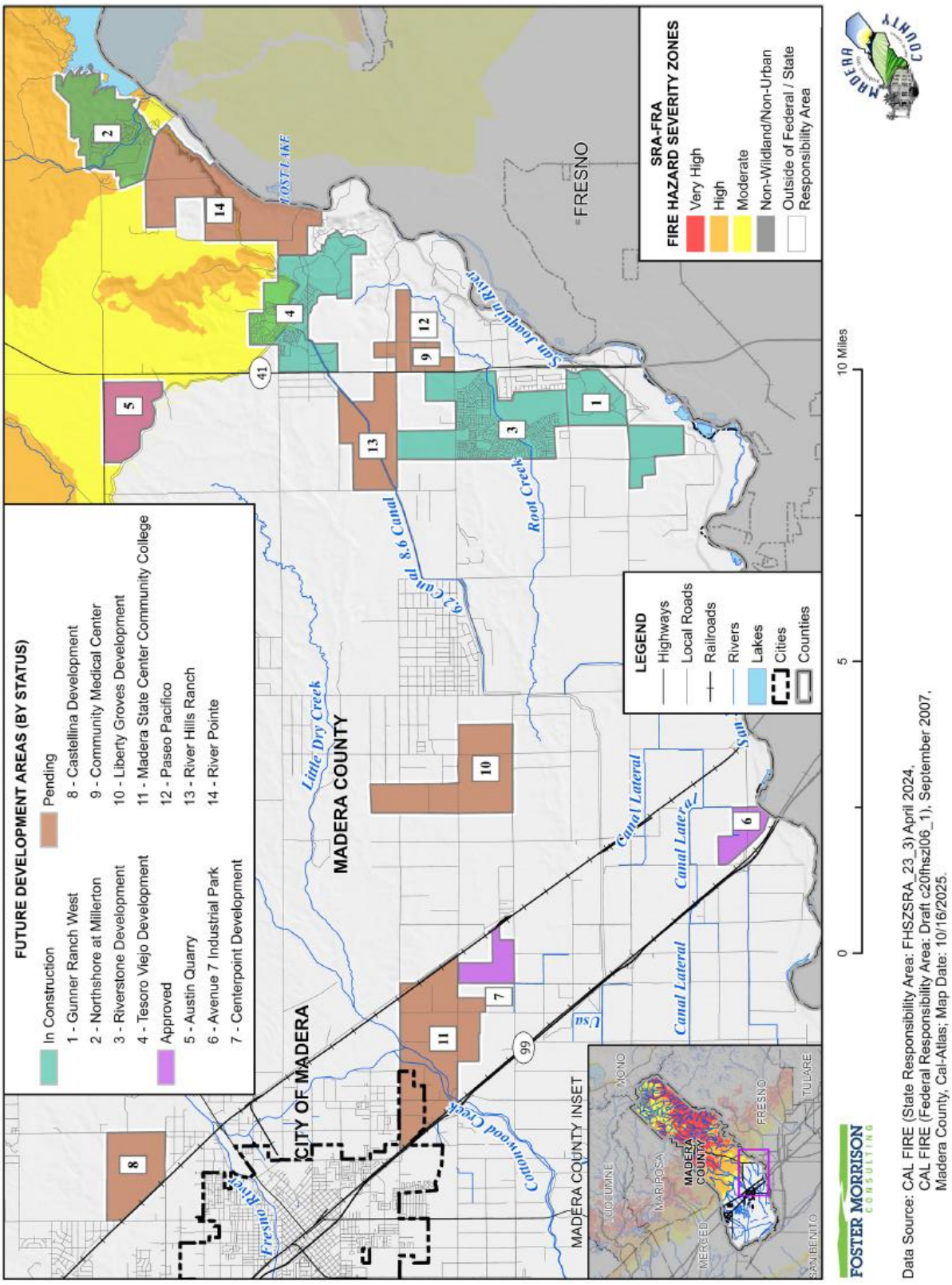


Table 4-160 Unincorporated Madera County – Future Development in SRA/FRA FHSZs with Parcel Counts and Acreages

Future Development Status and Type / Fire Hazard Severity Zone / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use						
Gunner Ranch West (Map ID 1)						
Outside of State and Federal Responsibility Area	53	12	41	974	394	580
Gunner Ranch West Total	**53**	**12**	**41**	**974**	**394**	**580**
Northshore at Millerton (Map ID 2)						
High	645	0	645	1,214	0	1,214
Moderate	1	0	1	3	0	3
Northshore at Millerton Total	**646**	**0**	**646**	**1,217**	**0**	**1,217**
Riverstone Development (Map ID 3)						
Outside of State and Federal Responsibility Area	4,053	1,771	2,282	1,770	569	1,201
Riverstone Development Total	**4,053**	**1,771**	**2,282**	**1,770**	**569**	**1,201**
Tesoro Viejo Development (Map ID 4)						
High	3	1	2	81	61	21
Moderate	870	727	143	289	98	192
Non-Wildland/Non-Urban	10	5	5	38	32	6
Outside of State and Federal Responsibility Area	1,439	110	1,329	1,008	308	700
Tesoro Viejo Development Total	**2,322**	**843**	**1,479**	**1,417**	**499**	**918**
Mixed Use Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
In Construction Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
Approved						
Industrial						
Austin Quarry (Map ID 5)						
Moderate	2	0	2	658	0	658
Austin Quarry Total	**2**	**0**	**2**	**658**	**0**	**658**
Avenue 7 Industrial Park (Map ID 6)						
Outside of State and Federal Responsibility Area	5	3	2	296	292	4
Avenue 7 Industrial Park Total	**5**	**3**	**2**	**296**	**292**	**4**
Industrial Total	**7**	**3**	**4**	**954**	**292**	**662**

Future Development Status and Type / Fire Hazard Severity Zone / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Mixed Use						
Centerpoint Development (Map ID 7)						
Outside of State and Federal Responsibility Area	81	34	47	307	159	148
Centerpoint Development Total	**81**	**34**	**47**	**307**	**159**	**148**
Mixed Use Total	**81**	**34**	**47**	**307**	**159**	**148**
Approved Total	**88**	**37**	**51**	**1,262**	**452**	**810**
Pending						
Commercial						
Community Medical Center (Map ID 9)						
Outside of State and Federal Responsibility Area	2	0	2	198	0	198
Community Medical Center Total	**2**	**0**	**2**	**198**	**0**	**198**
Commercial Total	**2**	**0**	**2**	**198**	**0**	**198**
Mixed Use						
Castellina Development (Map ID 8)						
Outside of State and Federal Responsibility Area	2	2	0	789	789	0
Castellina Development Total	**2**	**2**	**0**	**789**	**789**	**0**
Madera State Center Community College (Map ID 11)						
Outside of State and Federal Responsibility Area	67	33	34	1,881	1,442	439
Madera State Center Community College Total	**67**	**33**	**34**	**1,881**	**1,442**	**439**
River Hills Ranch (Map ID 13)						
Outside of State and Federal Responsibility Area	5	3	2	934	854	80
River Hills Ranch Total	**5**	**3**	**2**	**934**	**854**	**80**
River Pointe (Map ID 14)						
High	3	3	0	699	699	0
Moderate	7	7	0	1,027	1,027	0
Outside of State and Federal Responsibility Area	4	0	4	5	0	5
River Pointe Total	**14**	**10**	**4**	**1,732**	**1,727**	**5**
Mixed Use Total	**88**	**48**	**40**	**5,336**	**4,812**	**524**
Residential						
Liberty Groves Development (Map ID 10)						

Future Development Status and Type / Fire Hazard Severity Zone / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Outside of State and Federal Responsibility Area	16	16	0	1,369	1,369	0
Liberty Groves Development Total	16	16	0	1,369	1,369	0
Paseo Pacifico (Map ID 12)						
Outside of State and Federal Responsibility Area	3	1	2	285	61	223
Paseo Pacifico Total	**3**	**1**	**2**	**285**	**61**	**223**
Residential Total	**19**	**17**	**2**	**1,653**	**1,430**	**223**
Pending Total	**109**	**65**	**44**	**7,188**	**6,242**	**946**
Grand Total	**7,271**	**2,728**	**4,543**	**13,826**	**8,156**	**5,671**

Source: CAL FIRE, Madera County GIS

Figure 4-131 Unincorporated Madera County – Future Development in CAL FIRE LRA Fire Hazard Severity Zones

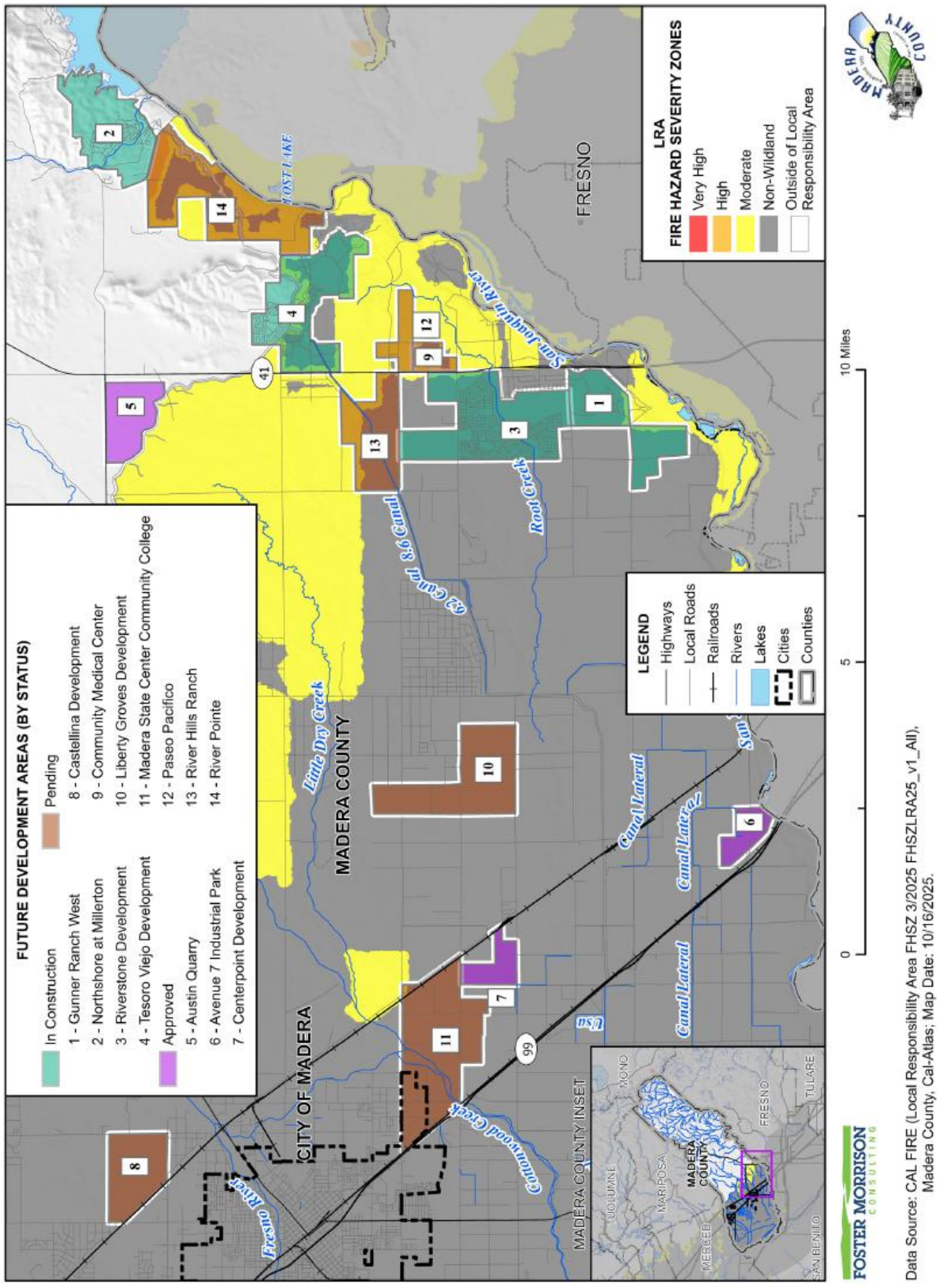


Table 4-161 Unincorporated Madera County – Future Development in LRA FHSZs with Parcel Counts and Acreages

Future Development Status and Type / Fire Hazard Severity Zone / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
In Construction						
Mixed Use						
Gunner Ranch West (Map ID 1)						
Moderate	13	5	8	414	369	45
Non-Wildland	40	7	33	560	25	535
Gunner Ranch West Total	**53**	**12**	**41**	**974**	**394**	**580**
Northshore at Millerton (Map ID 2)						
Outside of Local Responsibility Area	646	0	646	1,217	0	1,217
Northshore at Millerton Total	**646**	**0**	**646**	**1,217**	**0**	**1,217**
Riverstone Development (Map ID 3)						
Moderate	12	2	10	192	159	33
Non-Wildland	4,041	1,769	2,272	1,578	410	1,168
Riverstone Development Total	**4,053**	**1,771**	**2,282**	**1,770**	**569**	**1,201**
Tesoro Viejo Development (Map ID 4)						
Moderate	757	36	721	733	190	543
Non-Wildland	699	79	620	387	151	236
Outside of Local Responsibility Area	866	728	138	297	158	138
Tesoro Viejo Development Total	**2,322**	**843**	**1,479**	**1,417**	**499**	**918**
Mixed Use Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
In Construction Total	**7,074**	**2,626**	**4,448**	**5,377**	**1,462**	**3,915**
Approved						
Industrial						
Austin Quarry (Map ID 5)						
Moderate	1	0	1	451	0	451
Outside of Local Responsibility Area	1	0	1	208	0	208
Austin Quarry Total	**2**	**0**	**2**	**658**	**0**	**658**
Avenue 7 Industrial Park						
Non-Wildland	5	3	2	296	292	4
Avenue 7 Industrial Park Total	**5**	**3**	**2**	**296**	**292**	**4**

Future Development Status and Type / Fire Hazard Severity Zone / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Industrial Total	**7**	**3**	**4**	**954**	**292**	**662**
Mixed Use						
Centerpoint Development (Map ID 7)						
Non-Wildland	81	34	47	307	159	148
Centerpoint Development Total	**81**	**34**	**47**	**307**	**159**	**148**
Mixed Use Total	**81**	**34**	**47**	**307**	**159**	**148**
Approved Total	**88**	**37**	**51**	**1,262**	**452**	**810**
Pending						
Commercial						
Community Medical Center (Map ID 9)						
Moderate	2	0	2	198	0	198
Community Medical Center Total	**2**	**0**	**2**	**198**	**0**	**198**
Commercial Total	**2**	**0**	**2**	**198**	**0**	**198**
Mixed Use						
Castellina Development (Map ID 8)						
Non-Wildland	2	2	0	789	789	0
Castellina Development Total	**2**	**2**	**0**	**789**	**789**	**0**
Madera State Center Community College (Map ID 11)						
Moderate	4	0	4	123	0	123
Non-Wildland	63	33	30	1,758	1,442	317
Madera State Center Community College Total	**67**	**33**	**34**	**1,881**	**1,442**	**439**
River Hills Ranch (Map ID 13)						
Moderate	5	3	2	934	854	80
River Hills Ranch Total	**5**	**3**	**2**	**934**	**854**	**80**
River Pointe (Map ID 14)						
High	3	3	0	699	699	0
Moderate	11	7	4	1,032	1,027	5
River Pointe Total	**14**	**10**	**4**	**1,732**	**1,727**	**5**
Mixed Use Total	**88**	**48**	**40**	**5,336**	**4,812**	**524**
Residential						
Liberty Groves Development (Map ID 10)						
Non-Wildland	16	16	0	1,369	1,369	0
Liberty Groves Development Total	**16**	**16**	**0**	**1,369**	**1,369**	**0**

Future Development Status and Type / Fire Hazard Severity Zone / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Paseo Pacifico (Map ID 12)						
Moderate	3	1	2	285	61	223
Paseo Pacifico Total	**3**	**1**	**2**	**285**	**61**	**223**
Residential Total	**19**	**17**	**2**	**1,653**	**1,430**	**223**
Pending Total	**109**	**65**	**44**	**7,188**	**6,242**	**946**
Grand Total	**7,271**	**2,728**	**4,543**	**13,826**	**8,156**	**5,671**

Source: CAL FIRE, Madera County GIS

4.4 Capability Assessment

Thus far, the planning process has identified the natural hazards posing a threat to the Madera County Planning Area and described, in general, the vulnerability of the County to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the capability assessment. Combining the risk assessment with the capability assessment provides an overview of the County's net vulnerability to disasters, and more accurately focuses the goals, objectives, and proposed actions of this Plan.

A two-step approach is used to conduct the Capability Assessment for each participating jurisdiction to this LHMP Update. First, an inventory of common mitigation activities was made through the use of matrixes. 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, an inventory and review of existing policies, regulations, plans, and programs was conducted to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This section presents the County's mitigation capabilities that are applicable to the unincorporated County. These are in addition to, and supplement, the many plans, reports, and technical information reviewed and used for this LHMP Update as identified in Chapter 3 and in Chapter 4.

This assessment is divided into four sections: regulatory mitigation capabilities are discussed in Section 4.4.1; administrative and technical mitigation capabilities are discussed in Section 4.4.2; fiscal mitigation capabilities are discussed in Section 4.4.2; and mitigation education, outreach, and partnerships are discussed in Section 4.4.3.

4.4.1. Madera County's Regulatory Mitigation Capabilities

Table 4-162 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in unincorporated Madera County. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 4-162 Madera County Regulatory Mitigation Capabilities

Plans	In Place Y/N	Does the plan address hazards? Can the plan be used to carry out mitigation actions? When was it last updated??
Capital Improvements Plan	Y	2017 is the date of the most recent plan. An update is in progress in 2025.
Climate Change Adaptation Plan	N	But we do have a Climate Change Vulnerability Assessment. It addresses hazards and their possible worsening. This was updated in 2025.
Community Wildfire Protection Plan	Y	2023
Comprehensive/Master Plan	Y	1995 is the current date. It is being updated in 2025/2026.
Continuity of Operations Plan	Y	Updated in 2025. It references hazards.
Economic Development Plan	N	
Land Use Plan	Y	As part of General Plan.
Local Emergency Operations Plan	Y	This was recently updated in 2024.
Stormwater Management Plan	N	
Transportation Plan	N	
Other	Y	2025 CAL FIRE Fire Plan
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective way to reduce hazard impacts? Is the ordinance adequately administered and enforced?**
Acquisition of land for open space and public recreation use	Y	Yes, including open areas as shelter in place areas as part of a project
Building code	Y	Version/Year: 2025 California Building Code
Flood insurance rate maps	Y	Effective DFIRM is 2008; FEMA is in process with updated 2026 DFIRMs
Floodplain ordinance	Y	Madera County utilizes the FEMA Floodplain maps and has adopted an ordinance.
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	Y	Wildfire ordinance is effective and enforced.
Subdivision ordinance	Y	The subdivision ordinance requires an CEQA environmental review. All major subdivisions must have two points of ingress and egress
Zoning ordinance	Y	By designated specific areas for Industry it aid control and reduces hazards. There are strict setback standards to comply with State Fire Codes
Other		
How can these capabilities be expanded and improved to reduce risk?		
The County is seeking to increase capacity through staffing and training; plan development, monitoring and updating; increased enforcement and updates to ordinances, policies, and procedures; increased funding opportunities and capacity; and implementation of mitigation actions and projects.		

As indicated in the tables above, Madera County has several plans and programs that guide the County's mitigation of development of hazard-prone areas. Starting with the Madera 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.

Madera County General Plan (1995)

A general plan is a legal document, required by state law, that serves as a community's "constitution" for land use and development. The plan must be a comprehensive, long-term document, detailing proposals for the "physical development of the county or city, and of any land outside its boundaries which in the planning agency's judgment bears relation to its planning" (Government Code §65300 et seq.). Time horizons vary, but the typical general plan looks 10 to 20 years into the future. The law specifically requires that the general plan address seven topics or "elements." These are land use, circulation (transportation), housing, conservation, open space, noise, and safety. The plan must analyze issues of importance to the community, set forth policies in text and diagrams for conservation and development, and outline specific programs for implementing these policies.

Goals and policies related to mitigation from the General Plan are the following:

Public Facilities and Services Element

Goal 3.C	**To ensure the availability of an adequate and safe water supply and the maintenance of high quality water in water bodies and aquifers used as sources of domestic and agricultural water supply.**
Policy 3.C.1.	The County shall approve new development only if an adequate water supply to serve such development is demonstrated.
Policy 3.C.2.	The County shall approve new development based on the following guidelines for water supply: a. Urban and suburban development should rely on community water systems b. Rural communities should rely on community water systems. Individual wells may be permitted in cases where no community water system exists or can be extended to the property but development will be limited to densities which can be safely developed with wells. c. Agricultural areas should rely on public water systems where available, otherwise individual water wells are acceptable.
Policy 3.C.3.	The County shall limit development in areas identified as having severe water table depression to uses that do not have high water usage or to uses served by a surface water supply.
Policy 3.C.4.	The County shall require that water supplies serving new development meet state water quality standards
Policy 3.C.5.	The County shall require that new development adjacent to bodies of water used as domestic water sources adequately mitigate potential water quality impacts on these water bodies.
Policy 3.C.6.	The County shall promote efficient water use and reduced water demand by: a. Requiring water-conserving design and equipment in new construction; b. Encouraging water-conserving landscaping and other conservation measures; c. Encouraging retrofitting existing development with water-conserving devices; and d. Encouraging use of recycled or grey water for landscaping
Policy 3.C.7.	The County shall promote the use of reclaimed wastewater to offset the demand for new water supplies.

Goal 3.C	To ensure the availability of an adequate and safe water supply and the maintenance of high quality water in water bodies and aquifers used as sources of domestic and agricultural water supply.
Policy 3.C.8.	The County shall support opportunities for groundwater users in problem areas to convert to surface water supplies.
Policy 3.C.9.	The County shall promote the use of surface water for agricultural use to reduce groundwater table reductions.
Policy 3.C.10.	The County shall implement policies and procedures stated in the County adopted "AB3030 Groundwater Management Plan" for the Chowchilla, Delta-Mendota, and Madera Basins.
Policy 3.C.11.	The County shall encourage water conservation by farmers. To this end, the County support efforts to provide information on irrigation practices through the Agricultural Commissioner and U. C. Cooperative Extension. The County shall also support conservation efforts of the California Farm Bureau, U. S. Soil Conservation Service, resource conservation districts, and irrigation districts.
Policy 3.C.12.	The County shall support programs for the agricultural re-use of reclaimed water.
Policy 3.C.13.	The County shall work with local irrigation districts to preserve local water rights. The County shall oppose public and private sales of water rights to users outside Madera County.

Goal 3.E	To provide efficient, cost-effective, and environmentally-sound storm drainage and flood control facilities.
Policy 3.E.1	The County shall provide for expansion and development of storm drainage systems to meet the needs of existing and planned development.
Policy 3.E.2	The County shall require new development to pay its fair share of the costs of Madera County storm drainage and flood control improvements.
Policy 3.E.3	The County shall encourage project designs that minimize drainage concentrations and impervious coverage and maintain, to the extent feasible, natural site drainage conditions.
Policy 3.E.4	The County shall preserve creeks and rivers, as feasible, to maintain existing floodplain capacity. The County shall continue to require a drainage permit for any project that would potentially alter a watercourse.
Policy 3.E.5	Future drainage system discharges shall comply with applicable State and Federal pollutant discharge requirements.
Policy 3.E.6	The County shall encourage the use of natural stormwater drainage systems to preserve and enhance natural features.
Policy 3.E.7	The County shall consider recreational opportunities and aesthetics in the design of stormwater ponds and conveyance facilities.

Goal 3.G	To ensure the prompt and efficient provision of law enforcement, fire, and emergency medical facility and service needs.
Policy 3.G.1	The County shall ensure the provision of effective law enforcement, fire, and emergency medical services to unincorporated areas.
Policy 3.G.2	The County shall reserve adequate sites for sheriff, fire, and emergency medical facilities in unincorporated locations in Madera County.
Policy 3.G.3	The County shall require new development to pay its fair share of the costs for providing law enforcement, fire, and emergency medical facilities, subject to the requirements of California Government Code Section 66000 et seq.

Goal 3.G	To ensure the prompt and efficient provision of law enforcement, fire, and emergency medical facility and service needs.
Policy 3.G.4	The County shall require that new development is designed to maximize safety and security and minimize fire hazard risks to life and property.
Policy 3.G.5	The County shall limit development to very low densities in areas where emergency response times will average more than 20 minutes.

Goal 3.H	To protect residents of and visitors to Madera County from injury and loss of life and to protect property and watershed resources from fires.
Policy 3.H.1	The County shall encourage local fire protection agencies in Madera County to maintain the following as minimum fire protection standards (expressed as Insurance Service Organization (ISO) ratings): a. ISO 4 in urban areas b. ISO 6 in suburban areas c. ISO 8 in rural areas
Policy 3.H.2	The County shall encourage local fire protection agencies in the county to maintain the following as minimum standards (expressed as average first alarm response times to emergency calls): a. 10 minutes in urban areas b. 15 minutes in suburban areas c. 20 minutes in rural areas
Policy 3.H.3	The County shall require that new fire stations be located to achieve a service level capability consistent with existing and planned land uses.
Policy 3.H.4	The County shall require new development to develop or fund fire protection facilities that, at a minimum, maintain the above service level standards.
Policy 3.H.5	The County shall ensure that all proposed developments are reviewed for compliance with fire safety standards by responsible local fire agencies per the Uniform Fire Code and other state and local ordinances.
Policy 3.H.6	The County shall work with local fire protection agencies to eliminate structurally unsafe and fire-hazardous housing structures that are beyond repair or rehabilitation.
Policy 3.H.7	The County shall encourage local fire protection agencies to provide and maintain advanced levels of emergency medical services (EMS) to the public.

Historical and Cultural Resources Element

Goal 4.D	To identify, protect, and enhance Madera County's important historical, archaeological, paleontological, and cultural sites and their contributing environment.
Policy 4.D.1	The County shall solicit the views of the local Native American community in cases where development may result in disturbance to sites containing evidence of Native American activity and/or to sites of cultural importance.
Policy4.D.2	The County shall coordinate with the cities and advisory councils in the county to promote the preservation and maintenance of Madera County's paleontological, archaeological, and historical resources.
Policy4.D.3	The County shall require that discretionary development projects identify and protect from damage, destruction, and abuse, important historical, archaeological, paleontological, and cultural sites and their contributing environment.

Goal 4.D	To identify, protect, and enhance Madera County's important historical, archaeological, paleontological, and cultural sites and their contributing environment.
Policy4.D.4	The County shall, within its power, maintain confidentiality regarding the locations of archaeological sites in order to preserve and protect these resources from vandalism and the unauthorized removal of artifacts. If significant archaeological and cultural resources are open to the public, the County shall control public access to prevent damage or vandalism.
Policy 4.D.5	The County shall provide for the placement of historical markers or signs on adjacent county roadways and major thoroughfares to attract and inform visitors of important historic resource sites.
Policy 4.D.6	The County shall encourage the preservation of the original architectural character of significant historic structures and districts. To this end, the County shall use the State Historic Building Code.
Policy 4.D.7	The County will use existing legislation and propose local legislation for the identification and protection of cultural resources and their contributing environment.
Policy 4.D.8	The County shall support the registration of cultural resources in appropriate landmark designations (i.e., National Register of Historic Places, California Historical Landmarks, Points of Historical Interest, or Local Landmark). The County shall assist private citizens seeking these designations for their property.

Agricultural and Natural Resources

Goal 5.C	To protect and enhance the natural qualities of Madera County's streams, creeks and groundwater.
Policy 5.C.1	The County shall protect preserve areas with groundwater recharge capabilities and minimize placement of potential sources of pollution in such areas.
Policy 5.C.2	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 5.C.3	The County shall require new development of facilities near rivers, creeks, reservoirs, or substantial groundwater recharge areas to mitigate any potential impacts of release of pollutants in flood waters, flowing river, stream, creek, or reservoir waters.
Policy 5.C.4	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 that storm drainage systems use BMPs.
Policy 5.C.5	The County shall approve only wastewater disposal facilities that will not contaminate groundwater or surface water.
Policy 5.C.6	The County shall require that natural watercourses are integrated into new development in such a way that they are accessible to the public and provide a positive visual element.
Policy 5.C.8	The County shall protect groundwater resources from contamination and further overdraft by encouraging water conservation efforts and supporting the use of surface water for urban and agricultural uses wherever feasible.
Policy 5.C.9	The County shall support the policies of the San Joaquin River Parkway Plan to protect the San Joaquin River as an aquatic habitat and a water source.

Goal 5.D	To protect wetland communities and related riparian areas throughout Madera County as valuable resources.
Policy 5.D.1	The County shall comply with the wetlands policies of the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the California Department of Fish and Wildlife. 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 5.D.2	The County shall require new development to mitigate wetland loss in both regulated and non-regulated wetlands through any combination of avoidance, minimization, or compensation. The County shall support mitigation banking programs that can provide the opportunity to mitigate impacts to rare, threatened, and endangered species and/or the habitat which supports these species in wetland and riparian areas.
Policy 5.D.3	The County shall require development to be designed in such a manner that pollutants and siltation will not significantly adversely affect the value or function of wetlands.
Policy 5.D.4	The County shall require riparian protection zones around natural watercourses. Riparian protection zones shall include the bed and bank of both low and high flow channels and associated riparian vegetation, the band of riparian vegetation outside the high flow channel, and buffers of 100 feet in width as measured from the top of bank of unvegetated channels and 50 feet in width as measured from the outer edge for the canopy of riparian vegetation. Exceptions may be made in existing developed areas where existing development and lots are located within the setback areas.
Policy 5.D.5	The County shall strive to identify and conserve remaining upland habitat areas adjacent to wetlands and riparian areas that are critical to the feeding or nesting of wildlife species associated with these wetland and riparian areas.
Policy 5.D.6	The County shall require new private or public developments to preserve and enhance existing native riparian habitat unless public safety concerns require removal of habitat for flood control or other public purposes. In cases where new private or public development results in modification or destruction of riparian habitat for purposes of flood control, the developers shall be responsible for creating new riparian habitats within or near the project area at a ratio of 3:1 acres of new habitat for every acre destroyed.
Policy 5.D.7	The County shall support the management of wetland and riparian plant communities for passive recreation, groundwater recharge, nutrient catchment, and wildlife habitats. Such communities shall be restored, where possible.
Policy 5.D.8	The County shall support the goals and policies of the San Joaquin River Parkway Plan to preserve existing habitat and maintain, enhance, or restore native vegetation to provide essentially continuous riparian and upland habitat for wildlife along the river between Friant Dam and the Highway 145 crossing.

Goal 5.H	To preserve and enhance open space lands to maintain the natural resources of the county.
Policy 5.H.1	The County shall support the preservation and enhancement of natural land forms, natural vegetation, and natural resources as open space. To the extent feasible, the County shall permanently protect as open space areas of natural resource value, including wetlands preserves, riparian corridors, woodlands, and floodplains.
Policy 5.H.2	The County shall require that new development be designed and constructed to preserve the following types of areas and features as open space to the maximum extent feasible: a. High erosion hazard areas; b. Scenic and trail corridors; c. Streams and streamside vegetation; d. Wetlands; e. Other significant stands of vegetation; f. Wildlife corridors; and g. Any areas of special ecological significance.

Goal 5.H	To preserve and enhance open space lands to maintain the natural resources of the county.
Policy 5.H.3	The County shall support the maintenance of open space and natural areas that are interconnected and of sufficient size to protect biodiversity, accommodate wildlife movement, and sustain ecosystems.
Policy 5.H.4	Recognizing the importance of both public and privately-owned open space, the County shall encourage both private and public ownership and maintenance of open space.
Policy 5.H.5	The County shall require that significant natural, open space, and cultural resources be identified in advance of development and incorporated into site-specific development project design.

Safety Element

Goal 6.A	To minimize the loss of life, injury, and property damage due to seismic and geological hazards.
Policy 6.A.1	The County shall require the preparation of a soils engineering and geologic-seismic analysis prior to permitting development in areas prone to geological or seismic hazards (i.e., groundshaking, landslides, liquefaction, critically expansive soils).
Policy 6.A.2	In 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; removal of vegetative cover; and steepening of slopes and undercutting the bases of slopes. Areas of known landslides should be designated for open space uses.
Policy 6.A.3	The County shall limit development in areas of steep or unstable slopes to minimize hazards from landslides. Development will be prohibited in areas with slopes of 30 percent or more unless it can be demonstrated by a registered engineer or registered engineering geologist that such development will not present a public safety hazard.
Policy 6.A.4	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 groundshaking, and other hazardous conditions in Madera County.

Goal 6.B	To minimize the risk of loss of life, injury, damage to property, and economic and social dislocations resulting from flood hazards.
Policy 6.B.1	The County shall prohibit uses in designated floodways except those that do not adversely affect flood elevations or velocities, and are tolerant of occasional flooding, such as agriculture, outdoor recreation, mineral extraction, and natural resource areas.
Policy 6.B.2	The County shall require evaluation of potential flood hazards prior to approval of development projects and shall regulate development in urban and urbanizing areas per State law addressing 100-year and 200-year level of protection consistent with the current Central Valley Flood Protection Plan or the Federal Emergency Management Agency (FEMA) standard of flood protection.
Policy 6.B.3	The County shall not approve any new development agreement, building permit or entitlement, or tentative or parcel map, or any other entitlement, unless it finds one of the following: (1) The flood control facilities provide a 100-year level of protection consistent with the current Central Valley Flood Protection Plan or the Federal Emergency Management Agency (FEMA) standard of flood protection; (2) Conditions imposed on the development will protect the property at a 100-year level of protection consistent with the current Central Valley Flood Protection Plan or the Federal Emergency Management Agency (FEMA) standard of flood protection.; or (3) 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 a 100-year level of protection consistent with the current Central Valley Flood Protection Plan or the Federal Emergency Management Agency (FEMA) standard of flood protection.

Goal 6.B	To minimize the risk of loss of life, injury, damage to property, and economic and social dislocations resulting from flood hazards.
Policy 6.B.4	The County shall require, for areas protected by levees, all new developments to include a notice within the deed that the property is protected from flooding by a levee and that the property can be subject to flooding if the levee fails or is overwhelmed.
Policy 6.B.5	The County shall require project applicants to secure an encroachment permit from the Central Valley Flood Protection Board for any project that falls within the jurisdiction regulated by the Board (e.g., levees, designated floodways).
Policy 6.B.6	The County shall require flood-proofing of structures in areas subject to flooding and shall require that all development within special flood hazard areas (SFHA) be designed and constructed in a manner that will not cause floodwaters to be diverted onto adjacent property or increase flood hazards to other areas.
Policy 6.B.7	The County shall require adequate setbacks from flood control levees consistent with Federal, State, and local design and management standards, and for new development adjacent to an existing or planned levee to dedicate the levee footprint and necessary setback areas in a manner acceptable to the appropriate levee maintaining agency. The County shall prohibit new development from using levees as a primary access point.
Policy 6.B.8	The County shall provide verbal assistance or other cost-effective measures for reducing flood risk to existing structures located in Federal, State, and/or local determined special flood hazard areas.
Policy 6.B.9	The County shall strive to ensure that all levees protecting urban or urbanizing areas provide a minimum of 100-year flood protection in accordance with the Madera County Code (Title 14, Section IV. Flood Damage Prevention) and the Federal Emergency Management Agency (FEMA) standard of flood protection.
Policy 6.B.10	The County shall require that flood management programs avoid alteration of waterways and adjacent areas, whenever possible.
Policy 6.B.11	The County shall develop strategies to improve and maintain flood control facilities to withstand seismic and geologic impacts.
Policy 6.B.12	The County shall require new flood control projects within areas subject to any flood event to be constructed in a manner that will not cause floodwaters to be diverted onto adjacent property or increase flood hazards to property downstream and/or upstream.
Policy 6.B.13	The County shall require flood control structures, facilities, and improvements to be designed to conserve resources, incorporate and preserve scenic values, and to incorporate opportunities for recreation, where appropriate.
Policy 6.B.14	The County shall periodically update the Land Use Element to reflect current floodplain mapping data.
Policy 6.B.15	The County shall support Federal and State reservoir management practices and reservoir improvements that increase Madera County's level of flood protection.
Policy 6.B.16	The County shall ensure that all County flood plans and regulations are consistent with the Central Valley Flood Protection Plan.
Policy 6.B.17	The County shall support inspection and maintenance programs for dams protecting the county from flooding, such as the California Department of Water Resources Dam and Safety Program.
Policy 6.B.18	The County shall restrict uses in designated floodways to those that are tolerant of occasional flooding and do not restrict or alter flow of flood waters. Such uses may include agriculture, outdoor recreation, mineral extraction, and natural resource areas.
Policy 6.B.19	The County shall require that areas protected from flooding by levees be designed to provide multiple escape routes for residents and access for emergency services in the event of a levee or dam failure.

Goal 6.B	To minimize the risk of loss of life, injury, damage to property, and economic and social dislocations resulting from flood hazards.
Policy 6.B.20	The County shall participate in the National Flood Insurance Program and the Community Rating System, including: maintaining at least the minimum National Flood Insurance Program requirements, and adopt more stringent standards to further promote sound flood plain management when appropriate; promoting the purchase of flood insurance; undertaking outreach campaigns to inform the public of the risk of flooding; and coordinating with Federal, State, and local agencies on efforts to enhance the effectiveness of the implementation of the National Flood Insurance Program.
Policy 6.B.21	The County shall maintain and implement the following plans for dam failure and flood evacuation: Madera County Emergency Action Plan; and Madera County Local Hazard Mitigation Plan

Goal 6.C	To minimize the risk of loss of life, injury, and damage to property and watershed resources resulting from unwanted fires.
Policy 6.C.1	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 and meets all applicable state and county fire standards. In areas with high or extreme wildfire hazards, the County shall limit parcel sizes to 22 acres or larger or encourage clustered or planned residential development with on-site fire suppression measures.
Policy 6.C.2	The County shall require that discretionary permits for new development in fire hazard areas be conditioned to include requirements for fire-resistant vegetation, cleared fire breaks, or a long-term comprehensive fuel management program. Fire hazard reduction measures shall be incorporated into the design of development projects in fire hazard areas.
Policy 6.C.3	New development shall be required to have water systems that meet County fire flow requirements. Where minimum fire flow is not available to meet County standards, alternate fire protection measures, including sprinkler systems, shall be identified and may be incorporated into development if approved by the appropriate fire protection agency.
Policy 6.C.4	The County shall review project proposals to identify potential fire hazards and prevent or mitigate such hazards to acceptable levels of risk.
Policy 6.C.5	The County shall require development to have adequate access for fire and emergency vehicles and equipment. All major subdivisions shall have two points of ingress and egress.
Policy 6.C.6	The County shall ensure that existing and new buildings of public assembly incorporate adequate fire protection measures to reduce the potential loss of life and property in accordance with state and local codes and ordinances.
Policy 6.C.7	The County shall encourage fire protection agencies to continue education programs in schools, service clubs, organized groups, industry, utility companies, government agencies, press, radio, and television in order to increase public awareness of fire hazards within the county.
Policy 6.C.8	The County shall work with local fire protection agencies, 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.
Policy 6.C.9	The County shall encourage and promote installation and maintenance of smoke detectors in existing residences and commercial facilities that were constructed prior to the requirement for their installation.
Policy 6.C.10	The County shall continue to work cooperatively with the California Department of Forestry and Fire Protection and local fire protection agencies in managing wildland fire hazards.

Goal 6.E	To ensure the maintenance of an emergency action plan to effectively prepare for, respond to, recover from, and mitigate the effects of natural or technological disasters.
Policy 6.E.1	The County shall prohibit the construction of facilities essential for emergencies and large public assembly in the 100-year floodplain, unless the structure and access to the structure are free from flood inundation. Additionally, the County shall require that these facilities are designed to ensure access during the occurrence of a flood.
Policy 6.E.3	The County shall continue to maintain, periodically update, and test the effectiveness of its Emergency Action Plan.
Policy 6.E.4	The County shall coordinate emergency preparedness, response, recovery, and mitigation activities with special districts, service agencies, voluntary organizations, cities within the county, surrounding cities and counties, and state and federal agencies.
Policy 6.E.5	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 have minimal exposure to flooding, seismic and geological effects, fire, and explosions.

Goal 6.F	To protect public health and safety through safe location of structures necessary for the protection of public safety and/or the provision of emergency services.
Policy 6.F.1	The County shall seek to locate new public facilities necessary for emergency response, health care, and other critical functions outside areas subject to natural hazards, such as earthquakes or floods.
Policy 6.F.3	The County shall, within its authority, ensure that emergency dispatch centers, emergency operations centers, communications systems, vital utilities, and other essential public facilities necessary for the continuity of government be designed in a manner that will allow them to remain operational during and following an earthquake, flood, or other disaster.

Goal 6.G	To minimize the risk of loss of life, injury, serious illness, damage to property, and economic and social dislocations resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous materials wastes.
Policy 6.G.1	The County shall ensure that the use and disposal of hazardous materials in the county complies with local, state, and federal safety standards
Policy 6.G.2	The County shall encourage source reduction, recycling, and on-site treatment of hazardous wastes to reduce hazardous waste generation and disposal.
Policy 6.G.3	The County shall discourage the development of residences or schools near known hazardous waste disposal or handling facilities.
Policy 6.G.4	The County shall review all proposed development projects that manufacture, use, or transport hazardous materials for compliance with the County's Hazardous Waste Management Plan (CHWMP).
Policy 6.G.5	The County shall strictly regulate the storage of hazardous materials and wastes.
Policy 6.G.6	The County shall ensure that industrial facilities are constructed and operated in accordance with current safety and environmental protection standards.
Policy 6.G.7	The County shall require that applications for discretionary development projects that will generate hazardous wastes or utilize hazardous materials include detailed information on hazardous waste reduction, recycling, and storage.
Policy 6.G.8	The County shall require that any business that handles a hazardous material prepare a plan for emergency response to a release or threatened release of a hazardous material.

Goal 6.G	To minimize the risk of loss of life, injury, serious illness, damage to property, and economic and social dislocations resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous materials wastes.
Policy 6.G.9	The County shall encourage the State Department of Health Services and the California Highway Patrol to review permits for radioactive materials on a regular basis and to promulgate and enforce public safety standards for the use of these materials, including the placarding of transport vehicles.
Policy 6.G.10	The County shall identify sites as specified in the County Hazardous Waste Management Plan that are appropriate for hazardous material storage, maintenance, use, and disposal facilities due to potential impacts on adjacent land uses and the surrounding natural environment.
Policy 6.G.11	The County shall work with local fire protection and other agencies to ensure an adequate countywide response capability to hazardous materials emergencies.

Madera County Emergency Operations Plan (2024)

The County of Madera Emergency Operations Plan (EOP) addresses the County's planned response to extraordinary emergency situations associated with natural disasters, technological (man-made) emergencies, acts of war, and terrorism. The operational concepts reflected in this plan focus on large-scale emergencies and disasters that often generate situations requiring planned and coordinated responses by multiple disciplines, agencies, and jurisdictions. Such disasters and emergencies pose a danger to life and property and have long-term social, economic, political, and/or environmental implications. This plan accomplishes the following:

- Establish a framework for the overall management and coordination of emergency operations.

Enable emergency response personnel to assess emergency situations and take appropriate actions to save lives and reduce injuries, prevent, or minimize damage to public and private property, and protect the environment.

- Train and equip emergency response personnel and County Staff to prevent, prepare, respond, and recover from emergencies and disasters efficiently and effectively.
- Define the overall emergency management organization in Madera County as outlined in Standard Emergency Management System (SEMS) and National Incident Management System (NIMS).
- Delineate the roles and responsibilities of local, state, and federal agencies in emergencies and disaster events affecting Madera County.
- Establish lines of authority and coordination for the management and prevention of emergencies and disasters.
- Facilitate mutual aid to supplement local resources.
- Describe the procedures for accessing state and federal assistance during and following an emergency or disaster.

The Plan is the principal guide for the agencies of Madera County and other local government entities to prevent, prepare for, respond to, and recover from emergencies and disasters affecting Madera County. In addition, this plan is intended to facilitate multi-agency and multi-jurisdictional coordination, particularly between local, state, and federal agencies, in emergency operations. The SEMS is the organizational framework for emergency response and operations in Madera County. The EOP is consistent with the principles of the NIMS and aligned with the National Response Plan (NRP).

Madera County Hazardous Material Area Plan (2025)

This Hazardous Materials Area Plan (Area Plan) fulfills the Certified Unified Program Agency (CUPA) regulatory program requirements per State law. Copies of the Area Plan are on file at the Madera Office of Emergency Services. The Area Plan can be used as a resource document in conjunction with the Madera County EOP, and other state agency plans. The Area Plan describes the County's pre-incident planning and preparedness for hazardous materials releases including pesticide drift. It clarifies the roles and responsibilities of federal, state and local agencies during a hazardous materials incident. It describes the County's hazardous materials incident response program, training, communications and post-incident recovery procedures.

The Madera County Area Plan is organized into three basic sections: Part I - Basic Plan, Part II – Roles and Responsibilities and Part III – Appendices.

- Part I - Basic Plan – The Basic Plan is organized chronologically into the three stages of emergency management to assist personnel involved in hazardous materials emergencies: Preparedness, Response and Recovery.
- Part II - Roles and Responsibilities – This section describes the roles and responsibilities of local, state, and federal agencies in a hazardous materials emergency.
- Part III – Appendices – The Appendices provide supporting documentation and more detailed information on topics covered in the Area Plan. They are organized in the three categories of emergency management: Preparedness, Response and Recovery.

Madera County Drought and Water Shortage Analysis and Response Plan (2024)

The Madera County Drought and Water Shortage Response Plan (also known as the "Drought Plan") has been developed to satisfy the requirements of Senate Bill 552 (Drought Planning for Small Water Suppliers and Rural Communities, SB 552) and to prepare the County of Madera ("County") for future droughts and water shortages. This Drought Plan improves the County's preparedness for and resiliency to drought in a number of key ways. First, the Plan explores the risk of water shortage for the County's self-supplied communities, including analysis of State data and local stakeholder feedback. Second, opportunities to improve reliability through water system consolidation are considered. Third, an Action Plan is provided, including the monitoring protocols the County will use to detect water shortages, and interim and long term solutions for state small water systems and domestic wells within the County. Lastly, the Drought Plan concludes with recommendations for additional policies and actions which can further improve the County's preparedness for droughts and water shortages. Overall, this Drought Plan allows the County to anticipate water shortages before they occur and respond proactively, reducing the risk of drought impacts throughout the County

Climate Change and Health Profile Report – Madera County (2017)

The CCHPR seeks to provide a county-level summary of information on current and projected risks from climate change and potential health impacts. This report represents a synthesis of information on climate change and health for California communities based on recently published reports of state agencies and other public data. This CCHPR is intended to inform, empower, and nurture collaboration that seeks to protect and enhance the health and well-being of all California residents.

This report is part of a suite of tools that is being developed by the California Department of Public Health to support local, regional, and statewide efforts of the public health sector to build healthy, equitable, resilient, and adaptive communities ready to meet the challenges of climate change. Along with a county-level climate change and health vulnerability assessment and state guidance documents, such as Preparing California for Extreme Heat: Guidance and Recommendations, the profile provides a knowledge base for taking informed action to address climate change.

Madera County Community Wildfire Protection Plan (2023)

County officials fully recognize the potential disaster that would result from a wildfire in Eastern Madera County. Methods to decrease the wildfire problem and make the people, property, cultural and natural resources, more fire-safe is being pursued by the County in conjunction with wildland firefighting agencies, such as the United States Forest Service and CAL-FIRE. A CWPP is needed to address the catastrophic fire potential. A CWPP provides communities with an opportunity to influence where and how federal agencies implement fuel reduction projects on federal lands and how additional funds may be distributed for projects on nonfederal lands.

Upon completion of the assessment process, the next step is to formulate a plan for mitigating the hazards associated with wildfire for communities classified as having a high-risk rating. Fuel reduction projects, and education and outreach programs to inform residents of the potential projects and other FireWise activities should be prioritized for such communities.

Madera-Mariposa-Merced Unit Strategic Fire Plan (2025)

The Madera-Mariposa-Merced Unit has written its annual Fire Plan with the intention of establishing goals and priorities that align with CAL FIRE'S Strategic Plan and the California Fire Plan while identifying goals and priorities specific to the Unit.

The California Fire Plan is the road map for reducing the risk of wildfire. The Madera-Mariposa-Merced Unit's fire plan identifies strategic goals and objectives that target the anticipation and reduction of wildfire within the boundaries of the Unit. For the challenges facing the Unit with excessive tree mortality rates due to bug kill and a fourth year of drought, the Fire Plan will also serve the Unit in determining a plan to address our most dangerous areas and targets of risk within the overall Fire Plan. This fire plan seeks to improve operational effectiveness, scale to budgetary and fiscal circumstances, foster a healthy ecosystem and improve firefighter safety by identifying working projects specific to each Battalion within the Unit.

The Fire Plan strives to reduce property loss, damage to the local environment and ecosystems from destructive wildfires, along with a reduction of suppression costs within the Madera-Mariposa-Merced Unit.

Madera County Emergency Communications Plan (2024)

The purpose of the County of Madera Emergency Communications Plan is to establish a framework that ensures the effective and timely communication of critical information during emergency situations. This plan is designed to facilitate coordinated efforts among government agencies, public information teams, and community partners to provide accurate, accessible, and consistent information to the public.

This plan applies to any extraordinary situation, regardless of cause, when the conditions require the coordinated and timely preparation and dissemination of emergency messages to the public. The provisions, policies, and procedures described in this plan are applicable to all agencies and individuals, public and private, having responsibility for emergency preparedness, response, recovery and/or mitigation within the geographical boundaries of Madera County.

Madera County Evacuation and Transportation Plan (2024)

The purpose of the County of Madera Evacuation and Transportation Plan is to outline the concepts and policies that are used to coordinate safe, timely, and efficient evacuation operations within Madera County. This plan creates a framework for preparations and response within existing statutory obligations and limitations, provides consistent county-wide procedures, and describes the roles and responsibilities of various agencies, departments, organizations, and levels of government when implementing population protective measures.

This plan is applicable to all agencies involved in evacuation operations within Madera County and for all hazards, regardless of whether they are natural, human-caused, or technological in nature. The plan addresses the transportation and movement of people and animals as directed by local, state, territorial, and/or federal authorities. As an operational plan, this plan does not address response tactics and only addresses those activities directly related to evacuating the general human and animal populations. This plan does not address the provision of mass care services for sheltering and/or temporary housing.

Madera County Mass Fatality Management Plan (2024)

The purpose of the County of Madera Mass Fatality Management Plan is to facilitate the recovery and identification of deceased persons, assist in the proper notification of families, and describe the general processes to coordinate the final disposition of human remains in a timely, safe, and respectful manner while reasonably accommodating the religious, cultural, and societal expectations of the affected populations.

This plan is intended only to address general strategies used for any incident where the number of decedents exceeds the Madera County Sheriff-Coroners' resources and/or capabilities to handle. Specific tactical or operational actions are described in department or agency-specific procedures or protocols, as appropriate. The Plan is not intended to address the needs of injured survivors or coordination requirements for mass casualty incidents. This plan includes specific coordination requirements for effective mass fatality response, including functions at the incident site, the temporary morgue, and the Family Assistance Center (FAC). This plan applies to all agencies and organizations having a role for mass fatality response within Madera County.

Madera County Recovery Plan (2024)

The purpose of the County of Madera Recovery Plan is to define responsibilities for disaster recovery support functions, establish the recovery management organization of the County, describe the concept of recovery operations for short-term, intermediate, and long-term recovery activities, and describe the communication and coordination strategies of the county between higher, lateral, and subordinate entities during recovery operations.

The County of Madera Recovery Plan is intended to be a supporting planning document to the County's EOP. The Plan identifies how the County coordinates recovery operations in collaboration with all sub jurisdictions, stakeholders, and other Whole Community partners. This Plan is consistent with the recovery concepts described within both the National Disaster Recovery and California Disaster Recovery Frameworks. The plan addresses incidents of local, regional, state, and national significance, including presidentially declared emergencies and major disasters as defined by the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The processes described within the plan apply to all county departments and agencies having roles or responsibilities for Disaster Recovery.

Madera County Ordinances

The Madera County General Plan provides policy direction for land use, development, open space protection, and environmental quality; however, 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 Services and Disaster (Section 2.78)

This chapter establishes the county emergency services organization and provides for the preparation and carrying out of the plans for the protection of persons and property within the county in the event of an emergency; the direction of the emergency organization; the coordination of the emergency functions of the county with all other governmental agencies, incorporated areas, corporations, organizations, and affected private persons.

The Madera County disaster council is hereby created and shall consist of all the members of the board of supervisors. The chairman of the board shall be the chairman of the council. The director of emergency services shall be the secretary for the council. The duties of the council shall be to promote, receive, evaluate, coordinate, and make available the best information obtainable from all sources, toward the end that the most effective mobilization of all county resources and facilities, public and private, may be the foundation for the actions taken during emergency operations.

The council shall request representatives from the cities to participate in meetings concerning subjects which affect the cities.

Building and Construction (Chapter 14)

This title is adopted to provide minimum standards to safeguard life or limb, health, property and public welfare, by regulating and controlling structural design, construction, materials, occupancy and location of all buildings and structures within the unincorporated area of the county. This title shall apply to the erection, construction, demolition, enlargement, alteration, repair, relocation, conversion, occupancy, change of occupancy, and maintenance of buildings, structures, swimming pools, and also the installation of electrical, plumbing, heating and cooling facilities and appurtenances necessary thereto within the unincorporated area of the county. The current edition of the California Building Standards Code, incorporating the following codes by reference and, except as otherwise provided herein, are adopted and shall govern standards for buildings and construction within their respective applications:

- The California Building Code, current edition, including the appendices, as adopted by the International Conference of Building Officials;
- The California Mechanical Code, current edition, including all appendices thereto;
- The Uniform Housing Code, current edition, including all appendices thereto, as adopted by the International Conference of Building Officials;
- The California Plumbing Code, current edition, including all appendices thereto;
- The California Electrical Code, current edition, including all appendices thereto;
- The Uniform Code for the Abatement of Dangerous Buildings, current edition, including all appendices thereto, as adopted by the International Conference of Building Officials;
- The Uniform Solar Energy Code, current edition, including all appendices thereto, as adopted by the International Association of Plumbing and Mechanical Officials;
- The California Fire Code, current edition, including those sections and appendices as more specified in Chapter 14.35;
- National Fire Codes, current edition, as adopted by the National Fire Protection Association;
- Uniform Swimming Pool, Spa, and Hot Tub Code, current edition, as adopted by the International Association of Plumbing and Mechanical Officials.

Fire Prevention Ordinance (Chapter 14.35)

The California Fire Code and National Fire Protection Association Code (hereafter NFPA Code), as adopted by the board of supervisors, are amended as provided in this chapter and in Section 13.12.070 of the County code.

Chapter 14.38.010 - Grass and weeds—Discing.

Subdivisions within the unincorporated areas of the county of Madera with no development, or very little development, tend to promote the growing of grass and weeds that at various times during the year can become a serious fire hazard. Such grass and weeds can, with difficulty and great expense, be disced into the ground. However, that method of control requires the county or a person contracting with the county, to enter in and upon the property to so disc the property. There is statutory authority for the permitting of the county under certain conditions to so enter and perform such fire protection work. The fire protection project can be accomplished by the county in a less expensive manner, but more importantly, it promotes the production of food and fiber and does not waste the green forage which is accomplished by discing it into the ground. With fire protection uppermost in the minds of the board of supervisors and promoting additional production of food and fiber, it has adopted this law for the protection of certain county areas.

Flood Damage Prevention (Chapter 14.60)

The board of supervisors finds that the flood hazard areas of Madera County are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare. These 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 which increase flood heights and velocities also contributes to flood losses.

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 legally enforceable regulations applied uniformly throughout the community to all publicly and privately owned land within flood prone, mudslide/mudflow, or flood related erosion areas. These regulations are 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.

The legislature of the state of California has in Government Code Sections 65302, 65560, and 65800 conferred upon local governments the authority to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. Therefore, the board of supervisors of the county of Madera does hereby adopt the following floodplain management regulations. In order to accomplish its purposes, this chapter includes regulations 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.

The county engineer is designated as the floodplain administrator and is appointed to administer, implement, and enforce this chapter by granting or denying development permits in accord with its provisions. A development permit shall be obtained before any construction or other development, including manufactured homes, within any area of special flood hazard established.

Subdivisions (Chapter 17)

The Subdivision Ordinance of Madera County is adopted to promote and protect the public health, safety and welfare through the orderly regulation of land division throughout the unincorporated area of Madera County.

- Provide the economic and social advantages resulting from orderly land division.
- Encourage and guide development consistent with the Madera County general plan and adopted specific plans.
- Provide lots of sufficient size and appropriate design so as to be usable for their intended purposes.
- Provide for the preservation of environmental assets and natural resources, including land, water, air, minerals, vegetation, wildlife, silence, historic or aesthetic sites, and open space.
- Ensure provision of adequate traffic circulation, utilities and services.

- General Plan. This title shall implement the objective established for the development of the county in its general plan, and a proposed subdivision, street plan, or land division shall be consistent with and considered in relation to said plan.
- Lot Standards. It shall establish minimum standards for lot areas and dimensions, and the creation of reasonable building sites.
- Improvement Standards. It shall provide standards for the construction and installation of streets, roads, alleys, highways, public utilities, and other improvements.
- Access Standards. It shall provide for adequate street widths, alignment, and means of ingress and egress to property.
- Suitability. It shall control the division of land which is subject to inundation or other impediments affecting use of the land.
- Regulation. It shall provide rules and regulations governing the contents of preliminary map, tentative parcel maps, parcel maps, tentative, and final subdivision maps, land division, records of survey, street dedication maps, the filing thereof, and other related matters.

This title shall apply, to the extent permitted by law, to all property in unincorporated Madera County whether owned by private persons, firms, corporations or organizations; by the United States or any of its agencies; by the state of California or any of its agencies or political subdivisions or by any authority or public entity organized under the laws of the state of California excluding Madera County.

Zoning (Chapter 18)

The provisions of this title shall be held to be minimum requirements adopted to promote the health, safety, morals, comfort, prosperity and general welfare of the county. Among other purposes, such provisions are intended to provide for adequate light, air, sanitation, drainage, convenience of access, conservation of floodplains and woodlands, and safety from fire and other dangers; to promote the safety and efficiency of the public streets and highways; to aid in conserving and stabilizing the economic values of the community; to preserve and promote the general attractiveness and character of the community environment; to guide the proper distribution and location of population and of the various land uses, and otherwise provide for the healthy and prosperous growth of the community.

The zoning ordinance shall be composed of specific regulations controlling the uses of land, the density of population, the use and location of structures, and the height and bulk of these structures, the areas of open spaces surrounding the structures, areas and dimensions of sites, regulations concerning access, parking and loading areas; and a zoning plan. Madera County's Administrative/Technical Mitigation Capabilities

Table 4-163 identifies the County personnel responsible for activities related to mitigation and loss prevention in the County.

Table 4-163 Madera County Administrative/Technical Mitigation Capabilities

Administration	In Place Y/N	Describe capability Is coordination effective?

Staff		Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	Y	Staff is trained and adequate regulations are in place. There is coordination when needed.
Civil Engineer, including dam and levee safety	Y	Staff is trained and adequate regulations are in place. There is coordination when needed.
Community Planner	Y	Planning Department is trained and adequate.
Emergency Manager	Y	Training is in progress.
Floodplain Administrator	Y	Staff is trained and adequate regulations are in place. There is coordination when needed.
GIS Coordinator	Y	County IT Department
Planning Commission	Y	County Department. Coordination is effective.
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	Y	Grant writing by department.
Hazard data and information	N	No retention of data
GIS analysis	Y	GIS Technician with IT.
Mutual aid agreements	Y	City of Firebaugh, Madera, and Chowchilla for fire and medical. Yosemite National Park for fire. Coordination is effective.
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional training for County employees on hazards and hazard mitigation. The County has most of the staff in place but many lack the disaster training to operate in the roles in emergencies.		

4.4.2. Madera County's Fiscal Mitigation Capabilities

Table 4-164 identifies financial tools or resources that the County could potentially use to help fund mitigation activities.

Table 4-164 Madera County Fiscal Mitigation Capabilities

Funding Resource	In Place Y/N	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	County funds with Board of Supervisor's approval.
Community Development Block Grant	Y	Environmental Health has used in the past.
Federal funding programs (non-FEMA)	Y	DHS, USDA, FEMA

Funding Resource	In Place Y/N	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Fees for water, sewer, gas, or electric services	Y	County funds with Board of Supervisor's approval.
Impact fees for new development	Y	County funds with Board of Supervisor's approval.
State funding programs	Y	CDAA, Cal OES
Stormwater utility fee	Y	County funds with Board of Supervisor's approval.
Other		
How can these capabilities be expanded and improved to reduce risk?		
Increased capacity through staffing and training; plan development, monitoring, and updating; assessment and enhancements to funding opportunities and capacities; and evaluation of mitigation partnering opportunities and implementation of mitigation actions and projects. The County currently struggles to take advantage of the grants offered by the Federal Government. Most county departments do not want to deal with the time it takes to prepare projects to increase these capabilities.		

4.4.3. Madera County Mitigation Education, Outreach, and Partnerships

Table 4-165 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table 4-165 Madera County Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	N	Social Media is how the County Communicates with the public.
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	Y	Eastern Madera County Emergency Preparedness, Firewise groups
Local news	Y	Most of the news channels are Fresno focused.
Organizations that interact with underserved and vulnerable communities	Y	We do interact with the those communities via community non-profits and other community out reach meetings.
Social media	Y	The County and the Sheriff's Office has a Social Media Presence.
How can these capabilities be expanded and improved to reduce risk?		
The County now has its own PIO. The Sheriff's Office has a new PIO as well. More information is being placed out into the community. There is a need for more training for Joint Information Center.		

4.4.4. Other Mitigation Efforts

In addition to the tables above, the County noted the following mitigation efforts.

- Pest and diseases – the County Agricultural Commissioner's Office have monitoring programs and mitigation protocols in place for "pests of concern" which are designated by the state and federal agencies we partner with. These are on going programs and include new pests/diseases when detected.
- Madera County Social Services has a CalFresh County Disaster Plan for food distribution during times of emergencies. Madera County Social Services also has a Disaster Response Plan. This plan formalizes the relationship between Social Services and the Madera County OES for Temporary Evacuation and Emergency Shelter.
- Dam Safety Programs (USACE), inspect dams regularly. Assessments (w/ full teams) conducted every 10 years. Inspections are completed every 5 years/or after a earthquake event). Exercises are done every 2 years.
- Madera County schools conduct annual earthquake awareness activities during the Great Shakeout week. They focus on awareness activities. They also go through the school to identify and do any nonstructural mitigation (i.e., looking for shelves and other nonstructural school features that could fall and cause injury or damage during an earthquake).
- City of Madera in 2024 completed a seismic upgrade of a 1M gallon water storage tank.
- Arundo removal is done annually on the rivers in the County. This keeps river channels clear and reduces wildfire risk simultaneously (as Arundo is quite flammable).
- The Hazardous Material Area Plan (HMAP), 2025. The Area Plan establishes the emergency response organization for hazardous materials incidents occurring within Madera County. This Plan documents the operational and general response procedures for the Madera County Hazardous Materials Team (hereafter referred to as the HazMat Team). Although this plan does not specifically address the transportation of hazardous materials, it identifies the emergency response to all hazardous material incidents which are mostly transportation related.

4.5 Natural Hazards Summary

As detailed in the hazard identification section, those hazards identified as a high or medium significance in Table 4-166 are considered priority hazards for mitigation planning. Those hazards that occur infrequently or have little or no impact in the Madera County Planning Area were determined to be of low significance and not considered a priority hazard. Significance was determined based on the hazard profile, focusing on key criteria such as frequency, extent, and resulting damage, including deaths/injuries and property, natural and cultural resources, and economic damage. The ability of a jurisdiction to reduce losses through implementation of existing and new mitigation measures was also considered as to the significance of a hazard. This assessment was used to prioritize those hazards of greatest significance in the Madera County Planning Area, enabling the County and participating jurisdictions to focus resources where they are most needed.

Table 4-166 Hazard Identification and Initial Determination of Priority Hazards

Hazard	Likelihood of Future Occurrence	Vulnerability	Priority Hazard
Agricultural Hazard: Severe Weather/Pests/Invasives	Likely	High	Y
Climate Change	Likely	Medium	Y
Dam Failure	Unlikely	High	Y
Drought & Water shortage	Likely	High	Y
Earthquake (w/subhazards)	Unlikely	High	Y
Floods: 1%/0.2% annual chance (w/levee failure)	Occasional/ Unlikely	High	Y
Floods: Localized Stormwater	Highly Likely	High	Y
Hazardous Materials Transportation	Occasional	Medium	Y
Landslide, Mudslide, Debris Flow	Likely	Medium	Y
Severe Weather: Extreme Cold, Freeze, and Snow	Highly Likely	Medium	Y
Severe Weather: Extreme Heat	Highly Likely	Medium	Y
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)	Highly Likely	Medium	Y
Severe Weather: High Winds and Tornadoes	Highly Likely	Medium	Y
Wildfire (w/smoke and air quality)	Highly Likely	Extremely High	Y

Chapter 5 Mitigation Strategy

44 CFR §201.6(c)(3) and §201.7(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 this 2026 Madera County LHMP Update. It describes how all the participating jurisdictions met the following requirements from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

5.1 Mitigation Strategy: Overview

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 mitigation strategy and mitigation action plan for this LHMP Update. As part of the LHMP Update process, a comprehensive review and update of the mitigation strategy portion of the 2018 Madera County LHMP was conducted. Some of the initial goals and objectives from the previous LHMP were refined and reaffirmed, some goals were deleted, and others were added. The end result was a new set of goals, to reflect the completion of, or progress towards the 2018 mitigation actions, the updated risk assessment, and the new priorities of participating jurisdictions and this 2026 LHMP Update.

To support the updated mitigation strategy including updated goals, the mitigation actions from the 2018 LHMP were reviewed and assessed for their value in reducing risk and vulnerability to the Madera County Planning Area from identified hazards and further evaluated for their inclusion in this LHMP Update (See Chapter 2 What's New). Section 5.2 below identifies the new goals and objectives of this 2026 LHMP Update and Section 5.4 details the new mitigation action plan.

Taking all of the above into consideration, the participating jurisdictions and HMPC developed the following umbrella mitigation strategy for this LHMP Update:

- Communicate the hazard information collected and analyzed through this planning process as well as mitigation success stories so that the community better understands what can happen where and what they themselves can do to be better prepared.
- Implement the mitigation action plan recommendations of this Plan.
- Use existing rules, regulations, policies, and procedures already in place.
- Monitor multi-objective management opportunities so that funding opportunities may be shared and packaged, and broader constituent support may be garnered.

5.1.1. Continued Compliance with NFIP

Given the nature and extent of the flood hazard in the Madera County Planning Area, an emphasis will be placed on continued compliance with the National Flood Insurance Program (NFIP) by all communities. This Chapter 5 of the Base Plan for the County and the jurisdictional annexes for the two cities, as the three eligible NFIP communities, provides an overview of their flood management programs and continued compliance with the NFIP.

To participate in the NFIP a community must adopt and enforce floodplain management regulations that meet or exceed the minimum requirements of the Program. These requirements are intended to prevent loss of life and property and to reduce taxpayer's costs for disaster relief as well as minimize economic and social hardships that result from flooding. Participation in the NFIP provides a community with access to flood insurance.

Detailed below is a description of the County's flood management program to ensure continued compliance with the NFIP. Also to be considered are the flood mitigation actions contained in this LHMP that support the ongoing efforts by the County to minimize the risk and vulnerability of the community to the flood hazard and to enhance their overall floodplain management program.

Madera County's Flood Management Program

Madera County initially joined the NFIP as an Emergency Entry on March 3, 1972, and has participated in the Regular Phase of the NFIP since August 4, 1987. Since then, the County has administered floodplain management regulations that meet the minimum requirements of the NFIP. Under that arrangement, residents and businesses paid the same flood insurance premium rates as most other communities in the country.

The Community Rating System (CRS), a voluntary program under the NFIP, was created in 1990. It is designed to recognize floodplain management activities that go above and beyond the NFIP's minimum requirements. If a community implements public information, mapping, regulatory, loss reduction and/or flood preparedness activities and submits the appropriate documentation to FEMA, then its residents can qualify for a flood insurance premium rate reduction. The County does not currently participate in the CRS program.

Presently, the County manages its floodplains in compliance with NFIP requirements and implements a floodplain management program designed to protect the people and property of the County. Floodplain regulations are a critical element in local floodplain management and are a primary component in the County's participation in the NFIP.

The County will continue to manage their floodplains in continued compliance with the NFIP. An overview of the County's NFIP status and floodplain management program is discussed on Table 5-1.

Table 5-1 Madera County NFIP Status

NFIP Topic	Comments
Staff Resources	
Who is responsible for floodplain management in your community? Provide Department/Title. Do they serve any roles other than Community Floodplain Administrator (FPA)?	County Engineer and Director (along with Flood Control Staff) of Public Works department. They serve other roles as well.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	Yes
Is floodplain management an auxiliary function?	Yes
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Permitting, GIS, inspections, public information
What are the barriers to running an effective NFIP program in the community, if any?	Undetermined
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	440 policies in force $91,460,000 insurance in force $340,228 in annual premiums
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	55 paid claims $585,296.50 in paid losses 0 substantial damage claims
How many structures (residential and non-residential) are exposed to flood risk within the community?	4,582 in 1% annual flood zone 388 in 0.2% annual flood zone
Are there Repetitive Loss (RL) and Severe Repetitive Loss Properties (SRL) structures in the community?	CIS Data: 6 RL, 0 SRL PIVOT Data: 1 RL(Residential) 1 SRL (Non-Residential)
Describe any areas of flood risk with limited NFIP policy coverage	None known
How does the community teach property owners or other stakeholders about the importance of flood insurance?	Communication as needed, one on one at the homeowner's request, as well as an electronic newsletter.
What digital sources (like the FEMA Map Service Center, National Flood Hazard Layer) or non-regulatory tools does the community use?	FEMA Map Service Center, DWR map site for Best Available Maps
Compliance History	
Is the community in good standing with the NFIP?	Yes
Are there any outstanding compliance issues (i.e., current violations)?	No
Who is responsible (Department, Title) for making substantial damage/improvement determinations? How does the community identify substantially damaged/improved structures? What is the process to make sure these structures are brought into compliance?	Public Works and the Building Department work together to make substantial damage determinations. If the property is to be rehabilitated, the floodplain ordinance and building codes are enforced to the most recent standard in order to bring properties into compliance.

NFIP Topic	Comments
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	CAV 3/30/2015
Is a CAV or CAC scheduled or needed?	No
Regulation	
When did the community enter the NFIP?	8/4/1987
Are the FIRMs digital or paper?	Digital
Has the community adopted the NFIP minimum floodplain management criteria via local regulation? Date of current local regulation?	Yes. 2008.
Has the community adopted the latest effective FIRM? Date adopted?	Yes. 2008.
How does the community enforce local floodplain regulations and monitor compliance?	When permits are sought, floodplain maps are used to determine if the floodplain will affect the developed parcel. If so, the floodplain ordinance is enforced by the Building Department.
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Meet
How are Letters of Map Change (LOMCs) tracked and compiled?	Kept of file at County offices by the floodplain administrator.
Provide an explanation of the permitting process.	Every permit submitted to the planning department is routed through public works and therefore conditioned to be compliance with our National Flood Insurance Program. The Counties biggest challenges have been illegal structures that have been built without the permits. Wood Rodgers has met the criteria set by Madera County Flood Control and Water Conservation Agency to provide elevation certificates.
Community Rating System	
Does the community participate in CRS? If so, what is the community's CRS Class Ranking?	No
What categories and activities provide CRS points and how can the class be improved?	N/A
Does the plan include CRS planning requirements?	N/A

Source: FEMA CIS, FEMA PIVOT, Madera County

*FEMA CIS and PIVOT databases record this data differently; thus, results utilized differ depending on the source.

5.1.2. Integration of Mitigation with Post Disaster Recovery and Mitigation Strategy Funding Opportunities

Hazard mitigation actions are essential to weaving long-term resiliency into all community recovery efforts so that at-risk infrastructure, development, and other community assets are stronger and more resilient for the next severe storm or hazard event. Mitigation measures to reduce the risk and vulnerability of a community to future disaster losses can be implemented in advance of a disaster event and also as part of post-disaster recovery efforts.

Mitigation applied to recovery helps communities become more resilient and sustainable. It is often most efficient to fund eligible infrastructure mitigation through FEMA's Public Assistance mitigation program if the asset was damaged in a storm event. Mitigation work can be added to project worksheets if they can be proven to be cost-beneficial.

Integration of mitigation into post disaster recovery efforts should be considered by all communities as part of their post disaster redevelopment and mitigation policies and procedures. Post-disaster redevelopment and mitigation policies and procedures are evaluated and updated as part of the Emergency Operations Plan (EOP) updates and other emergency management plans for each community.

These EOP's and other emergency management documents, through its policies and procedures, seek to mitigate the effects of hazards, prepare for measures to be taken which will preserve life and minimize damage, enhance response during emergencies and provide necessary assistance, and establish a recovery system in order to return the community to their normal state of affairs. Mitigation is emphasized as a major component of recovery efforts.

Mitigation Strategy Funding Opportunities

An understanding of the various funding streams and opportunities enable the communities to match identified mitigation projects with the grant programs that are most likely to fund them. Additionally, some of the funding opportunities can be utilized together. Mitigation grant funding opportunities available pre- and post- disaster include the following.

FEMA HMA Grants

Cal OES administers four main types of HMA grants: (1) Hazard Mitigation Grant Program, (2) Pre-Disaster Mitigation Program, (3) Flood Mitigation Assistance Program, and (4) Building Resilient Infrastructure and Communities. Eligible applicants for the HMA include state and local governments, certain private non-profits, and federally recognized Indian tribal governments. While private citizens cannot apply directly for the grant programs, they can benefit from the programs if they are included in an application sponsored by an eligible applicant.

FEMA Public Assistance Section 406 Mitigation

The Robert T. Stafford Disaster Relief and Emergency Assistance Act provides FEMA the authority to fund the restoration of eligible facilities that have sustained damage due to a presidentially declared disaster. The regulations contain a provision for the consideration of funding additional measures that will enhance a facility's ability to resist similar damage in future events.

Community Development Block Grants

The California Department of Housing and Community Development administers the State's Community Development Block Grant (CDBG) program with funding provided by the U.S. Department of Housing and Urban Development. The program is available to all non-entitlement communities that meet applicable threshold requirements. All projects must meet one of the national objectives of the program – projects must benefit 51 percent low- and moderate-income people, aid in the prevention or clearance of slum and blight, or meet an urgent need. Grant funds can generally be used in federally declared disaster areas for

CDBG eligible activities including the replacement or repair of infrastructure and housing damaged during, or as a result of, the declared disaster.

Small Business Loans

SBA offers low-interest, fixed-rate loans to disaster victims, enabling them to repair or replace property damaged or destroyed in declared disasters. It also offers such loans to affected small businesses to help them recover from economic injury caused by such disasters. Loans may also be increased by up to 20 percent of the total amount of disaster damage to real estate and/or leasehold improvements to make improvements that lessen the risk of property damage by possible future disasters of the same kind.

Increased Cost of Compliance

Increased Cost of Compliance (ICC) coverage is one of several resources for flood insurance policyholders who need additional help rebuilding after a flood. It provides up to $30,000 to help cover the cost of mitigation measures that will reduce flood risk. ICC coverage is a part of most standard flood insurance policies available under NFIP.

5.2 Goals and Objectives

44 CFR §201.6(c)(3)(i) and §201.7(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 participating jurisdictions, along with the HMPC, have organized resources, assessed hazards and risks, and documented mitigation capabilities. The resulting goals, objectives, and mitigation actions were developed based on these tasks. The HMPC held a series of meetings and exercises designed to achieve a collaborative mitigation strategy as described further throughout this section. Appendix C documents the information covered in these mitigation strategy meetings, including information on the goals development and the identification and prioritization of mitigation alternatives by the HMPC and participating jurisdictions.

During the initial goal-setting meeting, the HMPC reviewed the results of the hazard identification, vulnerability assessment, and capability assessment. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the HMPC to formulate planning goals and objectives and to develop the mitigation strategy for the Madera County Planning Area.

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.

HMPC members were provided with the list of goals from the 2018 LHMP as well as a list of other sample goals to consider. The team was told that they could use, combine, or revise the statements provided or develop new ones, keeping the risk assessment in mind. Each member was asked to provide three goal statements. Goal statements were collected and grouped into similar themes and provided to the HMPC. Some of the statements were determined to be better suited as objectives or actual mitigation actions and were set aside for later use. Next, the HMPC developed objectives that summarized strategies to achieve each goal. Edits and refinements to these new goals and resulting objectives were provided by the HMPC until the team came to consensus on the final goals and objectives for this 2026 LHMP Update.

Based on the risk assessment review and goal setting process, the HMPC identified the following goals, which provide the direction for reducing future hazard-related losses within the Madera County Planning Area.

Goal 1: Reduce risk and vulnerability throughout Madera County to hazards and protect lives and prevent losses to property, public health and safety, economy, and the environment

- Reduce exposure and hazard related losses to residents, visitors, businesses, governmental, non-profit, and educational partners by implementing whole-community risk reduction and resilience strategies
- Provide protection for public health and safety including vulnerable and underserved populations
- Provide protection for the existing built environment and future development
- Strengthen and protect critical facilities, utilities, and services; and community lifelines; and minimize disruption through improved infrastructure resilience and redundancy
- Provide protection for the environmental, natural, cultural, and historical resources
- Protect economic stability and continuity from hazard impacts

Goal 2: Increase community education, outreach, and awareness of risk and vulnerability to hazards and promote preparedness, engagement, and readiness to reduce hazard-related losses

- Inform and educate residents and businesses about potential hazards they are exposed to, where they occur, and what they can do to mitigate exposure or damages through a multi-media, multi-agency outreach programs
- Improve accessible resources and education for underserved and vulnerable populations, including individuals with access and functional needs
- Emphasize preparedness and self-reliance to residents
- Educate and outreach on evacuation and shelter in place routes, locations, and procedures

Goal 3: Improve communities' capabilities to prevent/mitigate hazard-related losses and to be prepared for, respond to, and recover from a disaster event

- Continue to update and maintain hazard mitigation and disaster plans to minimize risk and potential harm from future disaster losses
- Promote equitable emergency management planning and risk reduction countywide

- Continued enhancements to alert and warning, evacuation, and sheltering procedures and information for residents, businesses, visitors, individuals with access and functional needs, and animals
- Protect and improve critical transportation corridors for EMS and evacuation during emergencies
- Improve and maintain interagency communications. Ensure functionality and redundancy of communications, information technology, and other critical systems
- Increase interoperability and use of shared resources and mutual aid among agencies operating in Madera County
- Make better use of technology and evidence-based solutions
- Build capacity and strategies to increase disaster resilience among historically underserved and vulnerable populations, individuals with access and functional needs, and communities disproportionately impacted by disasters
- Improve communication and training of staff for hazard mitigation, emergency preparedness, response, and recovery measures
- Improve methods and timeliness of communication during hazard events and address disinformation promptly
- Establish enhanced data collection and retention practices as required by law
- Improve and maintain communications with governing bodies, while maintaining compliance with the Ralph M. Brown Act
- Ensure pre-planning activities include anticipation of goods and services to meet basic community needs and advance arrangements/agreements are in place to ensure swift response
- Encourage conditions that facilitate public and private stewardship

Goal 4: Increase and maintain wildfire prevention and protection

- Promote community resiliency to wildfires by reducing wildfire risk and vulnerability countywide
- Reduce life safety issues, property loss, damages, and air quality impacts associated with wildfires through education and prevention
- Develop, implement, and maintain countywide fuel reduction strategies
- Promote tree mortality monitoring and mitigation
- Promote Firewise communities and individual responsibility for wildfire prevention and protection
- Increase public knowledge on home defensible space and fire hardening methods
- Educate residents of and visitors to Madera County with wildfire safe practices
- Increase the ability of underserved and vulnerable populations to survive a wildfire event with minimal property damage and prevent loss of life
- Identify and communicate solutions to assist homeowners with wildfire insurance alternatives
- Enhance the reliability and capacity of community water systems to ensure adequate resources for fire suppression
- Promote and enhance fire-fighting capabilities (e.g., access roads, water supply, etc.)

Goal 5: Improve community resiliency to drought conditions and water shortage including establishing a sustainable water supply

- Reduce drought/water shortage risk and vulnerability in Madera County
- Promote continued groundwater sustainability programs
- Identify and mitigate hazards to prevent long-term impacts to water quality
- Enhance the reliability, capacity, and redundancy of community water systems to ensure adequate resources for end users
- Increase water storage facilities to provide for consistent water supply and to mitigate flooding
- Develop comprehensive, countywide water plan(s) to provide for existing development and to guide future development opportunities

- Address drought impacts related to tree mortality to include dead tree removal that contributes to wildfire risk (i.e., increased fuel loads), flood risk (i.e., downed trees blocking flood control facilities), severe weather, and localized flooding
- Increase water recharge opportunities and facilities

Goal 6: Improve community resiliency to flooding

- Reduce flood risk and vulnerability
- Reduce life safety issues, property loss, and damages associated with flooding
- Promote multi-agency collaboration to protect and manage natural drainageways, waterways, floodplains, and retention basins
- Prioritize stormwater master plan updates, including flood management plans for local waterways and localized areas of concern, and project implementation with considerations for climate change
- Establish ongoing funding source(s) for Madera County Flood Control Agency and other local flood control agencies
- Review appropriate flood protection infrastructure improvements in both urban and non-urban areas to provide 100-year level of protection where feasible and address localized flooding caused by stormwater and weather events

Goal 7: Improve community education and resilience to climate-related impacts to life and safety

- Continue to update and maintain climate action plans and vulnerability assessments that include analysis of climate change impacts on other natural hazards and community resilience and provide opportunities to explore impact mitigation and/or reduction
- Improve community education and response to air quality and similar climate-related vulnerabilities caused by both climate-change and natural disasters

Goal 8: Maintain FEMA eligibility for grant funding

- Conformance to federal and state hazard mitigation initiatives and maximize potential for mitigation implementation
- Position jurisdictions for grant funding through monitoring and communicating available grant programs, timelines, and processes to all agencies and community mitigation partners
- Educate jurisdictions on grant eligibility and reimbursement requirements and strategies
- Reduce exposure to hazard-related losses through realistic mitigation project planning and implementation, ensuring that actions can be undertaken and sustained without excessive depletion of economic resources

5.3 Identification and Analysis of Mitigation Actions

44 CFR §201.6(c)(3)(ii) and §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In order to identify and select mitigation actions to support the mitigation goals, each hazard identified in Section 4.1 was evaluated at the completion of the risk assessment as part of the second prioritization process to determine which hazards were priorities for mitigation strategy planning. Only those hazards

that were determined to be a priority hazard for each participating jurisdiction were considered further in the development of hazard-specific mitigation actions. Those hazards not considered a priority for mitigation strategy development were eliminated from further consideration because the risk of a hazard event to the participating jurisdiction is unlikely, the vulnerability of the participating jurisdiction is low, or capabilities are already in place to mitigate adverse impacts. Further, the resulting mitigation strategy presented in this Chapter focuses on those mitigation actions that each jurisdiction has the authority, resources, and capacity to consider for implementation over the next 5-years covered by this LHMP Update. Table 5-2 provides a listing of priority hazards by jurisdiction to be addressed in the mitigation strategy portion of this Plan.

Table 5-2 Madera County Planning Area: Mitigation Action Priority Hazards by Jurisdiction

Hazard	Madera County	City of Chowchilla	City of Madera
Agricultural Hazards (severe weather/pests/invasives)	X		
Climate Change	X		X
Dam Failure	X		X
Drought & Water shortage (w/ tree mortality)	X	X	X
Earthquake (w/subhazards)	X	X	X
Floods: 1%/0.2% annual chance (w/ levee failure)	X	X	X
Floods: Localized Stormwater	X	X	X
Hazardous Materials Transportation	X	X	
Landslide, Mudslide, Debris Flow	X		
Severe Weather: Extreme Cold, Freeze, and Snow	X		X
Severe Weather: Extreme Heat	X	X	X
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)	X	X	X
Severe Weather: High Winds and Tornadoes	X	X	X
Wildfire (w/smoke and air quality)	X	X	X

It is important to note, however, that all the hazards addressed in this LHMP are included in the multi-hazard public awareness mitigation actions as well as in other multi-hazard, emergency management actions, and other hazard-specific actions, providing benefits to all participating jurisdictions to this 2026 LHMP Update.

Once it was determined which hazards warranted the development of specific mitigation actions, the participating jurisdictions and HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of categories of mitigation actions, which originate from the Community Rating System:

- Prevention
- Property protection
- Structural projects
- Natural resource protection
- Emergency services

- Public information

The HMPC was provided with examples of potential mitigation actions for each of the above categories. The HMPC was also instructed to consider both future and existing buildings in considering possible mitigation actions. A facilitated discussion then took place to examine and analyze the options. Appendix C provides a detailed review and discussion of the six mitigation categories to assist in the review and identification of possible mitigation activities or projects. Also utilized in the review of possible mitigation measures is FEMA's publication on Mitigation Ideas, by hazard type. Prevention type mitigation alternatives were discussed for each of the priority hazards. This was followed by a brainstorming session that generated a list of preferred mitigation actions by hazard.

5.3.1. Prioritization Process

Once the mitigation actions were identified, the HMPC was provided with several decision-making tools, including FEMA's recommended prioritization criteria, STAPLEE, sustainable disaster recovery criteria; Smart Growth principles, and others, to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. STAPLEE stands for the following:

- Social: Does the measure treat people fairly? (e.g., different groups, different generations)
- Technical: Is the action technically feasible? Does it solve the problem?
- Administrative: Are there adequate staffing, funding, and other capabilities to implement the project?
- Political: Who are the stakeholders? Will there be adequate political and public support for the project?
- Legal: Does the jurisdiction have the legal authority to implement the action? Is it legal?
- Economic: Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- Environmental: Does the action comply with environmental regulations? Will there be negative environmental consequences from the action?

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority. Other criteria used to assist in evaluating the benefit-cost of a mitigation action includes:

- Contribution of the action to save life or property
- Availability of funding and perceived cost-effectiveness
- Available resources for implementation
- Ability of the action to address the problem

The initial list of mitigation actions carried forward from the 2018 LHMP and new actions identified during this planning process were reviewed and prioritized using the criteria (alternatives and selection criteria) in Appendix C.

With these criteria in mind, the HMPC were each given a set of 9 colored dots, three each of red, blue, and green. The dots were assigned red for high priority (worth five points), blue for medium priority (worth three points), and green for low priority (worth one point). The HMPC was asked to use the dots to prioritize actions with the above criteria in mind. The point score for each action was totaled. Appendix C contains the total score given to each identified mitigation action.

The process of identification and analysis of mitigation alternatives allowed the HMPC to come to consensus and to prioritize recommended mitigation actions. During the voting process, emphasis was placed on the importance of a benefit-cost review in determining project priority; however, this was not a quantitative analysis. The team agreed that prioritizing the actions collectively enabled the actions to be ranked in order of relative importance and helped steer the development of additional actions that meet the more important objectives while eliminating some of the actions which did not garner much support.

Benefit-cost was also considered in greater detail in the development of the Mitigation Action Plan detailed below in Section 5.4. The cost-effectiveness of any mitigation alternative will be further considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this 2026 LHMP Update.

Recognizing the limitations in prioritizing actions from multiple jurisdictions and departments and the regulatory requirement to prioritize by benefit-cost to ensure cost-effectiveness, the participating jurisdictions and HMPC decided to pursue actions that contributed to saving lives and property as first and foremost, with additional consideration given to the benefit-cost aspect of a project. This process drove the development of a determination of a high, medium, or low priority for each mitigation action, and a comprehensive prioritized mitigation action plan for the Madera County Planning Area.

5.4 Mitigation Action Plan

44 CFR §201.6(c)(3)(iii) and §201.7(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This mitigation action plan was developed to present the recommendations developed by the HMPC for how the Madera County Planning Area can reduce the risk and vulnerability of people, property, critical facilities and infrastructure, natural and cultural resources, and the economy to future disaster losses. Emphasis was placed on both the existing built environment and future development. This mitigation action plan summarizes who is responsible for implementing each of the prioritized actions as well as when and how the actions will be implemented. Each action summary also includes a discussion of the benefit-cost review conducted to meet the regulatory requirements of the Disaster Mitigation Act.

Table 5-3 identifies all mitigation actions for participating jurisdictions to this LHMP Update. For each mitigation action item included in Table 5-3, a detailed mitigation implementation strategy has been developed. Detailed descriptions for each mitigation action are included below for the County and within each respective jurisdictional annex to this LHMP.

The mitigation action plan summarized below contains both new action items developed for this 2026 LHMP Update as well as old actions being carried forward from the 2018 LHMP. Table 5-3 indicates whether the action is new or from the 2018 LHMP and Chapter 2 contains the details for each 2018 mitigation action item indicating whether a given action item has been completed, deleted, or deferred.

As described throughout this 2026 LHMP Update, the Madera County Planning Area has many risks and vulnerabilities to identified hazards. Although many possible mitigation actions, as detailed in Appendix C, were brainstormed and prioritized during the mitigation strategy meetings, the resulting mitigation strategy presented in this Chapter 5 of this LHMP focuses only on those mitigation actions that are both reasonable and realistic for the communities to consider for implementation over the next 5-years covered by this 2026 Update. Thus, only a portion of the actions identified in Appendix C have been carried forward into the mitigation strategy presented in Table 5-3. Although many good ideas were developed during the mitigation action brainstorming process, the reality of determining which priority actions to develop and include in this LHMP Update came down to the actual priorities of communities, individuals and departments based in part on department direction, staffing, and available funding. The overall value of the mitigation action table in Appendix C is that it represents a wide-range of mitigation actions that can be consulted and developed for this LHMP Update during annual plan reviews and the formal 5-year update process.

It is also important to note that the participating jurisdictions have numerous existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents, such as stormwater and drainage plans, flood and water management plans, fire plans, climate plans, and capital improvement budgets and reports. These actions are considered to be part of this LHMP, and the details, to avoid duplication, should be referenced in their original source document. The HMPC also realizes that new

needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to the overall goals of this LHMP Update.

Further, it should be clarified that the actions included in this mitigation strategy are subject to further review and refinement; alternatives analyses; and reprioritization due to funding availability and/or other criteria. The participating jurisdictions are not obligated by this document to implement any or all of these projects. Rather this mitigation strategy represents the desires of the jurisdictions to mitigate the risks and vulnerabilities from identified hazards. The actual selection, prioritization, and implementation of these actions will also be further evaluated in accordance with the mitigation categories and criteria contained in Appendix C.

It should be noted that many of the projects submitted by each jurisdiction in Table 5-3 benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the public outreach actions, as well as many of the emergency services actions, apply to all hazards regardless of hazard priority. Collectively, this multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this 2026 LHMP Update.

Table 5-3 Madera County Planning Area Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Madera County					
Multi-Hazard Actions					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	Previous Action	X	X	X	Prevention Public Education
Action 3. Secondary Evacuation Routes during Emergencies	New Action	X	X		Prevention Property Protection Natural Resource Protection Emergency Services Public Information
Agricultural Hazard: Severe Weather/Pests/Invasives Actions					
Action 4. Agricultural Emergency Preparedness Plan	Previous Action	X	X		Prevention Natural Resource Protection Emergency Services

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Climate Change Actions					
Action 5. Climate Preparedness and Response Plan	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Dam Failure Action					
Action 6. Dam Monitoring and Early Warning Enhancement Program	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services
Drought and Water Shortage Actions					
Action 7. DWR Grant Program for SB 552 - Drought Task Force and County Drought Resiliency Planning and Project Implementation (Short term (i.e., Availability and Distribution of Water during Hazard Events) and Long-Term Planning (such as System Enhancements, Consolidation, etc.))	New Action	X	X		Prevention Property Protection
Action 8. Groundwater Recharge	New Action	X			Property Protection Natural Resource Protection
Action 9. Countywide Domestic Well Mitigation Programs (including Madera County – Madera GSA "White Area" DWMP).	Previous Action	X	X		Property Protection Natural Resource Protection
Action 10. Groundwater Sustainability Plans (GSPs)	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 11. Countywide Domestic Well Mitigation Programs (including Madera County – Madera GSA "White Area" DWMP).	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 12. Emergency Water Storage Tanks	New Action	X	X		Prevention Property Protection Natural Resource Protection
Earthquake Actions					
Action 13. Seismic Assessment and Retrofit of Critical Facilities	Previous Action	X	X		Emergency Services Property Protection Natural Resource Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Flood, Localized Flood, Severe Weather: Heavy Rains and Storm Actions					
Action 14. Establish Tactical Facilities for firefighting, Floodfighting, etc. (Airports, Heliports, Water Facilities, and Others and to Include Sandbag Locations at Fire Stations, USFS Facilities, Maintenance Yards, and Other Locations; w/ Public Education Component	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services Public Information
Action 15. Stormwater Plan updates and Project Implementation w/ Considerations for Climate Change	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 16. Continue to Implement and Maintain Routine Maintenance Processes/SOPs/projects Contained in the Flood O & M Manuals to Include: Vegetation Removal, Rodent Control, Sediment Removal, Erosion Repair and Restoration, Rehabilitation of Levee Patrol Roads, Flood Channel and Levee Inspections	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services
Action 17. Localized Flood Mitigation	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services
Hazardous Materials Transportation Actions					
Action 18. Hazardous Materials Incident Prevention and Response Mitigation	Previous Action	X	X		Prevention Property Protection Natural Resource Protection Emergency Services
Landslide, Mudslide, and Debris Flow Action					
Action 19. Madera County GIS Inventory & Risk Mapping: Landslide/Slide Locations and Roadside Culverts	New Action	X	X		Prevention Property Protection Natural Resource Protection Emergency Services
Severe Weather: Extreme Cold Actions					
Action 20. Countywide Snow Removal and Haul-Out Operations Plan for Public Roadways	Previous Action	X	X		Property Protection Emergency Services
Action 21. Create, Maintain, Enhance, and Outreach – Senior Firewood Assistance Program	New Action	X	X		Prevention Property Protection Natural Resource Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Wildfire Actions (with Smoke and Air Quality), Drought and Water Shortage, Landslide, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados					
Action 22. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Mudge Ranch/French Gulch Wildfire Fuels Reduction Project	New Action	X	X		Property Protection Natural Resource Protection
Action 23. Expansion of Strategic Hazard Reduction Burning Program in High-Risk Wildland–Urban Interface (WUI) Corridors	Previous Action	X	X		Property Protection Natural Resource Protection
Action 24. Removal of Down & Dead Trees	New Action	X	X		Property Protection Natural Resource Protection
Action 25. Taylor Mountain Fuel Break	New Action	X	X		Property Protection Natural Resource Protection
Action 26. Eastern Madera County WUI Communities Landscape Vegetation Treatments	New Action	X	X		Property Protection Natural Resource Protection
Action 27. Fire Adapted Madera County Collaborative Planning and Outreach Initiative: Preparation, Mitigation, Response, and Recovery Action	New Action	X	X		Prevention Property Protection Natural Resource Protection Public Information
Action 28. Fuel Reduction within Recognized Firewise Communities & Growth/Development of the Firewise Program (subject to change)	Previous Action	X	X		Prevention Property Protection Natural Resource Protection Public Information
Action 29. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Konklin Road Wildfire Fuels Reduction Project	New Action	X	X		Property Protection Natural Resource Protection
Action 30. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Bass Lake South Wildfire Fuels Reduction Project	New Action	X	X		Property Protection Natural Resource Protection
Action 31. Eastern Madera County Strategic Home Hardening Program	New Action	X	X		Prevention Property Protection
Action 32. Eastern Madera County WUI Community Evacuation Route	New Action	X	X		Prevention Emergency Services
Action 33. Strategic Water Storage Infrastructure Project – Eastern Madera County WUI	New Action	X	X		Prevention Property Protection Structural Projects
Action 34. Fresno River Unsheltered Encampment Fire Risk	New Action	X	X		Prevention Property Protection Structural Projects

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 35. Home Hardening against Wildfires	New Action	X	X		Prevention Property Protection Structural Projects
Action 36. Helicopter Water Dip Site (Drafting Pond/Tank) Connected to Main Water System with Remote-Control/Automated Filling for Wildfire Suppression	New Action	X	X		Prevention Property Protection Structural Projects
City of Chowchilla					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	Previous Action	X	X	X	Prevention Public Information
Action 3. Stormwater Pump Station Resilience Project	Previous Action	X	X	X	Property Protection
Action 4. Well Site Backup Generator Project	Previous Action	X	X		Property Protection Emergency Services
Action 5. SCADA System Modernization Project	New Action	X	X		Property Protection
Action 6. New Production Wells for Water Supply Redundancy	New Action	X	X		Property Protection Natural Resource Protection
Action 7. SR 99 / SR 233 Interchange and Bridge Expansion Project	New Action	X	X		Structural Projects
Action 8. Ventura Avenue Complete Streets and Evacuation Route Project	New Action	X	X		Structural Projects Emergency Services
Action 9. Citywide Tree Trimming and Vegetation Management Program	New Action	X	X		Property Protection Natural Resource Protection
Action 10. Truman Pond Flood Control and Stormwater Recharge Project	New Action	X	X	X	Property Protection Natural Resource Protection
Action 11. Wastewater Treatment Plant (WWTP) Electrical and Process Resilience Project	New Action	X	X		Property Protection Natural Resource Protection
Action 12. Airport Runway Drainage and Stormwater Improvements Project	New Action	X	X	X	Property Protection Natural Resource Protection Structural Projects

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 13. Ash Slough/Berenda Slough Levee Improvement and Erosion Repair Project	Previous Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 14. Municipal Yard Fueling and Operations Resilience Project	New Action	X	X		Property Protection Natural Resource Protection
City of Madera					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	New Action	X	X	X	Prevention Public Education
Action 3. Storm Drain Master Plan Update, Stormwater Retention Improvements, Debris Removal and Minimizing Localized Flooding	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection Structural Projects
Action 4. Basin/Water Storage Capacity	New Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 5. Pavement Management Systems	New Action	X	X		Property Protection
Action 6. Development of Climate Action Plans: i.e., Climate Action Plan, Climate Adaptation Plan, Climate Vulnerability Assessment	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 7. Supervisory Control and Data Acquisition (SCADA) Upgrade	New Action	X	X		Property Protection
Action 8. Tree Trimming Program/Urban Forestry Team	New Action	X	X		Property Protection Natural Resource Protection
Action 9. Participate in Update to Groundwater Sustainability Plan and Implement Plan Recommendations	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 10. Water Conservation Program Implementation	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 11. Water Tank Improvements	New Action	X	X		Property Protection Natural Resource Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 12. Update Urban Water Management Plan and Implement Plan Recommendations	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 13. Seismic Retrofit Programs	New Action	X	X		Prevention Property Protection Structural Projects
Action 14. Conduct Exploratory Studies Regarding Natural Waterways Related to Capacity-building, Bank Stability, and Property Preservation	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 15. Implement Communication System(s) to Ensure Information is Shared Timely and all Citizens have Access.	New Action	X	X		Public Information Emergency Services
Action 16. Backup Power Redundancy & Fuel Tanks for Critical Infrastructure	New Action	X	X		Property Protection Emergency Services
Action 17. Update Safety Element	New Action	X	X		Prevention
Action 18. Debris Removal, Tree Trimming and Fresno River Restoration	New Action	X	X	X	Property Protection Natural Resource Protection
Action 19. Yellow Reflective Border on Traffic Signal Backplates	New Action	X	X		Emergency Services
Action 20. Heating and Cooling Centers and Buildings of Respite for Vulnerable Population	New Action	X	X		Prevention Emergency Services Public Information
Action 21. Target Hardening for Extreme Weather and Air Quality for Public Infrastructure and Buildings	New Action	X	X		Property Protection Emergency Services
Action 22. Grade Separation for Railroad Lines	New Action	X	X		Emergency Services

Madera County Mitigation Actions

Multi-Hazard Actions

Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Hazards Addressed: Multi-hazard (Agricultural Hazards (severe weather/pests/invasive species), Avalanche, Climate Change, Dam Failure, Drought & Water shortage (w/ tree mortality), Earthquake (w/subhazards), Floods: 1%/0.2% annual chance (w/ levee failure), Floods: Localized Stormwater, Landslide, Mudslide, Debris Flow, Severe Weather: Extreme Cold, Freeze, and Snow, Severe Weather: Extreme Heat, Severe Weather: Heavy Rains and Storms (Hail, Lightning), Severe Weather: High Winds and Tornadoes, Wildfire (w/smoke and air quality)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Local jurisdictional reimbursement for mitigation projects and cost recovery after a disaster is guided by Government Code Section 8685.9 (Assembly Bill (AB) 2140).

Project Description: Specifically, this section requires that each applicable jurisdiction adopt a local hazard mitigation plan (LHMP) in accordance with the federal Disaster Mitigation Act of 2000 as part of the Safety Element of its General Plan. Adoption of the LHMP into the Safety Element of the General Plan may be by reference or incorporation.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be Implemented: Safety Element of General Plan

Responsible Office/Partners: Madera County Planning Department

Benefits (Losses Avoided): Incorporation of an adopted LHMP into the Safety Element of the General Plan will help jurisdictions maximize the cost recovery potential following a disaster.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budgets: General Fund, Staff Time

Timeline: Within year 1 as part of LHMP adoption

Priority (High, Medium, Low): High

Action 2. Comprehensive Public Education and Outreach Enhancement for All-Hazards Preparedness

Hazards Addressed: Multi-hazard (Agricultural Hazards (severe weather/pests/invasive species), Avalanche, Climate Change, Dam Failure, Drought & Water shortage (w/ tree mortality), Earthquake (w/subhazards), Floods: 1%/0.2% annual chance (w/ levee failure), Floods: Localized Stormwater, Landslide, Mudslide, Debris Flow, Severe Weather: Extreme Cold, Freeze, and Snow, Severe Weather:

Extreme Heat, Severe Weather: Heavy Rains and Storms (Hail, Lightning), Severe Weather: High Winds and Tornadoes, Wildfire (w/smoke and air quality))

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Madera County plays a key role in public outreach/education efforts to communicate the potential risk and vulnerability of their community to the effects of natural hazards. A comprehensive multi-hazard public education program will better inform the community of natural hazards of concern and actions the public can take to be better prepared for the next natural disaster event.

Project Description: A comprehensive multi-hazard outreach program will ascertain both broad and targeted educational needs throughout the community. The County will work with other agencies as appropriate to develop timely and consistent annual outreach messages in order to communicate the risk and vulnerability of natural hazards of concern to the community. This includes measures the public can take to be better prepared and to reduce the damages and other impacts from a hazard event. The public outreach effort will leverage and build upon existing mechanisms, will include elements to meet the objectives of Goal 2 of this LHMP Update, and will consider:

- Using a variety of information outlets, including websites, local radio stations, news media, schools, and local, public sponsored events;
- Creating and distributing (where applicable) brochures, leaflets, water bill inserts, websites, and public service announcements;
- Displaying public outreach information in County office buildings, libraries, and other public places and events;
- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be Implemented: Existing County outreach programs will be reviewed for effectiveness and leveraged and expanded upon to reach the broader region. The County desires to form a group from across county agencies to begin outreach.

Responsible Office: Madera County, Sheriff's Office of Emergency Services and Public Information Office in conjunction with all County Departments

Benefits (Losses Avoided): Improved public response in an event of emergency

Potential Funding (Local Budgets, Grant Funds, etc.): County General Fund and/or Grants, including FEMA HMA grants

Timeline: 1-5 years, and ongoing

Priority (High, Medium, Low): Medium

Action 3. Secondary Evacuation Routes during Emergencies

Hazards Addressed: Secondary evacuation routes for rural communities in Madera County – Multi-hazard (Agricultural Hazards (severe weather/pests/invasive species), Avalanche, Climate Change, Dam Failure, Drought & Water shortage (w/ tree mortality), Earthquake (w/subhazards), Floods: 1%/0.2% annual chance (w/ levee failure), Floods: Localized Stormwater, Landslide, Mudslide, Debris Flow, Severe Weather: Extreme Cold, Freeze, and Snow, Severe Weather: Extreme Heat, Severe Weather: Heavy Rains and Storms (Hail, Lightning), Severe Weather: High Winds and Tornadoes, Wildfire (w/smoke and air quality)).

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Multiple rural communities/areas of the county have only one ingress/egress to housing which makes it difficult for residents to properly evacuate during wildfire emergencies. It also creates a hazard for first responders having to use the same evacuation route to gain access to the emergency.

Project Description: Fund a study to determine what rural communities need a secondary means of ingress/egress within Madera County. Determine a proper plan to address these communities' needs and the possibility of implementing the plan.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County Fire Department will be working with other county agencies to determine the possibilities to complete emergency evacuation routes.

Responsible Office/Partners: Madera County Fire Department, Madera County Roads Department

Benefits (Losses Avoided): New well infrastructure that will operate during multiple emergencies.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA (PDM, HMGP, BRIC), or other grants to be determined, with County cost share

Timeline: 2-5 years

Project Priority (High, Medium, Low): Med-High

Agricultural Hazard: Severe Weather/Pests/Invasives Actions

Action 4. Agricultural Emergency Preparedness Plan

Hazards Addressed: Agricultural Hazards including Extreme Heat, Extreme Cold/Frost, Drought, Pest Infestation, and Related Agricultural Emergencies.

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): For many years, the County of Madera has been subject to Agricultural Emergencies with no real "playbook" to handle them, yet the same issues seem to recur. These types of damage are from heat, cold, drought, and pests. Over the past several decades, Madera County has experienced recurring agricultural emergencies caused by extreme heat, frost, prolonged drought, and pest infestations. Despite the frequency and economic impact of these events, the County does not currently maintain a comprehensive, formalized Agricultural Emergency Preparedness Plan.

Response efforts have historically been managed on a case-by-case basis without a standardized framework, resulting in recurring operational challenges, delayed coordination, and inconsistent mitigation strategies. Given the economic significance of agriculture to Madera County, the absence of a structured preparedness and mitigation strategy increases vulnerability to repeated losses.

Project Description: This project will involve a comprehensive review and analysis of significant and repetitive agricultural emergency events in Madera County over the past 50 years. The analysis will identify primary hazard drivers, frequency and severity trends, economic and operational impacts, and gaps in mitigation and response efforts. The resulting Agricultural Emergency Preparedness Plan will:

- Identify the most significant threats to Madera County's agricultural industry.
- Establish targeted mitigation actions to reduce long-term risk and economic loss.
- Define pre-incident preparedness measures, including monitoring, coordination, and resource readiness.
- Outline clear response protocols and operational procedures serving as a standardized response playbook for the Agricultural Commissioner's Office and County OES.
- Integrate agricultural emergency coordination within the County's Incident Command System (ICS) structure.

The completed plan will be structured for adoption as an annex to the Madera County Emergency Operations Plan (EOP).

Other Alternatives: Development of a response-only playbook without conducting a historical hazard and vulnerability analysis. This alternative was determined to be less effective because it would not incorporate long-term mitigation strategies or address the root causes of recurring agricultural losses.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Annex to the Madera County Emergency Operations Plan (EOP). Integration into the Local Hazard Mitigation Plan (LHMP). Alignment with applicable State and Federal agricultural emergency guidance.

Responsible Office/Partners:

- Madera County Agricultural Commissioner's Office
- Madera County Sheriff's Office of Emergency Services (OES)
- Local agricultural stakeholders and industry representatives (as appropriate)
- State agricultural agencies (as applicable)

Benefits (Losses Avoided):

- Reduced economic losses from recurring agricultural hazards.
- Improved interagency coordination and operational efficiency.
- Faster and more consistent implementation of emergency responses.
- Increased resilience of the County's agricultural sector.
- Enhanced eligibility for state and federal mitigation and disaster funding.

Potential Funding (Local Budgets, Grant Funds, etc.):

- County staff time (Agricultural Commissioner and OES).
- Local general fund allocation, if required.
- State or Federal Hazard Mitigation Assistance (HMA) grant programs.
- Agricultural resilience or disaster preparedness grant funding, as available.

Timeline: Within 1-5 years; Estimated 18 months for development, stakeholder coordination, review, and adoption.

Project Priority (High, Medium, Low): Medium

Climate Change Actions

Action 5. Climate Preparedness and Response Plan

Hazards Addressed: Climate Change Impacts, including: Extreme Heat, Prolonged Drought, Severe Storm Events, Flooding, Wildfire Conditions, and Air Quality Degradation

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): Over the past decade, Madera County has experienced increasingly frequent and severe impacts associated with climate variability and long-term climate change. These impacts include prolonged drought, extreme heat events, intensified storm systems, escalating wildfire risk, and related secondary effects on public health, infrastructure, water supply, agriculture, and vulnerable populations.

While individual hazard mitigation and emergency response efforts exist, the County does not currently maintain a comprehensive Climate Preparedness and Response Plan that systematically identifies climate-related risks, establishes long-term adaptation strategies, and formalizes coordinated response actions.

The absence of a consolidated climate framework limits the County's ability to proactively reduce long-term vulnerability, prioritize resilience investments, and coordinate cross-departmental climate adaptation initiatives.

Project Description: This project will involve a structured assessment of climate-related hazard events and trends in Madera County over the past 10 years, including:

- Frequency and severity analysis of climate-driven incidents
- Identification of vulnerable populations, infrastructure, and economic sectors
- Evaluation of cascading and compound hazard risks
- Assessment of existing mitigation gaps

Based on this assessment, the County will develop a comprehensive Climate Preparedness and Response Plan that will:

1. Identify the most significant climate-related threats to Madera County.

2. Establish long-term mitigation and climate adaptation strategies.

3. Define measurable resilience goals and implementation priorities.

4. Outline emergency response protocols for climate-driven incidents.

5. Provide a standardized operational "response playbook" for County departments.

6. Integrate climate adaptation considerations into land use planning, capital improvement planning, and infrastructure investment decisions.

The completed plan will serve as a strategic climate adaptation annex and will align with the County's Local Hazard Mitigation Plan (LHMP) and Emergency Operations Plan (EOP).

Other Alternatives: Development of a response-only playbook without conducting a climate risk and vulnerability assessment. This alternative was determined to be insufficient because it would focus solely on reactive measures and not address long-term climate adaptation, resilience building, or prioritization of mitigation investments.

Existing Planning Mechanism(s) through which Action Will Be Implemented:

- Local Hazard Mitigation Plan (LHMP) update and integration
- Annex to the Madera County Emergency Operations Plan (EOP)
- Integration with General Plan Safety Element (as applicable)
- Alignment with State climate adaptation guidance and FEMA mitigation frameworks

Responsible Office/Partners:

- Madera County Sheriff's Office of Emergency Services (OES)
- County Administration
- Public Works
- Planning Department
- Environmental Health
- Agricultural Commissioner (as applicable)
- Regional and State partners

Benefits (Losses Avoided):

- Reduced long-term infrastructure damage and repair costs
- Decreased public health impacts during extreme heat and poor air quality events
- Improved water resource resilience during drought conditions
- Reduced wildfire exposure and secondary economic losses
- Improved interdepartmental coordination and planning efficiency
- Enhanced eligibility and competitiveness for State and Federal climate resilience funding.

Without a comprehensive climate preparedness framework, future climate-related damages are likely to increase in frequency, severity, and cost.

Potential Funding (Local Budgets, Grant Funds, etc.):

- County staff time (OES and partner departments)
- General Fund allocation (if required)
- FEMA Hazard Mitigation Assistance (HMA) programs
- Building Resilient Infrastructure and Communities (BRIC) funding
- State climate resilience grants
- Federal infrastructure and adaptation funding opportunities

Timeline: Within 1-5 years; Estimated 18 months for assessment, stakeholder coordination, drafting, review, and formal adoption.

Project Priority (High, Medium, Low): Medium

Dam Failure Actions

Action 6. Dam Monitoring and Early Warning Enhancement Program

Hazards Addressed: Dam Failure and Secondary Flooding Impacts

Goals Addressed: 1, 2, 3, 5, 6, 7, 8

Issue/Background (Problem Statement): Several dams within and upstream of Madera County lack comprehensive hydrologic monitoring coverage at critical inflow and outflow points. Existing monitoring infrastructure does not fully capture real-time conditions in feeder waterways, spillways, or downstream discharge channels.

Limited situational awareness reduces the County's ability to detect abnormal inflow conditions, anticipate overtopping risks, identify rapid changes in discharge, and implement timely emergency response actions. In the event of extreme precipitation, rapid snowmelt, infrastructure malfunction, or structural compromise, insufficient monitoring may delay warning, evacuation coordination, and downstream protective measures.

Given the potential life-safety and infrastructure impacts associated with dam failure or uncontrolled releases, enhanced monitoring capability is a critical risk-reduction measure.

Project Description: The 2018 Local Hazard Mitigation Plan identified the development of a dam monitoring program as a priority action to increase situational awareness. Since that time, the County has installed monitoring devices at select flood-prone locations, improving real-time flood awareness.

This project expands upon those improvements by implementing a comprehensive dam monitoring enhancement program that includes:

- Installation of additional real-time water level sensors at dam inflow points
- Monitoring of outflow discharge channels and spillway conditions
- Integration of monitoring equipment with County emergency management systems
- Establishment of threshold alert triggers for operational decision-making
- Coordination with dam operators and state regulatory agencies

The enhanced monitoring system will improve the County's ability to:

- Detect abnormal hydrologic conditions early
- Monitor rapid inflow increases during storm events
- Track discharge rates and downstream flood potential
- Support evacuation and public warning decisions
- Reduce response time during potential dam-related emergencies

Where feasible, the monitoring system will be designed for interoperability with regional and state data systems to ensure redundancy and information sharing.

Other Alternatives: No action. Maintaining the current level of monitoring was considered but determined to be inadequate to address identified gaps in inflow and outflow awareness at key dam locations.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Local Hazard Mitigation Plan (LHMP), Emergency Operations Plan (EOP), Dam Emergency Action Plans (EAPs), where applicable, and Coordination with State dam safety regulatory frameworks

Responsible Office/Partners:

- Madera County Sheriff's Office of Emergency Services (OES)
- Dam owners and operators
- County Public Works (as applicable)
- California Department of Water Resources (Division of Safety of Dams), as applicable

Benefits (Losses Avoided):

- Improved early warning capability for dam overtopping or structural risk
- Faster activation of emergency response and evacuation protocols
- Reduced risk to downstream life and property
- Enhanced decision-making during high inflow storm events
- Decreased potential infrastructure damage from uncontrolled releases
- Improved coordination between dam operators and emergency management

Enhanced situational awareness significantly reduces the probability of delayed response during high-consequence, low-frequency dam failure events.

Potential Funding (Local Budgets, Grant Funds, etc.):

- County staff time (OES coordination and oversight)
- Local capital improvement funds (as available)
- FEMA Hazard Mitigation Assistance (HMA) programs
- Building Resilient Infrastructure and Communities (BRIC) funding
- State water infrastructure or dam safety grant programs

Timeline: Within 1- 5 years; Estimated 12 months for procurement, installation, system integration, and operational testing.

Drought and Water Shortage Actions

Action 7. DWR Grant Program for SB 552 - Drought Task Force and County Drought Resiliency Planning and Project Implementation (Short term (i.e., Availability and Distribution of Water during Hazard Events) and Long-Term Planning (such as System Enhancements, Consolidation, etc.))

Hazards Addressed: Drought and Water Shortage

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): Satisfy the requirements of Senate Bill 552 (Drought Planning for Small Water Suppliers and Rural Communities, SB 552) and to prepare the Madera County for future droughts and water shortages. Create a Drought Plan that improves the County's preparedness for and resiliency to drought in a number of keyways.

Project Description: First, it explores the risk of water shortage for the County's self-supplied communities, including analysis of State data and local stakeholder feedback. Second, opportunities to improve reliability through water system consolidation are considered. Third, create an action plan to include the monitoring protocols the County will use to detect water shortages, and interim and long-term solutions for state small water systems and domestic wells within the County. Lastly, the Drought Plan will conclude with recommendations for additional policies and actions which can further improve the County's preparedness for droughts and water shortages. Overall, the Drought Plan allows the County to anticipate water shortages before they occur and respond proactively, reducing the risk of drought impacts throughout the County.

Other Alternatives:

- Reduce drought/water shortage risk and vulnerability in Madera County
- Promote continued groundwater sustainability programs
- Identify and mitigate hazards to prevent long-term impacts to water quality
- Enhance the reliability and capacity of community water systems to ensure adequate resources for end users
- Increase water storage facilities to provide consistent water supply and to mitigate flooding
- Address drought impacts related to tree mortality to include dead tree removal that contributes to wildfire risk (i.e., increased fuel loads) and flood risk (i.e., downed trees blocking flood control facilities)

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing SB552 Drought and Water Storage Risk Analysis and Response Plan (October 2024) and existing Drought Work Group that meets quarterly during non-emergency/drought years and monthly during Drought years.

Responsible Office/Partners: Madera County Water & Natural Resources, Sheriff's Office of Emergency Services, Madera County Flood Control and Water Conservation Agency, Madera County Environmental Health, Madera County Groundwater Sustainability Agencies

Benefits (Losses Avoided): Improved system resiliency and customer affordability (consolidation of wells), possible financial and health benefits,

Potential Funding (Local Budgets, Grant Funds, etc.): SB552 provided a small grant to write the plan and drill a monitoring well, this was also used for facilitation purposes. The County provides a small budget through the general fund to support the drought work

Timeline: 1- 5 years - From the start of the plan and ongoing, based on weather and climate change.

Project Priority (High, Medium, Low): Currently low priority as there is no dedicated staff or full funding to run this program. It could become a high priority matter if the drought returns in full force.

Action 8. Groundwater Recharge

Hazards Addressed: Drought and Water Shortage

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): Lowering groundwater levels due to agricultural over pumping has resulted in domestic wells going dry at a high rate. Dropping groundwater levels can also lead to degraded water quality, limiting the community's overall access to safe, clean drinking water.

Finally, land subsidence due to dropping water levels can cause damage to key infrastructure, including roads, bridges and canals, and an overall reduction in aquifer storage.

Project Description: Recharge with flood flows reduces flood risks and benefits the groundwater. Senate Bill 122 has modified the California Water Code (1242.1) to allow temporary equipment to be in place to divert flood flows to conduct on-farm recharge and divert flood flows to dedicated recharge basins. Growers are encouraged to divert flood flows to recharge the underground aquifers to help reduce the impacts of over pumping and increase sustainability. Growers in Madera County GSAs, can meter their recharge water that they place on their property and receive allocation credits that they can later use towards the allowed overall water usage. Recharge occurs in other GSAs in various ways.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County GSAs adopted Resolution 2024-030 with Policies governing the practices of recharge. Recharge occurs in other GSAs in various ways.

Responsible Office/Partners: For land in Madera County GSA- Madera County GSA and Landowners; Recharge occurs in other GSAs in various ways.

Benefits (Losses Avoided): Help reduce inundations of surrounding cities and agricultural land. Improved groundwater levels. Could improve groundwater quality. Reduces subsidence.

Potential Funding (Local Budgets, Grant Funds, etc.): Growers conduct self-funded recharge in exchange for allocation credits. Grants (FMA HMA, Cal DWR water management and SGM grants) cover current, permanent infrastructure projects to aid with recharge. GSA funds cover administration costs related to recharge.

Timeline: Already implemented and ongoing. Recharge occurs when flood waters are available.

Project Priority (High, Medium, Low): High

Action 9. Countywide Domestic Well Mitigation Programs (including Madera County – Madera GSA "White Area" DWMP).

Hazards Addressed: Drought and Water Shortage

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): Madera County relies heavily on domestic groundwater wells for household water supply, especially in rural and unincorporated communities. Across the County, both within and outside the Madera County – Madera GSA 'white areas', domestic wells have gone dry due to groundwater level declines and subsidence. While the Madera County – Madera GSA Domestic Well Mitigation Program provides structured assistance for the white areas, a consistent countywide approach is underway to ensure all households have access to mitigation.

Project Description: Each GSA will develop and implement a Domestic Well Mitigation Program providing financial assistance to domestic well users within their GSA boundaries.

Other Alternatives:

- Do nothing – leaves residents without reliable water.
- Emergency water deliveries only – temporary, not a long-term fix.
- Countywide deeper well standards – does not help existing failed wells.
- Community system expansion – effective in a few areas but not feasible countywide.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera Subbasin Joint GSP, Madera County GSA Domestic Well Mitigation Rules, SB 552 countywide drought resilience requirements., Other GSA GSPs within the County.

Responsible Office/Partners: Madera County Water & Natural Resources Department - Madera County GSA, Other GSAs within the County, Davids Engineering (DWMP Manager for Madera County GSA program)

Benefits (Losses Avoided): Restores potable water supply; protects public health; ensures SGMA compliance; reduces emergency response costs; maintains household resilience during groundwater declines.

Potential Funding (Local Budgets, Grant Funds, etc.): Groundwater Sustainability Plan Fee (primary), overdraft penalties.

Timeline: Madera County GSA Program approval: Nov 2025, Implementation: CY 2026, Quarterly updates; Annual Report due Dec 2026

Project Priority (High, Medium, Low): High

Action 10. Groundwater Sustainability Plans (GSPs)

Hazards Addressed: Drought and Water Shortage

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): There are multiple plans in 3 separate subbasins, one plan currently in the Delta-Mendota, one plan currently in the Chowchilla Subbasin and four plans in the Madera Subbasin. Madera County GSA, City of Madera, Madera Irrigation District, Root Creek Water District, Madera Water District, Gravelly Ford Water District, and New Stone Water District. All GSAs must work together with groundwater issues to reduce the need for over pumping and prevent subsidence.

Project Description: There are multiple GSPs. The GSPs contain management actions and other measures taken to address groundwater over pumping which in turn slows down subsidence and helps prevent more wells from going dry.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: GSPs be updated and amended every 5 years

Responsible Office/Partners: Madera County has 14 GSAs: Aliso Water District, Chowchilla Water District, City of Madera, County of Madera GSA Chowchilla, County of Madera GSA Delta-Mendota, County of Mader GSA Madera, Gravelly Ford Water District, Madera Irrigation District, Madera Water District, New Stone Water District, Root Creek Water District, San Joaquin River Exchange Contractors Water Authority, ad Triangle T Water District

Benefits (Losses Avoided): Stop wells from going dry in the GSAs due to over pumping. Slow down subsidence.

Potential Funding (Local Budgets, Grant Funds, etc.): Currently no grant funds for GSPs but some could be found in FEMA BRIC, PDM or HMGP

Timeline: 1-5 years - as soon as possible from the start of the plan. Must be at sustainable yield by 2040

Project Priority (High, Medium, Low): High

Action 11. Countywide Domestic Well Mitigation Programs (including Madera County – Madera GSA "White Area" DWMP).

Hazards Addressed: Drought and Water Shortage (failed domestic wells due to declining groundwater levels).

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): Madera County relies heavily on domestic groundwater wells for household water supply, especially in rural and unincorporated communities. Across the County, both

within and outside the Madera County – Madera GSA 'white areas', domestic wells have gone dry due to groundwater level declines and subsidence. While the Madera County – Madera GSA Domestic Well Mitigation Program provides structured assistance for the white areas, a consistent countywide approach is underway to ensure all households have access to mitigation.

Project Description: Each GSA will develop and implement a Domestic Well Mitigation Program providing financial assistance to domestic well users within their GSA boundaries.

Other Alternatives:

- Do nothing – leaves residents without reliable water.
- Emergency water deliveries only – temporary, not a long-term fix.
- Countywide deeper well standards – does not help existing failed wells.
- Community system expansion – effective in a few areas but not feasible countywide.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera Subbasin Joint GSP, Madera County GSA Domestic Well Mitigation Rules; SB 552 countywide drought resilience requirements; Other GSA GSPs within the County.

Responsible Office/Partners: Madera County Water & Natural Resources Department - Madera County GSA; Other GSAs within the County; Davids Engineering (DWMP Manager for Madera County GSA program)

Benefits (Losses Avoided): Restores potable water supply; protects public health; ensures SGMA compliance; reduces emergency response costs; maintains household resilience during groundwater declines.

Potential Funding (Local Budgets, Grant Funds, etc.): Groundwater Sustainability Plan Fee (primary), overdraft penalties.

Timeline: Madera County GSA Program approval: Nov 2025; Implementation: CY 2026; Quarterly updates; Annual Report due Dec 2026

Project Priority (High, Medium, Low): High

Action 12. Emergency Water Storage Tanks

Hazards Addressed: Drought and Water Shortage (water shortage in many rural communities in Madera County).

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): The need for emergency water storage with backup generator powered wells to supply rural areas of Madera County with storage water to be used as emergency drinking water and water if the need arises for a local fire.

Project Description: Fund a study to determine the quantity, size, and placement of water storage tanks with backup generator wells. This project would have benefits to multiple communities providing emergency drinking water as well as emergency water storage to be used on local structure fires and wildland fires helping to protect Madera County Residents.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County Fire Department will be working with other county agencies to determine county owned property for potential sites.

Responsible Office/Partners: Madera County Fire Department, Madera County Dept. Water / Natural Resources.

Benefits (Losses Avoided): New well infrastructure that will operate during multiple emergencies.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA grants (HMA, PDM, BRIC); Cal DWR IRWM and water management grant, or other grants to be identified, with County cost share

Timeline: 2-5 years

Project Priority (High, Medium, Low): High

Earthquake Actions

Action 13. Seismic Assessment and Retrofit of Critical Facilities

Hazards Addressed: Earthquake. Secondary Impacts (Structural Failure, Fire Following Earthquake, Utility Disruption, and Infrastructure Collapse)

Goals Addressed: 1, 2, 3, 4, 7, 8

Issue/Background (Problem Statement): Madera County is subject to seismic risk posed by regional fault systems in Central California. Although the County is not located directly atop a major active fault, seismic shaking from regional events poses a significant risk to public safety, critical infrastructure, and the continuity of essential services.

Many critical facilities—including bridges, hospitals, schools, public safety buildings, emergency operations facilities, and other key infrastructure assets—may not have been constructed to current seismic design standards. Older structures, unreinforced masonry buildings, non-ductile concrete construction, and facilities built prior to modern building code updates are particularly vulnerable to structural damage during moderate-to-strong ground shaking.

Failure of critical facilities during an earthquake would significantly impair emergency response operations, medical surge capacity, sheltering capabilities, and overall disaster recovery. Without proactive assessment and mitigation, structural damage could result in:

- Injury or loss of life
- Extended service disruption
- Costly repairs or total facility replacement
- Long-term economic and operational impacts

A comprehensive seismic assessment and retrofit strategy is necessary to reduce risk and ensure continuity of essential services.

Project Description: This project will implement a phased seismic risk reduction program focused on critical public facilities and infrastructure throughout Madera County

Phase 1 – Seismic Risk Assessment

- Inventory and classification of critical facilities and essential infrastructure
- Structural vulnerability screening (Rapid Visual Screening or equivalent methodology)
- Engineering evaluation of high-risk facilities
- Identification of structural and non-structural deficiencies
- Prioritization of facilities based on life-safety risk and operational importance

Phase 2 – Seismic Retrofit and Hardening

- Development of site-specific retrofit designs
- Structural strengthening (e.g., shear walls, bracing, foundation anchoring, diaphragm strengthening)
- Non-structural mitigation (anchoring equipment, securing utilities, bracing mechanical systems)

- Utility resilience improvements (backup power, redundant systems where feasible)

Facilities Considered

- Hospitals and healthcare facilities
- Schools and educational facilities
- Emergency Operations Center (EOC)
- Law enforcement and fire stations
- Public works facilities
- Other identified essential government buildings

The program will be implemented in prioritized phases based on risk exposure, occupancy load, and essential service function.

Other Alternatives: Deferring seismic evaluation and retrofit activities would maintain current vulnerability levels and expose the County to potentially severe life-safety and service-disruption consequences.

Post-Disaster Repair Strategy: Relying on post-disaster repair or replacement funding was considered but deemed less cost-effective and inconsistent with mitigation best practices, as it does not reduce pre-disaster risk.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County Local Hazard Mitigation Plan (LHMP), County Capital Improvement Plan (CIP), Emergency Operations Plan (EOP), General Plan Safety Element, Applicable California Building Code seismic standards

Responsible Office/Partners:

- Madera County Sheriff's Office of Emergency Services (OES)
- County Public Works Department
- County Administration
- School Districts (as applicable)
- Healthcare facility administrators
- Structural engineering consultants
- State Office of Emergency Services (Cal OES), as applicable

Benefits (Losses Avoided):

- Reduced risk of injury or fatality during seismic events
- Protection of critical service continuity (medical, public safety, emergency management)
- Reduced repair and reconstruction costs following earthquakes
- Improved post-disaster recovery timeline
- Increased structural resilience of essential facilities
- Enhanced eligibility and competitiveness for FEMA HMA and BRIC funding
- Seismic retrofitting of critical facilities provides long-term, permanent risk reduction and significantly decreases both direct structural damage and indirect economic losses.

Potential Funding (Local Budgets, Grant Funds, etc.):

- County General Fund allocations
- Capital Improvement Program (CIP) funds
- FEMA Hazard Mitigation Assistance (HMA)
- FEMA Building Resilient Infrastructure and Communities (BRIC)
- California seismic safety or infrastructure grant programs
- Public-private cost share partnerships (where applicable)

Timeline: 1-5 years; Estimated 18 months for assessment, prioritization, engineering design, and initial retrofit implementation phase. Full program implementation may extend beyond 18 months, depending on funding and facility scope.

Project Priority (High, Medium, Low): Medium

Flood, Localized Flood, Severe Weather: Heavy Rains and Storm Actions

Action 14. Establish Tactical Facilities for Firefighting, Floodfighting, etc. (Airports, Heliports, Water Facilities, and Others and to Include Sandbag Locations at Fire Stations, USFS Facilities, Maintenance Yards, and Other Locations; w/ Public Education Component

Hazards Addressed: Flooding: 1% and 0.2% Annual Chance, Severe Weather Heavy Rain and Storms

Goals Addressed: 1, 2, 3, 6, 7, 8

Issue/Background(Problem Statement): Flood fighting equipment is stationed in multiple locations throughout County. Sandbags stockpiled in central location and distributed as needed.

Project Description: To ensure that if needed, flood fighting equipment is readily available

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: EAP

Responsible Office/Partners: Madera County, Sheriff's Office of Emergency Services, Madera County Flood Control and Water Conservation Agency, Public Works, Department of Water Resources

Benefits (Losses Avoided): Flood supplies are on hand and in stock to help mitigate flood damages

Potential Funding (Local Budgets, Grant Funds, etc.): DWR FSRP Grant Funded, River Partners Madera County Weed Project

Timeline: 1-5 years, from the Start of the plan and ongoing

Project Priority (High, Medium, Low): Medium

Action 15. Stormwater Plan Updates and Project Implementation w/ Considerations for Climate Change

Hazards Addressed: Climate Change, Flooding: 1% and 0.2% Annual Chance, Severe Weather Heavy Rain and Storms

Goals Addressed: 1, 2, 3, 6, 7, 8

Issue/Background (Problem Statement): With shifting weather patterns, it is essential to update the master plan accordingly as needs arise

Project Description: A planning document that includes stormwater projects and potential improvements

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Stormwater Plan

Responsible Office/Partners: Madera County Flood Control and Water Conservation Agency (MCFWCA)

Benefits (Losses Avoided): To improve storm water quality and encourage public involvement in preserving water quality.

Potential Funding (Local Budgets, Grant Funds, etc.): MCFCWCA Operating Budget

Timeline: 1-5 years, from the start of the plan and then ongoing

Project Priority (High, Medium, Low): Medium

Action 16. Continue to Implement and Maintain Routine Maintenance Processes/SOPs/projects Contained in the Flood O & M Manuals to Include: Vegetation Removal, Rodent Control, Sediment Removal, Erosion Repair and Restoration, Rehabilitation of Levee Patrol Roads, Flood Channel and Levee Inspections

Hazards Addressed: Flooding: 1% and 0.2% Annual Chance, Severe Weather Heavy Rain and Storms

Goals Addressed: 1, 2, 3, 4, 7, 8

Issue/Background (Problem Statement): Channels can become overgrown and rodent burrows can weaken levee integrity. This could lead erosion and levee failure.

Project Description: Routine Levee and Channel Maintenance

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Arundo removal, Rodent abatement program, annual vegetation removal, Flood System Repair Program, yearly state inspections

Responsible Office/Partners: Madera County Flood Control and Water Conservation Agency, , Department of Water Resources, River Partners

Benefits (Losses Avoided): Proper maintenance of channels will result in a reduction of potential, over banking and sheet flooding, and levee failure.

Potential Funding (Local Budgets, Grant Funds, etc.): DWR FSRP Grant Funded, River Partners Madera County Weed Project

Timeline: 1-5 years, from the start of the plan and then ongoing

Project Priority (High, Medium, Low): Medium

Action 17. Localized Flood Mitigation

Hazards Addressed: Flooding: Localized Flood, Severe Weather Heavy Rain and Storms

Goals Addressed: 1, 2, 3, 4, 7, 8

Issue/Background (Problem Statement): The County has experienced documented flooding issues in the following locations:

- The confluences of China Creek and Fresno River and half a mile above the confluences
- The pond in Cedar Valley which flows into Lewis Creek
- Within the downtown core of the community of Oakhurst where the Fresno River and China Creek drainages pose flooding risks to infrastructure and property during continuous heavy rain events
- North Fork along Church Street
- Wildwood Mobile Home Park along the San Joaquin River

Project Description: Root causes of each of these areas will be determined. Once that cause is determined, appropriate actions will occur.

Other Alternatives: Go to the locations when flooding occurs, rather than being proactive.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County EAP, NFIP regulations

Responsible Office/Partners: Madera County OES, Public Works, Madera County Flood Agency

Benefits (Losses Avoided): Reduced risk to people and property during heavy rain and storm events that can cause localized flooding.

Potential Funding (Local Budgets, Grant Funds, etc.): Currently County budgets (General Fund, CIP). CA DWR Stormwater grants (IRWM, FMPRA) or FEMA FMA grants may be sought.

Timeline: 1-5 years, as funding becomes available

Project Priority (High, Medium, Low): Medium

Hazardous Materials Transportation Actions

Action 18. Hazardous Materials Incident Prevention and Response Mitigation

Hazards Addressed: Hazardous materials releases due to highway transportation incidents (e.g., tanker truck accidents on State Routes 99, 41, 145, and 152); hazardous materials releases due to railway transportation incidents (freight rail lines transporting fuels, chemicals, and agricultural products); Hazardous materials releases from commercial and industrial facilities storing or using large quantities of hazardous substances; and secondary impacts including fires, explosions, environmental contamination, public health emergencies, and evacuation

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): Madera County's transportation corridors and industrial operations present an ongoing risk for hazardous materials incidents. Major highways and active rail lines pass through populated areas, agricultural zones, and environmentally sensitive regions. Additionally, several commercial and industrial facilities within the county store or use hazardous substances in quantities that could pose a significant threat if accidentally released. A hazardous materials incident could result in injuries, fatalities, environmental damage, disruption of transportation networks, and long-term economic impacts. Proactive mitigation actions are necessary to reduce the likelihood and severity of such incidents and improve response readiness.

Project Description: This mitigation action establishes a comprehensive countywide program focused on prevention, preparedness, and risk reduction related to hazardous materials incidents. Key components include:

- Identification and mapping of high-risk transportation corridors and fixed facilities
- Enhanced coordination with state agencies, rail operators, and private-sector businesses
- Development and maintenance of site-specific and corridor-based HazMat response plans
- Targeted training and exercises for first responders and emergency management personnel
- Public awareness and notification strategies for communities near high-risk locations

The program emphasizes mitigation actions that reduce exposure, improve early detection and reporting, and strengthen response capabilities before an incident occurs.

Other Alternatives: Maintain current response-only posture without additional mitigation efforts and improve team and equipment in place

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County Local Hazard Mitigation Plan (LHMP), Madera County Emergency Operations Plan (EOP) and Hazardous Materials Annex, California Accidental Release Prevention (CalARP) Program, California Emergency Services Act, County land-use planning and zoning regulations, Unified Program Agency (CUPA) inspections and compliance programs

Responsible Office/Partners:

- Madera County Office of Emergency Services (OES)

- Madera County Environmental Health Department (CUPA)
- Madera County Fire Department and local fire protection districts
- Madera County Sheriff's Office
- California Highway Patrol (CHP)
- Union Pacific and other rail operators
- California Office of Emergency Services (Cal OES)
- Private-sector hazardous materials facility operators

Benefits (Losses Avoided):

- Reduced likelihood and severity of hazardous materials releases
- Decreased risk of injury or death to residents, responders, and travelers
- Minimized environmental contamination of farmland, waterways, and wildlife habitats
- Improved response times and coordination during HazMat incidents
- Reduced economic losses due to transportation disruptions and business closures

Potential Funding (Local Budgets, Grant Funds, etc.):

- Madera County general fund and departmental budgets
- FEMA Hazard Mitigation Grant Program (HMGP)
- FEMA Building Resilient Infrastructure and Communities (BRIC) grants
- California Office of Emergency Services (Cal OES) grants
- Private-sector cost-sharing and compliance investments

Timeline:

- Short-term (0–1 year): Risk assessment updates, partner coordination, planning integration
- Mid-term (1–3 years): Training, exercises, public outreach, and response plan enhancements
- Long-term (3–5 years): Ongoing program maintenance, facility upgrades, and plan revisions

Project Priority (High, Medium, Low): Medium-High

Landslide, Mudslide, and Debris Flow Actions

Action 19. Madera County GIS Inventory & Risk Mapping: Landslide/Slide Locations and Roadside Culverts

Hazards Addressed: Landslides/slope failures/debris flows, Flooding/stormwater overtopping, Erosion/sediment/debris blockage impacts, Road/transportation disruption due to weather events

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): Madera County has recurring impacts on roadway access and public safety from slope failures (landslides/slide areas) and culvert capacity or blockage issues during heavy precipitation, wildfire-burn-scar runoff, and prolonged storm events. Current information on slide-prone areas, historic slide locations, and culvert assets/conditions is not consistently centralized in a GIS system with standardized attributes. This limits the County's ability to:

- Prioritize mitigation projects (replacement, upsizing, armoring, slope stabilization),
- Rapidly assess likely road closures and detours during incidents,
- Support grant applications with defensible, mapped risk and asset-condition data.

Project Description: Develop and maintain a Countywide GIS geodatabase and web map that inventories and maps:

1. Known landslide/slide locations and slide-prone segments affecting County roads (and key access routes), and

2. Roadside culvert locations (including key attributes: size/type/material, inlet/outlet condition, blockage risk, capacity concerns, maintenance history where available).

Core tasks/deliverables

- Create standardized GIS feature layers (points/lines/polygons as appropriate) for:
  - ✓ Slide locations and slide-prone road segments,
  - ✓ Culverts (points) and associated drainage features where feasible.
- Establish a field data collection workflow (mobile GIS) to validate locations and capture:
  - ✓ GPS location, photos, condition rating, observed sediment/debris issues, erosion/scour indicators, and notes.
- Develop a risk ranking/priority score to identify "hot spots" for mitigation (e.g., based on history of failure, consequence to critical routes, proximity to homes/critical facilities, drainage area, burn-scar influence, recurrence of maintenance issues).
- Publish an internal web map/dashboard for Public Works/Roads, Sheriff's OES, and partners to support:
  - ✓ Pre-storm readiness,
  - ✓ Incident response (road closures, detours),
  - ✓ Mitigation planning and grant justification.
- Set a maintenance/update cycle (e.g., annual refresh + post-storm/post-fire updates).

Other Alternatives:

- Continue with ad hoc mapping/spreadsheets by program or event (limited consistency and difficult to update).
- Contract out a one-time inventory without establishing an internal update/maintenance process (data becomes stale).
- Focus only on culverts or only on slides (reduces benefit; the hazards are often coupled slides and debris can overwhelm culverts and channels).

Existing Planning Mechanism(s) through which Action Will Be Implemented:

- Local Hazard Mitigation Plan (LHMP) update / mitigation action tracking
- County road maintenance programs and capital planning (CIP) / transportation asset management (as applicable)
- Emergency management preparedness and response planning (Sheriff's OES)
- Post-fire/post-storm damage assessment and reporting workflows

Responsible Office/Partners:

- Sheriff's OES (coordination, hazard planning integration)
- Madera County Public Works / Road Department (asset owner for culverts and road segments)
- County GIS staff/contracted GIS support
- Cal OES (grant coordination)
- Caltrans (state routes/coordination where interfaces occur)
- USFS / Sierra National Forest, BLM (where county access routes interface with federal lands)
- Cities/special districts/irrigation or water districts (data sharing where drainage infrastructure connects)

Benefits (Losses Avoided):

- Reduced road closures, isolation of communities, and emergency access delays through better prioritization of mitigation work.
- Reduced flooding/erosion damages by identifying undersized or high-risk culverts and chronic blockage locations.
- Improved situational awareness for storm response (pre-positioning resources, identifying likely failure points).
- Stronger, map-based documentation to support grant competitiveness and project scoping (clear locations, consequences, and risk rankings).

Potential Funding (Local Budgets, Grant Funds, etc.):

- FEMA mitigation grants (e.g., BRIC / HMGP, as available through state/federal cycles)
- State hazard mitigation / resilience funding opportunities (via Cal OES, when available)
- Transportation/road-related funding sources (local road funds; eligible state programs as applicable)
- In-kind staff time (Public Works/Roads, GIS, Sheriff's OES) + targeted GIS/field contract support

Timeline

- 0–3 months: Define data schema, compile existing datasets, create draft layers.
- 3–12 months: Field verification/collection (priority corridors first); publish internal web map.

- 12–24 months: Complete broader inventory, implement risk ranking, integrate into mitigation/CIP planning.
- Ongoing: Annual update + post-event updates after major storms/fires.

Project Priority (High, Medium, Low): High (supports life safety, emergency access, and recurring storm impacts).

Severe Weather: Extreme Cold Actions

Action 20. Countywide Snow Removal and Haul-Out Operations Plan for Public Roadways

Hazards Addressed: Severe Winter Storms, Heavy Snowfall, Snow Accumulation, Ice Storm Events. Secondary Flooding from Rapid Snowmelt

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): Madera County, particularly foothill and mountain communities including Oakhurst, North Fork, Bass Lake, Yosemite Forks, and surrounding high-elevation areas, is highly vulnerable to severe winter storms resulting in prolonged heavy snowfall and extreme snow accumulation.

During the 2023 Winter Storm events, Madera County experienced historic snowfall totals over multiple atmospheric river systems. Snow accumulations in mountain communities exceeded several feet, with repeated storm cycles preventing melt-off between events. Impacts included:

- Prolonged road closures and severely restricted lane widths
- Obstructed access to emergency services and medical care
- Delays in fire, EMS, and law enforcement response
- Structural failures from snow load
- Downed trees and utility lines blocking roadways
- School closures and economic disruption
- Isolation of residents for extended periods
- Limited access for fuel, food, and essential deliveries

In many areas, traditional plowing operations were insufficient due to limited roadside snow storage capacity. Snow berms narrowed roadways to single-lane access, impaired visibility at intersections, and blocked fire hydrants and driveways. In higher-density subdivisions and constrained corridors, accumulated snow required mechanical removal and hauling to restore safe travel widths.

The 2023 event demonstrated that:

- Snow removal operations must include pre-identified haul-out triggers and disposal sites.
- Surge equipment capacity and contractor activation need formal pre-event agreements.
- Priority route designations must be clearly mapped and publicly communicated.
- Documentation processes must be standardized to maximize FEMA and CDAA reimbursement eligibility.
- Multi-day storm planning assumptions must account for cumulative snow load, not single-event snowfall totals.

The scale and duration of the 2023 storms exceeded historical operational assumptions and revealed gaps in snow-hauling logistics, staging, and interagency coordination. Without a formalized Snow Response and Haul-Out Plan, future severe winter events could again result in:

- Life safety risks due to delayed emergency access
- Increased infrastructure damage

- Greater economic disruption
- Reduced eligibility or delays in disaster reimbursement

Given climate variability and the increasing frequency of extreme weather patterns, Madera County must institutionalize a comprehensive snowplowing and snow haul-out operational framework to mitigate the impacts of future winter storms.

Project Description:

1. Operational Triggers and Activation Framework

The County will establish defined activation thresholds for plowing and haul-out operations based on:

- Snow accumulation depth benchmarks (e.g., 6", 12", 24"+ cumulative)
- National Weather Service Winter Storm Warnings
- Multi-day atmospheric river forecasts
- Roadway lane width reduction below safety thresholds
- Emergency access impairment
- EOC activation level

Escalation tiers will distinguish between:

- Routine plowing operations
- Extended-duration storm response
- Full snow haul-out activation

2. Priority Route Classification and Mapping

Roadways will be formally categorized and GIS-mapped into three tiers:

Priority 1 – Critical Access Routes

- Access to hospitals, clinics, fire stations, and law enforcement facilities
- Primary evacuation routes
- Major arterials and school transportation routes
- Utility infrastructure access roads

Priority 2 – Secondary Transportation Corridors

- Collector roads
- High-density residential areas
- Commercial corridors

Priority 3 – Local Roads

- Rural residential roads
- Cul-de-sacs
- Low-volume access routes

GIS integration will allow real-time tracking of completed routes and public-facing snow route maps.

3. Equipment Inventory Assessment and Upgrade Plan

The County will conduct a formal equipment capability assessment evaluating:

- Age and mechanical reliability of existing snowplows
- Fleet capacity relative to storm severity benchmarks
- Availability of blowers, graders, loaders, and haul trucks
- Fuel storage and distribution resilience
- Equipment redundancy for extended operations

Based on this assessment, the County will identify needed upgrades including:

A. Fleet Modernization

- Acquisition of additional heavy-duty snowplows
- Purchase or lease of high-capacity snow blowers for deep snow events
- Additional front-end loaders for snow pile management
- Expanded dump truck fleet capacity for haul-out operations

B. Advanced Snow Removal Technologies

- Wing plows to increase clearing width in fewer passes
- Tow-behind snow pushers for subdivisions
- GPS-integrated fleet tracking for route optimization
- Automated vehicle location (AVL) systems
- Real-time material application monitoring
- Brine pre-treatment systems where climatically appropriate
- Infrared pavement temperature sensors for improved de-icing decisions

C. Telematics and Data Systems

- Equipment performance monitoring
- Fuel consumption tracking
- Digital documentation for FEMA Public Assistance reimbursement
- GIS-based snow depth and route condition mapping

This modernization effort will increase efficiency, reduce operational time, lower long-term maintenance costs, and enhance eligibility for state and federal reimbursement.

4. Snow Haul-Out Logistics and Disposal Planning

When roadside snow storage capacity is exceeded, snow will be mechanically removed and transported to pre-identified disposal/storage sites.

The County will:

- Identify and pre-approve environmentally compliant snow disposal areas
- Evaluate drainage and stormwater impacts
- Avoid placement near waterways or sensitive habitats
- Designate staging areas for loaders and haul trucks

- Pre-plan haul routes to minimize traffic disruption

Trigger points for haul-out activation will be clearly defined to prevent delayed response.

5. Public-Private Surge Capacity Program

Recognizing that extreme events (such as the 2023 winter storms) exceed organic County capacity, this project will formalize a structured On-Call Snow Removal Contractor Program.

A. Pre-Event Contracting

The County will:

- Develop competitively bid, pre-qualified on-call contracts
- Establish equipment rate schedules
- Pre-negotiate emergency activation clauses
- Verify insurance and liability coverage in advance
- Identify equipment inventories for each contractor

Eligible contractors may include:

- Local excavation companies
- Trucking firms
- Construction contractors
- Heavy equipment operators
- Forestry and tree removal companies

B. Tiered Activation System

Contractors will be categorized into:

- Tier 1: Immediate response (24-hour availability)
- Tier 2: Extended operations support
- Tier 3: Supplemental heavy haul capacity

This ensures scalable response during prolonged storms.

C. Documentation and Reimbursement Compliance

All contractor operations will follow FEMA-compliant documentation standards, including:

- Daily equipment logs
- Operator time tracking
- GPS route verification
- Photographic documentation
- Load counts for hauled snow

This improves eligibility for:

- FEMA Public Assistance

- California Disaster Assistance Act (CDAA) reimbursement

6. Interagency and ICS Integration

The Snow Response Plan will integrate into the County Emergency Operations Plan and follow:

- SEMS/NIMS compliance
- ICS organizational structure
- Operational Area coordination
- Caltrans coordination for state highways
- CHP traffic control coordination
- Utility company debris removal coordination

7. Training and Annual Preparedness

- Annual winter readiness workshop (September–October)
- Tabletop exercises simulating multi-day snow events
- Contractor coordination meetings
- Equipment inspection and maintenance certification
- Snow route public information campaign

8. Post-Event After-Action and Continuous Improvement

After each significant winter storm event, the County will:

- Conduct after-action reviews
- Evaluate equipment performance gaps
- Assess contractor surge effectiveness
- Update route prioritization maps
- Revise activation triggers if needed

Mitigation Value of Equipment and Contractor Expansion

By modernizing equipment and formalizing surge contracts, Madera County will:

- Reduce time to restore full roadway width
- Improve emergency response times
- Prevent prolonged isolation of residents
- Reduce risk of secondary accidents
- Lower long-term infrastructure repair costs
- Strengthen financial recovery through improved reimbursement documentation
- Increase operational resilience during extreme, multi-cycle winter events

Other Alternatives: Continue plow-only operations without haul-out capability (insufficient during major storms).

- Rely solely on state (Caltrans) assistance (limited to state highways).
- Limited reactive contracting during storm events (delays mobilization).
- Private property owner responsibility only (ineffective for public right-of-way management).

The proposed structured operational plan is the most comprehensive and sustainable solution.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County Emergency Operations Plan (EOP), Public Works Department Operational Procedures, Local Hazard Mitigation Plan (LHMP), Mutual Aid Agreements (Operational Area framework), ICS and SEMS compliance structure, Annual Winter Preparedness Planning Meetings

Responsible Office/Partners:

- Lead Agency:
  - ✓ Madera County Public Works Department
- Supporting Agencies:
  - ✓ Madera County Sheriff's Office of Emergency Services (OES)
  - ✓ County Administrative Office
  - ✓ Caltrans (District 6)
  - ✓ CHP
  - ✓ Madera County Fire
  - ✓ Utility Providers (PG&E)
  - ✓ Contracted Equipment Operators
  - ✓ Local School Districts
  - ✓ Community Services Districts (CSDs)

Benefits (Losses Avoided):

- Maintains emergency response times
- Reduces risk of traffic accidents
- Prevents isolation of vulnerable populations
- Protects economic activity in foothill and mountain communities
- Reduces long-term pavement and infrastructure damage
- Mitigates risk of flooding from improperly managed snow piles
- Improves reimbursement eligibility through documentation

Potential Funding (Local Budgets, Grant Funds, etc.):

- County Road Fund
- General Fund Allocations
- FEMA Public Assistance (Category B & C as applicable)
- California Disaster Assistance Act (CDAA)
- FEMA/Cal OES Hazard Mitigation Grant Program (HMGP)
- FEMA Pre-Disaster Mitigation / BRIC grants (planning components)
- Emergency proclamations enabling reimbursement

Timeline:

- Within 1-5 years
- Phase 1 – Plan Development: 6 months
- Phase 2 – Adoption and Training: 3 months
- Phase 3 – Pre-Season Implementation: Annual (October–November)

- Operational Activation: As needed during winter storm events
- Full operational readiness within 12 months of project initiation.

Project Priority (High, Medium, Low): Medium

Action 21. Create, Maintain, Enhance, and Outreach – Senior Firewood Assistance Program

Hazards Addressed: Wildfire, Severe Winter Storms, Extreme Cold, Public Safety Power Shutoffs (PSPS), Drought (indirectly, through vegetation management/fuel reduction)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Madera County includes extensive wildland-urban interface (WUI) areas and rural mountain communities that are highly susceptible to wildfire, severe winter storms, extreme cold, and Public Safety Power Shutoff (PSPS) events. Many senior residents in these areas rely on wood-burning stoves as a primary or supplemental heat source due to limited infrastructure, frequent outages, and economic constraints.

Currently, assistance for senior firewood needs is informal and not structured as a formal County mitigation program. The absence of a standardized program results in:

- Inconsistent identification of vulnerable seniors in high-risk areas.
- Limited coordination between fuel reduction efforts and beneficial reuse of removed vegetation.
- Reduced ability to document hazard mitigation outcomes.
- Gaps in outreach to isolated or mobility-limited residents.
- Increased risk of cold-weather medical emergencies and unsafe heating practices.

During extended winter storms or PSPS events, seniors without adequate heating resources face heightened risk of hypothermia, displacement, and reliance on emergency sheltering. Additionally, unmanaged dead and downed vegetation contributes to increased wildfire fuel loading in surrounding communities.

Formal creation and implementation of a County-supported Senior Firewood Assistance Program will address these vulnerabilities by:

- Providing reliable, pre-season heating resources to at-risk seniors.
- Integrating defensible space and vegetation management efforts with community benefit.
- Reducing emergency response demands during winter and outage events.
- Advancing LHMP goals related to wildfire risk reduction and protection of vulnerable populations.

Establishing the program as an ongoing mitigation action ensures sustainable administration, measurable outcomes, and alignment with County emergency management and hazard mitigation planning efforts.

Project Description: This project establishes, maintains, enhances, and conducts outreach for a formal Madera County Senior Firewood Assistance Program to support vulnerable senior residents in wildfire-prone and winter-impacted areas of the County.

1. Program Creation – The County will formally establish the Senior Firewood Assistance Program by:

- Developing program guidelines, eligibility criteria, and application procedures.
- Prioritizing low-income seniors, medically vulnerable individuals, and residents in high wildfire risk and rural mountain areas.
- Creating a tracking and documentation system to record applicants, deliveries, service areas, and mitigation outcomes.
- Establishing agreements or MOUs with local wood suppliers, fuel reduction contractors, Fire Safe Councils, and community partners.
- Identifying and securing staging/storage locations for firewood distribution.
- Integrating the program into Sheriff's OES seasonal preparedness and hazard mitigation operations.

2. Program Maintenance & Enhancement – Following program establishment, the County will:

- Continue annual firewood distribution prior to winter season.
- Expand geographic coverage in high-risk WUI and isolated communities.
- Increase supply capacity through coordination with defensible space inspections and vegetation management projects.
- Standardize intake, eligibility verification, and delivery documentation processes.
- Evaluate program effectiveness annually and adjust distribution levels based on hazard conditions and demand.

3. Outreach & Education – The County will implement targeted outreach to ensure eligible seniors are aware of and can access the program by:

- Conducting seasonal outreach prior to winter and wildfire seasons.
- Coordinating with Sheriff's OES, CAL-FIRE, Fire Safe Councils, community-based organizations, and senior service providers.
- Distributing educational materials on:
  - ✓ Safe wood stove operation.
  - ✓ Ember-resistant construction practices.
  - ✓ Defensible space compliance.
  - ✓ Winter storm and PSPS preparedness.

4. Resilience Integration – The program will align with LHMP and CWPP objectives by:

- Reducing hazardous fuel loads through redistribution of dead or removed vegetation.
- Increasing household-level resilience during extreme cold events and prolonged power outages.
- Supporting vulnerable population protection goals.
- Tracking distributed wood volume and service areas as wildfire mitigation performance indicators

Other Alternatives:

- Provide financial vouchers instead of physical wood distribution (less effective in remote areas with limited vendors).
- Rely solely on nonprofit or volunteer-based firewood programs (limited scale and sustainability).
- No action (would increase risk of cold exposure, unsafe heating practices, and wildfire fuel loading).

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County Local Hazard Mitigation Plan (LHMP), Community Wildfire Protection Plan (CWPP), County Emergency

Operations Plan (EOP), Sheriff's OES seasonal preparedness outreach, Fire Safe Council initiatives, CAL FIRE fuel reduction coordination

Responsible Office/Partners:

- Lead Agency:
  - ✓ Madera County Sheriff's Office of Emergency Services (OES)
- Supporting Partners:
  - ✓ County Agricultural Commissioner
  - ✓ CAL FIRE
  - ✓ Madera County Fire Safe Council
  - ✓ Public Works (logistics support)
  - ✓ Community Action Agencies
  - ✓ Local service clubs and volunteer organizations
  - ✓ PG&E (coordination during PSPS preparedness efforts)

Benefits (Losses Avoided):

- Reduced cold-weather medical emergencies among seniors.
- Reduced displacement during winter storms and extended power outages.
- Increased resilience during PSPS events.
- Reduction of hazardous fuel loads through redistribution of removed vegetation.
- Lower wildfire intensity in treated areas.
- Enhanced preparedness awareness among vulnerable populations.
- Reduced demand on emergency shelters and response services.

Potential Funding (Local Budgets, Grant Funds, etc.):

- County General Fund allocations
- CAL FIRE Fire Prevention Grants
- FEMA Hazard Mitigation Assistance (HMA)
- Pre-Disaster Mitigation/Building Resilient Infrastructure and Communities (BRIC)
- Community Development Block Grants (CDBG)
- Local service organization donations
- In-kind contributions (wood supply, volunteer labor)

Timeline:

- Short-Term (0–1 Year):
  - ✓ Formalize program structure and tracking.
  - ✓ Conduct annual outreach campaign.
  - ✓ Secure seasonal wood supply agreements.
- Mid-Term (1–3 Years):
  - ✓ Expand service coverage in high-risk mountain and WUI areas.
  - ✓ Develop additional storage/staging sites.
  - ✓ Integrate program metrics into LHMP reporting.
- Ongoing:
  - ✓ Annual distribution prior to winter season (September–November).

- ✓ Continuous coordination with fuel reduction projects.

Project Priority (High, Medium, Low): Low

Wildfire Actions (with Smoke and Air Quality, Drought and Water Shortage, Landslide, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados)

Action 22. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Mudge Ranch/French Gulch Wildfire Fuels Reduction Project

Hazards Addressed: Wildfire (with Smoke and Air Quality, as well as Drought and Water Shortage, Landslide, Mudslide, and Debris Flow, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): The increasing frequency and severity of wildfires throughout the Sierra Nevada foothills have placed significant strain on rural mountain communities, natural ecosystems, and local infrastructure. Dense vegetation, accumulated fuels, and the legacy of fire suppression have heightened the risk of catastrophic fire events that threaten lives, property, and critical wildlife habitat. Eastern Madera County with its limited access routes, steep terrain, and proximity to forested lands further amplify vulnerabilities. Climate change has intensified drought conditions and extended fire seasons, making proactive fuels reduction and forest health treatments an urgent priority. Wildfire burn scars often turn into potential landslide areas. Without strategic intervention, the area faces growing risks to public safety, watershed integrity, and long-term community resilience.

Project Description: The Mudge Ranch/French Gulch fuels reduction project aims to mitigate the potential damage posed by wildfire intensity caused by unchecked vegetation growth. Spanning 3,840 acres of densely wooded landscapes, the project seeks to address the imminent danger of catastrophic wildfires by strategically thinning overgrown vegetation, reducing flammable material accumulation, creating defensible spaces for suppression resources, and anchoring future fuel treatments in four key locations.

The construction of shaded fuel breaks should also include provisions for long term monitoring and maintenance. There are many species of brush and trees that are rigorous sprouters after cutting. Fuel break maintenance can extend the life of a fuel break from 2-3 years to indefinitely if regular entries are made after initial construction. Fuel breaks maintenance will address resprouting through herbicide and hand removal treatments.

The total costs for implementation of this project is $5,113,200. This includes total vegetation treatment costs of $4,261,000, and contract supervision and overhead costs of $852,200.

- Mudge Ranch Properties Fuels Treatment
  - ✓ 44 acres x $5000/ac = $220,000
- Madera County Property Treatment
  - ✓ 406 acres x $5000/ac = $2,030,000
- Poison Switch Fuelbreak Treatment
  - ✓ 155 acres x $4000/ac = $775,000
- French Gulch Prescribed Burn Treatment
  - ✓ 3090 acres x $400/ac = $1,236,000
- CEQA Notice of Exemption- $30,000

- Mitigated Negative Declaration- $50,000
- Federal Lands NEPA Categorical Exemption-$250,000

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: This project was developed through the Mountain Area Strategic Wildfire Treatments Program (M.A.S.T).

Responsible Office/Partners: Madera County OES, Fire, Eastern Madera County Fire Safe Council, CALFIRE, United States Forest Service-Bass Lake Ranger District

Benefits (Losses Avoided): An uncontrolled wildfire within this region would have drastic economic, social, and environmental impacts.

The most recent wildfire near the project area to the west in the Chowchilla River drainage was the River Fire. The fire started on July 11th, 2021, and was contained on July 19th after 8 days and burned 9,656 acres. The fire destroyed 12 structures and threatened the communities of Ahwahnee and Oakhurst.

Potential Funding (Local Budgets, Grant Funds, etc.): Prop 4 Funding, California CCI Investment Grants, Private Foundation Grants, CWDG Wildfire Defense Grants

Timeline: Within 5 Years 2026 -2032

Project Priority (High, Medium, Low): High

Action 23. Expansion of Strategic Hazard Reduction Burning Program in High-Risk Wildland–Urban Interface (WUI) Corridors

Hazards Addressed: Wildfire (Primary), Structure Loss in WUI Areas, Transportation Disruption and Evacuation Failure, Public Safety Impacts from Highway Closures, Secondary Economic Impacts from Fire Events

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Madera County contains multiple high-frequency ignition corridors and isolated WUI communities vulnerable to rapid wildfire spread. Highway 41 historically represented the most persistent roadside ignition corridor within the Madera–Mariposa–Merced Unit (MMU), with 87 roadside fire starts in the ten years prior to treatment. These ignitions caused repeated highway closures during peak commute periods, disrupted school transportation and commerce, delayed emergency response, and created secondary public safety hazards along a primary north–south evacuation route

Communities including Coarsegold, O'Neals, and Hidden Lakes were identified as high-risk fire zones due to:

- Proximity to continuous flashy fuels (annual grasses and brush)
- Limited ingress/egress routes

- Heavy roadside ignition sources
- Steep terrain and ladder fuels
- Isolation from urban suppression resources

Although the Highway 41 Emergency Fuel Break reduced roadside vegetation fires by 97% following implementation, similar untreated corridors and community perimeters remain at comparable risk. Without expansion of this program, the County remains vulnerable to:

- High-frequency roadside ignitions
- Evacuation bottlenecks
- Escalating suppression costs
- Increasing wildfire intensity due to fuel accumulation

A systematic, data-driven expansion of hazard reduction burning and fuel treatment is required to replicate the demonstrated success of the Highway 41 project across additional high-risk zones.

Project Description: Madera County will expand its Hazard Reduction Burning Program to establish strategic fuel breaks and defensible space corridors around high-risk communities and along critical transportation and evacuation routes.

Phase I – High-Risk Corridor Identification

- Analyze 10-year ignition data (CAL FIRE response records)
- Map repetitive ignition corridors (similar to Highway 41 pre-treatment conditions)
- Prioritize areas adjacent to WUI roadways with frequent roadside starts
- •Evaluate ingress/egress limitations and evacuation modeling data

Phase II – Fuel Break Construction & Prescribed Burning

Replicate Highway 41 treatment standards:

- Establish fuel breaks approximately 200 feet wide along prioritized corridors
- Target acreage based on corridor length (estimated 75–150 acres per corridor segment)
- Reduce fuel loading by ~80% within treated areas

Treatment methods:

- Prescribed burning of annual grasses
- Mechanical thinning of understory vegetation
- Pruning mature trees to remove ladder fuels
- Removal of roadside brush
- Felling of dead hazard trees while retaining healthy live trees

Burn operations will:

- Be conducted under San Joaquin Valley Air Pollution Control District permits
- Occur during periods of low fire danger
- Be supervised by qualified fire personnel and Registered Professional Foresters

Phase III – Environmental Compliance & BMP Integration

Implement Best Management Practices (BMPs), including:

- Protection of riparian zones
- Cultural resource avoidance
- Biological surveys via California Natural Diversity Database
- Coordination with Regional Water Quality Control Board
- Coordination with Department of Fish and Wildlife

Phase IV – Interagency Coordination & Outreach

Coordinate with:

- Madera County Sheriff's Office
- CAL FIRE MMU
- Caltrans
- CHP
- Madera County Roads Department
- Local landowners and regional partners

Public outreach will include:

- Community meetings
- Advance burn notifications
- Evacuation readiness education

Other Alternatives:

- Status Quo (Reactive Suppression Only) – Continues high suppression costs and repeated evacuation threats. Proven ineffective in high-ignition corridors.
- Mechanical-Only Treatment – More costly long-term; does not reduce fine fuel loading as effectively as prescribed fire.
- Structure Hardening Only (No Landscape Treatment) – Improves individual resilience but does not address corridor ignition frequency or evacuation reliability. Prescribed fire combined with mechanical thinning is the most cost-effective, data-supported approach based on the 97% reduction outcome along Highway 41.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Community Wildfire Protection Plan (CWPP), Madera County Local Hazard Mitigation Plan (LHMP), CAL FIRE Unit Fire Plan, County Emergency Operations Plan (EOP) – Evacuation Annex, General Plan Safety Element

Responsible Office/Partners:

- Lead / Coordination:
  - ✓ Madera County Sheriff's OES
  - ✓ CAL FIRE (Madera-Mariposa-Merced Unit)
- Key Partners (as applicable to location):
  - ✓ CAL FIRE Madera–Mariposa–Merced Unit

- ✓ County Agricultural Commissioner
- ✓ Madera County Roads Department
- ✓ Caltrans District 6
- ✓ CHP
- ✓ San Joaquin Valley APCD
- ✓ Regional Water Quality Control Board
- ✓ Department of Fish and Wildlife
- ✓ Local Fire Safe Councils
- ✓ Private Landowners

Benefits (Losses Avoided): Based on Highway 41 performance outcomes:

- Reduction in roadside ignition frequency (target ≥90%)
- Decreased probability of large fire spread into WUI communities
- Reduced structure loss potential in O'Neals, Hidden Lakes, Coarsegold, and other isolated communities
- Improved ingress/egress reliability
- Fewer unplanned highway closures
- Lower emergency response delays
- Reduced fire suppression costs
- Improved firefighter safety and operational efficiency
- Strengthened evacuation corridor integrity
- Reduced damage to critical infrastructure (power, communications, water conveyance), homes, and agricultural assets.
- Operational reliability during drought: dependable refill vs. seasonal ponds/streams.
- Potentially lower suppression costs and mutual aid draw by improving early containment success.

Potential Funding (Local Budgets, Grant Funds, etc.):

- FEMA Hazard Mitigation Grant Program (HMGP)
- Building Resilient Infrastructure and Communities (BRIC)
- CAL FIRE Fire Prevention Grants
- California Climate Investments
- Governor's Emergency Proclamation Fuel Reduction Funding
- County General Fund (matching funds)
- Caltrans Cooperative Agreements
- Community Wildfire Defense Grants (USDA)

Timeline:

- Within 1-5 years
- Year 1:
  - ✓ Data analysis and corridor prioritization
  - ✓ Environmental review and permitting
  - ✓ Community outreach
- Year 2–3:
  - ✓ Fuel break construction and prescribed burning (phased implementation)
  - ✓ Monitoring and performance tracking
- Ongoing:

- ✓ Maintenance burns every 3–5 years
- ✓ Annual evaluation of ignition frequency and corridor performance

Project Priority (High, Medium, Low): High

Action 24. Removal of Down & Dead Trees

Hazards Addressed: Wildfire

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): Due to years of drought conditions, wildfires, and the bark beetle epidemic, Eastern Madera County is filled with down and dead trees. These trees create issues such as blocking access roads for emergency vehicles and the ideal fuel for a potentially catastrophic wildfire.

Project Description: Eastern Madera County organizations would like to see this project provide assistance to local residents to remove these down and dead trees, identify areas of concern and road blockages, and collaborate on preventative measures moving forward.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Coarsegold RCD is partnering with Madera County & Yosemite Sequoia RC&DC on a current grant from the California Fire Safe Council to collaborate and identify gaps in Eastern Madera County, areas of concern, and to explore potential funding opportunities for projects.

Responsible Office/Partners: Coarsegold RCD, Madera County OES, Fire, Eastern Madera Fire Safe Council, Yosemite Sequoia RC&DC, Yosemite Gateway Prescribed Burn Committee

Benefits (Losses Avoided): Removing down and dead trees will eliminate fuel for wildfire and allow clear access roads for emergency vehicles and residents to use in the event of a wildfire or other emergency.

Potential Funding (Local Budgets, Grant Funds, etc.): CAL FIRE Wildfire prevention grants, SNC Grants, PG&E Grants, low income assistance grants

Timeline: Once funding is available/2026-2031. This project is in a planning stage and has not yet been submitted for potential funding sources. The project will be ongoing as further drought and wildfire conditions continue to increase.

Project Priority (High, Medium, Low): High

Action 25. Taylor Mountain Fuel Break

Hazards Addressed: Wildfire (with Smoke and Air Quality, as well as Drought and Water Shortage, Landslide, Mudslide, and Debris Flow, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): The increasing frequency and severity of wildfires throughout the Sierra Nevada foothills have placed significant strain on rural mountain communities, natural ecosystems, and local infrastructure. Dense vegetation, accumulated fuels, and the legacy of fire suppression have heightened the risk of catastrophic fire events that threaten lives, property, and critical wildlife habitat. Eastern Madera County with its limited access routes, steep terrain, and proximity to forested lands further amplify vulnerabilities. Climate change has intensified drought conditions and extended fire seasons, making proactive fuels reduction and forest health treatments an urgent priority. Wildfire burn scars often turn into potential landslide areas. Without strategic intervention, the area faces growing risks to public safety, watershed integrity, and long-term community resilience.

Project Description: The Taylor Mountain Fuel Break Project will construct a 91-acre shaded fuel break along a key ridge and access route in the Bass Lake area of Eastern Madera County, where multiple high-severity wildfires have occurred within the past decade. Located within mixed conifer and montane hardwood-conifer forest, the project area includes both private and federal lands and supports vegetation dominated by ponderosa pine, incense cedar, interior live oak, and black oak with dense understory brush components. Vegetation management will include selective thinning, ladder-fuel removal, pruning of residual trees, and the treatment of dead or dying material to reduce fire intensity and improve wildfire containment opportunities.

All work will occur under Registered Professional Forester (RPF) oversight, following CEQA Class 4 (15304) and NEPA categorical exemption 36 CFR 220.6(e)(6) for minor vegetation alteration. Treatments will be conducted using hand and mechanical methods, with slash disposed of by chipping or pile burning and ongoing maintenance through grubbing of resprouting brush. The completed project will establish a strategic, maintainable ridge-top defense feature that enhances firefighter safety, supports evacuation readiness, and strengthens the regional shaded fuel-break network within the Mountain Area Strategic Treatment (MAST) plan.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: This project was developed and will be implemented through the Mountain Area Strategic Wildfire Treatments Program (M.A.S.T). Full project scope details and cost estimates can be found in the M.A.S.T program documents.

Responsible Office/Partners: Eastern Madera County Fire Safe Council, Madera County OES, Fire, CAL FIRE, Sierra National Forest, Private Landowners

Benefits (Losses Avoided): Loss Without Action: Without treatment along the Taylor Mountain ridgeline, this area will continue to accumulate hazardous fuels that increase the potential for fast-moving, high-intensity wildfire. The ridge's steep slopes, dense vegetation, and wind exposure make it a likely ignition and spread corridor. Inaction would heighten risks to life safety, compromise critical infrastructure and evacuation routes, and diminish the effectiveness of adjacent fuel reduction projects within the regional network.

Benefit of Action: Implementing the Taylor Mountain Fuel Break will reduce fuel continuity, slow potential fire spread, and create a defensible landscape that supports safe suppression operations. The project strengthens regional wildfire resilience by connecting existing and planned treatments, protecting key access routes, and improving forest health through targeted thinning and maintenance. Over time, it will enhance safety for residents and responders while preserving ecological function and reducing long-term suppression costs.

Potential Funding (Local Budgets, Grant Funds, etc.): This project will be funded by grants such as FEMA BRIC, PDM, or HMGP or CAL FIRE Wildfire Prevention Grants

Timeline: 2026-2031

Project Priority (High, Medium, Low): High

Action 26. Eastern Madera County WUI Communities Landscape Vegetation Treatments

Hazards Addressed: Wildfire (with Smoke and Air Quality, as well as Drought and Water Shortage, Landslide, Mudslide, and Debris Flow, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Eastern Madera County contains some of California's most vulnerable Wildland–Urban Interface (WUI) neighborhoods, where dense vegetation, steep terrain, and limited egress routes create life-threatening conditions during wildfire. Many of these medium- to high-density communities sit within high and very high fire hazard severity zones, yet lack the resources or capacity to complete large-scale vegetation treatments. Overlapping jurisdictions and inconsistent maintenance have left hazardous fuel loads in place along access roads and residential perimeters, increasing ignition risk and complicating emergency response. There is an urgent need for coordinated, strategic vegetation management to reduce fuel continuity, improve evacuation safety, and protect lives, property, and infrastructure. Grant support will enable partners to implement prioritized treatments that directly enhance community safety and strengthen the regional wildfire resilience network.

The increasing frequency and severity of wildfires throughout the Sierra Nevada foothills have placed significant strain on rural mountain communities, natural ecosystems, and local infrastructure. Dense vegetation, accumulated fuels, and the legacy of fire suppression have heightened the risk of catastrophic fire events that threaten lives, property, and critical wildlife habitat. Eastern Madera County with its limited access routes, steep terrain, and proximity to forested lands further amplify vulnerabilities. Climate change has intensified drought conditions and extended fire seasons, making proactive fuels reduction and forest health treatments an urgent priority. Wildfire burn scars often turn into potential landslide areas. Without strategic intervention, the area faces growing risks to public safety, watershed integrity, and long-term community resilience.

Project Description: Communities: Dorstan/222, , Cascadel, Indian Lakes, , Bass Lake Annex, Quartz Mt., Cedar Valley, Sugar Pine, Mudge Ranch, Miami Highlands, Sky Ranch, Teaford, Other Communities identified through 2031

This project will implement coordinated landscape-level vegetation treatments within medium to high-density Wildland Urban Interface (WUI) communities across Eastern Madera County. Treatments will occur on privately owned lands and focus on creating defensible zones that reduce wildfire intensity, improve structure survivability, and enhance evacuation safety. Work will include interior broad limbing to raise canopy base heights, selective thinning of small-diameter trees and ladder fuels, and removal of dead or downed materials that contribute to hazardous fuel buildup.

Targeted roadside vegetation clearance will improve ingress and egress routes, expand roadside visibility for emergency response, and reduce ignition potential from vehicles or powerlines. Strategic shaded fuel buffers will be established around each participating community to reduce continuity of surface and canopy fuels, tying into existing county and CAL FIRE treatment footprints. Treatments will follow CAL FIRE and EMCFSC vegetation management standards and include biomass disposal through chipping, pile burning under permit, or other approved methods.

All vegetation management activities will align with CEQA Class 4 (15304) categorical exemption for minor alterations to land, incorporate best management practices for erosion control, and include landowner consent before implementation. Project design emphasizes community-scale resilience, long-term maintenance, and compatibility with defensible space regulations (PRC 4291) and the Madera County Community Wildfire Protection Plan.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: This project was developed and will be implemented through the Mountain Area Strategic Wildfire Treatments Program (M.A.S.T). Full project scope details and cost estimates can be found in the M.A.S.T program documents.

Responsible Office/Partners: Eastern Madera County Fire Safe Council, Madera County OES, Fire, CAL FIRE

Benefits (Losses Avoided): Loss Without Action: Without coordinated vegetation treatments in high and very high fire-risk communities across Eastern Madera County, residents in densely developed WUI neighborhoods with limited egress will remain in extreme danger during wildfire events. Heavy vegetation, ladder fuels, and accumulated debris surrounding homes and along narrow roadways create hazardous conditions that can trap evacuees, obstruct emergency response, and accelerate fire spread into populated areas. Inaction will lead to increased ignition potential, compromised evacuation safety, and higher structural loss during wildfire incidents. The absence of proactive vegetation management also allows fuel loads to build beyond manageable levels, increasing long-term suppression costs and post-fire recovery burdens for local agencies and residents.

Benefit of Action: Implementing targeted vegetation treatments in strategic high-risk WUI neighborhoods will significantly reduce fuel density and continuity, improving defensible space and evacuation safety for residents and first responders. These treatments will create protective buffers around communities, reduce wildfire intensity and spread, and enhance the effectiveness of suppression operations. By focusing on areas with limited access and high structural concentration, the project will protect life safety, maintain critical infrastructure, and strengthen the continuity of regional mitigation efforts. Over time, coordinated treatment

and maintenance will build a safer, more fire-adapted landscape, ensuring that high-risk WUI communities are better prepared to withstand and recover from wildfire events.

Potential Funding (Local Budgets, Grant Funds, etc.): This project will be funded by grants such as FEMA BRIC, HMGP, or PDM, CAL FIRE Wildfire Prevention Grants. Occasionally to rarely, landowner match can be acquired.

Timeline: 2026-2031 and ongoing

Project Priority (High, Medium, Low): High

Action 27. Fire Adapted Madera County Collaborative Planning and Outreach Initiative: Preparation, Mitigation, Response, and Recovery Action

Hazards Addressed: Wildfire (and Drought and Water Shortage, Landslide, Mudslide, and Debris Flow , Severe Weather: Extreme Heat, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Eastern Madera County lacks a coordinated, cross-agency framework to plan, prioritize, and implement wildfire resilience projects at the scale needed to protect its high-risk Wildland–Urban Interface communities. Currently, there is no coordinated action group operating across sectors in EMC on issues related to prioritizing and planning coordinated mitigation and recovery strategies. Multiple agencies, nonprofits, private citizens, and land managers operate within overlapping jurisdictions—often pursuing similar goals but without unified data sharing, project sequencing, or public engagement strategies. This fragmentation results in duplicated efforts, underserved areas, and missed opportunities for leveraging limited resources toward the highest-priority treatments. The absence of a formalized collaborative planning process also undermines consistent messaging to residents, making it harder to gain homeowner participation in mitigation programs and community-scale projects like the Mountain Area Strategic Treatments (MAST) suite. The Fire Adapted Madera County (FAM CO) Outreach and Collaboration Program addresses this critical gap by serving as a shared planning platform where partners can align priorities, coordinate outreach, and design complementary, non-duplicative projects that collectively advance a region-wide wildfire adaptation strategy.

Project Description: The Fire Adapted Madera County (FAM CO) Outreach and Collaboration Program builds wildfire resilience in Eastern Madera County through inclusive education, community engagement, and coordinated planning among public agencies, nonprofits, and residents. Co-led by the Eastern Madera County Fire Safe Council (EMCFSC) and the Coarsegold Resource Conservation District (CRCD), FAM CO functions as a central hub that connects local efforts to state and federal strategies, ensuring that projects complement rather than duplicate one another.

Through a mix of community events, home assessments, technical workshops, and partner coordination, the program advances four pillars of wildfire adaptation: mitigation, readiness, recovery preparation, and collaborative planning. The outreach component directly supports homeowner participation in the Mountain Area Strategic Treatments (MAST) suite and other mitigation initiatives, using one-on-one

consultations, neighborhood meetings, and Firewise USA® support to turn awareness into measurable action.

A defining feature of this program is collaborative agency planning. FAM CO convenes regular inter-agency coordination meetings to map active and proposed projects, share data, and identify geographic and programmatic gaps. This structured collaboration prevents overlap between agency or nonprofit activities, aligns messaging across programs, and promotes complementary project development that maximizes limited funding. By bringing together CAL FIRE MMU, Madera County OES, EMCFSC, CRCD, Yosemite/Sequoia RC&D, Sierra Nevada Conservancy, PG&E, UCCE, Prescribed Fire Associations, Air Districts, and local fire districts under one planning table, FAM CO ensures that efforts occur in the highest-priority areas identified through shared risk assessments.

The program also builds community trust and transparency by providing residents with consistent information on agency roles, project timelines, and available resources. This clarity increases homeowner buy-in, accelerates participation in defensible-space and retrofit programs, and strengthens the link between landscape-scale fuel reduction and parcel-level preparedness.

Ultimately, the FAM CO Outreach and Collaboration Program creates a unified platform for wildfire adaptation—bridging agency coordination, community outreach, and homeowner action—to produce measurable, lasting resilience across the Eastern Madera County WUI.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: This project was developed and will be implemented through the Mountain Area Strategic Wildfire Treatments Program (M.A.S.T). Full project scope details and cost estimates can be found in the M.A.S.T program documents.

Responsible Office/Partners: Eastern Madera County Fire Safe Council, Madera County OES, Fire, Madera County OES, CAL FIRE, MMU, SNF, Bass Lake Ranger District, PG&E, San Joaquin Valley Air Pollution Control District, Coarsegold Resource Conservation District, Yosemite Sequoia Resource Conservation and Development Council, Private Landowners, Red Cross, Sierra Foothill Conservancy, Yosemite Gateway Prescribed Burn Cooperative, UCCE, UC ANR, USDA, Sierra Nevada Conservancy, Tribal Partners (Chukchansi and North Fork Rancheria, and North Fork Mono), Sierra Ambulance, Local Chambers, Firewise Community Leaders.

Benefits (Losses Avoided): Loss Without Action: Without continued and coordinated outreach, Eastern Madera County communities will face increasing wildfire exposure, homeowner disengagement, and fragmented mitigation efforts. Opportunities for landscape-scale collaboration—like the MAST project suite—could lose community support, slowing implementation and reducing public safety outcomes. Residents will remain uninformed about available assistance, leaving high-risk properties untreated and perpetuating wildfire vulnerability.

Benefit of Action: By investing in coordinated outreach and education, FAM CO builds the foundation for long-term wildfire adaptation. Homeowners gain practical knowledge and financial pathways for mitigation; partners leverage shared resources to increase project efficiency; and communities strengthen

their collective capacity to withstand, respond to, and recover from wildfire events. The result is a measurable increase in safety, ecological health, and community resilience across the region.

Potential Funding (Local Budgets, Grant Funds, etc.): This project will be funded by grants and potential match from collaborating agencies and partners. Possible grants include FEMA HMGP, CAL FIRE, Wildfire Prevention Grants, and others.

Timeline: 2026 and ongoing through the life of this plan

Project Priority (High, Medium, Low): High

Action 28. Fuel Reduction within Recognized Firewise Communities & Growth/Development of the Firewise Program (subject to change)

Hazards Addressed: Wildfire

Goals Addressed: 1, 2, 3, 4, 7, 8

Issue/Background (Problem Statement): Several communities within Eastern Madera County are considered either High or Very High risk for wildfire. The area has experienced both the Fork Fire and the Creek Fire in past years which left several areas of the community damaged and at risk. This in combination with the bark beetle epidemic, poor winters and drought conditions have created potentially catastrophic wildfire conditions. Developing and promoting the Firewise program will help the county become more fire safe, and allow organizations such as Coarsegold RCD, Eastern Madera County Fire Safe Council, and Yosemite Sequoia RC&DC to apply for grant funding to provide fuel reduction assistance to those within recognized Firewise communities.

Project Description: This project will allow local organizations to continue promoting and growing the Firewise program in Eastern Madera County. Local organizations will also continue to hold local outreach and educational events. Having more established Firewise communities will allow local organizations to continue to apply for grant funding to provide fuel reduction assistances within these communities and create a more fire adapted county.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Coarsegold RCD currently is receiving a grant from Madera County to fund a Firewise Coordinator and continue pursuing the growth/development of the Firewise program within Eastern Madera County. Coarsegold RCD is also partnering with Madera County and Yosemite Sequoia RC&DC through a California Fire Safe Council Grant to continue to educate the community and identify the gaps within Eastern Madera County.

Responsible Office/Partners: Coarsegold RCD, Madera County OES, Fire, Eastern Madera Fire Safe Council, Yosemite Sequia RC&DC,

Benefits (Losses Avoided): The more Firewise communities we have, the greater Fuel Reduction we can provide to Eastern Madera County, therefore reducing our wildfire risk and potential damage due to wildfire

over time. Education and outreach will also help homeowners who don't qualify for the Firewise program on how to become fire safe and prepared for fire.

Potential Funding (Local Budgets, Grant Funds, etc.): Title III Funds through Madera County, CAL FIRE Wildfire Prevention Grants, SNC Grants, California Fire Safe Council County Coordinator Grants,

Timeline: 2026-2031. Currently in progress with grants through late 2026 but will need to be ongoing so long as there is a wildfire threat to the community.

Project Priority (High, Medium, Low): High

Action 29. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Konklin Road Wildfire Fuels Reduction Project

Hazards Addressed: Wildfire (with Smoke and Air Quality, as well as Drought and Water Shortage, Landslide, Mudslide, and Debris Flow, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): The increasing frequency and severity of wildfires throughout the Sierra Nevada foothills have placed significant strain on rural mountain communities, natural ecosystems, and local infrastructure. Dense vegetation, accumulated fuels, drought, high winds, and the legacy of fire suppression have heightened the risk of catastrophic fire events that threaten lives, property, and critical wildlife habitat. Eastern Madera County with its limited access routes, steep terrain, and proximity to forested lands further amplify vulnerabilities. Climate change has intensified drought conditions and extended fire seasons, making proactive fuels reduction and forest health treatments an urgent priority. Wildfire burn scars also often become future landslide areas. Without strategic intervention, the area faces growing risks to public safety, watershed integrity, and long-term community resilience.

Project Description: The Konklin Road Fuel Reduction Project consists of a roadside brushing project located in Eastern Madera County. Project involves hand cutting and chipping of brush and small trees. A total of 8.4 acres is proposed for treatment. The project objective is to provide an alternative means of emergency access and evacuation. Spanning 8.4 acres of wooded landscape, the project seeks to address the imminent danger of catastrophic wildfires by strategically thinning overgrown vegetation, reducing flammable material accumulation, creating defensible spaces for suppression resources, and providing an alternative means of emergency access and evacuation.

This project is for the FireWise Community of Meadow Springs. In the event of a large fire, it will create lower risk for residents and firefighters during mandatory evacuations and emergency access. Human activities such as- land use practices, urbanization, and nearby high recreational use, contribute significantly to the occurrence of wildfires in the project area. The expansion of residential areas into wildland-urban interface zones increases the risk of wildfires impacting communities

The estimated cost of this project from start to finish is $19,000 Included in this price is an organization administration cost of $3,000 and environmental compliance RPF services cost of $1,000. The

environmental cost would assume that the lead agency would be CALFIRE and a RPF would assist in environmental compliance and contract administration. The RPF contract administration fee is based on 15 hours of administration work at $80.00 per hour. The organization administration cost is based on 15% of the total cost of the vegetation management phase of project implementation. The estimated cost of vegetation management is $15,000. It is estimated that a 3-man crew with chainsaws and chipper would take one week to complete (120 hours) at an hourly rate of $125.00 per hour.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: This project was developed through the Mountain Area Strategic Wildfire Treatments Program (M.A.S.T).

Responsible Office/Partners: Madera County OES, Fire, Eastern Madera County Fire Safe Council, CAL FIRE, United States Forest Service-Bass Lake Ranger District

Benefits (Losses Avoided): An uncontrolled wildfire within this region would have drastic economic, social, and environmental impacts.

In the last ten years there have been two extended incident fires in the Coarsegold vicinity: Serpa Fire 2016, 80 acres and the Broken Fire 2016, 103 acres.

Potential Funding (Local Budgets, Grant Funds, etc.): Prop 4 Funding, California CCI Investment Grants, Private Foundation Grants, CWDG Wildfire Defense Grants

Timeline: Within 5 Years, 2026 -2031

Project Priority (High, Medium, Low): High

Action 30. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Bass Lake South Wildfire Fuels Reduction Project

Hazards Addressed: Wildfire (with Smoke and Air Quality, as well as Drought and Water Shortage, Landslide, Mudslide, and Debris Flow, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): The increasing frequency and severity of wildfires throughout the Sierra Nevada foothills have placed significant strain on rural mountain communities, natural ecosystems, and local infrastructure. Dense vegetation, accumulated fuels, and the legacy of fire suppression have heightened the risk of catastrophic fire events that threaten lives, property, and critical wildlife habitat. Eastern Madera County, with its limited access routes, steep terrain, and proximity to forested lands, further amplifies vulnerabilities. Climate change has intensified drought conditions and extended fire seasons, making proactive fuel reduction and forest health treatments an urgent priority. High winds in these areas often drive wildfires. Wildfires cause burn scars that are at risk to landslide. Without

strategic intervention, the area faces growing risks to public safety, watershed integrity, and long-term community resilience.

Specific problems in the County include:

- Wildfire: Reduces the intensity, rate of spread, and severity of wildfires by decreasing fuel loads and ladder fuels.
- Drought: Improves forest health and water retention by reducing competition among trees and vegetation.
- Extreme Heat: Mitigates heat buildup and canopy stress through improved forest structure and resilience.
- Air Quality Degradation: Reduces the amount of smoke and particulate matter generated during wildfire events.
- Erosion and Sedimentation: Prevents severe soil loss and downstream sedimentation that often follow high intensity burns.
- Post-Fire Flooding and Debris Flow: Minimizes risk of flash flooding and debris movement by maintaining soil stability and vegetation cover.
- Habitat Loss: Protects wildlife and sensitive habitats from high severity burns and facilitates ecological recovery.
- Infrastructure Damage: Reduces the threat to roads, powerlines, and communication networks located near wildland-urban interface zones.

Project Description: The Bass Lake South fuels reduction project aims to mitigate the potential damage posed by wildfire intensity caused by unchecked vegetation growth. Spanning 276 acres of densely wooded landscapes, the project seeks to address the imminent danger of catastrophic wildfires by strategically thinning overgrown vegetation, reducing flammable material accumulation, creating defensible spaces for suppression resources, and anchoring future fuel treatments in two key locations on Forest Service property.

This fuel reduction project would extend the work currently taking place along Road 274 and help protect structures adjacent to the project footprints. There is fuel reduction work taking place to the north and south along Malum Ridge. In the project area, there are pine plantations that need pre-commercial thinning. Thinning these plantations would reduce fuel loading, reduce the risk of insect and disease infestations, and help maintain a healthy forest

The construction of shaded fuel breaks should also include provisions for long-term monitoring and maintenance. Many species of brush and trees are vigorous sprouters after cutting. Fuel break maintenance can extend the life of a fuel break from 2-3 years to indefinitely if regular entries are made after initial construction. Fuel breaks maintenance will address resprouting through herbicide and hand removal treatments.

The estimated cost of this project from start to finish is $1,857,000. Included in this price is an organizational administration cost of $208,000, RPF contract administration cost of $20,700, and environmental compliance cost of $250,000. The environmental cost would assume that the lead agency would be the Forest Service, and a Categorical Exclusion would be required for a NEPA document. The RPF contract administration fee is based on $75.00 per acre rate or roughly 260 hours of administration and supervision work at $80.00 per hour. The organization's administration cost is based on 15% of the total cost of the vegetation management phase of project implementation. The estimated cost of vegetation

management is $1,380,000, which is calculated at the rate of $5,000 per acre. This cost includes mechanical and handwork that may be required to complete the project.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: This project was developed through the Mountain Area Strategic Wildfire Treatments Program (M.A.S.T).

Responsible Office/Partners: Madera County OES, Fire, Eastern Madera County Fire Safe Council, CAL FIRE, United States Forest Service-Bass Lake Ranger District

Benefits (Losses Avoided): An uncontrolled wildfire within this region would have drastic economic, social, and environmental impacts.

Fire History in the vicinity of the Bass Lake and North Fork areas, within the last ten years, includes six fires: Fork Fire (819 acres), Creek Fire 2020 (379,895 acres), Corrine Fire 2019 (920 acres), Mission Fire 2017 (1,037 acres), Willow Fire 2015 (5,702 acres) and the Power Fire 2015 (108 acres). (https://www.fire.ca.gov/incidents)

Potential Funding (Local Budgets, Grant Funds, etc.): Prop 4 Funding, California CCI Investment Grants, Private Foundation Grants, CWDG Wildfire Defense Grants

Timeline: Within the 1- 5 year lifespan of the LHMP

Project Priority (High, Medium, Low): High

Action 31. Eastern Madera County Strategic Home Hardening Program

Hazards Addressed: Wildfire (Drought and Water Shortage and Severe Weather: Extreme Heat)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Eastern Madera County's WUI communities face severe wildfire vulnerability due to dense vegetation, steep terrain, and an aging housing stock built before ignition-resistant codes. Many homes lack compliance with California PRC 4291 defensible-space standards and critical home-hardening features such as ember-resistant vents, Class A roofs, and non-combustible zones. Low-income and elderly residents are disproportionately unable to afford retrofits, leaving entire neighborhoods exposed. The Strategic Home Hardening Program addresses this need by providing technical and financial assistance to help homeowners meet PRC 4291 requirements and implement NFPA and IBHS wildfire-resilient upgrades that reduce structure ignition risk and enhance community safety.

Project Description: The Eastern Madera County Strategic Home Hardening Program is designed to enhance wildfire resilience in forest-service-adjacent communities by combining home-hardening retrofits with vegetation treatments mandated under California Public Resources Code § 4291 (PRC 4291). In alignment with the CAL FIRE and Cal OES Home Hardening Pilot Program, the NFPA Home Ignition

Zone (HIZ) framework, and the IBHS Wildfire Prepared Home (WPH) standard, this initiative provides targeted financial and technical assistance to homeowners in High and Very High Fire Hazard Severity Zones.

The program prioritizes low-income, elderly, and vulnerable households in communities most exposed to wildfire risk. Depending on eligibility, participants will receive either:

- Full-funding microgrants for retrofits and zone zero permanent infrastructure
- Cost-sharing for moderate-income households, or
- No-cost risk assessments and prioritized investment plans, prepared by NFPA-certified Wildfire Mitigation Specialists and CAL FIRE-qualified Defensible Space Assessors.

Retrofits and defensible-space treatments will adhere to PRC 4291, Title 14 CCR § 1299, and NFPA 1144, ensuring a continuous home-ignition-zone defense through a 0–5 ft non-combustible Zone 0, a 5–30 ft intermediate zone, and extended vegetation management to 100 ft or to the property line.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: This project was developed and will be implemented through the Mountain Area Strategic Wildfire Treatments Program (M.A.S.T). Full project scope details and cost estimates can be found in the M.A.S.T program documents.

Responsible Office/Partners: Eastern Madera County Fire Safe Council, Madera County OES, Fire, CAL FIRE, Private Landowners

Benefits (Losses Avoided): Benefits: This program will reduce structure ignitability and wildfire losses by integrating PRC 4291-compliant defensible space with NFPA- and IBHS-recognized home-hardening practices. The combination of vegetation management and structural retrofits is expected to decrease the likelihood of home ignition by 60–80% in treated parcels, improve firefighter safety and access, and increase the number of fire-resilient homes in Eastern Madera County. The initiative also enhances equity by ensuring that low-income and elderly residents receive protection commensurate with higher-income communities.

Losses Avoided: By reducing structure vulnerability and ignition potential, this project will prevent catastrophic wildfire losses including the destruction of homes, community infrastructure, and irreplaceable assets. Based on CAL FIRE post-incident loss data (e.g., Creek Fire 2020), similar interventions could avoid $40–60 million in structural and suppression costs and protect an estimated 1,500 homes and 4,000 residents within the program's service area. This initiative mitigates future economic disruption, displacement, insurance instability, and environmental recovery costs, while ensuring compliance with the life-safety intent of California PRC 4291.

Potential Funding (Local Budgets, Grant Funds, etc.): This project will be funded by grants and a scaled homeowner cost-share. Possible grants include FEMA HMGP and CAL FIRE Wildfire Prevention Grants

Timeline: 2026 and ongoing until completion

Project Priority (High, Medium, Low): High

Action 32. Eastern Madera County WUI Community Evacuation Route

Hazards Addressed: Wildfire (and Drought and Water Shortage, Severe Weather: Extreme Heat)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): In Eastern Madera County's high fire severity zones, narrow, overgrown roadways present a critical threat to life safety by restricting both resident evacuation and first responder access during wildfire events. Heavy roadside fuels, ladder vegetation, and dead material along primary and secondary routes create hazardous "choke points" that can trap evacuees and block emergency ingress. Many of these corridors serve as the sole access for entire neighborhoods and have not received regular maintenance due to jurisdictional overlaps, funding limitations, and environmental permitting delays. The absence of a coordinated roadside vegetation management program leaves these routes highly vulnerable to ignition and impassable conditions during wildfire, endangering residents and responders alike.

Project Description: The proposed project is a Roadside Hazardous Fuels Reduction Implementation project to remove hazardous vegetative fuels, creating arching shaded fuel breaks and defensible spaces along select county roadways proximate to hazard-prone and socially vulnerable communities within a wildland-urban interface region that have a very high risk for wildfire events in the foothill and mountain areas of eastern Madera County. This is a Priority Project as determined by the Comprehensive Community Fuel Reduction Plan for Eastern Madera County in development by EMCFSC under the title MAST (Mountain Area Strategic Projects) and partners under the Sierra Nevada Conservancy RFFCP program as well as a high priority by Madera County and CAL FIRE in its ongoing efforts to mitigate the risk for catastrophic wildfires within its jurisdiction. The proposed project incorporates nature-based solutions to wildfire mitigation through use of contracted hand crews to perform roadside hazardous vegetative fuels reduction work within the public right of way on select Madera County roads adjacent to at-risk properties and communities with high concentrations of structures and populations. Specific roadways to be targeted include both sides of Madera County Roads 222 (including sections from Bass Lake Dam through the Annex to North Fork; Manzanita Lake Dr. to Road 225), 423, 619, 620, 628, 632 (Sky Ranch Rd), Wallu, Opah, Harmony, Cascadel, 425B, Jean East, Jean West, John West, Delaware, Okawa, Chinook, Navajo, Modoc, Pamela Place, Willow Pond Road, Willow Pond Lane, Dorstan Drive and Ponderosa Drive and vegetation outside the CAL TRANS ROE along HWY 41 from Yosemite Lakes to Sugar Pine. The total mileage estimate is approximately 100 miles on both sides of the roadways, including a 5-mile buffer, or 200 miles total, counting both sides of each road.

Hazardous fuel reduction activities will involve the reduction of surface and ladder fuels, including the removal of both live and dead accumulated vegetation, as well as the creation of defensible areas along the roadways that decrease the likelihood of the start, tunneling, or spread of wildfire from both roadside or encroaching adjacent wildfires.

The outcome will be safe egress and access routes for both first responders and evacuating residents.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: This project was developed and will be implemented through the Mountain Area Strategic Wildfire Treatments Program (M.A.S.T). Full project scope details and cost estimates can be found in the M.A.S.T program documents.

Responsible Office/Partners: Eastern Madera County Fire Safe Council, Madera County OES, Fire, Cal Trans, CAL FIRE

Benefits (Losses Avoided): Loss Without Action: Without systematic roadside vegetation treatments, high fire severity areas in Eastern Madera County remain dangerously exposed to ignition along egress routes. Dense fuels, overhanging branches, and accumulated debris will continue to threaten evacuation safety, obstruct emergency response, and increase the likelihood of entrapment and infrastructure loss during wildfire. Delays in treatment also lead to higher long-term costs, greater ecological damage, and preventable risk to human life.

Benefit of Action: Proactive roadside vegetation management reduces ignition potential, widens evacuation corridors, and provides firefighters with safe anchor and access points for suppression. These treatments not only safeguard lives and property but also protect critical evacuation infrastructure, improve visibility and maneuverability for emergency vehicles, and create defensible buffer zones that slow wildfire spread. Coordinated maintenance along key routes establishes a sustainable wildfire resilience network that protects both communities and responders across Eastern Madera County.

Potential Funding (Local Budgets, Grant Funds, etc.): This project will be funded by grants (CAL FIRE Wildfire Prevention grants, FEMA HMA) and may have a match from county Measure T funds.

Timeline: 2026-2031 and annually

Project Priority (High, Medium, Low): High

Action 33. Strategic Water Storage Infrastructure Project – Eastern Madera County WUI

Hazards Addressed: Wildfire (and Drought and Water Shortage, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): In the wildland-urban interface (WUI) of eastern Madera County, numerous at-risk communities rely on private wells and lack access to communal water systems, ponds, or basins suitable for firefighting. To enhance fire-response capacity and bolster structural protection, this project will install a network of permanent water-storage assets (tanks/cisterns and dry hydrants) strategically located within medium- to high-density WUI communities and along key fuel-break corridors. By providing dependable, year-round drafting and fill points for engines and tenders, the infrastructure will reduce fill-trip times, support initial attack and structure defense, and integrate with EMCFSC's broader fuel-reduction and community resilience strategy.

Project Description: This initiative will consist of site selection, design, installation, and commissioning of water-storage and drafting systems at targeted locations lacking existing infrastructure. The project will:

- Identify candidate parcels and roadside sites near fuel breaks or ridgelines in high-risk communities, prioritizing parcels without existing ponds, basins or hydrants and where access for fire apparatus is feasible.
- Install fixed water tanks/cisterns sized to meet drafting standards (e.g., per NFPA 1142) and/or install non-pressurized dry hydrants in static water bodies, complete with engineered apron, fire-department connections, signage, access loops and turnarounds.
- Integrate hydro-access with apparatus provisioning: standard fire department fittings (NST/Storz), reflective identification, GIS-mapped in dispatch systems, and standard maintenance access.
- Coordinate slash and fuel-break completion with the new water infrastructure by aligning the storage sites near fuel-break nodes, evacuation corridors or community perimeter roads to maximize strategic value.
- Incorporate a five-year maintenance plan covering tank inspections, vegetation clearing, sediment/weed suppression, access road upkeep and water-level monitoring; secure owner/operator agreements for private-parceled infrastructure.
- Conduct all work consistent with environmental compliance (CEQA Class 4 minor facility installation; NEPA categorical exclusion for federal parcels where applicable), adhere to applicable local, state and federal regulations for fire-water systems and infrastructure installation.
- Engage a professional engineer or RPF as required to validate structural design, hydraulics, access roads, and ensure compliance with fire-agency requirements, Cal Fire SRA guidelines and local county fire-protection agency standards.
- Ensure contractor procurement follows best practice: lump-sum or unit-price contracting preferred, with prequalified contractors experienced in fire-water systems, rural equipment access and fuels-treatment integration.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: This project was developed and will be implemented through the Mountain Area Strategic Wildfire Treatments Program (M.A.S.T). Full project scope details and cost estimates can be found in the M.A.S.T program documents.

Responsible Office/Partners: Eastern Madera County Fire Safe Council, Madera County OES, Fire, CAL FIRE, Sierra National Forest, Private Landowners, Yosemite Sequoia Resource Conservation and Development Council, Coarsegold Resource Conservation District

Benefits (Losses Avoided): Benefits: The project will substantially enhance wildfire response capacity by providing reliable, strategically located water sources in WUI communities lacking hydrant or pond access. Improved refill efficiency, faster suppression response, and increased firefighter safety will reduce the likelihood of large fire growth and structural losses. This infrastructure strengthens community protection, supports defensible space operations, and improves long-term resilience across high-risk areas of Eastern Madera County.

Losses Avoided: By enabling quicker initial attack and sustained suppression capacity, the project is expected to prevent or reduce catastrophic wildfire losses—including destruction of homes, infrastructure, and natural resources—and to mitigate economic and ecological damages associated with large-scale fires. The installation of permanent water storage infrastructure helps avoid future emergency response delays, high suppression costs, and community displacement caused by wildfire impacts.

Potential Funding (Local Budgets, Grant Funds, etc.): This project will be funded by grants such as FEMA BRIC, FMA, HMGP and others

Timeline: 2026-2031 and ongoing

Project Priority (High, Medium, Low): High

Action 34. Fresno River Unsheltered Encampment Fire Risk

Hazards Addressed: Wildfire (during periods of both drought, extreme heat, as well as extreme cold)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (**Problem Statement**): These fires are typically caused by open-flame heating, cooking devices, improper disposal of combustibles, and lack of access to safer alternatives. Encampments are often located in areas with dense, dry vegetation and limited emergency access, which heightens ignition probability and increases response times for fire personnel. The cumulative effect has elevated wildfire risk near residential neighborhoods, key transportation routes, and critical infrastructure adjacent to the drainage.

Project Description: Measurable increase in vegetation fires associated with the rise of unsheltered encampments within the river corridor. Fund a study to determine how to address this issue which may include enhanced vegetation management, interagency coordination with law enforcement and social services, improved early detection and response capabilities, and long-term programs that reduce the conditions leading to encampment-related fire ignition.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County Fire Department, Madera City Fire Department and Madera City Public Works

Responsible Office/Partners: Madera County Fire Department, Madera City Fire Department, Madera City Public Works.

Benefits (Losses Avoided): Increased fire protection for the residents surrounding the Fresno River drainage.

Potential Funding (Local Budgets, Grant Funds, etc.): State Grants (CAL FIRE Wildfire Prevention grants) with County cost share

Timeline: 2-5 years

Project Priority (High, Medium, Low): Medium

Action 35. Home Hardening against Wildfires

Hazards Addressed: Wildfire – the need for communities in Madera County to replace flammable construction materials with fire-resistant building materials.

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Older construction communities within Madera County have the need to replace or add fire-resistive features such as metal roofs, ember-resistant vents and tempered glass windows to help limit structures during wildfires catching on fire.

Project Description: Fund a study to determine community needs to help with home hardening of homes within Madera County. The possibility of implementing a program to help homeowners replace or add home hardening items to existing structures.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Madera County Fire Department will be working with other county agencies to determine the possibilities to complete emergency evacuation routes.

Responsible Office/Partners: Madera County Fire Department, County OES

Benefits (Losses Avoided): New well infrastructure that will operate during multiple emergencies.

Potential Funding (Local Budgets, Grant Funds, etc.): Possibility of CAL FIRE Wildfire Prevention grants or other grants (FEMA HMA grants) with County cost share

Timeline: 1-2 years

Project Priority (High, Medium, Low): Medium

Action 36. Helicopter Water Dip Site (Drafting Pond/Tank) Connected to Main Water System with Remote-Control/Automated Filling for Wildfire Suppression

Hazards Addressed: Wildfire / Wildland-Urban Interface (WUI) fire, Drought / limited water availability during peak fire season, Extreme heat / red flag wind events (increases ignition and spread potential, Severe Winter Storms, Flooding or Atmospheric River Events, Public Safety Power Shutoffs (PSPS), Earthquake or Infrastructure Failure

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Madera County experiences recurring wildfire threat, including fast-moving incidents under red flag conditions and in areas where turnaround time to reload water increases suppression delays. Existing helicopter dip options can be limited by distance to water, seasonal sources, access constraints, and/or conflicts with recreational and agricultural water use. During initial

attack, delays in aerial water delivery can allow small ignitions to become large incidents, increasing risks to residents, responders, critical infrastructure, and agricultural assets.

To maximize benefit and cost-effectiveness, potential dip-site locations should be informed by a study of prior fire history and response patterns, including historic fire perimeters, ignition density, prevailing wind patterns, WUI exposure, and helicopter flight paths/loading areas. This analysis helps identify high-value, high-use locations where a permanent dip site will produce the greatest reduction in response time and fire growth.

A strategically located, engineered helicopter dip site connected to a reliable main water system and capable of remote/automated refill will improve initial-attack effectiveness and reduce response time, particularly in WUI and high-fuel-load areas.

Wildfire incidents frequently result in Public Safety Power Shutoffs (PSPS) or fire-related damage to electrical distribution infrastructure, which can interrupt power to local water systems. If the connected water main lacks generator backup, the helicopter dip site may be unable to refill during critical suppression operations.

As part of the planning study, the County and partner water providers will evaluate:

- Whether the local water system has existing generator backup capacity,
- Whether current generators are adequately sized to support both normal system demand and high-volume dip-site refill demand, and
- Whether additional electrical hardening or dedicated generator installation is necessary to ensure uninterrupted water supply during wildfire-related outages.

Ensuring water system resiliency during power outages is essential to maintaining reliable aerial firefighting operations and overall community fire protection capability.

Project Description: Design, permit, and construct at least three helicopter dip (drafting) sites supplied by a pressurized/municipal or district main water system (or equivalent reliable trunk line), with remote-controlled or automated valve/pump controls to maintain a target water level and provide rapid replenishment. The project will begin with a site selection and planning study that:

- Uses historical wildfire data (fire perimeters, ignition points, and acres burned),
- Evaluates response and flight-path data from prior incidents (where available),
- Assesses WUI exposure, critical infrastructure, and community assets at risk, and
- Screens candidate locations based on proximity to main water systems, land ownership, air operations safety, and access for maintenance.

This analysis will be GIS-based where feasible and will result in a ranked set of preferred locations and a recommended first project site (or sites). Key implementation elements (after the study phase):

- Dip structure: engineered pond, tank, or lined basin sized for helicopter bucket operations (including hover safety margins), with stabilized ingress/egress for maintenance.
- Water supply connection: tie-in to main water system with backflow prevention, metering, and isolation valves; designed to meet code and operator requirements.

- Remote/automated refill: telemetry/SCADA-style controls (or simpler remote valve actuation) to open/close fill valves, monitor water level, and alert for leaks, low level, or equipment faults.
- Site hardening & safety: hazard signage, rotor-wash considerations, vegetation management/defensible space, all-weather access for service vehicles, lighting if appropriate, and standardized coordinates/marking for dispatch use.
- Operational integration: add the dip site to response maps, dispatch/CAD notes, pre-plans, and briefings for responding air assets; include maintenance and inspection procedures.

Deliverable outcomes:

- Planning Study Report documenting fire-history analysis, siting methodology, and recommended dip-site locations; and
- At least three fully constructed, commissioned helicopter dip site (or more, depending on funding) at the highest-benefit location.
- In addition to the fire-history siting study, the project will include a water system resiliency assessment to determine electrical reliability and backup power capacity at the proposed connection point.

This assessment will:

- Review existing generator capacity, fuel type, and runtime,
- Evaluate whether current systems can sustain high-flow refill operations during peak fire conditions,
- Identify electrical upgrades needed to support automated refill controls and telemetry systems, and
- Determine the need for installation of a new dedicated standby generator system (diesel, natural gas, or other appropriate fuel source).

If identified as necessary, the project will include:

- Procurement and installation of a permanent standby generator sized to maintain water system pressure and refill capability during power outages.
- Installation of automatic transfer switches (ATS) and electrical infrastructure improvements.
- Fuel storage and refueling planning to ensure sustained operations during extended incidents.
- Integration with remote monitoring systems to ensure generator readiness and performance visibility.
- This component ensures that the helicopter dip site remains operational even during PSPS events or fire-caused grid failures.

This project also supports a broader Hazard Mitigation Benefits (All-Hazard Resilience). Installing generator backup provides additional community-wide resilience during:

- Severe Winter Storms
  - ✓ Maintains water pressure during grid outages caused by wind, snow, or ice.
  - ✓ Prevents service disruptions affecting residences, businesses, and fire suppression capability.
- Extreme Heat Events
  - ✓ Supports uninterrupted water supply during peak demand periods.
  - ✓ Protects vulnerable populations relying on consistent water service.
- Flooding or Atmospheric River Events
  - ✓ Maintains operational water infrastructure when electrical substations or lines are compromised.
- Public Safety Power Shutoffs (PSPS)
  - ✓ Reduces dependency on grid power during high fire danger conditions.
  - ✓ Minimizes cascading impacts to firefighting capability and domestic water service.

- Earthquake or Infrastructure Failure
  - ✓ Provides redundancy in the event of localized grid damage.

Other Alternatives:

- Construct standalone water tanks (not connected to mains) filled by tender trucks (slower refill; dependent on road access and fleet availability).
- Use existing surface water (seasonal, may be unavailable during drought; access and environmental constraints).
- Add additional hydrant upgrades only (may not be suitable/safe for dip operations; may not provide the needed volume quickly).
- Contract for portable folding tanks staged during high-risk periods (requires staffing/logistics; not permanent).
- Increase ground resources/water tenders instead of aerial supply improvements (does not solve terrain/rapid spread challenges where aviation is decisive).

Existing Planning Mechanism(s) through which Action Will Be Implemented:

- Community Wildfire Protection Plan (CWPP)
- Local Hazard Mitigation Plan (LHMP) wildfire mitigation actions and project tracking
- County/partner Wildfire Protection and Response planning (Cal Fire unit plan)
- County OES emergency operations planning and mutual aid coordination
- Water system capital improvement planning (district/municipal CIP), operational MOUs, and standard operating guidelines for emergency water use

Responsible Office/Partners:

- Lead / Coordination:
  - ✓ Madera County Sheriff's OES
  - ✓ CAL FIRE (Madera-Mariposa-Merced Unit)
- Key Partners (as applicable to location):
  - ✓ Local water district/municipal water provider (system owner/operator)
  - ✓ Madera County Public Works (site access, grading, permits support)
  - ✓ Landowner(s) / relevant agencies (if on public land: USFS/BLM/State)
  - ✓ Air operations stakeholders (helicopter operators, Helitack/air attack coordination)
  - ✓ Environmental/permitting partners (as required): RWQCB, CDFW, CEQA lead agency

Benefits (Losses Avoided):

- Faster initial attack: reduced helicopter turnaround time for water drops, improving probability of containment during the first burning period.
- Reduced wildfire spread and severity: fewer acres burned and lower suppression complexity.
- Protection of life safety: reduced threat to residents and responders in WUI.
- Reduced damage to critical infrastructure (power, communications, water conveyance), homes, and agricultural assets.
- Operational reliability during drought: dependable refill vs. seasonal ponds/streams.
- Potentially lower suppression costs and mutual aid draw by improving early containment success.

Potential Funding (Local Budgets, Grant Funds, etc.):

- FEMA Hazard Mitigation Assistance (e.g., HMGP/BRIC) for wildfire risk reduction infrastructure (eligibility to be confirmed during scoping)
- CAL FIRE wildfire prevention / resilience grants (as available)
- Local water district CIP / in-kind support (design, tie-in, operations)
- County general funds and/or capital funds (match)
- State or regional resilience funding opportunities (when applicable)
- Private/industry partnerships (if protecting high-value infrastructure/ag operations)

Timeline:

- 1-5 years
- Near-term (0–12 months): Site selection, stakeholder agreements/MOUs, feasibility and conceptual design, cost estimate, and permitting pathway.
- Mid-term (12–24 months): Final design/engineering, environmental compliance, procurement.
- Long-term (24–36 months): Construction/installation, testing/commissioning, mapping/dispatch integration, and maintenance plan adoption.

Project Priority (High, Medium, Low): High

Chapter 6 Plan Adoption

44 CFR §201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, county commissioner, Tribal Council).

The purpose of formally adopting this 2026 Madera County LHMP Update is to secure buy-in from each participating jurisdiction, raise awareness of the Plan, and formalize the Plan's approval and implementation. The adoption of this LHMP Update completes Planning Step 9 of the 10-step planning process: Adopt the Plan, in accordance with the requirements of DMA 2000. For the unincorporated County and the two incorporated communities, this adoption resolution also addresses AB 2140 requiring adoption by reference or incorporation into the Safety Element of the General Plan.

The governing board for each jurisdiction has adopted this 2026 Madera County LHMP Update by passing a resolution. A copy of the generic resolution is included in Appendix D: Adoption Resolution.

Chapter 7 Plan Implementation and Maintenance

44 CFR §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 this 2026 Madera County LHMP Update is critical to the success of hazard mitigation in the Madera County Planning Area. Plan implementation and maintenance is Planning Step 10 of the 10-step planning process. Accordingly, 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 in local hazard mitigation planning.

Chapter 3, Planning Process, includes information on the implementation and maintenance process since the adoption of the 2018 LHMP Update. This chapter includes information on the implementation and maintenance process for the development of this Plan, the 2026 Madera County LHMP Update.

7.1 Implementation

Once adopted, this 2026 Madera County LHMP Update faces the truest test of its worth: Implementation. While the Plan contains many worthwhile actions, the County and all participating jurisdictions will need to decide which action(s) to undertake first. Two factors should be considered when making that decision: the priority assigned to the mitigation actions in the Plan and funding availability. Low or no-cost actions most easily demonstrate progress toward successful Plan implementation.

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 local general plans, stormwater plans, Emergency Operations Plans (EOPs), evacuation plans, and other hazard and emergency management planning efforts by the participating jurisdictions. These jurisdictions already implement policies and programs to reduce losses to life and property from hazards. This 2026 LHMP Update builds upon the momentum developed through prior, related planning and mitigation programs and recommends implementing actions, where possible, through other programs.

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. Implementation can be accomplished by adhering to the schedules identified for each action through sustained collaborative efforts, highlighting the mutual benefits of proposed mitigation actions, and the Madera County jurisdictions, its stakeholders, and the public. This is achieved through the routine actions of monitoring agendas, attending meetings, and promoting mitigation initiatives to enhance the safety and sustainability of the community. Additional mitigation strategies may include consistent and ongoing enforcement of existing policies and the vigilant review of programs for coordination and multi-objective opportunities to enhance mitigation.

Simultaneously, it is important to continuously monitor potential funding opportunities to finance mitigation actions. This may include identifying funding sources to meet local matching funds requirements under FEMA pre- and post-disaster mitigation grant programs, and other sources. When funding does become available, the participating jurisdictions will be better positioned to capitalize on the opportunity.

Responsibility for Implementation of Goals and Activities

The elected officials, executive leadership teams, responsible staff and departments, and emergency management offices of the participating jurisdictions are charged with implementation of various activities in the 2026 LHMP Update. During annual reviews as described later in this section, each participating jurisdiction should conduct an assessment of progress toward meeting the goals and activities of the LHMP Update. At that time, recommendations may be made to modify timeframes for the completion of identified mitigation actions, identify funding sources, and work with responsible entities to implement the actions. On an annual basis, the priority of various mitigation actions may be adjusted. Some activities that are found not to be feasible may be removed from the Plan entirely, while other mitigation actions unforeseen during the Plan development process may be added.

7.1.1. Role of the LHMP Update Planning Committee in Implementation and Maintenance

With adoption of this Plan, each participating jurisdiction will be responsible for LHMP implementation and maintenance. The HMPC identified in Chapter 3 (or a similar committee) will reconvene annually to ensure mitigation strategies are being implemented, and the County and Cities continue to maintain compliance with the NFIP. The Madera County, Sheriff's Office, Office of Emergency Services (County OES), will continue in its role as project lead for LHMP implementation and maintenance. As such, County OES, as LHMP project lead, and all participating jurisdictions will continue their relationship, and will plan to convene the same or similar HMPC when preparing the subsequent LHMP Update. The County OES project lead, with support from participating jurisdictions and the LHMP Update HMPC will:

- 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;
- Ensure hazard mitigation remains a consideration for community decision makers;
- 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 the implementation and update of this Plan;
- Report on Plan progress and recommended changes to the governing boards for all participating jurisdictions; and
- Inform and solicit input from the public.

The primary duty of the County and all participating jurisdictions and the HMPC is to see the LHMP Update successfully carried out and to report to their governing boards and the public on the status of LHMP 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 about the LHMP on the websites of participating jurisdictions.

7.2 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate LHMP implementation and to update the Plan as progress, roadblocks, or changing circumstances are encountered.

7.2.1. Maintenance Schedule

Madera County OES, as project lead, in conjunction with the LHMP leads for all participating jurisdictions, is responsible for initiating Plan reviews. In order to monitor progress and update the mitigation strategies identified in the mitigation action plan, County OES, LHMP leads from other participating jurisdictions, and the HMPC will revisit this Plan annually each year and following a hazard event to review and document progress on Plan implementation. Madera County OES will also submit a five-year written update to the State and FEMA Region IX, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With this 2026 LHMP Update anticipated to be fully approved and adopted in mid- 2026, the next required written update of the Plan must be completed by mid- 2031. Madera County OES will initiate the Plan Update – which may include applying for grant funding to hire professional services to assist in preparing the 2031 LHMP Update. The 2031 LHMP Update development process should be initiated in 2028 to ensure the 2031 LHMP Update can be funded and completed by this 2026 Madera County LHMP's expiration date.

7.2.2. Maintenance Evaluation Process

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;
- Increased vulnerability as a result of new development (and/or annexation); and/or
- Increased vulnerability resulting from unforeseen or new circumstances.

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;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to infrastructure inventories; and
- Incorporate new action recommendations or changes in action prioritization.

Changes will be made to this Plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or

funding resources. All mitigation actions will be reviewed during the monitoring and update of this Plan to determine feasibility of future implementation. Updating of this LHMP will be by written changes and submissions, as the participating jurisdictions and HMPC deem appropriate and necessary, and as approved by the governing boards of each participating jurisdiction. In keeping with the five-year update process, the HMPC will convene public meetings to solicit public input on this LHMP Update and its routine maintenance, and the final product will be again adopted by the governing boards of each participating jurisdiction.

Annual Plan Review Process

For the LHMP Update review process, the County OES lead, and the LHMP leads for each of the participating jurisdictions, will be responsible for facilitating, coordinating, and scheduling reviews and maintenance of the LHMP. ***The LHMP is intended to be a living document.*** The review of the 2026 LHMP Update will normally occur on an annual basis each year and will be conducted by the HMPC as follows:

- County OES will place an advertisement in the local newspaper and will utilize other public outreach mechanisms, such as e-newsletters, social media blasts, and others, advising the public of the date, time, and place for each annual review of the LHMP Update and will be responsible for leading the meeting to review the Plan.
- Notices will be sent to the members of the HMPC, federal, state, and local agencies, non-profit groups, local planning agencies, representatives of business interests, neighboring communities, and others advising them of the date, time, and place for the review.
- County/City/District/Tribal officials will be noticed by email and telephone or personal visit and urged to participate.
- Members of any participating jurisdiction's planning commissions and other appointed commissions and groups will also be noticed by email and either by telephone or personal visit.
- Prior to the review, department heads and others tasked with implementation of the various activities will be queried concerning progress on each activity in their area of responsibility and asked to present a report at the review meeting.
- The local news media will be contacted, and a copy of the current LHMP will be available for public comment at Madera County OES as project lead.
- After the review meeting, minutes of the meeting and an annual report will be prepared by the participating jurisdictions and the HMPC and posted on the Madera County LHMP webpage for the public.
- A copy of the 2026 LHMP Update will be continually posted on the LHMP website for the participating jurisdictions.

Criteria for Annual Reviews

The criteria recommended in 44 CFR §201 and §206 will be utilized in reviewing and updating the 2026 LHMP Update. More specifically, the reviews should include the following information:

- Community growth or change in the past year.
- The number of substantially damaged or substantially improved structures by flood zone.

- The renovations to public infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the Emergency Operations Center(s) (EOC) and whether or not the event resulted in a federal disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- The dates of hazard events and descriptions.
- Documented damages due to the events.
- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures due to the hazard and the length of time closed.
- Assessment of the number of private and public buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed. The assessment will include residences, mobile homes, commercial structures, industrial structures, and public buildings, such as schools and public safety buildings.
- Review of the status of implementation of projects (mitigation strategies) including projects completed will be noted. Projects behind schedule will include a reason for delay of implementation.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the community and how and if the policy changes can or should be incorporated into the next LHMP Update.

7.2.3. Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of the 2026 LHMP Update recommendations and their underlying principles into other jurisdictional 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. The point is re-emphasized here. As described in this LHMP's capability assessment, the 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:

- General and master plans
- Emergency Operations Plans and other emergency management efforts
- Jurisdictional ordinances
- Flood/stormwater management/master plans
- Climate Plans
- Capital Improvement Plans and budgets
- Other plans and policies outlined in the capability assessment
- Other plans, regulations, and practices with a mitigation focus

Participating jurisdictions and HMPC members involved in these other planning and program mechanisms will be responsible for integrating the findings and recommendations of this LHMP with these other plans,

programs, etc., as appropriate. As described in Section 7.1 Implementation, incorporation into existing planning mechanisms will be done through the routine actions of:

- monitoring other planning/program agendas;
- attending other planning/program meetings;
- participating in other planning processes; and
- monitoring community budget meetings for other community program opportunities.

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

Examples of incorporation of the 2026 LHMP Update into existing planning mechanisms include:

1. As recommended by Assembly Bill 2140, the County and Cities should adopt (by reference or incorporation) this LHMP into the Safety Element of their General Plans. Evidence of such adoption (by formal, certified resolution and text within the body of the Safety Element) shall be provided to CAL OES and FEMA.
2. Integration of wildfire actions identified in this mitigation strategy with the actions and implementation priorities established in existing and new Community Wildfire Protection Plans and other fire plans. Key people responsible for development and implementation of these plans participated on the HMPC. Key projects were identified and integrated specifically into this LHMP, while others currently of lessor priority should be referenced in their source document. Actual implementation of these projects will likely occur through the CWPP's processes through the efforts of each responsible jurisdiction and department.
3. Integration of many of the infrastructure, roads, and facility improvement projects with the jurisdictional Stormwater Master Plans and Capital Improvement Programs.
4. Use of risk assessment information to inform future updates of the hazard analysis in the Emergency Operations Plans and related emergency management efforts for all participating jurisdictions.

Each jurisdiction will consider incorporation of the LHMP into planning mechanisms listed on Table 7-1.

Table 7-1 LHMP Incorporation into other Planning Mechanisms

Jurisdiction	General Plans/ Master Plans/	EOP/ Emergency Plans	CWPP/ Fire Plans	CIP	Flood/ Stormwater/ Watershed Plans	Other Plans: Drought/ Water Management/ Climate Plans/ Other
Madera County	X	X	X	X	X	X
City of Chowchilla	X	X	X	X	X	X
City of Madera	X	X	X	X	X	X

In addition, the mitigation actions included within each jurisdictions' mitigation strategy contain a category identifying "Existing Planning Mechanism(s) through which Action will be Implemented" that contains how each mitigation action is related to other planning mechanisms and jurisdictional programs. Those can

be found in Chapter 5 of the Base Plan for the County and within each jurisdictions' annex to this Base 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 LHMP.

7.2.4. Continued Public Involvement

Continued public involvement is a crucial element of successful Plan implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the 2026 LHMP implementation and seek additional public comment. The Plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, press releases to local media, and through public hearings.

Public Involvement Process for Annual Reviews

The public will be noticed by placing an advertisement in the newspaper and will utilize other public outreach mechanisms, such as e-newsletters, social media blasts, and others specifying the date and time for the review and inviting public participation. The HMPC, local, state, and regional agencies will be notified and invited to attend and participate.

Public Involvement for Five-year Update

When the participating jurisdictions and HMPC reconvenes for the next LHMP Update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the Plan. In reconvening, the HMPC will identify a public outreach subcommittee, which will be responsible for coordinating the activities necessary to involve the greater public. The subcommittee will develop a plan for public involvement and will be responsible for disseminating information through a variety of media channels detailing the LHMP update process. As part of this effort, public meetings will be held, and public comments will be solicited on the LHMP Update draft. In addition, continued public involvement and outreach efforts will place an emphasis on identifying and inviting representatives from underserved and vulnerable populations to be part of the next, 2031 Madera County LHMP Update. As a starting point the 2026 HMPC members and the underserved and vulnerable population groups identified for this 2026 LHMP Update will be contacted to invite them to the 2031 LHMP Update process with additional groups identified and added to meet the ongoing goal of mitigation planning for the whole community.

Prelude to Jurisdictional Annexes

For this 2026 Madera County LHMP Update, the **Jurisdictional Annexes**, working in conjunction with the Base Plan, detail the hazard mitigation planning elements specific to participating jurisdictions, beyond the unincorporated County which is covered in the Base Plan. Each Annex is not intended to be a standalone document, but appends to, supplements, and incorporates by reference the information contained in the Base Plan, as the umbrella document for this planning effort. As such, all Chapters 1-7 of the Base Plan and associated appendices, including the planning process and other procedural requirements and planning elements apply to and were met by each participating jurisdiction.

These Jurisdictional Annexes provide additional information specific to each participating jurisdiction, with a focus on providing additional details on the risk assessment and mitigation strategy beyond that provided in the Base Plan.

Annex A City of Chowchilla

A.1 Introduction

This Annex details the hazard mitigation planning elements specific to the City of Chowchilla, a previously participating jurisdiction to the 2018 Madera County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the City. This Annex provides additional information specific to the City of Chowchilla, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this jurisdiction.

A.2 Planning Process

As described above, the City of Chowchilla followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Madera County Hazard Mitigation Planning Committee (HMPC), the City formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table A-1. Additional details on Plan participation and City representatives are included in Appendix A.

Table A-1 City of Chowchilla – Planning Team

Name	Position/Title	How Participated
Christina Soares	Public Works – Administrative Analyst	Attended LHMP meetings. Provided data on hazard history. Filled out hazard ID table. Provided mitigation actions.
Fred Gaumnitz	Fire Department – Fire Chief	Provided history of previous plans and history of the City in regard to emergency services that are needed. Provided mitigation actions and other required data.

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the City integrated the previously approved 2018 LHMP into existing planning mechanisms and programs. The City of Chowchilla incorporated the 2018 LHMP into several key documents and planning mechanisms. Notably, it was referenced in the Safety Element of the City's General Plan. Additionally, data from the 2018 LHMP was used in the City's Emergency Operations Plan (EOP), which is periodically updated to reflect hazard mitigation best practices. The City also considers LHMP data when developing project prioritization for capital improvements. Specifically, the City incorporated into or implemented the 2018 LHMP through other plans and programs shown in Table A-2.

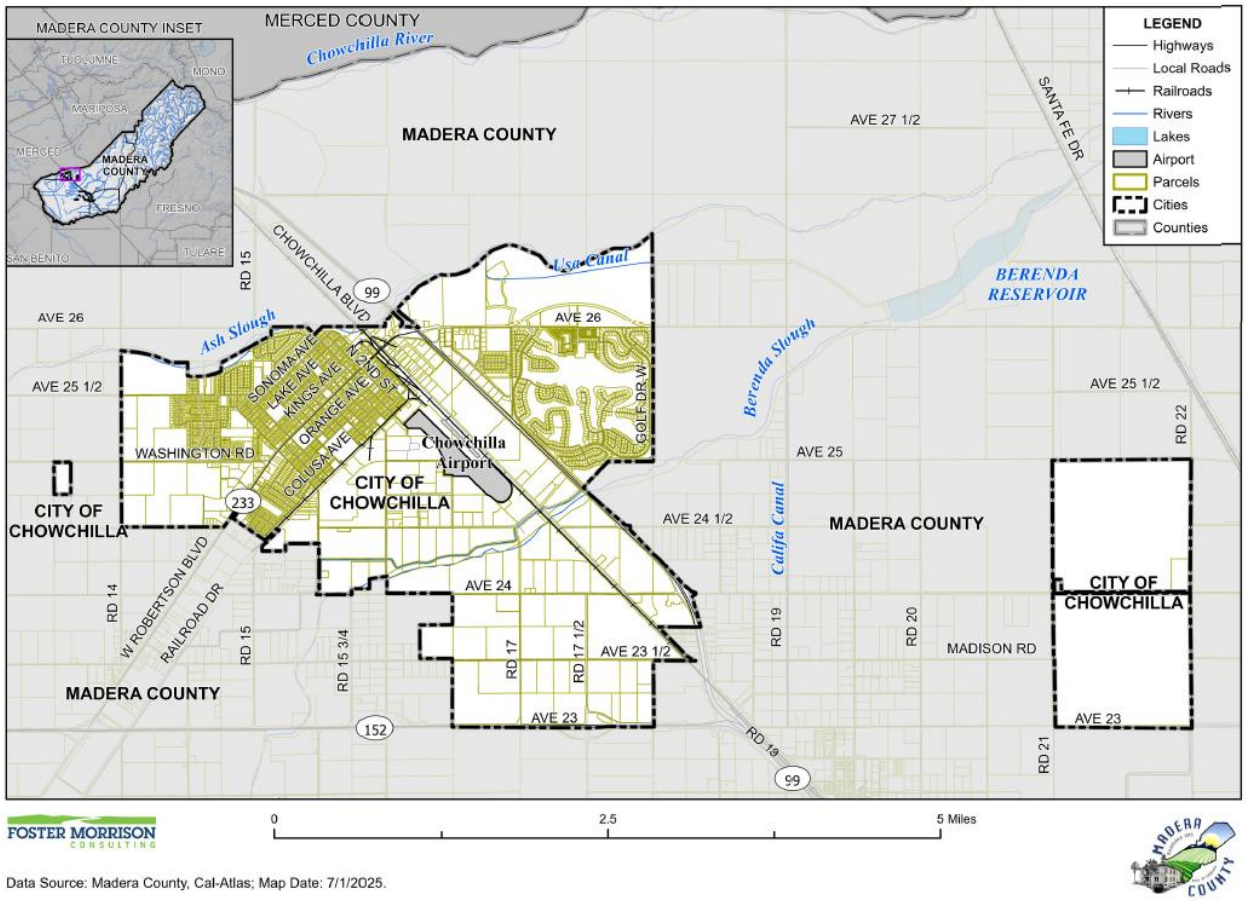
Table A-2 2018 LHMP Incorporation

Planning Mechanism 2018 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
Madera County General Plan	The County adopted the 2018 LHMP Update into the Safety Element of the General Plan.
Madera County EOP	The 2018 LHMP and its hazard information is utilized in the County Emergency Operations Plan updates.
Safety Element of the City's General Plan	The LHMP Update was referenced in this plan. Hazard data from the LHMP was utilized.
City EOP	Hazard and other data from the LHMP Update was utilized in the EOP, which is updated to reflect hazard mitigation best practices.

A.3 Community Profile

The community profile for the City of Chowchilla is detailed in the following sections. Figure A-1 displays a City map and the location of City of Chowchilla within Madera County.

Figure A-1 City of Chowchilla



A.3.1. Geography and Climate

Situated in the heart of the fertile San Joaquin Valley at the very center of California, Chowchilla is today a farming community, just as it was when it was first developed. Located just south of the Chowchilla River and to the west of the Chowchilla Mountain in the Sierras. Chowchilla covers four square miles with 480 acres and adjacent to the city limit is another 880 acres that are industrially zoned. The City sits at 240 feet above mean sea level. The City is serviced by two railroads (Santa Fe and Union Pacific) and two major highways –north and south by Highway 99 and to the west by Highway 152.

The climate of Chowchilla is Mediterranean. Chowchilla receives an average of about 12 inches of precipitation per year. The wettest months are January, February, and March with March being the wettest. Chowchilla has dry, hot summers, and mild to cool, rainy winters. Chowchilla experiences frequent fog from November to March and overcast days are common, especially in January. There are days with moderate to heavy rain during the winter months. In January, the high temperature may drop as low as 45°F. During the summer, when there is usually no rain, the temperature may reach as high as 110°F.

A.3.2. History

Chowchilla's colorful past began in the spring of 1844 when John Fremont and his party were making their way across what is now Madera County. In Fremont's memoirs we find the following recording: "Continuing along we came upon broad and deeply-worn trails which had been freshly traveled by large bands of horses, apparently coming from the San Joaquin Valley. But we heard enough to know that they came from the settlements on the coast. These and indications from horse bones dragged about by wild animals – wolves or bears – warned us that we were approaching the villages of Horse-thief Indians, a party who had just returned from a successful raid." This brief mention of the "Horse-thief Indians" gives us an introduction through the eyes of the white man, of the early inhabitants of the Chowchilla area.

The Chowchilla Indians lived along the several channels of the Chowchilla River in the plains region of Central California. According to one authority, the Chowchilla tribe may well have been a very populous tribe. At least we know they were a warlike one and the name Chowchilla was a byword for bravery to the southernmost end of Yokuts territory in the southern end of the San Joaquin Valley.

Around 1910, Mr. Orlando Alison Robertson (Pioneer) became interested in land development in California. It was during that year he organized the United States Farm Land Company. He established a general office in Sacramento and maintained offices in Winnipeg, St. Paul, and Denver.

At the time Mr. Robertson became interested in the Chowchilla area, he was estimated to be worth over four million dollars. Mr. Robertson believed that Chowchilla was ready for immediate development and held ambitious hopes for transforming the land into prosperous farms owned by happy people. He put all his money into the Chowchilla venture against the advice of his financial counselors and, as we shall see, it cost him heavily.

On May 22, 1912, Mr. Robertson purchased the Chowchilla Ranch from the California Pastoral & Agricultural Company Ltd. Over half of this ranch was divided into tracts for sale to farmers and the northeast corner of the property was set aside for the site of the town which became known as Chowchilla.

Though Chowchilla lies in the center of California and beside the main lines of the Southern Pacific, it was not the outgrowth of a geographic or economic need. It was, in fact, the result of the thinking and planning of one man: O. A. Robertson. The City of Chowchilla was incorporated in 1923. Since that time and after a few annexations, the City now comprises four square miles.

A.3.3. Economy and Tax Base

US Census estimates show economic characteristics for the City of Chowchilla. These are shown in Table A-3 and Table A-4. Mean household income in the City was $85,332. Median household income in the City was $63,308.

Table A-3 City of Chowchilla – Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	348	6.8%
Construction	435	8.5%
Manufacturing	230	4.5%
Wholesale trade	53	1.0%
Retail trade	557	10.9%
Transportation and warehousing, and utilities	521	10.2%
Information	43	0.8%
Finance and insurance, and real estate and rental and leasing	394	7.7%
Professional, scientific, and management, and administrative and waste management services	402	7.9%
Educational services, and health care and social assistance	1,151	22.6%
Arts, entertainment, and recreation, and accommodation and food services	471	9.3%
Other services, except public administration	159	3.1%
Public administration	325	6.4%

Source: US Census Bureau American Community Survey 2023 Estimates

Table A-4 City of Chowchilla – Income and Benefits

Income Bracket	Percent
<$10,000	10.2%
$10,000 – $14,999	4.4%
$15,000 - $24,9999	7.5%
$25,000 – $34,999	4.2%
$35,000 – $49,999	1.7%
$50,000 – $74,999	18.5%
$75,000 – $99,999	12.1%
$100,000 – $149,999	15.7%
$150,000 – $199,999	9.6%

Income Bracket	Percent
$200,000 or more	6.1%

Source: US Census Bureau American Community Survey 2023 Estimates

Chowchilla's primary economic drivers include the correctional facilities (Valley State Prison and Central California Women's Facility), agriculture, logistics, and retail services. The City also hosts several annual community events, including the Chowchilla-Madera County Fair, seasonal parades, and regional youth sports tournaments.

A.4 Risk Assessment

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

The City of Chowchilla risk assessment identifies and profiles relevant hazards and assesses the exposure of lives, property, infrastructure, and the environment to these hazards. The process allows for a better understanding of the City's potential risk and vulnerability to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Community Profile above, a risk assessment was performed for the City utilizing the existing City boundaries. This includes the following sections:

- A.4.1 Assets Inventory and Growth and Development Trends
- A.4.2 Hazard Identification
- A.4.3 Hazard Profiles and Vulnerability to Specific Hazards

A.4.1. Assets Inventory and Growth and Development Trends

This section provides an inventory of the City of Chowchilla's total assets potentially at risk to hazards and an overview of growth and development trends. This section is broken into two parts:

- **Asset Inventory** – The assets inventory identifies the City of Chowchilla's total assets, including the people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. This data is not hazard specific, but is representative of total assets within the City, potentially at risk to identified hazards as discussed in Section A.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the City, both current and future, is presented.

Assets Inventory

The City's asset inventory is detailed in the following sections:

- People and Populations
- Structures

- Critical Facilities and Infrastructure
- Community Lifelines
- Natural, Historic, and Cultural Resources
- Economic Assets and Community Activities of Value

A discussion of each of these assets follows and serves as the template for the asset discussion for each hazard in Section A.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the community. This section includes an inventory of past and current populations of the City and also discusses vulnerable populations and underserved communities as a subsection of people and populations located within the City and potentially at risk to hazards. Information from the City, US Census Bureau, California Department of Finance, and other sources as detailed below form the basis of this discussion.

Historic Population Trends and Current Population

Population growth can increase the number of people living in hazard prone areas. The City of Chowchilla has 18,742 residents, as of January 1, 2025. The City of Chowchilla has seen growth rates as shown in Table A-5. As shown, the City has grown consistently since 1930, with a small recent shrinkage of the population since the 2018 LHMP.

Table A-5 City of Chowchilla – Population Changes Since 1930

Year	Population	% Change
1930	847	–
1940	1,957	131.1%
1950	3,893	98.9%
1960	4,525	16.2%
1970	4,349	-3.9%
1980	5,122	17.8%
1990	5,930	15.8%
2000	11,127	87.6%
2010	18,720	68.2%
2020	19,039	1.7%
2025	18,742	-1.6%

Source: US Census Bureau, California Department of Finance (2025)

Underserved and Vulnerable Populations and Disadvantaged Communities

The City has a socially and economically diverse community, and many residents that are socially or economically disadvantaged or vulnerable due to varying reasons reside within the City. The City and surrounding County are no strangers to large natural disasters which have had a direct impact on the populations of the area. Thus, it is important to consider the potential effects of hazard events and disasters

on these more vulnerable populations. Socially vulnerable and disadvantaged communities in the City are discussed by the following sources:

- CDC Social Vulnerability Index
- California Department of Water Resources (CA DWR) Special Populations and Disadvantaged Community Mapping
- FEMA Community Disaster Resilience Zones
- City Planning Team Input

CDC Social Vulnerability Index

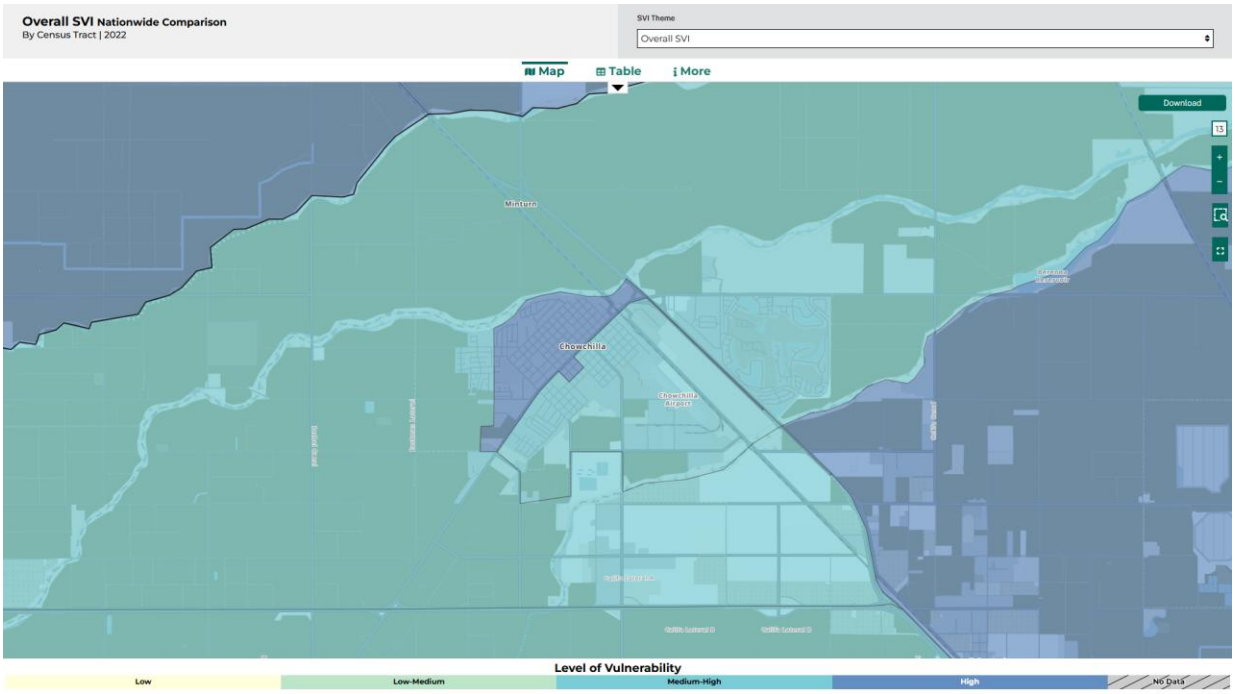
Every community must prepare for and respond to a hazard event, including the range of natural hazards addressed in this Plan, from severe weather extremes to large potentially catastrophic events such as wildfires or earthquakes. A number of factors, including poverty, lack of access to transportation, and crowded housing may weaken a community's ability to prevent human suffering and financial loss in a disaster. These factors are known as social vulnerability.

Social vulnerability refers to the potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss. The Agency for Toxic Substances and Disease Registry (ATSDR) Geospatial Research, Analysis & Services Program (GRASP) created databases to help emergency response planners and public health officials identify and map communities that will most likely need support before, during, and after a hazardous event. The CDC used these databases to create the CDC Social Vulnerability Index (CDC SVI), which uses 15 U.S. census variables to help local officials identify communities that may need additional support before, during, or after disasters.

CDC SVI uses U.S. Census data to determine the social vulnerability of every census tract. Census tracts are subdivisions of counties for which the Census collects statistical data. The CDC SVI ranks each tract on 15 social factors, including poverty, lack of vehicle access, and crowded housing, and groups them into four related themes. Each tract receives a separate ranking for each of the four themes, as well as an overall ranking. Maps of the four themes for the City are shown in the figures below.

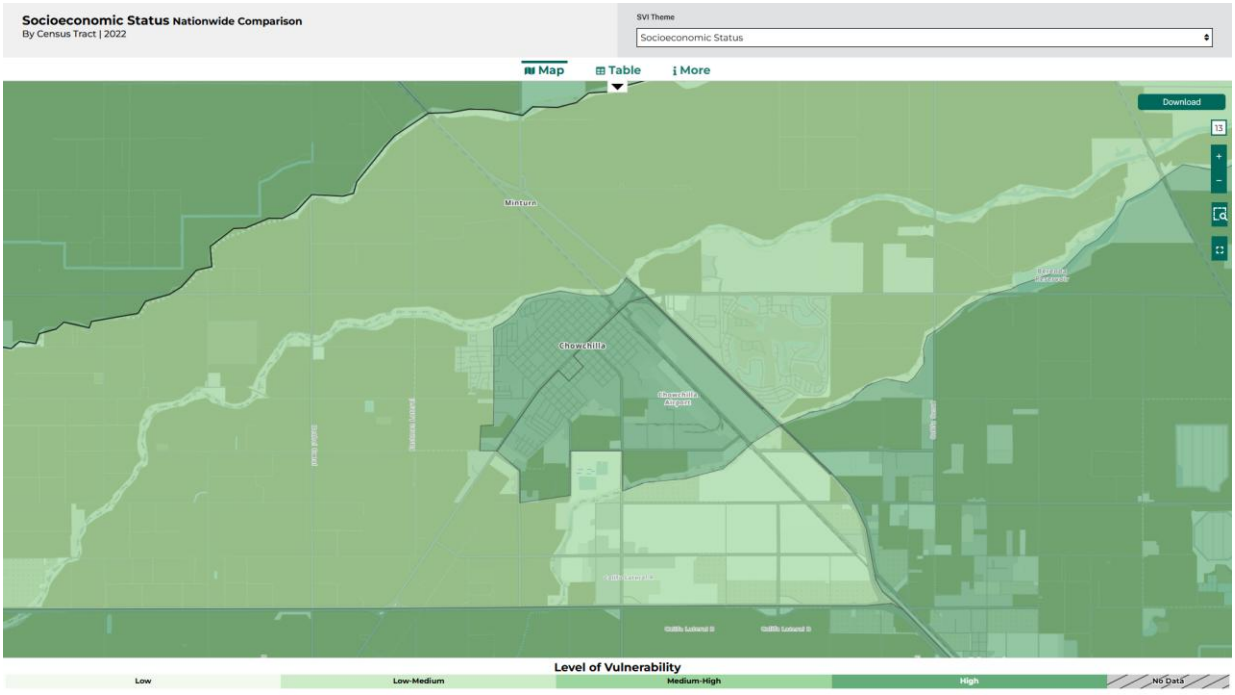
The overall SVI map is shown in Figure A-2; the socioeconomic SVI for the census tracts in and around the City are shown in Figure A-3; the household composition SVI is shown in Figure A-4; the minority and language SVI is shown in Figure A-5; and the housing and transportation SVI is shown in Figure A-6. Overall, the maps indicate that, in general, the City sees little change in social vulnerability regardless of location. As shown, there is moderate levels of change in each SVI across the City.

Figure A-2 City of Chowchilla – Overall Social Vulnerability



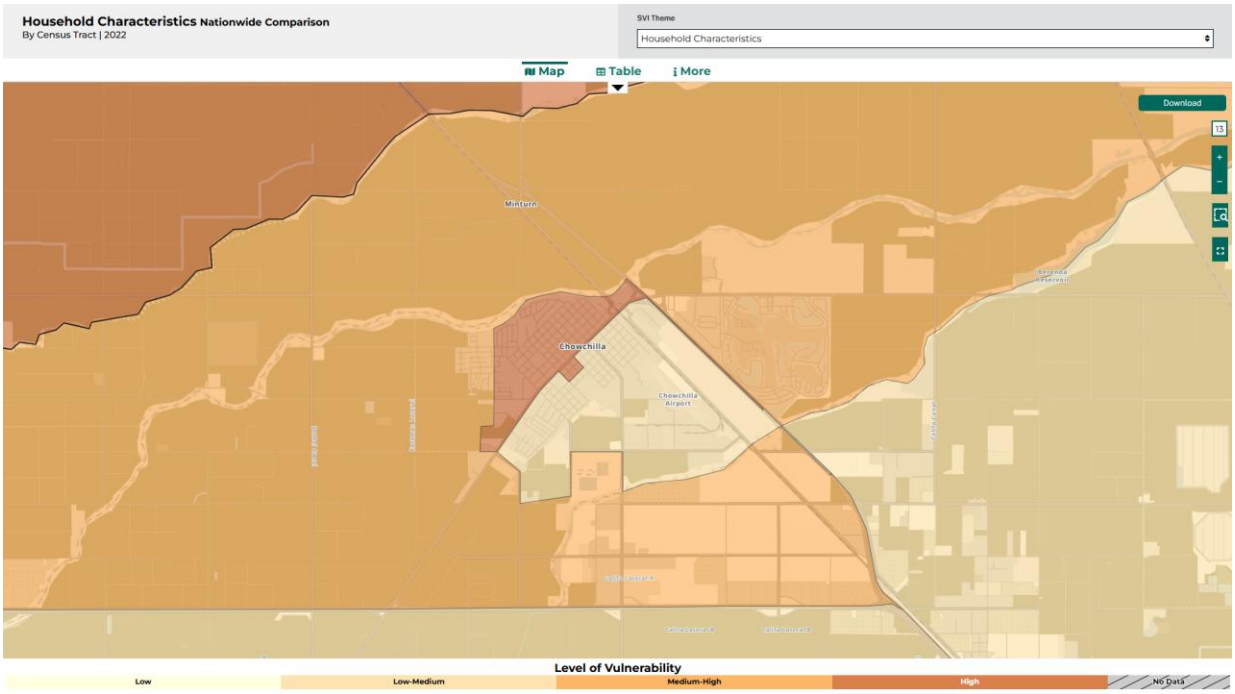
Source: CDC Social Vulnerability Index – map retrieved 10/17/2024
Level of Vulnerability Rating: **Yellow** – Low; **Green** – Low/Medium; **Aqua** – Medium/High; **Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure A-3 City of Chowchilla – Socioeconomic Status Vulnerability



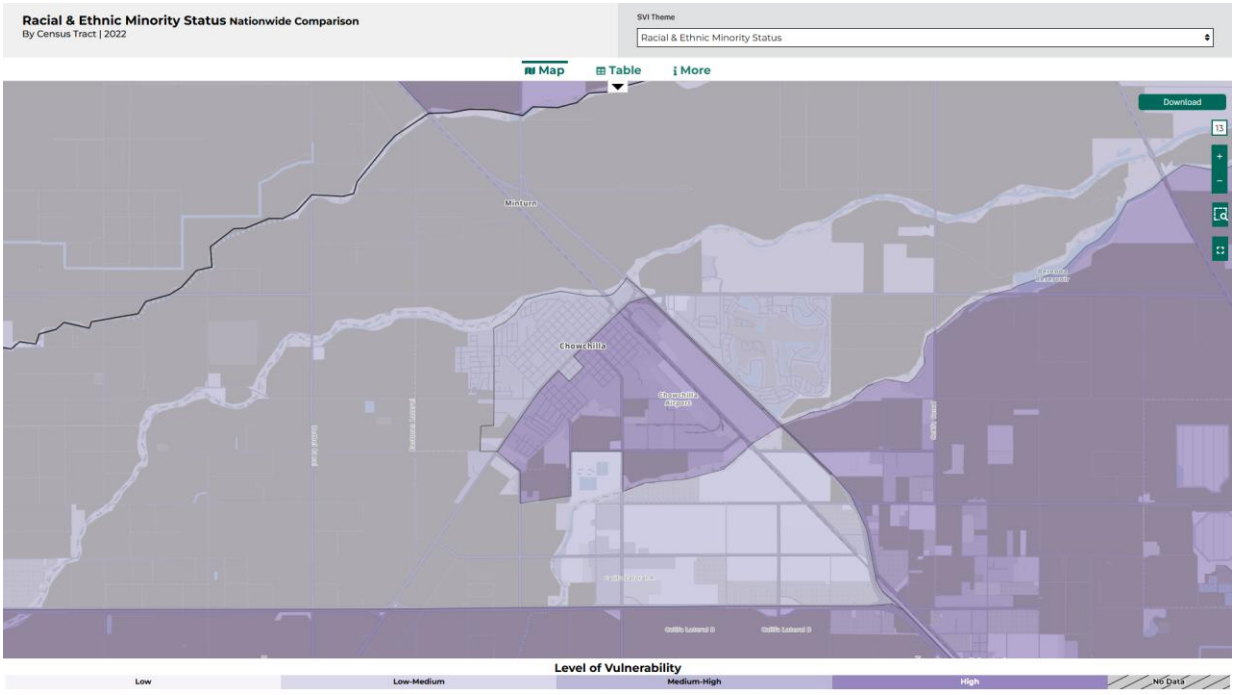
Source: CDC Social Vulnerability Index – map retrieved 10/17/2024
Level of Vulnerability Rating: **Faint Green** – Low; **Light Green** – Low/Medium; **Green** – Medium/High; **Dark Green** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure A-4 City of Chowchilla – Household Characteristics



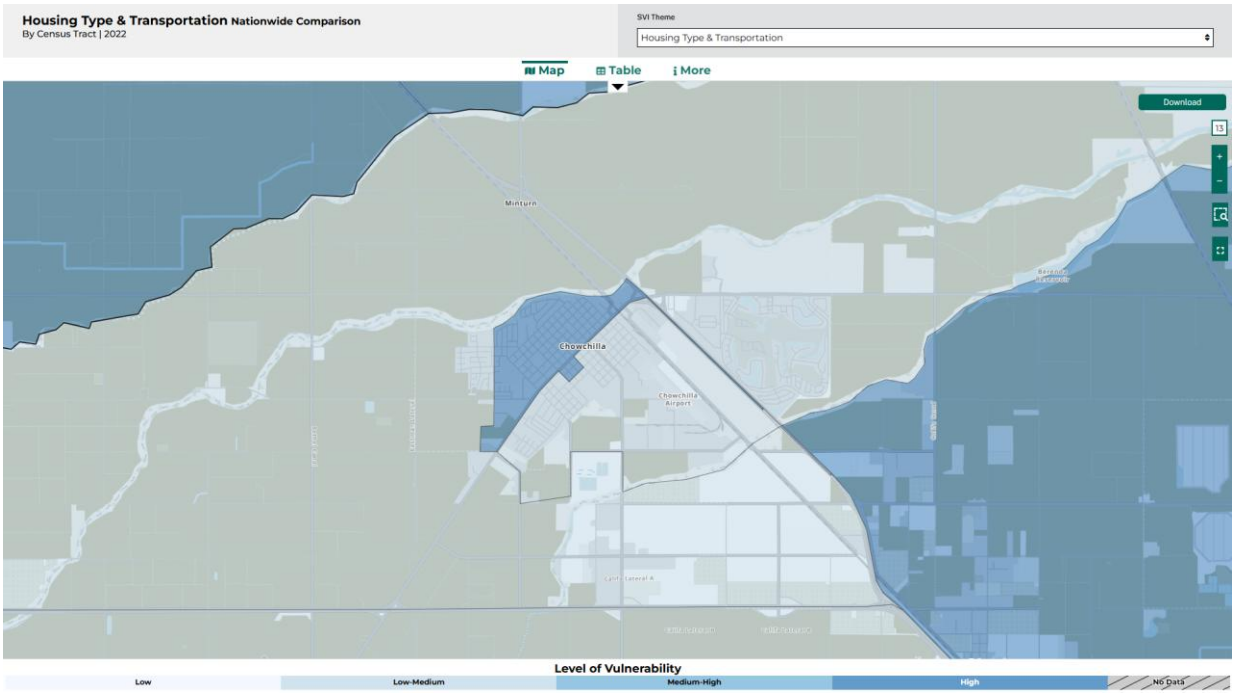
Source: CDC Social Vulnerability Index – map retrieved 10/17/2024
Level of Vulnerability Rating: **Faint Orange** – Low; **Light Orange**– Low/Medium; **Orange** – Medium/High; **Dark Orange** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure A-5 City of Chowchilla – Racial and Ethnic Minority Status



Source: CDC Social Vulnerability Index – map retrieved 10/17/2024
Level of Vulnerability Rating: **Faint Purple** – Low; **Light Purple** – Low/Medium; **Purple** – Medium/High; **Dark Purple** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure A-6 City of Chowchilla – Housing Type and Transportation

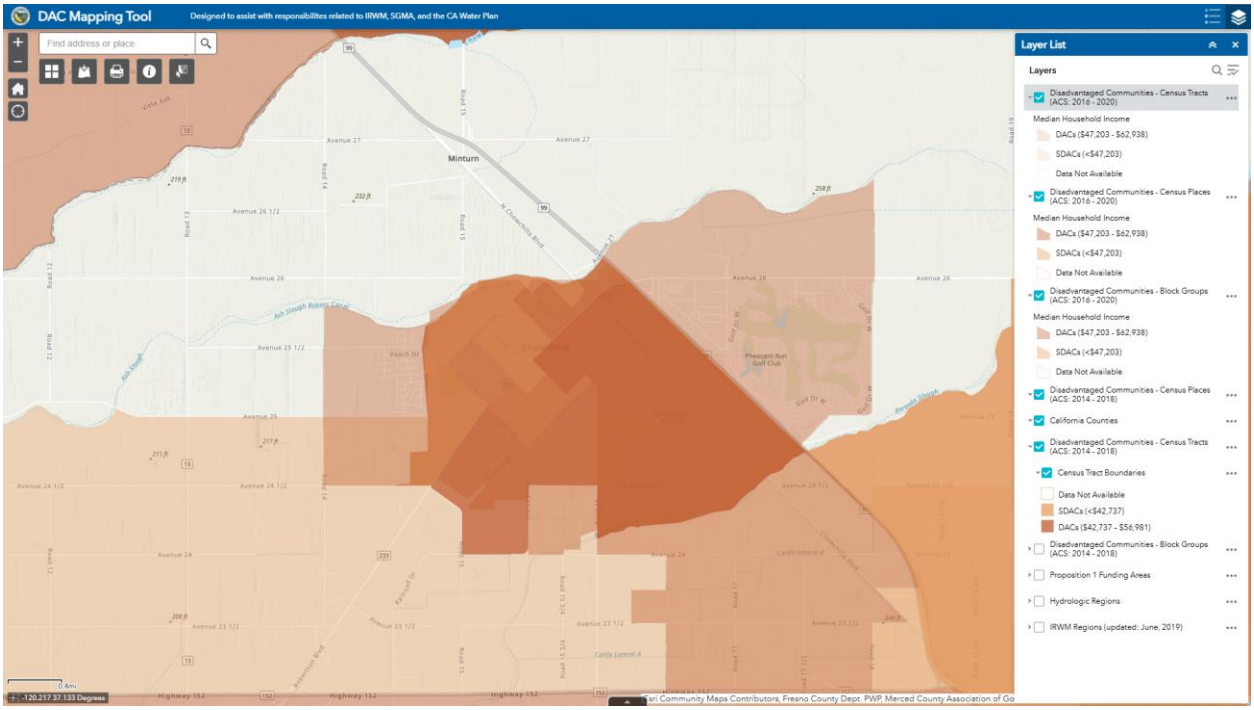


Source: CDC Social Vulnerability Index – map retrieved 10/17/2024
Level of Vulnerability Rating: **Faint Blue** – Low; **Light Blue** – Low/Medium; **Blue** – Medium/High; **Dark Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

California DWR Disadvantaged Community Mapping Tool

The State of California's Proposition 1 Disadvantaged Community (DAC) Involvement Program is designated to ensure the involvement of DACs as well as Economically Distressed Areas and Underrepresented Communities, which DWR collectively refers to as DACs. The Cal DWR definition for a Disadvantaged Community is a community with an annual median household income (MHI) that is less than 80% of the Statewide annual MHI (PRC Section 75005(g)), and those census geographies with an annual MHI less than 60% of the Statewide annual MHI are considered "Severely Disadvantaged Communities". Those areas in the City considered disadvantaged are shown in Figure A-7. As shown, much of the City falls in these DAC areas.

Figure A-7 City of Chowchilla – Disadvantaged Areas

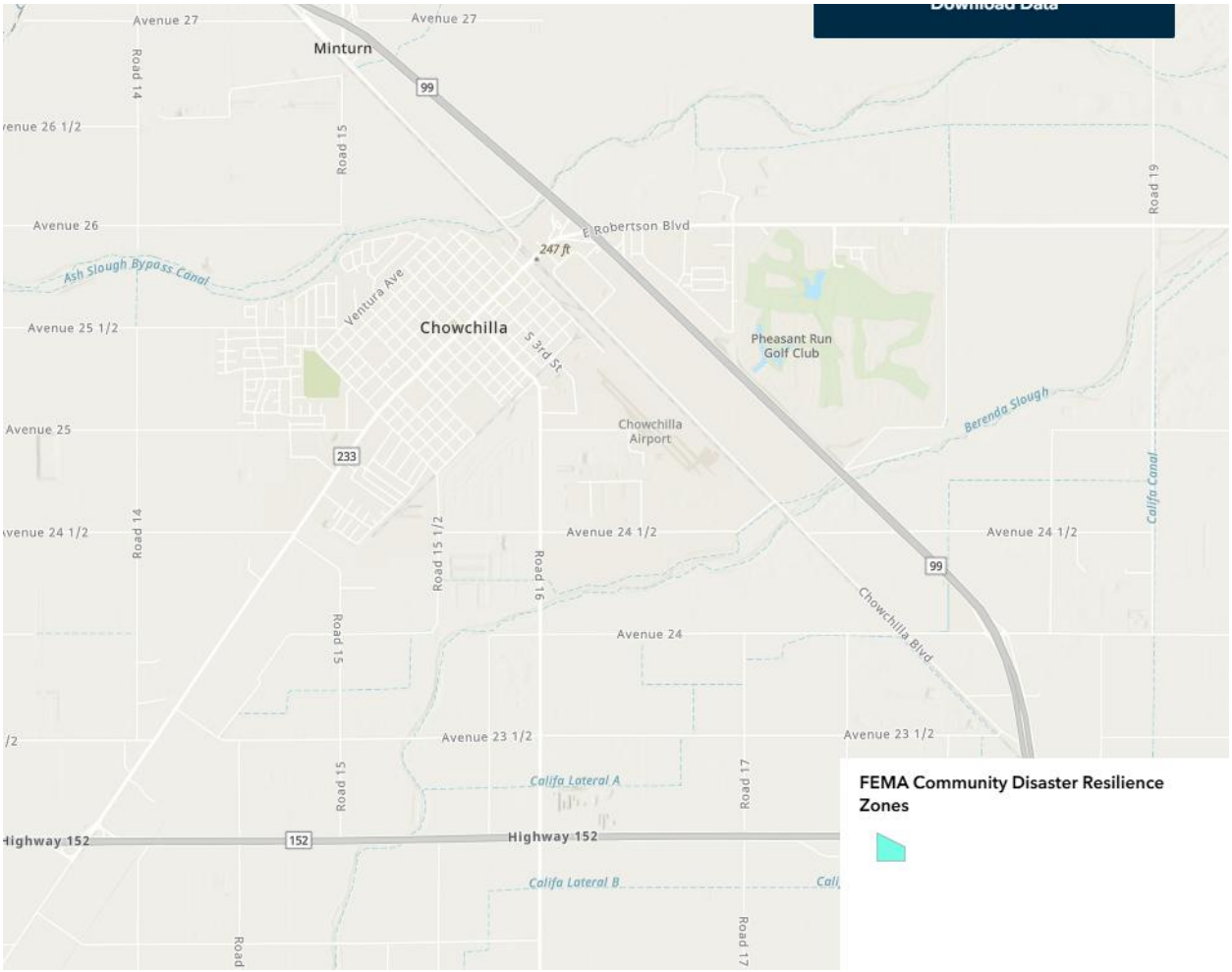


Source: Cal DWR DAC Mapping Tool – retrieved 10/17/2024

FEMA Community Disaster Resilience Zones

Community Disaster Resilience Zones aim to build and strengthen community resilience across the nation by driving federal, public, and private resources to the most at-risk and in-need communities. The Community Disaster Resilience Zones Act uses FEMA's National Risk Index to identify the most at-risk and in-need communities to identify resilience zones. Designated zones will be prioritized for targeted federal support, such as increased cost-share for resilience and mitigation projects, lessening the financial burden on communities to perform resilience-related activities. On September 6, 2023, FEMA announced the initial 483 designations in all 50 states and the District of Columbia. Figure A-8 shows these zones in teal green. As shown, there are no zones near the City limits.

Figure A-8 City of Chowchilla – FEMA Community Disaster Resilience Zones



Source: FEMA. Map retrieved 1/29/2025

City Planning Team Input

The City is classified as a Disadvantage Community, therefore the population of those elderly, disabled, low income, or migrant farm workers is higher than other cities. There is one area of the town that is of middle working class, but a majority of the population is considered a Disadvantage Community.

Because the City is limited with staff at city hall, the City has very limited number of personnel to notify special needs populations in the event of hazardous event, and the City relies heavily on the County to send out the necessary information. The 2017 Climate Change and Health Profile Report (CCHPR) noted that there are other special populations in the County.

> ***In 2010, the age-adjusted death rate in Madera County was higher than the state average. Disparities in death rates among race/ethnicity groups highlight how certain populations disproportionately experience health impacts. Within the county, the highest death rate occurred among Whites and the lowest death rate occurred among African-Americans. In 2012, nearly 49% of adults (47,829) reported one or more chronic***

health conditions including heart disease, diabetes, asthma, severe mental stress or high blood pressure.

In 2012, 16% of adults reported having been diagnosed with asthma. In 2012, approximately 34% of adults were obese (statewide average was 25%). In 2012, nearly 12% of residents aged 5 years and older had a mental or physical disability (statewide average was 10%). In 2005-2010, there was an annual average of 36 heat-related emergency room visits and an age adjusted rate of 24 emergency room visits per 100,000 persons (the statewide age-adjusted rate was 10 emergency room visits per 100,000 persons).

Among climate-vulnerable groups in 2010 were 11,983 children under the age of 5 years and 17,262 adults aged 65 years and older. In 2010, there were approximately 8,624 people living in nursing homes, dormitories, and other group quarters where institutional authorities would need to provide transportation in the event of emergencies.

Social and demographic factors and inequities affect individual and community vulnerability to the health impacts of climate change. In 2010, 10% of households (4,204) did not have a household member 14 years or older who spoke English proficiently (called linguistically isolated; statewide average was 10%).

Additionally, the Planning Team noted that due to Madera County being a largely agriculturally based county, there is a large segment of the population that is Spanish speaking only. The County recognized the fact they are a special population since they only speak Spanish. The County makes efforts to reach this special population by doing messaging in Spanish language as well as English.

Along with this, Chowchilla has a significant population of elderly residents, low-income households, migrant workers, and non-English-speaking individuals, primarily Spanish-speaking. These populations are particularly vulnerable during hazard events such as extreme heat, wildfires (smoke), and power outages. Challenges include limited access to transportation, language barriers, and lack of resources for emergency preparedness. The City is exploring the use of bilingual outreach, mobile cooling centers, and other efforts to support these groups during emergencies.

City of Chowchilla 2024-2032 Housing Element

The City Planning Team noted that the City of Chowchilla 2024-2032 Housing Element discusses special populations in the County. While the County Housing Element is discussed in the base plan and is very similar to Chowchilla, the City has completed their own Housing Element with unique differences. Discussions for seniors, people with disabilities, people experiencing homelessness, large households, female headed households, farmworkers, and extremely low income were included. These are discussed below.

Seniors

Seniors comprise approximately 10% of Chowchilla's population and from 2000 to 2020, the three fastest growing age groups were residents 55-64 years (288% growth), 45-54 years (111% growth), and 65+ years (94% growth), indicating that Chowchilla's population is aging. Approximately 22% of Chowchilla's households are headed by one person aged 65 years and over. This is slightly lower than the County, where 28% of households are headed by one person aged 65 years and over. Approximately 78% of senior households are owner occupied and 22% are renter occupied. This data indicates that the senior population is more likely to be a homeowner than renter.

Chowchilla provides a few housing options specifically to meet the needs of seniors. There are two senior living communities in Chowchilla: Golden Acres Apartments (900 Hospital Drive, Chowchilla, CA 93610) and the Chowchilla Terrace Senior Apartments (201 Washington Road #75, Chowchilla, CA 93610). Golden Acres Apartments provides 46 studio/one-bedroom units for senior residents. Chowchilla Terrace Senior Apartments provides 37 one-bedroom units for senior residents. Although both developments provide income restricted housing with the potential for rental assistance, neither community offers personal or medical assistance.

Aside from the two senior housing developments, the City has other senior specific services including the Chowchilla Senior Center and the Chowchilla Memorial Healthcare District. The Chowchilla Senior Center (820 W Robertson Boulevard, Chowchilla, CA 93610) provides a place for seniors to gather, socialize, and participate in organized activities. Programming is facilitated by the Chowchilla Memorial Healthcare District. The Chowchilla Memorial Healthcare District operates the Palms Care Center (1010 Ventura Avenue, Chowchilla, CA 93610), which is a long-term care and skilled nursing facility with 62 licensed beds.

People with Disabilities

According to the 2021 ACS 5-Year Estimates, approximately 10.9% of Chowchilla's population lives with one or more disabilities (i.e., approximately 1,283 residents out of an estimated 11,765 total civilian non-institutionalized population). Those with disabilities include ambulatory (47%) and cognitive difficulty (42%), which are the most prevalent, followed by independent living difficulty (27%) and hearing difficulty (26%). The 18 through 64-year age group accounts for 45% of the total population with a disability, followed by seniors (43%), then less than 18 years (11%). A majority (90%) of the less than 18 years age group experiences cognitive difficulty. A high proportion of the 18-64-year age group experiences cognitive difficulty (43%) and/or ambulatory difficulty (43%). Seniors have higher proportions of hearing difficulty (61%), ambulatory difficulty (62%), and independent living difficulty (35%) than other age groups.

While there are no facilities within the city limits of Chowchilla, both Madera and Merced counties host three different kinds of facilities: Adult Residential Care Facilities, Enhanced Behavioral Support Homes, and Social Rehabilitation Facilities. Currently, both Madera and Merced counties each have ten licensed Adult Residential Care Facilities. Additionally, Merced County has one licensed Social Rehabilitation Facility. However, neither county currently offers Enhanced Behavioral Support Homes. The Chowchilla Zoning Ordinance currently permits adult residential care facilities for up to six people by-right in all

residential zone districts; seven or more people are currently permitted in multi-family zone districts subject to an approved conditional use permit.

Homeless Persons

The Point-In-Time survey was completed on January 24, 2023, for Fresno County, Fresno (city), Madera County, and Madera (city). A visual count was conducted for Chowchilla. Overall, the survey found 4,492 persons in the Madera County area experiencing homelessness, including 34 people in Chowchilla, a 7% increase from 2022.

There are resources available for Chowchilla to provide essential special housing needs to the homeless population. The Emergency Solutions Grant Program is available through Housing and Urban Development (HUD). The purpose of the program is to engage homeless populations, rehouse them, provide essential services for the homeless, and prevent individuals and families from becoming homeless.

Large Households

Large households are defined by the U.S. Census Bureau as households containing five or more members. Typically, large households are families with two or more children or families with extended family members (e.g., in-laws, grandparents). Large households are considered a special needs population due to difficulty finding adequately sized and affordably priced units. Large households account for approximately 25% (823) of all households for Chowchilla. Approximately 53% of large households are renter occupied compared to 47% that are owner occupied.

There are currently four federally assisted apartments with units for large households in Chowchilla. The federally assisted apartments include Chowchilla Garden Apartments, Shasta Court Apartments, Village at Chowchilla, and Washington Square Apartments. Altogether, these apartments account for 248 units.

Female Headed Households

Female Headed Households are those with no spouse or partner present. Female headed households are a special housing needs group because females often make lower wages and lack essential resources such as childcare which can be a constraint for finding adequate housing.

Of the other family households, female-led households comprise a majority (63%, or 485 out of 776 households) where most female-led households (70%, or 339 out of 485 households) have own children of the householder under 18 years of age. For comparison, the 2016-2024 Housing Element identified 215 female-led households with own children under 18 years of age. Thus, the number of female-led households with own children has increased approximately 57%. Most female-led householders are renter-occupied (80% or 337 out of 485 households).

Of the non-married and non-family households, 82% of female-headed households (with or without children) are living below the poverty level compared to 18% of male-headed households (with or without children). Out of the 377 female-headed households living below the poverty level, 50% are with children under 18 years and 50% are without children. This data indicates that female-headed households (with or without children) are experiencing poverty at a significantly greater rate than male-headed households.

Farmworkers

According to the 2021 American Community Survey 5-Year Estimates, 365 Chowchilla residents worked in the agriculture, forestry, fishing and hunting, and mining employment industries, which equates to approximately 8% of the city's total employed labor force. The U.S. Census does not identify the number of individuals within each subsector of this industry.

There are no housing projects exclusively for farm workers within the Chowchilla city limits. Although the City is surrounded by agricultural land, crops within the vicinity of the city consist primarily of cotton, grains, alfalfa, and fruit and nut orchards. These crop types are generally seasonal and require sporadic work (i.e., planting row crops, pruning orchards) instead of intensive farm labor activities requiring large numbers of farm workers on a daily and regular basis. More intensive, produce-oriented crops are located around the City of Madera and to the southwest. The availability and concentration of farm worker housing is in the City of Madera and surrounding vicinity.

Although there is no exclusive farmworker housing in Chowchilla, the City does not prohibit or discourage farmworker housing. The Chowchilla Zoning Ordinance permits employee housing for six (6) or fewer employees by right in reach of the residential zone districts; employee housing for more than six (6) employees is permitted subject to an approved conditional use in R-M-5 and R-M-6 zone districts, and is permitted by right in zones that allow agricultural uses. Employee housing is defined in the Zoning Ordinance as "property used temporarily or seasonally (not more than 180 days in any calendar year) for the residential use of unrelated persons/families employed to perform agricultural or industrial labor either on or off site of agricultural activities."

Extremely Low Income

In Chowchilla, with an area of median income (AMI) of $83,800 based on the Madera County Metropolitan Statistical Area, extremely low-income households are those earning $25,140 or less annually, which amounts to 30% or less of the AMI. In the City, 485 of Chowchilla's total of 3,460 households are identified as earning a household income of 30% or less of the HUD Area Median Family Income. This indicates that a total of 14% of all Chowchilla households are within the extremely low-income category. Additionally, the Comprehensive Housing Affordability Strategy data shows that renters are more likely to live in an extremely low-income earning household, with 22% of all renter-occupied households falling into this category, as opposed to 7% of owner-occupied households.

28.9% of owner occupied and 33.0% of renter-occupied extremely low-income households experience severe overpayment in Chowchilla. This is a similar percentage to Madera County, which severe overpayment exists in 24.6% of owner-occupied households and 39.0% of renter occupied households. Housing problems are present in 28.9% of owner-occupied and 44.3% of renter-occupied extremely low-income households. These percentages are similar and slightly lower than Madera County.

Chowchilla provides a few housing options to meet the needs of extremely low-income households. Currently, there are 442 government assisted units in City limits; all of which have a low risk for conversion to market-rate dwelling units. These units are either partially or fully funded by the Low-Income Housing Tax Credit and are intended for a range of low-income families including seniors, large families, and housing choice voucher recipients.

In addition to the available government assisted units, the City currently permits other housing types that are suitable and available to extremely low-income households. Supportive housing, which is defined as affordable housing coupled with support services and amenities designed to encourage housing stability, is by-right in all residential zone districts. The City also allows single room occupancy, a residential facility with two or more individual rooms that may or may not include shared kitchen and bathroom facilities, are also permitted subject to discretionary review in the R-H zone district. However, the current Zoning Ordinance is silent on permanent supportive housing facilities, which is an opportunity to provide housing for extremely low-income housing.

Structures

This section inventories the parcels (and associated structures) that make up the built environment of the City. The 2024 Madera County Assessor's data and the associated parcel layer was used as the basis of this inventory. The methodology used to derive the number of total and improved parcels (i.e., those with an improved structure value),land and improved property values, personal property values (as well as content replacement values), follows the same methodology detailed in Section 4.2.1 of the Base Plan. This data should only be used as a guideline to overall values in the City, as the information has some limitations. The most significant limitations are created by Proposition 13. With respect to 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 most likely low and does not reflect current market value of properties within the City. It is also important to note, in the event of a disaster, it is often 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. However, depending on the type of hazard and impact of any given hazard event, land values may be adversely affected; thus, land values are included as appropriate. Table A-6 shows the Madera County Parcel/Assessor Data land and structure values and content replacement values (e.g., the values at risk) broken down by property use for the City.

Table A-6 City of Chowchilla – Total Value of Parcels and Structures by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Agricultural	67	52	$22,531,731	$2,830,342	$54,632	$2,830,342	$28,247,047
Commercial	285	169	$51,327,309	$110,348,191	$14,220,424	$110,348,191	$286,244,115
Government	61	0	$1	$0	$0	$0	$1
Industrial	34	22	$11,974,032	$29,105,709	$81,573,553	$43,658,564	$166,311,858
Institutional	57	28	$835,407	$4,824,646	$5,590	$4,824,646	$10,490,289
Recreational	93	3	$6,480,000	$2,159,468	$36,529	$2,159,468	$10,835,465
Residential	4,103	3,735	$193,112,835	$719,867,994	$657,896	$359,933,997	$1,273,572,722
Utilities	43	1	$28,888	$6,560	$0	$6,560	$42,008
Right of Way	182	0	$185	$0	$0	$0	$185
Unknown	8	0	$1,377	$0	$0	$0	$1,377

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Chowchilla Total	**4,933**	**4,010**	**$286,291,765**	**$869,142,910**	**$96,548,624**	**$523,761,768**	**$1,775,745,067**

Source: 2024 Madera County Parcel/Assessor Data

Critical Facilities and Infrastructure

Beyond just the buildings and structures that comprise the built environment, it is important to identify the critical facilities and infrastructure that are critical for life safety and property protection. This is done for the City of Chowchilla below.

For purposes of this plan, a critical facility is defined as:

> ***Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.***

A critical facility is classified by the following categories: (1) Essential Services Facilities, (2) At-Risk Populations Facilities, and (3) Hazardous Materials Facilities, as discussed in Section 4.3.1 of the Base Plan.

Note: The Hazardous Materials Facilities, while considered critical facilities for purposes of this Plan Update, are not mapped in this Plan due to the lack of an available GIS layer. In addition to the mapped critical facilities, it should further be noted that additional critical facilities, including infrastructure, utilities, and others have been identified for the City of Chowchilla and the larger Madera County Planning Area but are not included in the mapping and inventory due to privacy and security concerns.

An inventory of critical facilities in the City of Chowchilla from Madera County GIS is shown on Figure A-9. Table A-7 gives summary information about the critical facilities in the City. Table A-8 details the facility categories and breaks them down by facility type. Details of critical facility definition, type, name, address, and jurisdiction by hazard zone are listed in Appendix F.

Figure A-9 City of Chowchilla – Critical Facilities

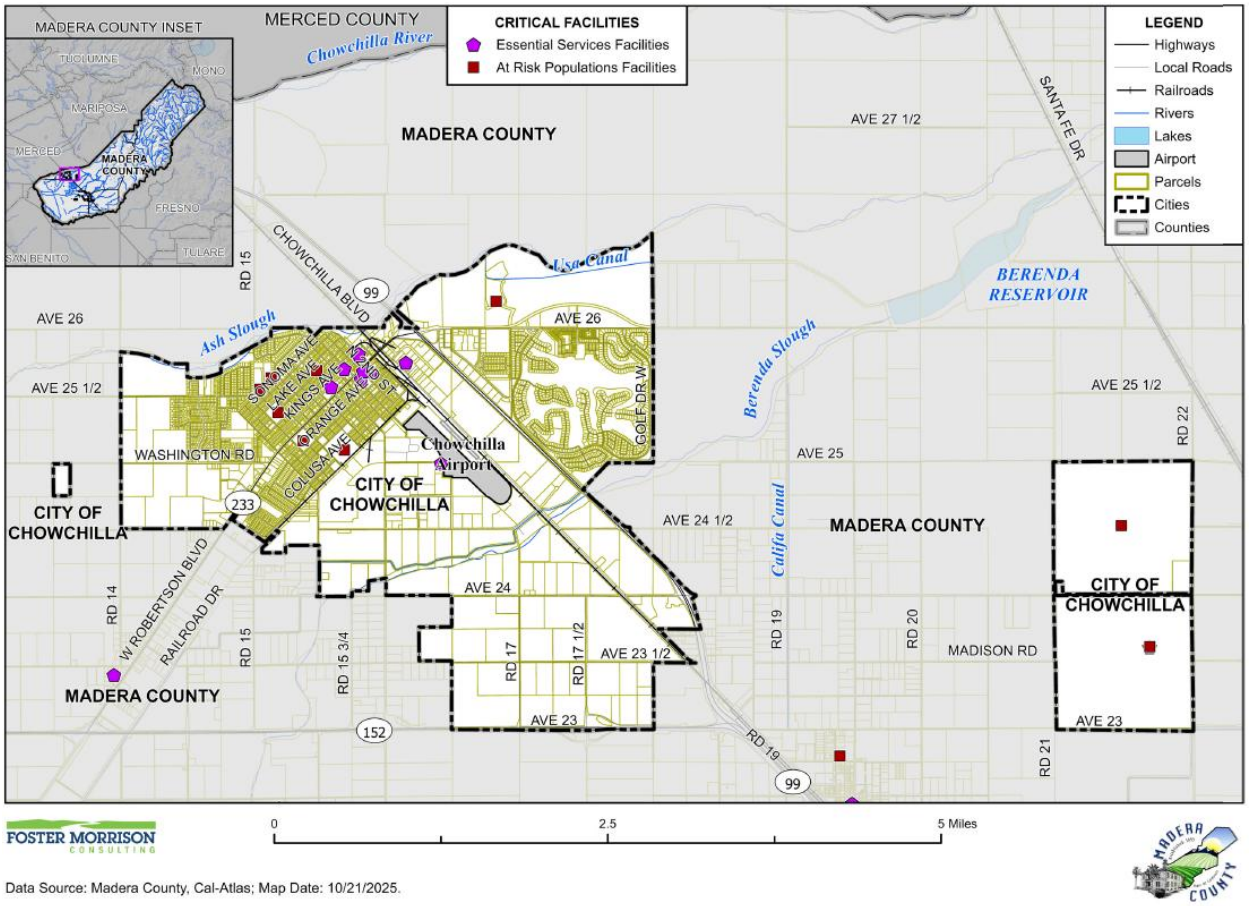


Table A-7 City of Chowchilla – Critical Facilities by Category

Jurisdiction /Critical Facility Category	Facility Count
Essential Services Facilities	10
At Risk Populations Facilities	9
City of Chowchilla Total	**19**

Source: Madera County GIS

Table A-8 City of Chowchilla – Critical Facilities by Category and Type

Critical Facility Category	Critical Facility Type	Facility Count
Essential Services Facilities	Community Services	2
	Fire Station	3
	Public Safety Facility / 911 PSAP	1
	Public Utility Plant Facilities	1
	Community Center	1
	Communications	2
	Total	**10**

Critical Facility Category	Critical Facility Type	Facility Count
At Risk Populations Facilities	School	5
	Health / Medical	2
	Jail / Prison	2
	Total	**9**
City of Chowchilla Total		**19**

Source: Madera County GIS

Community Lifelines

Assessing the vulnerability of the City of Chowchilla to natural hazards and disasters also involves reviewing and inventorying the community lifelines in place that could be affected. It is important to include these items in hazard discussions as the continuous operation of critical government and business functions is essential to human health and safety, property protection, and economic security. The importance of community lifelines is discussed below:

- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.
- FEMA has developed a method for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.
- The integrated network of assets, services, and capabilities that provide lifeline services are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function.
- When disrupted, decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to stabilize the incident.

Community lifelines, as defined by FEMA, include the following:

- **Safety and Security** – Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety
- **Food, Hydration, Shelter** – Food, Water, Shelter, Agriculture
- **Health and Medical –** Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management
- **Energy –** Power Grid, Fuel
- **Communications** – Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch
- **Transportation** – Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime
- **Hazardous Material –** Facilities, HAZMAT, Pollutants, Contaminants
- **Water Systems** – Potable Water Infrastructure, Wastewater Management

It should be noted that these community lifelines are all in place and functional as part of regular government operations in the Madera County Planning Area serving as a partnership between the cities, local special districts and agencies, and Madera County. Due to its more rural nature, there is an interplay in community lifelines between all jurisdictions in the County. Most all of the City's community lifelines overlap with the Planning Area's. It should also be noted that these lifelines collectively include many of

the critical facilities and infrastructure assets inventoried for this LHMP. As such, specific information on these community lifelines in the City and how they may be affected by a hazard event or disaster are discussed collectively for all jurisdictions in the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the City of Chowchilla to natural hazards and disasters also involves inventorying the natural, historic, and cultural assets of the area. This step is important for the following reasons:

- Environmental and natural resources add to a community's identity and quality of life. They also help the local economy through agriculture, tourism, and recreation. They support ecosystem services, such as clean air and water.
- Conserving the environment may help people mitigate risk. It can also protect sensitive habitats, develop parks and trails, and build the economy.
- 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, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

The City contains a variety of natural resources. Natural resources are unique to each area, often provide an important function, and are difficult to replace. Should a natural disaster occur, these species, resources, and locations are at risk. The City noted that it lies in the San Joaquin Valley. The portion of the discussion on the natural resources of the County in Section 4.3.1 applies to the City as well.

Additionally, the City noted that during the 2040 Open space and Conservation Element, the riparian scrub and aquatic habitats of Ash and Berenda Sloughs and the Chowchilla River provide the only known natural biotic habitat of substantial size within the 2040 General Plan Planning Area or Sphere of Influence boundaries. The 2040 General Plan Land Use Diagram designates Ash Slough and Berenda Slough as "Open Space" corridors.

A few special status species have the potential to occur within the 2040 General Plan Planning Area.10 These species include the lesser saltscale (*Atriplex minuscule*), a California Native Plant Society listing; conservancy fair shrimp (*Branchinecta conservation*), a federally endangered species; longhorn fairy shrimp (*Branchinecta longiantenna*), a federally endangered species; vernal pool fairy shrimp (*Branchinecta lynchi*), a federally threatened species; vernal pool tadpole shrimp (*Lepidurus packardi*), a federally endangered species; valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), a federally threatened species; California tiger salamander (*Ambystoma californiense*), a federal threatened and California species of concern; western spadefoot (*Scaphoipus hammondii*), a California species of

concern; western pond turtle (*Clemmys marmorata*), a California species of concern; California horned lizard (*Phrynosoma coronatum frontale*), a California species of concern; Swainson's hawk (*Buteo swainsoni*), a California threatened species; northern harrier (Circus cyaneus), a California species of concern; Copper's hawk (*Accipiter cooperii*), a California species of concern; western burrowing owl (*Athene cunicularia*), a California species of concern; long-eared owl (*Asio otus*), a California species of concern; black tern (*Chlidonias niger*), a California species of concern; California horned lark (*Eremophila alpestris acitia*), a California species of concern; loggerhead shrike (*Lanius ludovicianus*), a California species of concern; tri-colored blackbird (*Agelaius tricolor*), a California species of concern; Yuma myotis (*Myotis yumanensis*), a California species of concern; Townsend's western big-eared bat (*Corynorhinus townsendii townsendii*), a California species of concern; pallid bat (*Antrozous pallida*), a California species of concern; western mastiff bat (*Eumops perotis*), a California species of concern; and the American badger (*Taxidea taxus*), a California species of concern.

Of the special status species identified above, only the California tiger salamander has been observed within the 2040 General Plan Planning Area. The valley elderberry longhorn beetle and the lesser saltscale have been observed within the Sphere of Influence boundaries. A number of special status species listed above have been observed in the vicinity of 2040 General Plan Planning Area. Most of the special status species identified above are associated with the riparian scrub and aquatic habitats associated with Ash and Berenda Soughs and the Chowchilla River, or with seasonal wetland habitat. Site specific biotic studies would be necessary to ascertain the presence or absence of special status species within the 2040 General Plan Planning Area.

Wetlands and their Natural and Beneficial Functions

Wetlands are habitats in which soils are 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 considered to be waters of the United States and are subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE) as well as the California Department of Fish and Wildlife (CDFW). Where the waters provide habitat for federally endangered species, the U.S. Fish and Wildlife Service (FWS) may also have authority.

Wetlands are a valuable natural resource for communities providing beneficial impact 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 is 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.

Wetlands are often found in floodplains and depressional areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flow. Wetlands perform a variety of ecosystem functions including food web support, habitat for insects and other invertebrates, fish and wildlife habitat, filtering of waterborne and dry-deposited anthropogenic pollutants, carbon storage, water flow regulation (e.g., flood abatement), groundwater recharge, and other human and economic benefits.

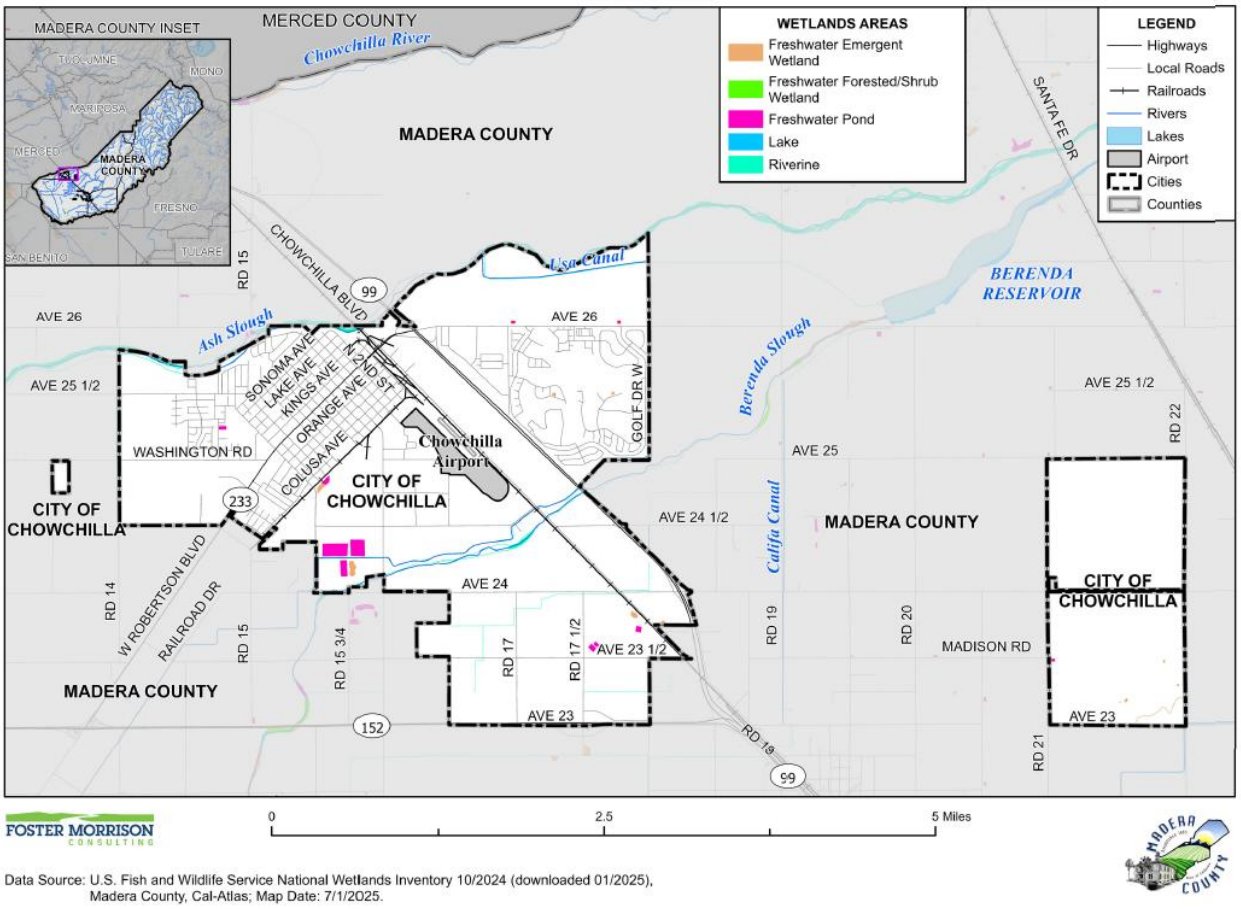
Wetlands, and other riparian and sensitive areas, provide habitat for insects and other invertebrates that are critical food sources to a variety of wildlife species, particularly birds. There are species that depend on these areas during all parts of their lifecycle for food, overwintering, and reproductive habitat. Other species use wetlands and riparian areas for one or two specific functions or parts of the lifecycle, most commonly for food resources. In addition, these areas produce substantial plant growth that serves as a food source to herbivores (wild and domesticated) and a secondary food source to carnivores.

Wetlands slow the flow of water through the vegetation and soil, and pollutants are often held in the soil. In addition, because the water is slowed, sediments tend to fall out, thus improving water quality and reducing turbidity downstream.

These natural floodplain functions associated with the natural or relatively undisturbed floodplain that moderates flooding, such as wetland areas, are critical for maintaining water quality, recharging groundwater, reducing erosion, redistributing sand and sediment, and providing fish and wildlife habitat. Preserving and protecting these areas and associated functions are a vital component of sound floodplain management practices for the City.

Wetlands in the City are shown in Figure A-10 and detailed in Table A-9.

Figure A-10 City of Chowchilla – Wetlands Areas



Data Source: U.S. Fish and Wildlife Service National Wetlands Inventory 10/2024 (downloaded 01/2025), Madera County, Cal-Atlas; Map Date: 7/1/2025.

Table A-9 City of Chowchilla – Wetland Types and Acreages

Wetlands Area Type	Wetlands Count	Wetlands Area (in Acres)	% of Total Acres	% of Total Acres
Freshwater Emergent Wetland	25	9.65	0.02%	11.85%
Freshwater Forested/Shrub Wetland	-	0	0.00%	0.00%
Freshwater Pond	18	30.28	0.07%	37.19%
Lake	-	0	0.00%	0.00%
Riverine	69	41.48	0.10%	50.95%
City of Chowchilla Total	**112**	**81.40**	**0.19%**	**100.00%**

Source: US Fish and Wildlife Service

Historic and Cultural Resources

Historic and cultural resources are difficult to replace. Should a natural disaster occur, these properties and locations can be at risk. The City of Chowchilla has a stock of historically significant homes, public buildings, and landmarks. The California Department of Parks and Recreation Office of Historic Preservation (OHP) was the primary source of information. OHP administers the National Register of Historic Places, the California Register of Historical Resources, California Historical Landmarks, and the California Points of Historical Interest programs. Each program has different eligibility criteria and procedural requirements. These requirements are detailed in Section 4.2.1 of the Base Plan. Table A-10 shows one historic building in the City from the OHP Database.

Table A-10 City of Chowchilla – Historic Resources

Resource Name (Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City
Robertson Boulevard, State Highway 233 (P724)				X	11/20/1989	Chowchilla

Source: California Department of Parks and Recreation Office of Historic Preservation. Retrieved 12/3/2024.

It should be noted that these lists may not be complete, as they may not include those 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, in the event that 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.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the City of Chowchilla to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the City.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. These include:

- Primary Economic Sectors
- Major employers
- Commercial Centers

In the City of Chowchilla, this includes the following:

- Brake Parts Inc – Brakes-Manufacturers
- Certain Teed Corp – Building Materials-Manufacturers
- Valley State Prison – Government
- Central California Women's Facility – Government

The City noted that Chowchilla's primary economic drivers include the correctional facilities (Valley State Prison and Central California Women's Facility), agriculture, logistics, and retail services. The City also hosts several annual community events, including the Chowchilla-Madera County Fair, seasonal parades, and regional youth sports tournaments. These assets could be impacted by disruptions from drought, floods, nearby wildfires (with smoke and air quality issues), extreme weather events, and transportation-related hazards.

Note: This inventory of economic assets is only included in this overall asset inventory for the City. To limit redundancy, it is not discussed further in the hazard profiles and vulnerability assessments in Section A.4.3 below. However, depending on the type, location, magnitude and extent of future hazard events and disasters, these City's economic assets may be vulnerable.

Community Activities of Value

Inventorying economic assets in the City and their vulnerability to natural hazards and disasters also involves inventorying activities that have value to the community. This includes activities that are important to a community, like long-standing traditions such as a festival or fair. Some areas rely on seasonal industries to sustain them throughout the year. Many of these activities also provide economic benefits to the City. A hazard event that cancels or shortens these can affect a community's livelihood and can make disaster recovery more difficult or prolonged. This includes activities such as:

- Festivals and Fairs
- Sporting Events
- Tourism
- Local Pools
- Local Splash Pools

The City noted the following community activities of value:

- Chowchilla-Madera County Fair
- Seasonal Parades

- Regional Youth Sports Tournaments

The City also hosts several annual community events, including the Chowchilla-Madera County Fair, seasonal parades, and regional youth sports tournaments. The City noted that these assets could be impacted by disruptions from floods, nearby wildfires (with smoke and air quality issues), extreme weather events, and transportation-related hazards.

Note: This inventory of community activities of value only occurs in this overall asset inventory for the City. To limit redundancy, it is not discussed further in the hazard profiles and vulnerability assessments in Section A.4.3 below. However, depending on the type, location, magnitude and extent of future hazard events and disasters, the City's community activities of value may be vulnerable.

Growth and Development Trends

As part of the planning process, the City looked at changes in growth and development, both current 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 over time.

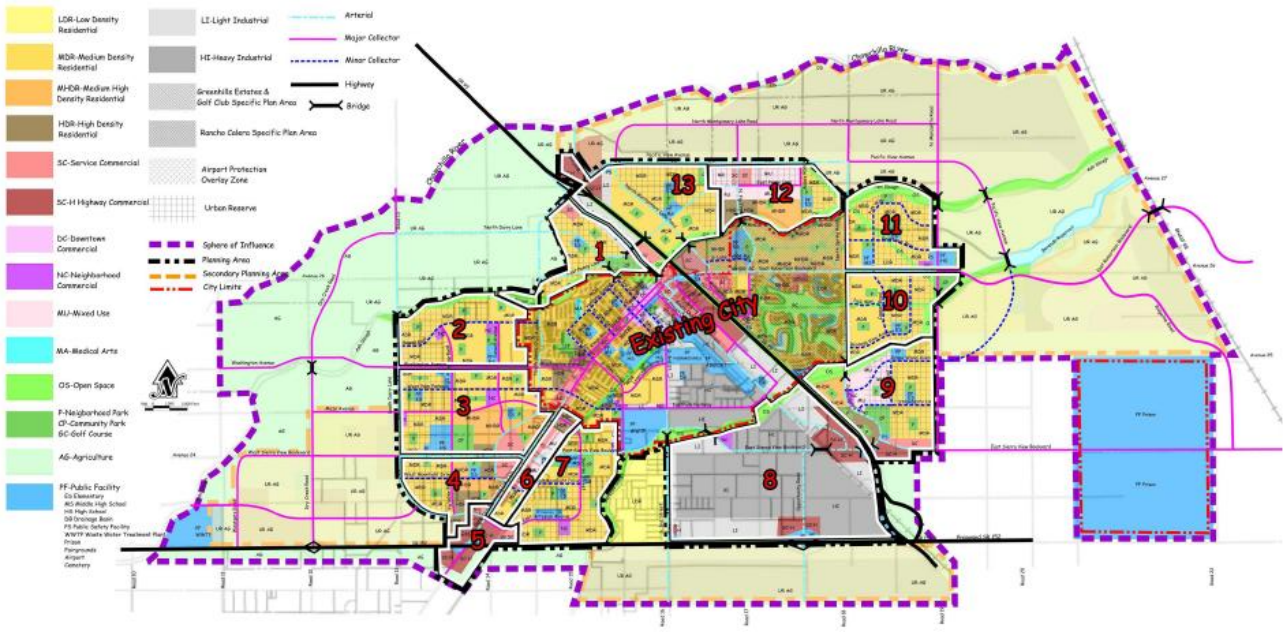
Land Use

State planning law requires that a land use element of a general plan include a statement of the standard population density, building intensity, and allowed uses for the various land use designations in the plan (Government Code Section 65302(a)). The City's land use designations are generally described below and mapped on the Land Use Diagram (Figure A-11). The City of Chowchilla Municipal Code provides detailed land use and development standards for development.

The Municipal Code works hand in hand with the City's General Plan Land Use Element. The purpose of the Land Use Element is to provide goals, policies, actions diagrams and standards to guide future land use decisions in the City of Chowchilla. While all elements of the General Plan have equal weight under California law, in some respects this Element is the most far-reaching. It informs all other elements of the General Plan, shaping the future transportation network and the location of future housing sites, and influencing public facility requirements and park and recreation needs. It defines the City's future open space system and responds to natural resource conservation issues and safety hazards. It establishes the basic pattern of development in the City for the next 20-25 years, including land uses and densities, and presents the policies and actions to ensure that future development will enhance the quality of life for all City of Chowchilla residents.

Future land use for the City of Chowchilla from the 2040 City of Chowchilla General Plan Land Use Element is shown on Figure A-11.

Figure A-11 City of Chowchilla – Land Use Diagram



Source: City of Chowchilla 2040 General Plan Land Use Element

Population Trends and Projections

There are no future City population projections. Madera County as a whole is expected to slowly continue to increase in population until 2045 (where growth plateaus), and then slowly shrink through 2070. As such, it is assumed that the City may see similar population growth as well.

Development since 2018 Plan

Development has occurred in the City since the last plan. Some of this has occurred in hazard prone areas. The City Planning Department tracked total building permits issued since 2018 for the City. These are tracked by total development, property use type, and hazard risk area. Based on the City's internal tracking permit database, development since 2018 includes significant residential growth, particularly from 2022 to 2024. Commercial and industrial projects have remained steady. No known developments occurred in mapped 1% annual chance flood zones, moderate wildfire zones, or known landslide areas. Development totals are shown in Table A-11 and Table A-12.

Table A-11 City of Chowchilla – Total Development Since 2018

Property Use	2019	2020	2021	2022	2023	2024
Residential	0	0	1	2	19	38
Commercial	0	6	3	2	3	2
Industrial	0	1	2	1	1	2
Total	**0**	**7**	**6**	**5**	**23**	**42**

Source: City of Chowchilla Planning Department

Table A-12 City of Chowchilla – Development in Hazard Areas since 2018

Property Use	1% Annual Chance Flood	Levee Protected Area	Wildfire Risk Area[1]	Other
Residential	0	0	0	0
Commercial	0	0	0	0
Industrial	0	0	0	0
Other	0	0	0	0
Total	**0**	**0**	**0**	**0**

Source: City of Chowchilla Planning Department. Collected information from FEMA website/GIS Files for 1% Annual Chance Flood. Collected Information from CAL FIRE website/GIS Files for Wildfire Risk.

[1]Moderate or higher wildfire risk area

No development has occurred in the identified hazard areas since 2018. All development identified in Table A-11 was completed in accordance with all current and applicable development codes, including floodplain ordinances, wildfire codes, and other applicable standards and should be adequately protected. Thus, with the exception of more people living in the area potentially exposed to natural hazards, this growth should not cause a significant change in vulnerability of the City to identified priority hazards.

Future Development Areas

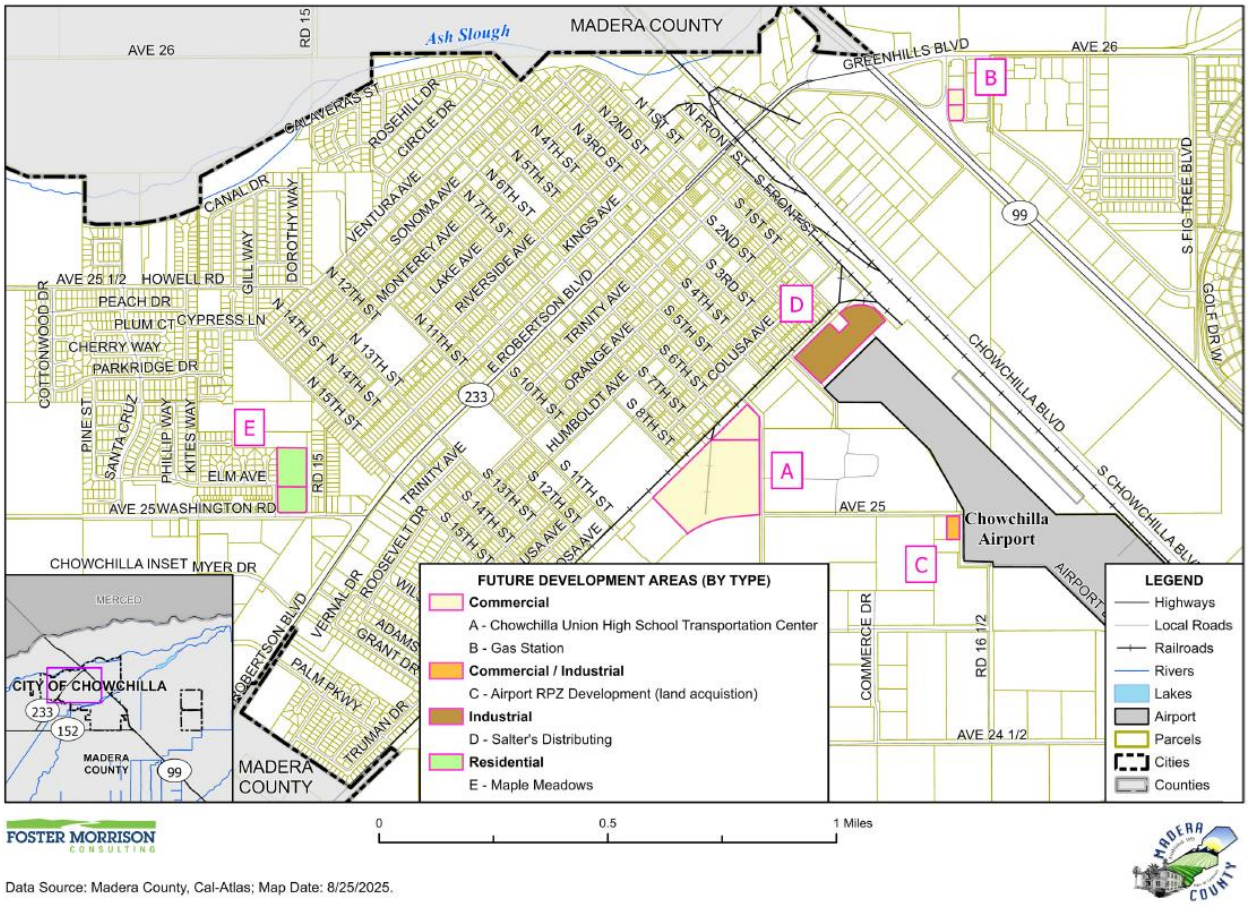
It is important to review future development plans for the City. Future development should be sited in areas that are away from known hazard risks. If this is not possible, mitigation should be done to ensure that future development is protected against future hazards.

The City of Chowchilla continues to experience residential growth, particularly in the northwest and southern edges of the City. There are various major project developments as shown in the map and table below; which include housing, industrial and transportation improvements. Hazard concerns with new development include localized flooding due to aging stormwater infrastructure, and extreme heat exposure for future residential neighborhoods. Chowchilla is also planning for a new Public Works yard and an expanded Civic Center campus over the next five years.

GIS Analysis

The City of Chowchilla provided eight future development areas which were used as the basis for the inventory of future development for the City. These were mapped in GIS. Figure A-12 show the locations of the future development areas. Table A-13 shows the details of the future development areas by map identification area and acreage.

Figure A-12 City of Chowchilla – Future Development Areas



Data Source: Madera County, Cal-Atlas; Map Date: 8/25/2025.

Table A-13 City of Chowchilla – Future Development Areas by Map ID and Acres

Site/Location Name/Map ID	Future Development Type	Units	Total Improved Acres	Total Unimproved Acres	Comments
Chowchilla Union High School Transportation Center (Map ID A)	Commercial	1	2.69	0	New construction of transportation and maintenance center
Chowchilla Union High School Transportation Center(Map ID A)	Commercial		2.45	0	New construction of transportation and maintenance center
Gas Station (Map ID B)	Commercial	1	0.72	0	Construct new gas station
Gas Station (Map ID B)	Commercial		0.71	0	Construct new gas station
Airport RPZ Development (land acquisition) (Map ID C)	Commercial / Industrial	0	0	0.91	Environmental Assessment and Land Acquisition for RPZ
Salter's Distributing (Map ID D)	Industrial	1	0	9.42	Expansion of current distribution warehouse
Maple Meadows (Map ID E)	Residential	160	2.26	0	New construction of 160-unit multi-family affordable housing complex

Site/Location Name/Map ID	Future Development Type	Units	Total Improved Acres	Total Unimproved Acres	Comments
Maple Meadows (Map ID E)	Residential		3.43	0	New construction of 160-unit multi-family affordable housing complex

Source: City of Chowchilla

A.4.2. Hazard Identification

The City of Chowchilla identified the hazards that affect the City and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the City (see Table A-14). Those hazards identified as a high or medium significance in Table A-14 are considered City of Chowchilla priority hazards for mitigation planning. Those hazards that occur infrequently or have little or no impact in the City were determined to be of low significance and not considered a priority hazard. Significance was determined based on the hazard profile, focusing on key criteria such as frequency, extent, and resulting damage, including deaths/injuries and property, natural and cultural resources, and economic damage. The ability of a jurisdiction to reduce losses through implementation of existing and new mitigation measures was also considered as to the significance of a hazard. This assessment was used to prioritize those hazards of greatest significance, enabling the City to focus resources where they are most needed.

Table A-14 City of Chowchilla—Hazard Identification Assessment

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Agricultural Hazard: Severe Weather/Pests/Invasives	Significant	Likely	Negligible	Low	Medium
Climate Change	Extensive	Likely	Limited	Low	–
Dam Failure	Significant	Unlikely	Critical	Low	Low
Drought & Water shortage	Extensive	Likely	Negligible	Medium	Medium
Earthquake (w/subhazards)	Extensive	Occasional	Critical	Medium	Low
Floods: 1%/0.2% annual chance (w/levee failure)	Limited	Occasional	Limited	Medium	Medium
Floods: Localized Stormwater	Limited	Highly Likely	Limited	Medium	Medium
Hazardous Materials Transportation	Significant	Likely	Critical	Medium	Low
Landslide, Mudslide, Debris Flow	Limited	Unlikely	Limited	Low	Low
Severe Weather: Extreme Cold, Freeze, and Snow	Significant	Likely	Limited	Low	Low
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds and Tornadoes	Significant	Highly Likely	Limited	Medium	Low
Wildfire (w/smoke and air quality)	Extensive	Likely	Limited	Medium	Medium

Geographic Extent

Limited: Less than 10% of planning area

Significant: 10-50% of planning area

Extensive: 50-100% of planning area

Likelihood 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 the next year or has a recurrence interval of 10 years or less.

Occasional: Between 1 and 10% chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.

Unlikely: Less than 1% chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

Catastrophic: More than 50 percent of property severely damaged; 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 and/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

Climate Change Influence

Low: Minimal potential impact

Medium: Moderate potential impact

High: Widespread potential impact

A.4.3. Hazard Profiles and Vulnerability to Specific Hazards

This section includes the hazard profiles and vulnerability assessment for hazards ranked of medium or high significance specific to the City of Chowchilla (as identified in the Significance column of Table A-14) and also includes a hazard profile and vulnerability assessment to the four primary hazards to the State of California: dam failure, earthquake, flood, and wildfire, regardless of the significance ranking by the City. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Madera County Planning Area. Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.2 of the Base Plan.

Hazard Profiles and Vulnerability Assessment

Each hazard is profiled in the following format:

- **Hazard Profile** – A hazard profile is included for each hazard. This includes information on:
  - ✓ **Hazard Overview** – A general discussion of the hazard and related issues is detailed here.
  - ✓ **Location** and **Extent** - Location is the geographic area within the City that is affected by the hazard. Extent is the expected range of intensity for each hazard. These are discussed in specific detail for mapped hazards, and in more general detail for those hazards that do not have discrete mapped hazard areas.
  - ✓ **Past Occurrences** – Past occurrences are discussed for each hazard. A discussion of disaster declarations is included in each hazard section. National Climactic Data Center (NCDC) events are also discussed. Other past occurrences data specific to the City follow the disaster declarations and NCDC events for each hazard.
  - ✓ **Climate Change** – This section contains the effects of climate change (as applicable). The possible influence of climate change on the hazard is discussed.

After the hazard profile, a vulnerability assessment is presented. As part of the vulnerability assessment, an estimate of the vulnerability of the City to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- **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. Here 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.
- **Extremely High**—Very widespread with catastrophic impact.

After this classification, a general discussion of hazard vulnerabilities occurs. This is done in the following format:

- **Local Concerns** – This includes City provided information on how the City is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same order as in Section A.4.1 above, with a few exceptions. This includes sections on: People and Populations; Structures; Critical Facilities and Infrastructure, and Natural, Historic, and Cultural Resources. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped. Sections on Community Lifelines and Economic Assets and Community Activities of Value are not included in the Sections below, as they are fully covered in Section A.4.1 above and in Chapter 4 of the Base Plan.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the City and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset.
- **Future Conditions/Future Development** – A discussion of how future conditions and future development may affect the hazard is also included. This is addressed specifically for mapped hazards, and in more general terms for those hazards that are unmapped.

Power Interruption/Power Failure: A Common Vulnerability of all Hazards

An impact of almost all hazards evaluated as part of this LHMP Update relates to power shortage and/or power failures. The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the U.S. Department of Energy, major blackouts are on the upswing. Incredibly, over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. In addition to blackouts, brownouts can occur. A brownout is an intentional or unintentional drop in voltage in an electrical power supply system. Intentional brownouts are used for load reduction in an emergency. Electric power disruptions can be generally grouped into two categories: intentional and unintentional. More information on types of power disruptions can be found in Section 4.3 of the Base Plan.

Public Safety Power Shutoff (PSPS)

An intentional disruption type of power shortage/failure event has been recently implemented in California as a result of wildfires starting as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), are preparing all Californians for the threat of wildfires and power outages during times of extreme (fire) weather. To help protect customers and communities during extreme fire weather events, electric power may be shut off for public safety in an effort to proactively prevent wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3 of the Base Plan.

In addition to PSPS to help prevent wildfires, electric utilities have begun to evolve safety efforts. This includes installing safety settings on powerlines in and around high fire-risk areas. These are known as

Enhanced Powerline Safety Settings (EPSS), and they help prevent falling tree branches, animals and other hazards from starting a wildfire. By stopping ignitions, it helps prevent wildfires from starting and spreading. According to PG&E, if ignitions occur, the size of fires are much smaller due to EPSS. In 2022, there was a 99% decrease in acres impacted by ignitions (as measured by fire size from electric distribution equipment (compared to the 2018-2020 average). This decrease occurred despite dry conditions.

Local Concerns

Extreme heat affects PG&E power lines and causes them to overheat, and can result in a power outage (sometimes from the heat, sometimes from PG&E turning off the power to cool down their systems). City generators have not been affected by power outages from extreme heat and function as a critical backup for power outages.

Dam Failure

Likelihood of Future Occurrence–Unlikely
Vulnerability–Low

Note: though a low significance hazard in the City, due to its importance in the County and in the State of California, this hazard is profiled here. It is not considered a City priority for mitigation planning purposes.

Hazard Profile

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 are usually 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 given year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped or fail. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failure is a natural disaster from two perspectives. First, the inundation from released waters resulting from dam failure is related to naturally occurring floodwaters. Second, a total dam failure would most probably happen as a consequence of the natural disaster triggering the event, such as an earthquake.

Location and Extent

An inventory map of dams located within Madera County was shown in Section 4.3.8 in the Base Plan. Dams with an inundation area within the City of Chowchilla are shown on Figure A-13. This includes 2 high hazard dams – Brenda Slough and Buchanan. No extremely high hazard dams intersected the City. No inundation mapping was available for any of the significant hazard dams in the City Planning Area.

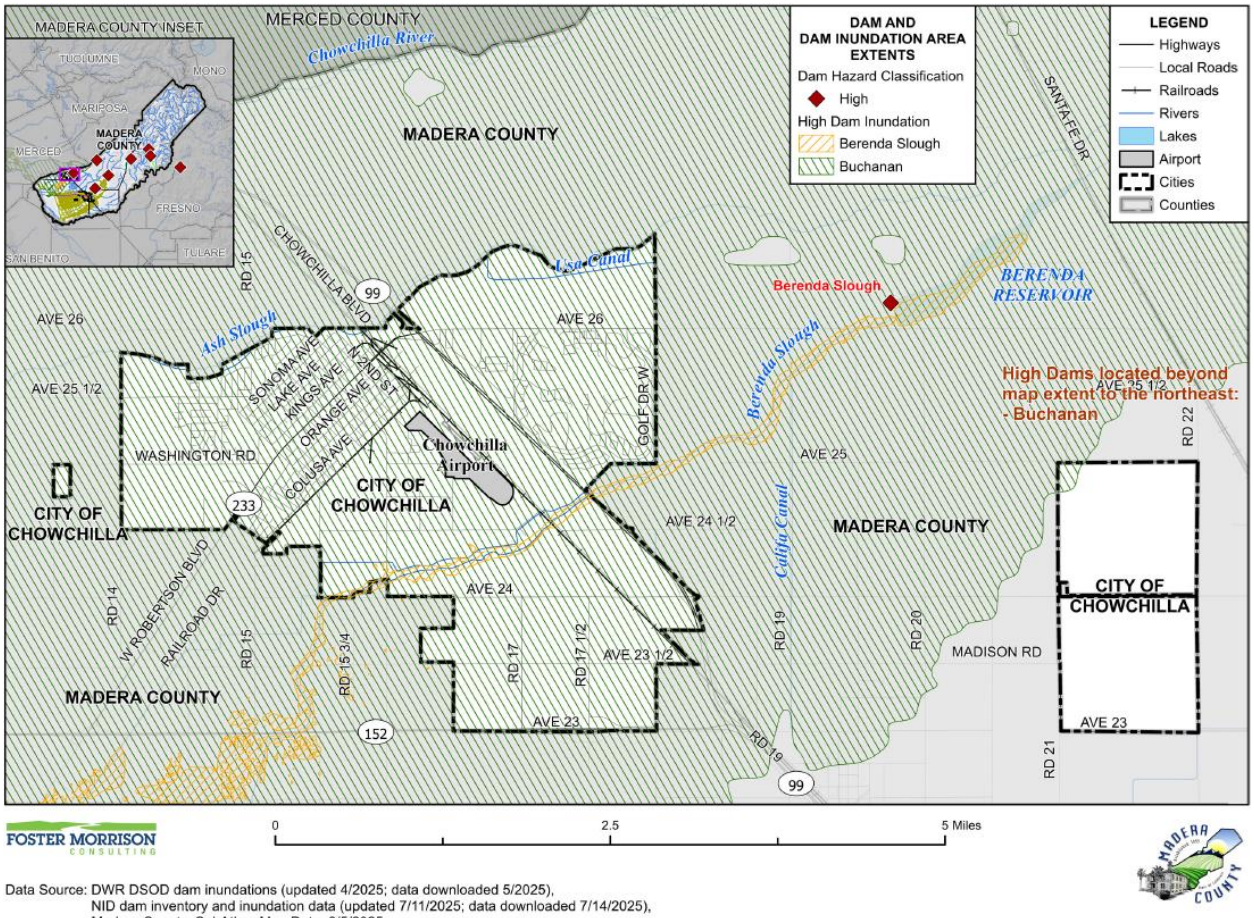
There is no scale with which to measure dam failure. However, FEMA and CA DWR Division of Safety of Dams (DSOD) assign hazard potential classifications to dams within the State that provides information on the potential impact should a dam fail. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. FEMA categorizes the downstream hazard potential into three categories in increasing severity: Low, Significant, and High.

DSOD adds a fourth category of Extremely High. Dams are classified in these four categories that identify the potential hazard to life and property. These were discussed in more detail in Section 4.3.8 of the Base Plan.

While a dam may fill slowly with runoff from winter storms, a dam break has a very quick speed of onset. The duration of dam failure is generally not long – only as long as it takes to empty the reservoir of water the dam held back. For dam overtopping, the speed of onset is somewhat slower than that of a dam break, and the duration is longer (as evidenced in the 2017 Oroville Dam spillway event). The City would be affected for as long as the flood waters from the dam failure took to drain downstream.

Geographic flood extent from the DSOD dam inundation areas is shown on Figure A-13, as well as in Table A-15.

Figure A-13 City of Chowchilla – High Hazard Dam Inundation Areas



Data Source: DWR DSOD dam inundations (updated 4/2025; data downloaded 5/2025), NID dam inventory and inundation data (updated 7/11/2025; data downloaded 7/14/2025), Madera County, Cal-Atlas; Map Date: 8/5/2025.

Table A-15 City of Chowchilla – High Hazard Dam Inundation Areas Geographical Extents

Dam Inundation Area	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Berenda Slough	78	0.01%	52	0.01%	26	0.003%

Dam Inundation Area	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Buchanan	5,470	81%	3,385	100%	2,086	62%

Source: DSOD, Madera County GIS

Drought & Water Shortage

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

Drought and water shortage are complex issues involving many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects. Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water supply is the most significant issue and is critical for agriculture, manufacturing, tourism, recreation, and commercial and domestic use. Drought has also affected tree mortality in the area in the past. As the population in the area continues to grow, so will the demand for water.

Tree Mortality and Drought

One of the specific impacts of drought in the City of Chowchilla and the Madera County Planning Area is the increased risk to trees from beetle kill and other insects, pathogens and parasites, and other tree mortality and die back issues. Drought weakens trees and makes them more susceptible to insect infestation and other pathogens. Insects, such as bark beetles and others, frequently attack trees weakened by drought, disease, injuries, or other factors that may stress the tree. These insects and other pathogens can contribute to the decline and eventual death of trees throughout the City. The tree mortality and dieback problems are a high priority because of the issue of hazardous trees and an increased wildfire hazard. In addition to an increase in wildfire fuels, hazardous trees can fall onto structures causing damage and a result in a reduction on the tree canopy within the City that provides relief during extreme heat days.

Location and Extent

Drought and water shortage are regional phenomenon. The whole of the City and County is at risk. The US Drought Monitor categorizes drought conditions with the following scale:

- None
- D0 – Abnormally dry
- D1 – Moderate Drought
- D2 – Severe Drought
- D3 – Extreme Drought
- D4 – Exceptional Drought

The Madera County Planning Area, including the City of Chowchilla, has been in and out of drought since 2014. Over the last seven years since the 2018 LHMP, drought conditions have ranged from none to exceptional. Drought conditions are expected to continue to be cyclical in nature depending on the year." Current drought conditions in the City are shown in Section 4.3.9 of the Base Plan.

Drought has a slow speed of onset and a variable duration. Drought can last for a short period of time (which does not usually affect water shortages) or for longer periods (which may challenge water supplies). Should a drought last for a long period of time, water shortage becomes a larger issue.

Groundwater is the dominant source due to the region's reliance on wells, but surface water supplements agriculture, which consumes the majority of water in the surrounding County. Over drafting of groundwater has led to challenges, prompting efforts like the Sustainable Groundwater Management Act (SGMA) to balance usage.

Past Occurrences

Disaster Declaration History

There have been four state and one federal disaster declarations for Madera County. This can be seen in Table A-16. Additionally, there have been 13 USDA Secretarial Disaster Declarations from drought in the County, as shown in Past Occurrences in Section 4.3.6 of the Base Plan.

Table A-16 Madera County –State and Federal Drought Disaster Declarations 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	4	1976, 2008, 2014, 2015	1	1977

Source: Cal OES, FEMA

NCDC Events

There have been 249 NCDC drought events in Madera County since 1993. These most likely had some impact on the City.

City of Chowchilla Events

Based on historical information, the occurrence of drought in California, including the City of Chowchilla, is cyclical, driven by weather patterns. Section 4.3.9 of the Base Plan notes that five droughts have occurred in the past 86 years, which impacted the City and Madera County Planning Area. Drought has occurred in the past and will occur in the future.

Climate Change and Drought and Water Shortage

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with drought and water shortage. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate scientists studying California find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years underscore the need to examine more closely the state's water storage, distribution, management, conservation, and use policies. The 2024 Climate Adaptation Study (CAS) stresses the need for public policy development addressing long term climate change impacts on water supplies. The CAS notes that climate change is likely to significantly diminish California's future water supply, stating that: California must change its water management and uses because climate change will likely create greater competition for limited water supplies needed by the environment, agriculture, and cities.

A 2018 report from the Public Policy Institute of California noted that thousands of Californians – mostly in rural, small, disadvantaged communities – already face acute water scarcity, contaminated groundwater, or complete water loss. Climate change would make these effects worse.

Cal Adapt scenarios for modeled future drought scenarios were shown in Section 4.3.9 of the Base Plan.

Vulnerability to Drought and Water Shortage

Based on historical information, the occurrence of drought and water shortage in California, including the City, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts can be extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. The vulnerability of the City of Chowchilla to drought may vary and include reduction in water supply, turf losses, impacts to natural resources, and an increase in dry fuels and tree dieback.

The whole of the City is at some measure of vulnerability to drought and water shortage. An assessment of a community's vulnerability to drought and water shortage begins with an understanding of local exposure to drought. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

The vulnerability of Chowchilla to drought is citywide, but impacts may vary and include reduction in water supply, agricultural losses, and an increase in dry fuels. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult. The City of Chowchilla is a rural community that is surrounded largely by farmland that is rich in agriculture for a variety of crops including dairy, poultry, horse and cattle ranches that may utilize surface water deliveries from approximately June –September and/or from ground water pumping systems. Since Chowchilla relies on ground water wells, drought and water shortage can cause acute problems. Chowchilla experienced reduced groundwater recharge and increased water conservation mandates during the most recent drought. No major closures occurred, but public green spaces and parks were impacted by watering restrictions.

The chief concern is the City's continued reliance on groundwater and the lack of long-term surface water allocations. As the population in the area continues to grow, so will the demand for water. Water shortages in the future may be worsened by drought, as the City relies on groundwater for its water source. Increased planning including conjunctive use will be needed to account for population growth and increased water demands. The City references the County Drought Contingency Plan and implements DWR conservation requirements.

Assets at Risk

Assets at risk from drought and water shortage include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

The people and populations of the City are not directly affected by drought; although, their turfed areas, trees, and other water dependent resources can all be affected. In extreme drought conditions, however, residents and other populations within the City may be vulnerability to drought and water shortage issues. Water quality can be impacted causing health problems, especially to vulnerable populations. Drought and water shortage can lead to an increase in wildfires threatening City residents. Water shortages can have an effect on all of the population in the City, but often have a greater effect on the unhoused and other vulnerable populations that may be unable to access clean drinking water during shortages. During periods of drought as the costs of water usage may increase, especially during mandated conservation times, those who are economically disadvantaged may be unable to afford the increased costs of potable water.

Structures

Structures have a limited vulnerability to drought and water shortage. It is the secondary hazard of drought (wildfire) which causes risks to structures. Drought can also stress trees, causing die off. These trees may fall on structures adjacent to them.

Critical Facilities and Infrastructure

Most critical facilities and infrastructure have a limited vulnerability to drought and water shortage. Should drought conditions be severe enough to cause water shortage reliability issues, some facilities and infrastructure may be affected. Water and wastewater systems may be impacted during times of reduced water supply and need to employ contingencies to remain functional and fully operational. Other water-dependent systems may also be adversely affected. Further, the secondary hazard of drought (increased potential for spread of urban fires and wildfire) can pose a significant risk to critical facilities and infrastructure. Sufficient water supply for firefighting can also be an issue. Drought can also stress trees, causing die off. These trees may fall on critical infrastructure adjacent to them and impact power lines and other utilities.

Natural, Historic, and Cultural Resources

Drought and water shortage can have a significant impact on natural resources. Water levels in reservoirs and lakes may be reduced and a loss of wetlands and coastal marsh areas may occur. Severe drought conditions can contribute to an increase in erosion of soils and lead to poor soil quality. Further, all of the trees in the City are at risk to drought impacts and a reduction in water supply. These trees provide a wealth of social and environmental benefits to City residents and visitors, from shade and beauty to air quality, carbon reduction and stormwater management. Drought can devastate crops and dry out pastures, dry out forests and critical habitat areas, and reduce food and water available for wildlife and livestock, the latter detailed above as a specific concern to the City. Additionally, drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. It is unlikely that drought and water shortage would have a significant impact on historic and cultural resources in the City.

Impacts from Drought and Water Shortage

The vulnerability of the City to drought is City-wide, but impacts may vary and include reduction in water supply and an increase in dry fuels. The potential for a reduction in water supply during drought conditions generally leads to both mandated and voluntary conservations measures during extended droughts. During these times, the costs of water can also increase. Also of concern, the increased dry fuels, fuel loads, and tree mortality events associated with drought conditions can result in an increased fire danger. In areas of extremely dry fuels, the intensity and speed of fires can be significant. Water supply and flows for fire suppression can also be an issue during extended droughts. Drought can also lead to turf losses and cause tree die off within the City.

Other qualitative impacts associated with drought in the City are those related to water intensive activities such as municipal usage, commerce, tourism, and recreation use. With more precipitation likely falling as rain instead of snow in the Sierra's, and warmer temperatures causing decreased snowfall to melt faster and earlier, water supply is likely to become more unreliable. In addition, drought and water shortage is predicted to become more common. This means less water available for use over the long run, and additional challenges for water supply reliability, especially during periods of extended drought.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the hazard profile discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Chowchilla include the following:

- Climate change is likely to exacerbate future drought conditions and associated impacts and vulnerability of the City to drought and water shortage.

- Future population growth should be considered as having more or less people in a community affects the overall hazard vulnerability to the City. Population growth in the City is expected to continue gradually. In addition, the City expects 8 future development areas to be developed in the next 5 years. One of these proposed areas has a 160-unit multi-family residential unit planned that could bring population growth. According to the HMPC, the City and Madera County has access to large quantities of water through its groundwater as well as surface water. However, any future population growth in the City will add additional pressure to water companies during periods of drought and water shortage. Water companies will need to continue to plan for and add infrastructure capacity for population growth. As the population grows, the nature and makeup of populations will shift and change along with it. Vulnerable and underserved populations, such as those with low incomes and the unhoused that might not always have access to clean water, will need to be considered as future development continues, since they may experience a disproportionate impact from drought and water shortage. Potential population growth will be a challenge not only with regard to the City's water access for agricultural production, but state- and nation-wide with regard to food production. Should the City see a growth in population, it will increase the vulnerability and impacts to the City from this hazard.
- Land use planning should be proactive to address future hazard conditions. The City has 8 future development areas planned in the next 5 years, covering over 12 acres. As the City continues to grow, more cropland may be taken out of production to provide housing to accommodate for population growth. As the areas adjacent to the City's agricultural lands are reduced, it seems likely that there would be less of a competing demand for water. However, more development will also require an increase in water supply and associated infrastructure. Changes in land use and development may or may not increase the impacts and associated vulnerabilities of the City to this hazard depending on where and how this future growth occurs and the continued availability of water to support development.

As the population in the area continues to grow, so will the demand for water. Ongoing planning will be needed by the City and local water companies to account for population growth and increased water demands.

Earthquake

Likelihood of Future Occurrence–Occasional (minor)/ Likely (major)
Vulnerability–High

Hazard Profile

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. 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. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. 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.

Location and Extent

Since earthquakes are regional events, the whole of the City is at risk to earthquake. The City of Chowchilla, Madera County, and surrounding areas have some level of risk from seismic and geologic hazards. Faults in and around the City were shown in Section 4.3.10 of the Base Plan. Only one fault does cross through the southeastern portion of Madera County; this is an unnamed fault that is part of the Hartley Springs Fault Zone. Other nearby faults include the Hartley Springs Fault Zone, Hilton Creek Fault, Silver Lake Fault, Ortigalita Fault Zone, San Andreas Fault Zone, and Rinconada Fault Zone faults. A significant seismic event on any of these major faults could cause damage in the City of Chowchilla.

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. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales, as discussed in Section 4.3.11 of the Base Plan.

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. The City is located in an area where earthquakes of some magnitude could occur, so both magnitude and intensity of earthquakes are expected to remain low to moderate. Seismic shaking maps for the area in Section 4.3.10 of the Base Plan show Madera County and the City fall within a low to moderate shake risk.

Past Occurrences

Disaster Declaration History

There has been no state or federal disaster declarations in Madera County from earthquake.

NCDC Events

The NCDC does not track earthquake events.

City of Chowchilla Events

As shown in the Base Plan, no disaster declarations have occurred in the County due to earthquake. The City noted that small earthquakes have occurred in the area, but none have caused any significant damage or impacts to the population, property, or related closures.

The City of Chowchilla has a low level of historic seismic activity. Since 1872 to 2009 there has been no significant property damage or loss of life due to earthquakes occurring within or near the City. Maximum recorded intensities have reached magnitude of ≥4.5 which is a very light reading according the California Historical Earthquake Online Database. According to the California Geological Survey, the Quaternary fault located closest to Madera County is Hartley Springs Fault located in Mono County.

Climate Change and Earthquake

Climate change is unlikely to increase earthquake frequency or strength. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Vulnerability to Earthquake

The combination of plate tectonics and associated California coastal mountain range building geology generates earthquakes as a result of the periodic release of tectonic stresses. 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 primary impacts of concern are life safety and property damage. Although several faults are in and near the Madera County Planning Area and the City, seismic hazard mapping indicates that the City has low to moderate seismic hazard potential. There is the potential for the City and Madera County Planning Area to be subject to some level of moderate seismic shaking. Some degree of structural damage due to stronger seismic shaking could be expected.

The whole of the City is at some measure of vulnerability to earthquake. An assessment of a community's vulnerability to earthquakes begins with an understanding of local exposure to earthquakes. This is included in the Local Concerns section below. After that section, assets at risk are discussed.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. The City of Chowchilla is located within Zone 3.

It was noted that earthquake activity has not been a serious hazard in the City of Chowchilla's history. There are, however, unreinforced masonry buildings in the City that may be at greater risk to earthquake. The City Planning Team noted that there is no inventory of these buildings. A number of the buildings in downtown area are not reinforced as these structures are built on hollow clay blocks.

Assets at Risk

Many assets in the City are at risk to ground shaking and other earthquake related impacts. Assets at risk from earthquake include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All people and populations are at risk from earthquake events. Those at heightened risk include:

- The unsheltered
- Infants and children under age five and their caregivers
- Seniors (65 and older)
- Individuals with disabilities
- Individuals dependent on medical equipment
- Individuals with impaired mobility

The greatest risk to people and populations from earthquake is death and injury. More information on people and populations at risk to earthquake shaking events can be seen in the Hazus scenarios developed for this LHMP. More information on the Hazus scenarios and how the County is affected is included in Section 4.3.10 of the Base Plan.

Structures

All structures in the City are vulnerable to earthquakes, depending on the severity and location of the event and the year built and construction type of structures. The Hazus scenarios conducted for the entire Madera County Planning Area show how structures may be affected.

Critical Facilities and Infrastructure

Earthquake and its related hazards present risks to the City. Earthquakes can damage critical facilities and infrastructure that provide vital services to the City. Damage to critical facilities from the Hazus earthquake scenarios for the Madera County Planning Area, including the City of Chowchilla, are presented in the Hazus analysis in Section 4.3.10 of the Base Plan. Given the nature of earthquake events causing significant ground shaking among other issues, those critical facilities and infrastructure that include underground components such as water and wastewater facilities would be uniquely vulnerable to damaging earthquakes.

Natural, Historic, and Cultural Resources

The 2023 State Hazard Mitigation Plan noted that environmental problems from earthquakes can be numerous. It is possible for earthquakes to reroute streams, which can change the water quality, possibly damaging habitat and feeding areas. Streams fed by groundwater and/or springs may dry up because of changes in underlying geology. Another threat to the environment from earthquakes is the potential release of hazardous materials into the natural environment causing contamination that can be difficult to contain. Historical and cultural resources are at risk, often due to their age and construction types. The Hazus scenarios in Section 4.3.10 of the Base Plan and included below are relatively silent on the vulnerability to natural, historic, and cultural resources, but impacts to these resources could be long lasting.

Impacts from Earthquake

Earthquakes can strike without warning and cause dramatic changes to the landscape of an area that can have devastating impacts on the built environment. The greatest impact is to life safety of the City of Chowchilla residents and visitors. Other impacts to the City could include damages to infrastructure such as roads, bridges, and dams; damages and loss of services to utilities and critical infrastructure, including those related to gas, power, water, wastewater and communication systems; damages to structures and other development; and possible loss of life and injuries.

Earthquakes can also cause failure of dams, levees, and reservoirs. Facilities and land downslope from dams or water reservoirs or behind levees might be subject to flooding, if the dams, reservoirs, or levees fail as a result of an earthquake. The City has locations with significant flood risk that include facilities downslope from dams or reservoirs that could be affected by a significant earthquake event.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Chowchilla include the following:

- Climate change is likely to have no effect on future earthquake conditions and associated impacts and vulnerability of the City.
- Population growth in the City is expected to continue gradually. In addition, the City has 8 future development areas planned in the next 5 years. One of these proposed areas has a 160-unit multi-family residential unit planned that could bring population growth. Any additional growth in the City would place additional populations at risk to earthquake. Additional population growth would likely bring continued diversity to the City. Vulnerable population groups could face disproportionate effects from an earthquake and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location and severity of future earthquake events.
- Land use planning should be proactive to address future hazard conditions. There are 8 areas the City has plans to develop over the next 5 years. However, City building codes include seismic standards to reduce structure damage, including damage to critical facilities and infrastructure, and should be updated as necessary to continue to address future earthquake conditions. Depending on the location of new development and adherence to protective building codes, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the City to this hazard.

Although new growth and development corridors would fall in the area affected by earthquake, given the limited chance of major earthquake and the building codes in effect, development in areas prone to earthquakes will continue to occur. The City enforces the state building code, which mandates construction

techniques that minimize seismic hazards. Future development in the City is subject to these building codes and land use planning.

Flood: 1%/0.2% Annual Chance (w/levee failure)

Likelihood of Future Occurrence–Occasional (1%)/Unlikely (0.2%)
Vulnerability–Medium

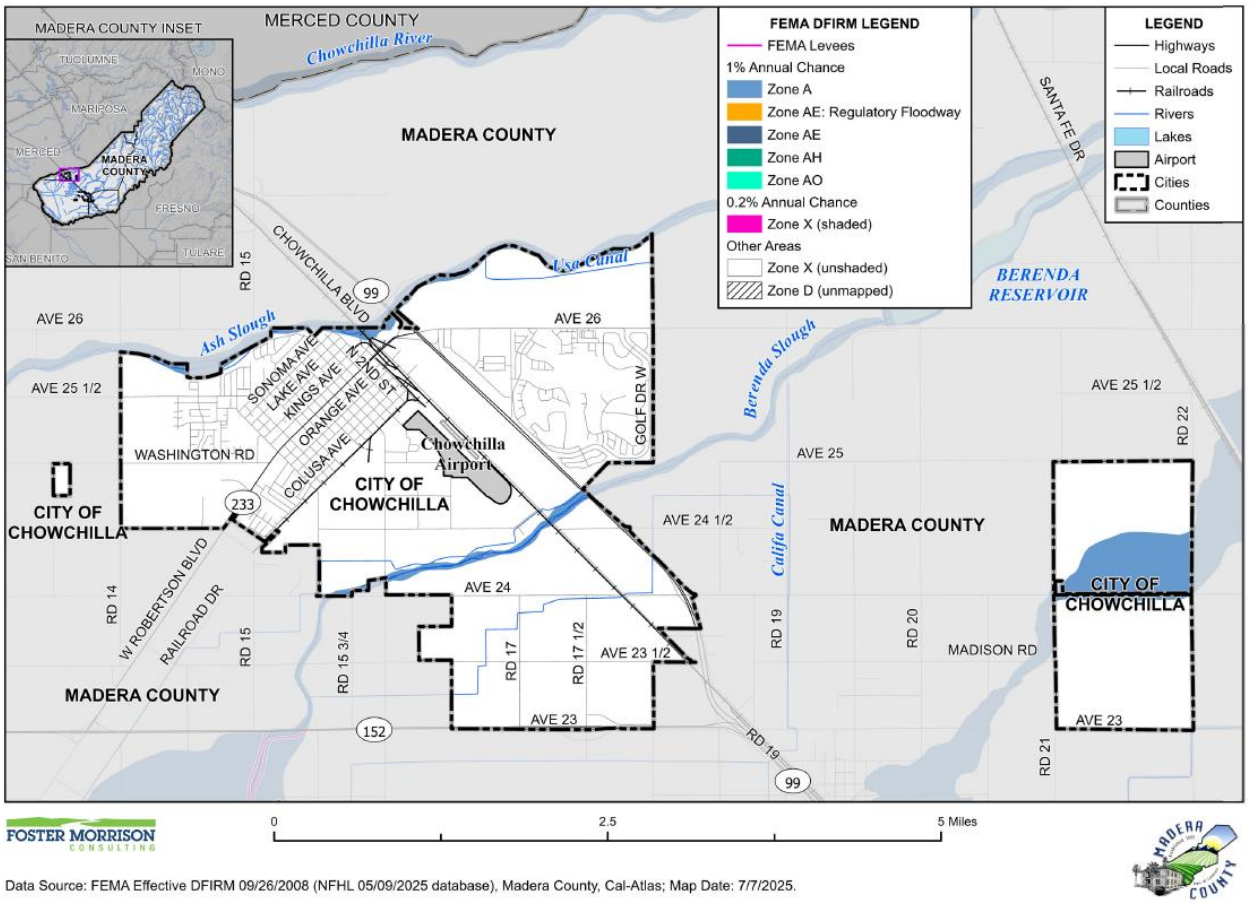
Hazard Profile

This hazard analyzes the FEMA Digital Flood Insurance Rate Map (DFIRM) 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the City and have caused damage in the past. Flooding can be a significant problem in the City. Historically, the City has been at risk to flooding primarily during the winter and spring months when river systems in the City swell with heavy rainfall and snowmelt runoff. The City has also been at risk during atmospheric river flood events. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures located throughout the Madera County Planning Area and the City of Chowchilla. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage. Flooding has occurred both within the 1% and 0.2% annual chance floodplains and in other localized areas in the City. The City has levees inside the City limits, though these levees are not certified as protecting against a 1% annual chance flood.

Location and Extent

The City of Chowchilla has areas located in the 1% annual chance flood zones. This is seen in Figure A-14.

Figure A-14 City of Chowchilla – FEMA DFIRM Flood Zones



Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the City vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the City tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Flooding in the City tends to have a shorter speed of onset, due to the amount of water that flows through the City.

Geographical flood extents for the City from the FEMA DFIRMs are shown in Table A-17.

Table A-17 City of Chowchilla – Geographical DFIRM Flood Zone Extents

Jurisdiction / Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla						
1% Annual Chance Flood Hazard	403	0.03%	68	0.01%	336	0.04%
0.2% Annual Chance Flood Hazard	0	0.0%	0	0.0%	0	0.0%

Jurisdiction / Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Other Areas	6,354	0.5%	3,317	0.6%	3,037	0.38%
City of Chowchilla Total	**6,758**	**0.5%**	**3,385**	**0.6%**	**3,373**	**0.42%**

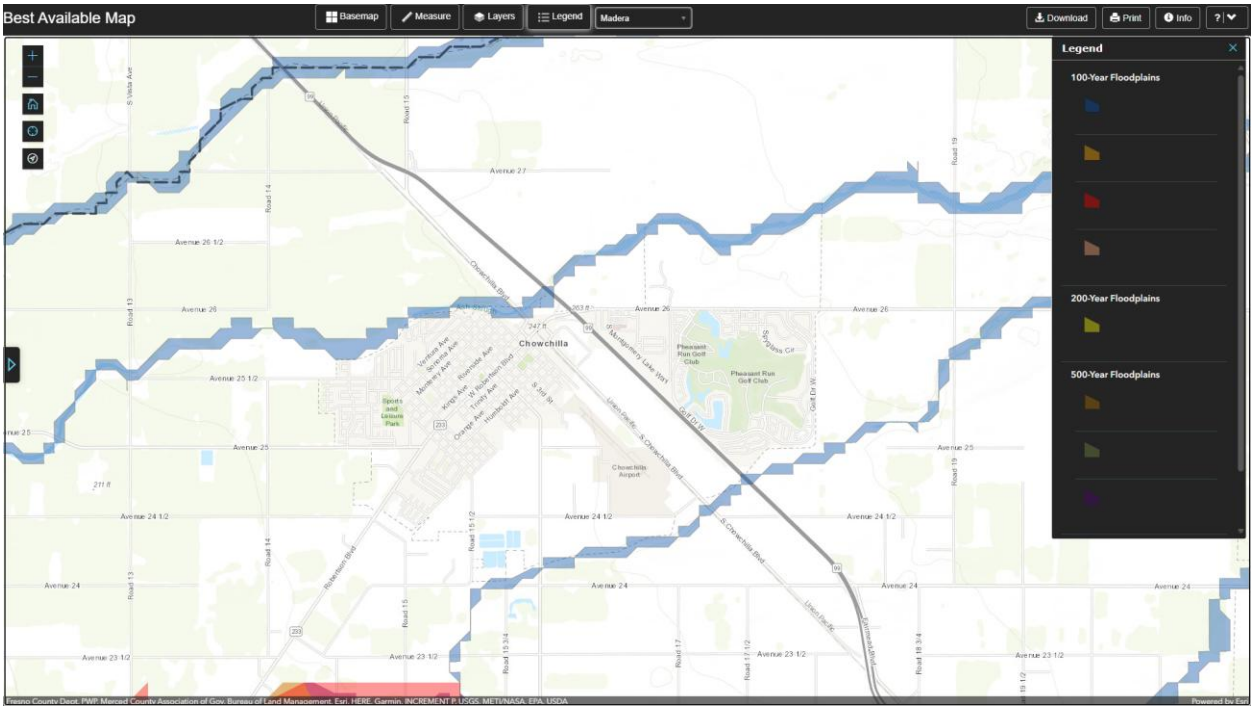
Source: FEMA DFIRM 9/26/2008

California Department of Water Resources Best Available Maps (BAM)

The FEMA regulatory maps provide just one perspective on flood risks in the City. Senate Bill 5 (SB 5), enacted in 2007, authorized the California DWR to develop the Best Available Maps (BAM) displaying 100- and 200-year floodplains for areas located within the Nevada-San Joaquin (SAC-SJ) Valley watershed. This effort was completed by DWR in 2008. DWR has expanded the BAM to cover all counties in the State and to include 500-year floodplains.

Different than the FEMA DFIRMs which have been prepared to support the NFIP and reflect only the 100-year event risk, the BAMs are provided for informational purposes and are intended to reflect current 100-, 200-(as applicable), and 500-year event risks using the best available data. The 100-year floodplain limits on the BAM are a composite of multiple 100-year floodplain mapping sources. It is intended to show all currently identified areas at risk for a 100-year flood event, including FEMA's 100-year floodplains. The BAM are comprised of different engineering studies performed by FEMA, Corps, and DWR for assessment of potential 100-, 200-, and 500-year floodplain areas. These studies are used for different planning and/or regulatory applications, and for each flood frequency may use varied analytical and quality control criteria depending on the study type requirements. The value in the BAMs is that they provide a bigger picture view of potential flood risk to the City than that provided in the FEMA DFIRMs. The BAM map for the City is shown in Figure A-15.

Figure A-15 City of Chowchilla – Best Available Map



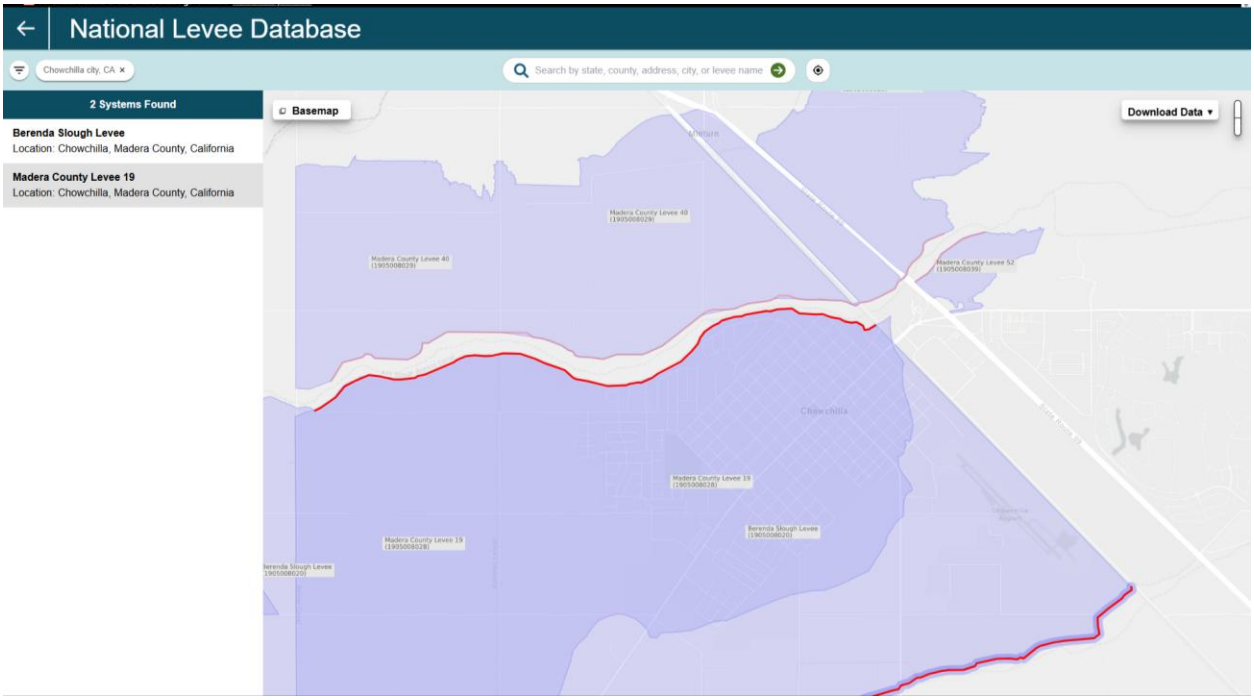
Source: California DWR

Legend explanation: **Blue** - FEMA 100-Year, **Orange** – Local 100-Year (developed from local agencies), **Red** – DWR 100-year (Awareness floodplains identify the 100-year flood hazard areas using approximate assessment procedures.), **Pink** – USACE 100-Year (2002 Sac and San Joaquin River Basins Comp Study), **Yellow** – USACE 200-Year (2002 Sac and San Joaquin River Basins Comp Study), **Tan** – FEMA 500-Year, Grey – Local 500-Year (developed from local agencies), **Purple** – USACE 500-Year (2002 Sac and San Joaquin River Basins Comp Study).

National Levee Database

The National Levee Database contains the location of levees in Madera County. These levees are located in the western portion of the County. The National Levee Database was queried to show the location of these levees. Levee locations from the National Levee Database are shown on Figure A-16. A table of these levees, with levee mileage, leveed area, and FEMA accreditation rating is shown on Table A-18. While the map shows areas protected by levee (in the light purple color), none of these levees are certified as protecting against a 1% annual flood event.

Figure A-16 City of Chowchilla – National Levee Database Levees and Protected Areas



Source: National Levee Database. Retrieved 3/4/2026.

Table A-18 Madera County – Levees Reported in National Levee Database

System Name	Levee Miles	Leveed Area Square Miles	Location	USACE Levee?	Waterway	FEMA Accreditation Rating	Segment Count
Berenda Slough Levee	11.64	51.01	Chowchilla, Madera County, California	No	Berenda Slough	Non-Accredited Levee System	3
Madera County Levee 19	3.07	4.79	Chowchilla, Madera County, California	No	ASH SLOUGH	Non-Accredited Levee System	1

Source: National Levee Database. Retrieved 3/4/2026.

Past Occurrences

Disaster Declaration History

A list of state and federal disaster declarations for Madera County from flooding is shown on Table A-19. These events also likely affected the City to some degree.

Table A-19 Madera County – State and Federal Disaster Declarations from Flood 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	20	1950, 1955, 1958, 1969, 1982 (twice), 1983, 1986, 1992, 1993, 1995 (three), 1997 (twice), 2006, 2010, 2023 (three)	21	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1982, 1986, 1992, 1995 (three), 1997 (twice), 2006, 2010, 2023 (four)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Madera County has seen 74 events. These events most likely had some impact on the City.

City of Chowchilla Events

Prior to the construction of Berenda Dam/Eastman Reservoir in 1962 (later renamed Berenda Reservoir), and Buchanan Dam/Eastman Lake in 1975, the City of Chowchilla experienced significant flooding back to 1950 documented in the Interior Central California Climate Calendar (National Weather Service in Hanford, CA) and the Chowchilla Historical Society. **In 1950 and 1955**, significant flooding caused rivers to swell and homes and businesses were inundated with water. In 1950, the rains brought more than fifteen inches of water in some high areas and snowpack melts resulted in historic flooding. **In the 1990's**, there were a few events that were beyond normal. During wet seasons, the City experienced potential levee breaks on both side banks of the Chowchilla River and Ash Slough which runs alongside and through the City of Chowchilla. These facilities reduce flood risk to Chowchilla and agricultural land; however, the potential for a flood hazard is still possible.

More recently, the City noted that there were no major flooding events in Chowchilla since 2018. However, there was major flooding in nearby Merced, so this indicates that larger flooding events are still a possibility. The flood drove people out of Merced County and into Madera County when ordered to evacuate to escape the flood, increasing the Madera County and City population temporarily as individuals and families sought shelter.

Climate Change and Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with flood. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 2024 CAS, climate change may affect flooding in California, the Madera County Planning Area, and the City of Chowchilla. While average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is possible that average soil moisture and runoff could decline, however, due to increasing temperature, evapotranspiration rates, and spacing between rainfall events. Reduced snowpack and increased number of intense rainfall events are likely to put additional pressure on water infrastructure which could increase the chance of flooding

associated with breaches or failures of flood control structures such as levees and dams. Cal Adapt future precipitation projections were shown in Section 4.3.4.

Vulnerability to Flood: 1% and 0.2% Annual Chance

Floods have been a part of the City's historical past and will continue to be so in the future. During winter months, long periods of precipitation and the timing of that precipitation are critical in determining the threat of flood, and these characteristics further dictate the potential for widespread structural and property damage. Predominantly, the effects of 1% and 0.2% annual chance flooding are generally confined to areas near the waterways of the City. As waterways grow in size from local drainages, so grows the threat of flood and dimensions of the threat.

The whole of the City is at some measure of vulnerability to floods. An assessment of a community's vulnerability to flood begins with an understanding of local exposure to flood. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Chowchilla is traversed by several stream systems and is at risk to both the 100-year flood as well as to localized stormwater flooding. In the Chowchilla area, the construction of Buchanan, Hidden and Friant Dams, as well as levee improvements along the sloughs and rivers, have eliminated the major flooding problems along the San Joaquin, Fresno, and Chowchilla Rivers whereby eliminating the risk of historical floods as were seen in the 1950's in the County of Madera and Chowchilla Area. However, although the historical floods have been reduced, during winter storms and extreme cold, the heavy snowfall in the mountains above Chowchilla starts to melt. The lakes, dams, levees, sloughs and waterways become swollen, and the Department of Engineering must release water down the Berenda and Ash Slough channels heading downstream to counties and cities which have flood prone areas. When these releases happen, the City of Chowchilla's most probable vulnerability to flooding and flood damage is along the natural Ash Slough Channel when the sandy drainage channel becomes stressed or cannot hold the water releases breaking away from the banks during period of high flow. Ash Slough is a distributary channel of the Chowchilla River that enters the Bypass system. The design capacity of Ash Slough at its confluence with the Eastside Bypass is 5,000 cfs based on O&M manuals described in the draft State Plan of Flood Control.

FEMA has identified Ash Slough, Berenda Slough and the Chowchilla River as floodways. Federally designated flood zones are limited to the defined bank and channels of Ash Slough, Berenda Slough and Chowchilla River. No base flood elevation has been determined for the 100-year floodplains. The remainder of the City is designated as Zone X – an area determined to be outside the 0.2 percent annual chance floodplain. The 2040 General Plan minimizes public exposure and property damage from potential floods by designating land adjacent to Ash Slough and Berenda Slough as Open Space.

Assets at Risk from Flood: 1%/0.2% Annual Chance

Assets at risk from flood (levee failure is discussed in the next section) include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All people and populations located in the 1% and 0.2% annual chance floodplains are at some risk to flooding. Certain vulnerable populations located within areas prone to flooding may be at increased risk to this hazard, especially during a large event with minimal advance notice. These vulnerable populations include: the unsheltered, those with limited mobility, and those that lack the resources to leave the area.

City residents that live in the 1% and 0.2% annual chance floodplains are often the most vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events. To further evaluate the impact to the City of Chowchilla's residential population residing within these hazard areas, the DFIRM flood zones were overlayed on the parcel layer. Those residential parcels that intersect the flood zones were counted and multiplied by the 2023 Census Bureau average household factors for the City of Chowchilla – 3.35. According to this analysis, there is a total population of 47 residents of the City at risk to flooding in the 1% annual chance floodplains. This is shown in Table A-20.

Table A-20 City of Chowchilla – Improved Residential Parcels and Population by Summary FEMA DFIRM Flood Zone

Jurisdiction	1% Annual Chance		0.2% Annual Chance	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Chowchilla	14	47	0	0

Source: FEMA DFIRM 09/06/2008, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35)

The City noted that the Critical Facilities and Infrastructure section below includes the facilities used by At-Risk populations that are threatened by this hazard. While this is not specific to what special populations reside in the City, it does speak to facilities that area used to serve (portions) of this population.

Structures

Certain structures in the City are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. GIS was used to determine the possible impacts of flooding on parcels and structures within the City of Chowchilla. The methodology described in Section 4.3.11 of the Base Plan was followed in determining structures and values at risk to the 1% (100-year) and 0.2% (500-year) annual chance flood event. Table A-21 is a summary table for the City of Chowchilla. Parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values in the City are shown for the 1% and 0.2% annual chance flood zones, as well as for those properties that fall outside of the mapped FEMA

DFIRM flood zones. Table A-22 breaks down Table A-21 and shows the same analysis further broken out by detailed FEMA flood zone and property use.

Table A-21 City of Chowchilla – Count and Value of Parcels and Structures in Summary DFIRM Flood Zone

Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard	63	34	$13,421,666	$7,566,284	$533,832	$6,799,375	$28,321,157
0.2% Annual Chance Flood Hazard	0	0	$0	$0	$0	$0	$0
Other Areas	4,870	3,976	$272,870,099	$861,576,626	$96,014,792	$516,962,393	$1,747,423,910
City of Chowchilla Total	**4,933**	**4,010**	**$286,291,765**	**$869,142,910**	**$96,548,624**	**$523,761,768**	**$1,775,745,067**

Source: FEMA DFIRM 09/06/2008, Madera County 2024 Parcel/Assessor Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Table A-22 City of Chowchilla – Count and Values of Parcels and Structures by Detailed DFIRM Flood Zone and Property Use

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard							
Zone AE							
Agricultural	19	13	$8,095,816	$1,043,469	$22,000	$1,043,469	$10,204,754
Commercial	8	5	$1,659,046	$4,358,138	$373,430	$4,358,138	$10,748,752
Government	9	0	$0	$0	$0	$0	$0
Industrial	4	2	$108,607	$315,429	$138,402	$473,144	$1,035,582
Institutional	1	0	$5,100	$0	$0	$0	$5,100
Recreational	1	0	$26,115	$0	$0	$0	$26,115
Residential	20	14	$3,526,982	$1,849,248	$0	$924,624	$6,300,854
Unknown	1	0	$0	$0	$0	$0	$0
Zone AE Total	**63**	**34**	**$13,421,666**	**$7,566,284**	**$533,832**	**$6,799,375**	**$28,321,157**
1% Annual Chance Flood Hazard Total	**63**	**34**	**$13,421,666**	**$7,566,284**	**$533,832**	**$6,799,375**	**$28,321,157**
Other Areas							
Zone X (unshaded)							

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Agricultural	48	39	$14,435,915	$1,786,873	$32,632	$1,786,873	$18,042,293
Commercial	277	164	$49,668,263	$105,990,053	$13,846,994	$105,990,053	$275,495,363
Government	52	0	$1	$0	$0	$0	$1
Industrial	30	20	$11,865,425	$28,790,280	$81,435,151	$43,185,420	$165,276,276
Institutional	56	28	$830,307	$4,824,646	$5,590	$4,824,646	$10,485,189
Recreational	92	3	$6,453,885	$2,159,468	$36,529	$2,159,468	$10,809,350
Residential	4,083	3,721	$189,585,853	$718,018,746	$657,896	$359,009,373	$1,267,271,868
Right of Way	182	0	$185	$0	$0	$0	$185
Utilities	43	1	$28,888	$6,560	$0	$6,560	$42,008
Unknown	7	0	$1,377	$0	$0	$0	$1,377
Zone X (unshaded) Total	**4,870**	**3,976**	**$272,870,099**	**$861,576,626**	**$96,014,792**	**$516,962,393**	**$1,747,423,910**
Other Areas Total	**4,870**	**3,976**	**$272,870,099**	**$861,576,626**	**$96,014,792**	**$516,962,393**	**$1,747,423,910**
City of Chowchilla Total	**4,933**	**4,010**	**$286,291,765**	**$869,142,910**	**$96,548,624**	**$523,761,768**	**$1,775,745,067**

Source: FEMA DFIRM 09/06/2008, Madera County 2024 Parcel/Assessor Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Table A-23 summarizes Table A-22 and shows City of Chowchilla loss estimates and improved values at risk by FEMA 1% and 0.2% annual chance flood zones. According to Table A-22 and Table A-23, the City of Chowchilla has 63 parcels and $28.3 million of structure and contents values or values in the 1% annual chance flood zone, and no improved parcels, structures, and contents values in the 0.2% annual chance flood zone. These values can be refined a step further. Applying the 20 percent damage factor as previously described in Section 4.3.11 of the Base Plan, there is a 1% chance in any given year of a flood event causing $3 million in damage. The loss ratio of 0.02% indicates that flood losses for 1% annual chance flooding would be minor, and the City would be able readily recover.

Table A-23 City of Chowchilla – Flood Loss Estimates

Jurisdiction / Flood Zone	Total Parcel Count	Imp. Parcel Count	Total Land Value	Improved Structure Value	Personal Property Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance Flood Hazard	63	34	$13,421,666	$7,566,284	$533,832	$6,799,375	$14,899,491	$2,979,898	0.02%

Jurisdiction / Flood Zone	Total Parcel Count	Imp. Parcel Count	Total Land Value	Improved Structure Value	Personal Property Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
0.2% Annual Chance Flood Hazard	0	0	$0	$0	$0	$0	$0	$0	0.00%
City of Chowchilla Total	**63**	**34**	**$13,421,666**	**$7,566,284**	**$533,832**	**$6,799,375**	**$14,899,491**	**$2,979,898**	**0.02%**

Source: FEMA DFIRM 09/06/2008, Madera County 2024 Parcel/Assessor Data

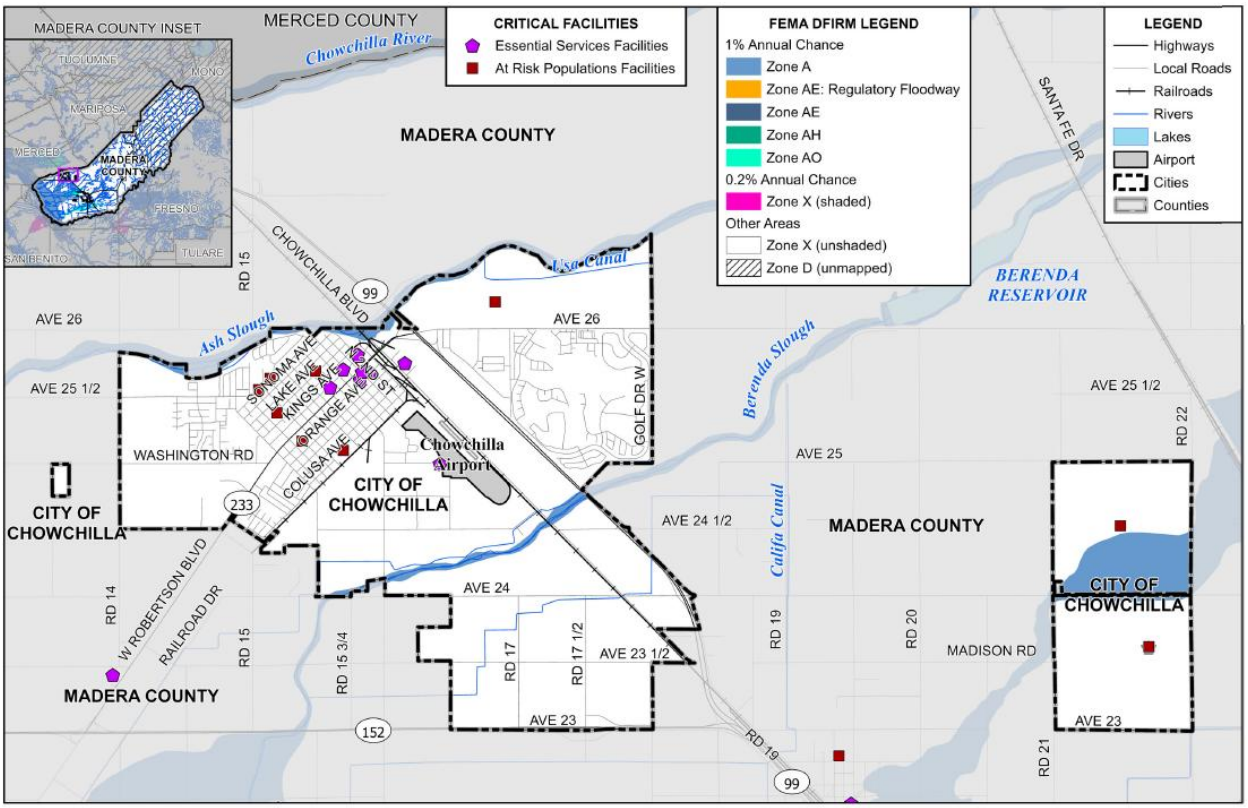
*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Critical Facilities and Infrastructure

1% annual chance flooding present a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the City to determine which critical facilities fall into each FEMA DFIRM flood zone. Using GIS, the FEMA DFIRM flood zones were overlayed on the critical facility GIS layer. This is shown on Figure A-17 for the FEMA DFIRM flood zones. Table A-44 details which critical facilities fall in which FEMA DFIRM flood zones. Details of critical facility categories, type, name, and address by FEMA DFIRM flood zones are listed in Appendix F.

Figure A-17 City of Chowchilla – Critical Facilities in FEMA DFIRM Flood Zones



Data Source: FEMA Effective DFIRM 09/26/2008 (NFHL 05/09/2025 database), Madera County, Cal-Atlas; Map Date: 10/21/2025.

Table A-24 City of Chowchilla – Critical Facilities by Category and Type in FEMA DFIRM Flood Zones

Jurisdiction / Flood Zone	Critical Facility Category / Type	Facility Count
1% Annual Chance Flood Hazard		
Zone AE	**Essential Services Facilities**	
	Fire Station	1
	Essential Services Facilities Total	**1**
	At Risk Populations Facilities	
	Jail / Prison	2
	At Risk Populations Facilities Total	**2**
	1% Annual Chance Flood Hazard Total	**3**
Other Areas		
Zone X (unshaded)	**Essential Services Facilities**	
	Communications	2
	Community Center	1

Jurisdiction / Flood Zone	Critical Facility Category / Type	Facility Count
	Community Services	2
	Fire Station	2
	Public Safety Facility / 911 PSAP	1
	Public Utility Plant Facilities	1
	Essential Services Facilities Total	**9**
	At Risk Populations Facilities	
	Health / Medical	2
	School	5
	At Risk Populations Facilities Total	**7**
	Other Areas Total	**16**
City of Chowchilla Total		**19**

Source: FEMA DFIRM 09/06/2008, City of Chowchilla

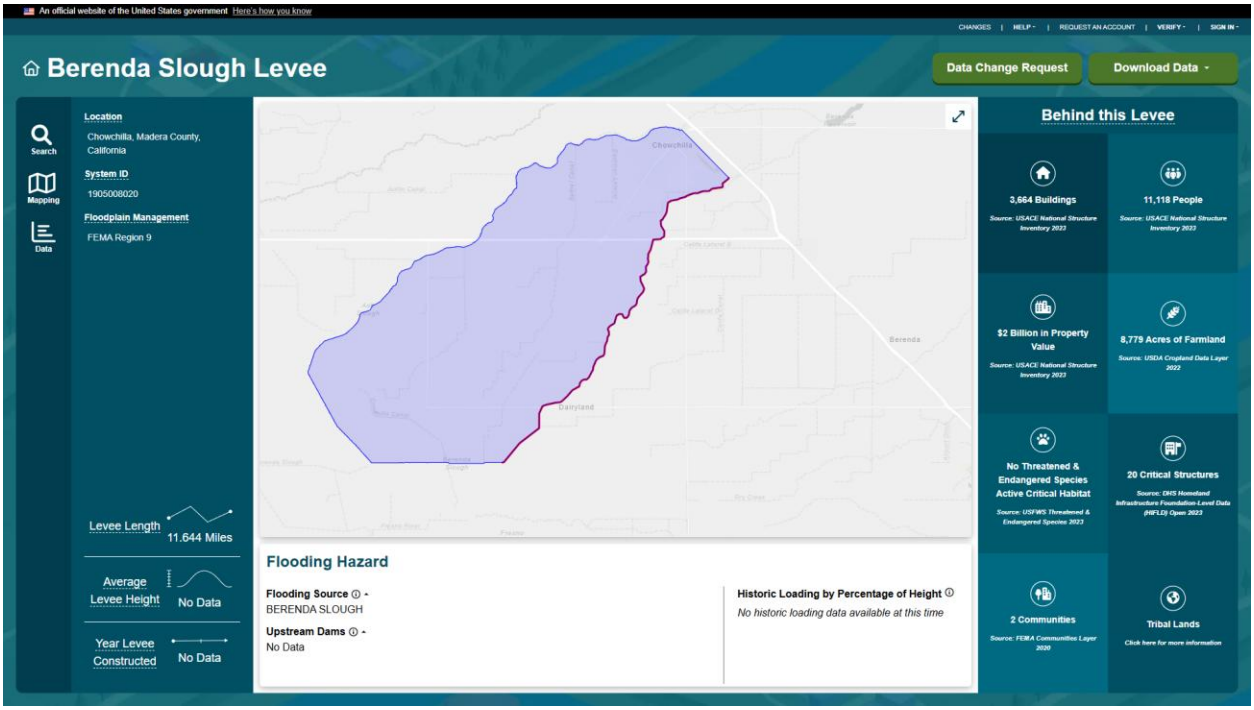
Natural, Historic, and Cultural Resources

Large flood events can affect natural, historic, and cultural resources. There are a number of ways floodwaters can impact natural resources and the environment. Wildlife habitats can be destroyed by floodwaters. Contaminated floodwater can pollute rivers and habitats. Silt and sediment can destroy natural areas. Riverbanks and natural levees can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survive the initial flood may die due to being inundated with water. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures within the flooded areas, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme flood events. Any of these that fall in the flood zones shown on Figure A-14 would be vulnerable.

Assets at Risk from Flood: Levee Failure

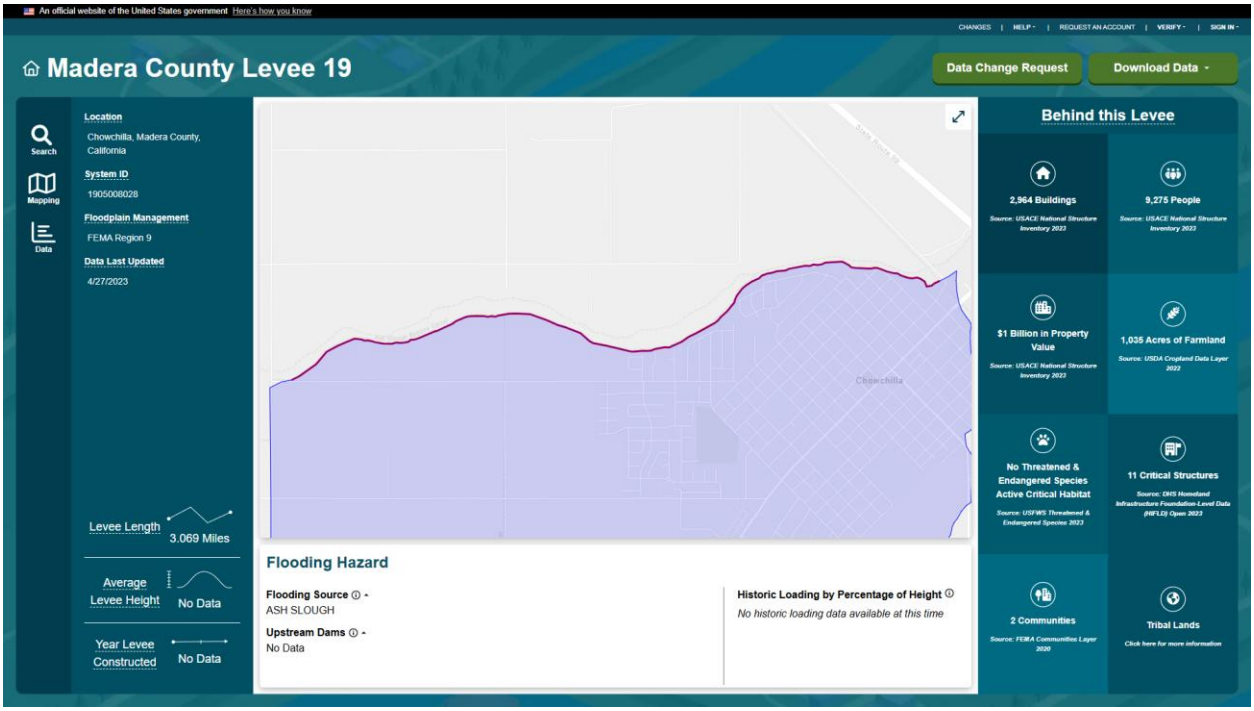
The National Levee Database shows an analysis of each levee section. This is shown for the Berenda Slough Levee (see Figure A-18) and Levee 19 (see Figure A-19) below.

Figure A-18 City of Chowchilla –Populations, Structures, Critical Facilities, and Natural Resources in the Berenda Slough Levee Area



Source: National Levee Database. Retrieved 3/12/2026.

Figure A-19 City of Chowchilla –Populations, Structures, Critical Facilities, and Natural Resources in the Levee 19 Area



Source: National Levee Database. Retrieved 3/12/2026.

Impacts from Flood: 1% and 0.2% Annual Chance

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Large flood events, including those associated with 1% and 0.2% annual chance floods, can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. People may be swept away in floodwaters, causing injuries or deaths. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Structures can be damaged directly from floodwaters and can also be damaged from trees falling as a result of water-saturated soils. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services causing power outages. The interruption of power causes major problems and can result in the closure of governmental offices and community businesses. Public schools may also be required to close or be placed on a delayed start schedule. Roads can be damaged and closed, causing safety and evacuation issues.

Standing water can cause damage to crops, roads, foundations, and electrical circuits. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the hazard profile discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed further below.

Insurance Coverage, Claims Paid, and Repetitive Losses

Standard property insurance does not include flood coverage because of the relatively high risk. The National Flood Insurance Program (NFIP) provides flood insurance to residents in those communities that participate in the NFIP. Federal financial assistance requires the purchase of flood insurance for structures located within a 100-year floodplain – a requirement that affects nearly all mortgages financed through commercial lending institutions. Flood insurance is also recommended for all structures protected by levees, even if not mapped within a floodplain.

The City of Chowchilla recently joined the NFIP on June 6, 2019. The City does not participate in the CRS program. Since the City recently joined the NFIP, there have been no paid losses, substantial damage claims, repetitive loss, or severe repetitive loss properties according to NFIP data from December 2, 2024.

Based on this analysis of insurance coverage, the City has values at risk to the 1% annual chance and greater floods. Of the 34 improved parcels within the 1% annual chance flood zone, none of those parcels maintain flood insurance. This can be seen on Table A-25.

Table A-25 City of Chowchilla – Percentage of Policy Holders to Improved Parcels in the 1% Annual Chance Floodplain

Jurisdiction	Improved Parcels in SFHA (1% Annual Chance) Floodplain*	Insurance Policies in the SFHA (1% Annual Chance) Floodplain	Percentage of 1% Annual Chance Floodplain Parcels Currently Insured
City of Chowchilla	34	0	0.0%

Source: FEMA DFIRM 9/26/2008, FEMA CIS 2024, 2024 Madera County Parcel/Assessor's Data

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Chowchilla include the following:

- Climate change is likely to exacerbate future flood conditions and associated impacts and vulnerability of the City to 1% and 0.2% annual chance flooding.
- Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the City. Population growth in the City is expected to continue gradually. In addition, the City has 8 future development areas planned in the next 5 years. One of these proposed areas has a 160 unit multi-family residential unit planned that could bring population growth. This additional growth is planned in areas outside both levee protected areas and 1% and 0.2% annual chance floodplains; thus this development is unlikely to increase the vulnerability of the City to this hazard. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location of future flood events.
- Land use planning should be proactive to address future hazard conditions. Of the 8 developments planned over the next 5 years (as shown in Figure A-20), none have areas near the floodplain. Locating new development, structures and critical facilities and infrastructure within or near areas of flood risk may put additional development at risk. However, City building codes and the City's floodplain ordinance are in effect to reduce this risk and should be updated as necessary to continue to address future flood conditions. As such, future development is not expected in increase the vulnerability of the City to flood.

Future Development

The potential for flooding may increase as floodwaters are channeled due to land development. Such changes can exacerbate flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. Floodplain modeling and master planning should be based on built out property 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 overall floodplain.

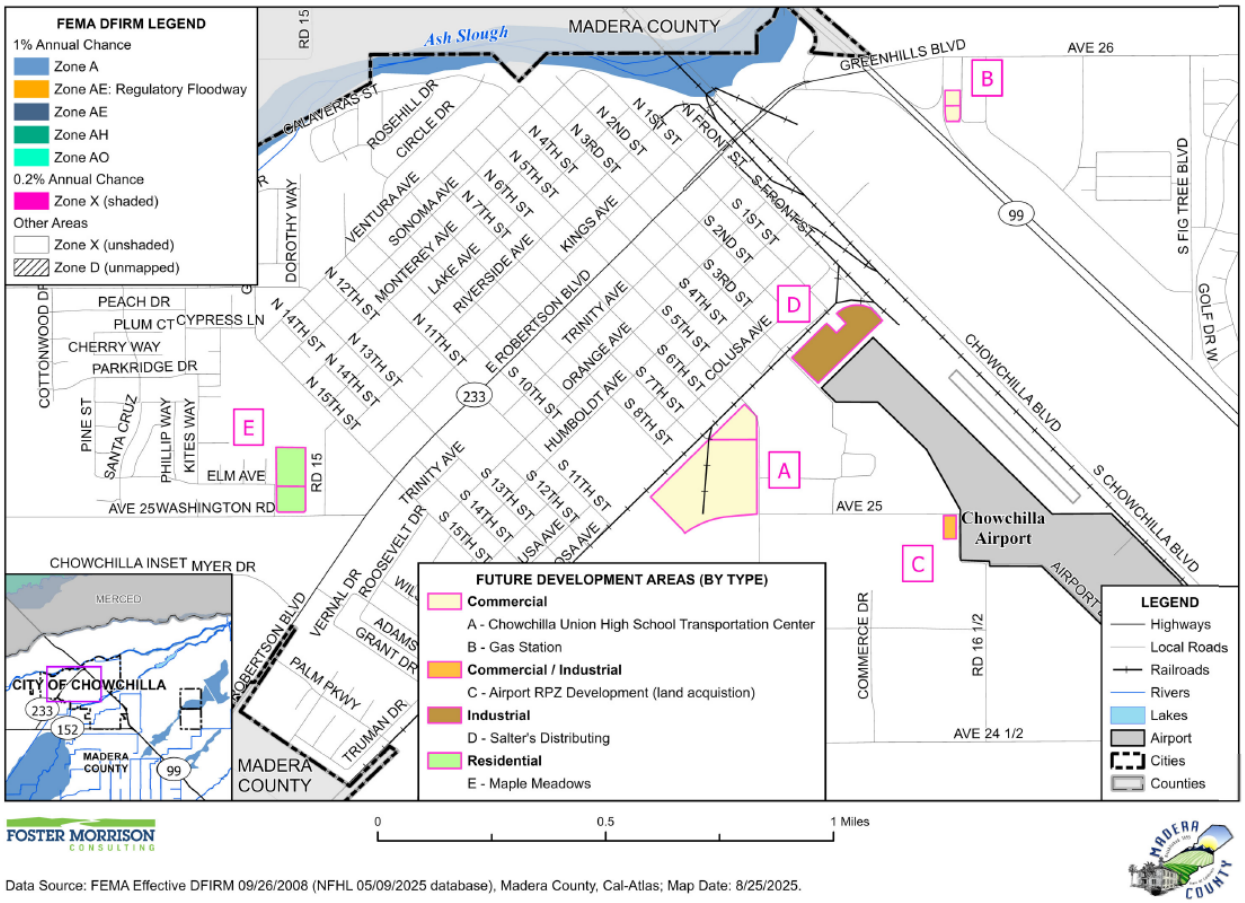
The City enforces its floodplain management ordinance. The City's floodplain ordinance should be updated to ensure new development within floodplains is adequately protected. More detail on the specifics of the floodplain ordinance can be found in the Capability section below.

Future development areas and their vulnerability to 1% and 0.2% annual chance flood are discussed further in the below GIS analysis.

GIS Analysis

The City provided eight future development areas which were used as the basis for the inventory of future development for the City. These areas were mapped in GIS. Utilizing the future development area spatial layer, the parcel polygon data was intersected to determine the future development areas within each DFIRM flood zone. Figure A-20 shows the locations of the future development area overlayed on the DFIRM flood zones. None of these future development areas fall within the mapped flood areas as shown on Table A-26.

Figure A-20 City of Chowchilla – Future Development Areas in FEMA DFIRM Flood Zones



Data Source: FEMA Effective DFIRM 09/26/2008 (NFHL 05/09/2025 database), Madera County, Cal-Atlas; Map Date: 8/25/2025.

Table A-26 City of Chowchilla – Future Development Area Acres and Parcels in FEMA DFIRM Flood Zones

Future Development in Flood Zones/ Property Use/Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Other Areas						
Zone X (unshaded)						
Chowchilla Union High School Transportation Center (Map ID A)						
Commercial	1	1	0	5.14	2.69	0
Commercial	1	1	0	0	2.45	0
Gas Station (Map ID B)						
Commercial	1	1	0	1.44	0.72	0
Commercial	1	1	0	0	0.71	0
Airport RPZ Development (land acquisition) (Map ID C)						
Commercial / Industrial	1	0	1	0.91	0	0.91

Future Development in Flood Zones/ Property Use/Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Salter's Distributing (Map ID D)						
Industrial	1	0	1	9.42	0	9.42
Maple Meadows (Map ID E)						
Residential	1	1	0	5.69	2.26	0
Residential	1	1	0	0	3.43	0
Zone X (unshaded) Total	8	6	2	22.6	12.26	10.33
Other Areas Total	8	6	2	22.6	12.26	10.33

Source: FEMA DFIRM 9/26/2008, City of Chowchilla

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile

Flooding occurs in areas other than the FEMA mapped 1% and 0.2% annual chance floodplains. Flooding may be from drainages not studied by FEMA, lack of or inadequate drainage infrastructure, or inadequate maintenance. Localized, stormwater flooding occurs throughout the City during the rainy season from November through April. Prolonged heavy rainfall (including that from atmospheric river events) contributes to a large volume of runoff resulting in high peak flows of moderate duration.

Location and Extent

The City of Chowchilla is subject to localized flooding throughout the City. Areas prone to localized flooding are included in Table A-27 below. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the City vary by location. Flood durations in the City tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Localized flooding in the City tends to have a shorter speed of onset, especially when antecedent rainfall has soaked the ground and reduced its capacity to absorb additional moisture.

Past Occurrences

Disaster Declaration History

There have been no state or federal disaster declarations from localized floods. There would most likely have been localized flood events during the disaster declarations from flood as shown in the previous 1%/0.2% annual chance flood section.

NCDC Events

The NCDC occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile above where past flood events were noted.

City of Chowchilla Events

The City noted that the times of flooding and localized flooding have coincided. These were discussed in the Past Occurrences Section of the Flood:1% and 0.2% annual chance flood section above. The City noted no other recent flooding since the 2018 LHMP.

Climate Change and Localized Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts from localized flood. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Even if average annual rainfall may decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century, increasing the likelihood of overwhelming stormwater systems built to historical rainfall averages. This makes localized flooding more likely.

Vulnerability to Localized Flood

Flood vulnerability and their impacts vary by location and severity of any given flood event and will likely only affect certain areas of the City during specific times. Based on the risk assessment, it is evident that floods will continue to have potentially significant impacts to certain areas of the City. However, while flooding can cause significant impacts, depending on the duration and volume of precipitation and the drainage in any given area, many of the floods in the City are minor, localized flood events that are more of a nuisance than a disaster.

Many areas of the City are at some measure of vulnerability to localized flooding. An assessment of a community's vulnerability to localized flooding begins with an understanding of local exposure to localized flooding. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Historically, the City has been affected by flooding of streams and creeks occurring during heavy rain and storm (including atmospheric river) events. Additional development in the City and in the watersheds of these streams affects both the frequency and duration of damaging floods through an increase in stormwater runoff and contributes to localized flooding occurring in areas throughout the City. The lack of or inadequate drainage infrastructure in the City contributes to localized flooding issues. Road closures are

seldom and water levels recede quickly leaving only minor cleanup of silt and debris. The drainage channel for Ash Slough is "natural." This natural channel with increased vegetation can become clogged or obstructed. Moderate to high intensity rainfall may cause overflows.

Localized flooding from high-intensity rainfall events, of which there can be a few a year, typically manifests as flooded ponding along some surface streets. Road closures are seldom and water levels recede quickly leaving only minor cleanup of silt and debris. The drainage channel for Ash Slough is "natural." This natural channel with increased vegetation can become clogged or obstructed. Moderate to high intensity rainfall may cause overflows. The City tracks localized flooding areas. Affected localized flood areas identified by the City of Chowchilla are summarized in Table A-27.

Table A-27 City of Chowchilla – List of Localized Flooding Problem Areas

Area Name	Flooding	Pavement Deterioration	Washout	High Water	Landslide/ Mudslide	Debris	Downed Trees
Robertson Blvd.	X	X		X		X	
Kings Ave	X	X		X			
Lake Ave	X	X		X			
N 1st – N 15th	X	X		X			
S 1st – S 15th	X	X		X			
Monterey Ave	X	X		X			
Sonoma Ave	X	X		X			
Ventura Ave	X	X		X			
Trinity Ave	X	X		X			
Orange Ave	X	X		X			
Humboldt Ave	X	X		X			
Alameda Ave	X	X		X			
Colusa Ave	X	X		X			
Mariposa Ave	X	X		X			
Church St	X			X			
Road 225 at Redinger Lake	X	X	X	X	X	X	
Ash Slough	X	X	X	X			
Berenda Slough	X		X	X		X	
Road 621 at High Point Court	X	X	X				
Cottonwood Creek			X			X	
Berenda Creek			X			X	

Source: City of Chowchilla

Currently a large portion of the downtown area in the City of Chowchilla lacks underground storm drainage infrastructure. Since the town is flat and the City experiences only periodic heavy downpour, the storm water will make its way to DI's (Drain inlets) located at the end of 15th St and Robertson Blvd. The City

Planning Team noted that if there is a heavy downpour for an hour it will take about an hour for the downtown area to reach the DI's located at the end of 15th St and Robertson Blvd the flooding will subside. For most residents, the water on the road during a downpour is a way of life and although annoying to residents, it's a fact of life that they have accepted. The City Planning Team also noted that if a nearby dam were to break, the City lacks the underground infrastructure to deal with that type of flooding.

Assets at Risk

Assets at risk from localized flood include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

People and populations (including vulnerable populations) are traditionally not highly vulnerable to localized flooding, but their structures and contents can be at risk. Localized flooding may also cause transportation issues as roads and lanes are impacted or closed and affect the ability for people to travel throughout the City.

Structures

Structures in areas with localized flooding can be affected if floodwaters intrude into the structure. Structures in low lying areas, or those with basements can be at greater risk. Buildings with older foundations that are prone to water intrusion are also at greater risk. Once water finds its way into a structure, it tends to continue to do so until the path that brings water into a structure is mitigated. Structures can also be damaged by trees that have become uprooted and fall during rain and storm events. Large trees falling onto structures can cause significant damage.

Critical Facilities and Infrastructure

Localized flooding, while often more of a nuisance, can cause damage to critical facilities and infrastructure during a heavy rain and storm event. Any facility that experiences localized flooding can be impacted. Utilities and other critical infrastructure can all be affected, causing interruptions in service until repairs can be made. For example, water and wastewater systems can be vulnerable to heavy rains and flood events. Rainfall creates a high water table, surging streams and creeks, and saturates soil. Infiltration of stormwater into water and wastewater systems may occur and presents a threat to public health and safety, when the infrastructure is no longer able to meet operational needs and local demands. Other critical facilities such as roads, bridges and other transportation facilities can also experience localized flooding causing road closures and other impacts until storm waters recede. This can result in extended road closures requiring alternate routes.

Natural, Historic, and Cultural Resources

Natural resource assets may have some vulnerabilities to localized flood during major storm events, but can benefit from floodwaters, often by design. Many parks and green spaces are designed to take overflow water and release it into the underlying soils and natural areas. Wetland areas in the City actually help reduce the risk of flooding, as they can absorb excess rainfall that would have to be drained away from

impervious surfaces. Flooding can provide many benefits to the natural environment, including recharging wetlands and groundwater, increasing fish production, creating wildlife habitat, and rejuvenating soil fertility. These smaller localized flooding events often provide more benefits to the environment in comparison to negative impacts associated with large flood events. Historic and cultural resources may be at some measure of vulnerability if they are located in areas subject to repeated localized flooding.

Impacts from Localized Flood

Primary concerns associated with stormwater flooding include impacts to infrastructure that provide a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Objects can also be buried or destroyed through sediment deposition. Floodwaters can break utility lines and interrupt services. Standing water can cause damage to crops, roads, and foundations. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

Life safety issues from localized flooding would be more limited. The amount and type of damage or flooding that occurs varies from year to year and from storm to storm, depending on the quantity of precipitation and runoff.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Chowchilla include the following:

- Climate change is likely to exacerbate future heavy rain conditions and associated impacts and vulnerability of the City to localized flood.
- Population growth in the City of Chowchilla has recently slowed. Population growth in the City is expected to continue gradually. In addition, the City has8 future development areas planned in the next 5 years. One of these proposed areas has a 160-unit multi-family residential unit planned that could bring population growth. Additional population growth would likely bring continued diversity to the City. This can also impact the vulnerable populations, like low-income individuals and households living in areas that are typically more hazardous. Vulnerable population groups such as low-income individuals and households living in flood prone areas could face disproportionate effects from localized flood and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location of future flood events.
- Land use planning should be proactive to address future hazard conditions. The City has 8 areas it is planning to see development in the next 5 years. Development in more urban areas causes an increase

in peak flow and stormwater runoff. Such growth will consume previously undeveloped acres, and the impacts may overwhelm existing drainage and flood control facilities. Locating new development, structures and critical facilities and infrastructure within or near areas of localized flooding risk may put additional development at risk. However, City building codes are in effect to reduce this risk and should be updated as necessary to continue to address future localized flood conditions. Depending on the location of new development and adherence to protective building codes, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the City to this hazard.

The City will need to be proactive to ensure that increased development has proper siting and drainage for stormwaters. The risk of localized flooding to future development can also be minimized by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the localized stormwater flooding will reduce future risks of losses.

Hazardous Material Transportation

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

According to the Environmental Protection Agency (EPA), a hazardous material is any item or agent (biological, chemical, physical) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Hazardous materials can be present in any form; gas, solid, or liquid. Environmental or atmospheric conditions can influence hazardous materials if they are uncontained.

The U.S. Occupational Safety and Health Administration's (OSHA) definition of hazardous material includes any substance or chemical which is a "health hazard" or "physical hazard," including: chemicals which are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents which act on the hematopoietic system; agents which damage the lungs, skin, eyes, or mucous membranes; chemicals which are combustible, explosive, flammable, oxidizers, pyrophoric, unstable-reactive or water-reactive; and chemicals which in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists or smoke which may have any of the previously mentioned characteristics.

The EPA incorporates the OSHA definition and adds any item or chemical which can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment. The EPA maintains a list of 366 chemicals that are considered extremely hazardous substances (EHS). This list was developed under the Superfund Amendments and Reauthorization Act. The presence of EHSs in amounts in excess of a threshold planning quantity requires that certain emergency planning activities be conducted.

A release or spill of bulk hazardous materials could result in fire, explosion, toxic cloud or direct contamination of water, people, and property. The effects may involve a local area or many square miles. Health problems may be immediate, such as corrosive effects on skin and lungs, or be gradual, such as the

development of cancer from a carcinogen. Damage to property could range from immediate destruction by explosion to permanent contamination by a persistent hazardous material.

Location and Extent

In Madera County there are multiple hazardous materials transportation routes. Highways 33, 41, 99, 145, and 152. In terms of the current transport situation, the major routes are Highway 99 and the two railroads (Union Pacific and Burlington Northern Santa Fe), which transport thousands of tons of hazardous materials each year. Of these, HWYs 99 and 152 and the BNSF and UP Railroads run through the City. Figure A-21 shows the hazardous materials transportation corridors (for roadways and rail) in the City as well as the one-mile buffer zone (on each side of the corridor for a two-mile total buffer) used for this analysis as detailed further in the methodology below. Geographic hazardous materials buffer zones for the City are detailed by highway in Table A-28 and by railroad in Table A-29.

Figure A-21 City of Chowchilla – Hazardous Materials Highway and Railroad Routes and Buffer Zones

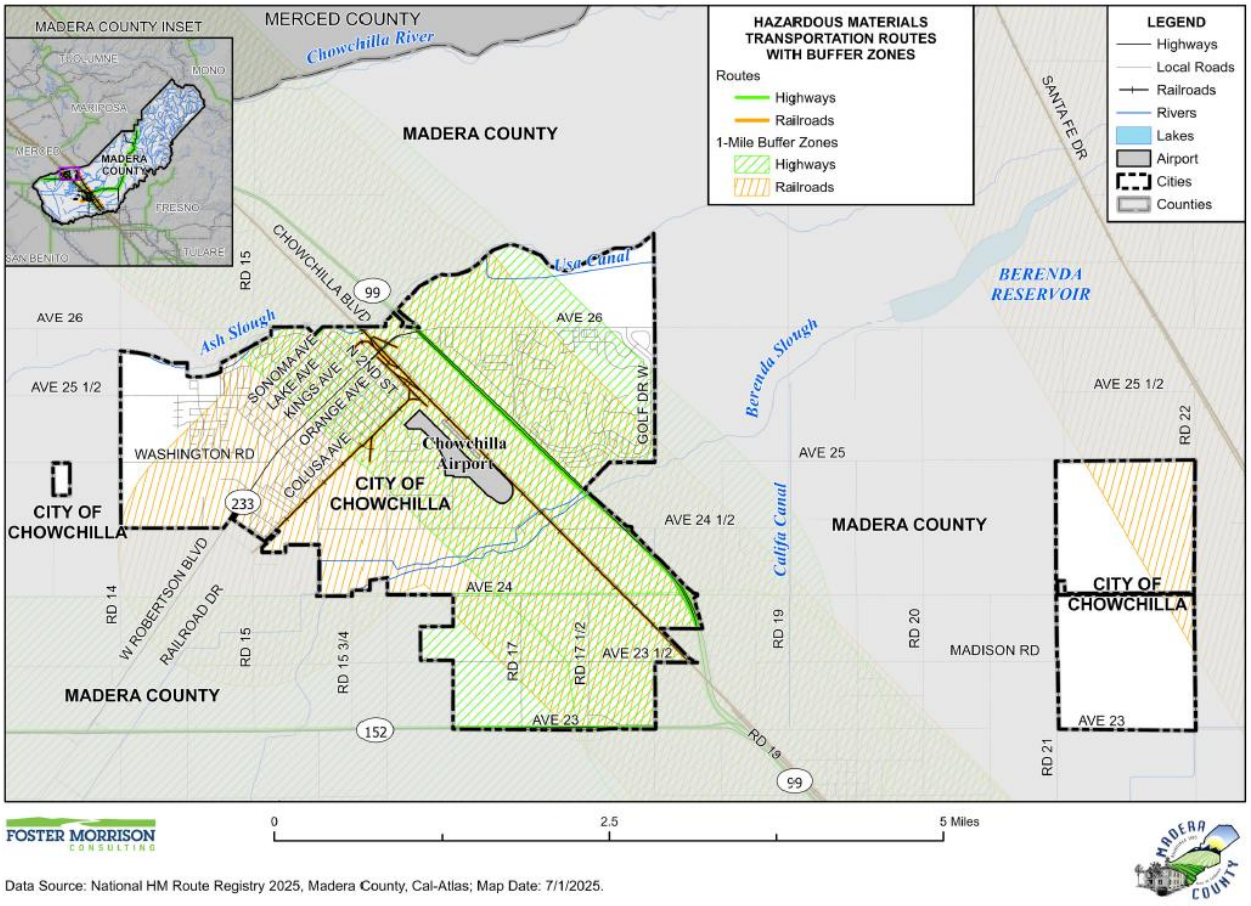


Table A-28 City of Chowchilla – Geographical Extent of Hazardous Materials Transportation Buffer Zones for Highways

Jurisdiction / Hazardous Materials Routes	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla						
HWY 152	1,006	0.1%	997	0.2%	9	0.001%
HWY 99	3,177	0.2%	1,856	0.3%	1,321	0.2%

Source: National Hazardous Materials Routes Registry (2025)

Table A-29 City of Chowchilla – Geographical Extent of Hazardous Materials Transportation Buffer Zones for Railroads

Jurisdiction / Hazardous Materials Routes	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Chowchilla						
BNSF	381	0.0%	-		381	0.0%
UP	4,303	0.3%	2,691	0.5%	1,613	0.2%

Source: National Hazardous Materials Routes Registry (2025)

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations for hazardous materials in the County.

NCDC Events

The NCDC does not track hazardous materials events.

Pipeline and Hazardous Materials Safety Administration Events

The U.S. Department of Transportation (USDOT) Pipeline and Hazardous Materials Safety Administration's (PHMSA) Office of Hazardous Materials Safety performs a range of functions to support the safe transport of hazardous materials. One of these functions is the tracking of hazardous materials incidents in the United States. The database was searched for hazardous materials incidents in the County. A summary of rail and highway incidents since 1970 in the Madera County Planning Area are shown in Section 4.3.13. 20 separate events were contained in the database. None of these were known to affect the City.

Table A-30 City of Chowchilla - Hazardous Materials Transportation Incidents Since 1970

Date of Incident	Incident City	Incident Route	Mode of Transportation	Transportation Phase	Commodity Short Name	Quantity Released	Amount of Damages
11/5/1974	Chowchilla	Unknown	Highway	N/A	Nitro Carbo Nitrate	100 lbs	$0
4/12/1977	Chowchilla	Unknown	Highway	N/A	Organic Phosphate	100 lbs	$0
10/10/1978	Chowchilla	Unknown	Highway	N/A	Sodium Chlorate	1,013 gal.	$0
2/16/1988	Chowchilla	Unknown	Highway	N/A	Ammonia Anhydrous	1,875 gal.	$0

Source: PHMSA Database – Search dates 01/01/1970 – 06/01/2025

City of Chowchilla Events

The City noted no past events of hazardous materials transportation where damages occurred.

Climate Change and Hazardous Materials

Climate change is unlikely to affect hazardous materials transportation incidents.

Vulnerability to Hazardous Materials Transportation

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 values will vary from event to event and depend on the type, location, and nature of a specific hazardous material incident. The most significant impact from hazardous materials transport is life safety. Given the difficulty in quantifying the losses associated with technological hazards, this section focuses on analyzing key Planning Area values relative to the hazardous materials transportation corridors identified above.

Much of the City is at some measure of vulnerability to hazardous materials transport. An assessment of a community's vulnerability begins with an understanding of local exposure to hazardous materials transport. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

In the Chowchilla area, hazardous materials may be transported via roadways, railways, and airways. Hazardous materials and wastes are regulated by federal and state laws and are required to be recycled or properly disposed. Transport of hazardous materials is also heavily regulated. However, illegal storage and disposal and unintentional releases of hazardous materials from leaks and accidents can still occur.

In the City of Chowchilla and outlying area, a mobile hazardous event is most likely to occur along Highways 99, 152 and SR233 and along railroad tracks. Trucks and rail cars that use these transportation corridors commonly carry a variety of hazardous materials including gasoline, other petroleum products, and other chemicals known to cause human health problems.

The impact to identified assets within the City will vary from event to event and depend on the type, location, and nature of a specific hazardous material incident.

Assets at Risk

Assets at risk from localized flood include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations are at some vulnerability to a hazardous materials transportation release. Certain vulnerable populations are at the greatest risk to the effects of hazardous materials. Vulnerable populations include:

- The unsheltered
- Those with breathing difficulties or other underlying health conditions
- Infants and children under age five and their caregivers
- Seniors (65 and older)
- Individuals with disabilities
- Individuals dependent on medical equipment
- Individuals who work, exercise, or physically train outdoors
- Individuals with impaired mobility

To determine the overall populations at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS to determine the residential population that resides within the two-mile buffer zone of the highway and railroad corridors. Using GIS, the buffered corridor was overlaid on the improved residential parcel and structure data and results tabulated for the Planning Area, as found in Table A-31. Those residential parcel polygons that intersect the buffered corridor were counted and multiplied by the 2023 Census Bureau average household factors for Chowchilla – 3.35.

Table A-31 City of Chowchilla – Improved Residential Parcels and Populations at Risk in Hazardous Materials Buffer Zones

Route Type/Route	Improved Residential Parcels	Population
Highways		
Highway 52	0	0
Highway 99	1,988	6,660
Highway 99 and Highway 152	4	13
Railways		
BNSF	0	0

Route Type/Route	Improved Residential Parcels	Population
UP	3,192	10,693

Source: National Hazardous Materials Route Registry 2025, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35).

Structures

Structures in the City have some measure of risk to hazardous materials which can affect the built environment of the City. During a hazardous materials transportation spill, it is generally the people that are at risk to the effects of the spill. During a spill, buildings, property, and their values are at a lessor risk; however, given the location and breadth of hazardous materials routes in the City, an analysis is performed here. The methodology described in Section 4.3.13 of the Base Plan was followed in determining structures and values at risk to the hazardous materials buffer zones. Analysis results for Chowchilla are summarized in Table A-32 for highways and in Table A-33 for railroads. These tables summarize by total parcel counts, improved parcel (structure) counts, their improved and land values, personal property values, and the estimated contents replacement values based on the CRV factors detailed in Section 4.2.1 of the Base Plan.

Table A-32 City of Chowchilla – Count and Value of Parcels and Structures in Highway Hazardous Materials Transportation Buffer Zone by Route and Property Use

Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Highway 152							
Agricultural	9	9	$3,712,133	$462,817	$0	$462,817	$4,637,767
Commercial	0	0	$0	$0	$0	$0	$0
Government	1	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0	$0
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
Highway 152 Total	**10**	**9**	**$3,712,133**	**$462,817**	**$0**	**$462,817**	**$4,637,767**
Highway 99							
Agricultural	18	9	$4,416,765	$690,381	$0	$690,381	$5,797,527
Commercial	220	127	$41,163,289	$88,801,628	$12,934,529	$88,801,628	$231,701,074
Government	40	0	$1	$0	$0	$0	$1
Industrial	31	19	$8,711,234	$13,685,895	$34,279,093	$20,528,843	$77,205,065
Institutional	31	19	$327,721	$2,207,665	$2,088	$2,207,665	$4,745,139

Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Recreational	92	3	$6,453,885	$2,159,468	$36,529	$2,159,468	$10,809,350
Residential	2,272	1,988	$118,546,621	$412,176,775	$138,680	$206,088,388	$736,950,464
Right of Way	168	0	$132	$0	$0	$0	$132
Utilities	38	1	$28,886	$6,560	$0	$6,560	$42,006
Unknown	5	0	$1,377	$0	$0	$0	$1,377
Highway 99 Total	**2,915**	**2,166**	**$179,649,911**	**$519,728,372**	**$47,390,919**	**$320,482,932**	**$1,067,252,134**
Highway 99 and Highway 152							
Agricultural	26	23	$7,263,356	$1,102,707	$22,799	$1,102,707	$9,491,569
Commercial	5	5	$1,765,741	$951,698	$316,734	$951,698	$3,985,871
Government	0	0	$0	$0	$0	$0	
Industrial	1	1	$2,998,288	$14,807,645	$47,294,460	$22,211,468	$87,311,861
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	4	4	$525,002	$611,503	$0	$305,752	$1,442,257
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
Highway 99 and Highway 152 Total	**36**	**33**	**$12,552,387**	**$17,473,553**	**$47,633,993**	**$24,571,624**	**$102,231,557**
City of Chowchilla Total	**2,961**	**2,208**	**$195,914,431**	**$537,664,742**	**$95,024,912**	**$345,517,373**	**$1,174,121,458**

Source: National Hazardous Materials Routes Registry (2025), Madera County 2024 Parcel/Assessor's Data
To avoid duplication of parcel count, the parcels located in areas where multiple haz-mat route buffers overlap were assigned the route grouping listed above.

Table A-33 City of Chowchilla – Count and Value of Parcels and Structures in Railroad Hazardous Materials Transportation Buffer Zone by Route and Property Use

Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
BNSF							
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	0	0	$0	$0	$0	$0	$0
Government	3	0	$0	$0	$0	$0	$0

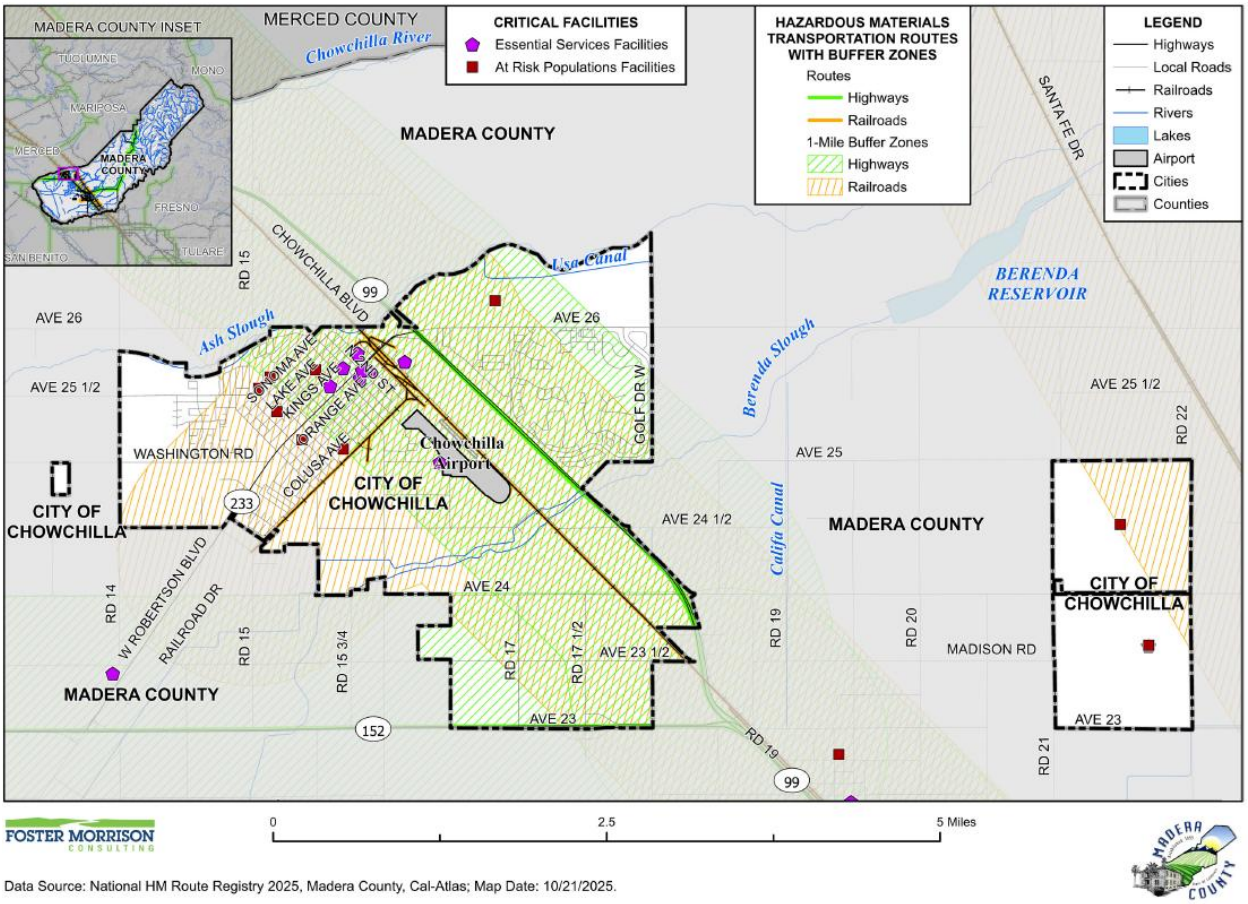
Hazardous Materials Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Recreational	0	0	$0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0	$0
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
BNSF Total	**3**	**0**	**$0**	**$0**	**$0**	**$0**	**$0**
UP							
Agricultural	60	46	$19,509,434	$2,543,632	$54,632	$2,543,632	$24,651,330
Commercial	285	169	$51,327,309	$110,348,191	$14,220,424	$110,348,191	$286,244,115
Government	58		$1	$0	$0	$0	$1
Industrial	34	22	$11,974,032	$29,105,709	$81,573,553	$43,658,564	$166,311,858
Institutional	57	28	$835,407	$4,824,646	$5,590	$4,824,646	$10,490,289
Recreational	3	2	$2,091,034	$1,294,968	$36,529	$1,294,968	$4,717,499
Residential	3,456	3,192	$158,337,913	$578,884,377	$657,896	$289,442,189	$1,027,322,375
Right of Way	137	0	$129	$0	$0	$0	$129
Utilities	21	0	$15	$0	$0	$0	$15
Unknown	8	0	$1,377	$0	$0	$0	$1,377
UP Total	**4,119**	**3,459**	**$244,076,651**	**$727,001,523**	**$96,548,624**	**$452,112,189**	**$1,519,738,987**
City of Chowchilla Total	**4,122**	**3,459**	**$244,076,651**	**$727,001,523**	**$96,548,624**	**$452,112,189**	**$1,519,738,987**

Source: National Hazardous Materials Routes Registry (2025), Madera County 2024 Parcel/Assessor's Data
To avoid duplication of parcel count, the parcels located in areas where multiple haz-mat route buffers overlap were assigned the route grouping listed above.

Critical Facilities and Infrastructure

Hazardous materials transport presents a threat to critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the City to determine which critical facilities fall into a highway or railroad hazardous materials buffer zones. Using GIS, the hazardous materials buffer zones were overlayed on the critical facility GIS layer. This is shown on Figure A-22 for the hazardous materials buffer zones. Table A-34 details which critical facilities fall in which hazardous materials buffer zones for highways, while Table A-35 details which critical facilities fall in the hazardous materials buffer zones for rail lines. Details of critical facility categories, type, name, and address by hazardous materials buffer zones are listed in Appendix F.

Figure A-22 City of Chowchilla – Critical Facilities in Hazardous Materials Buffer Zones



Data Source: National HM Route Registry 2025, Madera County, Cal-Atlas; Map Date: 10/21/2025.

Table A-34 City of Chowchilla – Critical Facilities by Category in Highway Hazardous Materials Buffer Zones

Jurisdiction / Hazardous Materials Routes	Critical Facility Category / Type	Facility Count
Highway 99	**Essential Services Facilities**	
	Communications	2
	Community Center	1
	Community Services	2
	Fire Station	2
	Public Safety Facility / 911 PSAP	1
	Public Utility Plant Facilities	1
	Essential Services Facilities Total	**9**
	At Risk Populations Facilities	
	Health / Medical	2
	School	3
	At Risk Populations Facilities Total	**5**

Jurisdiction / Hazardous Materials Routes	Critical Facility Category / Type	Facility Count
	Highway 99 Total	**14**
City of Chowchilla Total		**14**

Source: National Hazardous Materials Routes Registry (2025), City of Chowchilla

Table A-35 City of Chowchilla – Critical Facilities by Category in Railroad Hazardous Materials Buffer Zones

Jurisdiction / Hazardous Materials Routes	Critical Facility Category / Type	Facility Count
BNSF	**Essential Services Facilities**	
	Fire Station	1
	Essential Services Facilities Total	**1**
	At Risk Populations Facilities	
	Jail / Prison	2
	At Risk Populations Facilities Total	**2**
	BNSF Total	**3**
UP	**Essential Services Facilities**	
	Communications	2
	Community Center	1
	Community Services	2
	Fire Station	2
	Public Safety Facility / 911 PSAP	1
	Public Utility Plant Facilities	1
	Essential Services Facilities Total	**9**
	At Risk Populations Facilities	
	Health / Medical	2
	School	5
	At Risk Populations Facilities Total	**7**
	UP Total	**16**
City of Chowchilla Total		**19**

Source: National Hazardous Materials Routes Registry (2025), City of Chowchilla

Natural, Historic, and Cultural Resources

Any natural, historic, or cultural resource that falls in the buffer zones shown on Figure A-21 has some measure of vulnerability. If a release caused a fire, it could affect historic and cultural resources in the City. Natural resources can be more greatly affected by a hazardous materials spill. Clean up of a spill into a natural resource (such as a creek, stream, or river) may be difficult to complete. Hazardous releases can significantly harm wildlife and habitat areas. The contamination also can make its way up the food chain,

affecting the food supply. Open water and wetland environments experience significant exposure to hazardous materials events, which may result in further loss of ecosystem functions.

Impacts from Hazardous Materials Transportation

Impacts from hazardous materials transportation incidents vary by location and severity of any given event and will likely only affect certain areas of the City during specific times. Based on the risk assessment, it a hazardous materials transportation release could have potential adverse impacts to affected areas of the City as described below. However, the majority releases in the City are minor, localized 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;
- Contaminated water supplies
- Contaminated buildings
- Soil contamination that results in mass die-off of vegetation
- Fire and explosions
- Public health impacts
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure and services;
- Damage to roads/bridges resulting in loss of mobility;
- Business closures and significant economic impact (jobs, sales, tax revenue) to the community;
- Negative impact on commercial and residential property values; and
- Impact on the overall mental health of the community.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the hazard profile discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City include the following:

- Climate change is unlikely to exacerbate future hazardous material transportation events and associated impacts and vulnerability of the City.
- Population growth in the City is expected to continue gradually. In addition, the City has 8 future development areas planned in the next 5 years. One of these proposed areas has a 160-unit multi-family residential unit planned that could bring population growth. Vulnerable population groups could face

disproportionate effects from a hazardous materials release and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location, nature and extent of a hazardous materials transportation release.

- Land use planning should be proactive to address future hazard conditions. Many of the future development upcoming for the City resides within a hazardous material buffer zone, either railroad, highway, or both. However, it is difficult to locate development outside of the hazardous materials buffer zones, due to the location of rail lines and highways in the City. Building codes do not account for hazardous materials spills or incidents. Changes in land use planning and future development and may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location, nature and extent of a hazardous materials transportation release.

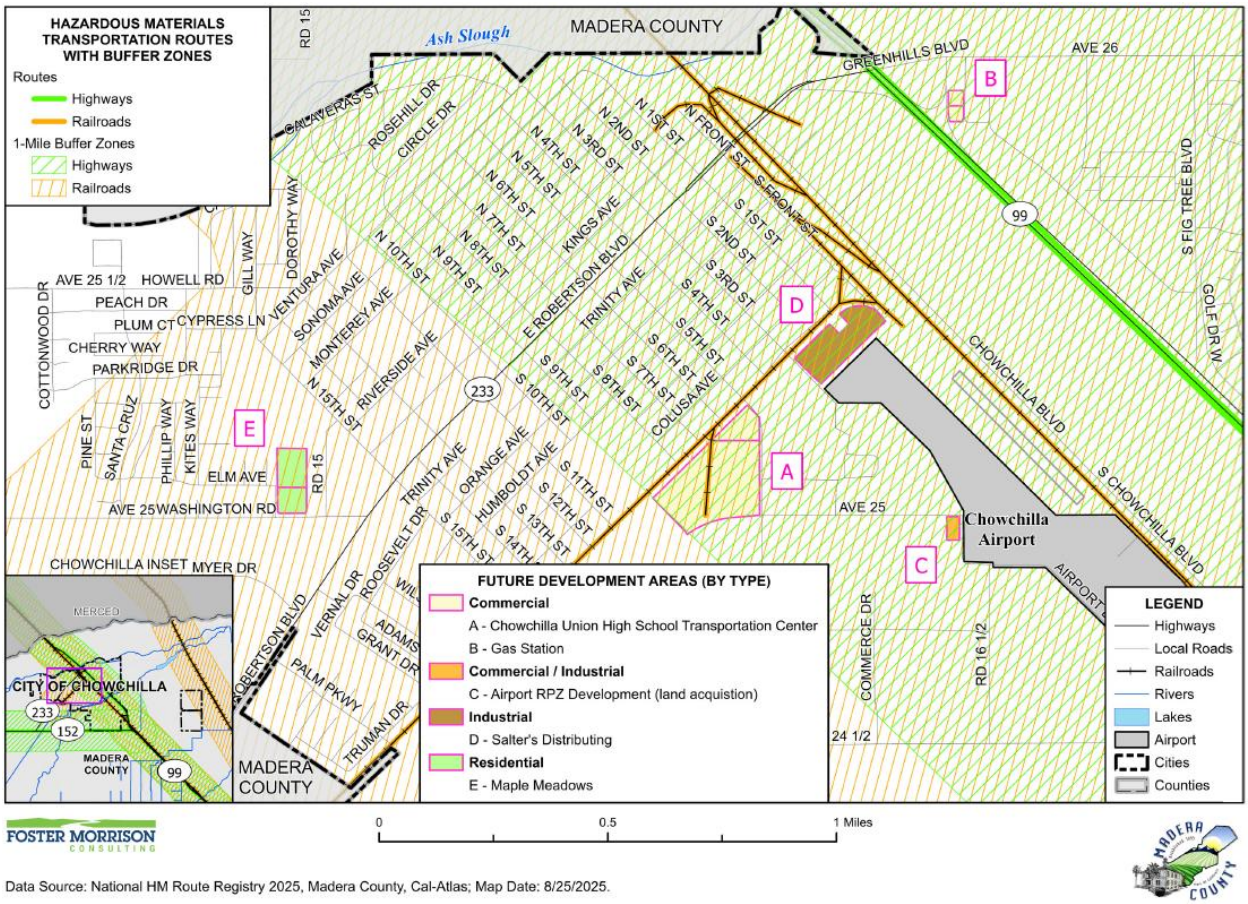
Future Development

Development will continue to happen within hazardous materials transportation corridors due to the large area within the City located within these corridors. Those who choose to develop in these areas should be made aware of the risks associated with living within close proximity to a hazardous materials transportation route. Future development areas and their vulnerability to hazardous materials transport are discussed further in the below GIS analysis.

GIS Analysis

The City provided eight future development areas which was used as the basis for the inventory of future development for the City. The areas were mapped in GIS. Utilizing the future development area spatial layer, the parcel polygon data was intersected to determine the future development areas within both the highway and railroad hazardous material buffer zones. Figure A-23 shows the locations of the future development areas overlayed on the hazardous materials buffer zones. As shown in Table A-36, 4 of these areas fall in the hazardous material buffer zones from both highways and railroads, while 5 are affected by the hazardous material buffer zones from railroads.

Figure A-23 City of Chowchilla – Future Development Areas in Highway and Railroad Hazardous Materials Buffer Zones



Data Source: National HM Route Registry 2025, Madera County, Cal-Atlas; Map Date: 8/25/2025.

Table A-36 City of Chowchilla – Future Development Parcels and Acres in Highway and Railroad Hazardous Materials Buffer Zones

Future Development by Hazardous Materials Routes / Property Use / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Highway 99						
Chowchilla Union High School Transportation Center (Map ID A)						
Commercial	1	1	0	5.14	2.69	0
Commercial	1	1	0	0	2.45	0
Gas Station (Map ID B)						
Commercial	1	1	0	1.44	0.72	0
Commercial	1	1	0	0	0.71	0
Airport RPZ Development (land acquisition) (Map ID C)						
Commercial / Industrial	1	0	1	0.91	0	0.91

Future Development by Hazardous Materials Routes / Property Use / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Salter's Distributing (Map ID D)						
Industrial	1	0	1	9.42	0	9.42
Highways Total	**6**	**4**	**2**	**16.91**	**6.57**	**10.33**
UP						
Chowchilla Union High School Transportation Center (Map ID A)						
Commercial	1	1	0	5.14	2.69	0
Commercial	1	1	0	0	2.45	0
Gas Station (Map ID B)						
Commercial	1	1	0	1.44	0.72	0
Commercial	1	1	0	0	0.71	0
Airport RPZ Development (land acquisition) (Map ID C)						
Commercial / Industrial	1	0	1	0.91	0	0.91
Salter's Distributing (Map ID D)						
Industrial	1	0	1	9.42	0	9.42
Maple Meadows (Map ID E)						
Residential	1	1	0	5.69	2.26	0
Residential	1	1	0	0	3.43	0
Railroads Total	**8**	**6**	**2**	**22.60**	**12.26**	**10.33**

Source: CalTrans, City of Chowchilla

Severe Weather: Extreme Heat

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

According to FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and lasts for several weeks. Heat kills by taxing the human body beyond its abilities. In extreme heat and high humidity, evaporation is slowed, and the body must work extra hard to maintain a normal temperature." Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children, those who are sick or overweight, and those that work or recreate outdoors are more likely to experience heat exhaustion or succumb to extreme heat.

In addition to the risks faced by citizens of the City, there are risks to the built environment from extreme heat. While extreme heat on its own does not usually affect structures, extreme heat during times of drought

can cause wildfire risk to heighten. Extreme heat can lead to interruptions in power, power outages, and when combined with high winds, to PSPS events, creating significant issues in the City.

Location and Extent

Heat is a regional phenomenon and affects the whole of the City. Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. Heat waves do not strike victims immediately, but rather their cumulative effects slowly affect general and vulnerable populations and communities. Heat waves do not generally cause damage or elicit the immediate response of floods, fires, earthquakes, or other more "typical" disaster scenarios. The City experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 105-110°F in rather extreme situations.

The National Weather Service (NWS) has in place a system to initiate alert procedures (advisories or warnings) when extreme heat is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. The NWS HeatRisk forecast provides a quick view of heat risk potential over the upcoming seven days. The heat risk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale which is similar in approach to the Air Quality Index (AQI) or the UV Index. This can be seen in Section 4.3.3 of the Base Plan.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations from extreme heat.

NCDC Events

The NCDC data shows 122 extreme heat incidents for Madera County since 1993, some of which likely affected the City.

City of Chowchilla Events

The City Planning Team noted that since extreme heat is a regional phenomenon, events that affected the County also affected the City. Those past occurrences were shown in the Base Plan in Section 4.3.3.

California, and by extension Madera County and the City of Chowchilla has been exposed to extreme heat annually each summer since 2018. The extreme heat is a fire hazard for the agricultural farms in the Central Valley. However, extreme heat events has not impacted the population, caused property damages, closures, or any other impacts.

Climate Change and Extreme Heat

The 2024 CAS, citing a California Energy Commission study, states that "over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined." This study shows that California is getting warmer, leading to an increased frequency, magnitude, and duration of heat waves. These factors may lead to increased mortality from excessive heat.

As temperatures increase, California and Madera County will face increased risk of death from dehydration, heat stroke, heat exhaustion, heart attack, stroke and respiratory distress caused by extreme heat. According to the 2024 CAS, report and the 2023 State of California Hazard Mitigation Plan, by 2100, hotter temperatures are expected throughout the state, with projected increases of 3-5.5°F (under a lower emissions scenario) to 8-10.5°F (under a higher emissions scenario). These changes could lead to an increase in deaths related to extreme heat in Madera County.

Vulnerability to Severe Weather: Extreme Heat

Extreme heat is becoming more frequent, intense, longer lasting and geographically widespread. Extreme heat occurs on an annual basis in the County and the City. In recent years, compounded by climate change conditions, summer months continue to get a bit hotter. The whole of the City is at some measure of vulnerability to extreme heat. An assessment of a community's vulnerability to extreme heat begins with an understanding of local exposure to extreme heat. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Extreme heat will affect PG&E power lines and cause them to overheat, resulting in a power outage (sometimes from the heat, sometimes from PG&E turning off the power to cool down their systems). Generators are in place at key City facilities to provide a backup during power outages. Power outages from extreme heat, individual homeowners or those without housing at all, have the potential to be affected severely during these annual heat events.

Health impacts are the primary concern with this hazard, though economic impacts are also an issue. The elderly and individuals below the poverty level are the most vulnerable to extreme temperatures. Nursing homes and elder care facilities are especially vulnerable to extreme heat events if power outages occur and air conditioning is not available. In addition, individuals below the poverty level may be at increased risk to extreme heat if use of air conditioning is not affordable.

Reliance on air conditioning causes a strain on the electrical energy in the Chowchilla area. Occasionally peak demands outweigh supply and a condition known as brown-out occurs. This is an extremely dangerous situation for electrical equipment as it operates without the needed electricity causing damage to the systems. Days of extreme heat have been known to result in medical emergencies, civil unrest, and unpredictable human behavior. Periods of extended heat and dryness (droughts) can have major economic, agricultural, and water resources impacts.

Assets at Risk

Assets at risk from extreme heat include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations within the City are vulnerable to extreme heat, but it generally affects people spending large amounts of time outside or without means of cooling indoor structures. During extended periods of high temperatures, extreme heat may overload the demands for electricity to run air conditioners and can present health concerns to individuals. When interruptions in power occur during extreme heat, the risk of heat related illnesses and deaths increase. Extreme heat is a significant concern to vulnerable populations. The unhoused; individuals who exercise or train outdoors; outdoor workers; individuals that lack the resources to afford heat; and the young, old, or medically fragile individuals that are more susceptible to heat related impacts. In addition to vulnerable populations, pets and livestock are at risk to extreme heat conditions.

Structures

Extreme heat normally does not generally impact structures, but individuals working in structures may be affected during periods of extended heat, especially in structures that might not be equipped with air conditioning or other means of cooling. The City noted that extreme heat has caused interruptions to power in the past. Also depending on the structure, sensitive contents such as IT equipment can be impacted, especially if a power outage occurs.

Critical Facilities and Infrastructure

Depending on their type and function, critical facilities and infrastructure can also be affected by extreme heat. Interruptions in power caused by extreme heat can lead to system failures. Backup generators in place can limit these types of impacts. Schools without air conditioning may have to close or operate on a reduced schedule.

Natural, Historic, and Cultural Resources

Natural resource assets, including those located in City park and open space areas, may be vulnerable during periods of extreme heat. These include turfed areas; landscapes, City trees, wildlife and habitat areas, and wetlands and marsh lands. Recently, trees were lost in areas of the City that were weakened by drought and extreme heat. Extreme heat may also cause drought-like conditions, contributing to other issues. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability in the region for that time period, even if the rest of the season is relatively moist. Historic and cultural resources are not expected to be affected by extreme heat.

Impacts from Severe Weather: Extreme Heat

The City experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 105-110°F in rather extreme situations. During these times, drought conditions may worsen, and the City may see an increase in dry fuels. Also, power outage and PSPS events may occur during these times as well. Health issues are a primary concern with this hazard, especially to vulnerable populations, although economic impacts can also be an issue.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in

population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for City include the following:

- Climate change is likely to exacerbate future extreme heat conditions and associated impacts and vulnerability of the City.
- Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the City. Population growth in the City is expected to continue gradually. In addition, the City has 8 future development areas planned in the next 5 years. One of these proposed areas has a 160-unit multi-family residential unit planned that could bring population growth. Any additional growth in the City would place additional populations at risk to extreme heat. Future low income and the unhoused populations are at risk to extreme heat which can put strain on emergency services and shelters. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the nature and intensity of future extreme heat events.
- Land use planning should be proactive to address future hazard conditions. The City has 8 areas where growth is expected over the next 5 years. City building codes are in effect to reduce this risk and should be updated as necessary to continue to address future extreme heat conditions. Changes in land use and development may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the nature and intensity of future extreme heat events.

Future development of new buildings in the City will likely not be affected by extreme heat. Extreme heat is more likely to affect vulnerable populations. Vulnerability to extreme heat will increase as the average age of the population shifts. It is encouraged that nursing homes and elder care facilities have emergency plans or backup power to address power failure during times of extreme heat and in the event of a PSPS. Low-income residents and unhoused populations are also more vulnerable and should be considered in future growth plans for the City. Cooling centers for these populations should be utilized when necessary.

Severe Weather: Heavy Rains and Storms

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile

Storms in the City occur annually and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. 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 contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in

excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the City falls mainly in the fall, winter, and spring months. Wind often accompanies these storms; hail and lightning are rare in the City. In recent years, heavy rain and storms have been compounded by more frequent and higher intensity atmospheric river events.

Location and Extent

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the City. All portions of the City are at risk to heavy rains and storms. Most of the severe rains occur during the fall, winter, and spring months in the City as discussed below (with problem flooding areas associated with heavy rains and storms shown in Table A-27 in the Flood: Localized Stormwater section). There is no scale by which heavy rains and severe storms are measured. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Hail and lightning are rarer in the City and Madera County. Duration of severe storms in the City can range from minutes to hours to days. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

Past Occurrences

Disaster Declaration History

According to historical hazard data, severe weather, including heavy rains and storms, is an annual occurrence in the City. This contributes to many of the federal disaster declarations related to flooding. Disaster declarations from flooding are shown on Table A-37.

Table A-37 Madera County – State and Federal Disaster Declarations from Flood (Heavy Rain and Storms) 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	20	1950, 1955, 1958, 1969, 1982 (twice), 1983, 1986, 1992, 1993, 1995 (three), 1997 (twice), 2006, 2010, 2023 (three)	21	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1982, 1986, 1992, 1995 (three), 1997 (twice), 2006, 2010, 2023 (four)

Source: Cal OES, FEMA

NCDC Events

The NCDC data recorded 67 hail, heavy rain, and winter weather incidents for Madera County since 1950. Winter weather events tend to be rain in the lower elevations of the County, while snow falls in the upper elevations.

City of Chowchilla Events

The City noted that heavy rains and storms are an annual occurrence, but did not recall any damaging events. Other events causing issues are listed in the Past Occurrences section of the Flood: 1%/0.2% Annual Chance and Flood: Localized Stormwater Flooding discussions above.

Climate Change and Heavy Rains and Storms

It is likely that climate change will increase the chance of future occurrence as well as future impacts from heavy rains and storms. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 2024 CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is unlikely that hail will become more common in Madera County and the City of Chowchilla. The amount of lightning is not projected to change.

Cal-Adapt noted that, on average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century. Cal-Adapt modeled scenarios are shown in Section 4.3.4 of the Base Plan.

Vulnerability to Heavy Rain and Storms

Heavy rain and severe storms are the most frequent type of severe weather occurrences in the City. These events can cause both significant and localized flooding. Flooding can be worse during times where the ground is already saturated. Wind often accompanies these storms and has caused damage in the past. Hail and lightning are rare in the City, but also can cause damage, with lightning occasionally igniting wildfires.

The whole of the City is at some measure of vulnerability to heavy rain and storms. An assessment of a community's vulnerability to heavy rains and storms begins with an understanding of local exposure to heavy rain and storms. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Problems associated with the primary effects of severe weather include flooding, pavement deterioration, washouts, high water crossings, landslide/mudslides, debris flows, and downed trees. The City also noted that heavy rains and storms cause localized flooding in the City. The problem areas shown on Table A-27 above details those areas within the City that are most often affected during these heavy storm events. The increased frequency and greater intensity of atmospheric river events in recent years compound the problems associated with these storm events.

Assets at Risk

Assets at risk from heavy rain and storms include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations (including vulnerable populations) in the City have some measure of risk to heavy rains and storms. Those populations that work or recreate outside and unhoused individuals are more vulnerable to impacts from heavy storm events. Heavy rains and storms occur every year and do not generally cause significant adverse impacts to individuals; it is the secondary hazard, flooding, which poses the biggest impact to people. Populations at risk to flooding resulting from heavy rains and storm events include those who live in floodplains (discussed in further detail in the Flood: 1%/0.2% Annual Chance section above) and those who live in and near localized flooding areas (discussed in further detail in the Flood: Localized Stormwater Flooding section above).

Structures

Structures in the City have some risk to heavy rains and storms. Structures built to modern building codes are built to withstand heavy rains and storms (including high winds and lightning). During a heavy storm, localized flooding may cause water intrusion into buildings from the outside. Trees can be downed causing impacts to structures. Older homes and buildings may be at increased risk to heavy rains and storms. Power outages during severe storm events can occur, impacting the use of structures until the power is back online.

Critical Facilities and Infrastructure,

Heavy rain and storms can affect critical facilities and infrastructure during large events. Power outages may occur taking facilities offline. High winds can down power lines and trees impacting facilities. Water intrusion into facilities and infrastructure, such as water and wastewater facilities, can impact operations. City roads, streets, and bridges can be impacted resulting in closures restricting traffic flow in the City. In certain areas, large storms can cause erosion and localized landslides which can impact facilities. Many critical facilities are built to modern design standards that take heavy rains and storms into account when siting and building these structures, and others may need to be retrofitted to better withstand these events.

Natural, Historic, and Cultural Resources

Large rain and storm events and associated flooding can affect natural, historic, and cultural resources. Silt and sediment can damage natural areas. Trees can be uprooted and downed by high winds. Extended periods of rainfall can erode natural banks along waterways and degrade soil stability for terrestrial species. While some natural systems can be adversely impacted during these large storms, heavy rain events can also provide benefits. Groundwater and wetland areas can be recharged and water supplies replenished. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures affected by large storm events, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged, and lost during extreme rain and storm and events.

Impacts from Heavy Rain and Storms

Impacts from heavy rains and storms include damage to property, critical facilities and infrastructure, and the natural landscape. This includes: erosion; downed trees; damaged utility structures and infrastructure; power outages; road damage and blockages; and even lightning strikes to critical infrastructure and people.

Lightning can also cause wildfires and urban fires to occur. Landsliding and erosion occur when the soil on slopes becomes oversaturated and fails. Climate change may cause these impacts to worsen.

Actual damage associated with the primary effects of severe storms and heavy rains has been somewhat limited. It is the secondary hazards caused by these severe weather events, such as floods, landslides, and erosion that would likely have the greatest impact.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City include the following:

- Climate change is likely to exacerbate future heavy rain and storm conditions and associated impacts and vulnerability of the City to flooding.
- Population growth in the City is expected to continue gradually. In addition, the City has 8 future development areas planned in the next 5 years. One of these proposed areas has a 160-unit multi-family residential unit planned that could bring population growth. Certain vulnerable populations, such as the those who work or spend extended periods outdoors, could experience disproportional effects from this hazard. and should be addressed as the City continues to grow. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the nature and intensity of future storm events.
- Land use planning should be proactive to address future hazard conditions. The City has 8 areas where growth is expected over the next 5 years. Changes in land use in these and other future areas may also amplify the impacts of heavy rains and storms, as additional impervious surfaces can cause additional runoff and localized flooding throughout the City.

Building codes in the City ensure that new development is built to current building standards, which should reduce the risk to future development in the City from heavy rains and storms. New critical facilities such as communications towers and others should be built to withstand hail damage, lightning, and thunderstorm winds. With adherence to development standards, future losses to new development should be minimal. Changes in land use may also amplify the impacts of heavy rains and storms, as additional impervious surfaces can cause additional runoff and localized flooding throughout the City.

Severe Weather: High Winds and Tornado

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile

High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. High winds can cause significant property damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds, when combined with high temperatures and low humidity can also lead to PSPS events. Winds can also drive fires in and near the City.

Portions of the City are also located in or near a special wind hazard region, which is a result of foehn winds. A foehn wind is a type of dry down-slope wind that occurs in the lee (downwind side) of a mountain range. Winds of this type are called "snow-eaters" for their ability to make snow melt or sublimate rapidly. These types of winds are also associated with the rapid spread of wildfires, making some regions which experience these winds particularly fire prone.

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 form when cool, dry air sits on top of warm, moist air. Tornadoes are the most powerful storms that exist. Tornadoes, though rare, can affect areas of the City, primarily during the rainy season in the late fall, winter, and early spring.

Location and Extent

The entire City is subject to significant, non-tornadic (straight-line), winds. Each area of the City is at risk to high winds. Magnitude of winds is measured often in speed and damages. These events are often part of a heavy rain and storm event but can occur outside of storms. The speed of onset of winds can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of winds in California is often short, ranging from minutes to hours. The Beaufort scale is an empirical 12 category scale that relates wind speed to observed conditions at sea or on land. Its full name is the Beaufort Wind Force Scale. The Beaufort Scale was shown in Section 4.3.5 of the Base Plan.

Tornadoes, while rare, can occur at any location in the City. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale (EF) provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. The F Scale and EF Scale are shown in Section 4.3.5 of the Base Plan.

Past Occurrences

Disaster Declarations

There have been no federal or state disaster declarations in the County for winds and tornadoes.

NCDC Events

The NCDC data recorded 271 high wind events (no tornado incidents) for Madera County since 1950. Many of these wind events likely affected the City.

City of Chowchilla Past Occurrences

On an annual basis, the City of Chowchilla experiences severe storms accompanied by strong wind and wind gusts. Not all of these winds cause damages. In March of 1998, the NDCD recorded high winds that caused $1,500 in damages to the City. Tornadoes in the City have occurred in the past as well. On **January 14, 1995**, an F1 (weak) tornado touched down in the City of Chowchilla. Its path was approximately 1 mile long damaging three city park sites (uprooted trees, roof damage, etc.), the roof/interior of an elementary school, and portions of buildings and homes in the community. Three other tornadoes have occurred in the Chowchilla area in **1991, 1998, and 2008**. All were F0 tornadoes, and no damages were recorded. The City noted that there haven't been any high wind or tornado events since the 2018 LHMP.

Climate Change and High Winds and Tornado

According to the 2024 CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual thunderstorm events is likely to increase during the 21st century. This may bring stronger thunderstorm winds. The CAS does not discuss non-thunderstorm winds or tornadoes.

Vulnerability to Severe Weather: High Wind and Tornadoes

The City is subject to potentially destructive high winds and tornadoes. High winds are common throughout the area and can happen during most times of the entire year and outside of a severe storm event. Tornadoes are rare. High winds and tornadoes can be a significant public safety and economic concern. The whole of the City is at some measure of vulnerability to wind and tornadoes.

An assessment of a community's vulnerability to high winds begins with an understanding of local exposure to wind and tornadoes. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

The City is in or adjacent to a special wind hazard region, which is a result of foehn winds. A foehn wind is a type of dry down-slope wind that occurs in the lee (downwind side) of a mountain range. Winds of this

type are called "snow-eaters" for their ability to make snow melt or sublimate rapidly. This snow-removing ability is caused not only by warmer temperatures, but also the low relative humidity of the air mass coming over the mountain(s). They are also associated with the rapid spread of wildfires, making some regions which experience these winds particularly fire prone. Burn patterns of almost all historic large wildfires in the larger County indicate they occurred during foehn winds.

Strong wind is a frequent type of severe weather occurrence in the area. Wind often accompanies the region's storms and has caused damage in the past. Buildings that house populations at risk such as schools, nursing homes, hospitals, and urgent care facilities are at risk to wind and tornadoes. Also at risk are power lines, which can arc or be damaged during high wind events. The City has had power outages and damages to electric lines in past storms and high wind events, but no specific events could be noted.

Assets at Risk

Assets at risk from winds and tornadoes include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations are at some vulnerability to high winds and tornadoes. Certain vulnerable populations are at the greatest risk to the effects of high winds and tornadoes. These include:

- The unsheltered.
- Citizens who reside in mobile homes.
- Citizens in buildings with no tornado shelter or below ground floors.
- Those with access and functional needs.
- The medically fragile experiencing power outages as a result of wind events.
- Those working or caught outdoors during a wind or tornado event.

Structures

All structures in the City have some measure of risk from high wind and tornadoes. Though rare, a tornado could cause damage to virtually all facilities in the tornado touchdown path. This would affect homes, businesses, commercial property, as well as government and critical facilities. During a wind or tornado event, power lines in the City can be damaged by falling trees caused by wind. High winds are a cause for PSPS events to be declared, causing power outages to occur. High winds and tornadoes could cause sparks from electric wires and other sources, which could lead to wildfire ignition. Once ignited, high winds can also cause wildfires to rapidly spread and become out of control. High wind conditions can cause wildfires to move into more urban areas destroying structures and whole subdivisions, as seen in recent wildfire events in the West.

Critical Facilities and Infrastructure

Though most critical facilities are built to withstand winds, high wind speeds can still cause damage to critical facilities and infrastructure in the City. Though rare, a tornado could cause damage to virtually all facilities in the tornado touchdown path. Winds can cause power outages affecting system operations.

Winds can also contribute to PSPS events, and lead to out of control wildfires, which can damage critical facilities and impact their abilities to perform their critical roles in the community.

Natural, Historic, and Cultural Resources

Natural resources, such as trees, are vulnerable to winds. Increased levee and streambank erosion can occur during periods of high water and high winds. High wave action during significant wind events can impact marsh lands and habitat areas. Soil erosion can also occur during high winds. Most all natural, historic, or cultural resources are at risk to tornadoes. Tornadoes can tear apart habitats, causing fragmentation across ecosystems and can damage and destroy historic structures and cultural resources.

Impacts from Severe Weather: High Wind and Tornado

Wind and tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, the majority of injuries and deaths generally result from flying debris. Property damage can include damage to buildings, fallen trees, and power lines. Local industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response. Winds can push automobiles off roads, damage roofs and structures, cause power outages, and cause secondary damage due to flying debris and hazardous trees. High winds can also contribute to the spread and intensity of wildfires. High winds during periods of high water can cause impacts to levees and streambanks from accelerated erosion. Climate change may affect this hazard and cause winds to increase in velocity and more tornadoes to affect the City.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City include the following:

- Climate change is likely to exacerbate future wind conditions and associated impacts and vulnerability of the County. Climate change is not likely to affect future tornado conditions.
- Future population growth should be considered as having more or less people in a community affects the overall hazard vulnerability to the City. Population growth in the City is expected to continue gradually. In addition, the City has 8 future development areas planned in the next 5 years. One of these proposed areas has a 160-unit multi-family residential unit planned that could bring population growth. Vulnerable populations could experience disproportional effects from this hazard and should be planned for as development of the City continues. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the nature and extent of future high winds and tornado events.

- Land use planning should be proactive to address future hazard conditions. 8 areas are expected to be built in the next 5 years. Building codes in the City ensure that new development is built to current building standards to withstand high winds, which should reduce the risk to future development in the City from high winds and tornadoes. With adherence to development standards, future losses to new development should be minimal. Changes in land use and increased development may amplify the impacts of high winds and tornadoes, as additional structures in the City increase the number of buildings at risk to high winds and tornadoes; however, given the limited development planned in the next five years, any increase in vulnerability of the City to this hazard should be limited.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the City are considered can help make for a more resilient community. The City enforces the state building codes which includes standards for new development to minimize damage from windstorms. New and existing critical facilities and infrastructure should also consider adding backup power systems to limit impacts associated with power outages.

Wildfire (w/ smoke and air quality)

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

Wildland fire and the risk of a conflagration is an ongoing concern for the City of Chowchilla. 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 fire regimes. Wildland fires affect grass, forest, and brushlands, as well as structures. Where there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Historically, the fire season extends from early spring through late fall of each year during the hotter, dryer months; however, in recent years, the risk of wildfire has become a year around concern.

Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds. These weather conditions can result in red flag (e.g., fire weather) days, and can result in PSPS events in the City. While wildfire risk has predominantly been associated with more remote forested areas and wildland urban interface (WUI) areas, significant wildfires can also occur in more populated, urbanized areas. There is also the concern of wildfires occurring in these more remote, forested areas that under certain weather conditions, can extend into areas not generally considered at a high risk to wildfire. Smoke and air quality also become an issue, both from fires occurring inside and outside of the Madera County Planning Area and the City.

Wildfire Smoke and Air Quality

Smoke from wildfires is made up of gas and particulate matter, which can be easily observed in the air. Air quality standards have been established to protect human health with the pollutant referred to as PM2.5

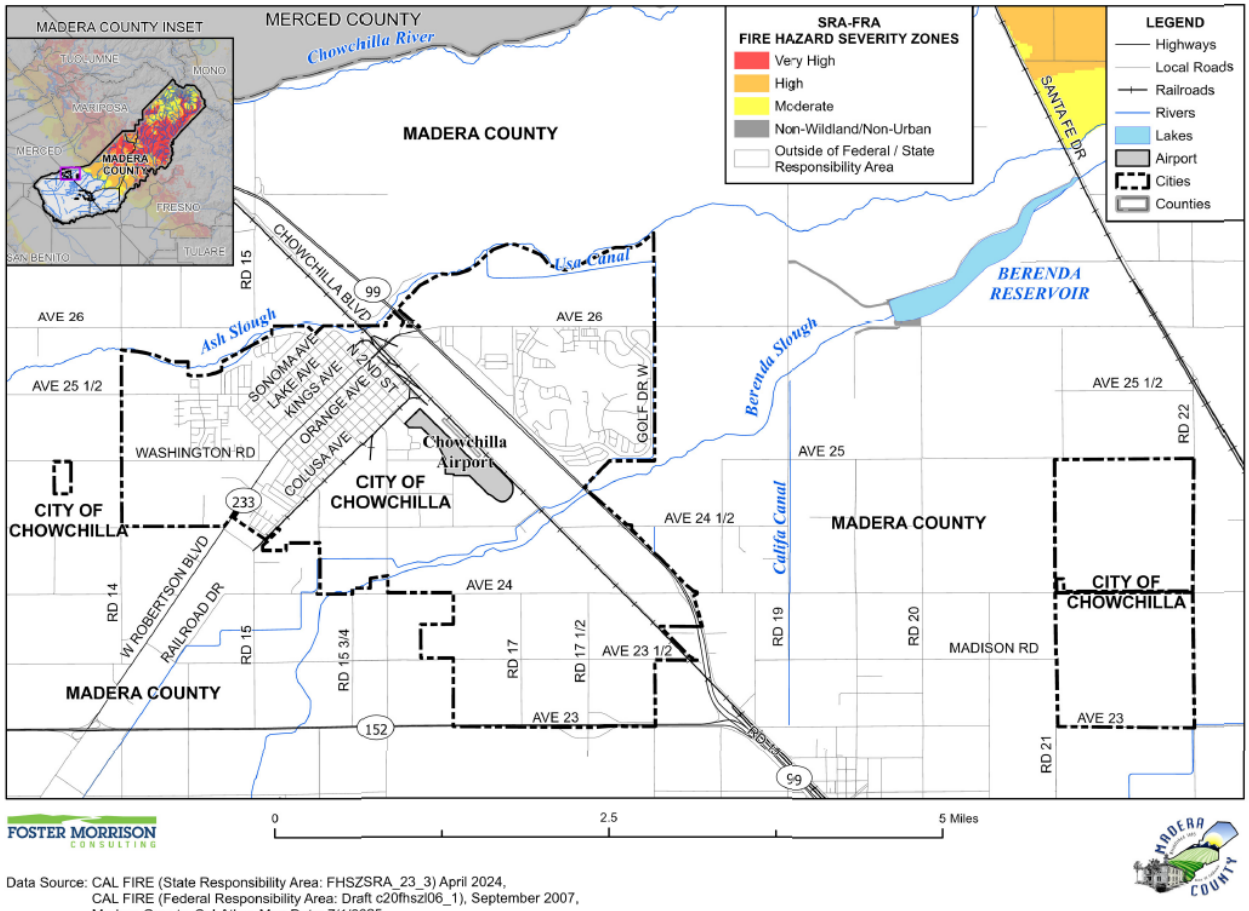
which consists of particles 2.5 microns or less in diameter. These smaller sizes of particles are responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract.

Wildfire smoke can have negative effects to those who live in or near a fire burn area. Smoke and air pollution from wildfires can be a severe health hazard. Significant wildfires occurring in both Madera County and nearby northern California communities since the 2018 LHMP Update have created significant air pollution affecting area residents. This was the case during the 2020 California Creek Fire, the 2022 Mosquito Fire, as well as others that affected nearby areas.

Location and Extent

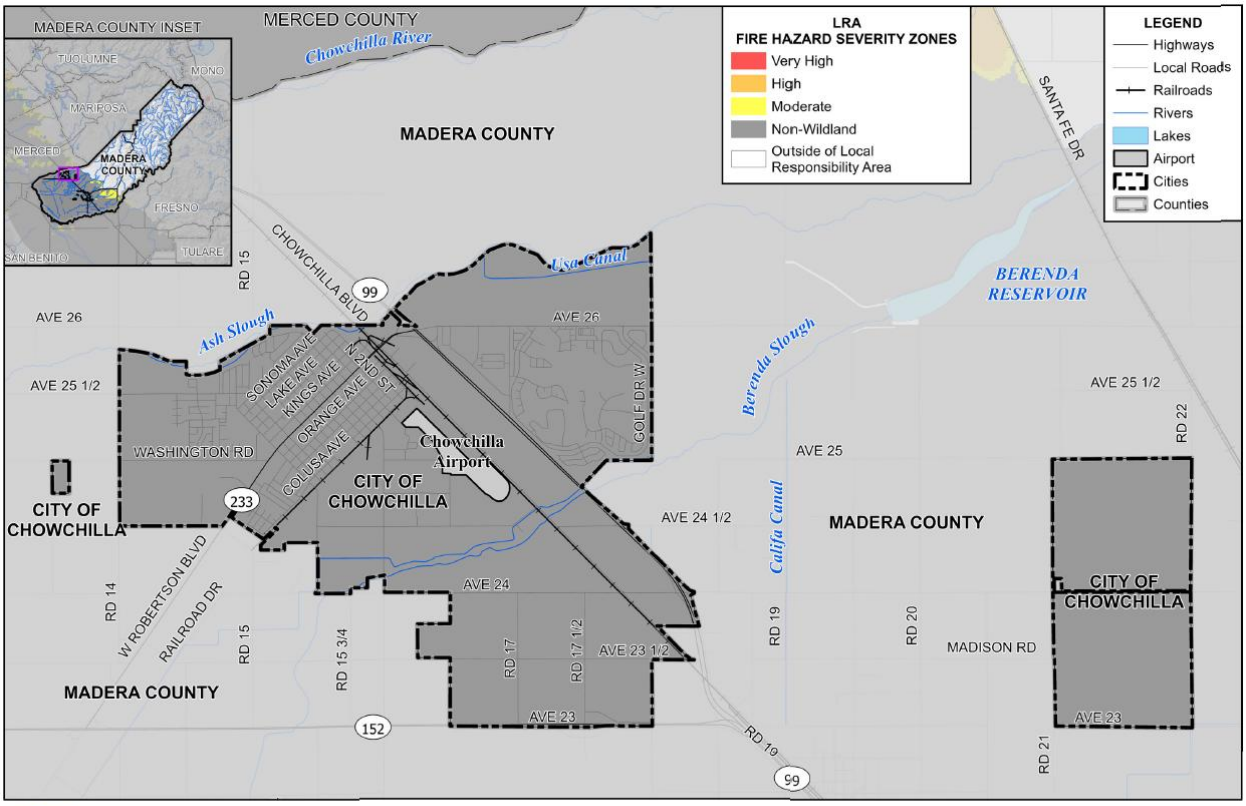
Wildfire can affect all areas of the City. CAL FIRE has estimated that the risk varies across the City and has created updated wildfire maps showing risk variance across the City and the Madera County Planning Area. Following the methodology described in Section 4.3.15 of the Base Plan, wildfire maps for the City of Chowchilla were created. Figure A-24 shows the CAL FIRE State Responsibility Areas (SRA) and Federal Responsibility Areas (FRA) and their associated Fire Hazard Severity Zones (FHSZ) in the City. Figure A-25 shows the CAL FIRE Local Responsibility Areas (LRA) and their associated Fire Hazard Severity Zones (FHSZ) in the City. As shown on the maps, SRA/FRA FHSZs within the City fall outside of the state and federal mapped areas; all LRA FHSZs in the City are classified as Non-Wildland..

Figure A-24 City of Chowchilla – CAL FIRE SRA/FRA Fire Hazard Severity Zones



Data Source: CAL FIRE (State Responsibility Area: FHSZSRA_23_3) April 2024,
CAL FIRE (Federal Responsibility Area: Draft c20fhszl06_1), September 2007,
Madera County, Cal-Atlas; Map Date: 7/1/2025.

Figure A-25 City of Chowchilla – CAL FIRE LRA Fire Hazard Severity Zones



Data Source: CAL FIRE (Local Responsibility Area FHSZ 3/2025 FHSZLRA25_v1_All), Madera County, Cal-Atlas; Map Date: 7/1/2025.

Wildfires tend to be measured in structure damages, injuries, and loss of life as well as acres burned. Fires can have a quick speed of onset, especially during periods of drought or during hot dry summer months. Fires can burn for a short period of time or may have durations lasting for a week or more. Geographical FHSZ extents in the SRA/FRA are shown in Table A-38, while extents in the LRA are shown on Table A-39.

Table A-38 City of Chowchilla – CAL FIRE SRA/FRA Fire Hazard Severity Zone Geographical Extents

Jurisdiction / Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Outside of State and Federal Responsibility Area	6,758	0.5%	3,385	0.6%	3,373	0.4%
City of Chowchilla Total	**6,758**	**0.5%**	**3,385**	**0.6%**	**3,373**	**0.4%**

Source: CAL FIRE

Table A-39 City of Chowchilla – CAL FIRE LRA Fire Hazard Severity Zone Geographical Extents

Jurisdiction / Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Non-Wildland	6,758	0.5%	3,385	0.6%	3,373	0.4%
City of Chowchilla Total	**6,758**	**0.5%**	**3,384.591**	**0.6%**	**3,373**	**0.4%**

Source: CAL FIRE

Past Occurrences

Disaster Declaration History

There has been five state and nine federal disaster declarations due to fire, as shown in Table A-40.

Table A-40 Madera County – State and Federal Wildfire Disaster Declarations 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Fire	5	2016 – Clayton Fire, 2017 (twice) – Mission Fire and Railroad Fire), 2020 – Creek Fire, 2022 – Mosquito Fire	9	2005 – Quartz Fire, 2014 – Junction Fire and Courtney Fire (twice), 2015, 2016 – Clayton Fire, 2017 – Mission Fire and Railroad Fire (twice), 2020 – California Creek Fires (twice – once as FMAG, and once as DR)

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked 118 wildfire events in the County dating back to 1993.

City of Chowchilla Events

There have not been any direct impacts from a wildfire in or around the City. However, there was a state-wide wildfire in late 2019, going into 2020 which affected all of California. The wildfire did not reach the central valley, but the air quality was greatly affected, so much so that all citizens were advised to stay inside because the air was so polluted with ash and smoke. Air quality is the City's biggest concern after the wildfires.

A list of state and federal disaster declarations for Madera County from wildfire is shown on Table A-40. These events also likely affected the City to some degree.

Climate Change and Wildfire

It is likely that climate change will increase the chance of future occurrence as well as future impacts from wildfire. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Warmer temperatures can exacerbate drought conditions. Drought often kills plants and trees, which serve as fuel for wildfires. Warmer temperatures could increase the number of wildfires and pest outbreaks, such as the western pine beetle. Cal-Adapt's wildfire tool predicts the potential increase in the amount of burned areas for the year 2090-2099, as compared to recent (2010) conditions. This is shown in Section 4.3.15 of the Base Plan. Based on this model, Cal-Adapt predicts that wildfire risk in Madera County will increase moderately at the end of the century. However, wildfire models can vary depending on the parameters used. Cal-Adapt does not take landscape and fuel sources into account in their model. In all likelihood, in the Madera County Planning Area, precipitation patterns, high levels of heat, topography, and fuel load will determine the frequency and intensity of future wildfire.

Vulnerability to Wildfire

Risk and vulnerability to the City from wildfire is of significant concern. Wildfires that occur in the City occur from a variety of both natural and manmade causes. The City can be affected both by fires that start on or near City lands as well as those that start elsewhere and move into the City. In addition to burning large areas of land, air quality can be affected in the City by smoke from fires occurring inside the City as well as those from many miles away. As growth continues and populations increase in the City, the potential for wildfires will also increase.

The whole of the City is at some measure of vulnerability to wildfire. An assessment of a community's vulnerability to wildfire begins with an understanding of local exposure to wildfire. This is included in the Local Concerns section below. After that section, assets at risk are discussed.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

The City's main concerns are poor air quality during wildfire seasons and visibility for drivers. As the summers become drier and wildfire season becomes longer, this is a significant concern. This is especially true for the vulnerable populations residing in the City such as the elderly, children, and the unhoused.

Assets at Risk

Assets at risk from wildfire include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations are vulnerable to wildfire. Certain vulnerable populations are at greater risk to the effects of wildfire as well as smoke and air quality issues that wildfires bring. Vulnerable populations include:

- Unhoused
- Infants and children under age five and their caregivers
- Seniors (65 and older)
- Individuals with disabilities
- Individuals' dependent on medical equipment
- Individuals who exercise, recreate, or work outdoors
- Individuals with impaired mobility

To further evaluate the impact to the residential population within the City, the CAL FIRE FHSZ datasets were overlayed on the parcel layer. Those residential parcels that intersect the FHSZs were counted and multiplied by the 2023 Census Bureau average household factors for the City of Chowchilla – 3.35. According to this analysis, there is a total population of 0 residents of the City of Chowchilla falling within the moderate or higher SRA/FRA FHSZs. This is shown in Table A-41. There is a total population of 0 residents of the City of Chowchilla falling within the moderate or higher LRA FHSZs, as shown on Source: CAL FIRE, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35)

Table A-42.

Table A-41 City of Chowchilla – Improved Residential Parcels and Population by CAL FIRE SRA/FRA Fire Hazard Severity Zone

Jurisdiction	Very High		High		Moderate	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Chowchilla	0	0	0	0	0	0

Source: CAL FIRE, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35)

Table A-42 City of Chowchilla – Improved Residential Parcels and Population by CAL FIRE LRA Fire Hazard Severity Zone

Jurisdiction	Very High		High		Moderate	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Chowchilla	0	0	0	0	0	0

Source: CAL FIRE, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35)

The City noted that the Critical Facilities and Infrastructure section below includes the facilities used by At-Risk populations that are threatened by this hazard. While this is not specific to what special populations reside in the City, it does speak to facilities that are used to serve (portions) of this population.

Structures

All structures in the City have some risk to wildfire. GIS was used to determine the possible impacts of wildfire within the City of Chowchilla. The methodology described in Section 4.3.15 of the Base Plan was followed in determining structures and values at risk in both the CAL FIRE's SRA/FRA and LRA Fire Hazard Severity Zone layers. Analysis results for the SRA/FRA in the City of Chowchilla are not shown since this layer doesn't intersect with the City. Analysis results for the LRA in the City of Chowchilla are shown in Table A-43, which summarizes total parcel counts, improved parcel counts and their structure values by FHSZs.

Table A-43 City of Chowchilla – Count and Value of Parcels and Structures by CAL FIRE LRA Fire Hazard Severity Zone

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Non-Wildland							
Agricultural	67	52	$22,531,731	$2,830,342	$54,632	$2,830,342	$28,247,047
Commercial	285	169	$51,327,309	$110,348,191	$14,220,424	$110,348,191	$286,244,115
Government	61	0	$1	$0	$0	$0	$1
Industrial	34	22	$11,974,032	$29,105,709	$81,573,553	$43,658,564	$166,311,858
Institutional	57	28	$835,407	$4,824,646	$5,590	$4,824,646	$10,490,289
Recreational	93	3	$6,480,000	$2,159,468	$36,529	$2,159,468	$10,835,465
Residential	4,103	3,735	$193,112,835	$719,867,994	$657,896	$359,933,997	$1,273,572,722
Right of Way	182	0	$185	$0	$0	$0	$185
Utilities	43	1	$28,888	$6,560	$0	$6,560	$42,008
Unknown	8	0	$1,377	$0	$0	$0	$1,377
Non-Wildland Total	**4,933**	**4,010**	**$286,291,765**	**$869,142,910**	**$96,548,624**	**$523,761,768**	**$1,775,745,067**
City of Chowchilla Total	**4,933**	**4,010**	**$286,291,765**	**$869,142,910**	**$96,548,624**	**$523,761,768**	**$1,775,745,067**

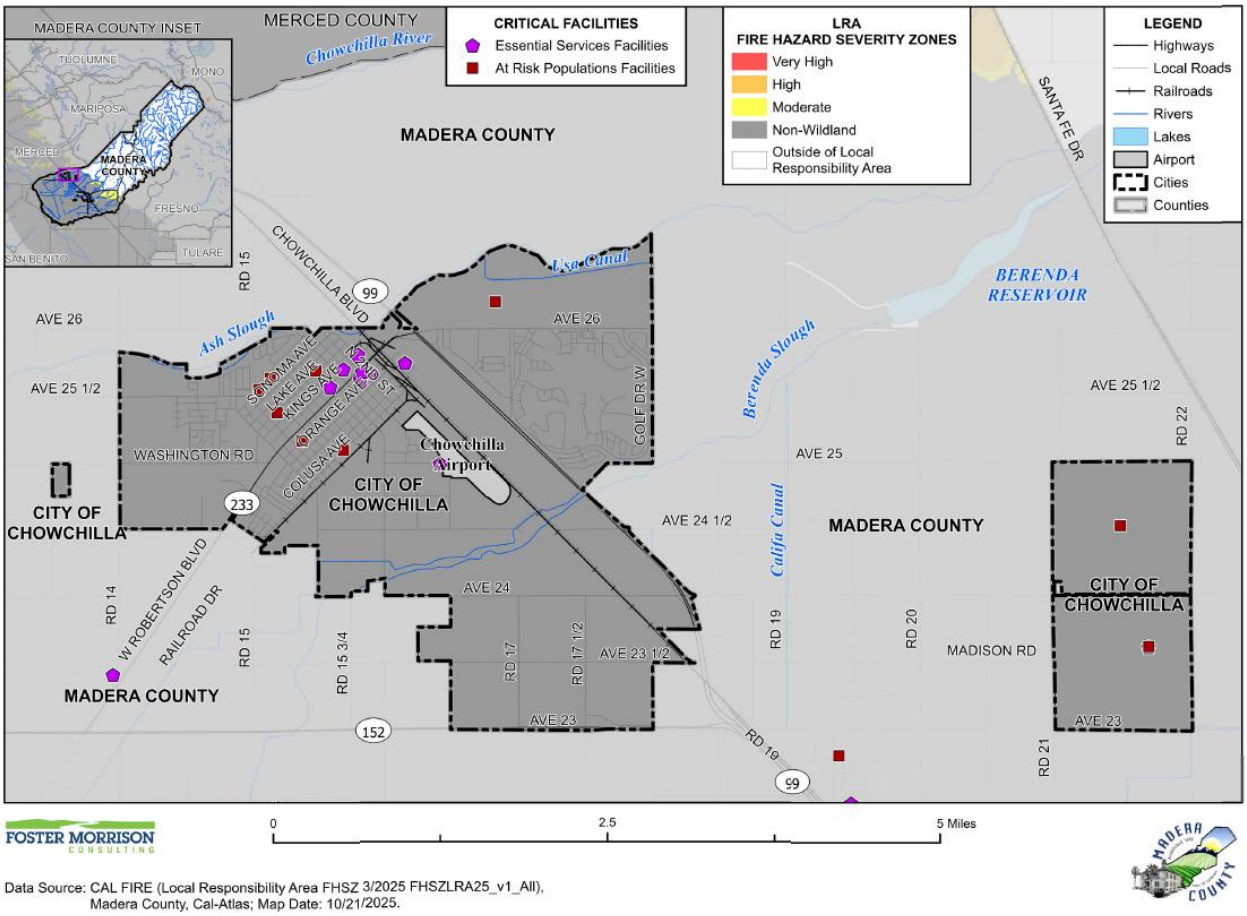
Source: CAL FIRE, Madera County 2024 Parcel/Assessor Data

Critical Facilities and Infrastructure

Wildfire present a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the City to determine which critical facilities fall into each fire hazard severity zone. Using GIS, the SRA/FRA and LRA fire hazard severity zone layers were overlayed on the critical facility GIS layer. Only LRA fire

hazard severity zones intersect the City; as such no SRA/FRA analysis is presented here. Only LRA analysis is presented. This is shown on Figure A-26 for the LRA fire hazard severity zones. Table A-44 details which critical facilities fall in which LRA fire hazard severity zone. Details of critical facility categories, type, name, and address by LRA fire hazard severity zones are listed in Appendix F.

Figure A-26 City of Chowchilla – Critical Facilities in LRA Fire Hazard Severity Zones



Data Source: CAL FIRE (Local Responsibility Area FHSZ 3/2025 FHSZLRA25_v1_All), Madera County, Cal-Atlas; Map Date: 10/21/2025.

Table A-44 City of Chowchilla – Critical Facilities by Category in LRA Fire Hazard Severity Zones

Jurisdiction / Fire Hazard Severity Zones	Critical Facility Category / Type	Facility Count
Outside of State and Federal Responsibility Area	**Essential Services Facilities**	
	Communications	2
	Community Center	1
	Community Services	2
	Fire Station	3
	Public Safety Facility / 911 PSAP	1
	Public Utility Plant Facilities	1
	Essential Services Facilities Total	**10**

Jurisdiction / Fire Hazard Severity Zones	Critical Facility Category / Type	Facility Count
	At Risk Populations Facilities	
	Health / Medical	2
	Jail / Prison	2
	School	5
	At Risk Populations Facilities Total	9
	Outside of State and Federal Responsibility Area Total	**19**
City of Chowchilla Total		**19**

Source: CGS, City of Chowchilla

Natural, Historic, and Cultural Resources

Natural, historic, and cultural resources located within areas at risk to wildfire would be vulnerable. Should a wildfire occur in the City, the impacts to natural, historic and cultural resources could be extensive and include air pollution, contamination from water runoff containing toxic products, and other environmental discharges or releases from burned materials affecting soils, habitat areas, wildlife, and aquatic resources. Historic and cultural resources can be damaged or destroyed and are often more vulnerable due to their older age, construction type, and lack of fire prevention infrastructure such as sprinklers.

Impacts from Wildfire

Potential impacts from wildfire include loss of life and injuries; damage to structures and other improvements, natural and cultural resources, croplands, and timber; and loss of recreational opportunities. Out of control wildfires can have catastrophic impacts. Wildfires can cause short-term and long-term disruption to the City. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the City by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires can also affect air quality in the City; smoke and air pollution from wildfires can be a severe health hazard. Smoke impacts may come from wildfires outside the City, as well as from within.

Although the physical damages and casualties arising from wildland-urban interface or conflagration fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Schools and businesses can be forced to close for extended periods of time. Recently, the threat of wildfire, combined with the potential for high winds, heat, and low humidity, has caused PG&E to initiate a PSPS which can also significantly impact a community through loss of services, business closures, and other impacts associated with loss of power for an extended period. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

The impacts of a fire are felt long after the fire is extinguished. In addition to the loss of property in fires, the loss in vegetation and changes in surface soils alters the environment. When supporting vegetation is

burned, hillsides become destabilized and prone to erosion. The burnt surface soils are harder and absorb less water. When winter rains come, this leads to increased runoff, erosion, and landslides in hilly areas.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the hazard profile above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Chowchilla include the following:

- Climate change is likely to exacerbate future wildfire conditions and associated impacts and vulnerability of the City to wildfire.
- Population growth in the City is expected to continue gradually. In addition, the City has 8 future development areas planned in the next 5 years. One of these proposed areas has a 160-unit multi-family residential unit planned that could bring population growth. All of this is expected to occur in the Non-Wildland FHSZs. Thus, changes in population and population patterns are not likely to increase the impacts and vulnerability of the City to this hazard.
- Land use planning should be proactive to address future hazard conditions. Locating new development, structures and critical facilities and infrastructure within or near areas of wildfire risk may put additional development at risk. The City has 8 areas where growth is expected over the next 5 years. These are located in the Non-Wildland FHSZs. Additionally, City building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions. Specifically, with the release of the new 2025 LRA mapping for Madera County, wildfire building codes should be updated as evaluated as required to include enhanced measures to reduce wildfire impacts on new construction, and including the formal adoption of the new LRA maps. Changes in land use and future development may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location, magnitude, and severity of future wildfire events.

Future Development

Additional growth and development within moderate or higher fire hazard severity zones in the City would place additional values at risk to wildfire. However, none of those FHSZs exist in the City. City building codes are in effect and should continue to be updated as appropriate to reduce future impacts. In addition, the City is located in the Non-Wildland FHSZs, which indicates a reduced risk to future development in the City.

Future development areas and their vulnerability to wildfire are discussed further in the below GIS analysis.

GIS Analysis

The City provided eight future development areas which were used as the basis for the inventory of future development for the City. These areas were mapped in GIS. Utilizing the future development area spatial layer, the parcel polygon data was intersected to determine the future development areas within each LRA fire hazard severity zone. No facilities fell in the SRA/FRA fire hazard severity zones; as such, no maps or tabular analysis is presented for the SRA/FRA. Figure A-27 shows the locations of the future development area overlayed on the LRA fire hazard severity zones. As shown in Table A-45, the future development areas fall within areas of Non-Wildland FHSZ.

Figure A-27 City of Chowchilla – Future Development Areas in LRA Fire Hazard Severity Zones

Data Source: CAL FIRE (Local Responsibility Area FHSZ 3/2025 FHSZLRA25_v1_All), Madera County, Cal-Atlas; Map Date: 8/25/2025.

Table A-45 City of Chowchilla – Future Development Parcels and Acres in LRA Fire Hazard Severity Zones

Future Development in FHSZ LRA/ Property Use/ Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Non-Wildland						
Chowchilla Union High School Transportation Center (Map ID A)						
Commercial	1	1	0	5.14	2.69	0
Commercial	1	1	0	0	2.45	0
Gas Station (Map ID B)						
Commercial	1	1	0	1.44	0.72	0
Commercial	1	1	0	0	0.71	0
Airport RPZ Development (land acquisition) (Map ID C)						
Commercial / Industrial	1	0	1	0.91	0	0.91

Future Development in FHSZ LRA/ Property Use/ Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Salter's Distributing (Map ID D)						
Industrial	1	0	1	9.42	0	9.42
Maple Meadows (Map ID E)						
Residential	1	1	0	5.69	2.26	0
Residential	1	1	0		3.43	0
Non-Wildland Total	8	6	2	22.6	12.26	10.33

Source: CAL FIRE, City of Chowchilla

A.5 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 education, outreach, and partnerships, and other mitigation efforts.

A.5.1. Regulatory Mitigation Capabilities

Table A-46 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 City of Chowchilla.

Table A-46 City of Chowchilla's Regulatory Mitigation Capabilities

Plans	In Place Y/N	Does the plan address hazards? Can the plan be used to carry out mitigation actions? When was it last updated??
Capital Improvements Plan	Y	The Plan addresses hazards and can be used to carry out mitigation actions. It was updated in 2025.
Climate Change Adaptation Plan	N	
Community Wildfire Protection Plan	N	
Comprehensive/Master Plan	Y	Listed under Public Section, but the mitigation strategy might be referred to in our CEQA document
Continuity of Operations Plan	Y	Yes, no, yes
Economic Development Plan	N	
Land Use Plan	N	
Local Emergency Operations Plan	Y	The Plan addresses hazards and can be used to carry out mitigation actions. It was updated in 2023.
Stormwater Management Plan	N	
Transportation Plan	N	

Other		
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective way to reduce hazard impacts? Is the ordinance adequately administered and enforced?**
Acquisition of land for open space and public recreation use	Y	Ordinance is effective to reduce hazard impacts and is adequately administered and enforced.
Building code	Y	Version/Year: 2013 CBC
Flood insurance rate maps	Y	Access, not city property-through county. Maps are dated 9/26/2008. New FEMA mapping is currently occurring (in 2026)
Floodplain ordinance	Y	But it has not been updated since 1973
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	Y	Yes, yes
Zoning ordinance	Y	Yes, yes
Other		
How can these capabilities be expanded and improved to reduce risk?		
Increase capacity through staffing and training; plan development, monitoring and updating; increased enforcement and updates to ordinances, policies, and procedures; increased funding opportunities and capacity; and implementation of mitigation actions and projects.		

Source: City of Chowchilla

A.5.2. Administrative/Technical Mitigation Capabilities

Table A-47 identifies the City department(s) responsible for activities related to mitigation and loss prevention in the City of Chowchilla.

Table A-47 City of Chowchilla's Administrative and Technical Mitigation Capabilities

Administration	**In Place Y/N**	**Describe capability Is coordination effective?**
Staff		**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Chief Building Official	N	
Civil Engineer, including dam and levee safety	Y	Contracted out
Community Planner	Y	Contracted out
Emergency Manager	Y	No, Some, Yes
Floodplain Administrator	Y/N	Ordinance does not state, but as listed above the ordinance has not been updated since 1973
GIS Coordinator	N	

Planning Commission	Y	Local
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	Y	Contracted / Yes
Hazard data and information	Y	Standard information/ Yes
GIS analysis	N	Some GIS capabilities, but not centralized
Mutual aid agreements	N	Fire only – Madera County
Other		
How can these capabilities be expanded and improved to reduce risk?		
Increase capacity through staffing, training, and enhanced coordination among all department and jurisdictions; emergency management/hazard specific program enhancements, training, and exercising; increased funding opportunities and capacity; and implementation of mitigation actions and projects.		

Source: City of Chowchilla

A.5.3. Fiscal Mitigation Capabilities

Table A-48 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table A-48 City of Chowchilla's Fiscal Mitigation Capabilities

Funding Resource	In Place Y/N	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	Funding has been used in the past by Public Works. Could fund future actions.
Community Development Block Grant	Y	Has been used in the past by Community Development and could be used in the future to fund actions.
Federal funding programs (non-FEMA)	Y	HUD, CDBG, FAA, USDOT, and others.
Fees for water, sewer, gas, or electric services	Y	Funding has been used in the past by Public Works. Could fund future actions.
Impact fees for new development	Y	Funding has been used in the past by Public Works. Could fund future actions.
State funding programs	Y	Funding has been used in the past by Public Works. Could fund future actions.
Stormwater utility fee	Y	Funding has been used in the past by Public Works. Could fund future actions.
Other		

Funding Resource	In Place Y/N	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
How can these capabilities be expanded and improved to reduce risk?		
Increased capacity through staffing and training; plan development, monitoring, and updating; assessment and enhancements to funding opportunities and capacities; and evaluation of mitigation partnering opportunities and implementation of mitigation actions and projects.		

Source: City of Chowchilla

A.5.4. Mitigation Education, Outreach, and Partnerships

Table A-49 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table A-49 City of Chowchilla's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	Emailed weekly
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	Y	Water conservation / staff very limited
Local news	Y	Case by case basis.
Organizations that interact with underserved and vulnerable communities	N	
Social media	Y	Regularly updated
How can these capabilities be expanded and improved to reduce risk?		
Increased capacity through staffing and training; plan/program development, monitoring and updating; assessment and enhancements to education, awareness, and outreach programs; increased funding opportunities and capacity; and evaluation of mitigation partnering opportunities and implementation of mitigation actions and projects.		

Source: City of Chowchilla

A.5.5. Other Mitigation Efforts

The City of Chowchilla has many other ongoing mitigation efforts that include the following:

- Partnerships with the County and other entities on mitigation efforts in and around the City

The City of Chowchilla Public Works Department provides public outreach activities which include map information services, public awareness, public hazard disclosure, and flood protection information. This information is readily available to the public and consists of current and accurate flood mapping. In addition, the Public Works Department provides information about our stormwater management program and up-to-date information related to the maintenance of our drainage system.

- Fire: P-6 CalFire Urban project

- Water: R-13 Bridge No. 41C0033, Berenda Slough Bridge BRLS – repair
- Water: R-14 Bridge Preventative Maintenance BPMPL – repair
- Wastewater: S-10 Fairmead Wastewater System Consolidation
- Stormwater: SD-1 Humboldt Storm Drain CRRSSA
- Stormwater: SD-2 Kings Storm Drain
- Stormwater: SD-3 Urban Runoff Management (Sonoma Storm Drain)
- Stormwater: SD-5 Truman Pond Reconfiguration
- Water: W-3 Water Main Replacement – Waterline Replacement Project
- Water: W-4 Well 15 & Generator Development
- Water: W-6 Water Tanks Back Up Generators Project
- Water: W-7 Well 16 Development
- Water: W-9 Berenda Slough Water Extension

A.6 Mitigation Strategy

A.6.1. Mitigation Goals and Objectives

The City of Chowchilla adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

A.6.2. NFIP Mitigation Strategy

The City of Chowchilla joined the National Flood Insurance Program (NFIP) on June 6, 2019. As a participant of the NFIP, the City of Chowchilla has administered floodplain management regulations that meet the minimum requirements of the NFIP. The management program objective is to protect people and property within the City. The City of Chowchilla will continue to comply with the requirements of the NFIP in the future.

In addition, the City of Chowchilla actively participates with Madera County to address local NFIP issues through a regional approach. Many of the program activities are the same for the City of Chowchilla as for Madera County since participation at the County level includes all local jurisdictions.

The City of Chowchilla Planning Department provides public outreach activities which include map information services, public awareness, public hazard disclosure, and flood protection information. This information is readily available to the public and consists of current and accurate flood mapping. In addition, the Planning and Engineering Department provides information about their stormwater management program and up-to-date information related to the maintenance of City drainage systems.

The NFIP's Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS which are to reduce flood losses, facilitate accurate insurance rating, and promote the awareness of flood insurance. The City of Chowchilla is not a current participant in the CRS program.

More information about the floodplain administration in the City of Chowchilla can be found in Table A-50.

Table A-50 City of Chowchilla Compliance with NFIP

NFIP Topic	Comments
Staff Resources	
Who is responsible for floodplain management in your community? Provide Department/Title. Do they serve any roles other than Community Floodplain Administrator (FPA)?	Public Works. Deputy Director and Water Supervisor. They serve other roles as well.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	No.
Is floodplain management an auxiliary function?	Auxiliary.
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Permit reviews are done. GIS is used to determine floodplain locations.
What are the barriers to running an effective NFIP program in the community, if any?	None noted.
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	0 policies $0 in premiums $0 in coverage
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	0 claims $0 in paid claims 0 substantial damage claims
How many structures (residential and non-residential) are exposed to flood risk within the community?	34 in 1% annual chance flood 0 in 0.2% annual chance flood
Are there Repetitive Loss (RL) and Severe Repetitive Loss Properties (SRL) structures in the community?	0 RL 0 SRL
Describe any areas of flood risk with limited NFIP policy coverage	Since the City just joined the NFIP, there are currently no areas where flood insurance has been issued. This will most likely change over time.
How does the community teach property owners or other stakeholders about the importance of flood insurance?	Mailers targeting those in the floodplain are sent.
What digital sources (like the FEMA Map Service Center, National Flood Hazard Layer) or non-regulatory tools does the community use?	FEMA Map Service Center.
Compliance History	
Is the community in good standing with the NFIP?	Yes
Are there any outstanding compliance issues (i.e., current violations)?	No
Who is responsible (Department, Title) for making substantial damage/improvement determinations? How does the community identify substantially damaged/improved structures? What is the process to make sure these structures are brought into compliance?	Public Works and Building Department work to make substantial damage determinations. This is done by comparing the value of the structure to the amount of anticipated damages. The Building Department then issues permits to make sure the structure is brought into compliance.

NFIP Topic	Comments
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	CAC 3/28/2019
Is a CAV or CAC scheduled or needed?	No
Regulation	
When did the community enter the NFIP?	6/6/2019
Are the FIRMs digital or paper?	Digital
Has the community adopted the NFIP minimum floodplain management criteria via local regulation? Date of current local regulation?	Minimum criteria have been adopted. Last adopted in November of 2023.
Has the community adopted the latest effective FIRM? Date adopted?	DFIRM is adopted. Was adopted in 2023.
How does the community enforce local floodplain regulations and monitor compliance?	Floodplain is limited in the City. Any development is monitored and the ordinance applied.
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Meet.
How are Letters of Map Change (LOMCs) tracked and compiled?	None have existed in the past. No tracking mechanism exists.
Provide an explanation of the permitting process.	The floodplain is very limited in the City. Development traditionally occurs outside of it. Any development in the floodplain would be permitted ONLY if the structure met the floodplain ordinance requirements.
Community Rating System	
Does the community participate in CRS? If so, what is the community's CRS Class Ranking?	No
What categories and activities provide CRS points and how can the class be improved?	N/A
Does the plan include CRS planning requirements?	N/A

Source: City of Chowchilla

A.6.3. Mitigation Actions

The Planning Team for the City of Chowchilla 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. The following hazards were considered a priority for purposes of mitigation action planning:

- Drought & Water shortage
- Earthquake (w/subhazards)
- Floods: 1%/0.2% annual chance (w/levee failure)
- Floods: Localized Stormwater Flooding
- Hazardous Material Transportation
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)

- Severe Weather: High Winds and Tornados
- Wildfire (w/smoke and air quality)

Low priority hazards for mitigation planning include:

- Agricultural Hazards (severe weather/pests/invasive species)
- Climate Change
- Dam Failure
- Landslide, Mudslide, and Debris Flow
- Severe Weather: Extreme Cold, Freeze, and Snow

It should be noted that many of the projects submitted by each jurisdiction in Table 5-4 in the Base Plan benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the countywide public outreach action, as well as many of the emergency services actions, apply to all hazards and jurisdictions regardless of hazard priority. Collectively, this LHMP's multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this plan. It should further be noted, that each jurisdiction has focused on identifying those mitigation actions and projects to address their priority hazards, which are both realistic and reasonable for them to implement for this 5-year planning process, and would like to preserve their right to modify hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Mitigation Actions

The City has put forward the actions as shown in Table A-51. Details of the actions can be found below the table.

Table A-51 City of Chowchilla Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
City of Chowchilla					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	Previous Action	X	X	X	Prevention Public Information
Action 3. Stormwater Pump Station Resilience Project	Previous Action	X	X	X	Property Protection
Action 4. Well Site Backup Generator Project	Previous Action	X	X		Property Protection Emergency Services
Action 5. SCADA System Modernization Project	New Action	X	X		Property Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 6. New Production Wells for Water Supply Redundancy	New Action	X	X		Property Protection Natural Resource Protection
Action 7. SR 99 / SR 233 Interchange and Bridge Expansion Project	New Action	X	X		Structural Projects
Action 8. Ventura Avenue Complete Streets and Evacuation Route Project	New Action	X	X		Structural Projects Emergency Services
Action 9. Citywide Tree Trimming and Vegetation Management Program	New Action	X	X		Property Protection Natural Resource Protection
Action 10. Truman Pond Flood Control and Stormwater Recharge Project	New Action	X	X	X	Property Protection Natural Resource Protection
Action 11. Wastewater Treatment Plant (WWTP) Electrical and Process Resilience Project	New Action	X	X		Property Protection Natural Resource Protection
Action 12. Airport Runway Drainage and Stormwater Improvements Project	New Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 13. Ash Slough/Berenda Slough Levee Improvement and Erosion Repair Project	Previous Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 14. Municipal Yard Fueling and Operations Resilience Project	New Action	X	X		Property Protection Natural Resource Protection

Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Hazards Addressed: Multi-hazard Drought & Water shortage, Earthquake (w/subhazards), Floods: 1%/0.2% annual chance, Floods: Localized Stormwater Flooding, Hazardous Material Transportation, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms, Severe Weather: High Winds and Tornados, Wildfire (w/smoke and air quality))

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Local jurisdictional reimbursement for mitigation projects and cost recovery after a disaster is guided by Government Code Section 8685.9 (AB 2140).

Project Description: Specifically, this section requires that each jurisdiction adopt a local hazard mitigation plan (LHMP) in accordance with the federal Disaster Mitigation Act of 2000 as part of the Safety

Element of its General Plan. Adoption of the LHMP into the Safety Element of the General Plan may be by reference or incorporation.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be Implemented: Safety Element of General Plan

Responsible Office/Partners: City of Chowchilla Planning Department

Benefits (Losses Avoided): Incorporation of an adopted LHMP into the Safety Element of the General Plan will help jurisdictions maximize the cost recovery potential following a disaster.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budgets (City General Fund, Staff Time)

Timeline: As soon as possible. Within 1 year.

Project Priority (High, Medium, Low): High

Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness

Hazards Addressed: Multi-hazard Drought & Water shortage, Earthquake (w/subhazards), Floods: 1%/0.2% annual chance, Floods: Localized Stormwater Flooding, Hazardous Material Transportation, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms, Severe Weather: High Winds and Tornados, Wildfire (w/smoke and air quality))

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): The City and County play a key role in public outreach/education efforts to communicate the potential risk and vulnerability of their community to the effects of natural hazards. A comprehensive multi-hazard public education program will better inform the community of natural hazards of concern and actions the public can take to be better prepared for the next natural disaster event.

Project Description: A comprehensive multi-hazard outreach program will ascertain both broad and targeted educational needs throughout the community. The City will work with the County and other agencies as appropriate to develop timely and consistent annual outreach messages in order to communicate the risk and vulnerability of natural hazards of concern to the community. This includes measures the public can take to be better prepared and to reduce the damages and other impacts from a hazard event. The public outreach effort will leverage and build upon existing mechanisms, and will consider:

- Using a variety of information outlets, including websites, local radio stations, news media, schools, and local, public sponsored events;
- Creating and distributing (where applicable) brochures, leaflets, water bill inserts, websites, and public service announcements;

- Displaying public outreach information in City office buildings, libraries, and other public places and events;
- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: Continue public information activities currently in place.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing City and County outreach programs will be reviewed for effectiveness and leveraged and expanded upon to reach the broader region.

Responsible Office/Partners: City of Chowchilla Fire Department in partnership with the County OES and County PIOs

Benefits (Losses Avoided): Increase residents' knowledge of potential hazards and activities required to mitigate hazards and be better prepared. Protect lives and reduce damages, relatively low cost to implement.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budgets (City General Fund, Staff Time), Grant funds: CA Office of Community Partnerships and Strategic Communications (OCPSC) public awareness and community outreach grants; CA DWR, public awareness and outreach grants; Cal OES/FEMA, PDM, HMGP, FMA,

Timeline: Initiated within 1-2 years/Annual public awareness campaign

Project Priority (High, Medium, Low): High

Action 3. Stormwater Pump Station Resilience Project

Hazards Addressed: Flooding: 1% and 0.2% Annual Chance, Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 6, 7, 8

Issue/Background (Problem Statement): Existing stormwater pump stations in Chowchilla are aging, lack backup power, and have insufficient capacity to handle intense rainfall events. Flooding has occurred near underpasses and low-lying areas during severe weather, disrupting local transportation and damaging property.

Project Description: Upgrade and replace stormwater pumps with modern, energy-efficient, and high-capacity models. This includes electrical panel modernization, generator backup, and integration into the City's SCADA system for real-time monitoring. The project will enhance Chowchilla's flood management and maintain public safety during extreme weather.

Other Alternatives:

1. No Action – continue risk of flooding and property damage;
2. Conduct only minor repairs;
3. Implement regional stormwater storage, but would be higher cost and require more land.

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla Capital Improvement Program (CIP), Stormwater Master Plan, and Madera County LHMP Implementation Strategy.

Responsible Office/Partners: City of Chowchilla Capital Improvement Program (CIP) Staff, Public Works Department, and Madera County OES

Benefits (Losses Avoided): Prevents flooding, reduces property damage, ensures continued stormwater system operation during power outages, and protects critical transportation corridors.

Potential Funding (Local Budgets, Grant Funds, etc.): Measure T: FEMA BRIC, HMGP; ARPA Funds; and State Water Board grants.

Timeline: 2026 – 2031, and ongoing. Design: 2026; Construction: 2027–2028; Operation: 2028 onward.

Project Priority (High, Medium, Low): High

Action 4. Well Site Backup Generator Project

Hazards Addressed: Drought, Wildfire

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): Chowchilla's well sites and wastewater facilities rely on grid power, creating vulnerability during outages. Loss of power results in reduced water pressure, storage depletion, and service disruption.

Project Description: Install permanent standby generators at water and wastewater facilities, ensuring operational continuity during grid outages. Include transfer switches, fuel storage, and periodic testing under load.

Other Alternatives:

1. Portable generators;
2. Solar-battery microgrids;
3. Intertie project with adjacent systems.

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla Emergency Operations Plan, Water System Master Plan, Madera County LHMP.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: PG&E, Cal OES, State Water Board.

Benefits (Losses Avoided): Ensures uninterrupted water service during disasters, supports firefighting water needs, reduces contamination risk, and maintains sanitation services.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA HMGP, BRIC; Measure T, and local enterprise funds.

Timeline: Design: 2026; Installation: 2027; Testing: 2028.

Project Priority (High, Medium, Low): High

Action 5. SCADA System Modernization Project

Hazards Addressed: Drought & Water Shortage, Flood: 1% and 0.2% Annual Chance

Goals Addressed: 1, 2, 3, 5, 6, 7, 8

Issue/Background (Problem Statement): The City's SCADA system for water, wastewater, and stormwater management is outdated, lacks secure communications, and cannot fully support remote diagnostics or redundancy.

Project Description: Upgrade SCADA system hardware and software, integrate cybersecurity protections, install additional monitoring sensors at wells and lift stations, and ensure redundancy in communication networks.

Other Alternatives:

1. Maintain existing system;
2. Upgrade software only;
3. Full modernization with regional data integration (preferred).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla CIP, Information Technology Plan, and Madera County LHMP.

Responsible Office/Partners: City of Chowchilla Public Works and IT Departments; Partners: Cal OES, DHS CISA, State Water Board.

Benefits (Losses Avoided): Improves monitoring and operational control, enhances system resilience to power outages and cyber incidents, and reduces downtime during emergencies.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA BRIC, State Water Board Infrastructure Funding, ARPA funds; BOR, WaterSMART grants

Timeline: Design/Procurement: 2026–2027; Installation: 2028; Operation: 2029 onward.

Project Priority (High, Medium, Low): Medium

Action 6. New Production Wells for Water Supply Redundancy

Hazards Addressed: Drought & Water Shortage, Wildfire

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): Existing wells experience declining yield and vulnerability to drought. Lack of redundancy increases risk of service disruption and limits firefighting water capacity.

Project Description: Develop and construct one or more new groundwater production wells with full SCADA integration, emergency backup power, and water quality monitoring. Connect new wells to distribution network to increase system redundancy.

Other Alternatives:

1. No Action;
2. Conservation-only approach;
3. Intertie project with other agencies (high cost).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla Water System Master Plan, Madera County LHMP, and SB 552 Drought Resilience Planning.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: Madera County GSA, State Water Board.

Benefits (Losses Avoided): Increases drought resilience, ensures continuous water supply, enhances firefighting capacity, and supports long-term growth.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA HMGP and BRIC, Prop 1, Prop 68, , and SWRCB Drought Resilience Grants.

Timeline: Planning: 2026–2027; Construction: 2028–2029.

Project Priority (High, Medium, Low): High

Action 7. SR 99 / SR 233 Interchange and Bridge Expansion Project

Hazards Addressed: Earthquake, Flooding 1% and 0.2% Annual Chance, Wildfire (Evacuation Access)

Goals Addressed: 1, 2, 3, 4, 6, 7, 8

Issue/Background (Problem Statement): The SR 99/SR 233 bridge limits emergency response capacity between the east and west sides of town. The current bridge lacks modern seismic design, adequate width, and multimodal evacuation capacity.

Project Description: Replace and widen the SR 99/SR 233 interchange bridge to modern seismic and hydraulic standards. Add lanes, bike/pedestrian paths, wider shoulders, and flood conveyance upgrades to improve safety and emergency access.

Other Alternatives:

1. No Action;
2. Retrofit existing structure;
3. Full replacement with multimodal design (preferred).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla CIP, Caltrans SHOPP, MCTC Regional Transportation Plan, and Madera County LHMP.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: Caltrans District 6, MCTC, FHWA, Cal OES.

Benefits (Losses Avoided): Improves emergency access, enhances seismic resilience, reduces flood risk, and ensures continuity of critical transportation routes.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA BRIC and HMGP, FHWA INFRA, Measure T, and LPP Funds.

Timeline: Design: 2026; Construction: 2027–2030; Operation: 2030 onward.

Project Priority (High, Medium, Low): High

Action 8. Ventura Avenue Complete Streets and Evacuation Route Project

Hazards Addressed: Hazardous Materials Transportation, Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): Ventura Avenue serves as a key east-west evacuation and emergency response corridor in Chowchilla. The existing roadway lacks consistent sidewalks, bike lanes, and stormwater conveyance. During severe weather, localized flooding and limited mobility create hazards for residents and emergency responders.

Project Description: Implement Complete Streets improvements along Ventura Avenue, including storm drain upgrades, bike lanes, bulbouts, medians, and pedestrian enhancements. The project will improve emergency access, increase safety, and reduce stormwater pooling.

Other Alternatives:

1. No Action – continued safety and drainage issues;
2. Limited resurfacing only;
3. Full corridor improvement (preferred).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla CIP, Active Transportation Plan, and Madera County LHMP.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: MCTC, Caltrans District 6, Cal OES.

Benefits (Losses Avoided): Enhances evacuation and response capabilities, reduces flood hazards, promotes multi-modal safety, and supports ADA accessibility.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA BRIC (Evacuation Route), Caltrans ATP, Measure T, City CIP funding, and Local Partnership Program (LPP).

Timeline: Design: 2026–2027; Construction: 2028–2029.

Project Priority (High, Medium, Low): High

Action 9. Citywide Tree Trimming and Vegetation Management Program

Hazards Addressed: Drought & Water Shortage, Severe Weather: Heavy Rains and Storms, Severe Weather: High Winds and Tornados, and Wildfire

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): Overgrown trees and vegetation near power lines, drainage channels, and public facilities pose a risk of outages, blocked storm drains, and wildfire spread. The City currently addresses vegetation issues reactively rather than through a structured mitigation program.

Project Description: Develop and implement a proactive vegetation management program to trim hazardous trees, remove dead vegetation, and maintain defensible space around key infrastructure and evacuation routes.

Other Alternatives:

1. No Action – continued reactive maintenance;
2. Contract-only trimming with limited scope;
3. Establish formal City program (preferred).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla Public Works Maintenance Plan, Madera County LHMP, CalFire Community Wildfire Prevention framework.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: CalFire, PG&E, Madera County Fire Department.

Benefits (Losses Avoided): Reduces wildfire and storm damage risks, prevents power outages, improves public safety, and supports climate resilience.

Potential Funding (Local Budgets, Grant Funds, etc.): CalFire Fire Prevention Grant, FEMA HMGP, Measure T, City General Fund.

Timeline: Program Launch: 2026; Ongoing Annual Maintenance.

Project Priority (High, Medium, Low): Medium

Action 10. Truman Pond Flood Control and Stormwater Recharge Project

Hazards Addressed: Drought& Water Shortage, Flooding: 1% & 0.2% Annual Chance, Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 5, 6, 7, 8

Issue/Background (Problem Statement): The existing Truman Pond stormwater basin is undersized and experiences overflow during major storm events. Flooding impacts nearby streets and neighborhoods. The facility also lacks groundwater recharge infrastructure that could provide drought resilience.

Project Description: Expand and retrofit the Truman Pond stormwater basin to increase capacity, improve flood control, and enhance groundwater recharge. Include new inlet/outlet structures, regrading, sediment forebay, recharge wells, and drought-tolerant landscaping.

Other Alternatives:

1. No Action – continued localized flooding;
2. New facility elsewhere (costly);
3. Retrofit existing pond (preferred).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla Stormwater Master Plan, CIP, and Madera County LHMP.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: Madera County Flood Control Agency, Cal OES, SWRCB.

Benefits (Losses Avoided): Reduces flood hazards, improves water quality, enhances groundwater recharge, and supports climate adaptation goals.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA BRIC, HMGP; DWR Urban Streams Program; SWRCB Stormwater Grants; Measure T

Timeline: Design: 2026–2027; Construction: 2028–2029.

Project Priority (High, Medium, Low): High

Action 11. Wastewater Treatment Plant (WWTP) Electrical and Process Resilience Project

Hazards Addressed: Drought & Water Shortage, Flooding 1% and 0.2% Annual Chance (and any other hazard that can cause a PSPS or Power Outage)

Goals Addressed: 1, 2, 3, 5, 6, 7, 8

Issue/Background (Problem Statement): The Wastewater Treatment Plant relies on critical electrical and control infrastructure that is vulnerable to flooding and power disruptions. During outages or major storms, treatment processes risk failure, leading to environmental hazards and loss of service continuity.

Project Description: Upgrade electrical systems and process controls at the WWTP to improve resilience to flooding, power loss, and cyber threats. Install floodproofed switchgear, backup generators, surge protection, and secure SCADA connectivity for process automation.

Other Alternatives:

1. No Action – continue to risk service interruption and environmental discharge;
2. Minor electrical repairs only;
3. Comprehensive electrical and control system modernization (preferred).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla Capital Improvement Program, Wastewater Master Plan, and Madera County LHMP.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: State Water Board, Cal OES, DHS CISA.

Benefits (Losses Avoided): Ensures continuous wastewater treatment during power outages or disasters, prevents overflows, protects public health, and enhances cybersecurity of control systems.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA BRIC, HMGP; SWRCB; CWSRF Resilience Grant; ARPA.

Timeline: Design: 2026–2027; Construction: 2028–2029.

Project Priority (High, Medium, Low): High

Action 12. Airport Runway Drainage and Stormwater Improvements Project

Hazards Addressed: Flooding 1% and 0.2% Annual Chance, Severe Weather: Heavy Rains and Storms, Severe Weather: High Winds and Tornados

Goals Addressed: 1, 2, 3, 6, 7, 8

Issue/Background (Problem Statement): During heavy rainfall, inadequate drainage along the Chowchilla Municipal Airport causes ponding on taxiways and runways, limiting aircraft operations and compromising safety. The airport also serves as an emergency staging area and must remain accessible during disasters.

Project Description: Install new storm drain piping, inlets, and detention basins to improve airfield drainage. Retrofit existing outfalls with energy dissipation structures and add secondary power for airfield lighting and pumps.

Other Alternatives:

1. No Action – continued airfield closures during storms;
2. Partial grading improvements;
3. Full drainage retrofit (preferred).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla Airport Capital Improvement Program, FAA ACIP, and Madera County LHMP.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: FAA, Cal OES, Madera County Flood Control Agency.

Benefits (Losses Avoided): Maintains operational readiness of the airport during floods, supports emergency aircraft operations, and reduces infrastructure damage from standing water.

Potential Funding (Local Budgets, Grant Funds, etc.): FAA AIP, FEMA HMGP, Cal OES Hazard Mitigation Assistance Program Funds.

Timeline: Design: 2026–2027; Construction: 2028.

Project Priority (High, Medium, Low): Medium

Action 13. Ash Slough/Berenda Slough Levee Improvement and Erosion Repair Project

Hazards Addressed: Flooding 1% and 0.2% Annual Chance, Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 6, 7, 8

Issue/Background (Problem Statement): Erosion and vegetation growth along the Ash/Berenda Sloughs levee system reduce flood conveyance capacity and increase the risk of overtopping and structural instability during high flow events.

Project Description: Repair eroded levee embankments, control vegetation, and reinforce slopes using riprap and geotechnical stabilization methods. Conduct rodent control, implement maintenance access improvements, and coordinate with USACE and Madera County Flood Control Agency.

Other Alternatives:

1) No Action – continued erosion and increased flood risk; 2) Routine maintenance only; 3) Full levee rehabilitation (preferred).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla CIP, Flood Control Maintenance Program, and Madera County LHMP.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: USACE, Madera County Flood Control Agency, Cal OES.

Benefits (Losses Avoided): Reduces flood risk to adjacent neighborhoods, protects infrastructure, ensures compliance with levee maintenance standards, and extends structure lifespan.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA BRIC, USACE Section 205, DWR Flood Corridor Program, Measure T.

Timeline: Design: 2026; Construction: 2027–2028.

Project Priority (High, Medium, Low): High

Action 14. Municipal Yard Fueling and Operations Resilience Project

Hazards Addressed: Hazardous Material Transportation, Severe Weather: All, and Wildfire (and any other hazard causing PSPS or Power Outage)

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): The City's Public Works Yard lacks resilient fueling and operations systems to support emergency response during extended power outages or flooding. Fuel pumps are not equipped with backup power, and containment protection is limited.

Project Description: Install emergency generators for fueling and operations areas, upgrade fuel tanks with secondary containment, and floodproof yard facilities. Include portable power hookups for continuity of citywide field operations.

Other Alternatives:

1. No Action – risk of fuel supply disruption during disasters;
2. Portable fueling only;
3. Permanent backup system (preferred).

Existing Planning Mechanism(s) through which Action Will Be Implemented: City of Chowchilla CIP, Emergency Operations Plan, and Madera County LHMP.

Responsible Office/Partners: City of Chowchilla Public Works Department; Partners: Cal OES, PG&E, CalFire, Madera County OES.

Benefits (Losses Avoided): Ensures continuity of emergency response, debris cleanup, and essential operations; prevents hazardous material release from flood-damaged equipment.

Potential Funding (Local Budgets, Grant Funds, etc.): FEMA HMGP, Cal OES Infrastructure Resilience Grants, Measure T.

Timeline: Design: 2026; Construction: 2027–2028.

Project Priority (High, Medium, Low): Medium

Annex B City of Madera

B.1 Introduction

This Annex details the hazard mitigation planning elements specific to the City of Madera, a previously participating jurisdiction to the 2018 Madera County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the City. This Annex provides additional information specific to the City of Madera, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this jurisdiction.

B.2 Planning Process

As described above, the City of Madera followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Madera County Hazard Mitigation Planning Committee (HMPC), the City formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table B-1. Additional details on Plan participation and City representatives are included in Appendix A.

Table B-1 City of Madera – Planning Team

Name	Position/Title	How Participated
Arnoldo Rodriguez	City Manager	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards
Will Tackett	Director of Community Development	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards
Keith Helmuth	City Engineer	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards
Eric Battles	Administrative Analyst II	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards
Wendy Silva	Director of Human Resources	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards
Giachino Chiaramonte	Police Chief	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards

Name	Position/Title	How Participated
Cole Scroggins	Electrical & Facilities Operations Manager	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards
Jamie Hickman	Streets & Storm Drainage Operations Manager	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards
John Botwright	Water & Sewer Operations Manager	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards
Rafael Magallan	Chief Building Official	Hazard ID Table, Existing applicable studies or reports to provide consultant, Discussion of historic incidents, Potential mitigation measures/ideas for identified hazards

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the City integrated the previously approved 2018 LHMP into existing planning mechanisms and programs. Specifically, the City incorporated into or implemented the 2018 LHMP through other plans and programs shown in Table B-2.

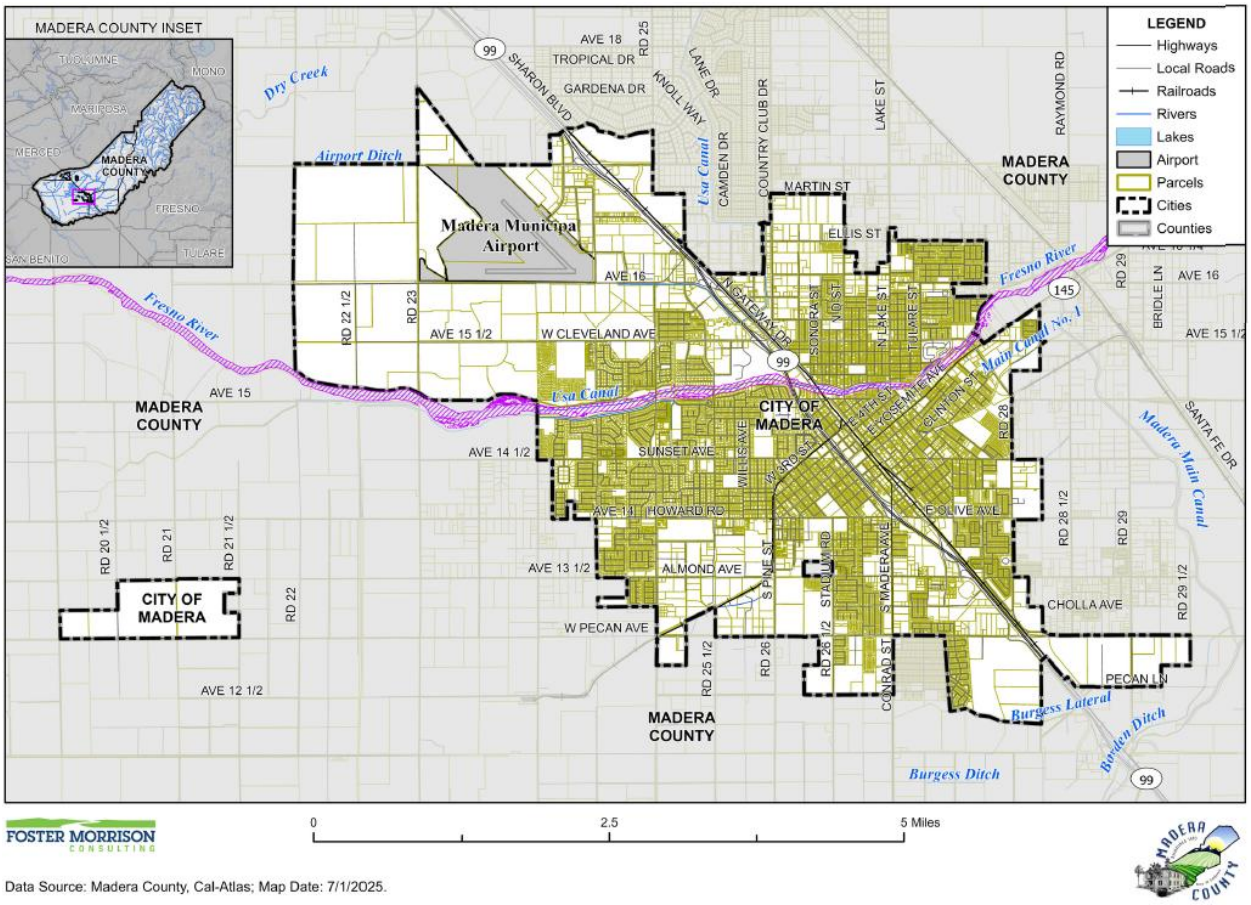
Table B-2 2018 LHMP Incorporation

Planning Mechanism 2018 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
Safety Element	LHMP was adopted by reference into the Safety Element.
Villages EIR	LHMP data was referenced in the hazard sections in the Villages EIR.

B.3 Community Profile

The community profile for the City of Madera is detailed in the following sections. Figure B-1 displays a City map and the location of City of Madera within Madera County.

Figure B-1 City of Madera



B.3.1. Geography and Climate

The City of Madera is the county seat of Madera County. The City has industrial parks, recreational parks, food and meat processing plants, wineries, and agricultural excellence in diversified farming – all of which contribute to a solid and substantial economy.

The City of Madera is located about midway and toward the eastern edge of the San Joaquin Valley. The Fresno River flows east to west through the City. The terrain around Madera itself is generally level with an abrupt upward slope about 10 miles eastward to the foothills of the Sierra Nevada. The main Sierra Nevada Range is located about 50 miles to the east and extends from 12,000 to more than 14,000 feet in elevation. About 30 miles west of the City lie the foothills of the Coastal Range. The City of Madera is situated on a young alluvial fan with permeable to moderately permeable soil.

The climate around the City of Madera is dry, mild in winter and hot in summer; nearly nine-tenths of the year's precipitation falls in the six months from November to April. Humidity is commonly as low as 15 percent and has been recorded as low as 8 percent. In contrast, humidity readings may reach 90 percent during the morning hours of December and January. The normal daily maximum temperature advances to a high of 99 degrees during the latter part of July. The daily maximum temperature during the warmest month has ranged from 76 degrees to 115 degrees. Winter temperatures are usually mild but during

infrequent cold spells minimum readings occasionally drop below freezing. Heavy frost occurs almost every year, and the first heavy frost in the autumn usually occurs during the last week of November. The last frost in the spring is in early March.

B.3.2. History

The City of Madera had its beginnings with William Thurman, a lumberman, in 1875 when the area was still part of Fresno County. A V-shaped water flume, 54 miles in length, carried lumber from the high country to Madera by gravity flow. The railhead and later SH-99 marked Madera for its place of importance in the San Joaquin Valley. Madera was chartered as an incorporated city, March 27, 1907.

B.3.3. Economy and Tax Base

US Census estimates show economic characteristics for the City of Madera. These are shown in Table B-3 and Table B-4. Mean household income in the City was $73,045. Median household income in the City was $55,622.

Table B-3 City of Madera – Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	3,779	14.4%
Construction	1,336	5.1%
Manufacturing	3,494	13.3%
Wholesale trade	284	1.1%
Retail trade	1,669	6.4%
Transportation and warehousing, and utilities	2,702	10.3%
Information	51	0.2%
Finance and insurance, and real estate and rental and leasing	976	3.7%
Professional, scientific, and management, and administrative and waste management services	1,206	4.6%
Educational services, and health care and social assistance	6,042	23.0%
Arts, entertainment, and recreation, and accommodation and food services	1,817	6.9%
Other services, except public administration	992	3.8%
Public administration	1,866	7.1%

Source: US Census Bureau American Community Survey 2023 Estimates

Table B-4 City of Madera – Income and Benefits

Income Bracket	Percent
<$10,000	7.3%
$10,000 – $14,999	7.0%
$15,000 - $24,9999	9.9%
$25,000 – $34,999	10.3%

Income Bracket	Percent
$35,000 – $49,999	12.2%
$50,000 – $74,999	18.2%
$75,000 – $99,999	11.4%
$100,000 – $149,999	12.2%
$150,000 – $199,999	7.4%
$200,000 or more	4.0%

Source: US Census Bureau American Community Survey 2023 Estimates

B.4 Risk Assessment

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

The City of Madera risk assessment identifies and profiles relevant hazards and assesses the exposure of lives, property, infrastructure, and the environment to these hazards. The process allows for a better understanding of the City's potential risk and vulnerability to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Community Profile above, a risk assessment was performed for the City utilizing the existing City boundaries. This includes the following sections:

- B.4.1 Assets Inventory and Growth and Development Trends
- B.4.2 Hazard Identification
- B.4.3 Hazard Profiles and Vulnerability to Specific Hazards

B.4.1. Assets Inventory and Growth and Development Trends

This section provides an inventory of the City of Madera's total assets potentially at risk to hazards and an overview of growth and development trends. This section is broken into two parts:

- **Asset Inventory** – The assets inventory identifies the City of Madera's total assets, including the people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. This data is not hazard specific, but is representative of total assets within the City, potentially at risk to identified hazards as discussed in Section B.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the City, both current and future, is presented.

Assets Inventory

The City's asset inventory is detailed in the following sections:

- People and Populations

- Structures
- Critical Facilities and Infrastructure
- Community Lifelines
- Natural, Historic, and Cultural Resources
- Economic Assets and Community Activities of Value

A discussion of each of these assets follows and serves as the template for the asset discussion for each hazard in Section B.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the community. This section includes an inventory of past and current populations of the City and also discusses vulnerable populations and underserved communities as a subsection of people and populations located within the City and potentially at risk to hazards. Information from the City, US Census Bureau, California Department of Finance, and other sources as detailed below form the basis of this discussion.

Historic Population Trends and Current Population

Population growth can increase the number of people living in hazard prone areas. The California Department of Finance reported that the City of Madera has 66,433 residents, as of January 1, 2025. The City of Madera has seen growth rates as shown in Table B-5. As shown, the City has grown consistently since 1950, with growth slowing recently since the 2018 LHMP.

Table B-5 City of Madera – Population Changes Since 1950

Year	Population	% Change
1950	10,497	–
1960	14,430	37.5%
1970	16,044	11.2%
1980	21,732	35.5%
1990	29,821	34.7%
2000	43,207	47.6%
2010	61,416	42.1%
2020	66,224	7.8%
2025	66,433	0.3%

Source: US Census Bureau, California Department of Finance (2025)

Underserved and Vulnerable Populations and Disadvantaged Communities

The City has a socially and economically diverse community, and many residents that are socially or economically disadvantaged or vulnerable due to varying reasons reside within the City. The City and surrounding County are no strangers to large natural disasters which have had a direct impact on the populations of the area. Thus, it is important to consider the potential effects of hazard events and disasters

on these more vulnerable populations. Socially vulnerable and disadvantaged communities in the City are discussed by the following sources:

- CDC Social Vulnerability Index
- California Department of Water Resources (CA DWR) Special Populations and Disadvantaged Community Mapping
- FEMA Community Disaster Resilience Zones
- City Planning Team Input

CDC Social Vulnerability Index

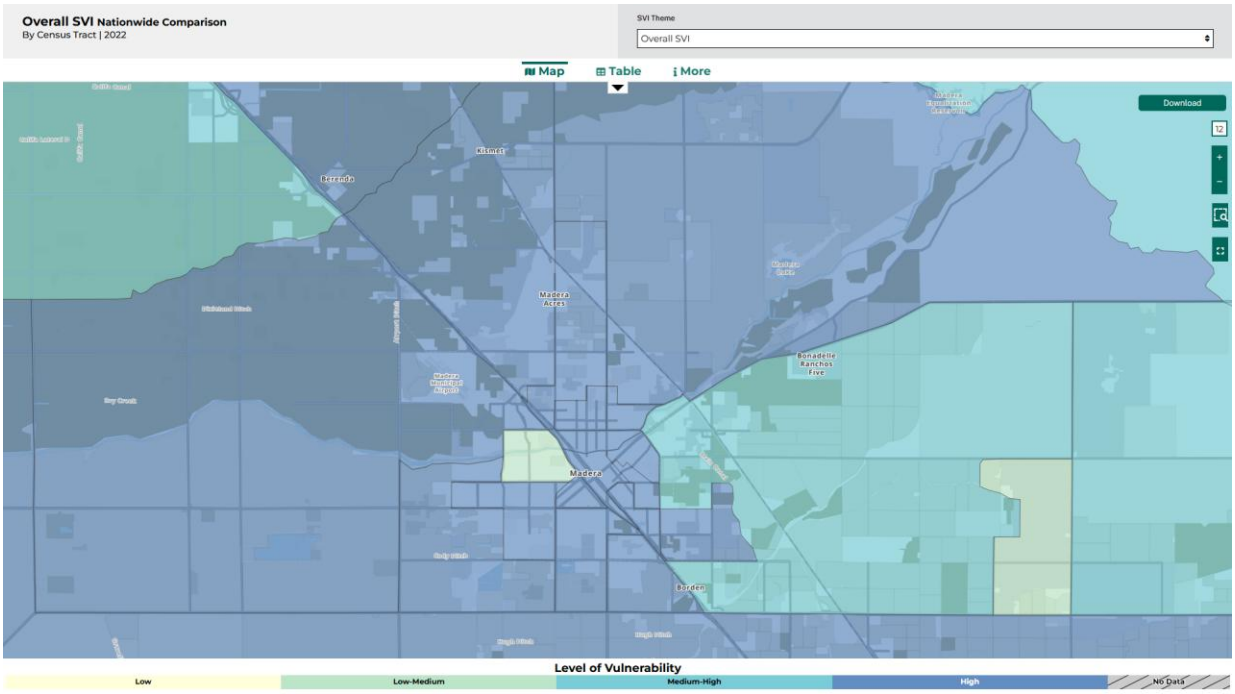
Every community must prepare for and respond to a hazard event, including the range of natural hazards addressed in this Plan, from severe weather extremes to large potentially catastrophic events such as wildfires or earthquakes. A number of factors, including poverty, lack of access to transportation, and crowded housing may weaken a community's ability to prevent human suffering and financial loss in a disaster. These factors are known as social vulnerability.

Social vulnerability refers to the potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss. The Agency for Toxic Substances and Disease Registry (ATSDR) Geospatial Research, Analysis & Services Program (GRASP) created databases to help emergency response planners and public health officials identify and map communities that will most likely need support before, during, and after a hazardous event. The CDC used these databases to create the CDC Social Vulnerability Index (CDC SVI), which uses 15 U.S. census variables to help local officials identify communities that may need additional support before, during, or after disasters.

CDC SVI uses U.S. Census data to determine the social vulnerability of every census tract. Census tracts are subdivisions of counties for which the Census collects statistical data. The CDC SVI ranks each tract on 15 social factors, including poverty, lack of vehicle access, and crowded housing, and groups them into four related themes. Each tract receives a separate ranking for each of the four themes, as well as an overall ranking. Maps of the four themes for the City are shown in the figures below.

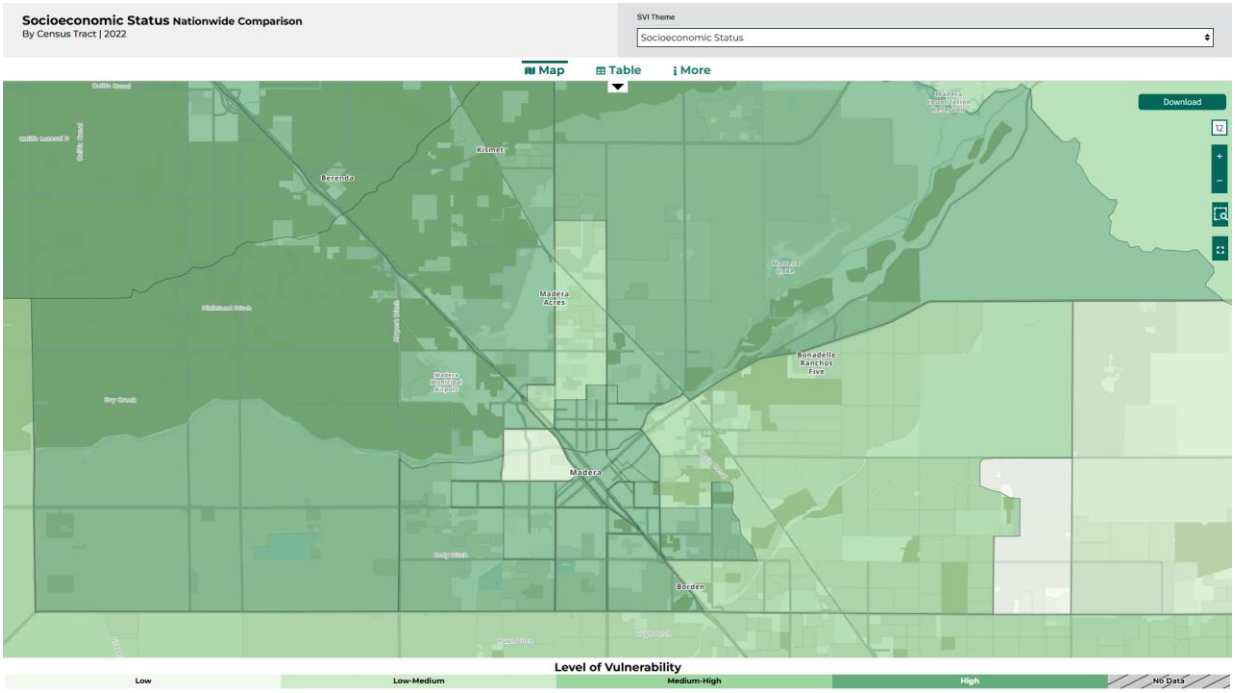
The overall SVI map is shown in Figure B-2; the socioeconomic SVI for the census tracts in and around the City are shown in Figure B-3; the household composition SVI is shown in Figure B-4; the minority and language SVI is shown in Figure B-5; and the housing and transportation SVI is shown in Figure B-6. Overall, the maps indicate that, in general, the City sees little change in social vulnerability regardless of location. As shown, there are moderate changes in each SVI across the City.

Figure B-2 City of Madera – Overall Social Vulnerability



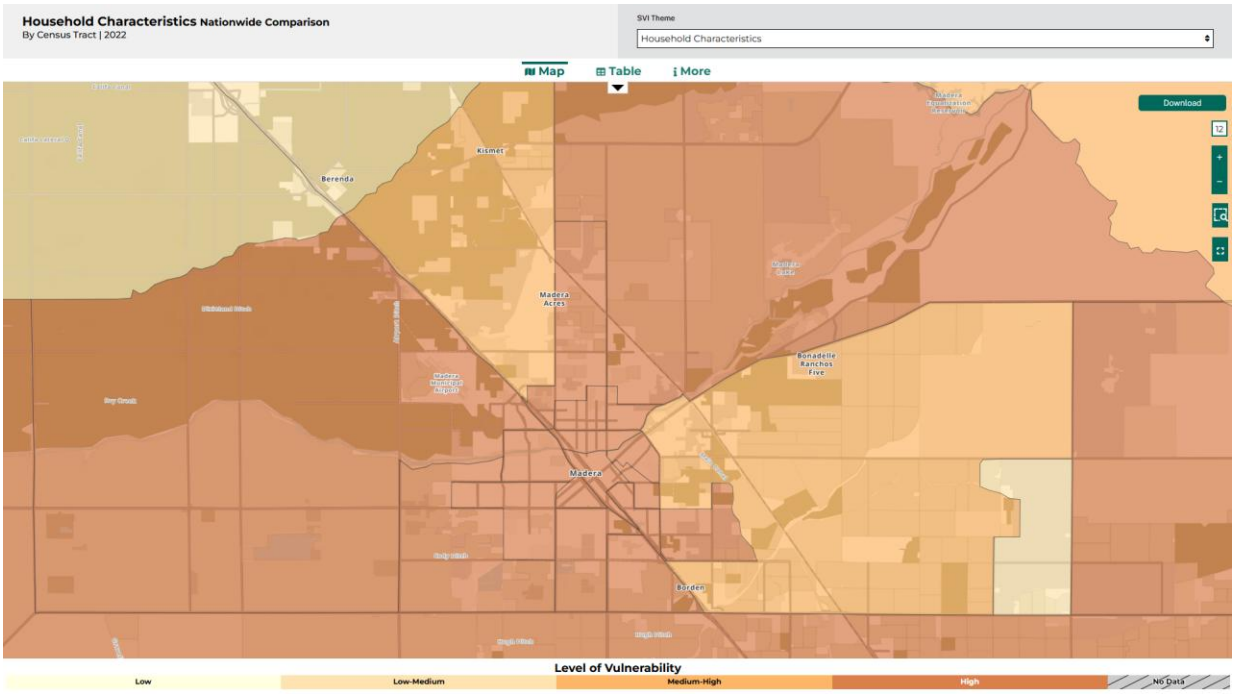
Source: CDC Social Vulnerability Index – map retrieved 12/16/2024
Level of Vulnerability Rating: **Yellow** – Low; **Green** – Low/Medium; **Aqua** – Medium/High; **Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure B-3 City of Madera – Socioeconomic Status Vulnerability



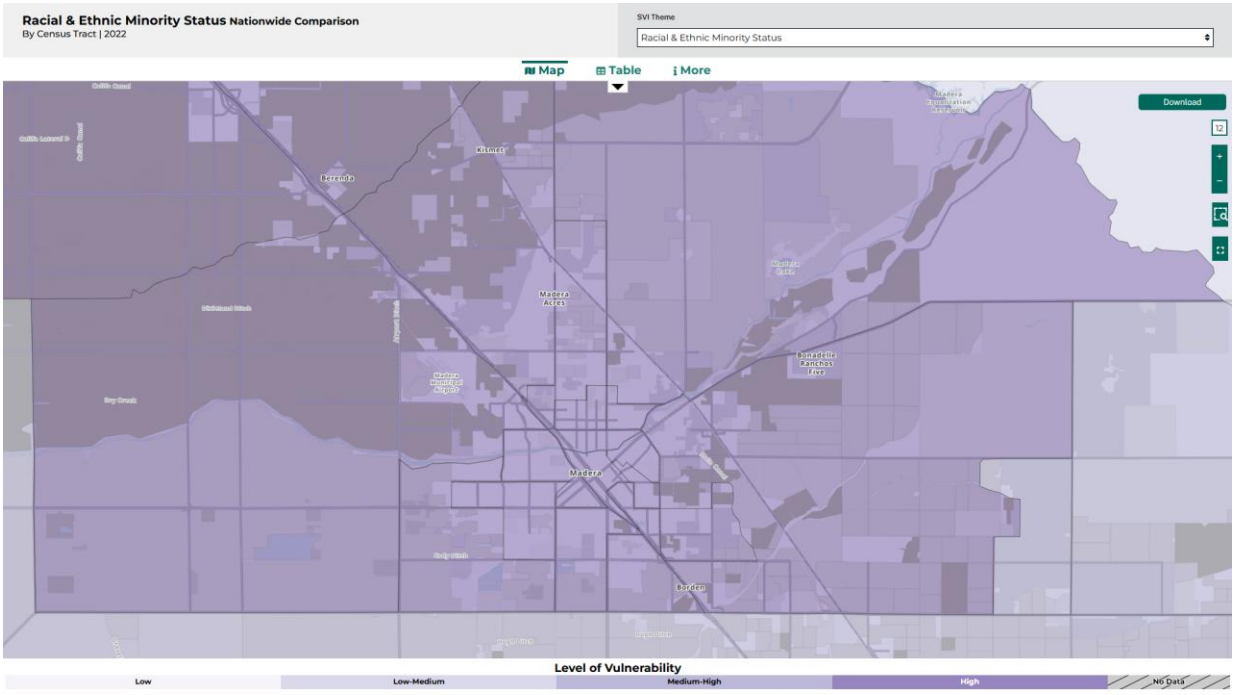
Source: CDC Social Vulnerability Index – map retrieved 12/16/2024
Level of Vulnerability Rating: **Faint Green** – Low; **Light Green** – Low/Medium; **Green** – Medium/High; **Dark Green** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure B-4 City of Madera – Household Characteristics



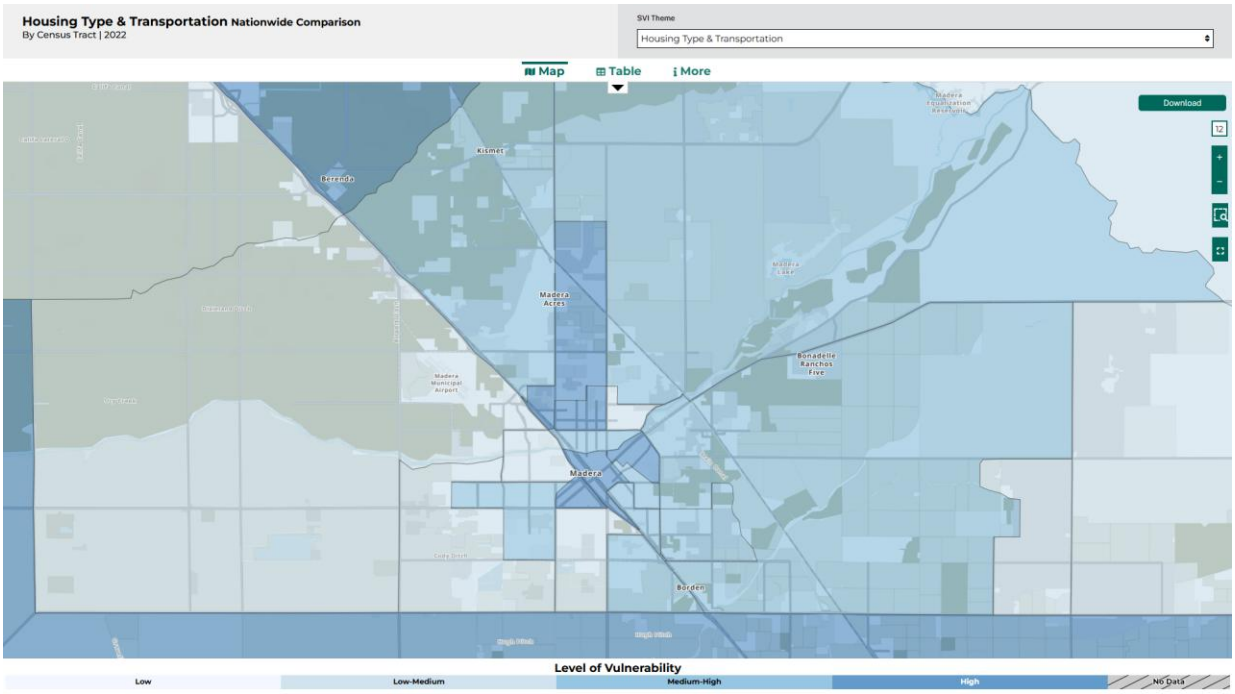
Source: CDC Social Vulnerability Index – map retrieved 12/16/2024
Level of Vulnerability Rating: **Faint Orange** – Low; **Light Orange**– Low/Medium; **Orange** – Medium/High; **Dark Orange** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure B-5 City of Madera – Racial and Ethnic Minority Status



Source: CDC Social Vulnerability Index – map retrieved 12/16/2024
Level of Vulnerability Rating: **Faint Purple** – Low; **Light Purple** – Low/Medium; **Purple** – Medium/High; **Dark Purple** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure B-6 City of Madera – Housing Type and Transportation

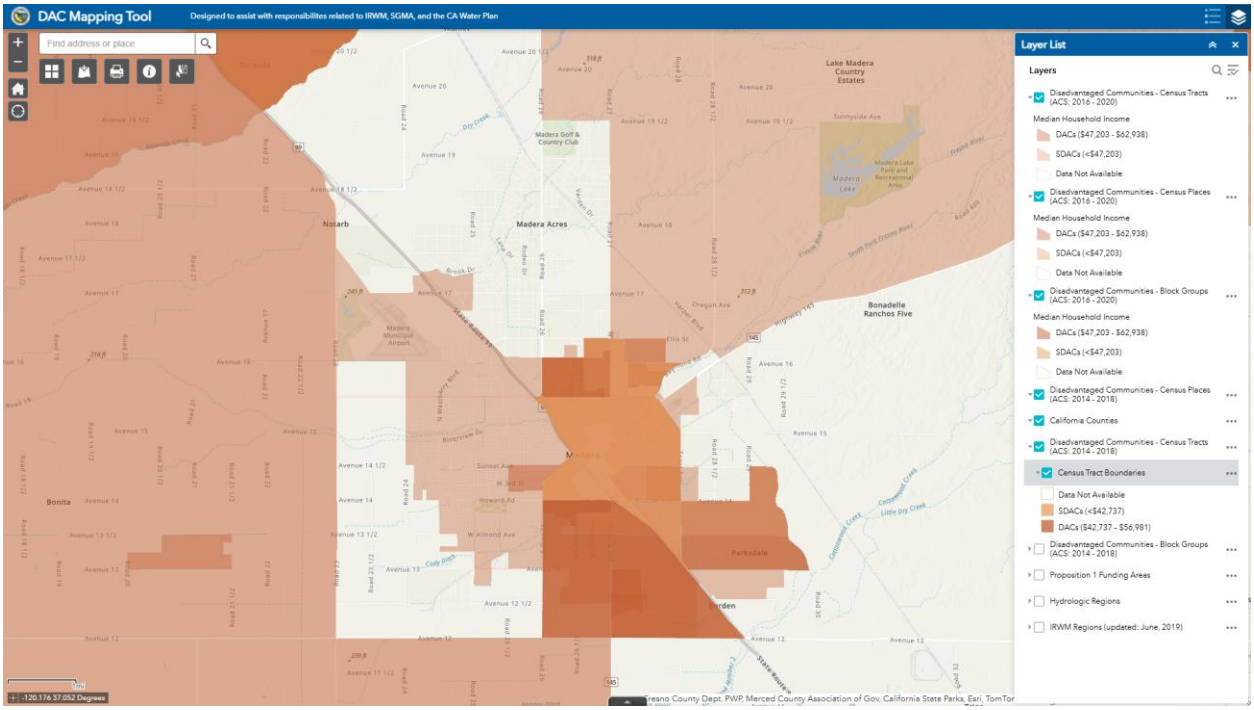


Source: CDC Social Vulnerability Index – map retrieved 12/16/2024
Level of Vulnerability Rating: **Faint Blue** – Low; **Light Blue** – Low/Medium; **Blue** – Medium/High; **Dark Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

California DWR Disadvantaged Community Mapping Tool

The State of California's Proposition 1 Disadvantaged Community (DAC) Involvement Program is designated to ensure the involvement of DACs as well as Economically Distressed Areas and Underrepresented Communities, which DWR collectively refers to as DACs. The Cal DWR definition for a Disadvantaged Community is a community with an annual median household income (MHI) that is less than 80% of the Statewide annual MHI (PRC Section 75005(g)), and those census geographies with an annual MHI less than 60% of the Statewide annual MHI are considered "Severely Disadvantaged Communities". Those areas in the City considered disadvantaged are shown in Figure B-7. As shown, much of the City falls in these DAC areas.

Figure B-7 City of Madera – Disadvantaged Areas

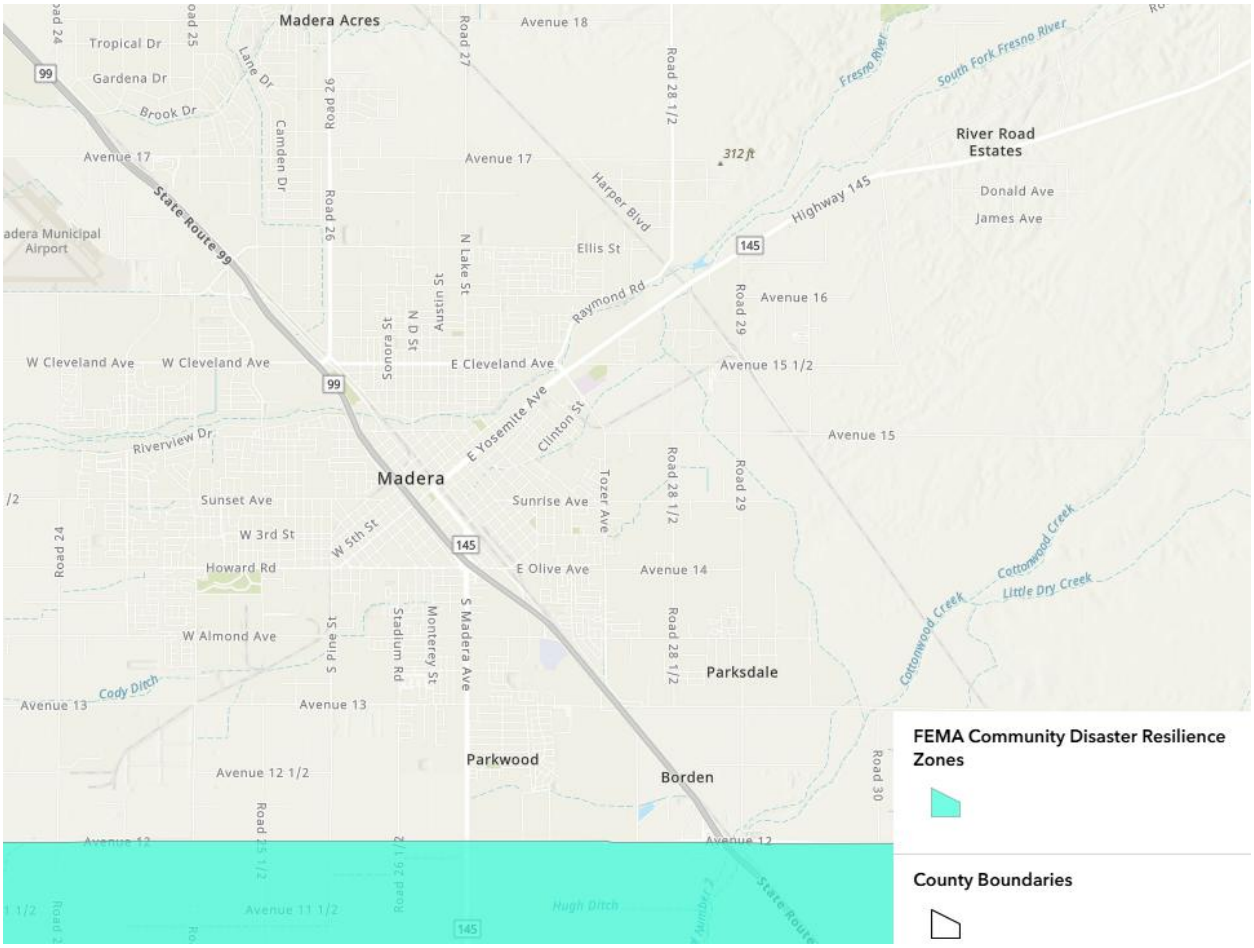


Source: Cal DWR DAC Mapping Tool – retrieved 12/16/2024

FEMA Community Disaster Resilience Zones

Community Disaster Resilience Zones aim to build and strengthen community resilience across the nation by driving federal, public, and private resources to the most at-risk and in-need communities. The Community Disaster Resilience Zones Act uses FEMA's National Risk Index to identify the most at-risk and in-need communities to identify resilience zones. Designated zones will be prioritized for targeted federal support, such as increased cost-share for resilience and mitigation projects, lessening the financial burden on communities to perform resilience-related activities. On September 6, 2023, FEMA announced the initial 483 designations in all 50 states and the District of Columbia. Figure B-8 shows these zones in teal green. As shown, there are no zones in the City, but zones just south of the City limits.

Figure B-8 City of Madera – FEMA Community Disaster Resilience Zones



Source: FEMA. Map retrieved 12/16/2024

City Planning Team Input

The City noted that there are certain sensitive communities in the City and surrounding area. The Urban Displacement Project (UDP) at the University of California, Berkeley, developed a map of "sensitive communities" where residents may be particularly vulnerable to displacement. Sensitive communities are defined based on the following set of criteria:

- The share of very low-income residents is above 20 percent.
  - ✓ Summary of Housing Needs:
    - Household Income. The median household income in Madera was $67,454 in 2022, according to the American Community Survey. Based on HUD's income definitions, about 54 percent of the City's households are considered lower income.
    - Extremely low-income households in Madera are defined as households with income less than 30 percent of the Madera County AMI. In 2020, 5.9 percent of Madera households were in the extremely low-income category.
- The census tract must also meet two of the following criteria:
  - ✓ The share of renters is above 40 percent.

- Regional Household Size by Tenure 2020): 8,689 renter occupied units, which comprises 49% of housing units citywide.

✓ The share of people of color is above 50 percent.

- Assessment of Fair Housing (p. 86): Persons of Hispanic or Latino origin make up the majority of the City of Madera's population (79 percent), as of 2019. Within the City of Madera, the lowest percentage of Hispanic population is found in the census tracts in western Madera. There are no block groups with a concentration of any other race.
- Racial and Ethnic Composition, City of Madera, 2011-2021.

✓ The share of very low-income households (50 percent AMI or below) that are severely rent burdened is above the county median.

- The census tract, or areas in close proximity, have been experiencing displacement pressures. Displacement pressure is defined as: The percentage change in rent in a selected census tract, divided by county median rent increases OR
- Median rent in a selected census tract, minus median rent for all surrounding tracts, divided by median rent for all tracts in county (rent gap)

"Displacement is used to describe any involuntary household move. Neighborhoods can experience displacement for a variety of reasons, including but not limited to disaster-driven displacement, which occurs when housing is destroyed or compromised by disasters and the result is that housing is not rebuilt. Lower-income households who tend to rent (and therefore lack control over whether their homes are rebuilt) or lower-income homeowners who have fewer financial resources to rebuild their homes are most at risk of this type of displacement.

Sensitive communities are located in the western part of the County, particularly in the Cities of Madera and Chowchilla. There are no sensitive communities in the central or eastern parts of the County.

The central area of the City of Madera is considered a sensitive community and is vulnerable to displacement. Vulnerable communities at risk of displacement in the City are primarily located in the east half of the City. These are the areas of the City located within the 500-year FEMA flood zone

Disaster driver displacement is unlikely in the City of Madera. Environmental risk and constraints are further discussed in the Constraints on Housing Chapter.

City of Madera 2024-2029 Housing Element

The City Planning Team noted that the City of Madera 2024-2032 Housing Element discusses special populations in the County. While the County Housing Element is discussed in the Base Plan and is very similar to Chowchilla, the City has completed their own Housing Element with unique differences. Discussions for seniors, those with disabilities, developmental disabilities, people experiencing homelessness, large households, female headed households, and farmworkers were included. These are discussed below.

Table B-6 provides an overview of the special needs populations within the City and each group is discussed in further detail in the following sections.

Table B-6 ***Overview of Special Needs, Groups, City of Madera, 2020***

Special Needs Group	# of People	% of Population
Persons with a Disability	8,074	12.2%
Persons Experiencing Homelessness	541	0.8%
Farmworkers	15,654	23.6%
Special Needs Group	**# of Households**	**% of Households**
Householders Age 65+	1,908	10.8%
Large Households	5,068	28.8%
Female-Headed Households	3,351	19.0%
Extremely Low-Income Households	519	5.9%

Source: US Census Bureau, American Community Survey 5-Year Data, 2016–2020, and US Housing and Community Development Comprehensive Housing Affordability Strategy Data, 2016–2020.

Farmworkers

Traditionally, agricultural workers are defined as persons whose primary incomes are earned through permanent or seasonal agricultural labor. The 2021 ACS found that approximately 5,565 Madera residents were employed in the agriculture, forestry, fishing and hunting, and mining industry. This equates to about 21 percent of all employed individuals in the City over 16 years old. Among other issues, farmworker typically face low wages, leading to high rates of housing cost burden for farm working families. According to the Bureau of Labor Statistics, California's mean farmworker wages range from $30,370 to $42,480 per year and the median wage for farmworkers in Madera in 2020 was $33,000.

The Housing Authority of the City of Madera operates the Farm Labor Housing program which provides permanent rental housing for "domestic farm laborers." A domestic farm laborer is a person (and the family of such person) who receives a substantial portion of his or her income from farm labor work. This program is funded by the US Department of Agriculture (USDA). The Housing Authority has three separate housing developments in the City of Madera with a total of 100 rental units. The Pomona Ranch Housing Center is a gated 50-unit complex, with 10 two bedroom, 30 three-bedroom, and 10 four-bedroom units. All units have 1 bathroom. In the spring/summer/fall months, rent is paid by migrant workers on a daily basis and all utilities are included. This center has an on-site laundry facility with coin operated machines and a daycare facility run and operated by the Madera County Community Action Partnership. Additionally, the Housing Authority operates a Farm Labor Housing Program which provides low-rent rental housing for eligible families.

Large Households

State Housing Law defines large households as those consisting of five or more members. Large households are considered a special needs group because it may be difficult for these households to secure adequately sized, affordable housing. In order to balance affordable housing along with other financial responsibilities, large households tend to reside in smaller dwelling units, which may lead to overcrowding.

In 2020, approximately 28 percent (5,068) of Madera's 17,598 households were considered large households. This is a similar proportion as seen Countywide. Of those large households, 23.8 percent (2,121) lived in owner-occupied units, while 33.9 percent (2,947) lived in rental housing (see Table 37). Between 2010 and 2020, the percentage of large households in the City remained unchanged, however the distribution between renters and homeowners of large households increased marginally. In 2010, approximately 26 percent (4,104) of Madera's 15,857 households were considered large households. Of those large households in 2010, 20 percent (1,631) lived in owner-occupied units, while 32 percent (2,473) lived in rental housing.

In the City of Madera, the proportion of large households that are owners (23.8 percent) is significantly lower to the general proportion of ownership households citywide (50.6 percent). Additionally in the County, there is a significantly smaller proportion of large households owning their homes (17.7 percent).

Based on HUD data, 58.7 percent of large households in Madera are in one of the lower-income categories. As of 2020, 27 percent of the City's housing stock have four or more bedrooms. This equates to 4,778 housing units with four or more bedrooms to serve the estimated 5,068 large households that require at least four bedrooms to avoid over-crowded conditions.

Female Headed Households

Female-headed households who do not have a spouse present are a special needs group because they tend to experience comparatively lower rates of homeownership, lower incomes, and higher poverty rates. In 2020, 19 percent of households in the City of Madera were female-headed households, similarly in the County 20 percent of households were female-headed. Female-headed households in the City have a slightly lower rate of homeownership than those in the County (11.8 percent and 13.3 percent, respectively), however in both female-headed households (with children and without children), the City has higher homeownership rates than the County. Of the 3,351 female-headed households in the City of Madera, 11.4 percent had children under 18. In the City of Madera, 28.9 percent of households below the poverty line are female-headed households (1,172 households). When compared, the City and County have a comparable percentage of female-headed households below the poverty line (28.9 percent and 27.1 percent, respectively).

Persons Experiencing Homelessness

Data on homelessness in Madera County is based on the 2023 Point-in-Time Count (PITC), information provided to HUD by the Fresno-Madera Continuum of Care (FMCoC). The PITC provides a count of sheltered and unsheltered homeless persons on a single night during the last ten days in January for the Fresno and Madera region. A follow-up survey sampling of unsheltered and sheltered individuals is conducted two weeks following the count. The count was conducted on January 24, 2023. No PITC was conducted in Fresno and Madera counties in 2024. Madera County had an estimated homeless count of 140, 100 percent of which were unsheltered. There were 541 homeless persons surveyed in the City of Madera, 205 of whom were unsheltered. Madera's homeless population accounts for 12 percent of all homeless persons in the region.

Disabilities

People living with disabilities may have a wide range of housing needs, depending on the type and severity of their disability. Housing affordability is a major concern for individuals with disabilities, particularly for those whose disability impacts their income earning potential.

Based on the 2016–2020 ACS, there are 7,658 individuals, or 11.8 percent of the population, living with at least one form of disability in Madera. This is substantially lower than the County, where 46.4 percent of the population has a disability

Developmental Disabilities

A subgroup of disabled residents is those who are developmentally disabled. Housing Element Law mandates that an analysis of special needs of disabled persons, including persons with developmental disabilities, be included in Housing Elements.

The California Department of Developmental Services (DDS) currently provides community-based services through 21 community-based nonprofit corporations known as regional centers. The regional centers serve as a local resource to help find and access services and support available to individuals and families once eligibility is determined. The Central Valley Regional Center provides service to developmentally disabled individuals throughout Madera County. According to the DDS, as of December 2021, the Central Valley Regional Center served 22,500 residents. The largest populations served are those with an intellectual disability (41 percent) followed by autism (28 percent).

Elderly Persons

The US Census defines persons 65 years of age and older as elderly. The City of Madera's elderly population has special housing needs associated with affordability, maintenance, and upkeep of their homes, as well as physical access. Elderly persons are more likely to have fixed incomes and have a substantial portion of their financial resources in non-liquid assets, such as property. They often spend a higher percentage of their income on food, housing, medical care, and personal care comparative to non-elderly persons. According to the 2020 US Census data, 17 percent of Madera's households are headed by one person aged 65 or over. This is significantly less than the 30 percent in Madera County households.

The 2020 median household income for households with a resident aged 65 and older was $39,548 in the City and $53,108 in Madera County. This is lower than the citywide median income of $49,358 and Countywide median income of $63,454 in 2020. The lower income is likely because fewer elderly persons are working full-time, and most income comes from a fixed income such as Social Security and/or part-time work. Based on HUD data, 48.2 percent of elderly households in the City of Madera are in one of the lower-income categories. Madera County had a lower percentage of elderly households within the lower income categories, at 36.9 percent.

Structures

This section inventories the parcels (and associated structures) that make up the built environment of the City. The 2024 Madera County Assessor's data and the associated parcel layer was used as the basis of

this inventory. The methodology used to derive the number of total and improved parcels (i.e., those with an improved structure value) and land and improved property values (as well as content replacement values) follows the same methodology detailed in Section 4.2.1 of the Base Plan. This data should only be used as a guideline to overall values in the City, as the information has some limitations. The most significant limitations are created by Proposition 13. With respect to 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 most likely low and does not reflect current market value of properties within the City. It is also important to note, in the event of a disaster, it is often 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. However, depending on the type of hazard and impact of any given hazard event, land values may be adversely affected; thus, land values are included as appropriate. Table B-7 shows the Madera County Parcel/Assessor Data land and structure values, personal property values, and content replacement values (e.g., the values at risk) broken down by property use for the City.

Table B-7 City of Madera – Total Value of Parcels and Structures by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Agricultural	77	55	$39,741,955	$10,537,300	$947,502	$10,537,300	$61,764,057
Commercial	1,012	753	$189,751,981	$534,266,572	$45,701,431	$534,266,572	$1,303,986,556
Government	212	1	$4,393,793	$12,481	$0	$12,481	$4,418,755
Industrial	241	113	$42,228,872	$183,432,081	$84,960,260	$275,148,122	$585,769,335
Institutional	85	60	$3,871,230	$30,519,200	$132,915	$30,519,200	$65,042,545
Recreational	7	0	$1,705	$0	$0	$0	$1,705
Residential	15,369	14,439	$729,655,028	$2,626,678,273	$3,751,750	$1,313,339,137	$4,673,424,188
Utilities	12	1	$231,063	$163,844	$2	$163,844	$558,753
Right of Way	31	1	$83,614	$46,163	$0	$46,163	$175,940
Unknown	42	1	$1,746,582	$187,553	$0	$187,553	$2,121,688
City of Madera Total	**17,088**	**15,424**	**$1,011,705,823**	**$3,385,843,467**	**$135,493,860**	**$2,164,220,371**	**$6,697,263,521**

Source: 2024 Madera County Parcel/Assessor Data

Critical Facilities and Infrastructure

Beyond just the buildings and structures that comprise the built environment, it is important to identify the critical facilities and infrastructure that are critical for life safety and property protection. This is done for the City of Madera below.

For purposes of this plan, a critical facility is defined as:

> ***Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.***

A critical facility is classified by the following categories: (1) Essential Services Facilities, (2) At-Risk Populations Facilities, and (3) Hazardous Materials Facilities, as discussed in Section 4.3.1 of the Base Plan.

Note: The Hazardous Materials Facilities, while considered critical facilities for purposes of this Plan Update, are not mapped in this Plan due to the lack of an available GIS layer. In addition to the mapped critical facilities, it should further be noted that additional critical facilities, including infrastructure, utilities, and others have been identified for the City of Madera and the larger Madera County Planning Area but are not included in the mapping and inventory due to privacy and security concerns.

An inventory of critical facilities in the City of Madera from Madera County GIS is shown on Figure B-9. Table B-8 gives summary information about the critical facilities in the City. Table B-9 details the facility categories and breaks them down by facility type. Details of critical facility definition, type, name, address, and jurisdiction by hazard zone are listed in Appendix F.

Figure B-9 City of Madera – Critical Facilities

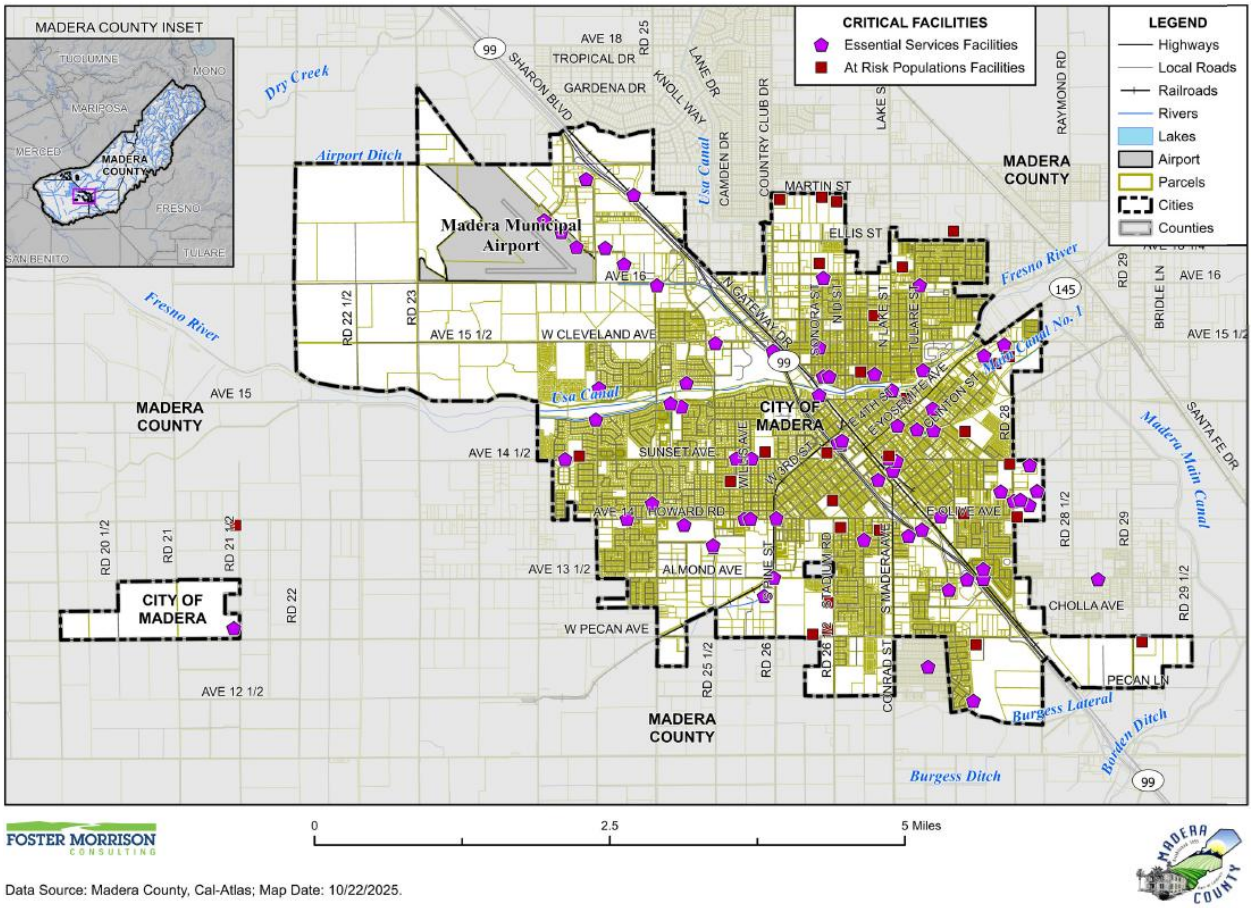


Table B-8 City of Madera – Critical Facilities by Category

Jurisdiction /Critical Facility Category	Facility Count
Essential Services Facilities	103

Jurisdiction /Critical Facility Category	Facility Count
At Risk Populations Facilities	29
City of Madera Total	**132**

Source: Madera County GIS

Table B-9 City of Madera – Critical Facilities by Category and Type

Critical Facility Category	Critical Facility Type	Facility Count
Essential Services Facilities	Cogeneration Power	5
	Community Services	6
	Emergency Dispatch Center	1
	Fire Command Center	1
	Fire Station	4
	Pavilion	1
	Police	3
	Wastewater Lift Station	26
	Water Treatment	49
	Health / Medical	1
	Communications	5
	Jail / Prison	1
	Total	**103**
At Risk Populations Facilities	Community Church	1
	Community Recreation Center	2
	School	26
	Total	**29**
City of Madera Total		**132**

Source: Madera County GIS

Community Lifelines

Assessing the vulnerability of the City of Madera to natural hazards and disasters also involves reviewing and inventorying the community lifelines in place that could be affected. It is important to include these items in hazard discussions as the continuous operation of critical government and business functions is essential to human health and safety, property protection, and economic security. The importance of community lifelines is discussed below:

- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.
- FEMA has developed a method for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.
- The integrated network of assets, services, and capabilities that provide lifeline services are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function.

- When disrupted, decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to stabilize the incident.

Community lifelines, as defined by FEMA, include the following:

- **Safety and Security** – Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety
- **Food, Hydration, Shelter** – Food, Water, Shelter, Agriculture
- **Health and Medical –** Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management
- **Energy –** Power Grid, Fuel
- **Communications** – Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch
- **Transportation** – Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime
- **Hazardous Material –** Facilities, HAZMAT, Pollutants, Contaminants
- **Water Systems** – Potable Water Infrastructure, Wastewater Management

It should be noted that these community lifelines are all in place and functional as part of regular government operations in the Madera County Planning Area serving as a partnership between the cities, local special districts and agencies, and Madera County. Due to its more rural nature, there is an interplay in community lifelines between all jurisdictions in the County. Most all of the City's community lifelines overlap with the Planning Area's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. As such, specific information on these community lifelines in the City and how they may be affected by a hazard event or disaster are discussed collectively for all jurisdictions in the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the City of Madera to natural hazards and disasters also involves inventorying the natural, historic, and cultural assets of the area. This step is important for the following reasons:

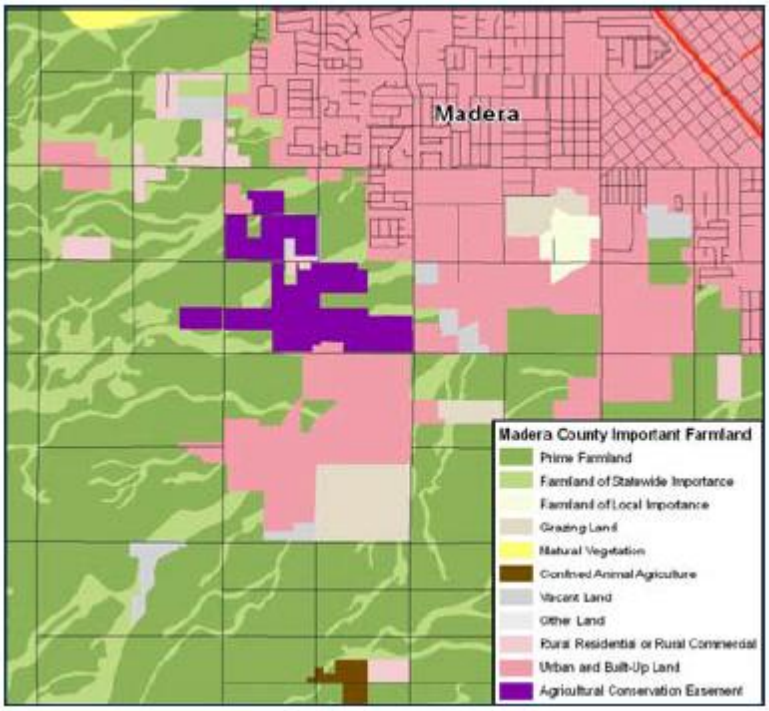
- Environmental and natural resources add to a community's identity and quality of life. They also help the local economy through agriculture, tourism, and recreation. They support ecosystem services, such as clean air and water.
- Conserving the environment may help people mitigate risk. It can also protect sensitive habitats, develop parks and trails, and build the economy.
- 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, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

The City contains a variety of natural resources. Natural resources are unique to each area, often provide an important function, and are difficult to replace. Should a natural disaster occur, these species, resources, and locations are at risk.

The City of Madera has a variety of natural resources of value to the community. As one of the primary sources of regional income, agriculture activity and the prime soils that support it are critical to the future of Madera. In the current City limits, about 950 acres—about one-tenth of the City—are in agricultural use (mostly near the Madera Airport, where land use restrictions preclude most urban uses). As is the case throughout the Central Valley, some farmland in Madera County is being lost to urbanization to meet the needs of the region's growing population. In 2002, Madera County farmers joined with County agricultural officials and state and federal conservation agencies to create an area of protected agriculture land in the southwest area of Madera. The 440-acre area (shown on Figure B-10) was established to help direct growth away from the west edge of Madera in recognition of the agricultural value the land in this area represents. While the protected area creates an irregular and noncontiguous barrier, its presence clearly reflects the intent to keep these and other lands further to the west in agricultural production.

Figure B-10 City of Madera – Farmlands near City



Source: City of Madera 2009 General Plan Conservation Element

The California Natural Diversity Database (a computerized database that shows where sensitive plants and animals have been found) documents seven plant and animal special-status species that have been found in the past in the City. The Database also shows one "natural community" that has also been found in the City. (Note: The list below is of species whose presence has been recorded within a one-mile radius of the City in the CNDDB. Other sensitive plants and animals have been found in or have the potential to be found in

the City, but are not recorded in the CNDDB.) Sensitive plants and animals that have been found in the City and are in the CNDDB are listed below.

- Burrowing Owl;
- California Tiger Salamander;
- Blunt nosed leopard lizard;
- California linderiella ("fairy shrimp");
- Vernal pool fairy shrimp;
- Madera leptosiphon;
- Hairy orcutt grass.

Although most of the City has been changed from its natural condition by farming and urban uses, a few areas of natural habitat remain. These include:

- Annual grasslands;
- Riparian areas;
- Wetlands.

In addition, according to state records, one type of "Natural Community" is found in the City. This Natural Community, Northern Hardpan Vernal Pool, contains vernal pools (which fill seasonally during the rainy season) that could harbor sensitive plant and animal species (including fairy shrimps). These vernal pools are generally found in annual grasslands, grasslands where the soils include an impermeable clay-pan layer below the surface, conditions which are widely distributed in the eastern portion of the City.

Wetlands and their Natural and Beneficial Functions

Wetlands are habitats in which soils are 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 considered to be 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 Wildlife (CDFW). Where the waters provide habitat for federally endangered species, the U.S. Fish and Wildlife Service may also have authority.

Wetlands are a valuable natural resource for communities providing beneficial impact 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 is 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.

Wetlands are often found in floodplains and depressional areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flow. Wetlands perform a variety of ecosystem functions including food web support, habitat for insects and other invertebrates, fish and wildlife habitat, filtering of waterborne and dry-deposited anthropogenic pollutants, carbon storage, water flow regulation (e.g., flood abatement), groundwater recharge, and other human and economic benefits.

Wetlands, and other riparian and sensitive areas, provide habitat for insects and other invertebrates that are critical food sources to a variety of wildlife species, particularly birds. There are species that depend on these areas during all parts of their lifecycle for food, overwintering, and reproductive habitat. Other species use wetlands and riparian areas for one or two specific functions or parts of the lifecycle, most commonly for food resources. In addition, these areas produce substantial plant growth that serves as a food source to herbivores (wild and domesticated) and a secondary food source to carnivores.

Wetlands slow the flow of water through the vegetation and soil, and pollutants are often held in the soil. In addition, because the water is slowed, sediments tend to fall out, thus improving water quality and reducing turbidity downstream.

These natural floodplain functions associated with the natural or relatively undisturbed floodplain that moderates flooding, such as wetland areas, are critical for maintaining water quality, recharging groundwater, reducing erosion, redistributing sand and sediment, and providing fish and wildlife habitat. Preserving and protecting these areas and associated functions are a vital component of sound floodplain management practices for the City.

According to US Fish and Wildlife Service maps, there are no wetlands in the City; as such, no mapping or tabular analysis is shown.

Historic and Cultural Resources

Historic and cultural resources are difficult to replace. Should a natural disaster occur, these properties and locations can be at risk. The City of Madera has a stock of historically significant homes, public buildings, and landmarks. The California Department of Parks and Recreation Office of Historic Preservation (OHP) was the primary source of information. OHP administers the National Register of Historic Places, the California Register of Historical Resources, California Historical Landmarks, and the California Points of Historical Interest programs. Each program has different eligibility criteria and procedural requirements. These requirements are detailed in Section 4.2.1 of the Base Plan. Table B-10 shows 4 historic buildings in the City from the OHP Database.

Table B-10 City of Madera – Historic Resources

Resource Name (Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City
Madera County Courthouse (N108)	X				9/3/1971	Madera

Source: California Department of Parks and Recreation Office of Historic Preservation. Retrieved 12/3/2024.

It should be noted that these lists may not be complete, as they may not include those 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, in the event that 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.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the City of Madera to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the City.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. These include:

- Primary Economic Sectors
- Major employers
- Commercial Centers

Madera's economy is driven primarily by agriculture, manufacturing, education, and public administration. The surrounding county is among the leading producers of grapes, almonds, pistachios, and figs in the United States. Food processing and distribution facilities support the region's agricultural output, while the Madera Unified School District and City of Madera are major public employers. The industrial sector continues to expand near State Route 99, supported by transportation and warehousing infrastructure.

Retail, logistics, and construction contribute to the City's private-sector growth. Although service-based employment has increased, agriculture and education remain the dominant job sectors.

Table B-11 City of Madera – Major Employers

Employer	Employer Size
Madera Unified School District	2,013
Madera County	1,896
City of Madera	333
US Government	300
Walmart	350
Camarena Health Care	249
Community Action Partnership	235
Vallarta Grocery Store	200
JBT Food tech	165
EVAPCO Inc.	100-249
Home Depot	145
Lowes	100-249
Span Construction	100-249
Madera Rehab Center	100-249
Georgia Pacific	100-249
Sealed Air	100
Oldcastle Enclosure Solutions	50-99

Employer	Employer Size
Nutra Blend	50-99
Madera Community Hospital	500-1,000

Source: City of Madera

Other employers not listed that would have significant impacts on the local economy include Midland Tractor, Madera Toyota/ Chevrolet, Madera Ford, Gil Chrysler Dodge/Jeep/Ram, Deerpoint, TranPak, Sealed Air, Purl's Sheet Metal, California Custom Processing, Florestone Products, The Almond Company, the Madera Airport, Loves Travel Center, Marshal's, Ross Clothing, Save Mart, Madera Community College, Miles Chemical.

Note: This inventory of economic assets is only included in this overall asset inventory for the City. To limit redundancy, it is not discussed further in the hazard profiles and vulnerability assessments in Section B.4.3 below. However, depending on the type, location, magnitude and extent of future hazard events and disasters, these City's economic assets may be vulnerable.

Community Activities of Value

Inventorying economic assets in the City and their vulnerability to natural hazards and disasters also involves inventorying activities that have value to the community. This includes activities that are important to a community, like long-standing traditions such as a festival or fair. Some areas rely on seasonal industries to sustain them throughout the year. Many of these activities also provide economic benefits to the City. A hazard event that cancels or shortens these can affect a community's livelihood and can make disaster recovery more difficult or prolonged. This includes activities such as:

- Festivals and Fairs
- Sporting Events
- Tourism
- Local Pools
- Local Splash Pools

The City noted the following community activities of value:

- PCS Easter Eggstravaganza, National Night Out, Graduations, Pomegranate Festival, Parades, Fair, Flea Market/Swap Meet, Little League World Series, Warbirds Airshow, 4th of July Celebration, Relay for Life, Movies in the Park, regional softball and baseball tournaments, Spring Fling VW Carshow, Madera Wine Trail Events, State of the County, Prayer Breakfast, La Guelaguetza, and the Madera Raceway.

Note: This inventory of community activities of value only occurs in this overall asset inventory for the City. To limit redundancy, it is not discussed further in the hazard profiles and vulnerability assessments in Section B.4.3 below. However, depending on the type, location, magnitude and extent of future hazard events and disasters, the City's community activities of value may be vulnerable.

Growth and Development Trends

As part of the planning process, the City looked at changes in growth and development, both current 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 over time.

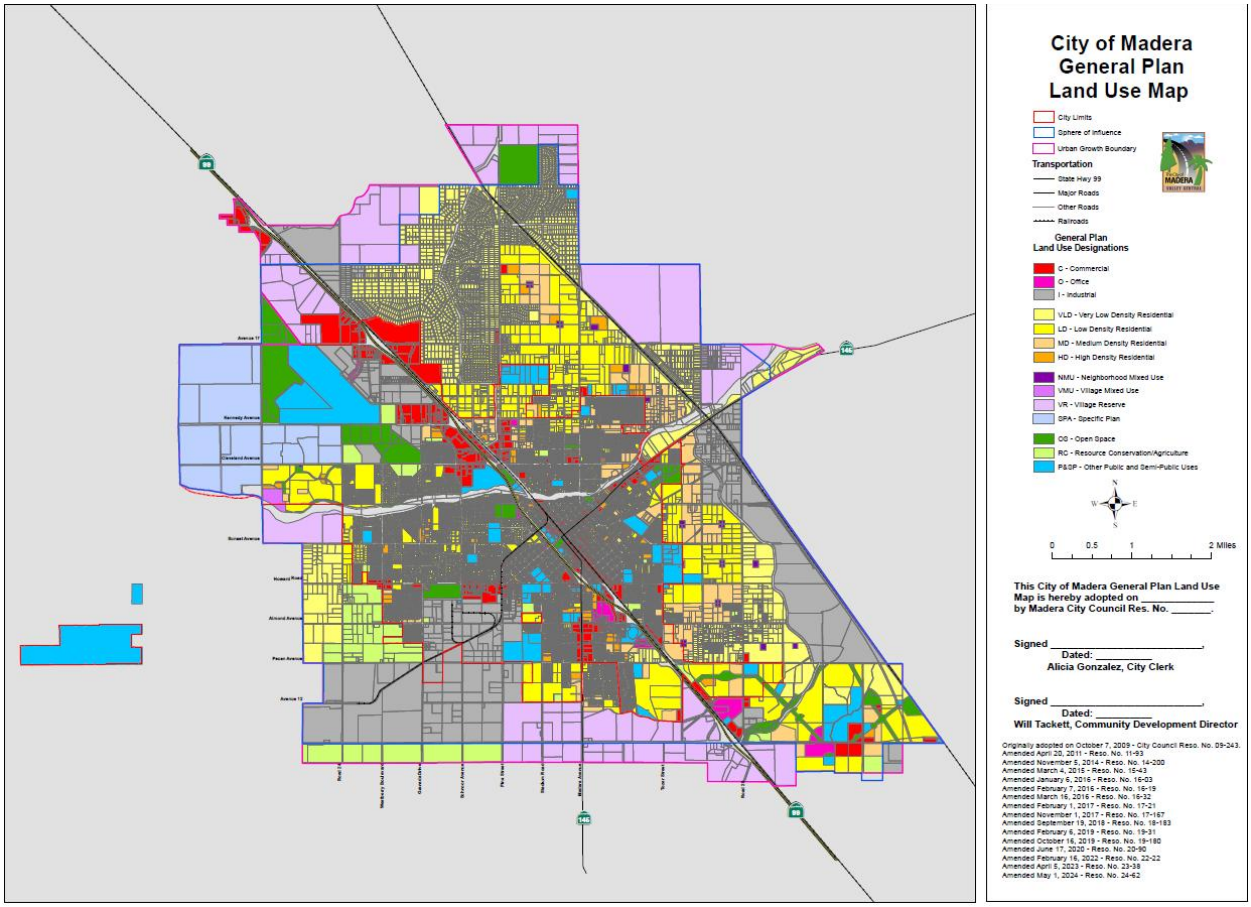
Land Use

State planning law requires that a land use element of a general plan include a statement of the standard population density, building intensity, and allowed uses for the various land use designations in the plan (Government Code Section 65302(a)). The City's land use designations are generally described below and mapped on the Land Use Diagram (Figure B-11). The City of Madera Municipal Code provides detailed land use and development standards for development.

The Municipal Code works hand in hand with the City's General Plan Land Use Element. The purpose of the Land Use Element is to provide goals, policies, actions diagrams and standards to guide future land use decisions in the City of Madera. While all elements of the General Plan have equal weight under California law, in some respects this Element is the most far-reaching. It informs all other elements of the General Plan, shaping the future transportation network and the location of future housing sites, and influencing public facility requirements and park and recreation needs. It defines the City's future open space system and responds to natural resource conservation issues and safety hazards. It establishes the basic pattern of development in the City for the next 20-25 years, including land uses and densities, and presents the policies and actions to ensure that future development will enhance the quality of life for all City of Madera residents.

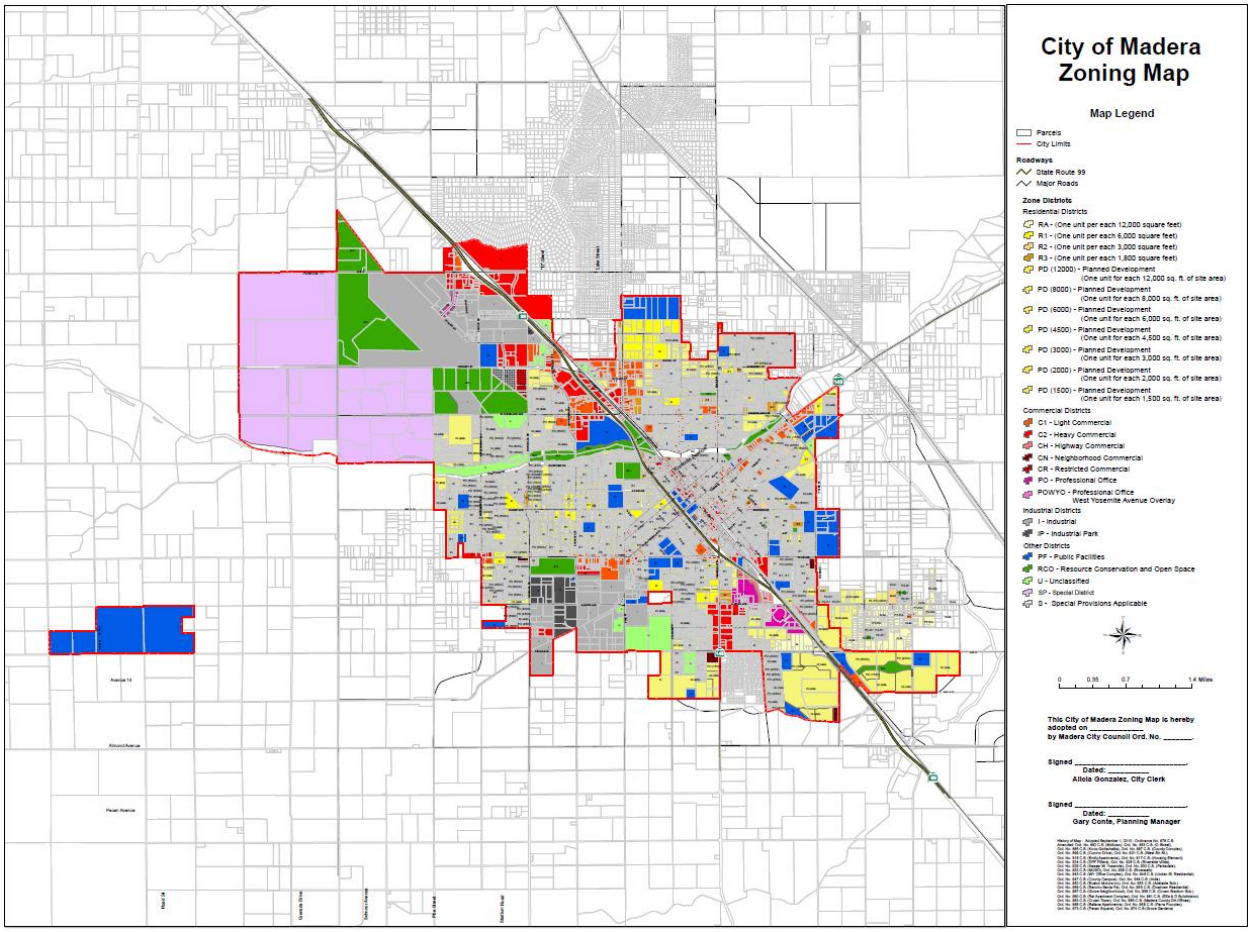
Future land use for the City of Madera from the 2017 City of Madera General Plan Land Use Element (and last amended on May 1, 2024) is shown on Figure B-11. This goes hand in hand with the City of Madera Zoning Map, which is shown on Figure B-12.

Figure B-11 City of Madera – Land Use Diagram



Source: City of Madera. Retrieved 1/22/2026.

Figure B-12 City of Madera - Zoning Map



Source: City of Madera. Retrieved 1/22/2026.

Population Trends and Projections

There are no future City population projections. Madera County as a whole is expected to slowly continue to increase in population until 2045 (where growth plateaus), and then slowly shrink through 2070. As such, it is assumed that the City may see similar population growth as well.

Development since 2018 Plan

Development growth in the City of Madera since the last LHMP update has, for the most part, been well-balanced. Development has been occurring in the City in recently annexed areas and in areas addresses in several specific plans:

Villages at Almond Grove Specific Plan

Substantial City growth has occurred with the annexation of 1,851 acres located in the northwestern portion of the City in 2022 (Villages at Almond Grove Specific Plan). The Specific Plan area is planned to consist of 10,783 residential units, approximately 2.1 million square feet of commercial and office space, approximately 164 acres of parks and recreational area, and approximately 54 acres of public facilities,

including schools. In addition, the proposed Specific Plan would include infrastructure improvements including roadways and utilities. Build-out is expected to occur over the next 20-30 years.

Country Club Drive – Martin Street Annexation

Approximately 250 acres of land in the north-central portion of the City was annexed in 2024 (Country Club Drive – Martin Street Annexation). The majority of acreage within this annexation area remains vacant, is located near Matilda Torres High School and is expected to be a focus for prospective development. Additionally, lands in this area are proposed for intensification and upzoning in the City's 6th Cycle Housing Element Public Review Draft (seeking adoption in 2026).

Granite Creek Plan Area

The City is processing a General Plan Amendment and annexation proposal pertaining to ±327 acres of property located on the north side of Avenue 14 ½ between Road 23 and Road 24 in the western portion of the City. Build out of the Granite Creek Plan Area is being planned to accommodate a maximum of 1,542 residential dwelling units and approximately 612,235 square feet of non-residential (commercial & public) or mixed-use floor area over approximately 204 acres. The number of residents at full build out is estimated at 5,119 based on an average household size of 3.32. Nearly 60% of the proposed Project area is planned for residential uses, followed by 40% planned for employment uses including commercial and mixed use, and the remaining for public institutional (K-8 School Site), open space, and roadways.

Ventana Specific Plan

The south-central area of the City have and are also experiencing development and investment interest. The Ventana Specific Plan was readopted and designed to provide residential housing, educational facilities, parks and landscaped open space areas, and circulation facilities that are consistent with the form and function of the City of Madera. The plan area is located to the west of State Route 99 in southern Madera and encompasses approximately 250.6 acres. The Ventana Specific Plan proposes approximately 1,444 residential units, 18.7 acres of parkland, neighborhood commercial uses, and a new elementary school. Lands located within the boundaries of the Madera State Center Community College Specific Plan and Southeast Madera Master Plan are expected to be a focus for future investment & development interests in the coming years.

Other Commercial and Industrial Development

Commercial & industrial development interests continue to primarily focus on vacant lands along or in near proximity to the State Route 99 & 145 corridors, near the airport & new casino as well as the industrial planned lands within the southwest portion of the City.

Development has occurred in the City since the last plan. Some of this has occurred in hazard prone areas. The City Planning Department tracked total building permits issued since 2018 for the City. These are tracked by total development, property use type, and hazard risk area. These are shown in Table B-12 and Table B-13.

Table B-12 City of Madera – Total Development Since 2018

Property Use	2019	2020	2021	2022	2023	2024
Residential	176	202	302	201	217	99
Commercial	20	13	17	11	9	14
Industrial	2	1	0	4	0	4
Total	**198**	**216**	**319**	**216**	**226**	**117**

Source: City of Madera Planning Department

Table B-13 City of Madera – Development in Hazard Areas since 2018

Property Use	1% Annual Chance Flood	Levee Protected Area	Wildfire Risk Area[1]	Other
Residential	15 Units (Zone X)	0	0	0
Commercial	0	0	0	0
Industrial	0	0	0	0
Total	**15**	**0**	**0**	**0**

Source: City of Madera Planning Department

[1]Moderate or higher wildfire risk area

Recent development since the 2018 LHMP has been primarily occurring outside of identified hazard areas. All development was completed in accordance with current and applicable development codes, including floodplain ordinances, wildfire codes, and other applicable standards and should be adequately protected. Thus, with the exception of more people living in the area potentially exposed to natural hazards, this growth should not cause a significant change in vulnerability of the City to identified priority hazards.

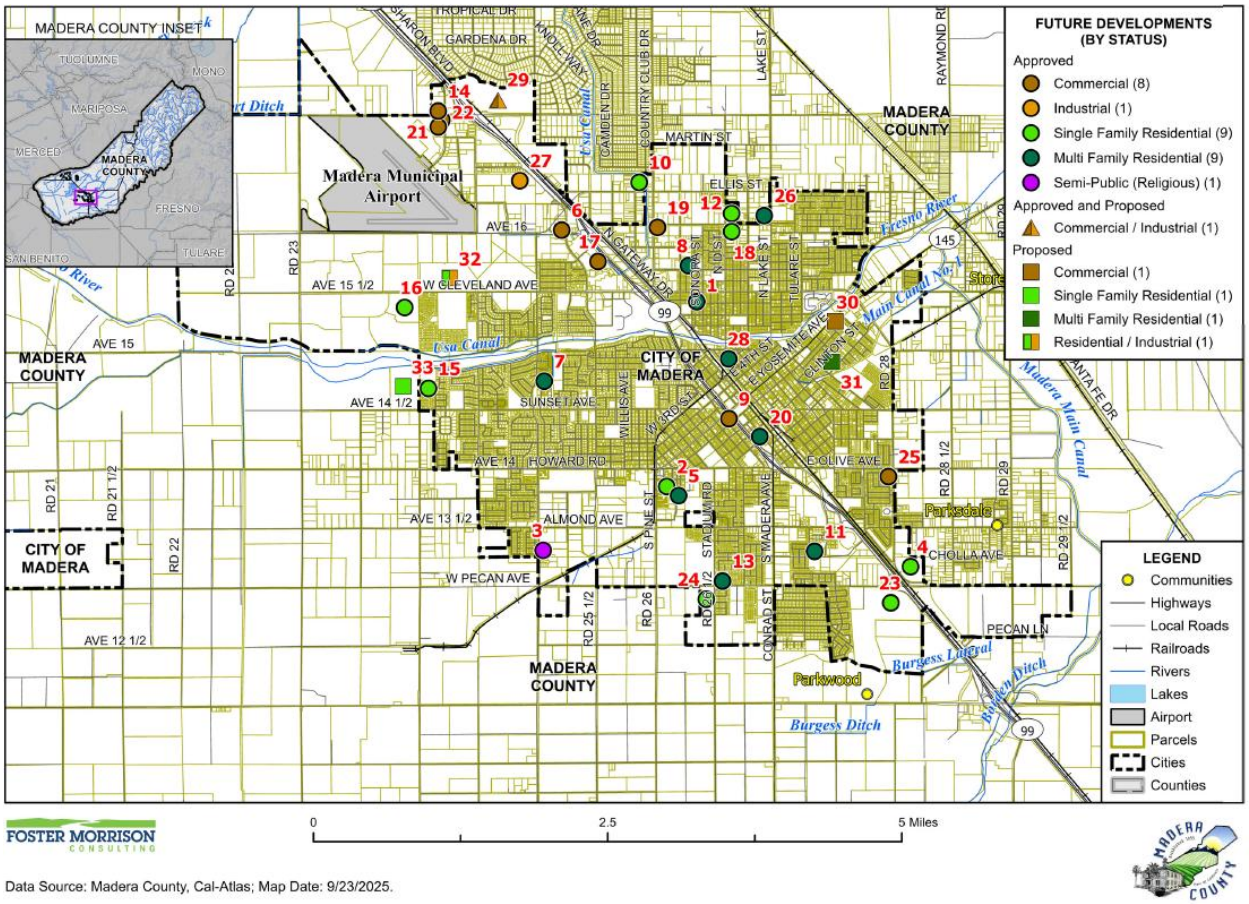
Future Development Areas

It is important to review future development plans for the City. Future development should be sited in areas that are away from known hazard risks. If this is not possible, mitigation should be done to ensure that future development is protected against future hazards.

GIS Analysis

The City of Madera provided 33 future development areas which were used as the basis for the inventory of future development for the City. These were mapped in GIS. Figure B-13 show the locations of the future development areas. Due to the high number of future development area, Figure B-14 shows a legend that matches us with the map identification numbers used in Figure B-13. Table B-14 shows the details of the future development areas by map identification area, acreage, and parcel count.

Figure B-13 City of Madera – Future Development Areas



Data Source: Madera County, Cal-Atlas; Map Date: 9/23/2025.

Figure B-14 City of Madera – Future Development Area Map Legend

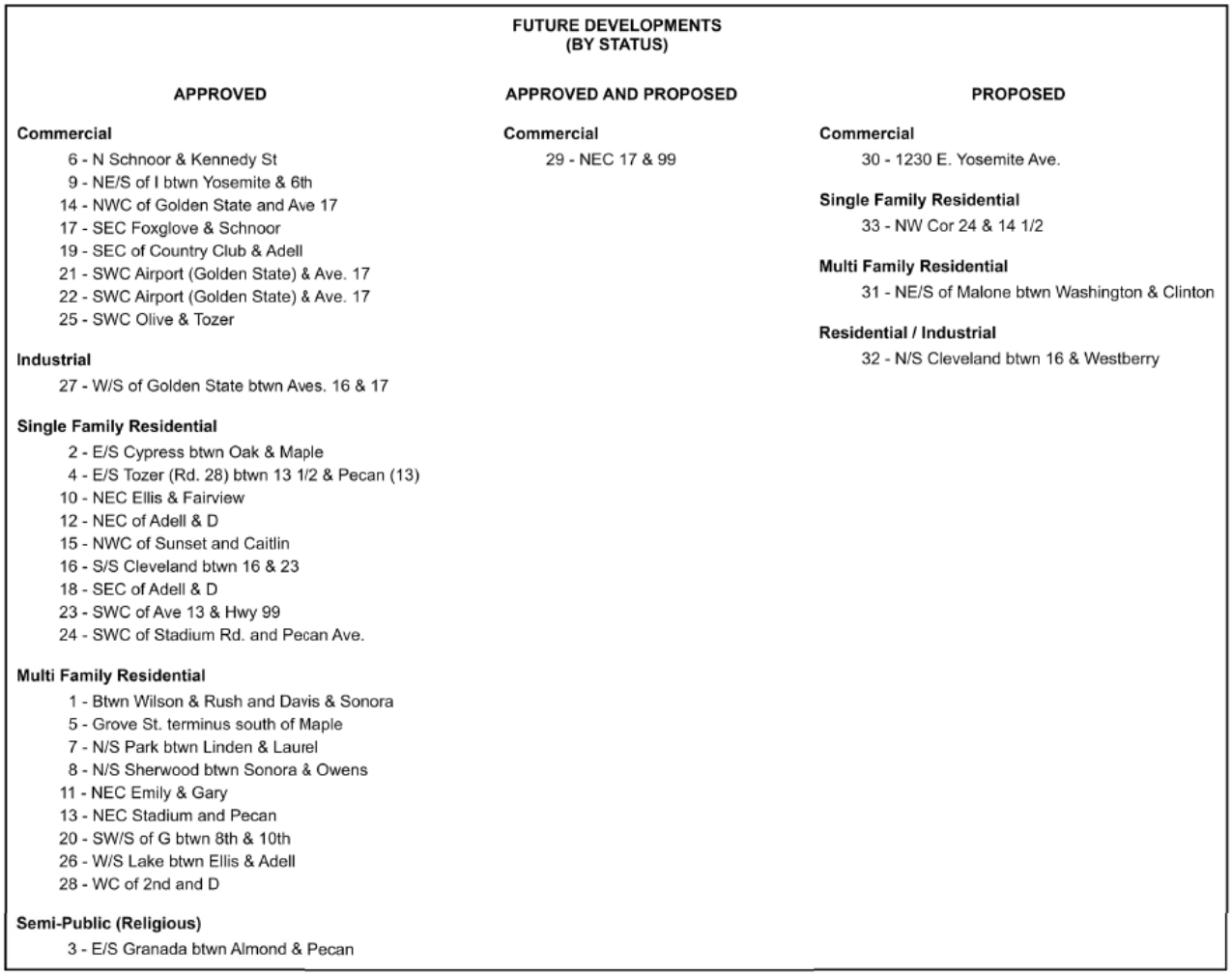


Table B-14 City of Madera – Future Development Areas by Map ID, Parcels, and Acres

Site / Map ID	Future Development Status	Total Parcels	Total Acres	Total Improved Parcels	Total Improved Acres
Btwn Wilson & Rush and Davis & Sonora (Map ID 1)	Approved	2	0.3		
E/S Cypress btwn Oak & Maple (Map ID 2)	Approved	1	0.2		
E/S Granada btwn Almond & Pecan (Map ID 3)	Approved	1	8.4	1	8.4
E/S Tozer (Rd. 28) btwn 13 1/2 & Pecan (13) (Map ID 4)	Approved	1	28.1	0	0
Grove St. terminus south of Maple(Map ID 5)	Approved	2	3.0	1	2.2
N Schnoor & Kennedy St (Map ID 6)	Approved	1	1.9	0	0
N/S Park btwn Linden & Laurel (Map ID 7)	Approved	3	0.7	0	0
N/S Sherwood btwn Sonora & Owens (Map ID 8)	Approved	1	1.4	0	0
NE/S of I btwn Yosemite & 6th (Map ID 9)	Approved	1	0.2	0	0
NEC Ellis & Fairview (Map ID 10)	Approved	1	6.3	0	0

Site / Map ID	Future Development Status	Total Parcels	Total Acres	Total Improved Parcels	Total Improved Acres
NEC Emily & Gary (Map ID 11)	Approved	1	4.5	0	0
NEC of Adell & D (Map ID 12)	Approved	2	9.1	1	4.1
NEC Stadium and Pecan (Map ID 13)	Approved	1	5.2	0	0
NWC of Golden State and Ave 17 (Map ID 14)	Approved	1	10.3	0	0
NWC of Sunset and Caitlin (Map ID 15)	Approved	1	0.1	0	0
S/S Cleveland btwn 16 & 23 (Map ID 16)	Approved	1	38.1	1	38.1
SEC Foxglove & Schnoor (Map ID 17)	Approved	2	19.4	0	0
SEC of Adell & D (Map ID 18)	Approved	3	7.8	0	0
SEC of Country Club & Adell (Map ID 19)	Approved	1	1.4	0	0
SW/S of G btwn 8th & 10th (Map ID 20)	Approved	1	0.3	0	0
SWC Airport (Golden State) & Ave. 17 (Map ID 21)	Approved	1	1.5	0	0
SWC Airport (Golden State) & Ave. 17 (Map ID 22)	Approved	1	1.1	0	0
SWC of Ave 13 & Hwy 99 (Map ID 23)	Approved	1	135.6	1	135.6
SWC of Stadium Rd. and Pecan Ave. (Map ID 24)	Approved	1	18.7	0	0
SWC Olive & Tozer (Map ID 25)	Approved	1	4.9	0	0
W/S Lake btwn Ellis & Adell (Map ID 26)	Approved	1	2.4	0	0
W/S of Golden State btwn Aves. 16 & 17 (Map ID 27)	Approved	1	17.2	0	0
WC of 2nd and D (Map ID 28)	Approved	1	0.3	0	0
NEC 17 & 99 (Map ID 29)	Approved & Proposed	1	99.6	0	0
1230 E. Yosemite Ave. (Map ID 30)	Proposed	5	4.5	1	0.2
NE/S of Malone btwn Washington & Clinton (Map ID 31)	Proposed	1	0.5	0	0
N/S Cleveland btwn 16 & Westberry	Proposed	1	71.4	1	71.4
NW Cor 24 & 14 1/2	Proposed	1	58.3	1	58.3
Total		**45**	**563**	**8**	**318**

Source: City of Madera

B.4.2. Hazard Identification

The City of Madera identified the hazards that affect the City and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the City (see Table B-15). Those hazards identified as a high or medium significance in Table B-15 are considered City of Madera priority hazards for mitigation planning. Those hazards that occur infrequently or have little or no impact in the City were determined to be of low significance and not considered a priority hazard. Significance was determined based on the hazard profile, focusing on key criteria such as frequency, extent, and resulting damage, including deaths/injuries and property, natural and cultural resources, and economic damage. The ability of a jurisdiction to reduce losses through implementation of existing and new mitigation measures

was also considered as to the significance of a hazard. This assessment was used to prioritize those hazards of greatest significance, enabling the City to focus resources where they are most needed.

Table B-15 City of Madera—Hazard Identification Assessment

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Agricultural Hazard: Severe Weather/Pests/Invasives	Significant	Occasional	Limited	Low	Medium
Climate Change	Extensive	Likely	Limited	Medium	--
Dam Failure	Significant	Unlikely	Catastrophic	High	Low
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake (w/subhazards)	Extensive	Occasional	Limited	High	Low
Floods: 1%/0.2% annual chance (w/levee failure)	Significant	Unlikely	Critical	High	Medium
Floods: Localized Stormwater	Significant	Highly Likely	Critical	High	Medium
Hazardous Materials Transportation	Limited	Occasional	Negligible	Low	Low
Landslide, Mudslide, Debris Flow	Limited	Unlikely	Negligible	Low	Medium
Severe Weather: Extreme Cold, Freeze, and Snow	Extensive	Likely	Limited	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	High	High
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)	Extensive	Likely	Limited	Medium	Medium
Severe Weather: High Winds and Tornadoes	Extensive	Likely	Limited	Medium	Medium
Wildfire (w/smoke and air quality)	Extensive	Likely	Limited	Medium	Medium/High

Geographic Extent

Limited: Less than 10% of planning area

Significant: 10-50% of planning area

Extensive: 50-100% of planning area

Likelihood 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 the next year or has a recurrence interval of 10 years or less.

Occasional: Between 1 and 10% chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.

Unlikely: Less than 1% chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

Catastrophic: More than 50 percent of property severely damaged; 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 and/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

Climate Change Influence

Low: Minimal potential impact

Medium: Moderate potential impact

High: Widespread potential impact

B.4.3. Hazard Profiles and Vulnerability to Specific Hazards

This section includes the hazard profiles and vulnerability assessment for hazards ranked of medium or high significance specific to the City of Madera (as identified in the Significance column of Table B-15) and also includes a hazard profile and vulnerability assessment to the four primary hazards to the State of California: dam failure, earthquake, flood, and wildfire, regardless of the significance ranking by the City. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Madera County Planning Area. Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.2 of the Base Plan.

Hazard Profiles and Vulnerability Assessment

Each hazard is profiled in the following format:

- **Hazard Profile** – A hazard profile is included for each hazard. This includes information on:
  - ✓ **Hazard Overview** – A general discussion of the hazard and related issues is detailed here.
  - ✓ **Location** and **Extent** - Location is the geographic area within the City that is affected by the hazard. Extent is the expected range of intensity for each hazard. These are discussed in specific detail for mapped hazards, and in more general detail for those hazards that do not have discrete mapped hazard areas.
  - ✓ **Past Occurrences** – Past occurrences are discussed for each hazard. A discussion of disaster declarations is included in each hazard section. NCDC events are also discussed. Other past occurrences data specific to the City follow the disaster declarations and NCDC events for each hazard.
  - ✓ **Climate Change** – This section contains the effects of climate change (as applicable). The possible influence of climate change on the hazard is discussed.

After the hazard profile, a vulnerability assessment is presented. As part of the vulnerability assessment, an estimate of the vulnerability of the City to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- **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. Here 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.
- **Extremely High**—Very widespread with catastrophic impact.

After this classification, a general discussion of hazard vulnerabilities occurs. This is done in the following format:

- **Local Concerns** – This includes City provided information on how the City is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same order as in Section B.4.1 above, with a few exceptions. This includes sections on: People and Populations; Structures; Critical Facilities and Infrastructure, and Natural, Historic, and Cultural Resources. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped. Sections on Community Lifelines and Economic Assets and Community Activities of Value are not included in the Sections below, as they are fully covered in Section B.4.1 above and in Chapter 4 of the Base Plan.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the City and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset.
- **Future Conditions/Future Development** – A discussion of how future conditions and future development may affect the hazard is also included. This is addressed specifically for mapped hazards, and in more general terms for those hazards that are unmapped.

Power Interruption/Power Failure: A Common Vulnerability of all Hazards

An impact of almost all hazards evaluated as part of this LHMP Update relates to power shortage and/or power failures. The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the U.S. Department of Energy, major blackouts are on the upswing. Incredibly, over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. In addition to blackouts, brownouts can occur. A brownout is an intentional or unintentional drop in voltage in an electrical power supply system. Intentional brownouts are used for load reduction in an emergency. Electric power disruptions can be generally grouped into two categories: intentional and unintentional. More information on types of power disruptions can be found in Section 4.3 of the Base Plan.

Public Safety Power Shutoff (PSPS)

An intentional disruption type of power shortage/failure event has been recently implemented in California as a result of wildfires starting as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), are preparing all Californians for the threat of wildfires and power outages during times of extreme (fire) weather. To help protect customers and communities during extreme fire weather events, electric power may be shut off for public safety in an effort to proactively prevent wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3 of the Base Plan.

In addition to PSPSs, to help prevent wildfires, electric utilities have begun to evolve safety efforts. This includes installing safety settings on powerlines in and around high fire-risk areas. These are known as

Enhanced Powerline Safety Settings (EPSS), and they help prevent falling tree branches, animals and other hazards from starting a wildfire. By stopping ignitions, it helps prevent wildfires from starting and spreading. According to PG&E, if ignitions occur, the size of fires are much smaller due to EPSS. In 2022, there was a 99% decrease in acres impacted by ignitions (as measured by fire size from electric distribution equipment (compared to the 2018-2020 average). This decrease occurred despite dry conditions.

Local Concerns

There has been no PSPS event for the City since the program started.

Climate Change

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

Climate change adaptation is a key priority of the State of California. The 2023 State of California Multi-Hazard Mitigation Plan noted that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the State's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

California's Adaptation Planning Guide: Understanding Regional Characteristics (from 2017) has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. The City falls in the North Central Valley Region. A map and climate projections for this region are shown in Section 4.3.7 of the Base Plan and include an increase in temperatures, moderate changes in rainfall, and increased risk to wildfire.

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the City of Madera, the Madera County Planning Area, surrounding counties, and State of California. There is no scale to measure the extent of climate change. Climate change exacerbates other hazards, such as drought, extreme heat, flooding, wildfire, and others. The speed of onset of climate change is very slow. The duration of climate change is not yet known but is feared to be tens to hundreds of years.

Past Occurrences

Disaster Declaration History

Climate change has never been directly linked to any declared disasters.

NCDC Events

NCDC does not track climate change events.

City of Madera Events

The City Planning Team noted that climate change is an ongoing vulnerability. Specific past occurrences were:

- **Warming Temperatures:** Madera and the surrounding region have experienced warming temperatures, both in winter and summer, with accelerated warming over the last decade.
- **Increased Extreme Heat Events:** Heat waves have become more frequent and potentially longer lasting, with potentially significant impacts on the health of the population and local ecosystems.
- **More Erratic Weather:** Weather extremes, including heat and precipitation, have intensified and become more erratic since 2018.
- **Impacts on Infrastructure:** Increased heat and precipitation extremes are expected to have impacted transportation and other infrastructure within the region, such as accelerating pavement wear.
- **Drought Conditions:** Recent years have seen increased variability in precipitation.

Vulnerability to Climate Change

The whole of the City is at some measure of vulnerability to climate change. The City Planning Team has concerns that the vulnerability of the City to climate change will continue to increase in the future. An assessment of a community's vulnerability to climate change begins with an understanding of local exposure to climate change. This is included in the Local Concerns section below followed by a discussion of the City's assets at risk and impacts to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Climate change will require the City of Madera to prepare for warmer and more extreme temperatures, decreased water supply, drought, flooding, increasing energy and water demand, and public health risks. In California, average temperatures are projected to rise as much as 9 degrees Fahrenheit by 2100. This is especially pertinent for Madera where extreme heat events are likely to increase and urban heat islands may intensify already high temperatures. Characterized by asphalt roads, concrete roofs, and energy use, urban developments modify the natural landscape using materials that create and/or retain heat.

Additionally the City noted impacts like temperature increases, climate-sensitive diseases, extreme weather events (droughts), and air quality. The Environmental Protection Agency provides there may be direct temperature effects through increases in average temperature leading to more extreme heat waves and less extreme cold spells. Those living in warmer climates (such as the City of Madera) are likely to experience more stress and heat-related problems. Heat-related problems include heat waves, heat rash and heat stroke. Aspects of extreme weather can include drought (City is a sole source aquifer and while the City does not

retain surface water rights; decline in Sierra snowpack can result in less opportunity for recharge where conveyances allow). In addition, climate-sensitive diseases may increase, such as those spread by mosquitoes and other disease-carrying insects. Locally, the City of Madera has a consistent risk of local transmission of such diseases including malaria, West Nile virus, encephalitis, Dengue and Yellow Fever). Extreme events such as flooding can displace people and agriculture. Climate change may also contribute to local air quality problems (designated as a non-attainment area for ozone and particulates) from increased frequency of smog and particulate air pollution.

The City noted that it has plans and capabilities in regard to climate change:

- The City of Madera addresses greenhouse gas in the Conservation Element of the General Plan. The Conservation Element provides goals, policies, and action items that work to meet or exceed all current and future state-mandated targets for reducing emissions of greenhouse gases, including the policies and action items from the Conservation Element, listed in Table 4.8.D, including but not limited to, implementation and enforcement of State and Regional regulations pertaining to GHG and climate change.
- City of Madera Climate Action Plan. The City of Madera Climate Action Plan (CAP) 28 is a long-range plan to reduce GHG emissions from City government (municipal) and community-wide activities within the City of Madera and prepare for the anticipated effects of climate change. Specifically, the CAP is designed to:
  - ✓ Benchmark Madera's 2007 GHG emissions and 2020 and 2030 projected emissions;
  - ✓ Establish GHG emissions targets for the years 2020 and 2030 to support California's larger effort to reduce statewide emissions under AB 32 and Executive Orders S-3-05 and B-30-15
  - ✓ Provide a roadmap for achieving the City's GHG emissions reduction targets;
  - ✓ Fulfill City of Madera General Plan Action Item CON-36.2, which directs the City to prepare the CAP; and
  - ✓ As a qualified CAP, support the streamlining of the environmental review process for future projects within Madera in accordance with State California Environmental Quality Act (CEQA) Guidelines Sections 15152 and 15183.5.

Assets at Risk

Assets at risk from climate change include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

Climate change affects people and populations within a community, especially those climate change issues related to increases in temperature over time. While all populations can be affected by temperature extremes, populations particularly vulnerable include the very old and very young, medically fragile people, people without means of shelter (and air conditioning or heat) or transportation, people who are socially isolated and other vulnerable or underserved populations (as shown in the discussion in Section B.4.1). Acclimatization to extreme temperatures and other weather extremes may help reduce impacts from these extreme events, such as from heat waves, in the healthy general population but may not be sufficient to protect those with underlying medical conditions.

Structures

Climate change, on its own, does not generally impact structures. However, structures in areas of increased wildfire, flood, or other areas exacerbated by the effects of climate change would be at increased risk, as described throughout this LHMP. More information on how structures may be affected by climate change can be found in Section 4.3.7 of the Base Plan.

Critical Facilities and Infrastructure

As with structures, critical facilities and infrastructure in areas of increased wildfire, flood, or other areas due to the effects of climate change would be at increased risk. Climate change is expected to increase the vulnerability of critical facilities and infrastructure to many natural hazards.

Natural, Historic, and Cultural Resources

The rivers, streams, agricultural areas, and open space areas of the City supports rich biodiversity, including many special-status species and habitat areas. These are all at risk from the effects of climate change. In addition, if heat continues to contribute to changes in wildfire patterns, all areas (on land) of the City are at increased risk from fire – including natural, historic, and cultural resources. Furthermore, as climate change exacerbates the drought hazard, areas of wetlands in the City may be reduced or dry up temporarily, which could damage habitat areas for waterfowl and other species that depend on these areas.

Impacts from Climate Change

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Central Valley Region in which the City is part of:

- Increased temperatures
- Reduced precipitation
- Public health – heat and air pollution
- Reduced agricultural productivity
- Inland flooding
- Reduced tourism

In addition to these sources, the 2023 State of California Hazard Mitigation Plan noted that according to California's Fourth Climate Change Assessment, the state will experience the following climate impacts:

- Annual average daily high temperatures are expected to rise by 2.7° F by 2040, 5.8°F by 2070, and 8.8°F by 2100 compared to observed and modeled historical conditions. These changes are statewide averages.
- Heat waves are projected to become longer, more intense, and more frequent.
- Warming temperatures are expected to increase soil moisture loss and lead to drier conditions. Summer dryness may become prolonged, with soil drying beginning earlier in the spring and lasting longer into the fall and winter.
- Droughts are likely to become more frequent and persistent through 2100.
- The strength of the most intense precipitation and storm events affecting California is expected to increase.

- Snowpack levels are projected to decline significantly by 2100 due to reduced snowfall and faster snowmelt.
- Marine layer clouds are projected to decrease.
- Extreme wildfires (i.e., fires larger than 24,710 acres) would occur 50 percent more frequently. The maximum area burned statewide may increase 178 percent by the end of the century.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City include the following:

- As climate change continues to accelerate over time, climate related impacts to the City will continue to increase.
- Climate change can influence population growth in the City over time. While the City is expected to see slow and steady growth, the City could see population fluctuations as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to impact demand for housing and other development. The 33 areas provided by the City as growth areas over the next 5 years do not delineate the exact number of homes to be added. However, there are 563 acres planned for development (for residential, industrial, commercial, and other uses), which would indicate that a somewhat sizable number of homes would be built. Further, while there are currently no formal studies of specific migration patterns expected to impact the City and larger Madera County region, climate-induced migration was recognized within the UNFCCC Conference of Parties Paris Agreement of 2015 and is expected to be the focus of future studies. Changes in population and population patterns that would come with the 33 future development areas would likely increase the impacts associated with this hazard. Additionally, climate change may also influence future population growth in the County.
- Land use planning should be proactive to address future hazard conditions. Significant development is planned in the City as previously described in the City's specific plans, areas recently annexed for development and 33 active development projects. The increasing severity and frequency of storms and other weather events and natural hazards due to the changing climate should be taken into account while considering land use planning and development in the City. Changes in land use and development may or may not increase the impacts and associated vulnerabilities of the City to this hazard depending on where and how this future growth occurs and the extent of future climate change influence in the City.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups that reside within the City are considered can help to make for a more disaster resilient community.

Dam Failure

Likelihood of Future Occurrence–Unlikely
Vulnerability– Extremely High

Hazard Profile

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 are usually 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 given year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped or fail. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failure is a natural disaster from two perspectives. First, the inundation from released waters resulting from dam failure is related to naturally occurring floodwaters. Second, a total dam failure would most probably happen as a consequence of the natural disaster triggering the event, such as an earthquake.

Location and Extent

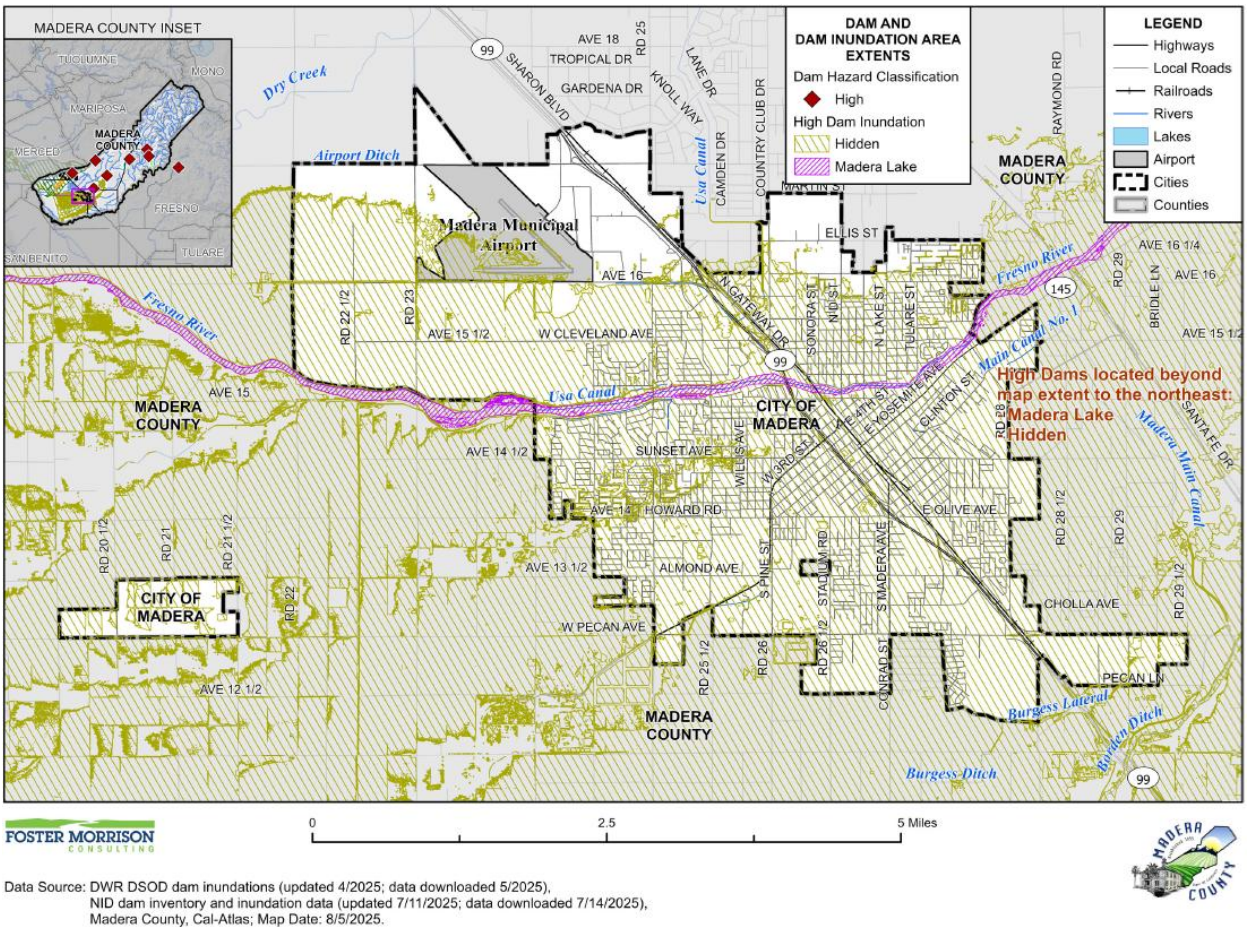
An inventory map of dams located within Madera County was shown in Section 4.3.8 in the Base Plan. Dams with an inundation area within the City of Madera are shown on Figure B-15. No extremely high hazard dams intersect the City; as such, no mapping or tabular analysis is presented. The City is affected by two high hazard dams – Hidden and Madera Lake.

There is no scale with which to measure dam failure. However, FEMA and CA DWR Division of Safety of Dams (DSOD) assign hazard potential classifications to dams within the State that provides information on the potential impact should a dam fail. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. FEMA categorizes the downstream hazard potential into three categories in increasing severity: Low, Significant, and High. DSOD adds a fourth category of Extremely High. Dams are classified in these four categories that identify the potential hazard to life and property. These were discussed in more detail in Section 4.3.8 of the Base Plan.

While a dam may fill slowly with runoff from winter storms, a dam break has a very quick speed of onset. The duration of dam failure is generally not long – only as long as it takes to empty the reservoir of water the dam held back. For dam overtopping, the speed of onset is somewhat slower than that of a dam break, and the duration is longer (as evidenced in the 2017 Oroville Dam spillway event). The City would be affected for as long as the flood waters from the dam failure took to drain downstream.

Geographic flood extent from the DSOD dam inundation areas is shown on Figure B-15 as well as in Table B-16.

Figure B-15 City of Madera – High Hazard Dam Inundation Areas



Data Source: DWR DSOD dam inundations (updated 4/2025; data downloaded 5/2025), NID dam inventory and inundation data (updated 7/11/2025; data downloaded 7/14/2025), Madera County, Cal-Atlas; Map Date: 8/5/2025.

Table B-16 City of Madera – Dam Inundation Areas Geographical Extents

Dam Inundation Area	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Hidden	8,303	78%	5,635	87%	2,669	64%
Madera Lake	124	1%	2	0.03%	122	3%

Source: DSOD, Madera County GIS

Past Occurrences

Disaster Declaration History

There have been no state or federal disaster declarations for dam failure in Madera County.

NCDC Events

The NCDC does not contain any dam failure events for Madera County.

City of Madera Events

The City Planning Team noted no past occurrences of dam failure to affect the City.

Climate Change and Dam Failure

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with dam failure. More information on future impacts to the City can be found below and in the Future Conditions/Future Development section of the Vulnerability Assessment below.

The 2023 California State Hazard Mitigation Plan noted that modeling described in California's Fourth Climate Change Assessment projects less frequent but more extreme daily precipitation. Year-to-year precipitation will become more volatile, and the number of dry years will increase by mid-century. As the climate continues to warm, atmospheric rivers will carry more moisture, and extreme precipitation may increase. Climate model projections show a tendency for the northern part of the State to become wetter. Increases in both precipitation and heat causing snow melt in areas upstream of dams could increase the potential for dam failure and uncontrolled releases in Madera County. The City, could be affected by these changes, especially in those areas of the City located within dam inundation areas.

Vulnerability to Dam Failure

The vulnerability of the City to dam failure flooding would vary depending on which dam fails and the nature and extent of the dam failure and associated flooding. An assessment of a community's vulnerability to dam failure begins with an understanding of local exposure to dam failure. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

General Concerns

Dam failures can result from a number of natural or man-made causes such as earthquakes, erosion of the face or foundation, improper siding, rapidly rising flood waters, structural/design flaws, and deliberate human actions. Madera's location downstream of Hidden Dam also raises the potential for flooding in the highly unlikely event of a failure of the dam.

As noted above, the City of Madera is located downstream of major flood control infrastructure, including federally managed dams such as Hidden Dam (Hensley Lake). Hidden Dam is a federally owned earth-fill dam constructed by the U.S. Army Corps of Engineers for flood control and water storage. Climate change poses growing concerns for existing dam systems that were originally designed based on historical hydrologic patterns that are no longer reliable under changing climate conditions and a historical climate that is no longer representative of current extremes. Dam failure has potential to cause loss of human life,

significant property damage, and infrastructure disruption downstream, including the entirety of the City of Madera.

Climate change is projected to increase the frequency and intensity of extreme precipitation events (e.g., atmospheric river storms and rapid snowmelt). Infrastructure like Hidden Dam, which was largely designed based on historical hydrologic records, may not be fully resilient to these evolving conditions. Such events can strain spillway capacity, raise reservoir levels rapidly, and increase the risk of overtopping or structural stress, which are leading mechanisms of dam failure.

Although routine inspections and maintenance reduce current risk, climate change impacts such as heavier downpours, increased runoff, and alterations in seasonal precipitation patterns can change the hydrograph (flow regime) above these dams, requiring operators to reconsider storage and release protocols. Increased sedimentation from wildfire-affected watersheds — more common with climate warming — can reduce reservoir capacity and degrade spillway performance, further challenging dam safety.

The entire City of Madera lies within the potential inundation area should Hidden Dam fail. Inundation from a dam breach could quickly inundate urban areas, critical infrastructure (roads, utilities, hospitals), homes, and businesses, leading to loss of life, displacement of residents, and economic disruption. Studies of local hazard plans identify dam failure as a significant flood hazard scenario and emphasize that catastrophic failure could overwhelm local emergency response capabilities.

Madera Lake and associated smaller control structures receive water from the Fresno River system. While not typically classified separately as large hazard dams, their performance is tied to flows from upstream reservoirs. Variability in releases from Hidden Dam, especially during extreme events can lead to higher peak flows into the Madera Lake system, increasing the risk of overtopping and hydraulic stress downstream. Climate change–driven shifts toward more intense seasonal storms can exacerbate these dynamics.

Socioeconomic factors further heighten Madera's vulnerability to climate hazards and consequences. A high proportion of disadvantaged and environmental justice communities limits adaptive capacity and recovery potential following hazard events.

EOP Concerns

Pages 334-336 of the City's EOP discuss Dam Failure. Page 515 (Figure C-14) displays inundation maps of various dams in the region, including Hidden Dam which would inundate the entire City of Madera if it were to fail. There is no specific Action Plan in the EOP as far as what actions to take.

Aemy Corps of Engineers Concerns

The City has a copy of an emergency action plan from the Army Corps of Engineers regarding Hidden Dam. However, this is information For Official Use Only and not allowed to be disclosed to the public.

Assets at Risk

Assets at risk from dam failure include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All people and populations located in dam inundation areas are vulnerable to dam failure. Certain vulnerable populations may be at increased risk to dam failure, especially during a large event with minimal advance notice. These vulnerable populations may include: the unsheltered, those with limited mobility, and those that lack the resources to leave the area.

City residents that live in these dam inundation areas are often the most vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events. To further evaluate the impact to the City of Madera's residential populations located in these hazard areas, a separate analysis was performed to determine residential populations in the dam inundation areas. The DSOD dam inundation areas were overlayed on the parcel layer. Those residential parcel that intersect the dam inundation areas were counted and multiplied by the Census Bureau average household factors for the City of Madera – 3.38. This is shown in Table B-17.

Table B-17 City of Madera – Improved Residential Parcels and Population by Dam Inundation Area

Dam Hazard Class/Jurisdiction/Dam Inundation Area	Improved Residential Parcels	Population
Hidden	14,074	47,870
Madera Lake	25	84

Source: DSOD, Madera County 2024 Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size –City of Madera (3.38).

The City noted that the Critical Facilities and Infrastructure section below includes the facilities used by At-Risk populations that are threatened by this hazard. While this is not specific to what special populations reside in the City, it does speak to facilities that area used to serve (portions) of this population.

Structures

Most structures in the City have some measure of risk to dam failure. Dam failure flooding can affect the built environment of the City. Structures in dam inundation areas are at risk and depending on flood depths, can range from slight damage to totally inundated. Analysis by extremely high hazard and high hazard dam follows.

A GIS based analysis was used to determine the possible impacts of dam inundation flooding on parcels and structures within the City of Madera. The methodology described in Section 4.3.8 of the Base Plan was followed in determining City parcels and structures at risk to dam failure. Parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values that fall within dam inundation areas in the City are

presented below by hazard classification and by dam. The results are presented in Table B-18 for the dams that affect the City.

Table B-18 City of Madera – Count and Value of Parcels and Structures in High Hazard Dam Inundation Area by Property Use

Dam Inundation Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Hidden							
Agricultural	65	49	$36,306,886	$8,482,076	$34,995	$8,482,076	$53,306,033
Commercial	967	739	$167,770,672	$510,080,182	$39,225,619	$510,080,182	$1,227,156,655
Government	195	1	$4,393,793	$12,481	$0	$12,481	$4,418,755
Industrial	153	91	$31,277,156	$119,111,051	$58,301,574	$178,666,577	$387,356,358
Institutional	81	59	$3,317,957	$27,525,410	$132,915	$27,525,410	$58,501,692
Recreational	7	0	$1,705	$0	$0	$0	$1,705
Residential	14,916	14,074	$710,227,059	$2,554,544,543	$3,674,962	$1,277,272,272	$4,545,718,836
Right of Way	31	1	$83,614	$46,163	$0	$46,163	$175,940
Utilities	10	1	$96,652	$163,844	$2	$163,844	$424,342
Unknown	42	1	$1,746,582	$187,553	$0	$187,553	$2,121,688
Hidden Total	**16,467**	**15,016**	**$955,222,076**	**$3,220,153,303**	**$101,370,067**	**$2,002,436,557**	**$6,279,182,003**
Madera Lake							
Agricultural	5	4	$1,825,257	$890,587	$0	$890,587	$3,606,431
Commercial	7	2	$437,534	$571,936	$2	$571,936	$1,581,408
Government	16	0	$6,902	$0	$0	$0	$6,902
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	2	1	$382,503	$2,013,500	$0	$2,013,500	$4,409,503
Recreational	4	0	$1,705	$0	$0	$0	$1,705
Residential	33	25	$2,648,347	$2,380,566	$0	$1,190,283	$6,219,196
Right of Way	0	0	$0	$0	$0	$0	$0
Utilities	0	0	$0	$0	$0	$0	$0
Unknown	1	0	$542	$0	$0	$0	$542
Madera Lake Total	**68**	**32**	**$5,302,790**	**$5,856,589**	**$2**	**$4,666,306**	**$15,825,687**

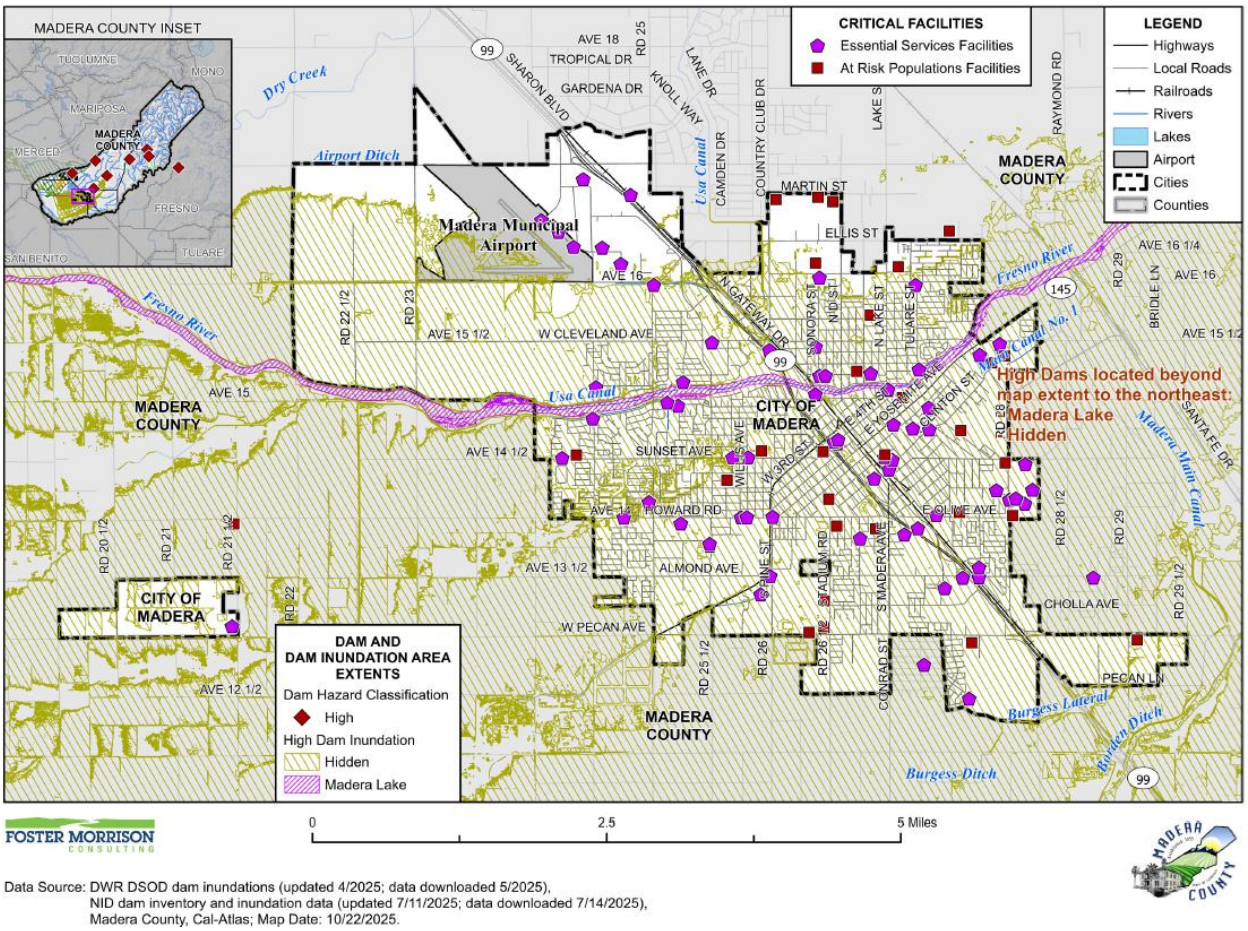
Source: DSOD, Madera County 2024 Parcel/Assessor Data

Critical Facilities and Infrastructure

Dam failure flooding presents a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the City to determine which critical facilities fall into each DSOD dam inundation area. This

was done separately for both extremely high hazard and high hazard dam inundation areas. Using GIS, the extremely high hazard dam inundation areas were overlayed on the critical facility GIS layer. The City has no extremely high hazard dam inundation areas; as such, no maps or tabular analysis is presented. Using GIS, the high hazard dam inundation areas were overlayed on the critical facility GIS layer. This is shown on Figure B-16 for the high hazard dam inundation areas. Table B-19 details which critical facilities fall in the high hazard dam inundation areas. Details of critical facility categories, type, name, and address by extremely high and high hazard dam inundation area are listed in Appendix F.

Figure B-16 City of Madera – Critical Facilities in High Hazard Dam Inundation Areas



Data Source: DWR DSOD dam inundations (updated 4/2025; data downloaded 5/2025), NID dam inventory and inundation data (updated 7/11/2025; data downloaded 7/14/2025), Madera County, Cal-Atlas; Map Date: 10/22/2025.

Table B-19 City of Madera – Critical Facilities by Category and Type in High Hazard Dam Inundation Areas by Category and Type

Jurisdiction / High Hazard Dam Inundation Area	Critical Facility Category / Type	Facility Count
Essential Services Facilities	Cogeneration Power	3
	Communications	5
	Community Services	6
	Fire Command Center	1

Jurisdiction / High Hazard Dam Inundation Area	Critical Facility Category / Type	Facility Count
	Fire Station	3
	Health / Medical	1
	Jail / Prison	1
	Pavilion	1
	Police	3
	Wastewater Lift Station	23
	Water Treatment	42
	Essential Services Facilities Total	**89**
At Risk Populations Facilities	Community Church	1
	Community Recreation Center	2
	School	21
	At Risk Populations Facilities Total	**24**
City of Madera Total		**113**

Source: Cal OES/DSOD, City of Madera

Natural, Historic, and Cultural Resources

A major dam failure event and associated flooding could have a devastating impact on the City. Large flood events can affect all natural, historic, and cultural resources that lie in the dam inundation areas. There are a number of ways floodwaters associated with a dam failure event can impact natural resources and the environment: Wildlife habitats can be destroyed by floodwaters. Contaminated floodwater can pollute rivers and habitats. Silt and sediment can destroy natural areas. Riverbanks and natural levées can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survive the initial flood may die due to being inundated with water. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to these structures within the inundated areas, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged, and lost during extreme dam failure flood events.

Impacts from Dam Failure

Impacts to the City from dam failure flooding could be extensive and widespread and include loss of life and injury, flooding and damage to property and structures, damage to critical facilities and infrastructure, loss of natural resources, and all other flood related impacts. Additionally, mass evacuations and associated economic losses can also be significant.

Other impacts associated with dam failure include landslides, bank erosion, and destruction of habitat. Dam failures can cause downstream flooding and can transport large volumes of sediment and debris and contaminants from the floodwaters. Other environmental impacts can include contamination from septic system failures and releases of contaminants from hazardous materials facilities, contamination of potable

water supplies; changes in configurations of streams; loss of wildlife habitats; and degradation of wetlands. A large dam failure event could have significant and catastrophic impacts.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the Climate Change and Dam Failure discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City include the following:

- Climate change is likely to exacerbate future rain and storm conditions and associated impacts and vulnerability of the City to dam failure.
- The City is expected to see slow and steady growth, and this additional growth within the dam inundation areas of the City would place additional populations at risk to dam failure. Many of the 33 future development areas would fall in a dam inundation area, which would raise the population residing or working on those areas. Additional population growth would likely bring continued diversity to the City. Vulnerable population groups could face disproportionate effects from a dam failure and should be planned for. Changes in population and population patterns that will come from new development will place more people within the dam inundation areas and would likely increase the impacts and vulnerability of the City to this hazard.
- Land use planning should be proactive to address future hazard conditions. Locating new development, structures, and critical facilities and infrastructure within or near areas of dam failure risk will put additional development at risk. 33 locations are expected to be developed in the next five years. Many of these fall inside of the dam inundation areas. City building codes are in effect to partially reduce this risk and should be updated as necessary to continue to address future dam failure conditions. Changes in land use and future development is likely to increase the impacts and associated vulnerabilities of the City to this hazard.

Future Development

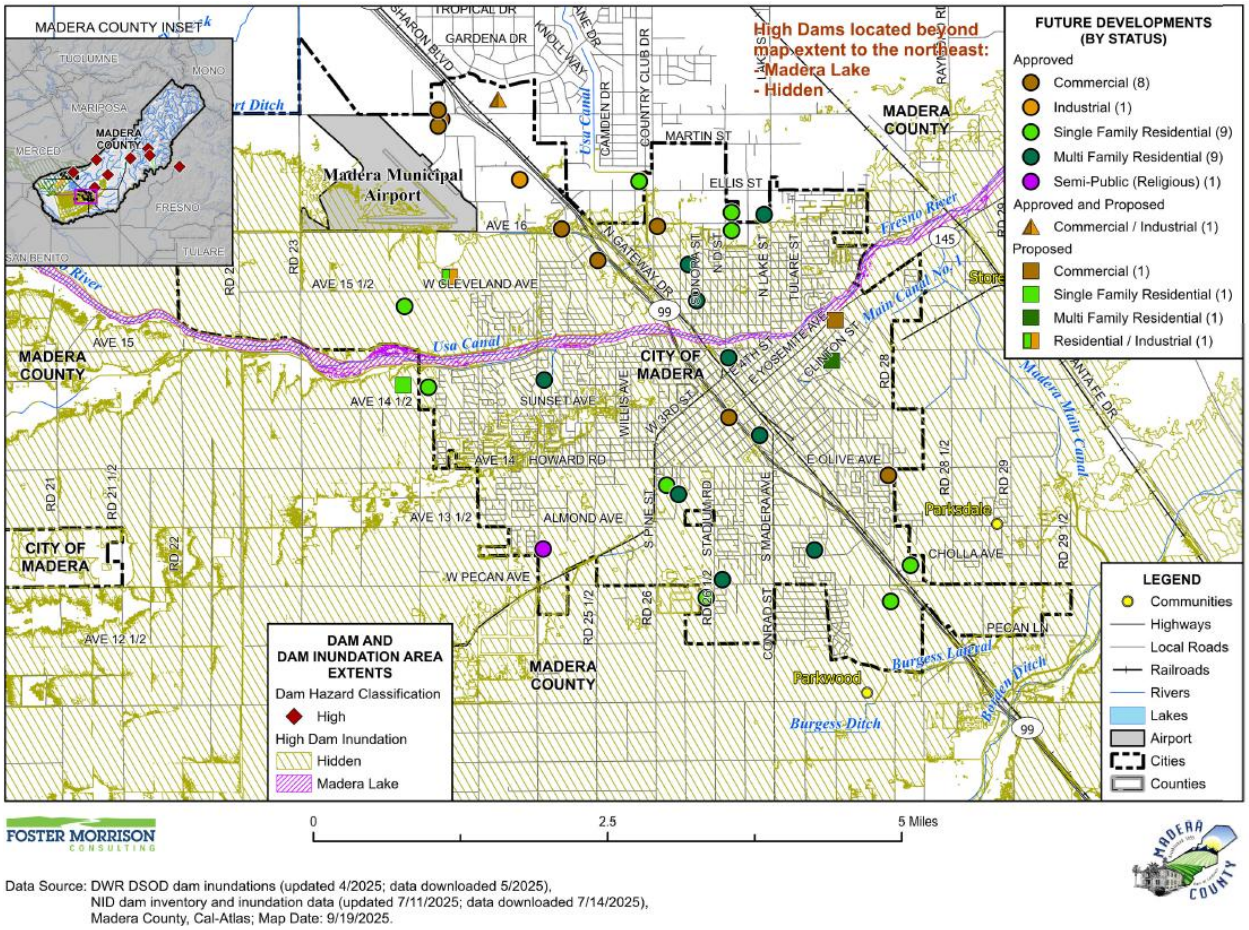
Future dam failure events may occur in the City. Given the number of affected parcels and structures, future development in the City would likely be affected by dam failures and associated flooding. Siting of future development areas should take dam failure flooding into account. The City enforces its floodplain ordinance, which helps to reduce risk to flooding by requiring structures to be above the base flood elevation which, depending on inundation depths, may provide some relief.

Future development areas and their vulnerability to dam failure are discussed further in the below GIS analysis.

GIS Analysis

The City of Madera provided 33 future development areas which were used as the basis for the inventory of future development for the City. These were mapped in GIS. Only high hazard dams inundation areas affect the City; as such, only high hazard dam inundation area analysis is presented. Figure B-17 shows the locations of the future development areas overlayed on the high hazard dam inundation areas. Only one dam (Hidden) intersects the future development areas. Future development affected by the Hidden Dam is detailed in Table B-20. As shown, 25 of the 33 future development areas fall in the Hidden Dam inundation area.

Figure B-17 City of Madera – Future Development Areas in High Hazard Dam Inundation Areas



Data Source: DWR DSOD dam inundations (updated 4/2025; data downloaded 5/2025), NID dam inventory and inundation data (updated 7/11/2025; data downloaded 7/14/2025), Madera County, Cal-Atlas; Map Date: 9/19/2025.

Table B-20 City of Madera – Future Development Areas in High Hazard Dam Inundation Areas by Map ID, Parcels, and Acres

Future Development / Property Use	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
High Dam Inundation Area – Hidden						
Btwn Wilson & Rush and Davis & Sonora (Map ID 1)						
Multi Family Residential	2		2	0.28		0.28
E/S Cypress btwn Oak & Maple						
Single Family Residential	1		1	0.23		0.23
E/S Granada btwn Almond & Pecan						
Semi-Public (Religious)	1	1		8.45	8.45	
E/S Tozer (Rd. 28) btwn 13 1/2 & Pecan (13)						
Single Family Residential	1		1	28.07		28.07
Grove St. terminus south of Maple						
Multi Family Residential	2	1	1	2.95	2.24	0.72
N Schnoor & Kennedy St						
Commercial	1		1	1.9		1.9
N/S Park btwn Linden & Laurel						
Multi Family Residential	3		3	0.72		0.72
N/S Sherwood btwn Sonora & Owens						
Multi Family Residential	1		1	1.43		1.43
NE/S of I btwn Yosemite & 6th						
Commercial	1		1	0.22		0.22
NEC Emily & Gary						
Multi Family Residential	1		1	4.53		4.53
NEC Stadium and Pecan						
Multi Family Residential	1		1	5.2		5.2
NWC of Sunset and Caitlin						
Single Family Residential	1		1	0.15		0.15
S/S Cleveland btwn 16 & 23						
Single Family Residential	1	1		38.11	38.11	

Future Development / Property Use	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
SEC Foxglove & Schnoor						
Commercial	2		2	19.44		19.44
SEC of Adell & D						
Single Family Residential	2		2	5.00		5.00
SEC of Country Club & Adell						
Commercial	1		1	1.37		1.37
SW/S of G btwn 8th & 10th						
Multi Family Residential	1		1	0.26		0.26
SWC of Ave 13 & Hwy 99						
Single Family Residential	1	1		135.59	135.59	
SWC of Stadium Rd. and Pecan Ave.						
Single Family Residential	1		1	18.70		18.70
SWC Olive & Tozer						
Commercial	1		1	4.92		4.92
WC of 2nd and D						
Multi Family Residential	1		1	0.34		0.34
1230 E. Yosemite Ave.						
Commercial	5	1	4	4.46	0.17	4.29
NE/S of Malone btwn Washington & Clinton						
Multi Family Residential	1		1	0.50		0.50
N/S Cleveland btwn 16 & Westberry						
Residential / Industrial	1	1		71.38	71.38	
NW Cor 24 & 14 1/2						
Residential	1	1		58.34	58.34	
Hidden Total	**35**	**7**	**28**	**413**	**314**	**98**
High Dam Inundation Area Total	**35**	**7**	**28**	**413**	**314**	**98**
Grand Total	**35**	**7**	**28**	**413**	**314**	**98**

Source: Cal OES/DSOD/NID, City of Madera

Drought & Water Shortage

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile

Drought and water shortage are complex issues involving many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects. Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water supply is the most significant issue and is critical for agriculture, manufacturing, tourism, recreation, and commercial and domestic use. Drought has also affected tree mortality in the area in the past. As the population in the area continues to grow, so will the demand for water.

Tree Mortality and Drought

One of the specific impacts of drought in the City of Madera and the Madera County Planning Area is the increased risk to trees from beetle kill and other insects, pathogens and parasites, and other tree mortality and die back issues. Drought weakens trees and makes them more susceptible to insect infestation and other pathogens. Insects, such as bark beetles and others, frequently attack trees weakened by drought, disease, injuries, or other factors that may stress the tree. These insects and other pathogens can contribute to the decline and eventual death of trees throughout the City. The tree mortality and dieback problems are a high priority because of the issue of hazardous trees and an increased wildfire hazard. In addition to an increase in wildfire fuels, hazardous trees can fall onto structures causing damage and a result in a reduction on the tree canopy within the City that provides relief during extreme heat days.

Location and Extent

Drought and water shortage are regional phenomenon. The whole of the City and County is at risk. The US Drought Monitor categorizes drought conditions with the following scale:

- None
- D0 – Abnormally dry
- D1 – Moderate Drought
- D2 – Severe Drought
- D3 – Extreme Drought
- D4 – Exceptional Drought

The Madera County Planning Area, including the City of Madera, has been in and out of drought since 2014. Over the last seven years since the 2018 LHMP, drought conditions have ranged from none to exceptional. Drought conditions are expected to continue to be cyclical in nature depending on the year." Current drought conditions in the City are shown in Section 4.3.9 of the Base Plan.

Drought has a slow speed of onset and a variable duration. Drought can last for a short period of time (which does not usually affect water shortages) or for longer periods (which may challenge water supplies). Should a drought last for a long period of time, water shortage becomes a larger issue.

Groundwater is the dominant source due to the region's reliance on wells, but surface water supplements agriculture, which consumes the majority of water in the surrounding County. Overdrafting of groundwater has led to challenges, prompting efforts like the Sustainable Groundwater Management Act (SGMA) to balance usage.

Past Occurrences

Disaster Declaration History

There have been four state and one federal disaster declarations for Madera County. This can be seen in Table B-21. Additionally, there have been 13 USDA Secretarial Disaster Declarations from drought in the County, as shown in Past Occurrences in Section 4.3.6 of the Base Plan.

Table B-21 Madera County –State and Federal Drought Disaster Declarations 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	4	1976, 2008, 2014, 2015	1	1977

Source: Cal OES, FEMA

NCDC Events

There have been 249 NCDC drought events in Madera County since 1993. These most likely had some impact on the City.

City of Madera Events

Based on historical information, the occurrence of drought in California, including the City of Madera, is cyclical, driven by weather patterns. Section 4.3.9 of the Base Plan notes that five droughts have occurred in the past 86 years, which impacted the City and Madera County Planning Area. The City Planning Team noted that the City has experienced multiple, consecutive years of drought. During droughts, surface water delivery to farmers is curtailed leading to increased pumping from the aquifer. In addition, current and all past occurrences have resulted in accelerated decline of the water table. Drought has occurred in the past and will occur in the future.

Climate Change and Drought and Water Shortage

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with drought and water shortage. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate scientists studying California find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years

underscore the need to examine more closely the state's water storage, distribution, management, conservation, and use policies. The 2024 Climate Adaptation Study (CAS) stresses the need for public policy development addressing long term climate change impacts on water supplies. The CAS notes that climate change is likely to significantly diminish California's future water supply, stating that: California must change its water management and uses because climate change will likely create greater competition for limited water supplies needed by the environment, agriculture, and cities.

A 2018 report from the Public Policy Institute of California noted that thousands of Californians – mostly in rural, small, disadvantaged communities – already face acute water scarcity, contaminated groundwater, or complete water loss. Climate change would make these effects worse.

Cal Adapt scenarios for modeled future drought scenarios were shown in Section 4.3.9 of the Base Plan.

Vulnerability to Drought and Water Shortage

Based on historical information, the occurrence of drought and water shortage in California, including the City, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts can be extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. The vulnerability of the City of Madera to drought may vary and include reduction in water supply, turf losses, impacts to natural resources, and an increase in dry fuels and tree dieback.

The whole of the City is at some measure of vulnerability to drought and water shortage. An assessment of a community's vulnerability to drought and water shortage begins with an understanding of local exposure to drought. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

General Drought Concerns

The City of Madera is a community surrounded largely by farmland that is rich in agriculture for a variety of crops including dairy, poultry, horse and cattle ranches that may utilize surface water deliveries from approximately June – September and/or from ground water pumping systems. During periods of droughts when the surrounding agricultural uses cannot receive surface deliveries of water, their increased pumping of ground water directly impacts the City's ability to pump from the common aquifer. Which can cause problems such as reduced pumping capacity and water quality.

The number and intensity of droughts are a key assumption within the modelling of how the Madera subbasin will ultimately achieve sustainability by the year 2040. Droughts, through actual data and

modeling are shown to significantly impact the water table. This impact can be experienced in a number of ways that include pumping capacity, water quality, and the economics of farming.

Climate change alters hydrologic patterns that are critical sources of water for the Central Valley. Reduced snowpack, shifts in the timing of snowmelt, and increases in temperature and evaporation diminish natural water storage and extend dry periods. Alterations to hydrology patterns and seasonal supplies complicate water supply planning and increases the likelihood of multi-year droughts, which can stress groundwater resources relied upon by the City of Madera.

The City of Madera has limited surface storage capacity and must rely on groundwater basins and smaller water storage facilities such as the City's existing 1-million-gallon Loy E. Cook water storage tower and the planned northeast water storage tank (City Project W-T-001) for supplemental supply, reliability resiliency.

Sustained drought conditions and overdraft result in declining aquifer levels reducing reliable supply, increasing pumping costs, and heightening the risk of well failures.

Domestic wells remaining within the City's boundary or which are located within the City's Sphere of Influence have gone dry during drought periods or are aging and lack regular maintenance making them more susceptible to drought-related outages when groundwater levels drop, requiring emergency and/or extraterritorial water service deliveries or reliance on hauled/bottled water solutions. Socioeconomic factors severely and further limit residents' adaptive capacity and recovery potential following domestic well failures, underscoring vulnerabilities in local water security.

Tree Mortality Concerns

We have lost approximately 10% of our larger trees due to drought conditions. The tree species would include Coastal Redwoods, Pine trees, and Some Bradford Pear trees, along with Douglas Fir. What the City has found over the years has been some diseases such as fire blight and aphids due to the excessive heat elements during longer summer months and hotter days.

Furthermore, the increase in limb failure due to the drought, along with other factors, is a serious concern. This not only affects the health of the trees but also poses a potential risk to City communities and the environment.

Assets at Risk

Assets at risk from drought and water shortage include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

The people and populations of the City are not directly affected by drought; although, their turfed areas, trees, and other water dependent resources can all be affected. In extreme drought conditions, however, residents and other populations within the City may be vulnerability to drought and water shortage issues.

Water quality can be impacted causing health problems, especially to vulnerable populations. Drought and water shortage can lead to an increase in wildfires threatening City residents. Water shortages can have an effect on all of the population in the City, but often have a greater effect on the unhoused and other vulnerable populations that may be unable to access clean drinking water during shortages. During periods of drought as the costs of water usage may increase, especially during mandated conservation times, those who are economically disadvantaged may be unable to afford the increased costs of potable water.

Structures

Structures have a limited vulnerability to drought and water shortage. It is the secondary hazard of drought (wildfire) which causes risks to structures. Drought can also stress trees, causing die off. These trees may fall on structures adjacent to them.

Critical Facilities and Infrastructure

Most critical facilities and infrastructure have a limited vulnerability to drought and water shortage. Should drought conditions be severe enough to cause water shortage reliability issues, some facilities and infrastructure may be affected. Water and wastewater systems may be impacted during times of reduced water supply and need to employ contingencies to remain functional and fully operational. Other water-dependent systems may also be adversely affected. Further, the secondary hazard of drought (increased potential for spread of urban fires and wildfire) can pose a significant risk to critical facilities and infrastructure. Sufficient water supply for firefighting can also be an issue. Drought can also stress trees, causing die off. These trees may fall on critical infrastructure adjacent to them and impact power lines and other utilities.

Natural, Historic, and Cultural Resources

Drought and water shortage can have a significant impact on natural resources. Water levels in reservoirs and lakes may be reduced and a loss of wetlands and coastal marsh areas may occur. Severe drought conditions can contribute to an increase in erosion of soils and lead to poor soil quality. Further, all of the trees in the City are at risk to drought impacts and a reduction in water supply. These trees provide a wealth of social and environmental benefits to City residents and visitors, from shade and beauty to air quality, carbon reduction and stormwater management. Drought can devastate crops and dry out pastures, dry out forests and critical habitat areas, and reduce food and water available for wildlife and livestock, the latter detailed above as a specific concern to the City. Additionally, drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. It is unlikely that drought and water shortage would have a significant impact on historic and cultural resources in the City.

Impacts from Drought and Water Shortage

The vulnerability of the City to drought is City-wide, but impacts may vary and include reduction in water supply and an increase in dry fuels. The potential for a reduction in water supply during drought conditions generally leads to both mandated and voluntary conservations measures during extended droughts. During these times, the costs of water can also increase. Also of concern, the increased dry fuels, fuel loads, and tree mortality events associated with drought conditions can result in an increased fire danger. In areas of

extremely dry fuels, the intensity and speed of fires can be significant. Water supply and flows for fire suppression can also be an issue during extended droughts. Drought can also lead to turf losses and cause tree die off within the City.

Other qualitative impacts associated with drought in the City are those related to water intensive activities such as municipal usage, commerce, tourism, and recreation use. With more precipitation likely falling as rain instead of snow in the Sierra's, and warmer temperatures causing decreased snowfall to melt faster and earlier, water supply is likely to become more unreliable. In addition, drought and water shortage is predicted to become more common. This means less water available for use over the long run, and additional challenges for water supply reliability, especially during periods of extended drought.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the hazard profile discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Madera include the following:

- Climate change is likely to exacerbate future drought conditions and associated impacts and vulnerability of the City to drought and water shortage.
- Future population growth should be considered as having more or less people in a community affects the overall hazard vulnerability to the City. Water shortages in the future may be worsened by drought, as the City relies on groundwater for its water source. The City is expected to see slow and steady growth, and any future population growth (like that shown in the 33 future development areas) in the City will add additional pressure to water companies during periods of drought and water shortage. Water companies will need to continue to plan for and add infrastructure capacity for population growth. As the population grows, the nature and makeup of populations will shift and change along with it. Vulnerable and underserved populations, such as those with low incomes and the unhoused that might not always have access to clean water, will need to be considered as future development continues, since they may experience a disproportionate impact from drought and water shortage. Potential population growth will be a challenge not only with regard to the City's water access for agricultural production, but state- and nation-wide with regard to food production. Should the City see a growth in population, it will increase the vulnerability and impacts to the County from this hazard.
- Land use planning should be proactive to address future hazard conditions. As the City continues to grow, more cropland may be taken out of production to provide housing to accommodate for population growth. As the areas adjacent to the City's agricultural lands are reduced, it seems likely that there would be less of a competing demand for water. However, more development will also require an increase in water supply and associated infrastructure. With the amount of growth planning in the City, changes in land use and development will likely increase the impacts and associated vulnerabilities of the City to this hazard, the extent, depending on where and how this future growth occurs.

As the population in the City continues to grow, so will the demand for water. Ongoing planning will be needed by the City and local water companies to account for population growth and increased water demands.

Earthquake

Likelihood of Future Occurrence–Occasional (minor)/ Likely (major)
Vulnerability–Extremely High

Hazard Profile

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, wastewater, power, gas, communication, and transportation. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. 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.

Location and Extent

Since earthquakes are regional events, the whole of the City is at risk to earthquake. The City of Madera, Madera County, and surrounding areas have some level of risk from seismic and geologic hazards. Faults in and around the City were shown in Section 4.3.10 of the Base Plan. Only one fault does cross through the southeastern portion of Madera County; this is an unnamed fault that is part of the Hartley Springs Fault Zone. Other nearby faults include the Hartley Springs Fault Zone, Hilton Creek Fault, Silver Lake Fault, Ortigalita Fault Zone, San Andreas Fault Zone, and Rinconada Fault Zone faults. A significant seismic event on any of these major faults could cause damage in the City of Madera.

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. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales, as discussed in Section 4.3.11 of the Base Plan.

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. The City is located in an area where earthquakes of some magnitude occur, so both magnitude and intensity of earthquakes are expected to remain low to moderate. Seismic shaking maps for the area in Section 4.3.10 of the Base Plan show Madera County and the City fall within a low to moderate shake risk.

Past Occurrences

Disaster Declaration History

There has been no state or federal disaster declarations in Madera County from earthquake.

NCDC Events

The NCDC does not track earthquake events.

City of Madera Events

As shown in the Base Plan, no disaster declarations have occurred in the County due to earthquake. The City noted that small earthquakes have occurred in the area, but none have caused any significant damage or impacts to the population, property, or related closures. The City of Madera has a relatively low probability of shaking and has historically been subject to low to moderate ground shaking. According to the Villages at Almond Grove Specific Plan DEIR, the City of Madera experienced the effects of ground shaking for several earthquakes with a magnitude of 6.0 or greater. The most recent (July 6, 2019) Ridgecrest earthquake had a magnitude of 7.1 and generated a weak (III) ground shaking intensity in the region. No earthquake with a magnitude of 5.5 or greater has ever been recorded in the Madera area, nor has any damage from earthquakes of magnitude 5.5 or greater ever been recorded in Madera County.

Climate Change and Earthquake

Climate change is unlikely to increase earthquake frequency or strength. More information on future impacts can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Vulnerability to Earthquake

The combination of plate tectonics and associated California coastal mountain range building geology generates earthquakes as a result of the periodic release of tectonic stresses 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 primary impacts of concern are life safety and property damage. Although several faults are in and near the Madera County Planning Area and the City, seismic hazard mapping indicates that the City has low to moderate seismic hazard potential. There is the potential for the City and Madera County Planning Area to be subject to some level of moderate seismic shaking. Some degree of structural damage due to stronger seismic shaking could be expected.

The whole of the City is at some measure of vulnerability to earthquake. An assessment of a community's vulnerability to earthquakes begins with an understanding of local exposure to earthquakes. This is included in the Local Concerns section below. After that section, assets at risk are discussed.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. The City of Madera is located within Zone 3.

The City Planning Team noted that no active earthquake faults are located in the City – the closest active faults are 50 or more miles distant. The lack of faults in the City reduces the possibility of damage from earth shaking in the City. Madera also does not have mapped liquefaction areas, a common earthquake-related hazard. However, the Almond Grove Specific Plan EIR noted that the City is located within the valley portion of Madera County, which is susceptible to greater ground shaking intensities. Because the valley is located on alluvium deposits, structures would suffer greater damage from grounds shaking.

Assets at Risk

Many assets in the City are at risk to ground shaking and other earthquake related impacts. Assets at risk from earthquake include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All people and populations are at risk from earthquake events. Those at heightened risk include:

- The unsheltered
- Infants and children under age five and their caregivers
- Senior (65 and older)
- Individuals with disabilities
- Individuals dependent on medical equipment
- Individuals with impaired mobility

The greatest risk to people and populations from earthquake is death and injury. More information on people and populations at risk to earthquake shaking events can be seen in the Hazus scenarios developed for this LHMP. More information on the Hazus scenarios and how the City and County is affected is included in Section 4.3.10 of the Base Plan.

Structures

All structures in the City are vulnerable to earthquakes, depending on the severity, location of the event age of structure relative to what building code the structure was designed for, and whether any seismic retrofits have been performed. The Hazus scenarios conducted for the entire Madera County Planning Area show how structures may be affected.

Critical Facilities and Infrastructure

Earthquake and its related hazards present risks to the City. Earthquakes can damage critical facilities and infrastructure that provide vital services to the City. Damage to critical facilities from the Hazus earthquake scenarios for the Madera County Planning Area, including the City of Madera, are presented in the Hazus analysis in Section 4.3.10 of the Base Plan. Given the nature of earthquake events causing significant ground shaking among other issues, those critical facilities and infrastructure that include underground components such as water and wastewater facilities would be uniquely vulnerable to damaging earthquakes.

Natural, Historic, and Cultural Resources

The 2023 State Hazard Mitigation Plan noted that environmental problems from earthquakes can be numerous. It is possible for earthquakes to reroute streams, which can change the water quality, possibly damaging habitat and feeding areas. Streams fed by groundwater and/or springs may dry up because of changes in underlying geology. Another threat to the environment from earthquakes is the potential release of hazardous materials into the natural environment causing contamination that can be difficult to contain. Historical and cultural resources are at risk, often due to their age and construction types. The Hazus scenarios in Section 4.3.10 of the Base Plan and included below are relatively silent on the vulnerability to natural, historic, and cultural resources, but impacts to these resources could be long lasting.

Impacts from Earthquake

Earthquakes can strike without warning and cause dramatic changes to the landscape of an area that can have devastating impacts on the built environment. The greatest impact is to life safety of the City of Madera residents and visitors. Other impacts to the City could include damages to infrastructure such as roads, bridges, and dams; damages and loss of services to utilities and critical infrastructure, including those related to gas, power, water, wastewater and communication systems; damages to structures and other development; and possible loss of life and injuries.

Earthquakes can also cause failure of dams, levees, and reservoirs. Facilities and land downslope from dams or water reservoirs or behind levees might be subject to flooding, if the dams, reservoirs, or levees fail as a result of an earthquake. The City has locations with significant flood risk that include facilities downslope from dams or reservoirs that could be affected by a significant earthquake event.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion

above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Madera include the following:

- Climate change is likely to have no effect on future earthquake conditions and associated impacts and vulnerability of the City.
- The City is expected to see slow and steady growth. There 33 areas which the City expects to see experience development over the next 5 years. Any additional growth in the City would place additional populations at risk to earthquake. Additional population growth would likely bring continued diversity to the City. Vulnerable population groups could face disproportionate effects from an earthquake and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location and severity of future earthquake events.
- Land use planning should be proactive to address future hazard conditions. There are 33 areas the City is planning to develop over the next five years. City building codes are in effect to reduce structure damage, including damage to critical facilities and infrastructure, and should be updated as necessary to continue to address future earthquake conditions. Depending on the location of new development and adherence to protective building codes, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the City to this hazard.

Although new growth and development corridors would fall in areas affected by earthquake, given the limited chance of major earthquake and the building codes in effect, development in areas prone to earthquakes will continue to occur. The City enforces the state building code, which mandates construction techniques that minimize seismic hazards. Future development in the City is subject to these building codes and land use planning.

Flood: 1%/0.2% Annual Chance (w/levee failure)

Likelihood of Future Occurrence–Occasional (1%)/Unlikely (0.2%)
Vulnerability–High

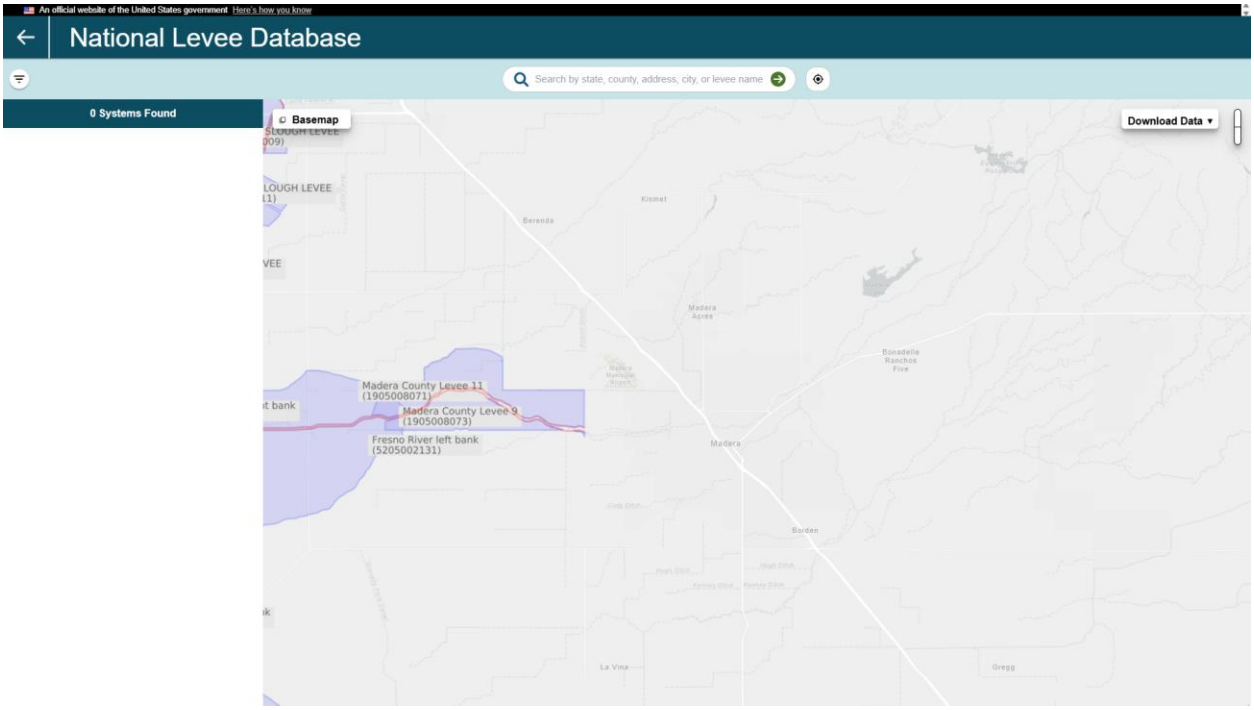
Hazard Profile

This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the City and have caused damage in the past. Flooding can be a significant problem in the City. Historically, the City has been at risk to flooding primarily during the winter and spring months when river systems in the City swell with heavy rainfall and snowmelt runoff. The City has also been at risk during atmospheric river flood events. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures located throughout the Madera County Planning Area and the City of Madera. Occasionally, extended heavy rains result in floodwaters that exceed normal

high-water boundaries and cause damage. Flooding has occurred both within the 1% and 0.2% annual chance floodplains and in other localized areas in the City.

Note: No levees exist in the City. According to the National Levee Database, there are levees near the City (as shown on Figure B-18 and Table B-22), but they do not protect areas inside the City limits. As such, no discussion of the levee hazard occurs in the sections below.

Figure B-18 City of Madera – National Levee Database Levee Map



Source: National Levee Database. Retrieved 3/12/2026.

Table B-22 City of Madera – Levees Reported in National Levee Database

System Name	Levee Miles	Leveed Area Square Miles	Location	USACE Levee?	Waterway	FEMA Accreditation Rating	Segment Count
Berenda Slough left bank - Fresno River right bank	16.36	11.80	City of Madera, Madera County, California	Yes	Berenda Slough, Deep Slough-Mariposa Slough-Eastside Bypass, Fresno River	Non-Accredited Levee System	4
Fresno River left bank	35.35	50.78	City of Madera, Madera County, California	Yes	Eastside Bypass, Fresno River, San Joaquin River	Non-Accredited Levee System	3

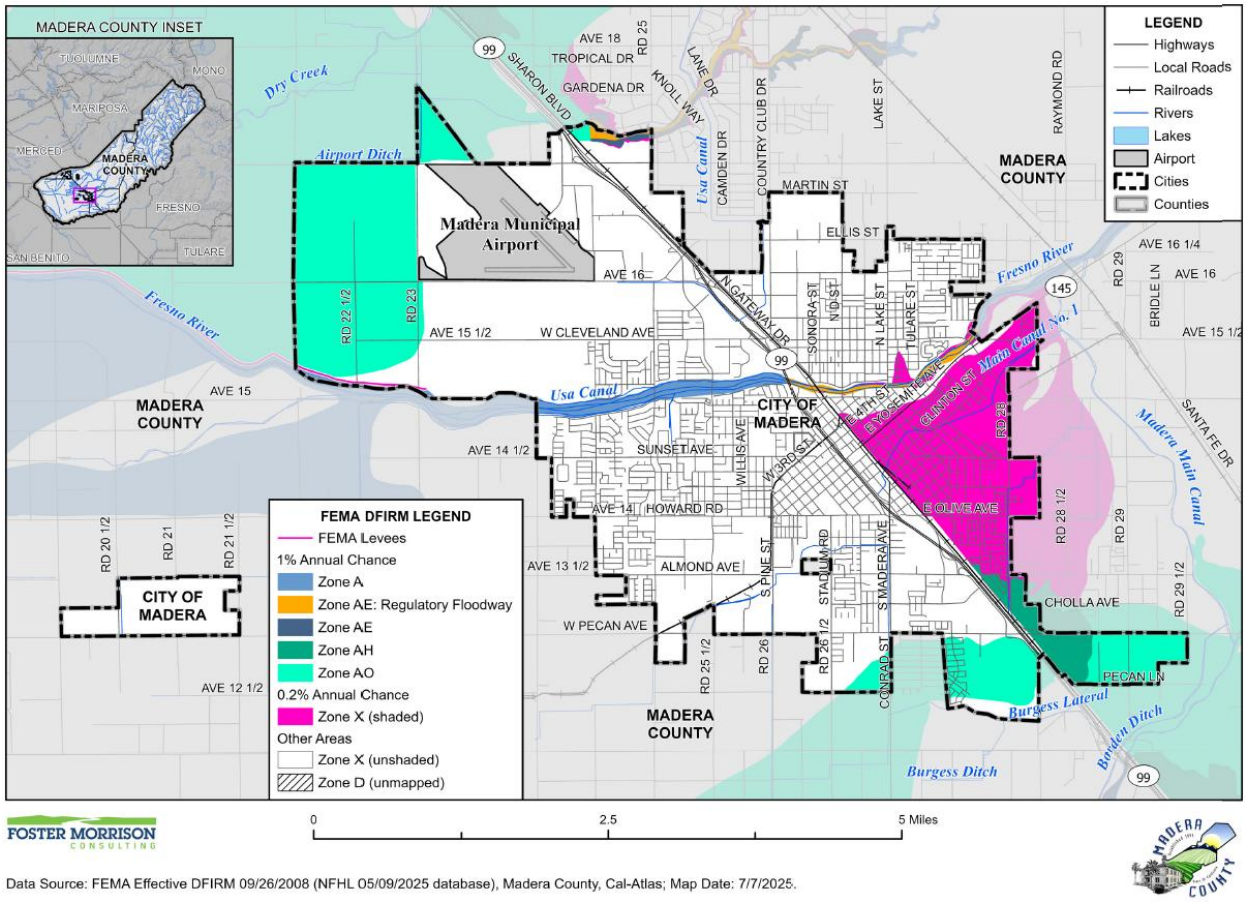
System Name	Levee Miles	Leveed Area Square Miles	Location	USACE Levee?	Waterway	FEMA Accreditation Rating	Segment Count
Madera County Levee 11	5.28	4.25	City of Madera, Madera County, California	No	FRESNO RIVER	Non-Accredited Levee System	1
Madera County Levee 9	5.24	2.53	City of Madera, Madera County, California	No	FRESNO RIVER	Non-Accredited Levee System	1

Source: National Levee Database. Retrieved 3/4/2026.

Location and Extent

The City of Madera has areas located in the 1% and 0.2% annual chance flood zones. This is seen in Figure B-19.

Figure B-19 City of Madera – FEMA DFIRM Flood Zones



Data Source: FEMA Effective DFIRM 09/26/2008 (NFHL 05/09/2025 database), Madera County, Cal-Atlas; Map Date: 7/7/2025.

Table B-23 details the DFIRM mapped flood zones located within the City.

Table B-23 City of Madera– DFIRM Flood Hazard Zones

Flood Zone	Description	Present in the City of Madera
Zone A	1% annual chance flooding: No base flood elevations provided	
Zone AE	1% annual chance flooding: Base flood elevations provided	X
Zone AE Floodway	1% annual chance flood: Regulatory floodway; Base flood elevations provided	X
Zone AH	1% annual chance flood areas of shallow flooding between one to three feet deep. Regulatory floodway; Base flood elevations provided	X
Zone AO	1% annual chance flooding: sheet flow areas. BFEs derived from detailed hydraulic analyses are shown in this zone.	X
Zone X (shaded)	0.2% annual chance flooding: The areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	X
Zone X (unshaded)	No flood hazard	X

Source: FEMA DFIRM 1/20/2016

Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the City vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the City tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Flooding in the City tends to have a shorter speed of onset, due to the amount of water that flows through the City.

Geographical flood extents for the City from the FEMA DFIRMs are shown in Table B-24.

Table B-24 City of Madera – Geographical DFIRM Flood Zone Extents

Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
1% Annual Chance Flood Hazard	2,119	0.2%	1,776	0.32%	343	0.04%
0.2% Annual Chance Flood Hazard	897	0.07%	482	0.09%	415	0.05%
Other Areas	7,677	0.6%	4,240	0.77%	3,436	0.43%
City of Madera Total	**10,692**	**0.79%**	**6,498**	**1.18%**	**4,194**	**0.52%**

Source: FEMA DFIRM 9/26/2008

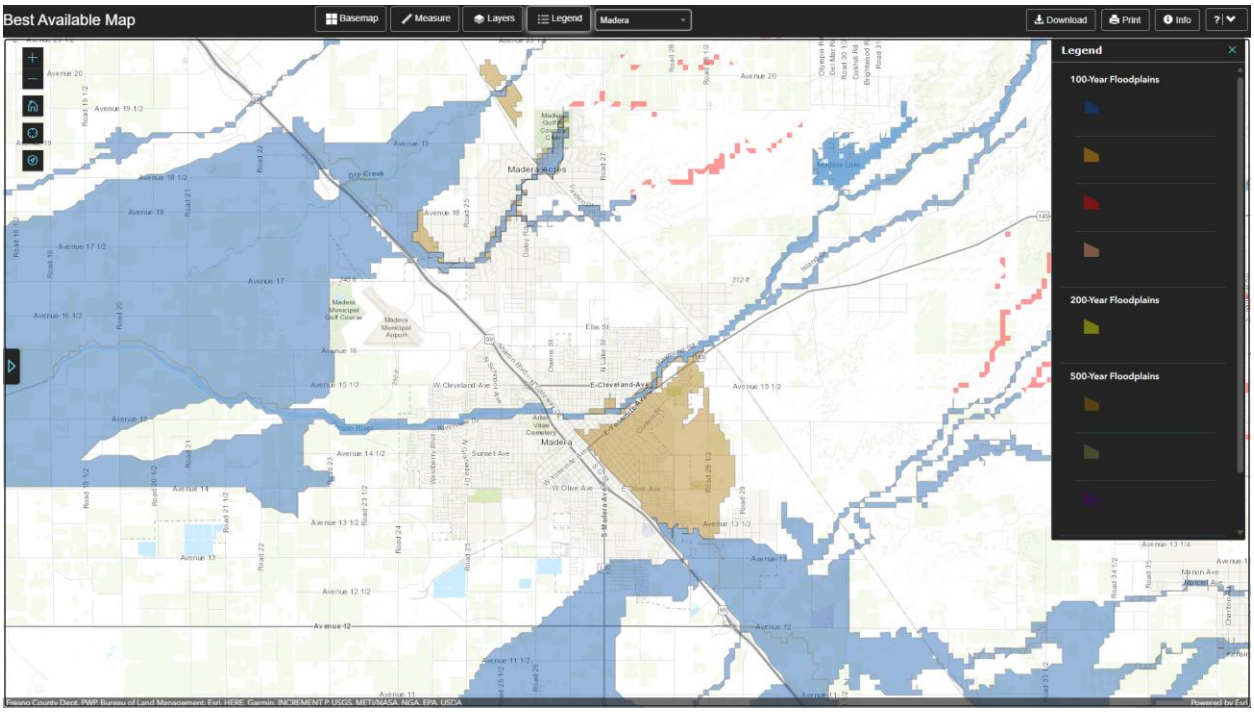
California Department of Water Resources Best Available Maps (BAM)

The FEMA regulatory maps provide just one perspective on flood risks in the City. Senate Bill 5 (SB 5), enacted in 2007, authorized the California DWR to develop the Best Available Maps (BAM) displaying

100- and 200-year floodplains for areas located within the Nevada-San Joaquin (SAC-SJ) Valley watershed. This effort was completed by DWR in 2008. DWR has expanded the BAM to cover all counties in the State and to include 500-year floodplains.

Different than the FEMA DFIRMs which have been prepared to support the NFIP and reflect only the 100-year event risk, the BAMs are provided for informational purposes and are intended to reflect current 100-, 200-(as applicable), and 500-year event risks using the best available data. The 100-year floodplain limits on the BAM are a composite of multiple 100-year floodplain mapping sources. It is intended to show all currently identified areas at risk for a 100-year flood event, including FEMA's 100-year floodplains. The BAM are comprised of different engineering studies performed by FEMA, Corps, and DWR for assessment of potential 100-, 200-, and 500-year floodplain areas. These studies are used for different planning and/or regulatory applications, and for each flood frequency may use varied analytical and quality control criteria depending on the study type requirements. The value in the BAMs is that they provide a bigger picture view of potential flood risk to the City than that provided in the FEMA DFIRMs. The BAM map for the City is shown in Figure B-20.

Figure B-20 City of Madera – Best Available Map



Source: California DWR

Legend explanation: **Blue** - FEMA 100-Year, **Orange** – Local 100-Year (developed from local agencies), **Red** – DWR 100-year (Awareness floodplains identify the 100-year flood hazard areas using approximate assessment procedures.), **Pink** – USACE 100-Year (2002 Sac and San Joaquin River Basins Comp Study), **Yellow** – USACE 200-Year (2002 Sac and San Joaquin River Basins Comp Study), **Tan** – FEMA 500-Year, Grey – Local 500-Year (developed from local agencies), **Purple** – USACE 500-Year (2002 Sac and San Joaquin River Basins Comp Study).

Past Occurrences

Disaster Declaration History

A list of state and federal disaster declarations for Madera County from flooding is shown on Table B-25. These events also likely affected the City to some degree.

Table B-25 Madera County – State and Federal Disaster Declarations from Flood 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	20	1950, 1955, 1958, 1969, 1982 (twice), 1983, 1986, 1992, 1993, 1995 (three), 1997 (twice), 2006, 2010, 2023 (three)	21	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1982, 1986, 1992, 1995 (three), 1997 (twice), 2006, 2010, 2023 (four)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Madera County has seen 74 events. These events most likely had some impact on the City.

City of Madera Events

In the past, flooding in Madera was a relatively frequent event. Floods struck Madera in 1938, 1943, 1945, 1950, 1952, 1955, 1956, 1958, 1962, 1963, and 1969. The era of significant flooding in Madera ended with the construction of the Hidden Dam on the Fresno River upstream of the City. Since the construction of the dam in 1976, no large, damaging floods have occurred in the City.

Climate Change and Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with flood. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 2024 CAS, climate change may affect flooding in California, the Madera County Planning Area, and the City of Madera. While average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is possible that average soil moisture and runoff could decline, however, due to increasing temperature, evapotranspiration rates, and spacing between rainfall events. Reduced snowpack and increased number of intense rainfall events are likely to put additional pressure on water infrastructure which could increase the chance of flooding associated with breaches or failures of flood control structures such as levees and dams. Cal Adapt future precipitation projections were shown in Section 4.3.4.

Vulnerability to Flood: 1% and 0.2% Annual Chance

Floods have been a part of the City's historical past and will continue to be so in the future. During winter months, long periods of precipitation and the timing of that precipitation are critical in determining the threat of flood, and these characteristics further dictate the potential for widespread structural and property damage. Predominantly, the effects of 1% and 0.2% annual chance flooding are generally confined to areas near the waterways of the City. As waterways grow in size from local drainages, so grows the threat of flood and dimensions of the threat.

The whole of the City is at some measure of vulnerability to floods. An assessment of a community's vulnerability to flood begins with an understanding of local exposure to flood. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Madera is traversed by several stream systems and is at risk to both the 1% (100-year) and 0.2% (500-year) annual chance flood. FEMA has identified DFIRM flood zones for the City. Residential, government, business and agriculture properties are at risk of flooding. The City of Madera's urban landscape includes paved surfaces and a storm drain system that can become overwhelmed during intense rainfall, contributing to street flooding and localized damage.

Climate change alters the hydrologic cycle in the Central Valley by increasing atmospheric moisture, intensifying storm events, and driving more frequent extremities in events where long dry spells are punctuated by intense rain events. These shifts as well as the potential for heavier rainfall and runoff events to become more common increase the potential for stormwater flooding beyond historical patterns and the design assumptions of the Storm Drainage System Master Plan.

In addition to direct impacts to residential areas and businesses, flooding can disrupt essential services such as transportation, utilities and emergency response. The impacts of climate change on groundwater storage also have a potential to influence land subsidence, which can increase surface water accumulations during storms due to the lowering of ground elevations.

The last Storm Drainage Master Plan illustrated that the magnitude of 1% storm had increased since the previous iteration. This increase, possibly associated with climate change, resulted in a significant identification of undersized existing facilities. This change directly affects the safety of the public and integrity of structures.

Assets at Risk

Assets at risk from flood include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All people and populations located in the 1% and 0.2% annual chance floodplains are at some risk to flooding. Certain vulnerable populations located within areas prone to flooding may be at increased risk to this hazard, especially during a large event with minimal advance notice. These vulnerable populations include: the unsheltered, those with limited mobility, and those that lack the resources to leave the area.

City residents that live in the 1% and 0.2% annual chance floodplains are often the most vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events. To further evaluate the impact to the City of Madera's residential population residing within these hazard areas, the DFIRM flood zones were overlayed on the parcel layer. Those residential parcels that intersect the flood zones were counted and multiplied by the 2023 Census Bureau average household factors for the City of Madera – 3.38. According to this analysis, there is a total population of 1,747 and 7,713 residents of the City at risk to flooding in the 1% and 0.2% annual chance floodplains, respectively. This is shown in Table B-26.

Table B-26 City of Madera – Improved Residential Parcels and Population by Summary FEMA DFIRM Flood Zone

Jurisdiction	1% Annual Chance		0.2% Annual Chance	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Madera	517	1,747	2,282	7,713

Source: FEMA DFIRM 09/06/2008, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size –City of Madera (3.38).

The City noted that the Critical Facilities and Infrastructure section below includes the facilities used by At-Risk populations that are threatened by this hazard. While this is not specific to what special populations reside in the City, it does speak to facilities that area used to serve (portions) of this population.

Structures

Certain structures in the City are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. GIS was used to determine the possible impacts of flooding on parcels and structures within the City of Madera. The methodology described in Section 4.3.11 of the Base Plan was followed in determining structures and values at risk to the 1% and 0.2% annual chance flood event. Table B-27 is a summary table for the City of Madera. Parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), personal property values, estimated content replacement values, and total values in the City are shown for the 1% and 0.2% annual chance flood zones, as well as for those properties that fall outside of the mapped FEMA DFIRM flood zones. Table B-28 breaks down Table B-27 and shows the same analysis further broken out by detailed FEMA flood zone and property use.

Table B-27 City of Madera – Count and Value of Parcels and Structures in Summary DFIRM Flood Zone

Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard	678	558	$66,746,126	$112,888,323	$199,372	$62,934,518	$242,768,339
0.2% Annual Chance Flood Hazard	3,010	2,504	$131,435,759	$428,038,984	$5,738,999	$253,097,832	$818,311,574
Other Areas	13,400	12,362	$813,523,938	$2,844,916,160	$129,555,489	$1,848,188,022	$5,636,183,609
City of Madera Total	**17,088**	**15,424**	**$1,011,705,823**	**$3,385,843,467**	**$135,493,860**	**$2,164,220,371**	**$6,697,263,521**

Source: FEMA DFIRM 09/06/2008, Madera County 2024 Parcel/Assessor Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Table B-28 City of Madera – Count and Values of Parcels and Structures by Detailed DFIRM Flood Zone and Property Use

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard							
Zone AE							
Agricultural	6	4	$1,825,257	$890,587	$0	$890,587	$3,606,431
Commercial	2	1	$18,340	$38,497	$6,063	$38,497	$101,397
Government	7	0	$6,902	$0	$0	$0	$6,902
Institutional	2	1	$382,503	$2,013,500	$0	$2,013,500	$4,409,503
Recreational	4	0	$1,705	$0	$0	$0	$1,705
Residential	77	64	$3,997,030	$15,484,738	$0	$7,742,369	$27,224,137
Right of Way	2	0	$1	$0	$0	$0	$1
Zone AE Total	**100**	**70**	**$6,231,738**	**$18,427,322**	**$6,063**	**$10,684,953**	**$35,350,076**
Zone AE: Regulatory Floodway							
Commercial	15	10	$6,134,915	$2,673,456	$4	$2,673,456	$11,481,831
Government	22	0	$0	$0	$0	$0	$0
Institutional	1	0	$0	$0	$0	$0	$0
Residential	53	38	$3,468,193	$5,643,994	$32,340	$2,821,997	$11,966,524
Unknown	1	0	$542	$0	$0	$0	$542
Zone AE: Regulatory Floodway Total	**92**	**48**	**$9,603,650**	**$8,317,450**	**$32,344**	**$5,495,453**	**$23,448,897**

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Zone AH							
Agricultural	4	3	$3,679,468	$184,129	$8,500	$184,129	$4,056,226
Commercial	1	1	$648,051	$4,572,619	$117,040	$4,572,619	$9,910,329
Government	2	0	$0	$0	$0	$0	$0
Residential	117	109	$7,009,641	$22,551,665	$0	$11,275,833	$40,837,139
Zone AH Total	**124**	**113**	**$11,337,160**	**$27,308,413**	**$125,540**	**$16,032,581**	**$54,803,694**
Zone AO							
Agricultural	23	21	$21,628,532	$2,607,924	$26,495	$2,607,924	$26,870,875
Government	4	0	$0	$0	$0	$0	$0
Residential	334	306	$17,945,045	$56,227,214	$8,930	$28,113,607	$102,294,796
Unknown	1	0	$1	$0	$0	$0	$1
Zone AO Total	**362**	**327**	**$39,573,578**	**$58,835,138**	**$35,425**	**$30,721,531**	**$129,165,672**
1% Annual Chance Flood Hazard Total	**678**	**558**	**$66,746,126**	**$112,888,323**	**$199,372**	**$62,934,518**	**$242,768,339**
0.2% Annual Chance Flood Hazard							
Zone X (shaded)							
Agricultural	3	1	$185,917	$164,045	$0	$164,045	$514,007
Commercial	264	199	$28,867,136	$73,361,937	$5,278,838	$73,361,937	$180,869,848
Government	48	0	$4	$0	$0	$0	$0
Industrial	18	4	$393,096	$183,484	$2	$275,226	$851,808
Institutional	21	18	$712,760	$4,263,729	$107,833	$4,263,729	$9,348,051
Recreational	2	0	$0	$0	$0	$0	$0
Residential	2,620	2,282	$100,900,849	$350,065,789	$352,326	$175,032,895	$626,351,859
Right of Way	9	0	$0	$0	$0	$0	$0
Utilities	6	0	$33,651	$0	$0	$0	$33,651
Unknown	19	0	$342,346	$0	$0	$0	$342,346
Zone X (shaded) Total	**3,010**	**2,504**	**$131,435,759**	**$428,038,984**	**$5,738,999**	**$253,097,832**	**$818,311,574**
0.2% Annual Chance Flood Hazard Total	**3,010**	**2,504**	**$131,435,759**	**$428,038,984**	**$5,738,999**	**$253,097,832**	**$818,311,574**
Other Areas							
Zone X (unshaded)							
Agricultural	41	26	$12,422,781	$6,690,615	$912,507	$6,690,615	$26,716,518
Commercial	730	542	$154,083,539	$453,620,063	$40,299,486	$453,620,063	$1,101,623,151
Government	129	1	$4,386,887	$12,481		$12,481	$4,411,849

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Industrial	223	109	$41,835,776	$183,248,597	$84,960,258	$274,872,896	$584,917,527
Institutional	61	41	$2,775,967	$24,241,971	$25,082	$24,241,971	$51,284,991
Recreational	1	0	$0	$0	$0	$0	$0
Residential	12,168	11,640	$596,334,270	$2,176,704,873	$3,358,154	$1,088,352,437	$3,864,749,734
Right of Way	20	1	$83,613	$46,163	$0	$46,163	$175,939
Utilities	6	1	$197,412	$163,844	$2	$163,844	$525,102
Unknown	21	1	$1,403,693	$187,553	$0	$187,553	$1,778,799
Zone X (unshaded) Total	**13,400**	**12,362**	**$813,523,938**	**$2,844,916,160**	**$129,555,489**	**$1,848,188,022**	**$5,636,183,609**
Other Areas Total	**13,400**	**12,362**	**$813,523,938**	**$2,844,916,160**	**$129,555,489**	**$1,848,188,022**	**$5,636,183,609**
City of Madera Total	**17,088**	**15,424**	**$1,011,705,823**	**$3,385,843,467**	**$135,493,860**	**$2,164,220,371**	**$6,697,263,521**

Source: FEMA DFIRM 09/06/2008, Madera County 2024 Parcel/Assessor Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Table B-29 summarizes Table B-28 and shows City of Madera loss estimates and improved values at risk by FEMA 1% and 0.2% annual chance flood zones. According to Table B-28 and Table B-29, the City of Madera has 558 parcels and $176.0 million of structure and contents values or values in the 1% annual chance flood zone, and 2,504 improved parcels and $686.9 million of structure and contents values in the 0.2% annual chance flood zone. These values can be refined a step further. Applying the 20 percent damage factor as previously described in Section 4.3.11 of the Base Plan, there is a 1% chance in any given year of a flood event causing $35.2 million in damage and a 0.2% chance in any given year of a flood event causing $137.4 million in damage in the City of Madera. The loss ratio of 0.19% indicates that flood losses for 1% annual chance flooding would be minor and the City would be able recover. The loss ratio of 0.75% indicates that flood losses for 0.2% annual chance flooding would be relatively minor and the City would be able to recover.

Table B-29 City of Madera – Flood Loss Estimates

Flood Zone	Total Parcel Count	Imp. Parcel Count	Total Land Value	Improved Structure Value	Personal Property Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance	678	558	$66,746,126	$112,888,323	$199,372	$62,934,518	$176,022,213	$35,204,443	0.19%
0.2% Annual Chance	3,010	2,504	$131,435,759	$428,038,984	$5,738,999	$253,097,832	$686,875,815	$137,375,163	0.75%

Flood Zone	Total Parcel Count	Imp. Parcel Count	Total Land Value	Improved Structure Value	Personal Property Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
City of Madera Total	**3,688**	**3,062**	**$198,181,885**	**$540,927,307**	**$5,938,371**	**$316,032,350**	**$862,898,028**	**$172,579,606**	**0.94%**

Source: FEMA DFIRM 09/06/2008, Madera County 2024 Parcel/Assessor Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Critical Facilities and Infrastructure

1% and 0.2% annual chance flooding present a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the City to determine which critical facilities fall into each FEMA DFIRM flood zone. Using GIS, the FEMA DFIRM flood zones were overlayed on the critical facility GIS layer. This is shown on Figure B-21 for the FEMA DFIRM flood zones. Table B-42 details which critical facilities fall in which FEMA DFIRM flood zones. Details of critical facility categories, type, name, and address by FEMA DFIRM flood zones are listed in Appendix F.

Figure B-21 City of Madera – Critical Facilities in FEMA DFIRM Flood Zones

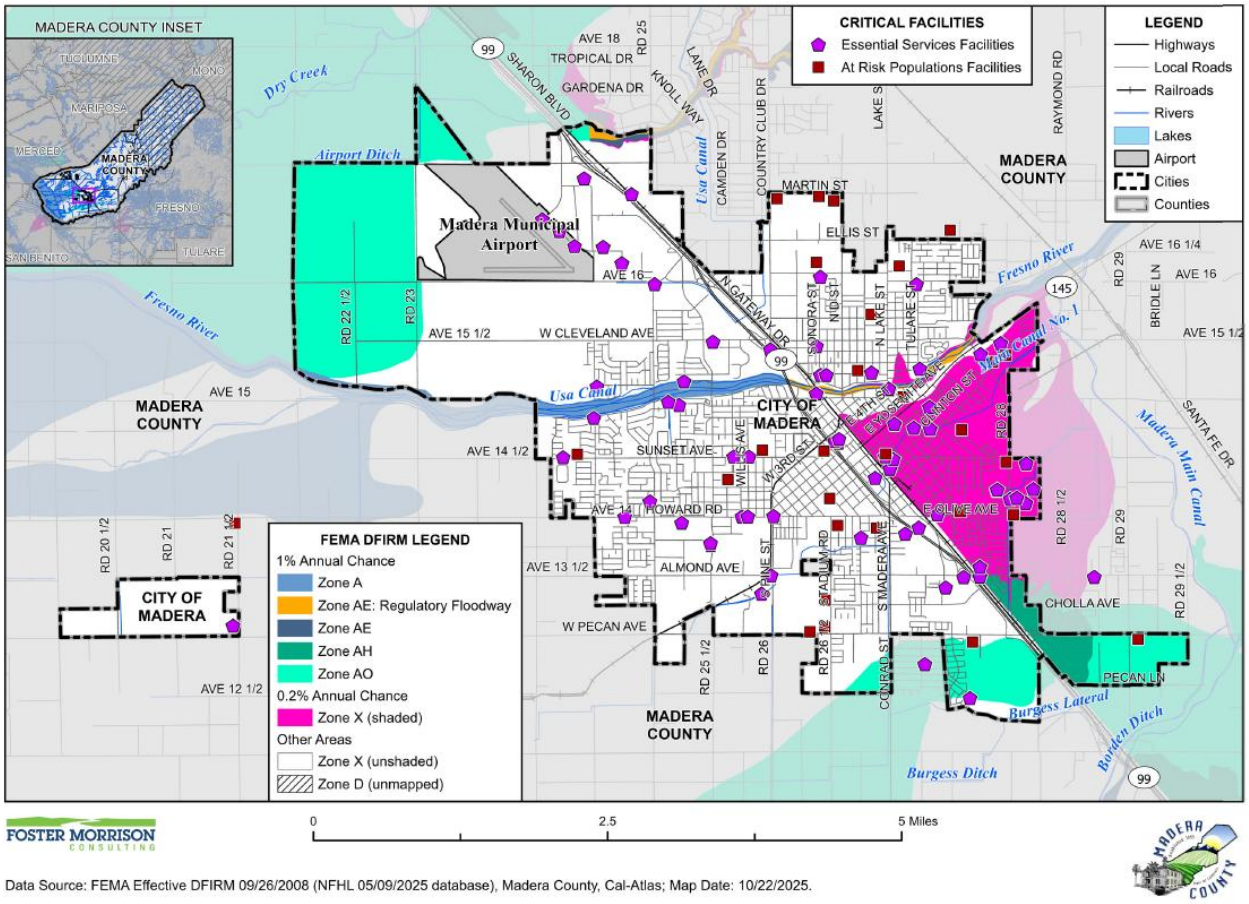


Table B-30 City of Madera – Critical Facilities by Category and Type in FEMA DFIRM Flood Zones

Jurisdiction / Flood Zone	Critical Facility Category	Facility Count
1% Annual Chance Flood Hazard		
Zone AE	Essential Services Facilities	1
Zone AE: Regulatory Floodway	Essential Services Facilities	3
	At Risk Populations Facilities	1
Zone AH	Essential Services Facilities	3
Zone AO	Essential Services Facilities	3
	At Risk Populations Facilities	2
1% Annual Chance Flood Hazard Total		**13**
0.2% Annual Chance Flood Hazard		
Zone X (shaded)	Essential Services Facilities	20
	At Risk Populations Facilities	7
0.2% Annual Chance Flood Hazard Total		27
Other Areas		
Zone X (unshaded)	Essential Services Facilities	73
	At Risk Populations Facilities	19
Other Areas Total		**92**
City of Madera Total		**132**

Source: FEMA DFIRM 09/06/2008, City of Madera

Natural, Historic, and Cultural Resources

Large flood events can affect natural, historic, and cultural resources. There are a number of ways floodwaters can impact natural resources and the environment. Wildlife habitats can be destroyed by floodwaters. Contaminated floodwater can pollute rivers and habitats. Silt and sediment can destroy natural areas. Riverbanks and natural levees can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survived the initial flood may die due to being inundated with water. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures within the flooded areas, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme flood events. Any of these that fall in the flood zones shown on Figure B-19 would be vulnerable.

Impacts from Flood: 1% and 0.2% Annual Chance

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Large flood events, including those associated with 1% and 0.2% annual chance floods, can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. People may be swept away in floodwaters, causing injuries or deaths. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. During a flood, people can also suffer

heart attacks or electrocution due to electrical equipment short outs. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Structures can be damaged directly from floodwaters and can also be damaged from trees falling as a result of water-saturated soils. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services causing power outages. The interruption of power causes major problems and can result in the closure of governmental offices and community businesses. Public schools may also be required to close or be placed on a delayed start schedule. Roads can be damaged and closed, causing safety and evacuation issues.

Standing water can cause damage to crops, roads, foundations, and electrical circuits. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the hazard profile discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed further below.

Insurance Coverage, Claims Paid, and Repetitive Losses

Standard property insurance does not include flood coverage because of the relatively high risk. The National Flood Insurance Program (NFIP) provides flood insurance to residents in those communities that participate in the NFIP. Federal financial assistance requires the purchase of flood insurance for structures located within a 100-year floodplain – a requirement that affects nearly all mortgages financed through commercial lending institutions. Flood insurance is also recommended for all structures protected by levees, even if not mapped within a floodplain.

The City of Madera joined the National Flood Insurance Program (NFIP) on June 4, 1987. The City does not participate in the CRS program. NFIP data indicates that as of December 2, 2024, there were 8 flood insurance policies in force in the City with $2,318,000 of coverage. There have been 9 historical claims for flood losses totaling $88,293.47. Of these, 1 was in an A zones and 1 were in B, C, or X zones. 2 of the claims were for pre-FIRM structures, while 0 were for post-FIRM structures in the B, C, or X zone. NFIP data further indicates that there are no repetitive loss or severe repetitive loss buildings in the City. There have been 1 substantial damage claims since 1978.

Based on this analysis of insurance coverage, the City has values at risk to the 1% annual chance and greater floods. Of the 558 improved parcels within the 1% annual chance flood zone, 2 of those parcels maintain flood insurance. This can be seen on Table B-31.

Table B-31 City of Madera – Percentage of Policy Holders to Improved Parcels in the 1% Annual Chance Floodplain

Jurisdiction	Improved Parcels in SFHA (1% Annual Chance) Floodplain*	Insurance Policies in the SFHA (1% Annual Chance) Floodplain	Percentage of 1% Annual Chance Floodplain Parcels Currently Insured
City of Madera	558	2	0.4%

Source: FEMA DFIRM 9/26/2008, FEMA CIS 2024, 2024 Madera County Parcel/Assessor's Data

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Madera include the following:

- Climate change is likely to exacerbate future flood conditions and associated impacts and vulnerability of the County to 1% and 0.2% annual chance flooding.
- Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the City. The City is expected to see slow and steady growth; therefore, any additional growth within the levee protected areas of the County and other 1% and 0.2% annual chance floodplains could place additional populations at risk to flood. Of the 33 future development areas, 6 fall within the 1% or 0.2% annual chance flood zones. These active developments, would place additional population in the flood zones. Additional population growth would likely bring continued diversity to the County. Vulnerable population groups could face disproportionate effects from flooding and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location of future flood events.
- Land use planning should be proactive to address future hazard conditions. Of the 33 developments planned over the next five years (as shown in Figure B-22), 6 have areas that fall within the 1% and 0.2% annual chance flood. Locating new development, structures and critical facilities and infrastructure within or near areas of flood risk may put additional development at risk. However, City building codes and the City's floodplain ordinance are in effect to reduce this risk and should be updated as necessary to continue to address future flood conditions. As such, changes in land use and future development may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location of future flood events.

Future Development

The potential for flooding may increase as floodwaters are channeled due to land development. Such changes can exacerbate flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. Floodplain modeling and master planning should be based on built out property 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 overall floodplain.

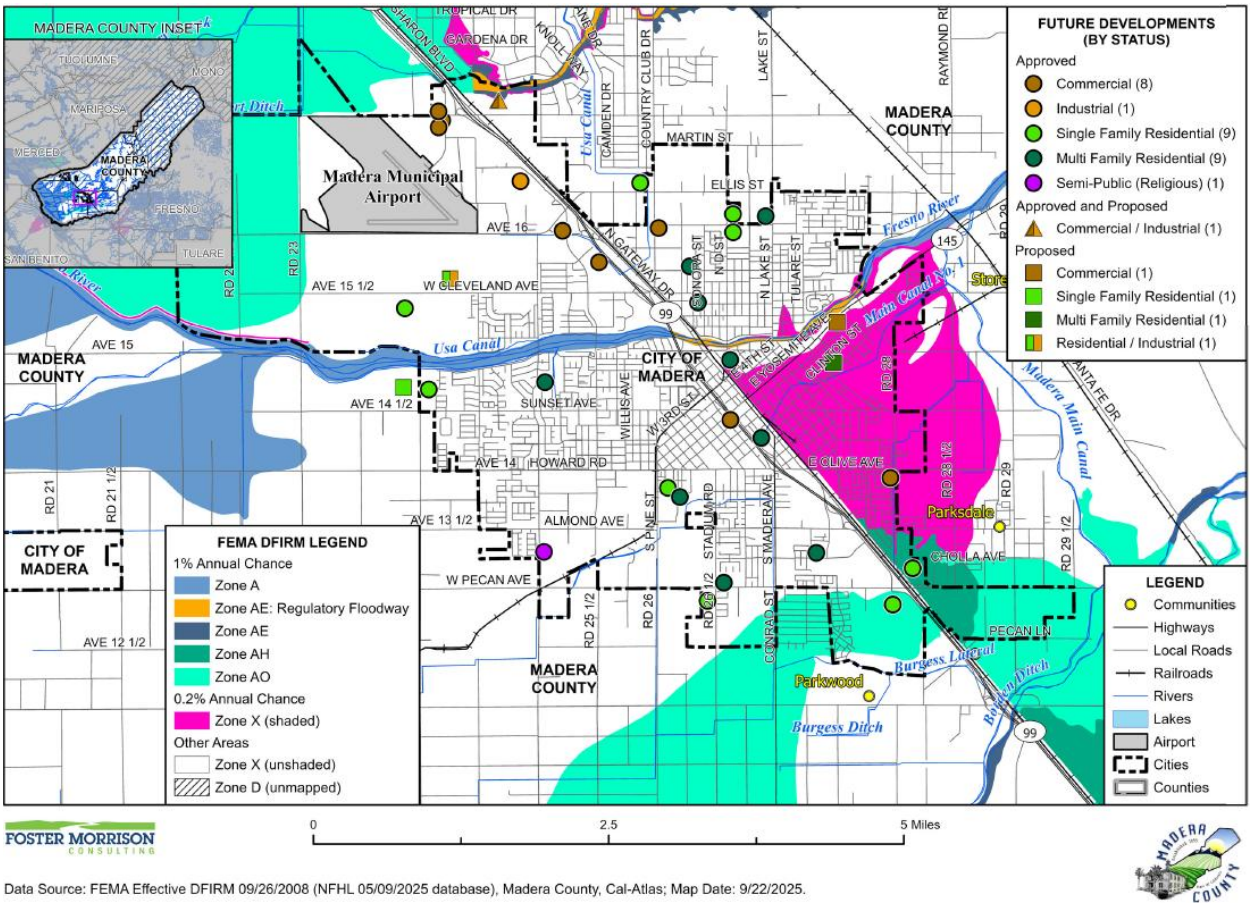
The City enforces its floodplain management ordinance. If any development is to occur in the floodplain, it would have to conform to the elevation and other standards of the floodplain ordinance. More detail on the specifics of the floodplain ordinance can be found in the Capability section below.

Future development areas and their vulnerability to 1% and 0.2% annual chance flood are discussed further in the below GIS analysis.

GIS Analysis

The City provided 33 future development areas which were used as the basis for the inventory of future development for the City. These areas were mapped in GIS. Utilizing the future development area spatial layer, the parcel polygon data was intersected to determine the future development areas within each DFIRM flood zone. Figure B-22 shows the locations of the future development area overlayed on the DFIRM flood zones. Some of these future development areas fall within the mapped flood areas as shown on Table B-32. As shown in the map and table, three of these future development areas sit in the 1% annual chance flood zone, while three more sit in the 0.2% annual chance flood zone.

Figure B-22 City of Madera – Future Development Areas in FEMA DFIRM Flood Zones



Data Source: FEMA Effective DFIRM 09/26/2008 (NFHL 05/09/2025 database), Madera County, Cal-Atlas; Map Date: 9/22/2025.

Table B-32 City of Madera – Future Development Area Acres and Parcels in FEMA DFIRM Flood Zones

Future Development / Property Use / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
1% Annual Chance Flood Hazard						
Zone AE: Regulatory Floodway						
NEC 17 & 99 (Map ID 29)						
Commercial / Industrial	1	0	1	99.58	0	99.58
Zone AE: Regulatory Floodway Total	**1**	**0**	**1**	**99.58**	**0**	**99.58**
Zone AH						
E/S Tozer (Rd. 28) btwn 13 1/2 & Pecan (13) (Map ID 4)						
Single Family Residential	1	0	1	28.07	0	28.07

Future Development / Property Use / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Zone AH Total	**1**	**0**	**1**	**28.07**	**0**	**28.07**
Zone AO						
SWC of Ave 13 & Hwy 99 (Map ID 23)						
Single Family Residential	1	1	0	135.59	135.59	0
Zone AO Total	**1**	**1**	**0**	**135.59**	**135.59**	**0**
1% Annual Chance Flood Hazard Total	**3**	**1**	**2**	**263.2**	**135.6**	**127.6**
0.2% Annual Chance Flood Hazard						
Zone X (shaded)						
SWC Olive & Tozer (Map ID 25)						
Commercial	1	0	1	4.92	0	4.92
1230 E. Yosemite Ave. (Map ID 30)						
Commercial	5	1	4	4.46	0.17	4.29
NE/S of Malone btwn Washington & Clinton (Map ID 31)						
Multi Family Residential	1	0	1	0.50	0	0.50
Zone X (shaded) Total	**7**	**1**	**6**	**9.88**	**0.17**	**9.71**
0.2% Annual Chance Flood Hazard Total	**7**	**1**	**6**	**9.9**	**0.2**	**9.7**
Other Areas						
Zone X (unshaded)						
Btwn Wilson & Rush and Davis & Sonora (Map ID 1)						
Multi Family Residential	2	0	2	0.28	0	0.28
E/S Cypress btwn Oak & Maple (Map ID 2)						
Single Family Residential	1	0	1	0.23	0	0.23
E/S Granada btwn Almond & Pecan (Map ID 3)						
Semi-Public (Religious)	1	1	0	8.45	8.45	0
Grove St. terminus south of Maple (Map ID 5)						
Multi Family Residential	2	1	1	2.95	2.24	0.72
N Schnoor & Kennedy St (Map ID 6)						
Commercial	1	0	1	1.86	0	1.86

Future Development / Property Use / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
N/S Park btwn Linden & Laurel (Map ID 7)						
Multi Family Residential	3	0	3	0.72	0	0.72
N/S Sherwood btwn Sonora & Owens (Map ID 8)						
Multi Family Residential	1	0	1	1.43	0	1.43
NE/S of I btwn Yosemite & 6th (Map ID 9)						
Commercial	1	0	1	0.22	0	0.22
NEC Ellis & Fairview(Map ID 10)						
Single Family Residential	1	0	1	6.27	0	6.27
NEC Emily & Gary (Map ID 11)						
Multi Family Residential	1	0	1	4.53	0	4.53
NEC of Adell & D (Map ID 12)						
Single Family Residential	2	1	1	9.12	4.13	4.99
NEC Stadium and Pecan (Map ID 13)						
Multi Family Residential	1	0	1	5.20	0	5.20
NWC of Golden State and Ave 17 (Map ID 14)						
Commercial	1	0	1	10.27	0	10.27
NWC of Sunset and Caitlin (Map ID 15)						
Single Family Residential	1	0	1	0.15	0	0.15
S/S Cleveland btwn 16 & 23 (Map ID 16)						
Single Family Residential	1	1	0	38.11	38.11	0
SEC Foxglove & Schnoor (Map ID 17)						
Commercial	2	0	2	19.44	0	19.44
SEC of Adell & D (Map ID 18)						
Single Family Residential	3	0	3	7.77	0	7.77
SEC of Country Club & Adell (Map ID 19)						
Commercial	1	0	1	1.37	0	1.37
SW/S of G btwn 8th & 10th (Map ID 20)						
Multi Family Residential	1	0	1	0.26	0	0.26
SWC Airport (Golden State) & Ave. 17 (Map ID 21)						

Future Development / Property Use / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Commercial	1	0	1	1.48	0	1.48
SWC Airport (Golden State) & Ave. 17 (Map ID 22)						
Commercial	1	0	1	1.14	0	1.14
SWC of Stadium Rd. and Pecan Ave. (Map ID 24)						
Single Family Residential	1	0	1	18.70	0	18.70
W/S Lake btwn Ellis & Adell (Map ID 1)						
Multi Family Residential	1	0	1	2.39	0	2.39
W/S of Golden State btwn Aves. 16 & 17 (Map ID 27)						
Industrial	1	0	1	17.16	0	17.16
WC of 2nd and D (Map ID 28)						
Multi Family Residential	1	0	1	0.34	0	0.34
N/S Cleveland btwn 16 & Westberry (Map ID 32)						
Residential / Industrial	1	1	0	71.38	71.38	0
NW Cor 24 & 14 ½ (Map ID 33)						
Residential	1	1	0	58.34	58.34	0
Zone X (unshaded) Total	**35**	**6**	**29**	**289.58**	**182.65**	**106.93**
Other Areas Total	**35**	**6**	**29**	**289.6**	**182.6**	**106.9**
Grand Total	**45**	**8**	**37**	**563**	**318**	**244**

Source: FEMA DFIRM 9/26/2008, City of Madera

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

Flooding occurs in areas other than the FEMA mapped 1% and 0.2% annual chance floodplains. Flooding may be from drainages not studied by FEMA, lack of or inadequate drainage infrastructure, or inadequate maintenance. Localized, stormwater flooding occurs throughout the City during the rainy season from November through April. Prolonged heavy rainfall (including that from atmospheric river events) contributes to a large volume of runoff resulting in high peak flows of moderate duration.

Location and Extent

The City of Madera is subject to localized flooding throughout the City. Areas prone to localized flooding are included in Table B-33 below. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the City vary by location. Flood durations in the City tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Localized flooding in the City tends to have a shorter speed of onset, especially when antecedent rainfall has soaked the ground and reduced its capacity to absorb additional moisture.

Past Occurrences

Disaster Declaration History

There have been no state or federal disaster declarations from localized floods. There would most likely have been localized flood events during the disaster declarations from flood as shown in the previous 1%/0.2% annual chance flood section.

NCDC Events

The NCDC occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile above where past flood events were noted.

City of Madera Events

The City noted that the times of flooding and localized flooding have coincided. These were discussed in the Past Occurrences Section of the Flood:1% and 0.2% annual chance flood section above. In addition to those events, the following events occurred"

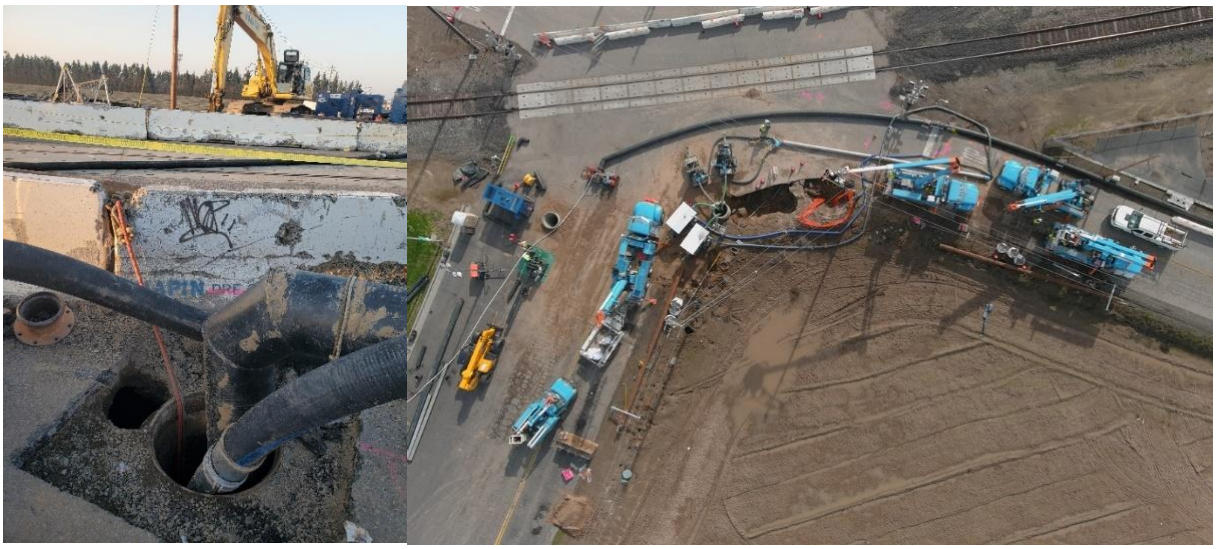
From **October 2024** to **February 2025**, there were additional road closures at Pine and Howard. Many other locations had areas affected by stormwater flooding. These areas saw over $87,000 in damages. This includes:

- Evans DI near Pump station 'E' Street
- 'D' Street, Social Services near 7th
- Yosemite Ave. from 'G' Street to 'Q' Street Down Drains
- Yosemite and Gateway (near Chevron)
- Oak & Pine
- Sunset Ave from 4th St to Laurel St
- Sundance Ln from Sunset to 3rd St
- 5th and Schnoor
- Modoc & Schnoor
- 'A' Street & Wallace down drain
- Oak & Cypress down drain
- Olive & N Streets
- 5th Street from Lake Street to 'E' Street
- City Hall – 4th Street between 'I' Street and 'G' Street
- City Hall – 'H' Street between 4th Street and 3rd Street

- 'G' Street between Central and Yosemite Ave.
- 'K' Street between 9th and 4th Street
- Yeager next to Moore's Galvanizing
- Gil and Noble Between Maple and Pine
- Madera Ave. and G Street (across from Ford Dealership)
- Pine And R Street (Sub Shop)
- Howard at Pine to Town & Country Park/Mainberry
- Cleveland Ave. and 99
- Dunham St. and S Madera Ave (dirt alley to the south of Dunham)
- Sherwood Basin (potential overflow issue)
- Olive between 'E' Street and Roosevelt
- Pecan between Golden State & Parkwood Elementary School also at Barnett and Valencia

In **January of 2023**, the City had localized flooding in multiple areas. City's sewer trunk main line experienced a sinkhole/collapse due to excessive stormwater intrusion into the City's sanitary sewer (see Figure B-23). The influx of storm water deteriorated the pipe and caused failure. City crews and contractors had to bypass the line break with above ground pumps and piping. Bypass pumping occurred while a permanent repair was made (lasted for approximately 2+ months). This is the main sewer line that all the City's effluent passes through on its way to the WWTP. Over $1.4 million in damages was reported. Eventually there was damage to WWTP when debris from this incident impacted pumps/impellers at the plant. Another sewer main collapsed several hundred feet east of the original failed line during the same incident.

Figure B-23 Damages from Localized Flooding and Stormwater Intrusion/Infiltration in 2023



In addition, there was a road closure in **2023** at Pine and Howard with property damage to local businesses. Street asphalt damage occurred in this area.

Climate Change and Localized Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts from localized flood. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Even if average annual rainfall may decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century, increasing the likelihood of overwhelming stormwater systems built to historical rainfall averages. This makes localized flooding more likely.

Vulnerability to Localized Flood

Flood vulnerability and their impacts vary by location and severity of any given flood event and will likely only affect certain areas of the City during specific times. Based on the risk assessment, it is evident that floods will continue to have potentially significant impacts to certain areas of the City. However, while flooding can cause significant impacts, depending on the duration and volume of precipitation and the drainage in any given area, many of the floods in the City are minor, localized flood events that are more of a nuisance than a disaster.

Many areas of the City are at some measure of vulnerability to localized flooding. An assessment of a community's vulnerability to localized flooding begins with an understanding of local exposure to localized flooding. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Historically, the City has been affected by flooding of streams and creeks occurring during heavy rain and storm (including atmospheric river) events. Additional development in the City and in the watersheds of these streams affects both the frequency and duration of damaging floods through an increase in stormwater runoff and contributes to localized flooding occurring in areas throughout the City. The lack of or inadequate drainage infrastructure in the City contributes to localized flooding issues.

The City tracks localized flooding areas. Affected localized flood areas identified by the City of Madera are summarized in Table B-33.

Table B-33 City of Madera – List of Localized Flooding Problem Areas

Road Name	Flooding	Pavement Deterioration	Washout	High Water	Landslide/ Mudslide	Debris	Downed Trees
Pine / R St. / Howard	Yes	Yes	No	Yes	No	Yes	No
E St (Evans Feed)	Yes	Yes	No	Yes	No	Yes	No
D / 7th	Yes	Yes	No	Yes	No	Yes	No
Oak St / Pine St	Yes	Yes	No	Yes	No	Yes	No
5th / Schnoor	Yes	Yes	No	Yes	No	Yes	No
Olive / N St	Yes	Yes	No	Yes	No	Yes	No
5th / E St	Yes	Yes	No	Yes	No	Yes	No
4 St / H St	Yes	Yes	No	Yes	No	Yes	No
Gill / Noble	Yes	Yes	No	Yes	No	Yes	No
Modoc / Schnoor	Yes	Yes	No	Yes	No	Yes	No
A St / Wallace	Yes	Yes	No	Yes	No	Yes	No
14th / E St	Yes	Yes	No	Yes	No	Yes	No
Liberty, Sunset to Doubletree	Yes	Yes	No	Yes	No	Yes	No

Source: City of Madera

It was noted that the City has 22 stationary storm pumps and multiple mobile pumps that are positioned in flood prone areas thus the City mitigates localized flooding during every storm. This system can become overwhelmed during intense rainfall, contributing to street flooding and localized damage.

Climate change alters the hydrologic cycle in the Central Valley by increasing atmospheric moisture, intensifying storm events, and driving more frequent extremities in events where long dry spells are punctuated by intense rain events. These shifts as well as the potential for heavier rainfall and runoff events to become more common increase the potential for stormwater flooding beyond historical patterns and the design assumptions of the Storm Drainage System Master Plan.

In addition to direct impacts to residential areas and businesses, flooding can disrupt essential services such as transportation, utilities and emergency response.

The impacts of climate change on groundwater storage also have a potential to influence land subsidence, which can increase surface water accumulations during storms due to the lowering of ground elevations.

Assets at Risk

Assets at risk from localized flood include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

People and populations (including vulnerable populations) are traditionally not highly vulnerable to localized flooding, but their structures and contents can be at risk. Localized flooding may also cause transportation issues as roads and lanes are impacted or closed and affect the ability for people to travel throughout the City.

Structures

Structures in areas with localized flooding can be affected if floodwaters intrude into the structure. Structures in low lying areas, or those with basements can be at greater risk. Buildings with older foundations that are prone to water intrusion are also at greater risk. Once water finds its way into a structure, it tends to continue to do so until the path that brings water into a structure is mitigated. Structures can also be damaged by trees that have become uprooted and fall during rain and storm events. Large trees falling onto structures can cause significant damage.

Critical Facilities and Infrastructure

Localized flooding, while often more of a nuisance, can cause damage to critical facilities and infrastructure during a heavy rain and storm event. Any facility that experiences localized flooding can be impacted. Utilities and other critical infrastructure can all be affected, causing interruptions in service until repairs can be made. For example, water and wastewater systems can be vulnerable to heavy rains and flood events. Rainfall creates a high water table, surging streams and creeks, and saturates soil. Infiltration of stormwater into water and wastewater systems may occur and presents a threat to public health and safety, when the infrastructure is no longer able to meet operational needs and local demands. Other critical facilities such as roads, bridges and other transportation facilities can also experience localized flooding causing road closures and other impacts until storm waters recede. This can result in extended road closures requiring alternate routes.

Natural, Historic, and Cultural Resources

Natural resource assets may have some vulnerabilities to localized flood during major storm events, but can benefit from floodwaters, often by design. Many parks and green spaces are designed to take overflow water and release it into the underlying soils and natural areas. Wetland areas in the City actually help reduce the risk of flooding, as they can absorb excess rainfall that would have to be drained away from

impervious surfaces. Flooding can provide many benefits to the natural environment, including recharging wetlands and groundwater, increasing fish production, creating wildlife habitat, and rejuvenating soil fertility. These smaller localized flooding events often provide more benefits to the environment in comparison to negative impacts associated with large flood events. Historic and cultural resources may be at some measure of vulnerability if they are located in areas subject to repeated localized flooding.

Impacts from Localized Flood

Primary concerns associated with stormwater flooding include impacts to infrastructure that provide a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Objects can also be buried or destroyed through sediment deposition. Floodwaters can break utility lines and interrupt services. Standing water can cause damage to crops, roads, and foundations. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

Life safety issues from localized flooding would be more limited. The amount and type of damage or flooding that occurs varies from year to year and from storm to storm, depending on the quantity of precipitation and runoff.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Madera include the following:

- Climate change is likely to exacerbate future heavy rain conditions and associated impacts and vulnerability of the City to localized flood.
- The City is expected to see slow and steady growth. The City has 33 areas planned for development in the next five years. Additional population growth would likely bring continued diversity to the City. This can also impact the vulnerable populations, like low-income individuals and households living in areas that are typically more hazardous. Vulnerable population groups such as low-income individuals and households living in flood prone areas could face disproportionate effects from localized flood and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location of future flood events.
- Land use planning should be proactive to address future hazard conditions. The City has 33 areas planned for development in the next five years. Development in more urban areas causes an increase in peak flow and stormwater runoff. Such growth will consume previously undeveloped acres, and the impacts may overwhelm existing drainage and flood control facilities. Locating new development, structures and critical facilities and infrastructure within or near areas of localized flooding risk may

put additional development at risk. However, City building codes are in effect to reduce this risk and should be updated as necessary to continue to address future localized flood conditions. Depending on the location of new development and adherence to protective building codes, changes in land use and development may or may not increase the impacts and associated vulnerabilities of the City to this hazard.

The City will need to be proactive to ensure that increased development has proper siting and drainage for stormwaters. The risk of localized flooding to future development can also be minimized by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the localized stormwater flooding will reduce future risks of losses.

Severe Weather: Extreme Cold, Freeze, and Snow

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

According to the National Weather Service (NWS) and the Western Regional Climate Center (WRCC), extreme cold often accompanies a winter storm or is left in its wake. Snow can occur during these events. Prolonged exposure to cold can cause frostbite or hypothermia and can be life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Freezing temperatures can cause significant damage to agricultural industry.

Location and Extent

Due to size of the County and changes in elevation (i.e., from approximately 250 feet to almost 10,000 feet above mean sea level (msl)) and climate, weather conditions can vary greatly across the County. The City falls in western Madera County, which is predominantly below an elevation of 4,000 feet above msl, is generally below the snowfall line, and includes the land to the west (including the incorporated communities). The City is generally below the snowfall line. According to the WRCC, in the western portion of Madera County, monthly average low temperatures in the coldest months (November through April) range from the mid-30s to the upper 40s. The lowest recorded daily extreme was 15°F on January 10, 1949. In a typical year, low temperatures fall below 32°F on 30.7 days. Extreme cold and freeze events occur on a regional basis. Extreme cold can occur in any location of the City. All portions of the City and County are at risk to extreme cold and freeze.

Past Occurrences

Disaster Declaration History

The County has had four past state and three past federal disaster declarations for extreme cold and freeze. There have been three (once in 2012 and twice in 2022) freeze events in 2022 that resulted in USDA disaster declarations, as discussed in Section 4.3.6 of the Base Plan.

NCDC Events

The NCDC data shows 787 extreme cold, freeze, and snow incidents for Madera County since 1993, some of which likely affected the City.

City of Madera Events

The City Planning Team noted that the Central Valley as a whole generally experiences a hard freeze every two to three years. Within the City, these freezes generally lead to above-ground pipes cracking. Since 2018, there have been no known property damages, closures, or impacts were recorded due to extreme cold, freeze or snow.

Climate Change and Extreme Cold, Freeze, and Snow

According to the 2024 CAS, freezing spells and snow are likely to become less frequent in California as climate temperatures increase; if emissions increase, freezing events could occur only once per decade in large portion of the State by the second half of the 21st century. According to a California Natural Resources Report in 2014, it was determined that while fewer freezing spells would decrease cold related health effects, too few freezes could lead to increased incidence of disease as vectors and pathogens do not die off.

Vulnerability to Extreme Cold, Freeze, and Snow

Extreme cold and freeze events happen in the City each year. Snow can occur, but it is rare. Cold and freeze can impact both structures and populations in the Planning Area. The whole of the City and County Planning Area has some measure of vulnerability to extreme cold and freeze.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to City. This is included in the Local Concerns section below. After that, vulnerability is discussed in multiple sections that detail how this hazard can affect the City. These sections include assets at risk, impacts, and how future development and future conditions can be affected by this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Madera has an unhoused population which would potentially be impacted by extreme cold, however, the City does not have specific data regarding impacts to this population. Additionally, private properties may be impacted if their infrastructure is not properly protected (i.e. exterior pipes) from freezing conditions. Certain crops can be impacted due to freezing weather as well, but the City does not track this.

The City has heating centers for those seeking refuge during these extreme heat and cold weather events. However, the City has not opened Warming Centers since 2021. The City does not maintain an overnight shelter, when extreme cold would be most impactful.

Assets at Risk

Assets at risk from extreme cold, freeze, and snow include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations within the City are vulnerable to extreme cold and freeze, but this hazard generally affects vulnerable populations and those spending large amounts of time outside. Prolonged exposure to cold can cause frostbite or hypothermia and can be life-threatening. Vulnerable populations to cold and freeze include the unhoused; individuals who exercise or train outdoors; outdoor workers; individuals that lack the resources to afford heat; and the young, old, or medically fragile individuals that are more susceptible to cold related impacts. In addition to vulnerable populations, pets and livestock are at risk to freeze and cold. Since snow is rare, its effect on people and populations are minimal.

Structures

Structures in the City have some measure of risk from extreme cold and freeze. Buildings can be affected directly by freeze, pipes that feed buildings can be damaged during periods of extreme cold and cause water damage and other related impacts to a structure. Structures can also be damaged by downed trees during freeze and winter storm events. Snowfall can occur, but it is usually not heavy enough to damage structures.

Critical Facilities and Infrastructure

Extreme cold and freeze, occasionally accompanied by high winds and snow, can cause downed trees and power lines, power outages, accidents, and road closures. Transportation networks, communications, and utilities infrastructure are the most vulnerable physical assets in the City. Depending on the facility type and function, critical facilities and infrastructure may be affected directly by freeze. Damage to pipes that feed buildings can be damaged during periods of extreme cold. Other equipment may also be affected. Infrastructure such as roads, highways, and bridges can become slippery, causing accidents and road closures.

Natural, Historic, and Cultural Resources

Depending on how low the temperatures go and the duration of an extreme cold and freeze event, natural resources in the City may be affected. During periods of freeze, trees in the City may be damaged. This is especially true if a freeze occurs during a winter storm with winds and precipitation. Other natural resources like wildlife may be at risk during a period of freeze. While it is rare for historic buildings to be affected directly by freeze, damages to pipes that feed historic buildings can be damaged during periods of extreme cold and cause additional impacts to the structures. Snow is relatively rare and is unlikely to affect natural, historic, or cultural facilities.

Impacts from Severe Weather: Extreme Cold, Freeze, and Snow

Extreme cold and freeze can affect critical facilities and infrastructure, down trees, break pipes, and can be a life safety issue. Transportation networks, communications, and utilities infrastructure are often the most vulnerable physical assets in the City. Infrastructure such as roads and utilities are at risk to freezing temperatures and snow, causing failures and hazardous road conditions. When extreme cold is coupled with high winds, snows, and freezing storms, power lines may be downed, resulting in power outages and an interruption of utilities and critical services. During periods of extremely low or prolonged cold temperatures, other impacts to the City can include interruption in business and school activities.

The elderly, the young, and those experiencing medical issues are often more vulnerable to temperature extremes, but anyone can be affected. Exposure to cold temperatures can cause hypothermia and frostbite. Those exercising or recreating outdoors, outdoor workers, and the unhoused may be at a higher risk.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on these factors for the City include the following:

- Climate change is unlikely to exacerbate extreme cold, freeze, and snow and their associated impacts to the City.
- The City is expected to see slow and steady growth. Additionally, the City has 33 areas planned for development in the next five years. Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the City. Changes in populations patterns should also be considered. Especially vulnerable individuals to this hazard include older adults, children, migrant farm workers, those below the poverty line and the unhoused. During hazard events, existing inequities can get worse, and these groups are the most likely to be affected and may require extra assistance. Planning for population changes will help to decrease the City's overall vulnerability. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of population growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. 33 developments are expected to be built in the next five years. City building codes are in effect to reduce this risk and should be updated as necessary to continue to address future freeze and extreme cold conditions. Due to adherence to protective building codes, changes in land use and development will likely not increase the impacts and associated vulnerabilities of the City to this hazard.

Future development built to code should be able to withstand extreme cold, freeze, and heavy snow. Current building codes provide such provisions for new construction. Older buildings and infrastructure should be

evaluated to ensure that extreme cold and freeze will not cause negative impacts. Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements such as building codes are followed, and varying needs for different demographic groups that reside within the County are considered can help make for a more resilient community.

Severe Weather: Extreme Heat

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile

According to FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and lasts for several weeks. Heat kills by taxing the human body beyond its abilities. In extreme heat and high humidity, evaporation is slowed, and the body must work extra hard to maintain a normal temperature." Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children, those who are sick or overweight, and those that work or recreate outdoors are more likely to experience heat exhaustion or succumb to extreme heat.

In addition to the risks faced by citizens of the City, there are risks to the built environment from extreme heat. While extreme heat on its own does not usually affect structures, extreme heat during times of drought can cause wildfire risk to heighten. Extreme heat can lead to interruptions in power, power outages, and when combined with high winds, to Public Safety Power Shutdown (PSPS) events, creating significant issues in the City.

Location and Extent

Heat is a regional phenomenon and affects the whole of the City. Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. Heat waves do not strike victims immediately, but rather their cumulative effects slowly affect general and vulnerable populations and communities. Heat waves do not generally cause damage or elicit the immediate response of floods, fires, earthquakes, or other more "typical" disaster scenarios. The City experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 105-110°F in rather extreme situations.

The NWS has in place a system to initiate alert procedures (advisories or warnings) when extreme heat is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. The NWS HeatRisk forecast provides a quick view of heat risk potential over the upcoming seven days. The heat risk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale which is similar in approach to the Air Quality Index (AQI) or the UV Index. This can be seen in Section 4.3.3 of the Base Plan.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations from extreme heat.

NCDC Events

The NCDC data shows 122 extreme heat incidents for Madera County since 1993, some of which likely affected the City.

City of Madera Events

The City Planning Team noted that the Central Valley as a whole experiences extreme heat each summer and sometimes into fall. The City Planning Team noted that since extreme heat is a regional phenomenon, events that affected the County also affected the City. Those past occurrences were shown in the Base Plan in Section 4.3.3.

Specifically for the City, in the summer and **early fall of 2024**, the City experienced multiple stretches of 100+ temperatures. October experienced an unusual heat wave, reaching 100 degrees on 10/2/24, setting an all-time record for that date. Throughout the summer, precautions had to be taken to ensure safe activities while outdoors. Madera Unified even moved a graduation ceremony to a later time to ensure a safer event (see Figure B-24). Cooling centers were opened 39 days in 2024, compared to 36 days in 2022 and 27 days in 2023. City staff open Cooling Centers when there are two consecutive days of 100 degrees or higher, or one day of 105 degrees or higher. The centers are open M-F 8am-7pm. When weather is extreme or there are excessive heat days, they do open for weekends from 8am-7pm. Parks and Community Services employees (PCS) staff the centers, however, this is also a busy time for PCS activities/events, so finding staff coverage can be a challenge at times.

Figure B-24 Notice from Madera Unified School District Related to Extreme Heat in 2024

Source: City of Madera

Climate Change and Extreme Heat

The 2024 CAS, citing a California Energy Commission study, states that "over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined." This study shows that California is getting warmer, leading to an increased frequency, magnitude, and duration of heat waves. These factors may lead to increased mortality from excessive heat.

As temperatures increase, California and Madera County will face increased risk of death from dehydration, heat stroke, heat exhaustion, heart attack, stroke and respiratory distress caused by extreme heat. According to the 2024 CAS, report and the 2023 State of California Hazard Mitigation Plan, by 2100, hotter temperatures are expected throughout the state, with projected increases of 3-5.5°F (under a lower emissions scenario) to 8-10.5°F (under a higher emissions scenario). These changes could lead to an increase in deaths related to extreme heat in Madera County.

Vulnerability to Severe Weather: Extreme Heat

Extreme heat is becoming more frequent, intense, longer lasting and geographically widespread. Extreme heat occurs on an annual basis in the County and the City. In recent years, compounded by climate change conditions, summer months continue to get a bit hotter. The whole of the City is at some measure of vulnerability to extreme heat. An assessment of a community's vulnerability to extreme heat begins with

an understanding of local exposure to extreme heat. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Reliance on air conditioning causes a strain on the electrical energy in the Madera area. Occasionally peak demands outweigh supply and a condition known as brown-out occurs. This is an extremely dangerous situation for electrical equipment as it operates without the needed electricity causing damage to the systems. In addition, PSPS events can cause issues for water supply. Days of extreme heat have been known to result in medical emergencies, civil unrest, and unpredictable human behavior.

Periods of extended heat and dryness (droughts) can have major economic, agricultural, and water resources impacts. Extreme heat results in increased water demand. The demand comes from farmers attempting to preserve their crops and from homeowners attempting to maintain yards. This reaction impacts the water level in the aquifer.

The City has cooling centers for those seeking refuge during these extreme heat and cold weather events. The criteria to open cooling centers is two consecutive days of 100 degrees or higher, or one day of 105 degrees or higher. The centers are open M-F 8am-7pm. When weather is extreme or there are excessive heat days, they do open for weekends from 8am-7pm. Parks and Community Services employees (PCS) staff the centers, however, this is also a busy time for PCS activities/events, so finding staff coverage can be a challenge at times.

Assets at Risk

Assets at risk from extreme heat include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations within the City are vulnerable to extreme heat, but it generally affects people spending large amounts of time outside or without means of cooling indoor structures. During extended periods of high temperatures, extreme heat may overload the demands for electricity to run air conditioners and can present health concerns to individuals. When interruptions in power occur during extreme heat, the risk of heat related illnesses and deaths increases. Extreme heat is a significant concern to vulnerable populations. The unhoused; individuals who exercise or train outdoors; outdoor workers; individuals that lack the resources to afford heat; and the young, old, or medically fragile individuals that are more susceptible to heat related impacts. In addition to vulnerable populations, pets and livestock are at risk to extreme heat conditions.

Structures

Extreme heat normally does not generally impact structures, but individuals working in structures may be affected during periods of extended heat, especially in structures that might not be equipped with air conditioning or other means of cooling. The City noted that extreme heat has caused interruptions to power in the past. Also depending on the structure, sensitive contents such as IT equipment can be impacted, especially if a power outage occurs.

Critical Facilities and Infrastructure

Depending on their type and function, critical facilities and infrastructure can also be affected by extreme heat. Interruptions in power caused by extreme heat can lead to system failures. Schools without air conditioning may have to close or operate on a reduced schedule.

Natural, Historic, and Cultural Resources

Natural resource assets, including those located in City park and open space areas, may be vulnerable during periods of extreme heat. These include turfed areas; landscapes, City trees, wildlife and habitat areas, and wetlands and marsh lands. Recently, trees were lost in areas of the City that were weakened by drought and extreme heat. Extreme heat may also cause drought-like conditions, contributing to other issues. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability in the region for that time period, even if the rest of the season is relatively moist. Historic and cultural resources are not expected to be affected by extreme heat.

Impacts from Severe Weather: Extreme Heat

The City experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 105-110°F in rather extreme situations. During these times, drought conditions may worsen, and the City may see an increase in dry fuels. Also, power outage and PSPS events may occur during these times as well. Health issues are a primary concern with this hazard, especially to vulnerable populations, although economic impacts can also be an issue.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for City include the following:

- Climate change is likely to exacerbate future extreme heat conditions and associated impacts and vulnerability of the City.

- Future population growth should be considered, as having more or less people in a community affects the overall hazard vulnerability to the City. The City is expected to see slow and steady growth. The City has 33 areas where growth is expected over the next five years. Any additional growth in the City would place additional populations at risk to extreme heat. As such, the vulnerability to this hazard is expected to decrease. However, any future low income and the unhoused population are at risk to extreme heat which can put strain on emergency services and shelters. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the nature and intensity of future extreme heat events.
- Land use planning should be proactive to address future hazard conditions. The City has 33 areas where growth is expected over the next five years. City building codes are in effect to reduce this risk and should be updated as necessary to continue to address future extreme heat conditions. Due to adherence to protective building codes, changes in land use and development will likely not increase the impacts and associated vulnerabilities of the City to this hazard.

Future development of new buildings in the City will likely not be affected by extreme heat. Extreme heat is more likely to affect vulnerable populations. Vulnerability to extreme heat will increase as the average age of the population shifts. It is encouraged that nursing homes and elder care facilities have emergency plans or backup power to address power failure during times of extreme heat and in the event of a PSPS. Low-income residents and unhoused populations are also more vulnerable and should be considered in future growth plans for the City. Cooling centers for these populations should be utilized when necessary.

Severe Weather: Heavy Rains and Storms

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

Storms in the City occur annually and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. 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 contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the City falls mainly in the fall, winter, and spring months. Wind often accompanies these storms; hail and lightning are rare in the City. In recent years, heavy rain and storms have been compounded by more frequent and higher intensity atmospheric river events.

Location and Extent

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the City. All portions of the City are at risk to heavy rains and storms. Most of the severe rains occur during the fall, winter, and spring months in the City as discussed below (with problem flooding areas associated with heavy rains and storms shown in Table B-33 in the Flood: Localized Stormwater section). There is no scale by which heavy rains and severe storms are measured. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms

often let the public know of upcoming events. Hail and lightning are rarer in the City and Madera County. Duration of severe storms in the City can range from minutes to hours to days. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

Past Occurrences

Disaster Declaration History

According to historical hazard data, severe weather, including heavy rains and storms, is an annual occurrence in the City. This contributes to many of the federal disaster declarations related to flooding. Disaster declarations from flooding are shown on Table B-34.

Table B-34 Madera County – State and Federal Disaster Declarations from Flood (Heavy Rain and Storms) 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	20	1950, 1955, 1958, 1969, 1982 (twice), 1983, 1986, 1992, 1993, 1995 (three), 1997 (twice), 2006, 2010, 2023 (three)	21	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1982, 1986, 1992, 1995 (three), 1997 (twice), 2006, 2010, 2023 (four)

Source: Cal OES, FEMA

NCDC Events

The NCDC data recorded 67 hail, heavy rain, and winter weather incidents for Madera County since 1950. Winter weather events tend to be rain in the lower elevations of the County, while snow falls in the upper elevations.

City of Madera Events

The City noted that heavy rains and storms are an annual occurrence. Other events causing issues are listed in the Past Occurrences section of the Flood: 1%/0.2% Annual Chance and Flood: Localized Stormwater Flooding discussions above.

The City Planning Team noted that the City experiences generally at least one heavy rainfall event each winter, however it hadn't gone past the level of a 25-year storm until 2023. Atmospheric weather events have been compounding rain events in recent years. The rainfall causes localized flooding. In 2023, there were heavy rain events that caused issues in the City. These are discussed in the localized flood section.

Climate Change and Heavy Rains and Storms

It is likely that climate change will increase the chance of future occurrence as well as future impacts from heavy rains and storms. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 2024 CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is unlikely that hail will become more common in Madera County and the City of Madera. The amount of lightning is not projected to change.

Cal-Adapt noted that, on average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century. Cal-Adapt modeled scenarios are shown in Section 4.3.4 of the Base Plan.

Vulnerability to Heavy Rain and Storms

Heavy rain and severe storms are the most frequent type of severe weather occurrences in the City. These events can cause both significant and localized flooding. Flooding can be worse during times where the ground is already saturated. Wind often accompanies these storms and has caused damage in the past. Hail and lightning are rare in the City, but also can cause damage, with lightning occasionally igniting wildfires.

The whole of the City is at some measure of vulnerability to heavy rain and storms. An assessment of a community's vulnerability to heavy rains and storms begins with an understanding of local exposure to heavy rain and storms. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

The City noted that heavy rains and storms cause localized flooding in the City. The problem areas area shown on Table B-33 above.

Problems associated with the primary effects of severe weather include flooding, pavement deterioration, washouts, high water crossings, landslide/mudslides, debris flows, and downed trees. Most of the localized flooding in the City is generally limited to flooding within the street ROW and only has limited impact to private property. It is anticipated that a 100-year rainfall event would impact private facilities to varying degrees in various parts of the City.

Assets at Risk

Assets at risk from heavy rain and storms include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations (including vulnerable populations) in the City have some measure of risk to heavy rains and storms. Those populations that work or recreate outside and unhoused individuals are more vulnerable to impacts from heavy storm events. Heavy rains and storms occur every year and do not generally cause

significant adverse impacts to individuals; it is the secondary hazard, flooding, which poses the biggest impact to people. Populations at risk to flooding resulting from heavy rains and storm events include those who live in floodplains (discussed in further detail in the Flood: 1%/0.2% Annual Chance section above) and those who live in and near localized flooding areas (discussed in further detail in the Flood: Localized Stormwater Flooding section above).

Structures

Structures in the City have some risk to heavy rains and storms. Structures built to modern building codes are built to withstand heavy rains and storms (including high winds and lightning). During a heavy storm, localized flooding may cause water intrusion into buildings from the outside. Trees can be downed causing impacts to structures. Older homes and buildings may be at increased risk to heavy rains and storms. Power outages during severe storm events can occur, impacting the use of structures until the power is back online.

Critical Facilities and Infrastructure,

Heavy rain and storms can affect critical facilities and infrastructure during large events. Power outages may occur taking facilities offline. High winds can down power lines and trees impacting facilities. Water intrusion into facilities and infrastructure, such as water and wastewater facilities, can impact operations. City roads, streets, and bridges can be impacted resulting in closures restricting traffic flow in the City. In certain areas, large storms can cause erosion and localized landslides which can impact facilities. Many critical facilities are built to modern design standards that take heavy rains and storms into account when siting and building these structures, and others may need to be retrofitted to better withstand these events.

Natural, Historic, and Cultural Resources

Large rain and storm events and associated flooding can affect natural, historic, and cultural resources. Silt and sediment can damage natural areas. Trees can be uprooted and downed by high winds. Extended periods of rainfall can erode natural banks along waterways and degrade soil stability for terrestrial species. While some natural systems can be adversely impacted during these large storms, heavy rain events can also provide benefits. Groundwater and wetland areas can be recharged and water supplies replenished. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures affected by large storm events, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged, and lost during extreme rain and storm and events.

Impacts from Heavy Rain and Storms

Impacts from heavy rains and storms include damage to property, critical facilities and infrastructure, and the natural landscape. This includes: erosion; downed trees; damaged utility structures and infrastructure; power outages; road damage and blockages; and even lightning strikes to critical infrastructure and people. Lightning can also cause wildfires and urban fires to occur. Landsliding and erosion occur when the soil on slopes becomes oversaturated and fails. Climate change may cause these impacts to worsen.

Actual damage associated with the primary effects of severe storms and heavy rains has been somewhat limited. It is the secondary hazards caused by these severe weather events, such as floods, landslides, and erosion that would likely have the greatest impact.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City include the following:

- Climate change is likely to exacerbate future heavy rain and storm conditions and associated impacts and vulnerability of the City to flooding.
- The City is expected to see slow and steady growth. The City has 33 areas where growth is expected over the next five years. Certain vulnerable populations, such as the those who work or spend extended periods outdoors, could experience disproportional effects from this hazard. and should be addressed as the City continues to grow. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the nature and intensity of future storm events.
- Land use planning should be proactive to address future hazard conditions. The City has 33 areas where growth is expected over the next five years. Changes in land use in these and other future areas may also amplify the impacts of heavy rains and storms, as additional impervious surfaces can cause additional runoff and localized flooding throughout the City. However, changes in land use and future development may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the nature and intensity of future storm events.

Building codes in the City ensure that new development is built to current building standards, which should reduce the risk to future development in the City from heavy rains and storms. New critical facilities such as communications towers and others should be built to withstand hail damage, lightning, and thunderstorm winds. With adherence to development standards, future losses to new development should be minimal. Changes in land use may also amplify the impacts of heavy rains and storms, as additional impervious surfaces can cause additional runoff and localized flooding throughout the City.

Severe Weather: High Winds and Tornado

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. High winds can cause significant property damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds, when combined with high temperatures and low humidity can also lead to PSPS events. Winds can also drive fires in and near the City.

Portions of the City are also located in or near a special wind hazard region, which is a result of foehn winds. A foehn wind is a type of dry down-slope wind that occurs in the lee (downwind side) of a mountain range. Winds of this type are called "snow-eaters" for their ability to make snow melt or sublimate rapidly. These types of winds are also associated with the rapid spread of wildfires, making some regions which experience these winds particularly fire prone.

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 form when cool, dry air sits on top of warm, moist air. Tornadoes are the most powerful storms that exist. Tornadoes, though rare, can affect areas of the City, primarily during the rainy season in the late fall, winter, and early spring.

Location and Extent

The entire City is subject to significant, non-tornadic (straight-line), winds. Each area of the City is at risk to high winds. Magnitude of winds is measured often in speed and damages. These events are often part of a heavy rain and storm event but can occur outside of storms. The speed of onset of winds can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of winds in California is often short, ranging from minutes to hours. The Beaufort scale is an empirical 12 category scale that relates wind speed to observed conditions at sea or on land. Its full name is the Beaufort Wind Force Scale. The Beaufort Scale was shown in Section 4.3.5 of the Base Plan.

Tornadoes, while rare, can occur at any location in the City. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale (EF) provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. The F Scale and EF Scale are shown in Section 4.3.5 of the Base Plan.

Past Occurrences

Disaster Declarations

There have been no federal or state disaster declarations in the County for winds and tornadoes.

NCDC Events

The NCDC data recorded 271 high wind events (no tornado incidents) for Madera County since 1950. Many of these wind events likely affected the City.

City of Madera Past Occurrences

The City Planning Team noted no past occurrences of tornado that had damaging effects on the City since 2018. There was an event of winds in 2023 that occurred after heavy rains had fallen. City and private trees were blown over. The City removed 12 tons of vegetative debris and trees from roads and public property including right of ways. The City also removed 3 hazardous leaning trees from trees from roads and public property including right of ways. Some of these can be seen in Figure B-25.

Figure B-25 Trees Removed in 2023

Climate Change and High Winds and Tornado

According to the 2024 CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual thunderstorm events is likely to increase during the 21st century. This may bring stronger thunderstorm winds. The CAS does not discuss non-thunderstorm winds or tornadoes.

Vulnerability to Severe Weather: High Wind and Tornadoes

The City is subject to potentially destructive high winds and tornadoes. High winds are common throughout the area and can happen during most times of the entire year and outside of a severe storm event. Tornadoes are rare. High winds and tornadoes can be a significant public safety and economic concern. The whole of the City is at some measure of vulnerability to wind and tornadoes.

An assessment of a community's vulnerability to high winds begins with an understanding of local exposure to wind and tornadoes. This is included in the Local Concerns section below followed by a discussion of the City's Assets at Risk to this hazard.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

The City is in or adjacent to a special wind hazard region, which is a result of foehn winds. A foehn wind is a type of dry down-slope wind that occurs in the lee (downwind side) of a mountain range. Winds of this type are called "snow-eaters" for their ability to make snow melt or sublimate rapidly. This snow-removing ability is caused not only by warmer temperatures, but also the low relative humidity of the air mass coming over the mountain(s). They are also associated with the rapid spread of wildfires, making some regions which experience these winds particularly fire prone. Burn patterns of almost all historic large wildfires in the larger County indicate they occurred during foehn winds.

Strong wind is a frequent type of severe weather occurrence in the area. Wind often accompanies the region's storms and has caused damage in the past. Buildings that house populations at risk such as schools, nursing homes, hospitals, and urgent care facilities are at risk to wind and tornadoes. Also at risk are power lines, which can arc or be damaged during high wind events. The City has had power outages and damages to electric lines in past storms that included high winds. The City is also concerned about the D Street Water Tower during periods of extreme wind and tornado.

Assets at Risk

Assets at risk from winds and tornadoes include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations are at some vulnerability to high winds and tornadoes. Certain vulnerable populations are at the greatest risk to the effects of high winds and tornadoes. These include:

- The unsheltered.
- Citizens who reside in mobile homes.
- Citizens in buildings with no tornado shelter or below ground floors.
- Those with access and functional needs.

- The medically fragile experiencing power outages as a result of wind events.
- Those working or caught outdoors during a wind or tornado event.

Structures

All structures in the City have some measure of risk from high wind and tornadoes. Though rare, a tornado could cause damage to virtually all facilities in the tornado touchdown path. This would affect homes, businesses, commercial property, as well as government and critical facilities. During a wind or tornado event, power lines in the City can be damaged by falling trees caused by wind. High winds are a cause for PSPS events to be declared, causing power outages to occur. High winds and tornadoes could cause sparks from electric wires and other sources, which could lead to wildfire ignition. Once ignited, high winds can also cause wildfires to rapidly spread and become out of control. High wind conditions can cause wildfires to move into more urban areas destroying structures and whole subdivisions, as seen in recent wildfire events in the West.

Critical Facilities and Infrastructure

Though most critical facilities are built to withstand winds, high wind speeds can still cause damage to critical facilities and infrastructure in the City. Though rare, a tornado could cause damage to virtually all facilities in the tornado touchdown path. Winds can cause power outages affecting system operations. Winds can also contribute to PSPS events, and lead to out of control wildfires, which can damage critical facilities and impact their abilities to perform their critical roles in the community.

Natural, Historic, and Cultural Resources

Natural resources, such as trees, are vulnerable to winds. Increased levee and streambank erosion can occur during periods of high water and high winds. High wave action during significant wind events can impact marsh lands and habitat areas. Soil erosion can also occur during high winds. Most all natural, historic, or cultural resources are at risk to tornadoes. Tornadoes can tear apart habitats, causing fragmentation across ecosystems and can damage and destroy historic structures and cultural resources.

Impacts from Severe Weather: High Wind and Tornado

Wind and tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, the majority of injuries and deaths generally result from flying debris. Property damage can include damage to buildings, fallen trees, and power lines. Local industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response. Winds can push automobiles off roads, damage roofs and structures, cause power outages, and cause secondary damage due to flying debris and hazardous trees. High winds can also contribute to the spread and intensity of wildfires. High winds during periods of high water can cause impacts to levees and streambanks from accelerated erosion. Climate change may affect this hazard and cause winds to increase in velocity and more tornadoes to affect the City.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the County may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in

population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City include the following:

- Climate change is likely to exacerbate future wind conditions and associated impacts and vulnerability of the County. Climate change is not likely to affect future tornado conditions.
- Future population growth should be considered as having more or less people in a community affects the overall hazard vulnerability to the City. The City is expected to see slow and steady growth. The City has 33 areas where growth is expected over the next five years. Vulnerable populations could experience disproportional effects from this hazard and should be planned for as development of the City continues. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions.
- Land use planning should be proactive to address future hazard conditions. 33 areas are expected to be built in the next five years. Building codes in the City ensure that new development is built to current building standards to withstand high winds, which should reduce the risk to future development in the City from high winds and tornadoes. With adherence to development standards, future losses to new development should be minimal. Changes in land use and increased development may amplify the impacts of high winds and tornadoes, as additional structures in the City increase the number of buildings at risk to high winds and tornadoes; however, given the limited development planned in the next five years, any increase in vulnerability of the City should be limited.

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes, are followed, and varying needs for different demographic groups with intersecting identities that reside within the City are considered can help make for a more resilient community. The City enforces the state building codes which includes standards for new development to minimize damage from windstorms. New and existing critical facilities and infrastructure should also consider adding backup power systems to limit impacts associated with power outages.

Wildfire (with smoke and air quality)

Likelihood of Future Occurrence–Likely
Vulnerability–Extremely High

Hazard Profile

Wildland fire and the risk of a conflagration is an ongoing concern for the City of Madera. 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 fire regimes. Wildland fires affect grass, forest, and brushlands, as well as structures. Where there is human

access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Historically, the fire season extends from early spring through late fall of each year during the hotter, dryer months; however, in recent years, the risk of wildfire has become a year around concern.

Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds. These weather conditions can result in red flag (e.g., fire weather) days, and can result in PSPS events in the City. While wildfire risk has predominantly been associated with more remote forested areas and wildland urban interface (WUI) areas, significant wildfires can also occur in more populated, urbanized areas. There is also the concern of wildfires occurring in these more remote, forested areas that under certain weather conditions, can extend into areas not generally considered at a high risk to wildfire. Smoke and air quality also become an issue, both from fires occurring inside and outside of the Madera County Planning Area and the City.

Wildfire Smoke and Air Quality

Smoke from wildfires is made up of gas and particulate matter, which can be easily observed in the air. Air quality standards have been established to protect human health with the pollutant referred to as PM2.5 which consists of particles 2.5 microns or less in diameter. These smaller sizes of particles are responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract.

Wildfire smoke can have negative effects to those who live in or near a fire burn area. Smoke and air pollution from wildfires can be a severe health hazard. Significant wildfires occurring in both Madera County and nearby northern California communities since the 2018 LHMP Update have created significant air pollution affecting area residents.

In the summer of 2020, a record number of large wildfires (see Figure B-26) occurred on the West Coast creating hazardous air quality conditions. Within California, the northern portion of the state, the coast, and the Sierra Nevada all experienced numerous, large fires including the SCU Lightning Complex, CZU August Lightning Complex, LNU Lightning Complex, SQF Complex and the Creek Fire. These fires caused massive amounts of smoke and ash to fall upon the City of Madera. The mixture of the smoke and typical Central Valley summer heat resulted in dangerous levels of air pollution. Outdoor events were cancelled and people were encouraged to stay inside for long periods of time.

Figure B-26 2020 Wildfires and Smoke Causing Air Quality Issues

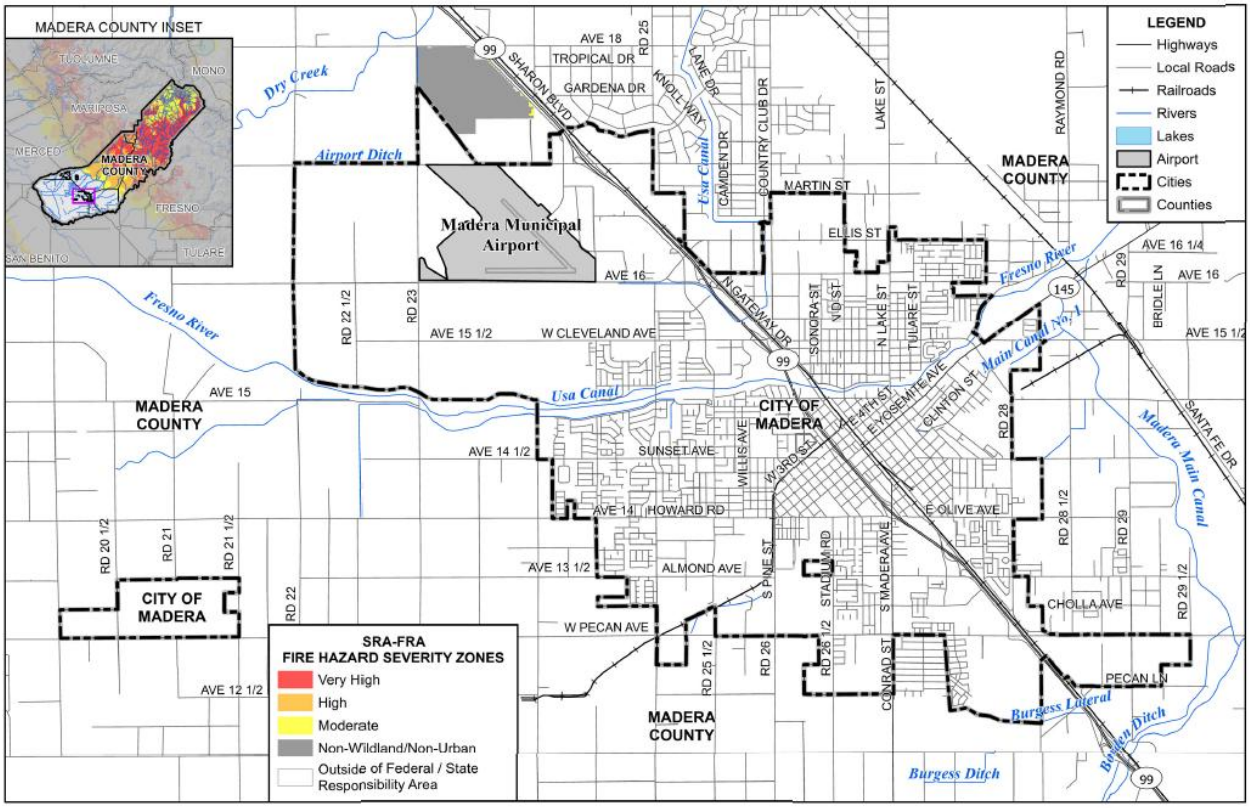
Source: City of Madera

A list of these and other events can be seen below in Table B-38.

Location and Extent

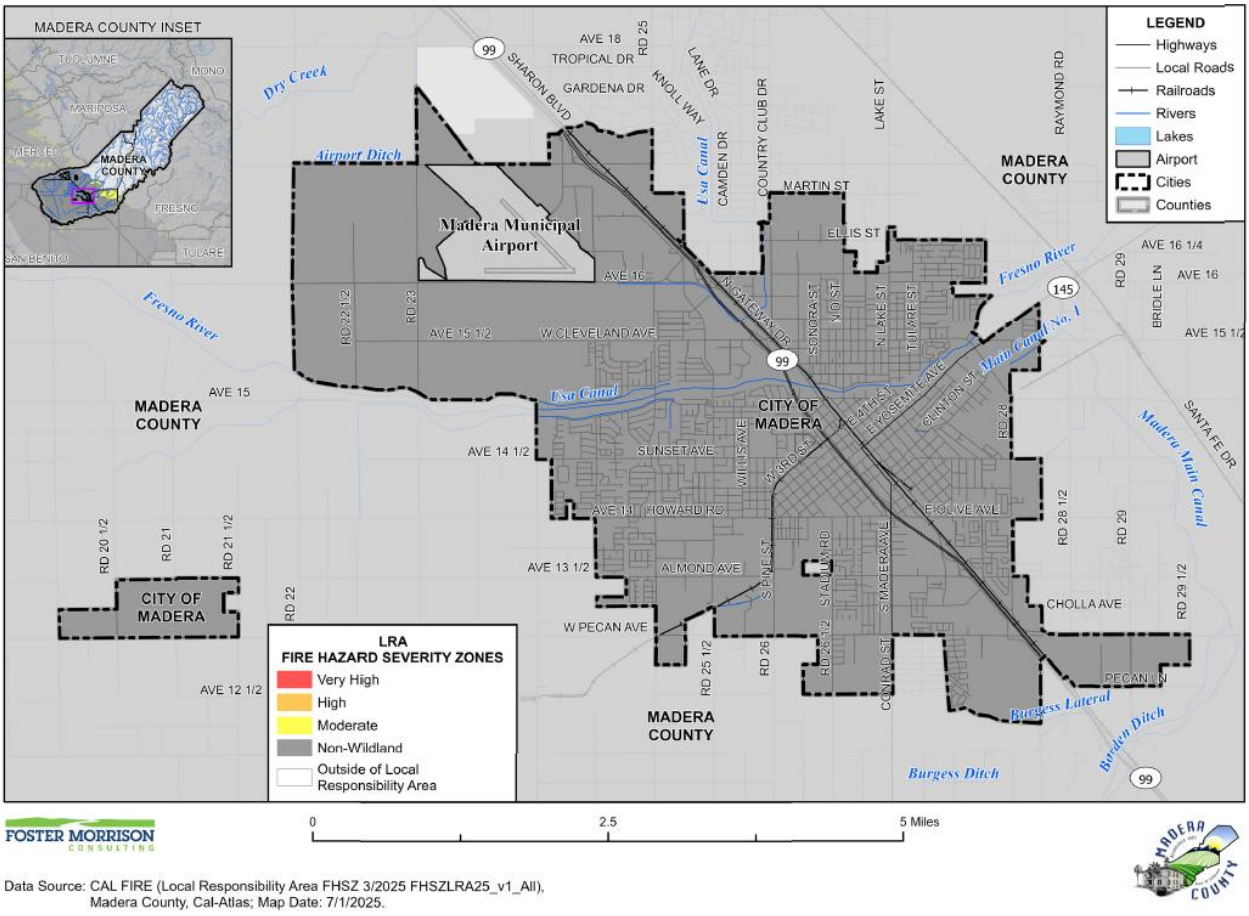
Wildfire can affect all areas of the City. CAL FIRE has estimated that the risk varies across the City and has created updated wildfire maps showing risk variance across the City and the Madera County Planning Area. Following the methodology described in Section 4.3.15 of the Base Plan, wildfire maps for the City of Madera were created. Figure B-27 shows the CAL FIRE State Responsibility Areas (SRA) and Federal Responsibility Areas (FRA) and their associated Fire Hazard Severity Zones (FHSZ) in the City. Figure B-28 shows the CAL FIRE Local Responsibility Areas (LRA) and their associated Fire Hazard Severity Zones (FHSZ) in the City. As shown on the maps, SRA/FRA FHSZs within the City fall outside of the state and federal mapped areas; all LRA FHSZs in the City are classified as Non-Wildland.

Figure B-27 City of Madera – CAL FIRE SRA/FRA Fire Hazard Severity Zones



Data Source: CAL FIRE (State Responsibility Area: FHSZSRA_23_3) April 2024,
CAL FIRE (Federal Responsibility Area: Draft c20fhszl06_1), September 2007,
Madera County, Cal-Atlas; Map Date: 7/1/2025.

Figure B-28 City of Madera – CAL FIRE LRA Fire Hazard Severity Zones



Wildfires tend to be measured in structure damages, injuries, and loss of life as well as acres burned. Fires can have a quick speed of onset, especially during periods of drought or during hot dry summer months. Fires can burn for a short period of time or may have durations lasting for a week or more. Geographical FHSZ extents in the SRA/FRA are shown in Table B-35, while extents in the LRA are shown on Table B-36. As shown, the City sits outside of the SRA/FRA and fully inside the LRA. In the LRA, the only FHSZ is the Non-Wildland zone.

Table B-35 City of Madera – CAL FIRE SRA/FRA Fire Hazard Severity Zone Geographical Extents

Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Non-Wildland/Non-Urban	1	0.0001%	1	0.0002%	0	0.0%
Outside of State and Federal Responsibility Area	10,692	0.8%	6,497	1.2%	4,194	0.5%

Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Madera Total	**10,692**	**0.8%**	**6,498**	**1.2%**	**4,194**	**0.5%**

Source: CAL FIRE

Table B-36 City of Madera – CAL FIRE LRA Fire Hazard Severity Zone Geographical Extents

Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Non-Wildland	10,692	0.8%	6,497	1.2%	4,194	0.5%
Outside of Local Responsibility Area	1	0.0001%	1	0.0002%	-	0.0%
City of Madera Total	**10,692**	**0.8%**	**6,498**	**1.2%**	**4,194**	**0.5%**

Source: CAL FIRE

Past Occurrences

Disaster Declaration History

There has been five state and nine federal disaster declarations due to fire, as shown in Table B-37.

Table B-37 Madera County – State and Federal Wildfire Disaster Declarations 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Fire	5	2016 – Clayton Fire, 2017 (twice) – Mission Fire and Railroad Fire), 2020 – Creek Fire, 2022 – Mosquito Fire	9	2005 – Quartz Fire, 2014 – Junction Fire and Courtney Fire (twice), 2015, 2016 – Clayton Fire, 2017 – Mission Fire and Railroad Fire (twice), 2020 – California Creek Fires (twice – once as FMAG, and once as DR)

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked 118 wildfire events in the County dating back to 1993.

City of Madera Events

A list of state and federal disaster declarations for Madera County from wildfire is shown on Table B-37. These events also likely affected the City to some degree. The City Planning Team noted that there are no notable major wildfire events within the City limits within recent history. Vegetation fires occur during the

dry months but these are small and quickly contained. This was the case on May 17, 2022 – a brushfire started in the dry river bottom and due to high winds, quickly spread to a neighborhood, burning two homes and damaging others as well as vehicles, burning under 5 acres in total.

Climate Change and Wildfire

It is likely that climate change will increase the chance of future occurrence as well as future impacts from wildfire. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Warmer temperatures can exacerbate drought conditions. Drought often kills plants and trees, which serve as fuel for wildfires. Warmer temperatures could increase the number of wildfires and pest outbreaks, such as the western pine beetle. Cal-Adapt's wildfire tool predicts the potential increase in the amount of burned areas for the year 2090-2099, as compared to recent (2010) conditions. This is shown in Section 4.3.15 of the Base Plan. Based on this model, Cal-Adapt predicts that wildfire risk in Madera County will increase moderately at the end of the century. However, wildfire models can vary depending on the parameters used. Cal-Adapt does not take landscape and fuel sources into account in their model. In all likelihood, in the Madera County Planning Area, precipitation patterns, high levels of heat, topography, and fuel load will determine the frequency and intensity of future wildfire.

Vulnerability to Wildfire

Risk and vulnerability to the City from wildfire is of significant concern. Wildfires that occur in the City occur from a variety of both natural and manmade causes. The City can be affected both by fires that start on or near City lands as well as those that start elsewhere and move into the City. In addition to burning large areas of land, air quality can be affected in the City by smoke from fires occurring inside the City as well as those from many miles away. As growth continues and populations increase in the City, the potential for wildfires will also increase.

The whole of the City is at some measure of vulnerability to wildfire. An assessment of a community's vulnerability to wildfire begins with an understanding of local exposure to wildfire. This is included in the Local Concerns section below. After that section, assets at risk are discussed.

Local Concerns

The City has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

General Wildfire Concerns

Wildfires can cause short-term and long-term disruption to the City and larger County as a whole. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the City by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires may result in casualties and can destroy buildings and infrastructure.

Areas of the City most susceptible to brushfire are along any open field areas such as the Fresno River. There is no real threat of property damage due to large scale wildfire in the City. City and other partners have worked hard to clear the river area from overgrown vegetation as well as removing unhoused individuals who have caused fires in the past. Specifically on May 17, 2022, a brushfire started in the dry river bottom and due to high winds, quickly spread to a neighborhood, burning two homes and damaging others as well as vehicles, burning under 5 acres in total.

Air Quality Concerns

The City of Madera is not in a high hazard fire zone according to Cal Fire's latest mapping, however, indirect impacts still apply, primarily poor air quality. Poor air quality due to nearby wildfires can directly impact the City's population. Schools and businesses with outdoor workers must consider wildfire smoke impacts when air quality reaches certain unhealthy levels. Additionally, when major fires occur in the region, City resources may be called on to assist per mutual aid agreements. There are no known property damage or closures due to large scale wildfire in the City. The extent of the impact would primarily be to cancellation of outdoor events like youth/rec sports and health impacts to unhoused individuals that would be exposed to smoke from wildfire. The City does not maintain records of closures/cancellations due to wildfire smoke. Since 2018, the major wildfires causing impacts to the City include those shown in Table B-38.

Table B-38 City of Madera – Fires Causing Air Quality Issues

Fire Name	Started	Area	Impact
Carr	Jul-18	Northern California	Poor air quality
Mendocino Complex	Jul-18	Northern California	Poor air quality
Ferguson	Jul-18	Central Sierra Nevada	Poor air quality
Camp	Nov-18	Northern California	Poor air quality
August Complex	Aug-20	Northern California	Poor air quality
SCU Lightning Complex	Aug-20	Central Coast	Poor air quality
SQF Complex	Aug-20	Central Sierra Nevada	Poor air quality
SQF Complex	Aug-20	Central Sierra Nevada	Poor air quality
Creek	Sep-20	Central Sierra Nevada	Poor air quality
Dixie	Jul-21	Northern California	Poor air quality
KNP Complex	Sep-21	Central Sierra Nevada	Poor air quality
Windy	Sep-21	Central Sierra Nevada	Poor air quality
Mosquito	Sep-22	Northern California	Poor air quality
Park	Jul-24	Northern California	Poor air quality

Source: City of Madera

Depending on atmospheric conditions, wildfires from southern and northern California, as well as those in our local foothills and mountains can negatively impact air quality in the City. The San Joaquin Valley Air Pollution Control District (District) monitors impacts to air quality from wildfires. The District provides alerts when air quality reaches unhealthy levels and provides suggestions to stay safe. Some

recommendations include staying inside/limiting outdoor activity when the air is unhealthy, wearing N95 masks if you must go outside during poor air quality conditions, and using CARB-certified air cleaners and/or MERV 13+ air filters in the home/workplace to keep indoor air quality safe. According to the EPA, Wildfire smoke exposure is a known source for various medical problems including eye irritation, reduced lung function, coughing, aggravation of certain chronic conditions, heart failure, stroke, wheezing, and difficulty breathing. Additionally, wildfire smoke exposure can cause increased health problems among those who are pregnant, children, the elderly, and those who have certain chronic conditions including but not limited to COPD, asthma, and heart disease.

Assets at Risk

Assets at risk from wildfire include people and populations; structures; critical facilities and infrastructure; and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations are vulnerable to wildfire. Certain vulnerable populations are at greater risk to the effects of wildfire as well as smoke and air quality issues that wildfires bring. Vulnerable populations include:

- Unhoused
- Infants and children under age five and their caregivers
- Senior (65 and older)
- Individuals with disabilities
- Individuals' dependent on medical equipment
- Individuals who exercise, recreate, or work outdoors
- Individuals with impaired mobility

To further evaluate the impact to the residential population within the City, the CAL FIRE FHSZ dataset was overlayed on the parcel layer. Those residential parcels that intersect the FHSZs were counted and multiplied by the 2023 Census Bureau average household factors for the City of Madera – 3.38. According to this analysis, there is a total population of 0 residents of the City of Madera falling within the moderate or higher SRA/FRA as well as the LRA FHSZs. This is shown in Table B-39 and Table B-40, respectively.

Table B-39 City of Madera – Improved Residential Parcels and Population by CAL FIRE SRA/FRA Fire Hazard Severity Zone

Jurisdiction	Very High		High		Moderate	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Madera	0	0	0	0	0	0

Source: CAL FIRE, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size –City of Madera (3.38).

Table B-40 City of Madera – Improved Residential Parcels and Population by CAL FIRE LRA Fire Hazard Severity Zone

Jurisdiction	Very High		High		Moderate	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Madera	0	0	0	0	0	0

Source: CAL FIRE, 2024 Madera County Parcel/Assessor Data, 2023 US Census Bureau American Community Survey Average Household Size – City of Chowchilla (3.35); City of Madera (3.38).

The City noted that the Critical Facilities and Infrastructure section below includes the facilities used by At-Risk populations that are threatened by this hazard. While this is not specific to what special populations reside in the City, it does speak to facilities that are used to serve (portions) of this population.

Structures

All structures in the City have some risk to wildfire. GIS was used to determine the possible impacts of wildfire within the City of Madera. The methodology described in Section 4.3.15 of the Base Plan was followed in determining structures and values at risk in both the CAL FIRE's SRA/FRA and LRA Fire Hazard Severity Zone layers. Analysis results for the SRA/FRA in the City of Madera are not shown since this layer doesn't intersect with the City. Analysis results for the LRA in the City of Madera are shown in Table B-41, which summarizes total parcel counts, improved parcel counts and their structure values by FHSZs.

Table B-41 City of Madera – Count and Value of Parcels and Structures by CAL FIRE LRA Fire Hazard Severity Zone

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
Non-Wildland							
Agricultural	77	55	$39,741,955	$10,537,300	$947,502	$10,537,300	$61,764,057
Commercial	1,012	753	$189,751,981	$534,266,572	$45,701,431	$534,266,572	$1,303,986,556
Government	212	1	$4,393,793	$12,481	$0	$12,481	$4,418,755
Industrial	241	113	$42,228,872	$183,432,081	$84,960,260	$275,148,122	$585,769,335
Institutional	85	60	$3,871,230	$30,519,200	$132,915	$30,519,200	$65,042,545
Recreational	7	0	$1,705	$0	$0	$0	$1,705
Residential	15,369	14,439	$729,655,028	$2,626,678,273	$3,751,750	$1,313,339,137	$4,673,424,188
Right of Way	31	1	$83,614	$46,163	$0	$46,163	$175,940
Utilities	12	1	$231,063	$163,844	$2	$163,844	$558,753
Unknown	42	1	$1,746,582	$187,553	$0	$187,553	$2,121,688
Non-Wildland Total	**17,088**	**15,424**	**$1,011,705,823**	**$3,385,843,467**	**$135,493,860**	**$2,164,220,371**	**$6,697,263,521**

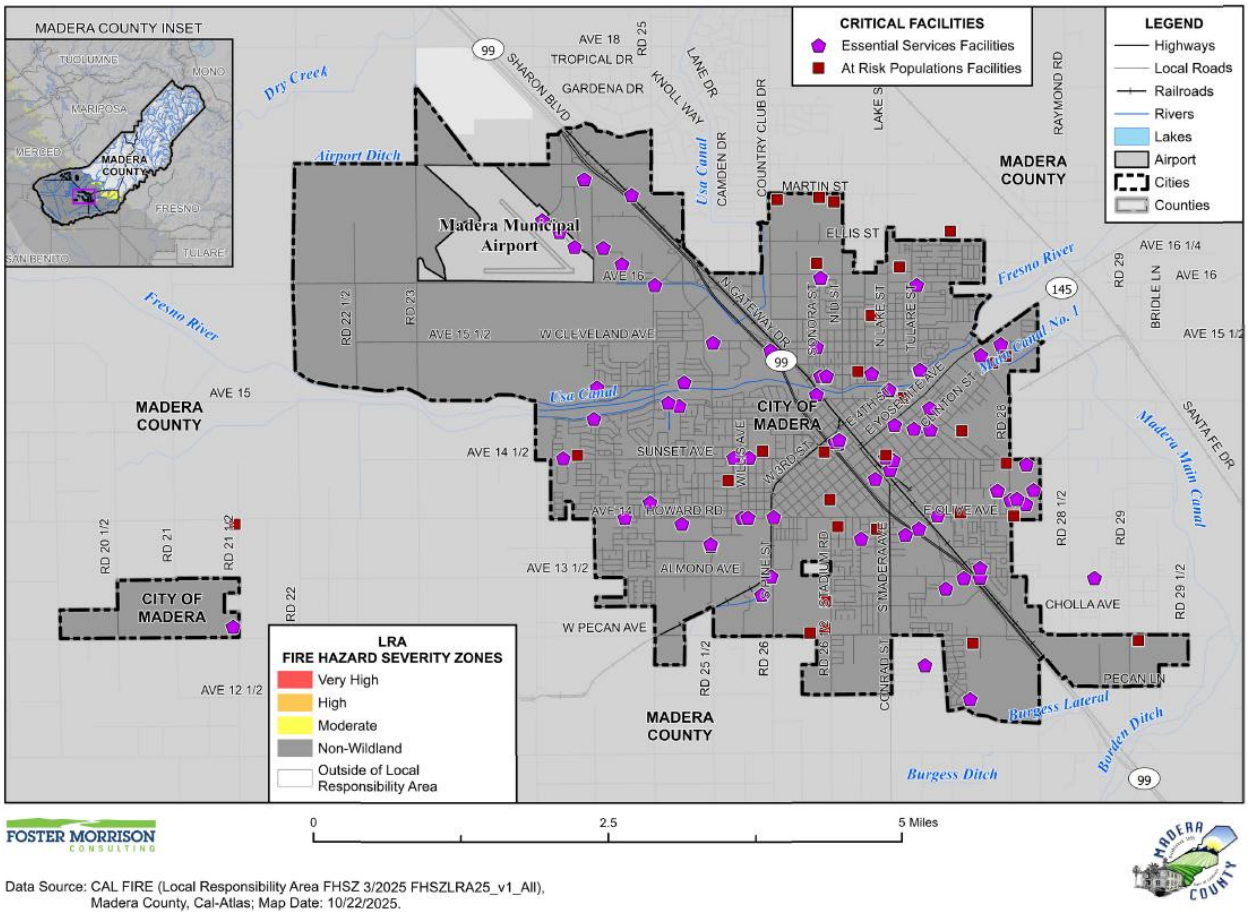
Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Structure Value	Personal Property Value	Estimated Contents Value	Total Value
City of Madera Total	**17,088**	**15,424**	**$1,011,705,823**	**$3,385,843,467**	**$135,493,860**	**$2,164,220,371**	**$6,697,263,521**

Source: CAL FIRE, Madera County 2024 Parcel/Assessor Data

Critical Facilities and Infrastructure

Wildfire present a threat to critical facilities and infrastructure. The following analysis discusses critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the City to determine which critical facilities fall into each fire hazard severity zone. Using GIS, the SRA/FRA and LRA fire hazard severity zone layers were overlayed on the critical facility GIS layer. Only LRA fire hazard severity zones intersect the City; as such no SRA/FRA analysis is presented here. Only LRA analysis is presented. This is shown on Figure B-29 for the LRA fire hazard severity zones. Table B-42 details which critical facilities fall in which LRA fire hazard severity zone. All fall into the Non-Wildland FHSZ. Details of critical facility categories, type, name, and address by LRA fire hazard severity zones are listed in Appendix F.

Figure B-29 City of Madera – Critical Facilities in LRA Fire Hazard Severity Zones



Data Source: CAL FIRE (Local Responsibility Area FHSZ 3/2025 FHSZLRA25_v1_All), Madera County, Cal-Atlas; Map Date: 10/22/2025.

Table B-42 City of Madera – Critical Facilities by Category in LRA Fire Hazard Severity Zones

Jurisdiction / Fire Hazard Severity Zones	Critical Facility Category	Facility Count
Non-Wildland	Essential Services Facilities	103
	At Risk Populations Facilities	29
	Non-Wildland Total	**132**
City of Madera Total		**132**

Source: CGS, City of Madera

Natural, Historic, and Cultural Resources

Natural, historic, and cultural resources located within areas at risk to wildfire would be vulnerable. Should a wildfire occur in the City, the impacts to natural, historic and cultural resources could be extensive and include air pollution, contamination from water runoff containing toxic products, and other environmental discharges or releases from burned materials affecting soils, habitat areas, wildlife, and aquatic resources. Historic and cultural resources can be damaged or destroyed and are often more vulnerable due to their older age, construction type, and lack of fire prevention infrastructure such as sprinklers.

Impacts from Wildfire

Potential impacts from wildfire include loss of life and injuries; damage to structures and other improvements, natural and cultural resources, croplands, and timber; and loss of recreational opportunities. Out of control wildfires can have catastrophic impacts. Wildfires can cause short-term and long-term disruption to the City. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the City by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires can also affect air quality in the City; smoke and air pollution from wildfires can be a severe health hazard. Smoke impacts may come from wildfires outside the City, as well as from within.

Although the physical damages and casualties arising from wildland-urban interface or conflagration fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Schools and businesses can be forced to close for extended periods of time. Recently, the threat of wildfire, combined with the potential for high winds, heat, and low humidity, has caused PG&E to initiate a PSPS which can also significantly impact a community through loss of services, business closures, and other impacts associated with loss of power for an extended period. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

The impacts of a fire are felt long after the fire is extinguished. In addition to the loss of property in fires, the loss in vegetation and changes in surface soils alters the environment. When supporting vegetation is burned, hillsides become destabilized and prone to erosion. The burnt surface soils are harder and absorb less water. When winter rains come, this leads to increased runoff, erosion, and landslides in hilly areas.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the City may be affected in the future by climate change (which was discussed in the hazard profile above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the City of Madera include the following:

- Climate change is likely to exacerbate future wildfire conditions and associated impacts and vulnerability of the City to wildfire.
- The City is expected to see slow and steady growth. The City has 33 areas where growth is expected over the next five years. Additional population growth would likely bring continued diversity to the City. Vulnerable population groups could face disproportionate effects from wildfire and should be planned for. Changes in population and population patterns may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location, magnitude, and severity of future wildfire events.
- Land use planning should be proactive to address future hazard conditions. Locating new development, structures and critical facilities and infrastructure within or near areas of wildfire risk may put additional development at risk. The City has 33 areas where growth is expected over the next five years. These are located in the Non-Wildland FHSZ which reduces risk. Additionally, City building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions. Specifically, with the release of the new 2025 LRA mapping for Madera County, wildfire building codes should be evaluated and updated as required to include enhanced measures to reduce wildfire impacts on new construction, and including the formal adoption of the new LRA maps. Changes in land use and future development may or may not increase the impacts and vulnerability of the City to this hazard depending on the location and nature of growth and continued planning for future hazard conditions and the location, magnitude, and severity of future wildfire events.

Future Development

Additional growth and development within moderate or higher fire hazard severity zones in the City would normally place additional values at risk to wildfire. However, none of those FHSZs exist in the City. City building codes are in effect and should continue to be updated as appropriate to reduce future impacts.

Future development areas and their vulnerability to wildfire are discussed further in the below GIS analysis.

GIS Analysis

The City provided 33 future development areas which were used as the basis for the inventory of future development for the City. These areas were mapped in GIS. Utilizing the future development area spatial layer, the parcel polygon data was intersected to determine the future development areas within each LRA fire hazard severity zone. No facilities fell in the SRA/FRA fire hazard severity zones; as such, no maps or tabular analysis is presented for the SRA/FRA. Figure B-30 shows the locations of the future development area overlayed on the LRA fire hazard severity zones. As shown in Table B-43, the future development areas fall within areas of Non-Wildland FHSZ.

Figure B-30 City of Madera – Future Development Areas in LRA Fire Hazard Severity Zones

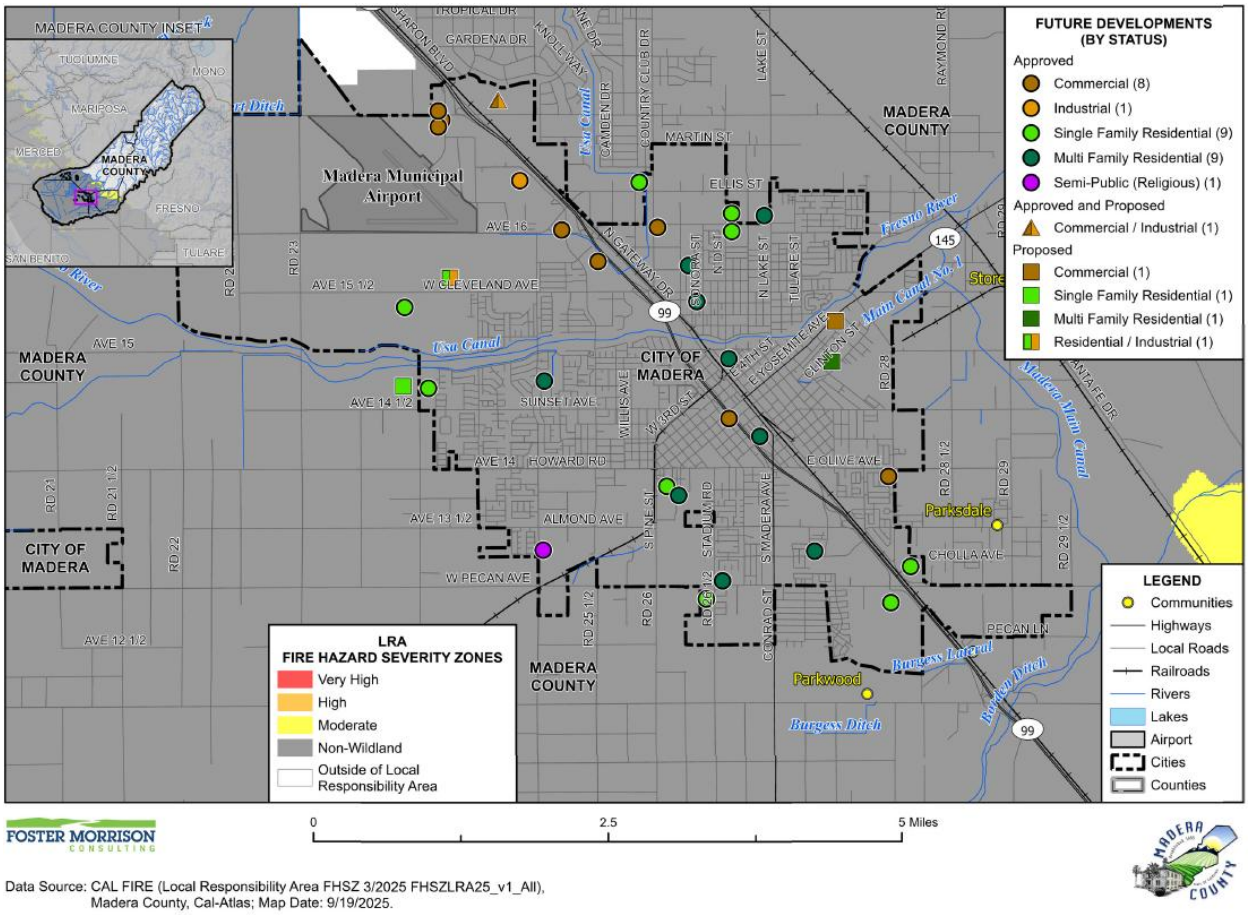


Table B-43 City of Madera – Future Development Parcels and Acres in LRA Fire Hazard Severity Zones

Future Development / Property Use / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Non-Wildland						
Btwn Wilson & Rush and Davis & Sonora (Map ID 1)						
Multi Family Residential	2	0	2	0.28	0	0.28
E/S Cypress btwn Oak & Maple (Map ID 2)						
Single Family Residential	1	0	1	0.23	0	0.23
E/S Granada btwn Almond & Pecan (Map ID 3)						
Semi-Public (Religious)	1	1	0	8.45	8.45	0
E/S Tozer (Rd. 28) btwn 13 1/2 & Pecan (13) (Map ID 4)						
Single Family Residential	1	0	1	28.07	0	28.07
Grove St. terminus south of Maple (Map ID 5)						
Multi Family Residential	2	1	1	2.95	2.24	0.72
N Schnoor & Kennedy St (Map ID 6)						
Commercial	1	0	1	1.86	0	1.86
N/S Park btwn Linden & Laurel (Map ID 7)						
Multi Family Residential	3	0	3	0.72	0	0.72
N/S Sherwood btwn Sonora & Owens (Map ID 8)						
Multi Family Residential	1	0	1	1.43	0	1.43
NE/S of I btwn Yosemite & 6th (Map ID 9)						
Commercial	1	0	1	0.22		0.22
NEC Ellis & Fairview (Map ID 10)						
Single Family Residential	1	0	1	6.27	0	6.27
NEC Emily & Gary (Map ID 11)						
Multi Family Residential	1	0	1	4.53	0	4.53
NEC of Adell & D (Map ID 12)						
Single Family Residential	2	1	1	9.12	4.13	4.99
NEC Stadium and Pecan (Map ID 13)						

Future Development / Property Use / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Multi Family Residential	1	0	1	5.20	0	5.20
NWC of Golden State and Ave 17 (Map ID 14)						
Commercial	1	0	1	10.27	0	10.27
NWC of Sunset and Caitlin (Map ID 15)						
Single Family Residential	1	0	1	0.15	0	0.15
S/S Cleveland btwn 16 & 23 (Map ID 16)						
Single Family Residential	1	1	0	38.11	38.11	0
SEC Foxglove & Schnoor (Map ID 17)						
Commercial	2	0	2	19.44	0	19.44
SEC of Adell & D (Map ID 18)						
Single Family Residential	3	0	3	7.77	0	7.77
SEC of Country Club & Adell (Map ID 19)						
Commercial	1	0	1	1.37	0	1.37
SW/S of G btwn 8th & 10th (Map ID 20)						
Multi Family Residential	1	0	1	0.26	0	0.26
SWC Airport (Golden State) & Ave. 17 (Map ID 21)						
Commercial	1	0	1	1.48	0	1.48
SWC Airport (Golden State) & Ave. 17 (Map ID 22)						
Commercial	1	0	1	1.14	0	1.14
SWC of Ave 13 & Hwy 99 (Map ID 23)						
Single Family Residential	1	1	0	135.59	135.59	0
SWC of Stadium Rd. and Pecan Ave. (Map ID 24)						
Single Family Residential	1	0	1	18.70	0	18.70
SWC Olive & Tozer (Map ID 25)						
Commercial	1	0	1	4.92	0	4.92
W/S Lake btwn Ellis & Adell (Map ID 26)						
Multi Family Residential	1	0	1	2.39	0	2.39
W/S of Golden State btwn Aves. 16 & 17 (Map ID 27)						
Industrial	1	0	1	17.16	0	17.16
WC of 2nd and D (Map ID 28)						

Future Development / Property Use / Map ID	Total Parcel Count	Improved Parcel Count	Unimproved Parcel Count	Total Acres	Total Improved Acres	Total Unimproved Acres
Multi Family Residential	1	0	1	0.34	0	0.34
NEC 17 & 99 (Map ID 29)						
Commercial / Industrial	1	0	1	99.58	0	99.58
1230 E. Yosemite Ave. (Map ID 30)						
Commercial	5	1	4	4.46	0.17	4.29
NE/S of Malone btwn Washington & Clinton (Map ID 31)						
Multi Family Residential	1	0	1	0.50	0	0.50
N/S Cleveland btwn 16 & Westberry (Map ID 32)						
Residential / Industrial	1	1	0	71.38	71.38	0
NW Cor 24 & 14 1/2 (Map ID 33)						
Residential	1	1	0	58.34	58.34	0
Non-Wildland Total	**45**	**8**	**37**	**563**	**318**	**244**
Grand Total	**45**	**8**	**37**	**563**	**318**	**244**

Source: CAL FIRE, City of Madera

B.5 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 education, outreach, and partnerships, and other mitigation efforts.

B.5.1. Regulatory Mitigation Capabilities

Table B-44 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 City of Madera.

Table B-44 City of Madera's Regulatory Mitigation Capabilities

Plans	In Place Y/N	Does the plan address hazards? Can the plan be used to carry out mitigation actions? When was it last updated??
Capital Improvements Plan	Y	Yes to all questions – as funded.
Climate Change Adaptation Plan	Y	Climate Action Plan (2015)

Community Wildfire Protection Plan	N	No major threat of wildfire in the City.
Comprehensive/Master Plan	Y	Storm Drainage Master Plan, yes to all questions. 2014
Continuity of Operations Plan	Y	2017
Economic Development Plan		Incorporated within Land Use and Sustainability Elements of General Plan (2009)
Land Use Plan		General Plan (2009); including subsequent project amendments to land use plan (yearly to-date).
Local Emergency Operations Plan	Y	Yes to all questions. 2017
Stormwater Management Plan	Y	Storm drainage master plan. Yes to all questions. 2014
Transportation Plan	Y	Within General Plan. 2009
Other		
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective way to reduce hazard impacts? Is the ordinance adequately administered and enforced?**
Acquisition of land for open space and public recreation use	Y	The City has a Quimby Act Ordinance. At present, it is not utilized with the intent of reducing hazards.
Building code	Y	Version/Year: 2016
Flood insurance rate maps	Y	
Floodplain ordinance	Y	It is effective and enforced.
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	Y	It is effective and enforced.
Zoning ordinance	Y	It is effective and enforced.
Other		
How can these capabilities be expanded and improved to reduce risk?		
Review plans routinely for necessary updates and modifications. Update the General Plan Safety Element to incorporate the LHMP, Vulnerability Assessment, evacuation routes/study, wildfires and hazard zones, etc. Update the 2014 Storm Drainage System Master Plan Consider developing and adopting ordinances, standards and/or policies incorporating proper location and design of stormwater retention basins Consider developing and adopting ordinances, standards and/or policies incorporating proper use of drainage swales within the urban form. Consider developing and adopting additional landscaping ordinances, standards and/or policies incorporating proper species selection, drought resistance, and planting and maintenance practices that will not exacerbate the effects of drought.		

Source: City of Madera

B.5.2. Administrative/Technical Mitigation Capabilities

Table B-45 identifies the City department(s) responsible for activities related to mitigation and loss prevention in the City of Madera.

Table B-45 City of Madera's Administrative and Technical Mitigation Capabilities

Administration	In Place Y/N	Describe capability Is coordination effective?
Staff		**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Chief Building Official	Y	Staffing is adequate and trained. Coordination is effective.
Civil Engineer, including dam and levee safety	Y	Staffing is adequate and trained. Coordination is effective.
Community Planner	Y	Staffing is adequate and trained. Coordination is effective.
Emergency Manager	Y	Staffing is adequate and trained. Coordination is effective.
Floodplain Administrator	Y	Staffing is adequate and trained. Coordination is effective.
GIS Coordinator	Y	Staffing is adequate and trained. Coordination is effective.
Planning Commission	Y	
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	Y	
Hazard data and information	N	
GIS analysis	Y	Use and staff resources have been limited; progressing.
Mutual aid agreements	Y	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Incorporate GIS analysis, data and tools to plan, operate, maintain, and monitor City services and facilities for preparedness and resilience.		

Source: City of Madera

B.5.3. Fiscal Mitigation Capabilities

Table B-46 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table B-46 City of Madera's Fiscal Mitigation Capabilities

Funding Resource	In Place Y/N	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	Annual CIP budget adopted by Council. It can be used for future mitigation actions

Funding Resource	In Place Y/N	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Community Development Block Grant	Y	Non-Profit agency support, capital improvements. It's possible it can be used for mitigation actions, depending on the funding priorities set by Council and approved by the HUD officials.
Federal funding programs (non-FEMA)	Y	Capital purchases. It's possible that resources from Federal funding programs could be used to fund mitigation actions depending on the terms of the grant awarded.
Fees for water, sewer, gas, or electric services	Y	Operating costs, debt service costs, capital improvements. Can be used for future mitigation actions.
Impact fees for new development	Y	Capital improvements. Can be used for future mitigation actions.
State funding programs	Y	Capital purchases. It's possible that resources from State funding programs could be used to fund mitigation actions depending on the terms of the grant awarded
Stormwater utility fee	Y	Operating costs, debt service costs, capital improvements. Can be used for future mitigation actions.
Other		
How can these capabilities be expanded and improved to reduce risk?		
Update the Development Impact Fee Program Funding from these various sources will allow the City to address the issues detailed in this report through increased staffing, enhanced training, design and construction of mitigation capital projects, as well as corroboration with non-profit organizations and other governmental agencies on mitigation strategies		

Source: City of Madera

B.5.4. Mitigation Education, Outreach, and Partnerships

Table B-47 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table B-47 City of Madera's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	Widespread.

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	Y	Water Conservation mitigates effects of drought. The City's Water Conservation Program currently offers several rebates to decrease water use and increase efficiency in homes (e.g. turf replacement, clothes washer rebate, drip irrigation, etc.). Public Outreach through staffing booths at community events, public service announcements on social media, and water patrol, provide education on conservation and responsible water use. The City will continue to make efforts to educate the public on the importance of conservation and plans on expanding conservation programs. Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)" The City primarily relies on social media to disseminate information. While the City uses print media, it is costly and not as effective as social media, including the City's Facebook, YouTube, and Twitter handles.
Local news	Y	City works to have press releases go to local news organizations. This includes hazard related news and events.
Organizations that interact with underserved and vulnerable communities		Community Action Partnership uses CDBG funds for their membership in continuum of care, which works to minimize the trauma and dislocation caused by homelessness . This program promotes access to mainstream programs and helps individuals and families experiencing homelessness optimize their self-sufficiency, thereby mitigating the risks associated with long-term homelessness. OLIVE Charitable organization uses CDBG funds for women who have been human trafficked. OLIVE is directly involved in activities that aim to prevent, address and reduce the harm caused by human trafficking. In addition, CAPMC, Housing Authority, Madera Rescue Mission, Madera County Food Bank, Downtown Business Association, OLIVE, Pequenos Empresarios, Madera Community College all work with vulnerable communities.

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Social media		The City (local government) has a Facebook account with 6,400 followers, a separate Police Dept. Facebook page with over 58k likes, a separate Parks Dept. Facebook page, a YouTube channel, and a Twitter handle. In addition, the City publishes press releases of notable events, and prints newsworthy items in the local newspaper the Madera Tribune. The City also employs a full-time Communication Specialist.
How can these capabilities be expanded and improved to reduce risk?		
The City partners with several non-profit agencies who work with disadvantaged communities, including the Community Action Partnership of Madera County, the OLIVE human trafficking prevention initiative, the Madera Coalition for Community Justice, and the Madera Rescue Mission. Some funding provided by the City to these agencies can be used for mitigation activities and communicating hazard-related information. The City of Madera can enhance its Water Conservation Program by expanding rebate offerings to include smart irrigation controllers, rainwater harvesting systems, high-efficiency toilets, and landscape conversion options tailored to local climate conditions. Pairing these incentives with targeted outreach to neighborhoods and customer classes with historically higher usage will increase participation and yield measurable reductions in demand. Establishing a data-driven monitoring framework—tracking application volume, estimated savings per measure, and post-installation consumption trends—will help quantify program effectiveness, support funding requests, and guide continuous improvement. Collectively, these actions will mitigate drought impacts, embed long-term water-wise behaviors, and ensure resources are allocated to the most cost-effective measures. Public outreach should move beyond passive messaging to more interactive, inclusive engagement. In addition to social media, the City could deploy email newsletters, SMS alerts, and collaborate with local radio and community partners to reach residents who are less active online. Hosting hands-on workshops, webinars, school presentations, and neighborhood events—supported by multilingual materials, especially Spanish—will foster two-way communication, build trust, and translate guidance into action. These improvements will broaden reach across demographics, improve compliance with conservation practices, and strengthen community resilience during dry years. For ongoing public education, establishing a centralized digital resource hub—such as a dedicated webpage or mobile-friendly portal—will streamline access to rebate applications, conservation tips, seasonal watering guidance, and preparedness information (e.g., fire safety, household emergency planning, environmental stewardship). Incorporating behavioral nudges like gamified challenges, recognition programs, and neighborhood leaderboards can motivate sustained participation and celebrate local success. Partnering with schools and businesses to integrate water education and workplace conservation commitments will deepen community ownership and normalize responsible use across generations and sectors. While social media remains a cost-effective backbone, the City can further optimize its digital presence by using analytics to refine content, timing, and audience targeting. Short-form videos, how-to reels, and success stories can boost engagement, while limited, well-targeted paid campaigns can reach high-need segments such as high-volume users and new homeowners. These enhancements will increase message penetration at comparatively low cost, build a consistent brand for conservation, and create clear pathways for residents to learn, act, and demonstrate measurable savings.		

Source: City of Madera

B.5.5. Other Mitigation Efforts

Related to flood hazards, the City is actively seeking grants for local flood hazard concerns that include Pine Street/Howard Road and Sunset Avenue between 4th Street and Schnoor Avenue.

The City also makes sand for sandbags available seasonally to mitigate property damage to residences in the event of a flood.

Related to wildfire/brush fire – starting in 2022, the City has implemented an aggressive plan to reduce brush/dry fuels in the Fresno River bottom as well as increased outreach efforts/ code enforcement related to the unhoused population in an attempt to reduce fires.

The City has been moving transients out of high fire and flood risk areas, such as the river. The City installed a pole camera in the river to monitor for fires and arsonists.

The City also has an annual weed abatement program where properties that aren't maintained are cleaned/plowed by the City and then the property owner is billed. This is to help prevent grass/wild fires within the City.

Related to extreme weather (heat/cold) - the City provides Cooling and Warming Centers during extreme weather events (with the exception of the warming centers not occurring since 2021).

Related to Public Education and Neighborhood Watch - The City has made a concentrated effort over the last few years to connect with neighborhoods and organize neighborhoods with block captains. The purpose is so that neighbors know each other, know their government officials/services, and are connected to each other and committed to an investment in their neighborhood. Neighborhood Watch has been successful:

- The are 84 organized Neighborhood Watches across the City:
- 46 of the 84 are certified and 38 are in progress toward certification
- Quarterly Neighborhood Watch Leaders meeting are hosted to update the leaders about matters pertaining to public safety or community engagement. They then take the information and share with their neighbors and those who participate in their Neighborhood Watch Program.
- The program is promoted by canvassing neighborhoods, attending resource fairs, tabling at community events, and through social media accounts and the City's website. To date since July 2015, members have canvassed over 50 neighborhoods and contacted over 5000 residents.
- The program has spawned many successful outcomes. In various neighborhoods, it has helped (1) bust neighborhood drug dealers and confiscate their drugs and weapons; (2) connect neighbors together to promote proactive neighborhood policing; (3) improved law enforcement-community relations; (4) educate residents on ways they could promote neighborhood safety and improve their neighborhood's standards of living.

National Night Out

- In 2017, there were had 53 block parties across Madera. This is about 2,150 Maderans celebrating this year's National Night Out on August 1st.
- Two days later, on August 3rd, the Madera Police Department in conjunction with other law enforcement agencies had planned and implemented National Night Out Connect event. Around 2,000 Maderans continuing the spirit of celebrating National Night Out at the Madera Fairgrounds.
- During NNO, law enforcement and community residents mingled, socialized, and bonded together, both in their neighborhoods on Tuesday, August 1st and at a centralized location on Thursday, August 3rd (NNO Connect).

Through communications with American Red Cross, the City learned that they were short on local volunteers. Neighborhood outreach staff worked with ARC to organize volunteer education events. Since partnering with American Red Cross (ARC), the City has successfully recruited and trained 10 volunteers who are prepared to help ARC respond to any emergency within City or County of Madera. This past January, the City canvassed neighborhoods to install smoke detectors in homes that did not have any or had less than the minimum required detectors in the home. There were over 50 detectors installed, mostly were in homes owned by senior citizens. The City is currently planning their next Smoke Detectors Drive and are continuing efforts to recruit volunteers and collaborate with local Cal-Fire.

B.6 Mitigation Strategy

B.6.1. Mitigation Goals and Objectives

The City of Madera adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

B.6.2. NFIP Mitigation Strategy

The City of Madera joined the National Flood Insurance Program (NFIP) on June 4, 1987. As a participant of the NFIP, the City of Madera has administered floodplain management regulations that meet the minimum requirements of the NFIP. The management program objective is to protect people and property within the City. The City of Madera will continue to comply with the requirements of the NFIP in the future.

In addition, the City of Madera actively participates with Madera County to address local NFIP issues through a regional approach. Many of the program activities are the same for the City of Madera as for Madera County since participation at the County level includes all local jurisdictions.

The City's regulatory activities apply to existing and new development areas of the City; implementing flood protection measures for existing structures and new development, and maintaining drainage systems. The goal of the program is to enhance public safety, and reduce impacts and losses while protecting the environment. The City's Municipal Code has a Flood Damage Prevention Section under the Zoning Ordinance that regulates construction in the floodplain. The City intends to continue to implement the ordinance and participate at the regional level with Madera County implementing appropriate measures to mitigate exposure and damages within designated flood prone areas.

The NFIP's Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS which are to reduce flood losses, facilitate accurate insurance rating, and promote the awareness of flood insurance. The City of Madera is not a current participant in the CRS program.

More information about the floodplain administration in the City of Madera can be found in Table B-48.

Table B-48 City of Madera Compliance with NFIP

NFIP Topic	Comments
Staff Resources	
Who is responsible for floodplain management in your community? Provide Department/Title. Do they serve any roles other than Community Floodplain Administrator (FPA)?	City Engineer – Engineering Department. Also serves as the City Engineer
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	No. He serves as an assigned role as City Engineer.
Is floodplain management an auxiliary function?	Yes, it represents one function or responsibility of the Engineering Department
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Permit review, inspections, engineering capability, respond to public inquiry
What are the barriers to running an effective NFIP program in the community, if any?	Funding for additional staff with expertise for reviews that are very irregular. Staff has, however, performed to FEMA expectations based on past reviews of the City.
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	8 policies $6,385 total premiums $2,318,000 total coverage
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	9 paid losses $88,293.47 in paid losses 1 substantial damage claim
How many structures (residential and non-residential) are exposed to flood risk within the community?	558 in 1% annual chance flood 2,504 in 0.2% annual chance flood
Are there Repetitive Loss (RL) and Severe Repetitive Loss Properties (SRL) structures in the community?	0 RL 0SRL
Describe any areas of flood risk with limited NFIP policy coverage	None known.
How does the community teach property owners or other stakeholders about the importance of flood insurance?	At present, there are no dedicated education programs. As noted previously, there are only 8 policies. This is a result of a limited, when compared to other communities, properties within the flood plain.
What digital sources (like the FEMA Map Service Center, National Flood Hazard Layer) or non-regulatory tools does the community use?	The community utilizes all resources provided by FEMA along with City of Madera ordinances available online for reference by developer.
Compliance History	
Is the community in good standing with the NFIP?	Yes
Are there any outstanding compliance issues (i.e., current violations)?	No
Who is responsible (Department, Title) for making substantial damage/improvement determinations? How does the community identify substantially damaged/improved structures? What is the process to make sure these structures are brought into compliance?	The City has not encountered the need for these determinations within the flood plane. Regardless, the Building Department would be responsible for determining damage Should the need arise, the City would utilize available resources, training and education available from FEMA.

NFIP Topic	Comments
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	CAC 2/27/2024
Is a CAV or CAC scheduled or needed?	No
Regulation	
When did the community enter the NFIP?	6/4/1987
Are the FIRMs digital or paper?	Digital
Has the community adopted the NFIP minimum floodplain management criteria via local regulation? Date of current local regulation?	Yes. There is a draft ordinance in preparation to meet the lates draft ordinance examples from FEMA.
Has the community adopted the latest effective FIRM? Date adopted?	Yes. 2008.
How does the community enforce local floodplain regulations and monitor compliance?	Given the minimal number of parcels within the flood plain, there has been no need for a formal program
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	At present, the City meets minimum requirements
How are Letters of Map Change (LOMCs) tracked and compiled?	They are stored on the City of Madera Engineering Department server. At present, there are a minimal number of LOMCs to be tracked.
Provide an explanation of the permitting process.	An expanded permitting process is included in the upcoming update to the floodplain management ordinance. It is a multi-step process that has several levels of review
Community Rating System	
Does the community participate in CRS? If so, what is the community's CRS Class Ranking?	No
What categories and activities provide CRS points and how can the class be improved?	N/A
Does the plan include CRS planning requirements?	N/A

Source: City of Madera

B.6.3. Mitigation Actions

The Planning Team for the City of Madera 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. The following hazards were considered a priority for purposes of mitigation action planning:

- Climate Change
- Dam Failure
- Drought & Water shortage
- Earthquake (w/subhazards)
- Floods: 1%/0.2% annual chance (w/levee failure)
- Floods: Localized Stormwater

- Severe Weather: Extreme Cold, Freeze, and Snow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
- Severe Weather: High Winds and Tornadoes
- Wildfire (w/smoke and air quality)

Low priority hazards for mitigation planning include:

- Agricultural Hazard: Severe Weather/Pests/Invasives
- Hazardous Materials Transportation
- Landslide, Mudslide, Debris Flow

It should be noted that many of the projects submitted by each jurisdiction in Table 5-4 in the Base Plan benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the countywide public outreach action, as well as many of the emergency services actions, apply to all hazards and jurisdictions regardless of hazard priority. Collectively, this LHMP's multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this plan. It should further be noted, that each jurisdiction has focused on identifying those mitigation actions and projects to address their priority hazards, which are both realistic and reasonable for them to implement for this 5-year planning process, and would like to preserve their right to modify hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Mitigation Actions

The City has put forward the actions as shown in Table B-49. Details of the actions can be found below the table.

Table B-49 City of Madera Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
City of Madera					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	New Action	X	X	X	Prevention Public Education
Action 3. Storm Drain Master Plan Update, Stormwater Retention Improvements, Debris Removal and Minimizing Localized Flooding	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection Structural Projects

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 4. Basin/Water Storage Capacity	New Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 5. Pavement Management Systems	New Action	X	X	X	Property Protection
Action 6. Development of Climate Action Plans: i.e., Climate Action Plan, Climate Adaptation Plan, Climate Vulnerability Assessment	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 7. Supervisory Control and Data Acquisition (SCADA) Upgrade	New Action	X	X		Property Protection
Action 8. Tree Trimming Program/Urban Forestry Team	New Action	X	X		Property Protection Natural Resource Protection
Action 9. Participate in Update to Groundwater Sustainability Plan and Implement Plan Recommendations	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 10. Water Conservation Program Implementation	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 11. Water Tank Improvements	New Action	X	X		Property Protection Natural Resource Protection
Action 12. Update Urban Water Management Plan and Implement Plan Recommendations	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 13. Seismic Retrofit Programs	New Action	X	X		Prevention Property Protection Structural Projects
Action 14. Conduct Exploratory Studies Regarding Natural Waterways Related to Capacity-building, Bank Stability, and Property Preservation	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 15. Implement Communication System(s) to Ensure Information is Shared Timely and all Citizens have Access.	New Action	X	X		Public Information
Action 16. Backup Power Redundancy & Fuel Tanks for Critical Infrastructure	New Action	X	X		Property Protection Emergency Services
Action 17. Update Safety Element	New Action	X	X		Prevention

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 18. Debris Removal, Tree Trimming and Fresno River Restoration	New Action	X	X	X	Property Protection Natural Resource Protection
Action 19. Yellow Reflective Border on Traffic Signal Backplates	New Action	X	X		Emergency Services
Action 20. Heating and Cooling Centers and Buildings of Respite for Vulnerable Population	New Action	X	X		Prevention Emergency Services Public Information
Action 21. Target Hardening for Extreme Weather and Air Quality for Public Infrastructure and Buildings	New Action	X	X		Property Protection Emergency Services
Action 22. Grade Separation for Railroad Lines	New Action	X	X		Emergency Services

Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Hazards Addressed: Multi-hazard (Climate Change, Dam Failure, Drought & Water shortage, Earthquake (w/subhazards), Floods: 1%/0.2% annual chance (w/levee failure), Floods: Localized Stormwater, Severe Weather: Extreme Cold, Freeze, and Snow, Severe Weather: Extreme Heat, Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind), Severe Weather: High Winds and Tornadoes, Wildfire (w/smoke and air quality))

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Local jurisdictional reimbursement for mitigation projects and cost recovery after a disaster is guided by Government Code Section 8685.9 (AB 2140). Specifically, this section requires that each jurisdiction adopt a local hazard mitigation plan (LHMP) in accordance with the federal Disaster Mitigation Act of 2000 as part of the Safety Element of its General Plan. Adoption of the LHMP into the Safety Element of the General Plan may be by reference or incorporation.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be Implemented: Safety Element of General Plan

Responsible Office/Partners: City of Madera Planning Department

Benefits (Losses Avoided): Incorporation of an adopted LHMP into the Safety Element of the General Plan will help jurisdictions maximize the cost recovery potential following a disaster.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budgets (City General Fund, staff time)

Timeline: As soon as possible. Within 1 year.

Project Priority (High, Medium, Low): High

Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness

Hazards Addressed: Multi-hazard (Climate Change, Dam Failure, Drought & Water shortage, Earthquake (w/subhazards), Floods: 1%/0.2% annual chance (w/levee failure), Floods: Localized Stormwater, Severe Weather: Extreme Cold, Freeze, and Snow, Severe Weather: Extreme Heat, Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind), Severe Weather: High Winds and Tornadoes, Wildfire (w/smoke and air quality))

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): The City and County play a key role in public outreach/education efforts to communicate the potential risk and vulnerability of their community to the effects of natural hazards. A comprehensive multi-hazard public education program will better inform the community of natural hazards of concern and actions the public can take to be better prepared for the next natural disaster event.

Project Description: A comprehensive multi-hazard outreach program will ascertain both broad and targeted educational needs throughout the community. The City will work with the County and other agencies as appropriate to develop timely and consistent annual outreach messages in order to communicate the risk and vulnerability of natural hazards of concern to the community. This includes measures the public can take to be better prepared and to reduce the damages and other impacts from a hazard event. The public outreach effort will leverage and build upon existing mechanisms, and will consider:

- Using a variety of information outlets, including websites, local radio stations, news media, schools, and local, public sponsored events;
- Creating and distributing (where applicable) brochures, leaflets, water bill inserts, websites, and public service announcements;
- Displaying public outreach information in City office buildings, libraries, and other public places and events;
- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: Continue public information activities currently in place.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing City and County outreach programs will be reviewed for effectiveness and leveraged and expanded upon to reach the broader region.

Responsible Office/Partners: City of Madera, Departments of Human Resources, Community Development, and others City Departments depending on the specific outreach, and conducted in partnership with County OES

Benefits (Losses Avoided): Increase residents' knowledge of potential hazards and activities required to mitigate hazards and be better prepared. Protect lives and reduce damages, relatively low cost to implement.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budgets (City General Fund,, staff time) grant funds (like CA DWR, Cal OESPDM, HMGP, FMA, BRIC, or other sources).

Timeline: To be initiated within 1-2 years; Ongoing/Annual public awareness campaign

Project Priority (High, Medium, Low): High

Action 3. Storm Drain Master Plan Update, Stormwater Retention Improvements, Debris Removal and Minimizing Localized Flooding.

Hazards Addressed: Climate Change/Flood/Severe Weather: Heavy Rain and Storms, Drought & Water Shortage, Flood/Severe Weather: Heavy Rain and Storms

Goals Addressed: 1, 2, 3, 5, 6, 7, 8

Issue/Background (Problem Statement): Localized flooding continues to be a problem causing property damage, asphalt failure to streets, and street closures. By clearing street debris and performing weed abatement, water will be able to flow freely to storm pump stations which will then send storm water to City-owned ponding basins / Fresno River for groundwater recharge.

Project Description: Upgrade or replace storm water pumps. Increase capacity at ponding basins. Update the storm water master plan. Perform vegetation management in the Fresno River and ponding basins. Increase sandbag and sand locations City wide. City staff will dredge, rip and expand ponding basins for capacity and recharge. Replace or upgrade storm pumps. Clear street debris and perform weed abatement. Expand sandbag / sand locations.

Other Alternatives: Do nothing and continue to experience localized flooding.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Updated Storm Water Master Plan; Hire a consultant to update the Storm Water Master Plan.

Responsible Office/Partners: City of Madera Department of Public Works, Street and Storm Drainage Division.

Benefits (Losses Avoided): Less flooding and insurance claims. Increasing basin capacity for ground water recharge.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budgets (General fund, CIP) and Grant funds (FEMA HMGP; Cal DWR: USRP, FMPRA).

Timeline: Immediately and within year 1 – update Stormwater Master Plan; Implement projects – 2-5 years

Project Priority (High, Medium, Low): High

Action 4. Basin/Water Storage Capacity

Hazards Addressed: Climate Change/Drought and Water Storage, Flood/Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 5, 6, 7, 8

Issue/Background (Problem Statement): This Action's goal is to address

- Reduced snowpack and rainfall that reduces available water in the aquifer
- Accommodate rainfall that can result in flooding, damage to private and public structures, and public safety concerns
- Accommodate runoff with the goal of minimizing loss of ability to recharge the aquifer
- Provide additional storage for recharge in partnership with the Madera Irrigation District

Project Description: Multiple projects are incorporated under this action. They include:

- Add water recharge and storm basins for increased capacity
- Construct storm systems intended to provide connectivity of existing and future basins with the goal of increasing storage
- Add flow meters to wells sites to identify where water might be wasted
- Implement recharge projects not yet envisioned
- Construct projects found in the 2014 Storm Drainage System Master Plan

Other Alternatives: Multiple projects/options provided above. Alternative to these would be to maintain status quo, however due to changing conditions, this may not be the best path forward.

Existing Planning Mechanism(s) through which Action Will Be Implemented: 2014 Storm Drainage System Master Plan, Groundwater Sustainability Plan, list of areas within City that have been identified as recurring flood areas

Responsible Office/Partners: City of Madera Engineering

Benefits (Losses Avoided): Benefits – The benefit to each project varies. Some provide additional water storage. Others provide the ability to safely capture and convey storm wastewater recharge. By virtue of those benefits, losses such as property damage are avoided.

Potential Funding (Local Budgets, Grant Funds, etc.): Some minimal local funding exists though road funds for matches. The bulk is necessary through grant funds: (FEMA HMGP; Cal DWR IRMP, USRP, FMPRA).

Timeline: 1 year to 10 years

Project Priority (High, Medium, Low): Projects vary between medium and high. Areas already identified as being subject to flooding and property damage would be high. Others would be medium. Further stratification would be based on access to funding.

Action 5. Pavement Management Systems

Hazards Addressed: Climate Change

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): As a result of flooding at various areas throughout the City, damage to the pavement have occurred and continue to occur. This damage will continue to occur until other action items are implemented that address flooding. Until that time where flooding is mitigated, a Pavement Management Systems (PMS) is necessary to identify and prioritize repairs and protection to the pavement surfaces

Project Description: Continue to implement the PMS and projects related thereto.

Other Alternatives: Discontinue current PMS and do not seek new PMS or related projects.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Previous and current PMS

Responsible Office/Partners: City of Madera Engineering

Benefits (Losses Avoided): Benefits – Deteriorated pavement surfaces will be repaired and/or protected through various pavement rehabilitation measures

Potential Funding (Local Budgets, Grant Funds, etc.): Local funds (General Fund, staff time, CIP), gas taxes, Measure T funds and other State provided funding assists in implementation of the PMS but sufficient funds are typically well short of what is necessary

Timeline: 1-5 years and Ongoing

Project Priority (High, Medium, Low): Medium

Action 6. Development of Climate Action Plans: i.e., Climate Action Plan, Climate Adaptation Plan, Climate Vulnerability Assessment

Hazards Addressed: Climate Change

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): Climate Action and Adaption Plans as well as Climate Vulnerability Assessments outline a course of action to reduce Greenhouse Gas (GHG) emissions from community-wide activities and City government operations to recognize and assume local government responsibility in reducing GHG emissions, ensure mitigation of climate change impacts in accordance with the California Environmental Quality Act (CEQA) and support the State of California's mandated GHG reduction target goals.

Project Description: Conduct Climate Vulnerability Assessments and prepare, update and/or adjust the City of Madera's Climate Action and Adaption Plans and as well as the goals, objectives, policies and action items of the City General Plan Conservation Element pertaining to targets for reducing emissions of greenhouse gases in accordance with contemporary or updated State guidance, scoping requirements, statewide adaptation strategies and/or new data, policies and economic conditions emerge.

Other Alternatives: Address climate change vulnerability and climate-related hazards in the General Plan's Safety and Conservation Elements rather than within a standalone Climate Action Plan.

Existing Planning Mechanism(s) through which Action Will Be Implemented: General Plan Requirement. Climate adaptation and resilience strategies must be updated in accordance with state-mandated house or safety element cycle updates.

Responsible Office/Partners: City of Madera, Planning Department

Benefits (Losses Avoided): The State of California recognizes that climate change poses risks to the public health, environment, economic well-being, and natural resources of California. Recognize local government influence and authority over activities that result in GHG emissions through planning and permitting processes, ordinances, outreach and education efforts and participate in implementation efforts at the local level to reach state-mandated GHG reduction target goals. Streamline environmental reviews.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budget (General Fund) or available grant opportunities (ICARP Caltrans Climate Adaptation Planning Grants, Regional Climate Collaboratives Program).

Timeline: Within 1-3 years. Local governments are advised by the California Air Resources Board (CARB) to adopt Climate Adaptation Plans on 3-4 year cycles. Mandatory every 8 years.

Project Priority (High, Medium, Low): High- The City of Madera is required to update its Safety Element following adoption of the 6th Cycle Housing Element Update and Local Hazard Mitigation Plan (LHMP).

Action 7. Supervisory Control and Data Acquisition (SCADA) Upgrade

Hazards Addressed: Drought and Water Shortage / Flood

Goals Addressed: 1, 2, 3, 5, 6, 7, 8

Issue/Background (Problem Statement): The City's SCADA systems allow for remote operation and real time data of water, wastewater, and storm drain facilities. The City's existing SCADA systems has reached end-of-life. The system lacks software support and cyber security protection. Replacement parts for the City's SCADA systems have become harder to find and more expensive over time, making repairs difficult and extending downtime. It is also prone to intermittent failures, which can jeopardize operations and increase overall risk.

Project Description: Upgrades will improve operations, improve cybersecurity, enhance monitoring, and reduce long-term costs like overtime or unnecessary pump operations.

Other Alternatives: Do nothing and increase downtime which require costly third-party services

Existing Planning Mechanism(s) through which Action Will Be Implemented: Public Works Program. Public Works will hire a consultant/integrator for replacement.

Responsible Office/Partners: City of Madera Public Works - Electrical and Facilities Division

Benefits (Losses Avoided): More real-time analytics, safeguarding of critical infrastructure against cyber threats, reliable operation prevents disruption of services to community (water, wastewater, storm drain).

Potential Funding (Local Budgets, Grant Funds, etc.): Local Budgets (General Fund, CIP), Grant Funds (FEMA HMGP; EPA CWSRF and DWSRF funding programs)

Timeline: Immediately, within 1-2 years.

Project Priority (High, Medium, Low): High

Action 8. Tree Trimming Program/Urban Forestry Team

Hazards Addressed: Drought, Severe Weather: Extreme Heat, Severe Weather: High Winds and Tornadoes, and Wildfire

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): There are a number of mature and maturing trees throughout the City of Madera. Many of these trees require considerable maintenance, trimming and or removal which is attributable to growth and sometimes disease.

Project Description: This Action's goal is to establish a dedicated urban forestry team to address:

- Hazardous tree trimming
- Tree mortality management
- Hazardous tree removal

Other Alternatives: Continue to outsource tree maintenance and removal.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Parks maintenance staff will continue to monitor needs related to tree trimming issues.

Responsible Office/Partners: City of Madera Parks Department

Benefits (Losses Avoided): Less reliance on the schedule of an outsourced vendor to address immediate needs, reduced property damage and personal injury due to limb/tree failure, reduced wildfire fuel hazards, reduced interruptions to service due to limbs/trees falling into critical infrastructure (roadways, power lines, communication lines, etc.)

Potential Funding (Local Budgets, Grant Funds, etc.): Local Budget (General Fund, staff time), Grant Funds (CAL FIRE Urban and Community Forestry Grants, Federal Inflation Reduction Act Funding, California Natural Resources Agency (Urban Greening Program)

Timeline: 1-10 years

Project Priority (High, Medium, Low): Medium

Action 9. Participate in Update to Groundwater Sustainability Plan and Implement Plan Recommendations

Hazards Addressed: Drought and Water Storage

Goals Addressed: 1, 2, 3, 5, 7, 8

Issue/Background (Problem Statement): As part of the Sustainable Groundwater Management Act (SGMA), the City participates in the preparation of the Groundwater Sustainability Plan (GSP) with other local agencies. Financial assistance in these projects is important given the current unavailability of full funding for the various components.

Project Description: Assist in the preparation and funding of the updated GSP, when it comes due, including possible identification of and implementation of new projects not already identified

Other Alternatives: The City must be a member of the GSP under SGMA and work toward sustainability. Failure to comply with SGMA could result in State intervention of the water system, fines, etc.

Existing Planning Mechanism(s) through which Action Will Be Implemented: GSP, previous GSP Update and annual reports of progress

Responsible Office/Partners: City of Madera Engineering

Benefits (Losses Avoided): Benefits – Full sustainability of the basin by 2040 and relaxation of concerns relative to a shortage of groundwater.

Potential Funding (Local Budgets, Grant Funds, etc.): Local funding from water rates which is an impact to the rate payers in a City in which many residents are economically disadvantaged. SGMA grants.

Timeline: 3 years to 15 years

Project Priority (High, Medium, Low): High- failure to reach sustainability is a paramount goal for the City and the region.

Action 10. Water Conservation Program Implementation

Hazards Addressed: Drought & Water Shortage, Severe Weather: All

Goals Addressed: 1, 2, 3, 5, 7, 8

Issue/Background (Problem Statement): Water shortage created by drought

Project Description: Implement a multi-pronged water conservation program targeting both residential and commercial sectors to reduce community-wide water usage.

Other Alternatives: Find other ways to encourage water conservation.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing Water conservation program

Responsible Office/Partners: Public Works - Water Quality

Benefits (Losses Avoided): Preservation of groundwater supplies

Potential Funding (Local Budgets, Grant Funds, etc.): Local budget (General Fund), Grant funds (NRCS Conservation Innovation grants, Cal DWR Agricultural Water Use Efficiency grants)

Timeline: Witin 1 year and ongoing. Immediately and perpetually

Project Priority (High, Medium, Low): Medium

Action 11. Water Tank Improvements

Hazards Addressed: Drought and Water Shortage, Severe Weather: All, Wildfire,

Goals Addressed: 1, 2, 3, 4, 5, 7, 8

Issue/Background (Problem Statement): This action's goal is to address

- Water tank improvements to sustain water pressure and to maintain consistent (pressure and volume) supply during droughts when well capacity can drop significantly during peak usage times
- Identify and establish additional water storage tanks, wells, and others
- Establish potable water sources for extreme weather conditions

Project Description: Construct tank and large diameter pipe mains that are under design as well as additional tanks as determined are necessary

Other Alternatives: Consider other methods of water storage or do nothing.

Existing Planning Mechanism(s) through which Action Will Be Implemented: 2014 Water System Master Plan

Responsible Office/Partners: City of Madera Engineering

Benefits (Losses Avoided): Reduce potential for community being asked to severely limit water usage as opposed to less restrictive measures. Maintaining consistent water system pressure in times of major need such as peak usage times and fire suppression.

Potential Funding (Local Budgets, Grant Funds, etc.): Local water rates of which would be severely impacted and grants likely through the State (Cal DWR IRWM) and FEMA (HMGP)

Timeline: 2 years

Project Priority (High, Medium, Low): High – Droughts are not usually identified until they are in progress

Action 12. Update Urban Water Management Plan and Implement Plan Recommendations

Hazards Addressed: Drought and Water Shortage

Goals Addressed: 1, 2, 3, 5, 7, 8

Issue/Background (Problem Statement): The Urban Water Management Plan allows the City to ensure a reliable water supply by evaluating current and future water needs against the availability of water sources.

Project Description: Update Urban Water Management Plan as required by regulation

Other Alternatives: Do not update Urban Water Management Plan

Existing Planning Mechanism(s) through which Action Will Be Implemented: Urban Water Management Plan. Water Division will hire consultant to update plan

Responsible Office/Partners: City of Madera Public Works - Water Maintenance and Operations

Benefits (Losses Avoided): Provides framework for addressing water cycle and supply challenges

Potential Funding (Local Budgets, Grant Funds, etc.): Local budget (General Fund staff time), Grant funds: FEMA HMGP, Cal DWR IRWM.

Timeline: Planning to begin immediately

Project Priority (High, Medium, Low): High

Action 13. Seismic Retrofit Programs

Hazards Addressed: Earthquake/Seismic

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background (Problem Statement): The City of Madera General Plan supports efforts to investigate local seismic and geological hazards and support programs that effectively mitigate these hazards. The City seeks to ensure that new and old/historic structures (including those constructed of unreinforced masonry) are protected from damage caused by earthquakes, geologic conditions, or soil conditions.

Project Description: Evaluate feasibility and implement programs to assist property owners assess seismic vulnerability and provide City resources and/or connect property owners to resources (expertise and/or funding) for purposes of retrofitting existing structures for seismic resiliency. This includes critical facilities, public buildings and structures.

Other Alternatives: Produce City documentation and links to resources, including but not limited to potential grant funding for public educational purposes.

Existing Planning Mechanism(s) through which Action Will Be Implemented: This would be a voluntary program using available resources and which is intended to support property owners, historic preservation efforts, and/or public building and structure safety efforts.

Responsible Office/Partners: City of Madera, Community Development Departments (i.e., Planning, Building and Engineering Departments).

Benefits (Losses Avoided): Reduce damage to existing and/or historic building stock. Protect citizens and increase or prevent loss of structures, improvements and/or property values.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budgets (General Fund) or available grants (FEMA HMGP) or state-funded incentive programs (e.g., Earthquake Brace & Bolt [EBB] Program).

Timeline: 1 year to 5 years

Project Priority (High, Medium, Low): Low- According to the California Department of Conservation, Madera is in an area in which there is a 10 percent chance in the next 50 years for an earthquake that would result in "strong" ground shaking (as felt by people) and "light" damage to structures.

Action 14. Conduct Exploratory Studies Regarding Natural Waterways Related to Capacity-building, Bank Stability, and Property Preservation

Hazards Addressed: Flood/Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 6, 7, 8

Issue/Background (Problem Statement): This Action's goal is to address

- Flood channel and levee inspections – vegetation, rodent control and other issues
- Channel, river, creek, levee embankments – erosion repair and restoration
- Continue modeling and mapping of Fresno River

Project Description: Initiate studies intended to identify those areas along creeks and the Fresno River where channel capacity may be insufficient. As a result of studies, identify and implement mitigation measures, including inspections, intended to address potential for flooding.

Other Alternatives: Do not conduct study. Rely on general observations and limited information from other agencies.

Existing Planning Mechanism(s) through which Action Will Be Implemented: 2014 Storm Drainage System Master Plan. FEMA mapping and ongoing FEMA studies.

Responsible Office/Partners: City of Madera Engineering

Benefits (Losses Avoided): Benefits – reduction in property damage and damage to natural resources as a result of failure of river, creek, channel, or levees.

Potential Funding (Local Budgets, Grant Funds, etc.): Grant funding as there are no local funds of consequence that are available for this type of effort: FEMA HMGP, BRIC; Cal DWR IRMP, USRP, FMPRA.

Timeline: 1 year to 10 years

Project Priority (High, Medium, Low): Medium

Action 15. Implement Communication System(s) to Ensure Information is Shared Timely and all Citizens have Access.

Hazards Addressed: Multi-hazard (Climate Change, Dam Failure, Drought & Water shortage, Earthquake (w/subhazards), Floods: 1%/0.2% annual chance (w/levee failure), Floods: Localized Stormwater, Severe Weather: Extreme Cold, Freeze, and Snow, Severe Weather: Extreme Heat, Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind), Severe Weather: High Winds and Tornadoes, Wildfire (w/smoke and air quality))

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): Natural disasters and other hazards (like dam failure) frequently cause widespread physical damage to, or trigger the functional failure of, terrestrial communications infrastructure (telephone lines, cellular towers, fiber optics, and power grids). This disruption results in a critical inability for emergency responders from different agencies and jurisdictions to communicate and coordinate effectively (interoperability issues), and for authorities to disseminate timely, accurate, and accessible information to all segments of the public, especially vulnerable populations with access and functional needs. The consequence of these communication failures is often a fragmented response, extended periods of chaos, increased casualties, and greater property damage, thereby hindering the overarching national goal of a secure and resilient community.

Project Description:

- Achieve full voice and data interoperability between all local emergency response agencies.
- Establish redundant and resilient communication pathways by integrating satellite and amateur radio (HAM) capabilities to ensure system survivability during primary infrastructure failures.
- Enhance public information and warning capabilities by integrating all local systems with the FEMA Integrated Public Alert and Warning System (IPAWS) and developing culturally competent messaging templates for diverse populations.

Other Alternatives: To be determined.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing radio and telecommunication network to be expanded upon/ hardened/ enhanced.

Responsible Office/Partners: City of Madera, Information Technology Department and Public Works Facilities Department.

Benefits (Losses Avoided): Preventing casualties, Efficient search and rescue, Reducing public confusion and panic.

Potential Funding (Local Budgets, Grant Funds, etc.): Local Budgets (General Fund, CIP), Grant Funds: Homeland Security Grant Program, FEMA HMGP, EMPG, and EOC grant program.

Timeline: Immediately, within 1 year.

Project Priority (High, Medium, Low): Medium

Action 16. Backup Power Redundancy & Fuel Tanks for Critical Infrastructure

Hazards Addressed: Multi-hazard for those that can cause power outages (Dam Failure, Drought & Water shortage, Earthquake (w/subhazards), Floods: 1%/0.2% annual chance (w/levee failure), Floods: Localized Stormwater, Severe Weather: Extreme Cold, Freeze, and Snow, Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind), Severe Weather: High Winds and Tornadoes, Wildfire (w/smoke and air quality))

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): During PSPS events city has only the fuel on hand and no storage to keep essential services functioning like water wells, storm lift stations, WWTP and emergency vehicles.

Project Description: Install Diesel 10,000 gallon storage tanks at each Fire station, 10,000 gallon diesel tank at WWTP for power backup and 20,000 fuel tank at Public Works for all other essential vehicles like patrol cars and heavy equipment for debris or hazard removal.

Other Alternatives: Do nothing and have no back up more than a half to full day. Seek emergency priority contracts with private fuel providers.

Existing Planning Mechanism(s) through which Action Will Be Implemented: No current mechanisms in place. Would need to initiate design, procurement and install.

Responsible Office/Partners: City of Madera Public Works Electrical and Facilities Division

Benefits (Losses Avoided): Fuel for fire and police protection activities, as well enabling major essential infrastructure to continue operations, preventing interruptions to sewer system, water system, essential buildings, etc.

Potential Funding (Local Budgets, Grant Funds, etc.): Local Budgets (General Fund), Grant Funds (FEMA HMGP)

Timeline: Immediately, within 1 year.

Project Priority (High, Medium, Low): Medium

Action 17. Update Safety Element

Hazards Addressed: Multi-hazard (Climate Change, Dam Failure, Drought & Water shortage, Earthquake (w/subhazards), Floods: 1%/0.2% annual chance (w/levee failure), Floods: Localized Stormwater, Severe **Weather**: Extreme Cold, Freeze, and Snow, Severe Weather: Extreme Heat, Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind), Severe Weather: High Winds and Tornadoes, Wildfire (w/smoke and air quality))

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): The Safety Element of the City of Madera General Plan contains policies directly related to health and safety. The safety element must identify hazards and hazard abatement provisions to guide local decisions related to zoning, subdivisions, and entitlement permits. The safety element should also contain general hazard and risk reduction strategies complementary with those of the Local Hazard Mitigation Plan (LHMP).

Project Description: Update the Safety Element of the City of Madera General Plan in accordance with State of California requirements. This includes but is not limited to performing ongoing evacuation planning and implementation; increasing community outreach, education and awareness (including out-of-town homeowners, renters, and visitors; increasing training opportunities and exercises; and evaluation of routes and signage.

Other Alternatives: No alternative. The Safety Element is a State-mandated element for all General Plans.

Existing Planning Mechanism(s) through which Action Will Be Implemented: A Safety Element of a General Plan must be updated in accordance with state-mandated cycle updates; every 8 years.

Responsible Office/Partners: City of Madera, Planning Department

Benefits (Losses Avoided): 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.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budget (General Fund, staff time) or available grant opportunities: SB 2 Planning Grants Program.

Timeline: Mandatory every 8 years.

Project Priority (High, Medium, Low): High- The City of Madera is required to update its Safety Element following adoption of the 6th Cycle Housing Element Update and Local Hazard Mitigation Plan (LHMP).

Action 18. Debris Removal, Tree Trimming and Fresno River Restoration.

Hazards Addressed: Drought & Water Storage, Flood/Severe Weather: Heavy Rain and Storms, Multi-Hazard, Wildfire

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): The Fresno River contains many dead trees and dry vegetation that causes drain inlets to the river to plug. Dry vegetation is also a dangerous fire accelerant.

Project Description: Perform weed abatement and tree removal on a consistent basis. Back fill sand bridge piers.

Other Alternatives: No action will result in localized flooding and potential fires.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Remove dead vegetation/trees and clear drain inlets.

Responsible Office/Partners: City of Madera Public Works – Safe and Clean Team

Benefits (Losses Avoided): Reduced flooding. Reduced impact from wildfire/brushfire, reduced property losses, preservation of life.

Potential Funding (Local Budgets, Grant Funds, etc.): Local Budget (General Fund, staff time) and Grant Funds (CAL FIRE Urban and Community Forestry Grants, Fire Prevention Grants)

Timeline: Immediate, within 1 year and ongoing

Project Priority (High, Medium, Low): High

Action 19. Yellow Reflective Border on Traffic Signal Backplates

Hazards Addressed: Multi-Hazard - Nighttime power outages

Goals Addressed: 1, 2, 3, 4, 6, 7, 8

Issue/Background (Problem Statement): In power outages or fog scenarios traffic signal are very hard to see and cause major accidents including fatalities. Reflective backboards help drivers see the intersection very clearly even in worse weather or storms.

Project Description: Replace all existing plain back backplate with yellow reflective safety borders

Other Alternatives: Do nothing

Existing Planning Mechanism(s) through which Action Will Be Implemented: No action plans from the City. Enhance existing traffic light infrastructure.

Responsible Office/Partners: Public-Works Electrical and Facilities Division

Benefits (Losses Avoided): Reduced property damage, limit loss of life/bodily injury.

Potential Funding (Local Budgets, Grant Funds, etc.): Local Budget (General Fund, CIP ,staff time), Grant Funds (CalTrans, FHWA)

Timeline: Within 1-5 years

Project Priority (High, Medium, Low): Medium

Action 20. Heating and Cooling Centers and Buildings of Respite for Vulnerable Population

Hazards Addressed: Severe Weather: Extreme Cold, Freeze, and Snow, Severe Weather: Extreme Heat/wildfire (smoke and air quality)

Goals Addressed: 1, 2, 3, 4, 7, 8

Issue/Background (Problem Statement): The City currently offers basic cooling and warming center services during extreme weather events.

Project Description: Enhance the existing cooling and warming center services by

- Adding transportation and contingency planning
- Establish and equip (clean rooms) safe space/centers to provide relief from poor air quality, especially from wildfire smoke
- Conduct air scrubber inventory and identify key at-risk facilities/populations for installation of air scrubbers and other equipment to reduce air quality impacts

Other Alternatives: Continue basic operations

Existing Planning Mechanism(s) through which Action Will Be Implemented: Heating and Cooling Center Plans

Responsible Office/Partners: City of Madera Parks and Community Services - Facilities Team

Benefits (Losses Avoided): Better options for the City's vulnerable populations, reduced health impacts/loss of life due to extreme weather and wildfire.

Potential Funding (Local Budgets, Grant Funds, etc.): Local Budget (General Fund, CIP, staff time), Grant Funding: FEMA HMGP, EMPG)

Timeline: 1 – 10 years

Project Priority (High, Medium, Low): Medium – High

Action 21. Target Hardening for Extreme Weather and Air Quality for Public Infrastructure and Buildings

Hazards Addressed: Severe Weather: Extreme Heat/Extreme Cold, Freeze, and Snow

Goals Addressed: 1, 2, 3, 7, 8

Issue/Background(Problem Statement): The City's buildings, critical facilities, and infrastructure are at risk of damage from extreme weather. For example, exterior plumbing fixtures can freeze during extreme cold and cooling equipment can fail in extreme heat.

Project Description: Identify critical facilities that need hardening from extreme weather events. Enhancements can include but are not limited to: protecting plumbing fixtures from freeze, providing air scrubbers/clean air spaces in City buildings, taking measures to protect roadways, ensuring air conditioning/heating equipment is maintained and replaced as necessary to avoid failures during extreme temperatures, and exploring redundancy options if facilities, buildings, or infrastructure fail during extreme weather events.

Other Alternatives: Do not harden public infrastructure and buildings

Existing Planning Mechanism(s) through which Action Will Be Implemented: None, will need to adopt procedures/plans to address vulnerabilities and take action.

Responsible Office/Partners: City of Madera Public Works – Facilities Division, Water Division, Streets Division

Benefits (Losses Avoided): Preventative measures can be taken to reduce property damage losses, reduce insurance claims, ensure consistent services to the community during extreme weather events.

Potential Funding (Local Budgets, Grant Funds, etc.): Local budgets (General fund, CIP), Grant funds (FEMA HMGP)

Timeline: Immediately within 1 year, and perpetually

Project Priority (High, Medium, Low): Medium

Action 22. Grade Separation for Railroad Lines

Hazards Addressed: Multi-hazard (Climate Change, Dam Failure, Drought & Water shortage, Earthquake (w/subhazards), Floods: 1%/0.2% annual chance (w/levee failure), Floods: Localized Stormwater, Severe **Weather**: Extreme Cold, Freeze, and Snow, Severe Weather: Extreme Heat, Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind), Severe Weather: High Winds and Tornadoes, Wildfire (w/smoke and air quality))

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8

Issue/Background (Problem Statement): The City is bisected by a Class I Union Pacific Railroad mainline that carries significant freight traffic through the heart of the community. The railroad includes numerous at-grade crossings with limited grade-separated alternatives, resulting in substantial mobility and safety challenges. During emergencies, frequent train activity, often occurring during peak traffic periods, causes roadway blockages that impede the timely response of emergency vehicles. This issue is particularly critical given that the City operates a single police department and three fire stations to serve the entire community. When crossings are occupied, emergency responders may be forced to reroute, resulting in delayed response times and reduced access to residents and businesses located on the opposite side of the tracks. The limited number of grade-separated crossings significantly constrains the City's ability to provide consistent and reliable emergency response, underscoring the need for mitigation measures such as additional grade separations to ensure public safety and improve community resilience.

Project Description: Grade separation to ensure timely emergency response times. Implementing grade separation improvements along the UPRR corridor will directly address these vulnerabilities. The proposed project will enhance emergency access, reduce congestion, and improve the reliability of critical transportation routes used by first responders. This effort aligns with FEMA's hazard mitigation priorities by proactively reducing risk to life, safety, and property; ensuring continued access for emergency services; and improving the community's overall resilience to both everyday incidents and large-scale disasters.

Other Alternatives: Add additional fire and police stations, including personnel

Existing Planning Mechanism(s) through which Action Will Be Implemented: The City is currently preparing a grade separation study with funding from the Federal Railroad Administration

Responsible Office/Partners: City, Caltrans, Union Pacific Railroad

Benefits (Losses Avoided): Implementation of this project will provide substantial safety, mobility, and emergency response benefits for the community. By reducing the frequency and duration of roadway blockages caused by train activity, grade separation improvements along the UPRR corridor will eliminate a major barrier that currently disrupts traffic flow and emergency service delivery across the City. The primary benefits include avoided loss of life, reduced emergency response times, improved access for first responders, and decreased property losses resulting from delayed emergency interventions.

Over the long term, the avoided losses associated with improved emergency response, reduced collision risk, and enhanced mobility will far exceed the cost of planning and implementing grade separation improvements. The project strengthens the City's overall disaster resilience by ensuring that emergency access routes remain functional during both routine rail operations and large-scale emergencies such as fires, floods, or earthquakes. These outcomes are consistent with FEMA's mission to reduce risk to life and property through proactive mitigation measures and infrastructure resilience investments.

Potential Funding (Local Budgets, Grant Funds, etc.): Federal Railroad Administration, Local Transportation Tax (Measure T), Development Impact Fees, Other State and Federal Grants to be identified

Timeline: 5-10 years

Project Priority (High, Medium, Low): High

Appendix A Planning Process

A.1 Lists of HMPC Invites/Stakeholders

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Dominic Tyburski	Public Works, Director	dominic.tyburski@maderacounty.com;
Elfego Franco	BLTS	elfego.franco@maderacounty.com

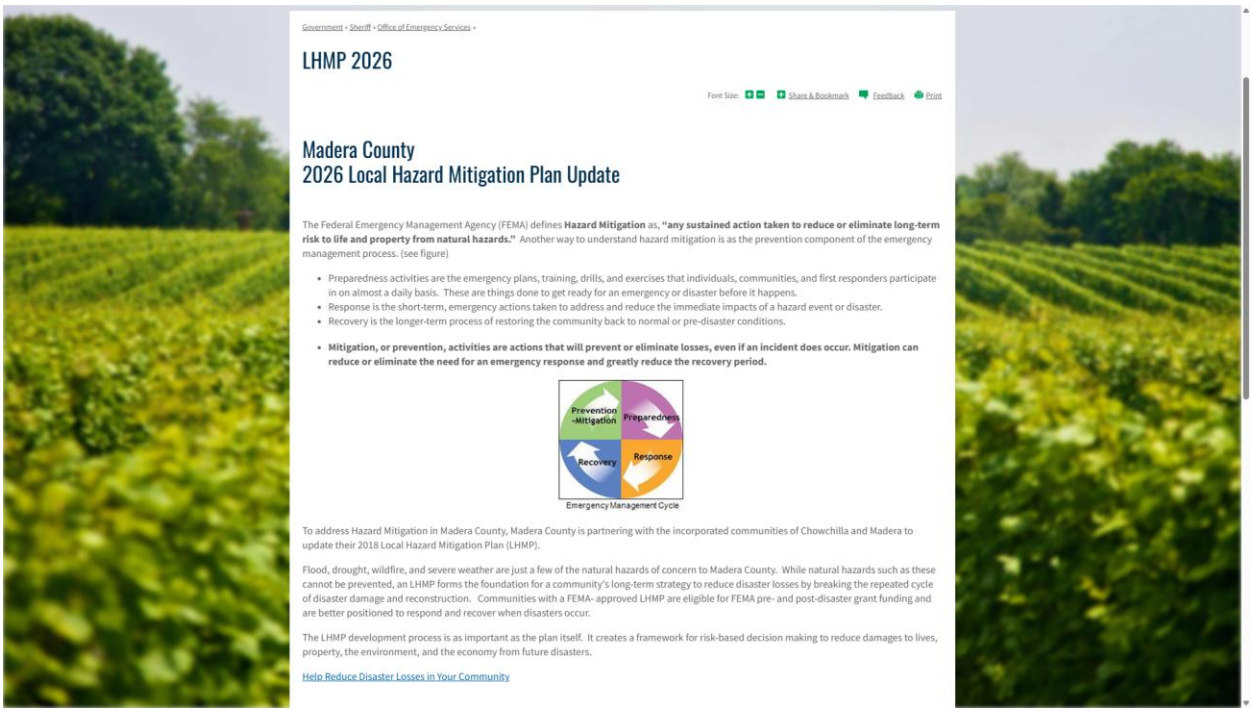
Name	Agency	Email
Geraldine Lakey	Madera County - Road Department	geraldine.lakey@maderacounty.com;
Candelario Salas	Probation, Supervising Deputy Probation Officer	CSalas@maderacounty.com
Helen Diaz	DA	helen.diaz@maderacounty.com
Jamie Bax	CED, Deputy Director	jamie.bax@maderacounty.com;
Jared Carter	Public Works, Deputy Director	jcarter@maderacounty.com;
Jason Yang	Madera County - IT	jason.yang@maderacounty.com;
Jay Varney	County Administration, Chief Administrative Officer	jay.varney@maderacounty.com;
Jeanne Habben	Water and Natural Resources, Director Deputy Director	jeaninne.habben@maderacounty.com;
Jennipher Garcia	Madera County - Tax Collector/Treasurer	jennipher.garcia@maderacounty.com;
Joseph Wilder	Madera County Sheriff's OES	jwilder@maderacounty.com
Karen Scrivner	Board of Supervisor's Office, Chief Clerk of the Board	karen.scrivner@maderacounty.com;
Matt Treber	CED, Chief of Development Services	matthew.treber@maderacounty.com;
Melisa DeSilva	Board of Supervisor's Office, District 5 Chief of Staff	melisa.dasilva@maderacounty.com;
Monty Cos	Public Transit	monty.cos@maderacounty.com
Regina Garza	Madera County - County Council	rgarza@lozanosmith.com
Raeanne Jain	Department of Social Services	raeanne.jain@maderacounty.com
Rusty Lantsberger	Ag Commissioner	rusty.lantsberger@maderacounty.com;
Ryan Videgain	MSO	ryan.videgain@maderacounty.com
Sandi Edwards	Human Resources	sandi.edwards@maderacounty.com;
Shane Gray	Animal Services	shane.gray@maderacounty.com;
Simon Paul	Department of Public Health, Public Health Officer	simon.paul@maderacounty.com;
Stephanie Anagnoson	Water and Natural Resources, Director	stephanie.anagnoson@maderacounty.com;

Name	Agency	Email
Terrance Carter	Department of Public Health, Program Manager	terrance.carter@maderacounty.com;
Tyson Pogue	Sheriff, Elected	tpogue@maderacounty.com;
Victoria Cantu	Madera County - Auditor-Controller	victoria.cantu@maderacounty.com;
Yvette Gomez	County Administration, Executive Assistant to CAO	yvette.gomez@maderacounty.com;
Gloria Garcia	Probation, Supervising Deputy Probation Officer	Gloria.Garcia@maderacounty.com;
External Stakeholders		
Justin Macomb	CAL-FIRE/Madera County Fire	Macomb@fire.ca.gov;
Andrew Overbay	CAL-FIRE/Madera County Fire	andrew.overbay@fire.ca.gov;
Dan Mccarroll	CAL-FIRE	dana.mccarroll@fire.ca.gov
Larrry Pendarvis	Madera City/County Fire	larry.pendarvis.fire.ca.gov
B.J. Jones	CAL-OES Law Branch	bj.jones@caloes.ca.gov;
Ryan Essepian	CAL-OES, ESC	ryan.essepian@caloes.ca.gov;
Patti Orozco	Cal OES	patti.orozco@caoes.ca.gov
Annette Rogers	Central Valley Regional Center	arogers@cvrc.org;
Tamara Salem	Central Valley Regional Center	
Fred Gaumnitz	Chowchilla Fire - Chief	fgaumnitz@ cityofchowchilla.org
Rod Pruett	City of Chowchilla	rpruett@cityofchowchilla.org
Joann McClendon	City of Chowchilla	jmcclendon@cityofchowchilla.org
Christian Soares	City of Chowchilla	csoares@cityofchowchilla.org
Jason Rogers	City of Chowchilla	jrodgers@cityofchowchilla.org
Denise Munoz	City of Chowchilla	dmunoz@cityofchowchilla.org
Jeff Palmer	Chowchilla Police	jpalmer@cityofchowchilla.org;
Wendy Silva	City of Madera HR Director	wsilva@madera.gov
Will Tackett	City of Madera	wtackett@madera.gov
Alicia Videgain	City of Madera MPD	avidegain@madera.gov
Eric Battles	City of Madera Admin Analyst	ebattles@madera.gov
Joe	City of Madera	
Javier Valdez	City of Madera	jvaldez@madera.gov

Name	Agency	Email
Arnoldo Rodriguez	City of Madera	arodriguez@Madera.gov
Gary Price	City of Madera IT	gprice@madera.gov
Keith Helmuth	City of Madera Engineering	khelmuth@madera.gov
Ellen Bitter	City of Madera	ebitter@madera.gov
Rafael Magallan	City of Madera Building Department	rmagallan@madera.gov
Jamie Hickman	City of Madera	jhickman@madera.gov
John Botwright	City of Madera Public Works	jbotwright@madera.gov
Adam Romo	City of Madera Parks	cromo@madera.gov
Cole Scroaains	City of Madera	cscroaains@madera.gov
H Gandhi	City of Madera Public Works	hgandhi@madera.gov
Whitney Lecat	Coarsegold Resource Conservation District	whitney.lecat@crcd.org
Kyle Gaede	Coarsegold Resource Conservation District	kyle.gaede@crcd.org
Mattie Mendez	Community Action Partnership of Madera County	mmendez@maderacap.org;
Ashley Nebeker	Eastern Madera County Fire Safe Council	info@easternmaderacountyfiresafecouncil.com;
Kevin Kirk	Eastern Madera County Fire Safe Council	kevinkirkemcfsc@gmail.com
Kevin Hatch	Golden Valley Unified School District	khatch@gvusd.org;
Carrie Richardson	Hensley Lake, US Army Corps	carrie.richardson@usace.army.mil;
Doug Plitt	Hensley Lake, US Army Corps	doug.plitt@usace.army.mil;
Kim Linderhome	Madera County Superintendent of Schools	klinderholm@maderacoe.us;
Gino Chiaramonte	Madera Police	gchiaramonte@madera.gov;
Felix Castro	National Weather Service - Hanford	felix.castro@noaa.gov;
Lanie Suderman	Visit Yosemite-Madera County	Lanie@YosemiteThisYear.com;
Dave Ficklin	SAR/ Public	luficklin@sbcglobal.net
Laura Unti	SAR/ Public	Dave Ficklin@gmail.com

A.2 Websites for Hazard Mitigation Plan

A.2.1. Madera County Website



Government » Sheriff » Office of Emergency Services »

LHMP 2026

Font Size: Share & Bookmark Feedback Print

Madera County
2026 Local Hazard Mitigation Plan Update

The Federal Emergency Management Agency (FEMA) defines **Hazard Mitigation** as, **"any sustained action taken to reduce or eliminate long-term risk to life and property from natural hazards."** Another way to understand hazard mitigation is as the prevention component of the emergency management process. (see figure)

- Preparedness activities are the emergency plans, training, drills, and exercises that individuals, communities, and first responders participate in on almost a daily basis. These are things done to get ready for an emergency or disaster before it happens.
- Response is the short-term, emergency actions taken to address and reduce the immediate impacts of a hazard event or disaster.
- Recovery is the longer-term process of restoring the community back to normal or pre-disaster conditions.

- **Mitigation, or prevention, activities are actions that will prevent or eliminate losses, even if an incident does occur. Mitigation can reduce or eliminate the need for an emergency response and greatly reduce the recovery period.**

Emergency Management Cycle

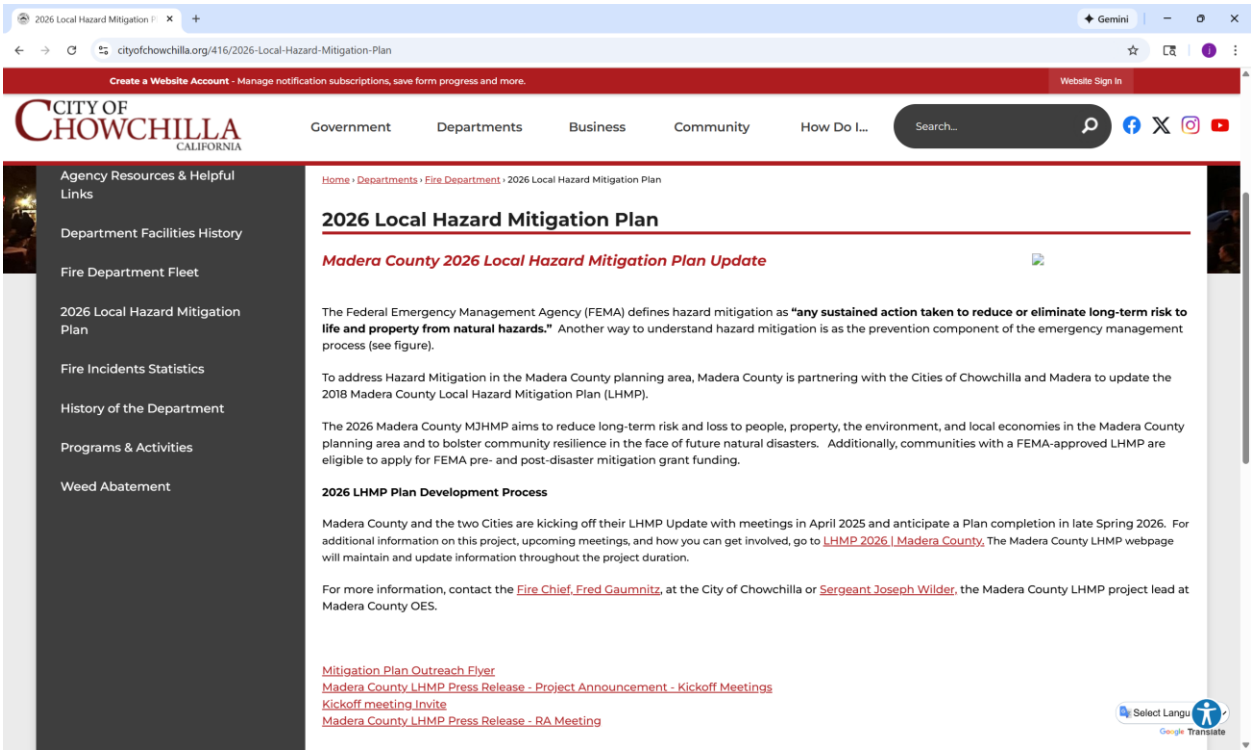
To address Hazard Mitigation in Madera County, Madera County is partnering with the incorporated communities of Chowchilla and Madera to update their 2018 Local Hazard Mitigation Plan (LHMP).

Flood, drought, wildfire, and severe weather are just a few of the natural hazards of concern to Madera County. While natural hazards such as these cannot be prevented, an LHMP forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Communities with a FEMA- approved LHMP are eligible for FEMA pre- and post-disaster grant funding and are better positioned to respond and recover when disasters occur.

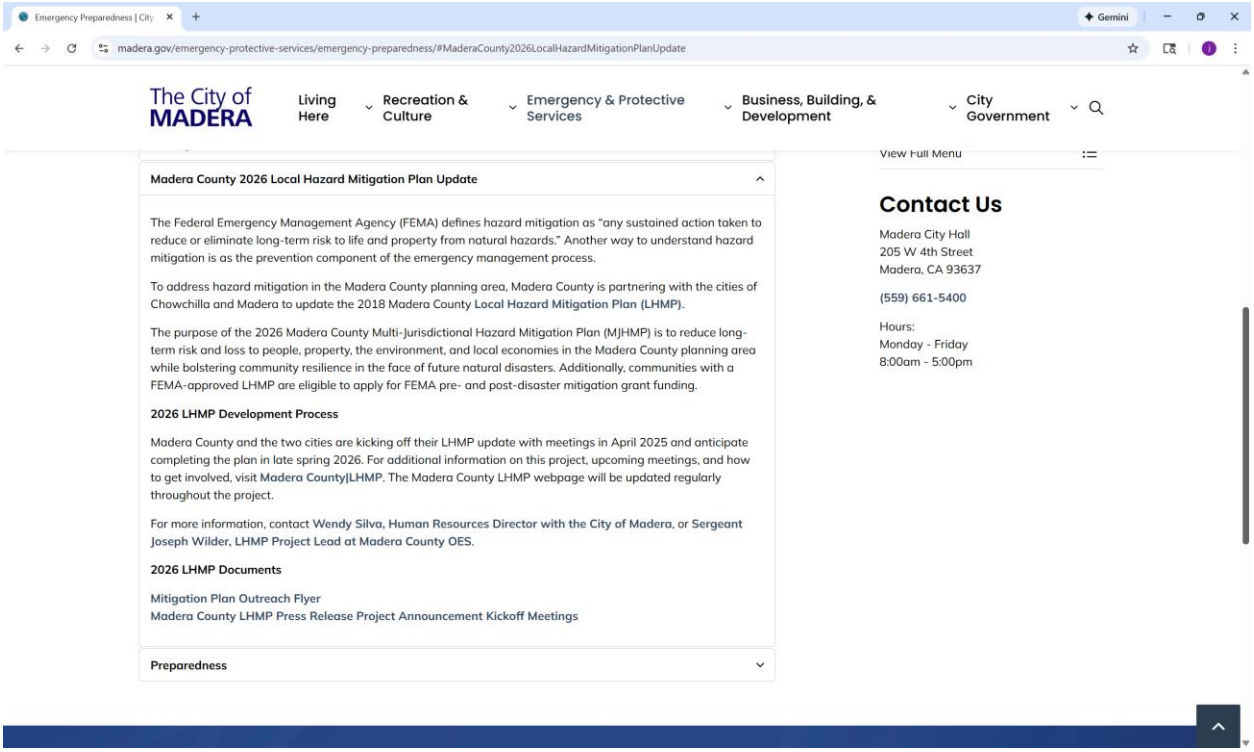
The LHMP development process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, the environment, and the economy from future disasters.

Help Reduce Disaster Losses in Your Community

A.2.2. City of Chowchilla Website



A.2.3. City of Madera Website



A.3 HMPC Internal Meeting

A.3.1. Meeting Invite for Internal Meeting

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Friday, March 21, 2025 12:23 PM
To: Carena Valdez <cavaldez@maderacounty.com>; Kayla Gates <Kayla.Gates@maderacounty.com>
Cc: Ryan Videgain <ryan.videgain@maderacounty.com>; Jeanine Foster <jeanine.foster@fostermorrison.com>
Subject: LHMP - Media

Howdy,

I am working on an update to the County's Local Hazard Mitigation Plan. The Sheriff's Office has hired a contractor to help with the completion of this plan update. With new FEMA Requirements, we need to reach out to the public and be more transparent than we ever have. Part of that, I will need help from both of you to complete this aspect of this. I will need changes to the Sheriff's Web Page, as well as social media posting regarding the update. This required documentation for FEMA approval of the plan.

Website:

@Carena Valdez, if you could create a new page under the "Office of Emergency Services" drop down menu and add "LHMP 2026". We will need to add the information contained on the Word Document labeled "Madera County Website". What/Who do I need to contact regarding getting added to the County Master Page as one of the rotating images?

If you could include the other document "Madera County Public Outreach Flyer V1" as a download as well.

After the initial development, I will be reaching out to update the meeting dates every so often.

Press Release/Social Media:

@Kayla Gates, The Sheriff's Office has to document the distribution of the Press Release. If you could CC @Jeanine Foster on those. It is a FEMA Requirement. We must show proof of distribution. If you CC @Jeanine Foster, we won't have to turn around and ask for copies later. @Jeanine Foster has prepared a sample Press Release if you would like to use that.

For Social Media, we will need to advertise the upcoming April 22nd meetings. There are two. One during the day from 1-4pm that is the Hazard Mitigation Planning Committee (HMPC) Meeting. This is open to the public as well. This is a first for this type of meeting but is a new FEMA requirement. Then the official Public Planning Meeting that evening from 5:30pm to 7pm. The flyer contains detailed information regarding it you can use for the post.

After this initial posting, there will be follow up post needed for the additional meetings. I will be reaching out with this information as we get further along the road.

I appreciate your help with this. FEMA has added a lot more work on this type of project. I apologies for the inconvenience but I have to get this done. This plan is directly tied to Cost Recovery Dollars coming back.

If you have any further questions, please feel free to reach out. I will be reaching out next week as well.

Thanks,

JW

Joseph Wilder | Sergeant/OES & SAR Coordinator - OES
MADERA COUNTY SHERIFF'S OFFICE
2725 Falcon Drive, Madera, CA 93637
Office: (559) 675-7770

A.3.2. Internal Meeting Followup

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Friday, March 21, 2025 12:28 PM
To: wsilva@madera.gov; 'Fred Gaumnitz' <fgaumnitz@cityofchowchilla.org>
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>
Subject: FW: Madera County LHMP Update Project Kickoff

Good Morning Everyone,

Here is some public outreach information from Jeanine.

I have pushed this forward to my Webpage and PIO for some of the push out of information.

Thanks,

JW

Joseph Wilder | Sergeant/OES & SAR Coordinator - OES
MADERA COUNTY SHERIFF'S OFFICE
2725 Falcon Drive, Madera, CA 93637
Office: (559) 675-7770

From: Jeanine Foster <jeanine.foster@fostermorrison.com>
Sent: Tuesday, March 18, 2025 7:59 AM
To: Joseph Wilder <jwilder@maderacounty.com>
Subject: Madera County LHMP Update Project Kickoff

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you validate the sender and know the content is safe. Please use the Phish Alert Button to report this email if suspicious. If the Phish Alert Button is not available please forward this email to [phish@maderacounty.com] if you believe this email is suspicious.

Hi Joey,

I have developed several attachments to get the LHMP project up and running – both for the planning committee and public meetings.

To support our LHMP kickoff meetings, I have attached the following:

- **HMPC Email Invite.** This is the email invite that should be sent to all the direct invites to the Hazard Mitigation Planning Committee (HMPC) Kickoff meeting. It sounds like

- the County and the Cities will be responsible for inviting their own internal and external HMPC members. Please note the following:
    - It is suggested that the email invite be put into the body of an email and sent to everyone on their HMPC invite list.
    - **Please be sure to copy Jeanine.foster@fostermorrison.com on all invites**. I will capture and save the invite emails and they will be included in the Planning Process Appendix (PPA). We need to clearly document who was invited to all meetings.
    - The County and the Cities will need to assist in maintaining and updating their LHMP Invite lists throughout the project. After each of the five meetings, I will go through each of the lists and add additional attendees to each list based on meeting attendance. At the end of the project, these lists will also be included in the PPA.
    - Following the email invite, County OES will be sending an outlook invitation out to everyone on all three lists so we can get these dates on everyone's calendar. The County can either send the outlook invites to all three invite lists OR just to the City lead, and the City lead can forward the outlook invitation to their internal and external invites.
    - Note: Having all 3 jurisdictions sending their own invites will require some additional coordination by all 3 participating jurisdictions. It may be easier to work from one list, but either approach is doable.
- **Madera County website text.** It is recommended that the County develop an LHMP webpage that will house all information for the plan development process. This primary LHMP webpage will be updated throughout the project with information on new meetings and other information.
- **Cities of Chowchilla and Madera website text.** Each City should also have an LHMP webpage. This webpage will include a link to the County LHMP webpage (the current link in yellow will change once the County LHMP webpage is established). It is anticipated that the City webpages will remain the same throughout the project. The intent is to provide a link to County webpage that will house current and updated project information. The County webpage will also eventually house the LHMP Public Review Draft.
- **Public Press Release/Project Announcement for Project Kickoff.** The County should send this out as a press release on behalf of all jurisdictions. If you have local news outlets/contacts you can send directly and see if they can include this or something similar – that would be great. Please document where this Press Release was sent and provide screenshots, links, or other information on actual posting of the press release.
- **Public Outreach Flyer.** This can be used throughout the project by all three jurisdictions. Note, we will create a second version once we have a Public Review Draft. But for the early project phase, this can be placed in public areas of the County/Cities, such as the planning department and other areas where it would be visible. It can also be placed in libraries, coffee shops and other local public locations,

- community bulletin boards, and private business to help get the word out. It can also be used to take with you and leave behind at any interagency type meetings you might attend – again to get the word out and provide something that allows them to access the website and other information for this project. Note: For all posting/dissemination of the Public Outreach Flyer, please take a photo of the flyer postings and provide to me along with a list of locations where the flyer was posted.
- **Social Media Postings.** Social media mechanisms utilized by each participating jurisdiction, such as Facebook, X, and others, should be used by all three jurisdictions to post meeting announcements and other information to promote the 5 HMPC and 3 public meetings. These social media posts can be derived from the above attachments. I can also assist with creating these. Similar to the other public outreach, please send screenshots of the posting along with information on posting date, etc.

Note, some of the above documents have areas in yellow highlighting that will need to be updated before these documents are distributed. It will be important to get the County website up and a URL created to be included in many of the highlighted areas before some of the public outreach goes out.

I still owe you a complete schedule for the project and am working on that.

That is all I have for now. It might be helpful to get on a call with the County and two Cities to walk through this email and attachments. Let me know.

This is the hard part – getting the project going! We are looking forward to working with the County and Cities again!

Thank you,
Jeanine Foster
Foster Morrison Consulting
(303) 717-7171

A.4 HMPC Meeting #1: Kickoff Meeting

A.4.1. Kickoff Meeting Invite to HMPC and Stakeholders

Note: this section includes multiple emails as the list of stakeholders was being built.

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Thursday, April 17, 2025 7:10 PM
To: Heather.betts@cdcr.ca.gov; MillerJ@Chowchillahigh.org; CR@ccchowchilla.com; StocktonR@chowchillahigh.org; Pastor1227@sbcglobal.net; worrellm@chowkids.com; Ssilvacmhd@yahoo.com; logan@ccchowchilla.com; Vortiz@Fairmead.org; rmcwherter.maderafoodbank@gmail.com; ChowchillaChamber@gmail.com; nalvarez@maderacap.org; Marisol Torres <marisol.torres@maderacounty.com>; Maria Barragan <maria.barragan@maderacounty.com>; Kathleen.Ratliff@cdcr.ca.gov; Jim@chowchillafair.org; Graciela Valdez <Graciela.Valdez@maderacounty.com>; Collinsd@chowkids.com; chad.cbc@gmail.com; CJFloresCDMH@aol.com; Bnelson@fairmead.org
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>; fgaumnitz@cityofchowchilla.org
Subject: Local Hazard Mitigation Plan - Update

Hello,

The Sheriff's Office and the County of Madera are reaching out to inform you of the upcoming revision of the Madera County Local Hazard Mitigation Plan (LHMP).

The purpose of the hazard mitigation planning process is to help reduce the impacts of natural hazards to the citizens, property, critical facilities, infrastructure, and other key assets in the County. In addition, the Disaster Mitigation Act of 2000 (DMA 2000) requires that local governments have a FEMA-approved LHMP in place to be eligible for certain pre and post disaster mitigation funding to protect communities from future disaster-related losses.

The County is partnering with the Cities of Chowchilla and Madera to update the 2018 LHMP. To facilitate this vital update, we have engaged Foster/Morrison Consulting.

You are receiving this email because outside stakeholders are welcome to take part in this LHMP Update as a member of the Hazard Mitigation Planning Committee (HMPC).

County Stakeholders' expertise and involvement are crucial to this process. We are asking each stakeholder to join the planning committee. Participation will entail:

- Attendance at HMPC meetings, with five sessions expected over the next year.
- Providing available data/information requested of the HMPC
- Responding to request for information from Foster/Morrison
- Reviewing and providing comments on the plan draft.

County, city, district, agency, and public and private stakeholder participation and coordination is a requirement of an approved plan by FEMA, as is the inclusion of any hazard data, information, and mitigation projects your agency considers important to the development of the LHMP. Thus, your input will be critical to the success of this project.

A project kickoff meeting of the HMPC will be held at the following time and location:

HMPC Meeting
April 22, 2025 (Tuesday) 1:00 – 4:00 pm
Sheriff's Office

Emergency Operation Center
2725 Falcon Drive
Madera, CA 93637

A public stakeholder meeting will also be held the evening of the same day of the kickoff meeting.

April 22, 2025 (Tuesday) 5:30 – 7:00 pm
Sheriff's Office
Emergency Operation Center
2725 Falcon Drive
Madera, CA 93637

If your able to participate, please send an RSVP email to me. If you need further information, please feel free to contact me at (559) 675-7792 or jwilder@maderacounty.com

Thanks,

Joseph Wilder

Joseph Wilder | Sergeant/OES & SAR Coordinator - OES
MADERA COUNTY SHERIFF'S OFFICE
2725 Falcon Drive, Madera, CA 93637
Office: (559) 675-7770

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Tuesday, April 1, 2025 1:10 PM
To: adam.amaral@countyofmerced.com; tmejorado@fresnocountyca.gov; garmstrong@kerncountyfire.org; abraham.valencia@co.kings.ca.us; rsandoval@mariposacounty.org; oes@monosheriff.org; dkmy@pge.com; aaron.sundstrom@sierraambulance.org; calbanese@chp.ca.gov; danr@stcg.net; morgan.j.barnes@usace.army.mil; carrie.richardson@usace.army.mil; doug.plitt@usace.army.mil; shane.swartz.lsjld@gmail.com; mwynn@chukchansi-nsn.gov; curtis.scribner@dot.ca.gov; adam.wimberly@dot.ca.gov; toddlile@maderausd.org; brian.thoburn@sce.com; rgonzalez@usbr.gov; antonio.cabrera@usda.gov; tgreci@madera-id.org; rene.villanueva@usda.gov; lindsey.stanley@caloes.ca.gov; ryan.essepian@caloes.ca.gov; btomlinson@cwdwater.com; daniel.tune@usda.gov; bill.mccullough@usda.gov; bart.zahourek@dot.ca.gov; bj.jones@caloes.ca.gov; bbeck@yosemiteusd.org; jnino@mychawanakee.org; nvonflue@mychawanakee.org; mtownsend@basslakesd.org; Justin.demeusy@amwater.com; lfink@northforkrancheria-nsn.gov; info@easternmaderacountyfiresafecouncil.com; jon.cottington@crcd.org; chamber@oakhurstchamber.com; chamber@coarsegoldchamberofcommerce.com; chamber@basslakechamber.com; northforkchamberofcommerce@gmail.com; Rhonda@YosemiteThisYear.com; Lanie@YosemiteThisYear.com; aave@valleychildrens.org; cmassetti@mcsos.org; klinderholm@maderacoe.us; cjack@fresnocountyca.gov; dlynch@fresnocountyca.gov; daniel.turner@cdcr.ca.gov; felix.castro@noaa.gov; lance@pistoresiambulance.com; mquintero@valleychildrens.org; sandy.morehouse2@redcross.org; tiffany.covell@redcross.org; sjvapcd@valleyair.org; khatch@gvusd.org; collinsd@chowkids.com; millerj@chowchillahigh.org; angel.reyna@maderacollege.edu; darin.soukup@maderacollege.edu
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>
Subject: Local Hazard Mitigation Plan - Update

Hello,

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Thanks,

Joseph Wilder

Joseph Wilder | Sergeant/OES & SAR Coordinator - OES
MADERA COUNTY SHERIFF'S OFFICE
2725 Falcon Drive, Madera, CA 93637
Office: (559) 675-7770

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Saturday, April 5, 2025 8:48 PM
To: l.leach@maderavwcc.com; arcfresno@arcfresno.org.
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>
Subject: Local Hazard Mitigation Plan - Update

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The Sheriff's Office and the County of Madera are reaching out to inform you of the upcoming revision of the Madera County Local Hazard Mitigation Plan (LHMP).

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- Reviewing and providing comments on the plan draft.

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Emergency Operation Center
2725 Falcon Drive
Madera, CA 93637

A public stakeholder meeting will also be held the evening of the same day of the kickoff meeting.

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Saturday, April 5, 2025 8:53 PM
To: tmcknight@cvrc.org; arogeres@cvrc.org
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>
Subject: Local Hazard Mitigation Plan - Update

Hello,

The Sheriff's Office and the County of Madera are reaching out to inform you of the upcoming revision of the Madera County Local Hazard Mitigation Plan (LHMP).

The purpose of the hazard mitigation planning process is to help reduce the impacts of natural hazards to the citizens, property, critical facilities, infrastructure, and other key assets in the County. In addition, the Disaster Mitigation Act of 2000 (DMA 2000) requires that local governments have a FEMA-approved LHMP in place to be eligible for certain pre and post disaster mitigation funding to protect communities from future disaster-related losses.

The County is partnering with the Cities of Chowchilla and Madera to update the 2018 LHMP. To facilitate this vital update, we have engaged Foster/Morrison Consulting.

You are receiving this email because outside stakeholders are welcome to take part in this LHMP Update as a member of the Hazard Mitigation Planning Committee (HMPC).

County Stakeholders' expertise and involvement are crucial to this process. We are asking each stakeholder to join the planning committee. Participation will entail:

- Attendance at HMPC meetings, with five sessions expected over the next year.
- Providing available data/information requested of the HMPC
- Responding to request for information from Foster/Morrison
- Reviewing and providing comments on the plan draft.

County, city, district, agency, and public and private stakeholder participation and coordination is a requirement of an approved plan by FEMA, as is the inclusion of any hazard data, information, and mitigation projects your agency considers important to the development of the LHMP. Thus, your input will be critical to the success of this project.

A project kickoff meeting of the HMPC will be held at the following time and location:

HMPC Meeting
April 22, 2025 (Tuesday) 1:00 – 4:00 pm
Sheriff's Office
Emergency Operation Center
2725 Falcon Drive
Madera, CA 93637

A public stakeholder meeting will also be held the evening of the same day of the kickoff meeting.

A.4.2. Kickoff Meeting Invite on Facebook

Madera County Sheriff's Office's Post

Madera County Sheriff's Office
April 22, 2025 ·

Local Hazard Mitigation Plan Update Meeting

This afternoon, the Madera County Sheriff's Office of Emergency Services hosted the LHMP Update kickoff meeting, which is the first step in the important process of updating Madera County's Local Hazard Mitigation Plan. This plan is more than a box to check—it's a proactive tool that helps us identify and reduce risks before a disaster occurs.

With our partners in the Cities of Madera and Chowchilla, and the support of Foster Morrison Consulting, we'll be working to ensure this plan reflects the real hazards we face and the strategies we need in place to protect our residents, infrastructure, and public safety operations.

📣You are invited! We encourage the public and all interested stakeholders to attend and participate in our project kickoff meeting, which will review the LHMP development process, the benefits of hazard mitigation planning, and how you can be involved.

Public Meeting- TONIGHT
April 22 (Tuesday) 5:30 – 7:00 pm
Madera County Sheriff's Office
Emergency Operation Center
2725 Falcon Drive, Madera, CA 93644

For more information on this project, please visit: https://www.maderacounty.com/.../office-of.../lhmp-2026-1718

You may also contact Sergeant Joseph Wilder at (559) 675-7770 or email at jwilder@maderacounty.com

A.4.3. HMPC #1: Kickoff Meeting Agenda

AGENDA

MADERA COUNTY
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
Hazard Mitigation Planning Committee (HMPC)
Kickoff Meeting #1

Tuesday, April 22, 2025
1:00 - 4:00 pm
Sheriff's Office Emergency Operations Center
2725 Falcon Drive
Madera, CA 93637

---

1. Introductions
2. Hazard Mitigation & the Disaster Mitigation Act Planning Requirements
3. The Role of the Hazard Mitigation Planning Committee (HMPC): Participating Jurisdictions and Stakeholders
4. Planning for Public Input
5. Coordinating with Other Agencies and Stakeholders
6. LHMP Update Schedule
7. Hazard Identification
8. Data Needs
9. Questions?

A.4.4. HMPC #1: Kickoff Meeting Sign-in Sheet

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #1: Kickoff Meeting
April 22, 2025 (1:00-4:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Ryan Esseplan	ryan.esseplan@caloes.ca.gov	916-559-7484	Cal OES
JASON YANG	jason.yang@maderacounty.com	—	IT
Arnoldo Rodriguez	arodriguez@Madera.gov	559.871.9113	city of Madera
Javier Valdez	JValdez1@madera.gov	559-645-2203	City of Madera
Joe Hebert	jhebert@madera.gov	559 661-5491	City of Madera
REGINA GARZA	rgarza@lozanosmith.com	559 431-5600	County counsel
Fred Gaumnitz	fgaumnitz@cityofchowchilla.org	209-489-9693	City of Chowchilla
Rod Pruett	rpruett@cityofchowchilla.org	559-696-5959	"
Jeff Palmer	jpalmer@cityofchowchill.org	559-999-4556	"
JOANN MCCLENDON	JMCCLENDON@CITYOFCHOWCHILLA.ORG		"
TYSON POGUE	TPOGUE@MADERACOUNTY.COM		MADERA COUNTY
JOSEPH WILDER	JWILDER@MADERACOUNTY.COM		"

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
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Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
BJ JONES Asst. Chief	bjjones@CALOES.CA.GOV	916 802 4240	CAL OES LAW
Chenecua Dixon Director of HR	Chenecua.dixon@maderacounty.com	559 675 7705	HR
Sandi Edwards Asst Dir of HR	sandi.edwards@maderacounty.com	559-675-7705	HR
Amy Tobler	amy.tobler@Maderacounty.com	(559) 675-7891	MCAS
Shane Gray	Shane.Gray@[illegible]	(559) 718-1584	MCCFS
Douglas Pliff Operations Project Mgr.	doug.pliff@usace.army.mil	559-831-7021	USACE- Hidden Dam, Hensley Lake
Christian Soares	csoares@cityofchowchilla.org	559-665-8615	City of Chowchilla
Eric Battles Admin Analyst	ebattles@madera.gov	559-661-5417	City of Madera
Jay Varney CAO	jay.varney@maderacounty.com	559-474-0266	Madera County
Annette Rogers Emergency ops Mgr	arogers@cvrc.org	559-558-8814	Central Valley Regional Center
Alicia Videgain/LT	avidegain@madera.gov	559-252-1612	MPD
Ryan Videgain/LT	Ryan.videgain@maderacounty.com	559-517-0613	MSO

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Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Geraldine Lakey	geraldine.lakey@madera county.com	559 675 7811	Public Transit
Monty Cox	monty.cox@maderacounty.com	559 675-7811	Public Transit / PW
Ashley Nebeker	info@easternmaderacountyfires	afccouncil 559-917-7370	FIRE
Kevin Kirk	kevinkirkemcfsc@gmail	"	"
Ashley Mcvk	ashley.mcvk@maderacounty.com	559 675 7811	Social Services
Simon Paul	[illegible]	[illegible] 901695x	DPH
Terrance Carter	terrance.carter@maderacounty.com	559-505-3486	Public Health
Will Tackett	w-tackett@madera.gov	(559) 661-5451	City of Madera
Wendy Silva/ HR Director	wsilva@madera.gov	5596615481	HR/RISK / City of Madera
Stephanie Anagnoson	stephanie.anagnoson	5595980362	Flood
Dominic Ybarra/ PW	dominic.ybarra@madera	559.674-781	PW
GARY PRICE	gprice@madera.gov	5396615411	City I.T.

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #1: Kickoff Meeting
April 22, 2025 (1:00-4:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Rusty Lantsberger Ag Commission	rusty.Lantsberger@maderacounty.com	559-675-7976	Ag Commissioner
Gino Chiaramonte	gchiaramonte@madera.gov	559-675-5961	Madera PD
Keith Helmuth	Khelmuth@madera.gov	661-5418	City Engineering
Kim Linderholm	Klinderholm@mcsos.org	673-6051 x6295	MCSOS
Ellen Bitter	ebitter@madera.gov	661 5472	City of Madera
Kevin Hatch	khatch@gvusd.org	559 645-3570	Golden Valley Unified
Karen SCRIVNER	KAREN.SCRIVNER@maderacounty.com	559.977.5115	Madera County
Justin Macomb	justin.macomb@fire.ca.gov	559-706-8805	CAL FIRE
GLORIA GARCIA	GLORIA GARCIA @ MADERACOUNTY.COM	559 660 6413	PROBATION
Amalia Hernandez	ahernandez@maderacounty.com	559-448-7016	Public Health
RAFAEL MAGALLAN	rmagallan@madera.gov	559-661-5946	BUILDING DEPARTMENT
MATT Treber	Matthew.Treber@maderacounty	559-675-7821	

A.5 HMPC #2: Risk Assessment Meeting

A.5.1. Emailed Invite to Internal Stakeholders – Risk Assessment Meeting

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Monday, June 23, 2025 11:24 AM
To: Amy Toler <amy.toler@maderacounty.com>; Brett Frazier <Brett.Frazier@maderacounty.com>; Brian Esteves, MS <Brian.Esteves@maderacounty.com>; Chenecua Dixon <Chenecua.Dixon@maderacounty.com>; Chris Childers <cchilders@maderacounty.com>; Christine Doss <Christine.Doss@maderacounty.com>; Darin McCandless <darin.mccandless@maderacounty.com>; Darin McMechan <dmcmechan@maderacounty.com>; David Richstone <David.Richstone@maderacounty.com>; Deborah Martinez <deborah.martinez@maderacounty.com>; Dominic Tyburski, P.E., MPA <Dominic.Tyburski@maderacounty.com>; Jamie Bax <Jamie.Bax@maderacounty.com>; Jay Varney <Jay.Varney@maderacounty.com>; Jeff Dupras <JDupras@maderacounty.com>; Joel Bugay <Joel.Bugay@maderacounty.com>; Jose Pantoja <JPantoja@maderacounty.com>; Joshua Christopherson <Josh.Christopherson@maderacounty.com>; Justin Macomb <Justin.Macomb@maderacounty.com>; Karen Scrivner <Karen.Scrivner@maderacounty.com>; Krista Riggs <Krista.Riggs@maderacounty.com>; Matthew Treber <matthew.treber@maderacounty.com>; Mattie Mendez <Mattie.Mendez@maderacounty.com>; Rebecca Martinez <rmartinez@maderacounty.com>; Regina Garza <Regina.Garza@maderacounty.com>; Robert Blehm <robert.blehm@maderacounty.com>; Rusty Lantsberger <Rusty.Lantsberger@maderacounty.com>; Sally O. Moreno <Sally.Moreno@maderacounty.com>; Sandi Edwards <Sandi.Edwards@maderacounty.com>; Sara Bosse <Sara.Bosse@maderacounty.com>; Sarah Honeycutt <sarah.honeycutt@maderacounty.com>; Simon Paul, M.D. <Simon.Paul@maderacounty.com>; Stephanie Anagnoson <stephanie.anagnoson@maderacounty.com>; Tania Say <tania.say@maderacounty.com>; Tracy Kennedy <TKennedy@maderacounty.com>; Victoria Cantu <Victoria.Cantu@maderacounty.com>; Yvette Gomez <yvette.gomez@maderacounty.com>; Regina Garza (out) <rgarza@lozanosmith.com>; Ana Velasquez <AVelasquez@maderacounty.com>; Amalia Hernandez <AHernandez@maderacounty.com>; Amy Toler <amy.toler@maderacounty.com>; Amy Ybarra <Amy.Ybarra@maderacounty.com>; Andrea Saldate, MBA <Andrea.Saldate@maderacounty.com>; Annette Ybarra <Annette.Ybarra@maderacounty.com>; Ashley Monk <Ashley.Monk@maderacounty.com>; Brett Frazier <Brett.Frazier@maderacounty.com>; Brian Gamble <brian.gamble@maderacounty.com>; Brooke Bergman <Brooke.Bergman@maderacounty.com>; Chenecua Dixon <Chenecua.Dixon@maderacounty.com>; Chris Childers <cchilders@maderacounty.com>; Chris L. Rodriguez <clrodriguez@maderacounty.com>; Darin McCandless <darin.mccandless@maderacounty.com>; Darin McMechan <dmcmechan@maderacounty.com>; David Richstone <David.Richstone@maderacounty.com>; Deborah Martinez <deborah.martinez@maderacounty.com>; Deseri Ornelas <dornelas@maderacounty.com>; Dexter Marr <DMarr@maderacounty.com>; Dominic Tyburski, P.E., MPA <Dominic.Tyburski@maderacounty.com>; Elizabeth Cruz <Elizabeth.Cruz@maderacounty.com>; Geraldine Lakey <Geraldine.Lakey@maderacounty.com>; Gloria Garcia <Gloria.Garcia@maderacounty.com>; Jacqueline Torres <Jacqueline.Torres@maderacounty.com>; Jamie Bax <Jamie.Bax@maderacounty.com>; Jared Carter <jcarter@maderacounty.com>; Jason Blanks <Jason.Blanks@maderacounty.com>; Jason Yang <Jason.Yang@maderacounty.com>; Jay Varney <Jay.Varney@maderacounty.com>; Jeannie Habben <Jeaninne.Habben@maderacounty.com>; Jennipher Garcia <jennipher.garcia@maderacounty.com>; Joel Bugay <Joel.Bugay@maderacounty.com>; Joey Nunes, M.A. <Joey.Nunes@maderacounty.com>; Joshua Christopherson <Josh.Christopherson@maderacounty.com>; Juan Witrago <Juan.Witrago@maderacounty.com>; Julia Pineda <Julia.Pineda@maderacounty.com>; Justin Macomb (out) <Justin.macomb@fire.ca.gov>; Justin White <justin.white@maderacounty.com>; Karen Scrivner <Karen.Scrivner@maderacounty.com>; Karla Estupinian <Karla.Estupinian@maderacounty.com>;

Kenneth Shirley Jr <Kenneth.ShirleyJr@maderacounty.com>; Kevin Davie <KDavie@maderacounty.com>; Krista Riggs <Krista.Riggs@maderacounty.com>; Madeleine Magana <Madeleine.Magana@maderacounty.com>; Maria Knobloch <Maria.Knobloch@maderacounty.com>; Marizela Terkildsen <marizela.terkildsen@maderacounty.com>; Matt Skolnik <Matthew.Skolnik@maderacounty.com>; Matthew Treber <matthew.treber@maderacounty.com>; Mattie Mendez (out) <mmendez@maderacap.org>; Mee Wang <mee.wang@maderacounty.com>; Melisa DaSilva <melisa.dasilva@maderacounty.com>; Melody Viscara-Kellar <mkellar@maderacounty.com>; Mika Flores <Mika.Flores@maderacounty.com>; Minh Nguyen <Minh.Nguyen@maderacounty.com>; Monica Roath <monica.roath@maderacounty.com>; Nick Salinas <Nicholas.Salinas@maderacounty.com>; Odalys Ortiz <Odalys.Ortiz@maderacounty.com>; Omar Molina <omar.molina@maderacounty.com>; Philip Toler <philip.toler@maderacounty.com>; Randip Khangura <Randip.Khangura@maderacounty.com>; Regina Garza (out) <rgarza@lozanosmith.com>; Richard Jitsumyo <richard.jitsumyo@maderacounty.com>; Robert Blehm <robert.blehm@maderacounty.com>; Roman Noriega <Roman.Noriega@maderacounty.com>; Rusty Lantsberger <Rusty.Lantsberger@maderacounty.com>; Sally O. Moreno <Sally.Moreno@maderacounty.com>; Sandi Edwards <Sandi.Edwards@maderacounty.com>; Sandra Mendez <sandra.mendez@maderacounty.com>; Sara Bosse <Sara.Bosse@maderacounty.com>; Sarah Honeycutt <sarah.honeycutt@maderacounty.com>; Shane Gray <Shane.Gray@maderacounty.com>; Simon Paul, M.D. <Simon.Paul@maderacounty.com>; Stephanie Anagnoson <stephanie.anagnoson@maderacounty.com>; Tania Say <tania.say@maderacounty.com>; Terrance Carter <terrance.carter@maderacounty.com>; Tharen Higginbotham <Tharen.Higginbotham@maderacounty.com>; Tracy Kennedy <TKennedy@maderacounty.com>; Trini Aleman <Trini.Aleman@maderacounty.com>; Victoria Cantu <Victoria.Cantu@maderacounty.com>; Yvette Gomez <yvette.gomez@maderacounty.com>
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>; Tyson J. Pogue <tpogue@maderacounty.com>; Darin McMechan <dmcmechan@maderacounty.com>; Brian Esteves, MS <Brian.Esteves@maderacounty.com>; Jason Clark <jclark@maderacounty.com>; Ryan Videgain <ryan.videgain@maderacounty.com>; Michael Chambers <Michael.Chambers@maderacounty.com>
Subject: LHMP Update - July 9th Meeting

Hello Everyone,

This is a reminder for our next meeting for the update to the Local Hazard Mitigation Plan (LHMP). The next meeting for the Hazard Mitigation Planning Committee (HMPC) is Wednesday, July 9th, 2025, from 1pm – 4pm at the Sheriff's Office Headquarters in the Emergency Operations Center (2725 Falcon Drive, Madera, CA 93637). The calendar invite will follow this email.

There will be a public meeting on the same day from 5:30pm – 7pm at the Sheriff's Office Headquarters in the Emergency Operations Center (2725 Falcon Drive, Madera, CA 93637). The two meetings will be covering the same topics. You're welcome to attend either meeting.

I have attached the agenda as well. Below this email is the notes and information from the last meeting.

If you have questions, comments, or concerns, feel free to reach out to any of us on the project team.

Joseph Wilder (County) jwilder@maderacounty.com

Jeanine Foster (Contractor) Jeanine.foster@fostermorrison.com

Thanks,

JW

Joseph Wilder | Sergeant/OES & SAR Coordinator - OES
MADERA COUNTY SHERIFF'S OFFICE
2725 Falcon Drive, Madera, CA 93637
Office: (559) 675-7770

A.5.2. HMPC #2: Emailed Invite to Stakeholders

Sent: Monday, June 23, 2025 11:24 AM
To: Amalia Hernandez; Amy Toler; Amy Ybarra; Andrea Saldate, MBA; Annette Ybarra; Ashley Monk; Ana Velasquez; Brett Frazier; Brian Esteves, MS; Brian Gamble; Brooke Bergman; Chris Childers; Chenecua Dixon; Christine Doss; Chris L. Rodriguez; Darin McCandless; David Richstone; Deborah Martinez; Dexter Marr; Darin McMechan; Dominic Tyburski, P.E., MPA; Deseri Ornelas; Elizabeth Cruz; Geraldine Lakey; Gloria Garcia; Jacqueline Torres; Jamie Bax; Jason Blanks; Jason Yang; Jay Varney; Jared Carter; Jason Clark; Jeff Dupras; Jeanine Foster; Jeannie Habben; Jennipher Garcia; Joel Bugay; Joey Nunes, M.A.; Joshua Christopherson; Jose Pantoja; Juan Witrago; Julia Pineda; Justin Macomb (out); Justin Macomb; Justin White; Karen Scrivner; Karla Estupinian; Kevin Davie; Kenneth Shirley Jr; Krista Riggs; Madeleine Magana; Maria Knobloch; Marizela Terkildsen; Matt Skolnik; Matthew Treber; Mattie Mendez; Mee Wang; Melisa DaSilva; Michael Chambers; Mika Flores; Minh Nguyen; Melody Viscara-Kellar; Mattie Mendez (out); Monica Roath; Nick Salinas; Odalys Ortiz; Omar Molina; Philip Toler; Randip Khangura; Regina Garza; Regina Garza (out); Richard Jitsumyo; Rebecca Martinez; Robert Blehm; Roman Noriega; Rusty Lantsberger; Ryan Videgain; Sally O. Moreno; Sandi Edwards; Sandra Mendez; Sara Bosse; Sarah Honeycutt; Shane Gray; Simon Paul, M.D.; Stephanie Anagnoson; Tania Say; Terrance Carter; Tharen Higginbotham; Tracy Kennedy; Tyson J. Pogue; Trini Aleman; Victoria Cantu; Yvette Gomez
Subject: Local Hazard Mitigation Meeting - County [In-person]
When: Wednesday, July 9, 2025 1:00 PM-4:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: 2725 Falcon Drive, Madera, CA 93637 (Headquarters)

Hello Everyone,

This is a reminder for our next meeting for the update to the Local Hazard Mitigation Plan (LHMP). The next meeting for the Hazard Mitigation Planning Committee (HMPC) is Wednesday, July 9th, 2025, from 1pm – 4pm at the Sheriff's Office Headquarters in the Emergency Operations Center (2725 Falcon Drive, Madera, CA 93637). The calendar invite will follow this email.

There will be a public meeting on the same day from 5:30pm – 7pm at the Sheriff's Office Headquarters in the Emergency Operations Center (2725 Falcon Drive, Madera, CA 93637). The two meetings will be covering the same topics. You're welcome to attend either meeting.

I have attached the agenda as well. Below this email is the notes and information from the last meeting.

If you have questions, comments, or concerns, feel free to reach out to any of us on the project team.

Joseph Wilder (County) jwilder@maderacounty.com
Jeanine Foster (Contractor) Jeanine.foster@fostermorrison.com

Thanks,

JW

A.5.3. HMPC #2: Risk Assessment Meeting Agenda

AGENDA

MADERA COUNTY
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
Hazard Mitigation Planning Committee (HMPC)
Risk Assessment Meeting #2

Wednesday, July 9, 2025
1:00 - 4:00 pm
Sheriff's Office Emergency Operations Center
2725 Falcon Drive
Madera, CA 93637

---

1. Introduction
2. Status of the Disaster Mitigation Act Planning Process
3. Review of Risk Assessment (PowerPoint)
4. Open Discussion and Input on the Risk Assessment (Handout)
5. Review of Data Needs
6. Next Steps
7. Questions?

A.5.4. HMPC #2: Risk Assessment Meeting Sign in Sheet

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #2: Risk Assessment Meeting
July 9, 2025 (1:00-4:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Dexter Marr	dmarr@maderacounty.com	559 232-0946	Environmental Health
Rusty Lantzberger	Rusty.Lantzberger@maderaCounty.com	675-7876	AgComm.
Wendy Silva/ HR Director	wsilva@madera.gov	559-661-5481	HR / City of Madera
Douglas R. Platt /OPM	doug.platt@usace.army.mil	559-831-7021	US Army Corps of Engineers
Elfego Franco AAE	elfego.franco@maderacounty.com	559 716-4421	BITS
Jennifer Garcia	Jennifer.Garcia@maderacounty	559 481-3397	TAX
Dominic Tyburski PIO	dominic.tyburski@cal		PKV
Tamara Salem	[illegible]		CURC
Chenecua Dixon	chenecua.dixon@maderacounty.com	5559 675-7705	County / HR
Sandi Edwards	sandi.edwards@maderacounty.com	559-675-7705	County HR
RAFAEL MAGALLAN	rmagallan@madera.gov	559 661-5496	CITY OF MADERA
Melisa DaSilva	melisa.dasilva@maderacounty.com	559 662-6050	DOS

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #2: Risk Assessment Meeting
July 9, 2025 (1:00-4:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Regina Garza		559 431-5600	County Counsel
Stephanie Aragnoson	stephanie.aragnoson@maderacounty.com	5595980372	WNR
Ashley Nebeker	info@easternmadercountyfire.com	559-917-7370 afcconcil.com	EMCFSC
Jamie Hickman	JHICKMAN@MADERA.GOV	232-9615	City of Madera
JOAN BOTWRIGHT	jbotwright@Madera.gov	232-7364	City of MADERA P.D.
KAREN SCRIVNER	Karen.Scrivner@maderacounty.com	977.3115	BOS
Kim Linderholm	klinderholm@mcsos.org	662-6295	Madera Co. Supt of Sch
JASON FANG	jason.fang@maderacounty.com	662-6193	Madera Co. IT
Terrance Carter	terrance.carter@maderacounty.com	505-3486	Madera County DPH
LANIE SUDERMAN	lanie.suderman@yahoo	760-1372	VVMC
Ryan Esseman	ryan.esseman@caloes.ca.gov	916-579-2600	Cal OES
Victoria Cantu	victoria.cantu@madera	559 715-1375	Admin Rev

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #2: Risk Assessment Meeting
July 9, 2025 (1:00-4:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Carrie Richardson	Carrie.Richardson@usace.army.mil	559 681 3255	USACE - Buchanan Dam - Eastman
Kyle Coade	Kyle.Coade@CRCD.org	559(760)2109	CRCD
ERIC Battles	ebattles@madera-ca.gov	559-661-5417	City of Madera
Ashley Monk	ashley.monk@Maderacounty.com	559 675 7841	DSS Social Services
[illegible]	[illegible]	[illegible]	MSO
[illegible]	[illegible]	[illegible]	MSO
Gino Chiaramonte	gchiaramonte@madera.gov	559-675-4201	MPD
Dave Ticklin			SAR
Laura Uutela			SAR
Brooke Bergman	brooke.bergman@maderacounty.com		DA Office
[illegible]	[illegible]	675-2941	Probation

A.6 HMPC #3 & #4: Mitigation Strategy Meetings

A.6.1. Email Invites to Mitigation Strategy Meetings (Internal County)

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Friday, September 12, 2025 3:08 PM
To: Ana Velasquez; Amalia Hernandez; Amy Toler; Amy Ybarra; Andrea Saldate, MBA; Annette Ybarra; Ashley Monk; bward@maderacounty.com; Brett Frazier; Brian Gamble; Brooke Bergman; Chenecua Dixon; Chris Childers; Chris L. Rodriguez; connie.moreno-peraza@maderacounty.com; Darin McCandless; Darin McMechan; David Richstone; deborah.mahler@maderacounty.com; Deborah Martinez; Deseri Ornelas; Dexter Marr; Dominic Tyburski, P.E., MPA; Elizabeth Cruz; Geraldine Lakey; Candelario Salas; Jacqueline Torres; Jamie Bax; Jared Carter; Jason Blanks; Jason Clark; Jason Yang; Jay Varney; Jeannie Habben; Jennipher Garcia; Joel Bugay; Joey Nunes, M.A.; Joshua Christopherson; Juan Witrago; Julia Pineda; Justin Macomb (out); Justin White; Karen Scrivner; Karla Estupinian; Kenneth Shirley Jr; Kevin Davie; Krista Riggs; Madeleine Magana; Maria Knobloch; Marizela Terkildsen; Matt Skolnik; Matthew Treber; Mattie Mendez (out); Mee Wang; Melisa DaSilva; Melody Viscara-Kellar; michele.may@maderacounty.com; Mika Flores; Minh Nguyen; Monica Roath; Nick Salinas; Odalys Ortiz; Omar Molina; paul.durrell@maderacounty.com; Philip Toler; Randip Khangura; Regina Garza (out); Richard Jitsumyo; Robert Blehm; Roman Noriega; Rusty Lantsberger; Sally O. Moreno; Sandi Edwards; Sandra Mendez; Sara Bosse; Sarah Honeycutt; Shane Gray; Simon Paul, M.D.; Stephanie Anagnoson; tania.say@maderacounty.com; Terrance Carter; Tharen Higginbotham; Tracy Kennedy; Trini Aleman; Tyson J. Pogue; Victoria Cantu; Yvette Gomez; Zack Zamudio; Gloria Garcia; Ryan Videgain; Brian Esteves, MS; Jeanine Foster
Subject: LHMP - Mitigation Strategy Meeting 1
When: Wednesday, September 24, 2025 1:00 PM-4:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: 2725 Falcon Drive, Madera, CA 93637

Hello Everyone

Thank you again to everyone who attended our July Risk Assessment meeting.

Our next meeting is our Mitigation Strategy Meeting towards the end of the month. These two meetings are the most important meetings of the project.

We have attached the agenda and a FEMA Document on Mitigation Strategies. Please give the FEMA Document a look. It is a fairly simple document and provides examples of mitigations by hazards. We recommend taking a look at the document now and giving it some thought before the meeting. Then take a quick refresh before the meeting. Try to find some hazard mitigation strategies that might work for our area. We encourage you to have some mitigation actions in mind when you attend the meeting. We have attached the mitigation strategies from the 2017 Plan to draw some ideas from.

Both meetings will be at the Sheriff's Office - Emergency Operations Center at 2725 Falcon Drive, Madera, CA 93637.

- **1st Meeting - Wednesday, September 24th from 1pm to 4pm -** The group will be briefly revisiting the risk assessment data developed to date and will be establishing updated LHMP goals and objectives.

- **2nd Meeting - Thursday, September 25th 2025 from 9am to 12pm** - The group will be working to identify and discuss potential mitigation actions and projects for reducing Madera County's risk and vulnerability to identified hazards and disasters.

As a reminder, County, City, and stakeholder participation and coordination are a requirement of an approved LHMP, as is the inclusion of any hazard data, information, and mitigation projects you may want to see included in the Plan. Your continued participation and input are critical to the success of this project!

The calendar invitations will follow this email. I will also send an email on the Monday prior to the meeting.

If you have any questions or concerns, please feel free to reach out to our Consultant Jeanine Foster at Jeanine.foster@fostermorrison.com or me.

I appreciate everyone's engagement on this project.

Thanks,

JW

A.6.2. Email Invites to Mitigation Strategy Meetings (External Stakeholders)

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Friday, September 12, 2025 3:16 PM
To: adhcofmadera@gmail.com; Sandy Morehouse <sandy.morehouse2@redcross.org>; Tiffany Covell <tiffany.covell@redcross.org>; Sandy Morehouse <sandy.morehouse2@redcross.org>; arcfresno@arcfresno.org; chamber@basslakechamber.com; mtownsend@basslakesd.org; Macomb@fire.ca.gov; Andrew Overbay (out) <Andrew.overbay@fire.ca.gov>; Anthony Garcia (Out) <Anthony.garcia@fire.ca.gov>; Chris Reneau <chris.reneau@fire.ca.gov>; Justin.demeusy@amwater.com; Chris Albanese <calbanese@chp.ca.gov>; Jones, BJ@CalOES <bj.jones@caloes.ca.gov>; Essepian, Ryan@CalOES <ryan.essepian@caloes.ca.gov>; Lindsey Standley <Lindsey.Stanley@CalOES.ca.gov>; Scribner, Curtis A@DOT <curtis.scribner@dot.ca.gov>; Adam Wimberly <adam.wimberly@dot.ca.gov>; bart.zahourek@dot.ca.gov; sgutierrez@camarenahealth.org; gmejia@camarenahealth.org; gorbaker@camarenahealth.org; GGonzalez@ccdof.org; Kathleen.Ratliff@cdcr.ca.gov; Daniel Turner <daniel.turner@cdcr.ca.gov>; Daniel Turner <daniel.turner@cdcr.ca.gov>; Curtis Jack <cjack@fresnocountyca.gov>; Dan Lynch <dlynch@fresnocountyca.gov>; tmcknight@cvrc.org; arogers@cvrc.org; aolson@cvrc.org; ChowchillaChamber@gmail.com; jnino@mychawanakee.org; nvonflue@mychawanakee.org; worrellm@chowkids.com; collinsd@chowkids.com; collinsd@chowkids.com; gene@chowchillafair.org; sturner@cityofchowchilla.org; Jim@chowchillafair.org; Chad Middleton <cmiddletoncdmh@hotmail.com>; CJFloresCDMH@aol.com; cdenny@cityofchowchilla.org; Jeffrey Palmer <jpalmer@cityofchowchilla.org>; Ssilvacmhd@yahoo.com; millerj@chowchillahigh.org; StocktonR@chowchillahigh.org; Brandon Tomlinson <btomlinson@cwdwater.com>; millerj@chowchillahigh.org; Michael Wynn <mwynn@chukchansi-nsn.gov>; nlambert@chukchansi-nsn.gov; chamber@coarsegoldchamberofcommerce.com; Jon Cottington <jon.cottington@crcd.org>; nalvarez@maderacap.org; Mattie Mendez (out) <mmendez@maderacap.org>; logan@ccchowchilla.com; CR@ccchowchilla.com; glen.gamueda@davita.com; Michelleb@dhhsc.org; angelicamb@dhhsc.org; Eastern Madera County Fire Safe Council <info@easternmaderacountyfiresafecouncil.com>; Barnes, Morgan J CIV USARMY CESPK (USA) <morgan.j.barnes@usace.army.mil>; Vortiz@Fairmead.org; Bnelson@fairmead.org; chad.cbc@gmail.com; tmejorado <tmejorado@fresnocountyca.gov>; Curtis Jack <cjack@fresnocountyca.gov>; Dan Lynch <dlynch@fresnocountyca.gov>; Hbennett@fmaaa.org; Sumandeep.gill@goldenmaderahc.com; joy.trapanese@goldenmaderahc.com; khatch@gvusd.org; Graciela Valdez <Graciela.Valdez@maderacounty.com>; Richardson, Carrie A CIV USARMY CESPK (USA) <carrie.richardson@usace.army.mil>; Plitt, Douglas R CIV USARMY CESPK (USA) <doug.plitt@usace.army.mil>; Istratigos@hindshospice.org; Imoolchan@hindshospice.org; dviloria@hindshospice.org; Marissa.Honnette@JerichoCare.com; parksc@kerncounty.com; Georgianna Armstrong <garmstrong@kerncountyfire.org>; Valencia, Abraham <abraham.valencia@co.kings.ca.us>; shane.swartz.lsjld@gmail.com; shane@lsjld.org; mfernandez@cgafresno.com; jwilliams@cgafresno.com; angel.reyna@maderacollege.edu; msmithwagner@maderahospital.org; tdavis@maderahospital.org; avelarde@maderahospital.org; hchahal@maderahospital.org; rmcwherter.maderafoodbank@gmail.com; Jvestal@maderamosq.com; cmassetti@mcsos.org; Kim Linderholm <klinderholm@maderacoe.us>; mverduzco@mesos.org; Jeasarez@mcsos.org; tgreci@madera-id.org; Rosa.valles@innovativerenal.com; antonette.benitez@innovativerenal.com; l.leach@maderavwcc.com; Giachino Chiaramonte <gchiaramonte@madera.gov>; Emelyn.Reyes@maderahcc.com; toddlile@maderausd.org; robertshill@maderausd.org; Raquel Sandoval <rsandoval@mariposacounty.org>; AMARAL, ADAM <adam.amaral@countyofmerced.com>; oes@monosheriff.org; Felix Castro - NOAA Federal <felix.castro@noaa.gov>; northforkchamberofcommerce@gmail.com; Lance Fink <lfink@northforkrancheria-nsn.gov>; daguayo@nfr-nsn.gov; lbeihn@nfr-nsn.gov; apomona@nfr-nsn.gov; emcdonald@nfr-nsn.gov;

; fbeihn@nfr-nsn.gov; chamber@oakhurstchamber.com; Darin Soukup <darin.soukup@maderacollege.edu>; anne-marie.louissaint@oakhursthellc.com; meagan@ohrestar.com; noemi@ohrestar.com; dkmy@pge.com; administrator@palmscarecenter.org; Lance Hoffrage <lance@pistoresiambulance.com>; rick@pistoresiambulance.com; ted@pistoresiambulance.com; gpirie@pistoresiambulance.com; sjvapcd@valleyair.org; Aaron Sundstrom <aaron.sundstrom@sierraambulance.org>; Dan Rule <danr@stcg.net>; Brian Thoburn <brian.thoburn@sce.com>; Pastor1227@sbcglobal.net; thegoldenyearscarehome@gmall.com; dcontreras@uwfm.org; GONZALEZ, RUFINO <rgonzalez@usbr.gov>; Tune, Daniel - FS, CA <daniel.tune@usda.gov>; antonio.cabrera@usda.gov; Rene Villanueva <rene.villanueva@usda.gov>; bill.mccullough@usda.gov; sbussean@valleycrc.org; Ashley Ave <aave@valleychildrens.org>; Mary Jo Quintero <mquintero@valleychildrens.org>; cupdegraff@valleychildrens.org; Heather.betts@cdcr.ca.gov; Rhonda Salisbury <rhonda@yosemitethisyear.com>; Lanie Suderman <lanie@yosemitethisyear.com>; Brian Beck <bbeck@yosemiteusd.org>; whitney.lecat@crcd.org; Morgan.Leon@countyofmerced.com; tprotzman@mcsos.org
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>; Joseph Wilder <jwilder@maderacounty.com>; Wendy Silva <wsilva@madera.gov>; 'Fred Gaumnitz' <fgaumnitz@cityofchowchilla.org>
Subject: LHMP - September Meeting - Stakeholders

Hello Everyone

Thank you again to everyone who attended our July Risk Assessment meeting.

Our next meeting is our Mitigation Strategy Meeting towards the end of the month. These two meetings are the most important meetings of the project.

We have attached the agenda and a FEMA Document on Mitigation Strategies. Please give the FEMA Document a look. It is a fairly simple document and provides examples of mitigations by hazards. We recommend taking a look at the document now and giving it some thought before the meeting. Then take a quick refresh before the meeting. Try to find some hazard mitigation strategies that might work for our area. We encourage you to have some mitigation actions in mind when you attend the meeting.

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As a reminder, County, City, and stakeholder participation and coordination are a requirement of an approved LHMP, as is the inclusion of any hazard data, information,

and mitigation projects you may want to see included in the Plan. Your continued participation and input are critical to the success of this project!

If you're available to attend, please reach out to me to RSVP and for the calendar invitation.

If you have any questions or concerns, please feel free to reach out to our Consultant Jeanine Foster at Jeanine.foster@fostermorrison.com or me.

I appreciate everyone's engagement on this project.

Thanks,

JW

Joseph Wilder | Sergeant/OES & SAR Coordinator - OES
MADERA COUNTY SHERIFF'S OFFICE
2725 Falcon Drive, Madera, CA 93637
Office: (559) 675-7770

A.6.3. HMPC #3 & #4: Mitigation Strategy Meeting Agenda

AGENDA

MADERA COUNTY
MULTI-JURISDICTIONAL
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
Hazard Mitigation Planning Committee (HMPC)
Meetings #3 & #4 – Mitigation Strategy

Wednesday September 24, 2025 (1:00 - 4:00 pm)
Thursday September 25, 2025 (9:00 am - 12:00 pm)

Sheriff's Office Emergency Operations Center | Madera, California

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HMPC Meeting #3:

1. Introductions
2. LHMP Project Status and Next Steps/Timeline
3. Risk Assessment Status
4. Priority Hazards Review
5. Develop Plan Goals and Objectives
6. Introduction to HMPC Meeting #4: Mitigation Alternatives/Actions/Projects

HMPC Meeting #4:

1. Introductions
2. Review Mitigation Categories and Selection Criteria
3. Brainstorming of Mitigation Alternatives/Actions/Projects by Hazard
4. Prioritization of Mitigation Actions/Projects
5. Next Steps

A.6.4. HMPC #3 & #4: Mitigation Strategy Meeting Sign in Sheets

September 24th Meeting

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #3: Mitigation Strategy Meeting: Goals
September 24, 2025 (1:00-4:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Jason Rogers	jrogers@cityofchowchilla.org	559-664-8615	Chowchilla
COLE SCROGGINS	CSCROGGINS@MADERA.GOV	559-661-5490	CITY MADERA
Denise Munoz	dmunoz@cityofchowchilla.org	559.907.4896	Chowchilla
Adam Ramos	aramos@mgmsterr.gov	871-1969	City of Madera
RAD PRUETT	RPruett@CityofChowchilla.org	665-8615	City of Chowchilla
Wendy Silva	wsilva@madera.gov	661-5481	City of Madera
Dana McCarroll	dana.mccarroll@fire.ca.gov	209-347-7170	CALFIRE
Laura Lintz	lufticklin@sbcglobal.net	650 868 7424	Citizen
Dave Ticklin	daveticklin@gmail.com	650 868 9707	Citizen
Brooke Bergman	brooke.bergman@maderacounty.com		DA Office
Kyle Carde	kyle.garde@CRCD.org	559 760-2109	CRCD
Geraldine Lakey	geraldine.lakey@maderacounty.com	559 675 7511	PW

SIGN-IN SHEET
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Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
KAREN SCRIVNER CLERK TO THE BOARD	KAREN.SCRIVNER@ MADERACOUNTY.COM	559. 977. 5115	MADERA COUNTY BOARD OF SUPERVISORS
Regina Garza, Madera County Counsel	regina.garza @maderacounty.com	559 431-5600	County Counse Department Madera County
Felix Castro	Felix.Castro@nsa.gov	559-564-0563	NSAD/ NWS Hanford

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
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Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Terrance Carter	terrance.carter@maderacounty.com	559-305-3486	Public Health
JOHN BOTWRIGHT	jbotwright@madera.gov		CITY OF MADERA P.W.
Ashley Monk	ashleymonk@maderacounty.com		DSS
Whitney Lecat (CRCD)	whitney.lecat@crcd.org	559-430-4448	CRCD
Annette Rogers	Arogerse cusc.org	559-658-8814	CUSC
Cam Price, Dir. IT	gprice@madera.gov	5596615411	City of Madera
Keithle Smith, City Eng	Khsmith@madera.gov	559-661-5418	--
Roeanne Jain	Roeanne.Jain@Maderacounty	559675-7815	DSS
Arnoldo Rodriguez	arodriguez@Madera.gov	871.9113	city of Madera
[illegible]	[illegible]	559-232-8738	[illegible]
Lacey Pendarvis	Lacey.Pendarvis@fire.ca.gov	559-355-9113	Madera City/County Fire

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
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September 24, 2025 (1:00-4:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
JOSEPH WILDER	JWILDER@MADERACOUNTY.COM	559-675-7770	SHERIFF'S OFFICE
Amy Toler	amy.toler@maderacounty.com	559675-7891	MCAS
Christin Soares	csoares@cityofchowchilla.org	559-665-8615x.308	Chowchilla
Jeannie Habben	Jeannie.Habben@maderacounty.com	559-598-0421	Water & Natural Resources
Doug Plitt	doug.plitt@usace.army.mil	559-831-7021	USACE
Annette Kephart	annette.kephart@maderacounty.com	559675-7821	CEO
Sandi Edwards	sandi.edwards@maderacounty.com	559-675-7705	MC HR
Chenecia Dixon	chenecia.dixon@maderacounty.com	559 675 7705	HR Madera County
Fred Graumnitz	fgraumnitz@cityofchowchilla.org	209-489-9093	Chowchilla Fire
Yvette Gomez	Yvette.gomez@maderacounty.com	559.675-7703	Admin Madera County
Eric Battles	ebattle@madera.gov	559-661-5417	City of Madera
Will Tackett	wtackett@madera.gov	(559)661-5457	City of Madera

September 25th Meeting

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #4: Mitigation Strategy Meeting: Actions and Projects
September 25, 2025 (9:00-12:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Amy Tole (Director)	amy.tole@maderacounty.com	(559)706-3967	Animal Servs.
Adam Bomer	abomer@madera.gov	831-1469	Parks
Keith Helmuth	Khelmuth@madera.gov	559-861-5418	City - Engineering
Dave Ticklin	Dave.ticklin@gmail.com	658 868 9707	Citizen
Mattie Mendez	mmendez@maderacoop.org	559-351-7135	CAPMC
Jason Rogers	jrogers@cityofchowchilla.org	559-664-8615	Chowchilla
KAREN SCRIVNER	CLERK TO THE BOARD KAREN.SCRIVNER@MADERACOUNTY.com	559.977.5115	BOS
Helen Diaz	helen.diaz@maderacounty.com	559-706-1858	DA.
Kevin Kirk	kevinkirkemcfsc@gmail.com	559-760-6856	EMCFSC
Kyle Goede	Kyle.goede@CRCD.org	559-760-2109	CRCD
Denise Munoz/com	Dev Director dmunoz@cityofchowchilla	559.907.4846	City of Chowchilla
Christina Soarez	csoarez@cityofchowchilla.org	559-665-8615 ext 308	Chowchilla

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #4: Mitigation Strategy Meeting: Actions and Projects
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Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Wendy Silva/HR Director	wsilva@madera.gov	559-661-5481	City of Madera
MATT Treber	Matthew.treber@MaderaCounty.c.	559-675-788	Dev Services
Eric Bottles	ebottles@madera.gov	559-661-5417	City of Madera
Cole Scroggins	CSCROGGINS@MADERA.GOV	(559) 232-0081	City of Madera
RAFAEL MAGALLAN	rmagallan@madera.gov	(559) 661-5496	City of Madera
Gary Price, IT Dir	gprice@madera.gov	559-661-5411	City Madera
Ron Pruett, Chowchilla City Admin	rpruett@ci.chowchilla.ca.us	(559) 665-8615	City of Chowchilla
Terrance Carter	terrance.carter@maderacounty.com	559-505-3486	Public Health
Alicia Videgain	avidegain@maderapd.com	559-675-4230	City Madera PD
Jamie Bax	Jamie.bax@madco.com	675-7821	MadCEO
JOSEPH WILDER	JWILDER@MADERACOUNTY	675-7770	SHERIFF
Arnoldo Rodriguez	arodriguez@madera.gov	871.9113	City of Madera

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
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Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Sandi Edwards Asst Dir HR	sandi.edwards@maderacounty.com	559-675-7705	Madera County
Chenecua Dixon Director of HR	chenecua.dixon@maderacounty.com	559 675-7705	Madera County
Lanie Sunderman	lanie@yosemitethisyear.com	559-760-1372	VYMC
Raeanne Jain	raeanne.jain@maderacounty.com	559 675 7845	DSS
Yvette Cramer Exec Assistant to CAO	Yvettegmar@maderacounty.com	675-7703	Admin
Laura Uribe	Left		
Doug Plitt/Operations Project Mgr	doug.plitt@usace.army.mil	559-831-7021	USACE
Jeannie Habben/Dep Dir WNR	jeannie.habben@maderacounty.com	559-598-0421	Water & Natural Resources
Felix Castro/Marine Coord Fire Ecology	Felix.Castro@noaa.gov	559-584-0583	NOAA/NWS Hanford
JAMIE HICKMAN	JHICKMAN@MADERA.COM		CITY OF MADERA
JOHN BOTWRIGHT	jbotwright@madera.gov		CITY OF MADERA
Ashley Monk	ashley.monk@maderca.com	559 675 7841	DSS

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #4: Mitigation Strategy Meeting: Actions and Projects
September 25, 2025 (9:00-12:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Rusty Lantzberger Ag Comm	rusty-lantzberger@madera.co.ca	559-675-7876	Ag Comm Madera Co.
Tamera Salem	tsalem@cvirc.org		CVIRC
Regina Garza	rgarza@lozanosmith.com	559 431-5600	County Counsel
Annette Rogers	Arogers@cvirc.org	559-558-8814	CVIRC

A.7 HMPC #5: Final HMPC Meeting

A.7.1. Final HMPC Meeting Invite (Internal County)

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Wednesday, February 11, 2026 7:30 AM
To: Ana Velasquez <AVelasquez@maderacounty.com>; Amalia Hernandez <AHernandez@maderacounty.com>; Amy Toler <amy.toler@maderacounty.com>; Amy Ybarra <Amy.Ybarra@maderacounty.com>; Andrea Saldate, MBA <Andrea.Saldate@maderacounty.com>; Annette Ybarra <Annette.Ybarra@maderacounty.com>; Ashley Monk <Ashley.Monk@maderacounty.com>; Brett Frazier <Brett.Frazier@maderacounty.com>; Brian Gamble <brian.gamble@maderacounty.com>; Brooke Bergman <Brooke.Bergman@maderacounty.com>; Chenecua Dixon <Chenecua.Dixon@maderacounty.com>; Chris Childers <cchilders@maderacounty.com>; Chris L. Rodriguez <clrodriguez@maderacounty.com>; Darin McCandless <darin.mccandless@maderacounty.com>; David Richstone <David.Richstone@maderacounty.com>; Deborah Martinez <deborah.martinez@maderacounty.com>; Deseri Ornelas <dornelas@maderacounty.com>; Dexter Marr <DMarr@maderacounty.com>; Dominic Tyburski, P.E., MPA <Dominic.Tyburski@maderacounty.com>; Geraldine Lakey <Geraldine.Lakey@maderacounty.com>; Jacqueline Torres <Jacqueline.Torres@maderacounty.com>; Jamie Bax <Jamie.Bax@maderacounty.com>; Jared Carter <jcarter@maderacounty.com>; Jason Blanks <Jason.Blanks@maderacounty.com>; Jason Clark <jclark@maderacounty.com>; Jason Yang <Jason.Yang@maderacounty.com>; Jeannie Habben <Jeaninne.Habben@maderacounty.com>; Jennipher Garcia <jennipher.garcia@maderacounty.com>; Joel Bugay <Joel.Bugay@maderacounty.com>; Joey Nunes, M.A. <Joey.Nunes@maderacounty.com>; Joshua Christopherson <Josh.Christopherson@maderacounty.com>; Juan Witrago <Juan.Witrago@maderacounty.com>; Julia Pineda <Julia.Pineda@maderacounty.com>; Justin Macomb (out) <Justin.macomb@fire.ca.gov>; Justin White <justin.white@maderacounty.com>; Karen Scrivner <Karen.Scrivner@maderacounty.com>; Kenneth Shirley Jr <Kenneth.ShirleyJr@maderacounty.com>; Krista Riggs <Krista.Riggs@maderacounty.com>; Madeleine Magana <Madeleine.Magana@maderacounty.com>; Maria Knobloch <Maria.Knobloch@maderacounty.com>; Marizela Terkildsen <marizela.terkildsen@maderacounty.com>; Matt Skolnik <Matthew.Skolnik@maderacounty.com>; Matthew Treber <matthew.treber@maderacounty.com>; Mattie Mendez (out) <mmendez@maderacap.org>; Mee Wang <mee.wang@maderacounty.com>; Melisa DaSilva <melisa.dasilva@maderacounty.com>; Melody Viscara-Kellar <mkellar@maderacounty.com>; Mika Flores <Mika.Flores@maderacounty.com>; Minh Nguyen <Minh.Nguyen@maderacounty.com>; Monica Roath <monica.roath@maderacounty.com>; Nick Salinas <Nicholas.Salinas@maderacounty.com>; Odalys Ortiz <Odalys.Ortiz@maderacounty.com>; Omar Molina <omar.molina@maderacounty.com>; Philip Toler <philip.toler@maderacounty.com>; Randip Khangura <Randip.Khangura@maderacounty.com>; Regina Garza (out) <rgarza@lozanosmith.com>; Richard Jitsumyo <richard.jitsumyo@maderacounty.com>; Robert Blehm <robert.blehm@maderacounty.com>; Roman Noriega <Roman.Noriega@maderacounty.com>; Rusty Lantsberger <Rusty.Lantsberger@maderacounty.com>; Sally O. Moreno <Sally.Moreno@maderacounty.com>; Sandi Edwards <Sandi.Edwards@maderacounty.com>; sandra.mendez@maderacounty.com; Sara Bosse <Sara.Bosse@maderacounty.com>; Sarah Honeycutt <sarah.honeycutt@maderacounty.com>; Shane Gray <Shane.Gray@maderacounty.com>; Simon Paul, M.D. <Simon.Paul@maderacounty.com>; Stephanie Anagnoson <stephanie.anagnoson@maderacounty.com>; Terrance Carter <terrance.carter@maderacounty.com>; Tharen Higginbotham <Tharen.Higginbotham@maderacounty.com>; Tracy Kennedy <TKennedy@maderacounty.com>; Trini Aleman <Trini.Aleman@maderacounty.com>; Victoria Cantu <Victoria.Cantu@maderacounty.com>; Yvette Gomez <yvette.gomez@maderacounty.com>; Zack Zamudio <zzamudio@maderacounty.com>; Larry Pendarvis (Out) <Larry.pendarvis@fire.ca.gov>; Eric Palmer <eric.palmer@fire.ca.gov>

Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>; Tyson J. Pogue <tpogue@maderacounty.com>; Brian Esteves, MS <Brian.Esteves@maderacounty.com>; Jason Clark <jclark@maderacounty.com>; Ryan Videgain <ryan.videgain@maderacounty.com>
Subject: Local Hazard Mitigation Plan - Final Meeting

Good Afternoon,

Thank you to those who provided comments and feedback on the draft plan.

We are now at the public comment phase of the project.

There will be two meetings this month. Public Meeting on Wednesday, February 18th 2026, from 5:30 pm to 7 pm and Hazard Mitigation Planning Committee (HMPC) on Thursday, February 19th, from 9 am to 12 pm.

At the Wednesday meeting, the focus will be on receiving public comment. This meeting will be at 5:30 pm at the Sheriff's Headquarters (2725 Falcon Drive, Madera, CA 93637) in the County Emergency Operations Center. Key Staff will be on hand to take public comment and interact with the community.

We will be posting this information on social media and in the newspapers. We would appreciate it if you could share this information with your circles to get the word out. I have attached the flyers for the meetings.

Copies of the plan are available for download at:
https://www.maderacounty.com/government/sheriff/office-of-emergency-services/lhmp-2026-1718

Due to the size of the document, we have provided printed reference drafts at the County Libraries listed below.

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Chowchilla Branch Library - 300 Kings Avenue, Chowchilla, CA 93610 – 559-665-2630
Madera Ranchos Branch Library - 37398 Berkshire Drive, Madera, CA 93636 – 559-645-1214
North Fork Branch Library - 32908 Road 222, North Fork, CA 93643 - 559-877-2387
Oakhurst Branch Library - 49044 Civic Circle Drive, Oakhurst, CA 93644 – 559-683-4838
We welcome any comments on the plan. The public can email, mail or come to the meeting to provide comments.

- Email comments to jeanine.foster@fostermorrison.com or jwilder@maderacounty.com

- Drop off written comments or send by mail to: Madera County Sheriff's Office, Office of Emergency Services, Attn. Sergeant Joseph Wilder, 2725 Falcon Drive, Madera, CA 93637
- Bring comments to the final Public or HMPC meetings

At the meeting on Thursday, we will review the public comments received on Wednesday, as well as any written comments.

Those who participated on the Planning Committee are encouraged to attend the Thursday meeting to address any written comments received. During this meeting, we will address any questions from the HMPC and make any necessary changes to the draft.

Public Comment will be open until February 27th, 2026. There may be a chance that public comment is received after these meetings, and staff may need to reach out to you regarding it.

I have attached the agendas for both meetings as well.

If you have any questions, please feel free to reach out to Jeanine (jeanine.foster@fostermorrison.com) or me.

Again, thank you for your participation in this process.

Thanks,

JW

Joseph Wilder | Sergeant/OES & SAR Coordinator - OES
MADERA COUNTY SHERIFF'S OFFICE
2725 Falcon Drive, Madera, CA 93637
Office: (559) 675-7770

A.7.2. Final HMPC Meeting Invite (External Stakeholders)

From: Joseph Wilder <jwilder@maderacounty.com>
Sent: Tuesday, February 10, 2026 7:33 PM
To: adhcofmadera@gmail.com; Sandy Morehouse <sandy.morehouse2@redcross.org>; Tiffany Covell <tiffany.covell@redcross.org>; Sandy Morehouse <sandy.morehouse2@redcross.org>; arcfresno@arcfresno.org; chamber@basslakechamber.com; mtownsend@basslakesd.org; Macomb@fire.ca.gov; Andrew Overbay (out) <Andrew.overbay@fire.ca.gov>; Anthony Garcia (Out) <Anthony.garcia@fire.ca.gov>; Chris Reneau <chris.reneau@fire.ca.gov>; Justin.demeusy@amwater.com; Chris Albanese <calbanese@chp.ca.gov>; Jones, BJ@CalOES <bj.jones@caloes.ca.gov>; Lindsey Standley <Lindsey.Stanley@CalOES.ca.gov>; Scribner, Curtis A@DOT <curtis.scribner@dot.ca.gov>; Orozco, Patti@CalOES <patti.orozco@caloes.ca.gov>; Adam Wimberly <adam.wimberly@dot.ca.gov>; bart.zahourek@dot.ca.gov; sgutierrez@camarenahealth.org; gmejia@camarenahealth.org; gorbaker@camarenahealth.org; GGonzalez@ccdof.org; Kathleen.Ratliff@cdcr.ca.gov; Daniel Turner <daniel.turner@cdcr.ca.gov>; Daniel Turner <daniel.turner@cdcr.ca.gov>; Curtis Jack <cjack@fresnocountyca.gov>; Dan Lynch <dlynch@fresnocountyca.gov>; tmcknight@cvrc.org; arogers@cvrc.org; aolson@cvrc.org; ChowchillaChamber@gmail.com; jnino@mychawanakee.org; nvonflue@mychawanakee.org; worrellm@chowkids.com; collinsd@chowkids.com; collinsd@chowkids.com; gene@chowchillafair.org; sturner@cityofchowchilla.org; Jim@chowchillafair.org; Chad Middleton <cmiddletoncdmh@hotmail.com>; CJFloresCDMH@aol.com; cdenny@cityofchowchilla.org; Jeffrey Palmer <jpalmer@cityofchowchilla.org>; Ssilvacmhd@yahoo.com; millerj@chowchillahigh.org; StocktonR@chowchillahigh.org; Brandon Tomlinson <btomlinson@cwdwater.com>; millerj@chowchillahigh.org; Michael Wynn <mwynn@chukchansi-nsn.gov>; nlambert@chukchansi-nsn.gov; chamber@coarsegoldchamberofcommerce.com; Jon Cottington <jon.cottington@crcd.org>; nalvarez@maderacap.org; Mattie Mendez (out) <mmendez@maderacap.org>; logan@ccchowchilla.com; CR@ccchowchilla.com; glen.gamueda@davita.com; Michelleb@dhhsc.org; angelicamb@dhhsc.org; Eastern Madera County Fire Safe Council <info@easternmaderacountyfiresafecouncil.com>; Barnes, Morgan J CIV USARMY CESPK (USA) <morgan.j.barnes@usace.army.mil>; Vortiz@Fairmead.org; Bnelson@fairmead.org; chad.cbc@gmail.com; tmejorado <tmejorado@fresnocountyca.gov>; Curtis Jack <cjack@fresnocountyca.gov>; Dan Lynch <dlynch@fresnocountyca.gov>; Hbennett@fmaaa.org; Sumandeep.gill@goldenmaderahc.com; joy.trapanese@goldenmaderahc.com; khatch@gvusd.org; Graciela Valdez <Graciela.Valdez@maderacounty.com>; Richardson, Carrie A CIV USARMY CESPK (USA) <carrie.richardson@usace.army.mil>; Plitt, Douglas R CIV USARMY CESPK (USA) <doug.plitt@usace.army.mil>; Istratigos@hindshospice.org; Imoolchan@hindshospice.org; dviloria@hindshospice.org; Marissa.Honnette@JerichoCare.com; parksc@kerncounty.com; Georgianna Armstrong <garmstrong@kerncountyfire.org>; Valencia, Abraham <abraham.valencia@co.kings.ca.us>; Shane Swartz <shane.swartz.lsjld@gmail.com>; Shane@LSJLD.org; mfernandez@cgafresno.com; jwilliams@cgafresno.com; angel.reyna@maderacollege.edu; msmithwagner@maderahospital.org; tdavis@maderahospital.org; avelarde@maderahospital.org; hchahal@maderahospital.org; rmcwherter.maderafoodbank@gmail.com; Jvestal@maderamosq.com; cmassetti@mcsos.org; Kim Linderholm <klinderholm@maderacoe.us>; mverduzco@mesos.org; Jeasarez@mcsos.org; tgreci@madera-id.org; Rosa.valles@innovativerenal.com; antonette.benitez@innovativerenal.com; l.leach@maderavwcc.com; Giachino Chiaramonte <gchiaramonte@madera.gov>; Emelyn.Reyes@maderahcc.com; toddlile@maderausd.org; robertshill@maderausd.org; Raquel Sandoval <rsandoval@mariposacounty.org>; AMARAL, ADAM <adam.amaral@countyofmerced.com>; oes@monosheriff.org; Felix Castro - NOAA Federal <felix.castro@noaa.gov>; northforkchamberofcommerce@gmail.com; Lance Fink <lfink@northforkrancheria-nsn.gov>; daguayo@nfr-nsn.gov; lbeihn@nfr-nsn.gov; apomona@nfr-nsn.gov; emcdonald@nfr-nsn.gov;

nlambert@chukchansi-nsn.gov; chamber@coarsegoldchamberofcommerce.com; Jon Cottington <jon.cottington@crcd.org>; nalvarez@maderacap.org; Mattie Mendez (out) <mmendez@maderacap.org>; logan@ccchowchilla.com; CR@ccchowchilla.com; glen.gamueda@davita.com; Michelleb@dhhsc.org; angelicamb@dhhsc.org; Eastern Madera County Fire Safe Council <info@easternmaderacountyfiresafecouncil.com>; Barnes, Morgan J CIV USARMY CESPK (USA) <morgan.j.barnes@usace.army.mil>; Vortiz@Fairmead.org; Bnelson@fairmead.org; chad.cbc@gmail.com; tmejorado <tmejorado@fresnocountyca.gov>; Curtis Jack <cjack@fresnocountyca.gov>; Dan Lynch <dlynch@fresnocountyca.gov>; Hbennett@fmaaa.org; Sumandeep.gill@goldenmaderahc.com; joy.trapanese@goldenmaderahc.com; khatch@gvusd.org; Graciela Valdez <Graciela.Valdez@maderacounty.com>; Richardson, Carrie A CIV USARMY CESPK (USA) <carrie.richardson@usace.army.mil>; Plitt, Douglas R CIV USARMY CESPK (USA) <doug.plitt@usace.army.mil>; Istratigos@hindshospice.org; Imoolchan@hindshospice.org; dviloria@hindshospice.org; Marissa.Honnette@JerichoCare.com; parksc@kerncounty.com; Georgianna Armstrong <garmstrong@kerncountyfire.org>; Valencia, Abraham <abraham.valencia@co.kings.ca.us>; Shane Swartz <shane.swartz.lsjld@gmail.com>; Shane@LSJLD.org; mfernandez@cgafresno.com; jwilliams@cgafresno.com; angel.reyna@maderacollege.edu; msmithwagner@maderahospital.org; tdavis@maderahospital.org; avelarde@maderahospital.org; hchahal@maderahospital.org; rmcwherter.maderafoodbank@gmail.com; Jvestal@maderamosq.com; cmassetti@mcsos.org; Kim Linderholm <klinderholm@maderacoe.us>; mverduzco@mesos.org; Jeasarez@mcsos.org; tgreci@madera-id.org; Rosa.valles@innovativerenal.com; antonette.benitez@innovativerenal.com; l.leach@maderavwcc.com; Giachino Chiaramonte <gchiaramonte@madera.gov>; Emelyn.Reyes@maderahcc.com; toddlile@maderausd.org; robertshill@maderausd.org; Raquel Sandoval <rsandoval@mariposacounty.org>; AMARAL, ADAM <adam.amaral@countyofmerced.com>; oes@monosheriff.org; Felix Castro - NOAA Federal <felix.castro@noaa.gov>; northforkchamberofcommerce@gmail.com; Lance Fink <lfink@northforkrancheria-nsn.gov>; daguayo@nfr-nsn.gov; lbeihn@nfr-nsn.gov; apomona@nfr-nsn.gov; emcdonald@nfr-nsn.gov; fbeihn@nfr-nsn.gov; chamber@oakhurstchamber.com; Darin Soukup <darin.soukup@maderacollege.edu>; anne-marie.louissaint@oakhursthellc.com; meagan@ohrestar.com; noemi@ohrestar.com; dkmy@pge.com; administrator@palmscarecenter.org; lance@pistoresiambulance.com; rick@pistoresiambulance.com; ted@pistoresiambulance.com; gpirie@pistoresiambulance.com; sjvapcd@valleyair.org; Aaron Sundstrom <aaron.sundstrom@sierraambulance.org>; Dan Rule <danr@stcg.net>; brian.thoburn@sce.com; Pastor1227@sbcglobal.net; thegoldenyearscarehome@gmall.com; dcontreras@uwfm.org; rgonzalez@usbr.gov; daniel.tune@usda.gov; antonio.cabrera@usda.gov; rene.villanueva@usda.gov; bill.mccullough@usda.gov; sbussean@valleycrc.org; Ashley Ave <aave@valleychildrens.org>; Mary Jo Quintero <mquintero@valleychildrens.org>; cupdegraff@valleychildrens.org; Heather.betts@cdcr.ca.gov; Rhonda@YosemiteThisYear.com; Lanie Suderman <lanie@yosemitethisyear.com>; bbeck@yosemiteusd.org; Whitney Lecat <whitney.lecat@crcd.org>; Morgan.Leon@countyofmerced.com; tprotzman@mcsos.org; Erin Capuchino <ecapuchino@ysrcandd.org>; 'Fred Gaumnitz' <fgaumnitz@cityofchowchilla.org>; Wendy Silva <wsilva@madera.gov>
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>
Subject: Local Hazard Mitigation Plan - Final Meeting - Stakeholders

Good Afternoon,

Thank you to those who provided comments and feedback on the draft plan.

We are now at the public comment phase of the project.

There will be two meetings this month. Public Meeting on Wednesday, February 18th 2026, from 5:30 pm to 7 pm and Hazard Mitigation Planning Committee (HMPC) on Thursday, February 19th, from 9 am to 12 pm.

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We welcome any comments on the plan. The public can email, mail or come to the meeting to provide comments.

- Email comments to jeanine.foster@fostermorrison.com or jwilder@maderacounty.com
- Drop off written comments or send by mail to: Madera County Sheriff's Office, Office of Emergency Services, Attn. Sergeant Joseph Wilder, 2725 Falcon Drive, Madera, CA 93637
- Bring comments to the final Public or HMPC meetings

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I have attached the agendas for both meetings as well.

If you have any questions, please feel free to reach out to Jeanine (jeanine.foster@fostermorrison.com) or me.

Again, thank you for your participation in this process.

Thanks,

JW

Joseph Wilder | Sergeant/OES & SAR Coordinator - OES
MADERA COUNTY SHERIFF'S OFFICE
2725 Falcon Drive, Madera, CA 93637
Office: (559) 675-7770

A.7.3. HMPC #5: Final HMPC Meeting Agenda

AGENDA

MADERA COUNTY
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
Hazard Mitigation Planning Committee (HMPC)
Final Meeting #5

Thursday, February 19, 2026
9:00 am - 12:00 pm
Sheriff's Office Emergency Operations Center
2725 Falcon Drive
Madera, CA 93637

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1. Introductions
2. Status of the LHMP Planning Process
3. Addressing Public Comments
4. Final Planning Committee Input/Outstanding Items
5. Summary of Changes in Madera Planning Area Hazard Vulnerabilities/ Mitigation Priorities
6. Final Steps
7. Questions?

A.7.4. HMPC #5: Final Meeting Sign In Sheets

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #5: Final Meeting – Draft Plan
February 19, 2026 (9:00-12:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Arnoldo Rodriguez	arodriguez@madera.gov	871.9113	City of Madera
Keith Helmuth	khelmuth@madera.gov	661-5418	" "
Andrew Ownby	andrew.ownby@fire.ca.gov	580 0264	CAL FIRE
Fred Gaumnitz	fgaumnitz@cityofchowchilla.org	209-489-9693	Chowchilla Fire
HARDISH GANDHI	hgandhi@madera.gov	7802013021	PW (City of Madera)
Patti Orozco	Patti.orozco@caloes.ca.gov	916.807 5361	Cal OES
LACEY PENDARVIS	LACEY.PENDARVIS@FIRE.CA.GOV	559 358-7113	CAL FIRE
WILL TACKETT	wtackett@cityofmadera.gov	(559) 661-5451	City of Madera
JOSEPH WILDER	JWILDER@MADERACOUNTY.com	559-675-7770	SHERIFF/OES

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #5: Final Meeting – Draft Plan
February 19, 2026 (9:00-12:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Laura Unti			Citizen
David Fiddlin	Dave.Ficklin@gmail.com	650 868 9707	Citizen
Ashley Monk	ashley.monk@maderacounty.com	559 675 7841	DSS
Terrance Carter	terrance.carter@maderacounty.com	559 505 3486	Public Health
Eric Battles	ebattles@madera.gov	559-661-5417	City of Madera
Whitney Lecat	whitney.lecat@crcd.org	559-430-4048	Coarsegoldrcd
Christina Soares	csoares@cityofchowchilla.org	559-665-8615ext308	City of Chowchilla
Carrie Richardson	Carrie.Richardson@usace.army.mil	559 689 3255	USACE - Buchanan Dam
Douglas R. Plitt	doug.plitt@usace.army.mil	559-831-7021	USACE - Hidden Dam
Wendy Silva	wsilva@madera.gov	559 661 5481	City of Madera HR/Risk
KAREN SCRIVNER	Karen.Scrivner@maderacounty.com	559. 977. 5115	County of Madera

A.8 Public Involvement

A.8.1. Public Meeting #1: Press Release

Madera County
2026 Local Hazard Mitigation Plan Update
PRESS RELEASE: PROJECT ANNOUNCEMENT & UPCOMING MEETINGS

Get Involved!

HELP YOUR COMMUNITY BE HAZARD-READY!

Madera County, CA: Madera County is partnering with the incorporated communities of Chowchilla and Madera to update their 2018 Local Hazard Mitigation Plan (LHMP). Floods, drought, wildfires, and severe weather are just a few of the hazards of concern to Madera County. While natural hazards such as these cannot be prevented, an LHMP forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding.

You are invited. We encourage the public and all interested stakeholders to attend and participate in our upcoming project kickoff meetings. An initial Public Meeting will explain the LHMP development process, the benefits of hazard mitigation planning, and how you can be involved. In addition, Hazard Mitigation Planning Committee (HMPC) Meetings to develop the plan with participating jurisdictions and other stakeholders are open to the public. Please select the time that works best for you.

HMPC Meeting
April 22 (Tuesday) 1:00 – 4:00 pm

Public Meeting
April 22 (Tuesday) 5:30 – 7:00 pm

Both meetings will be held at the: **Sheriff's Office Emergency Operation Center, 2725 Falcon Drive, Madera, CA 93644**

For more information on this project, please visit: LHMP 2026 | Madera County. You may also contact Sergeant Joseph Wilder at (559) 675-7770 or email at jwilder@maderacounty.com.

" " "

A.8.2. Public Meeting #1: Facebook Post on Madera County Facebook Page

Madera County Sheriff's Office's Post

Madera County Sheriff's Office
April 22, 2025 ·

Local Hazard Mitigation Plan Update Meeting

This afternoon, the Madera County Sheriff's Office of Emergency Services hosted the LHMP Update kickoff meeting, which is the first step in the important process of updating Madera County's Local Hazard Mitigation Plan. This plan is more than a box to check—it's a proactive tool that helps us identify and reduce risks before a disaster occurs.

With our partners in the Cities of Madera and Chowchilla, and the support of Foster Morrison Consulting, we'll be working to ensure this plan reflects the real hazards we face and the strategies we need in place to protect our residents, infrastructure, and public safety operations.

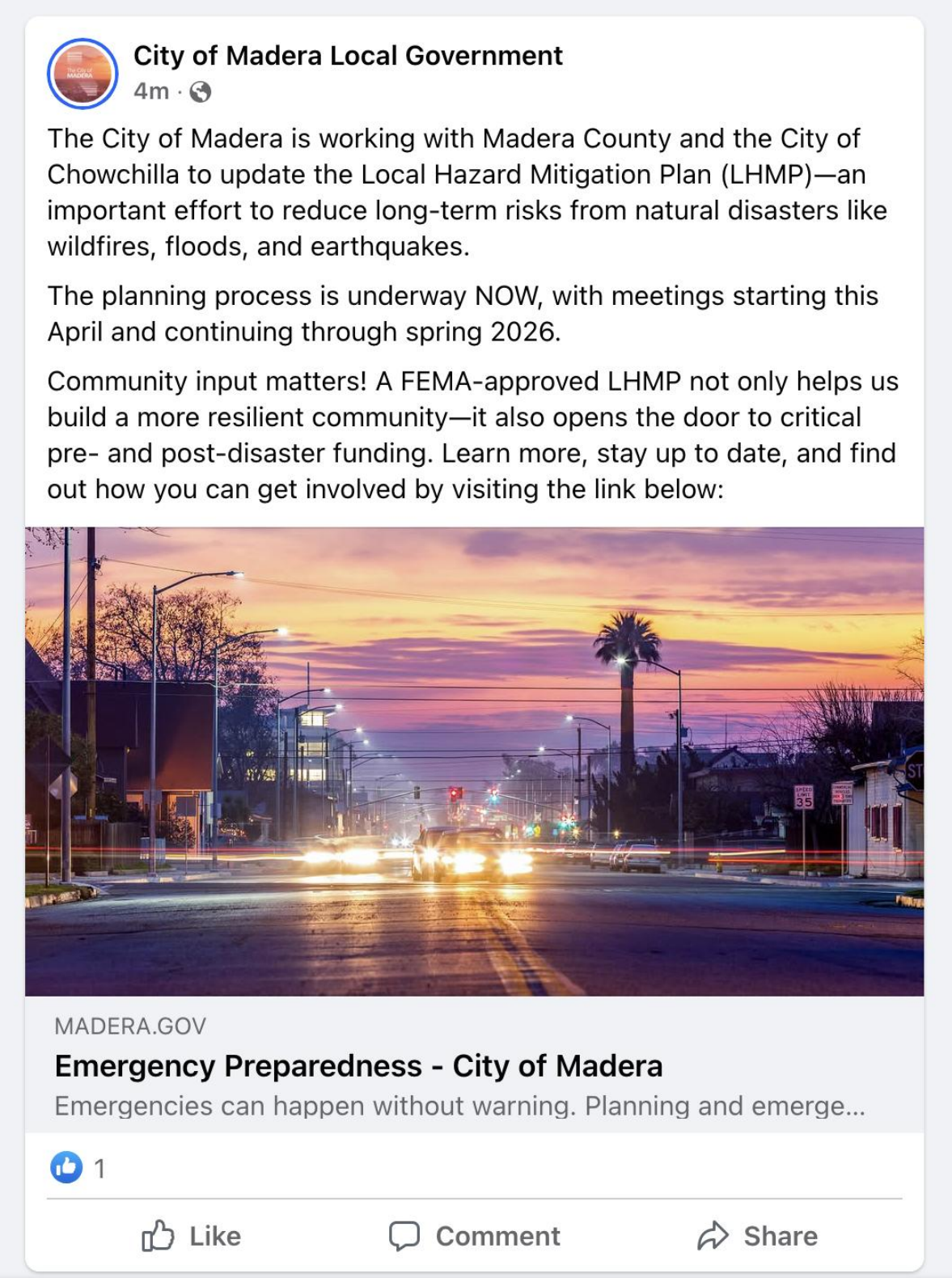
📣You are invited! We encourage the public and all interested stakeholders to attend and participate in our project kickoff meeting, which will review the LHMP development process, the benefits of hazard mitigation planning, and how you can be involved.

Public Meeting- TONIGHT
April 22 (Tuesday) 5:30 – 7:00 pm
Madera County Sheriff's Office
Emergency Operation Center
2725 Falcon Drive, Madera, CA 93644

For more information on this project, please visit: https://www.maderacounty.com/.../office-of.../lhmp-2026-1718

You may also contact Sergeant Joseph Wilder at (559) 675-7770 or email at jwilder@maderacounty.com

A.8.3. Public Meeting #1: Facebook Post on City of Madera Facebook Page



A.8.4. Public Meeting Outreach Flyer for Project Kickoff Meeting

Help Reduce Disaster Losses in Your Community by Participating in the Madera County 2026 Local Hazard Mitigation Plan Update

Madera County is developing a Local Hazard Mitigation Plan (LHMP) Update to their 2018 plan. The purpose of the 2026 LHMP Update is to assess risk to natural hazards, implement actions to reduce future losses, and maintain eligibility for federal mitigation grant funding in accordance with the Disaster Mitigation Act of 2000. Partners in this planning effort include the Cities of Chowchilla and Madera.

What is Hazard Mitigation?

Hazard mitigation means any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.

Why is Hazard Mitigation Important?

Most people who live or work in Madera County have been affected by natural hazards in one way or another. Madera County and its residents are vulnerable to a variety of hazards including floods, drought, wildfire, and other severe weather events.

Rising costs associated with disaster response and recovery have focused the attention of federal, state, and local government officials on addressing natural hazards before they occur. For example, torrential rains and floods cannot always be prevented from occurring. Planning for natural hazards and implementing hazard mitigation and risk reduction measures, however, can reduce the impact of such events when they do occur. Emergency response and recovery costs; property damage; personal injury and loss of life; and the overall economic and social impact on the community can all be reduced, and in some instances eliminated through natural hazard mitigation.

2026 Local Hazard Mitigation Plan and Plan Update Process

Madera County, partnering with the Cities of Chowchilla and Madera, is leading the effort to develop an update to their 2018 LHMP. The 2026 LHMP Update is being developed by a Hazard Mitigation Planning Committee (HMPC) comprised of representatives from various County and City departments; Districts; neighboring jurisdictions; key federal, state, and local agency stakeholders; and the public.

The plan will be developed to meet new FEMA LHMP guidance (effective April 2023) and will address an updated list of hazards and assess the likely risk and vulnerability of these hazards to the people and assets of the Madera County planning area. This will involve establishing an

updated mitigation strategy designed to reduce the impacts of future disasters on people and property, critical facilities and infrastructure, and the environment as well as to the local economy.

Opportunities for Input

Members of the community have a very important role in this process. Several planning committee and public meetings will be held over the next year. A draft of the 2026 Madera County LHMP Update will be available winter of 2026 for review and comment by the public and all interested stakeholders on the County LHMP website at: LHMP 2026 | Madera County and in hard copy form in select public locations to be announced. A public meeting on the Draft Plan and a final planning committee meeting will also occur in spring of 2026. All interested stakeholders and members of the public are encouraged to attend the planning committee and public meetings.

For more information on this project, please contact the following individuals:

Madera County	City of Chowchilla	City of Madera
Sergeant Joseph Wilder Madera County Sheriff's Office of Emergency Services (559) 675-7770 jwilder@maderacounty.com	Fred Gaumnitz Fire Chief, City of Chowchilla (559) 665-8626 fgaumnitz@cityofchowchilla.org	Wendy Silva Director of Human Resources (559) 661.5481 wsilva@madera.gov

A.8.5. Public Meeting #1: Public Agenda

AGENDA

MADERA COUNTY
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
Public Kickoff Meeting #1

Tuesday April 22, 2025
5:30 - 7:00 pm
Sheriff's Office Emergency Operations Center
2725 Falcon Drive
Madera, CA 93637

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1. Introductions
2. Hazard Mitigation & the Disaster Mitigation Act Planning Requirements
3. LHMP Update Schedule
4. Hazard Identification
5. Questions?

A.8.6. Public Meeting #1: Public Sign in Sheet

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
Public Meeting #1: Kickoff Meeting
April 22, 2025 (5:30-7:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Aaron Olson Director	aolson@cvrc.org	559.276.4359	CVRC

A.8.7. Public Meeting #2 Press Release Risk Assessment Meetings

Madera County
2026 Local Hazard Mitigation Plan Update
PRESS RELEASE: RISK ASSESSMENT MEETINGS

Get Involved!

HELP YOUR COMMUNITY BE HAZARD-READY!

Madera County, CA: Madera County is partnering with the incorporated communities of Chowchilla and Madera to update their 2018 Local Hazard Mitigation Plan (LHMP). Floods, drought, wildfires, and severe weather are just a few of the hazards of concern to Madera County. While natural hazards such as these cannot be prevented, an LHMP forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding and are better positioned to respond and recover when disasters do occur.

You are invited. Members of the Public and all interested stakeholders are encouraged to attend and participate in the upcoming risk assessment meetings. During these meetings we will be sharing the risk assessment data developed to date and are looking for your feedback in refining and adding to the in-process risk assessment. Please select the time that works best for you.

HMPC Meeting
July 9 (Wednesday) 1:00 – 4:00 pm

Public Meeting
July 9 (Wednesday) 5:30 – 7:00 pm

Both meetings will be held at the: **Sheriff's Office Emergency Operation Center, 2725 Falcon Drive, Madera, CA 93644**

For more information on this project, please visit: LHMP 2026 | Madera County. You may also contact Sergeant Joseph Wilder at (559) 675-7770 or email at jwilder@maderacounty.com.

###

A.8.8. Public Meeting #2 July 7, Sherriff's Office Facebook post

Madera County Sheriff's Office's Post

Madera County Sheriff's Office
July 7, 2025 ·

HELP YOUR COMMUNITY BE HAZARD-READY!

The Madera County Office of Emergency Services is requesting the community's participation in updating our 2018 Local Hazard Mitigation Plan (LHMP). Floods, drought, wildfires, and severe weather are just a few of the hazards of concern to Madera County. While natural hazards such as these cannot be prevented, a LHMP forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding.

🗣️ You are invited! We encourage the public and all interested stakeholders to attend and participate in our upcoming project kickoff meetings. An initial Public Meeting will explain the LHMP development process, the benefits of hazard mitigation planning, and how you can be involved. In addition, Hazard Mitigation Planning Committee (HMPC) Meetings to develop the plan with participating jurisdictions and other stakeholders are open to the public. Please select the time that works best for you.

HMPC Meeting
July 9th (Wednesday) - 1:00pm to 4:00pm

Public Meeting
July 9th (Wednesday) - 5:30pm to 7:00pm

📍Both meetings will be held at:
Madera County Sheriff's Office
Emergency Operation Center
2725 Falcon Drive, Madera, CA 93644

For more information on this project, please visit: https://www.maderacounty.com/.../office-of.../lhmp-2026-1718

You may also contact Sergeant Joseph Wilder at (559) 675-7770 or email at jwilder@maderacounty.com

A.8.9. Public Meeting #2 Agenda

AGENDA

MADERA COUNTY
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
Public Risk Assessment Meeting #2

Wednesday, July 9, 2025
5:30 - 7:00 pm
Sheriff's Office Emergency Operations Center
2725 Falcon Drive
Madera, CA 93637

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1. Introduction
2. Status of the Disaster Mitigation Act Planning Process
3. Review of Risk Assessment (PowerPoint)
4. Open Discussion and Input on the Risk Assessment
5. Next Steps
6. Questions?

A.8.10. Public Meeting #2 Sign in Sheet

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
Public Meeting #2: Risk Assessment Meeting
July 9, 2025 (5:30-7:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Dave Ficklin	Dave.Ficklin@gmail.com	650 868 9707	SAR
Laura Ficklin	LAficklin@sbcglobal.net		SAR
JOSEPH WILDER	JWILDER@MADERACOUNTY.COM	559-675-7770	MADERA S.O.

A.8.11. Public Meeting #3 – Press Release

Madera County
2026 Local Hazard Mitigation Plan Update
PRESS RELEASE: PUBLIC REVIEW DRAFT AND FINAL MEETINGS

HELP YOUR COMMUNITY BE HAZARD-READY!

Madera County, CA: Madera County is partnering with the incorporated communities of Chowchilla and Madera to update their 2018 Local Hazard Mitigation Plan (LHMP). Floods, drought, wildfires, and severe weather are just a few of the hazards of concern to Madera County. While natural hazards such as these cannot be prevented, an LHMP forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding.

The process began in March 2025 with the establishment of a Hazard Mitigation Planning Committee (HMPC) comprising County, City, and jurisdictional staff, as well as key agency and public stakeholders. The LHMP Update is scheduled to be finalized and submitted to Cal OES and FEMA in March 2026.

Public Review Draft

The 2026 LHMP Public Review Draft is available online at: LHMP 2026 | Madera County. It is also available in printed form at several locations identified on the Madera County LHMP webpage, including LHMP 2026 | Madera County.

Open Public and Planning Committee Meetings

Final public and planning committee meetings are being held to review and provide comments on the Public Review Draft LHMP as follows:

Public Meeting	**HMPC Meeting**
February 18 (Wednesday) 5:30 – 7:00 pm	**February 19 (Thursday) 9:00 am – 12:00 pm**

Both meetings will be held at the **Madera County Sheriff's Office Emergency Operations Center, 2725 Falcon Drive, Madera, CA 93637**

All interested stakeholders and members of the public are encouraged to attend either of these meetings.

Comments on the LHMP Public Review Draft (Due by February 27, 2026)

There are several options for providing comments on the LHMP Public Review Draft:

- **Email comments to jeanine.foster@fostermorrison.com or jwilder@maderacounty.com**
- **Drop off written comments or send by mail to: Madera County Sheriff's Office, Office of Emergency Services, Attn. Sergeant Joseph Wilder, 2725 Falcon Drive, Madera, CA 93637**
- **Bring comments to either the Public or HMPC meetings**

For more information on this project, please visit: LHMP 2026 | Madera County. You may also contact Sergeant Joseph Wilder at (559) 675-7770 or email at jwilder@maderacounty.com.

###

A.8.12. Public Meeting #3 – Public Outreach Flyer

Help Reduce Disaster Losses in Your Community by Participating in the Madera County 2026 Local Hazard Mitigation Plan Update

Madera County is developing a Local Hazard Mitigation Plan (LHMP) Update to their 2018 plan. The purpose of the 2026 LHMP Update is to assess risk to natural hazards, implement actions to reduce future losses, and maintain eligibility for federal mitigation grant funding in accordance with the Disaster Mitigation Act of 2000. Partners in this planning effort include the Cities of Chowchilla and Madera.

What is Hazard Mitigation?

Hazard mitigation means any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.

Why is Hazard Mitigation Important?

Most people who live or work in Madera County have been affected by natural hazards in some way. Madera County and its residents are vulnerable to a variety of hazards, including floods, drought, wildfire, and other severe weather events.

Rising costs associated with disaster response and recovery have focused the attention of federal, state, and local government officials on addressing natural hazards before they occur. For example, torrential rains and floods cannot always be prevented. Planning for natural hazards and implementing hazard mitigation and risk reduction measures, however, can reduce the impact of such events when they do occur. Emergency response and recovery costs, property damage, personal injury and loss of life, and the overall economic and social impact on the community can all be reduced, and in some instances eliminated, through natural hazard mitigation.

2026 Local Hazard Mitigation Plan and Plan Update Process

Madera County, partnering with the Cities of Chowchilla and Madera, is leading the effort to develop an update to their 2018 LHMP. The 2026 LHMP Update is being developed by a Hazard Mitigation Planning Committee (HMPC) comprised of representatives from various County and City departments, Districts, neighboring jurisdictions, key federal, state, and local agency stakeholders, and the public.

The plan will be developed to meet new FEMA LHMP guidance (effective April 2023) and will address an updated list of hazards and assess the likely risk and vulnerability of these hazards to the people and assets of the Madera County planning area. This will involve establishing an updated mitigation strategy designed to reduce the impacts of future disasters on people and property, critical facilities and infrastructure, and the environment, as well as on the local economy.

Opportunities for Input

Members of the community have a very important role in this process. A draft of the 2026 Madera County LHMP Update is available for review and comment by the public and all interested stakeholders on the Madera County LHMP webpage at: LHMP 2026 | Madera County. Printed copies of the LHMP will also be available at several public locations identified on the LHMP webpage: LHMP 2026 | Madera County.

Comments on the Public Review Draft (Final comments due by February 27, 2026)

There are several options for providing comments on the LHMP Public Review Draft:

- Email comments to jeanine.foster@fostermorrison.com or jwilder@maderacounty.com
- Drop off written comments or send by mail to: Madera County Sheriff's Office, Office of Emergency Services, Attn. Sergeant Joseph Wilder, 2725 Falcon Drive, Madera, CA 93637
- Bring comments to the final Public or HMPC meetings

Final Public and HMPC Meetings on the Public Review Draft LHMP

All interested stakeholders and members of the public are encouraged to attend either of these meetings.

Public Meeting
February 18 (Wednesday) 5:30-7:00 pm

HMPC Meeting
February 19 (Thursday) 9:00-12:00 pm

Both meetings will be held at the **Madera County Sheriff's Office Emergency Operations Center, 2725 Falcon Drive, Madera, CA 93637**

For more information on the project, visit: LHMP 2026 | Madera County or contact the following individuals:

Madera County	City of Chowchilla	City of Madera
Sergeant Joseph Wilder Madera County Sheriff's Office of Emergency Services (559) 675-7770 jwilder@maderacounty.com	Fred Gaumnitz Fire Chief, City of Chowchilla (559) 665-8626 fgaumnitz@cityofchowchilla.org	Wendy Silva Director of Human Resources (559) 661.5481 wsilva@madera.gov

A.8.13. Public Meeting #3 Invitation on the Draft Plan on Facebook on 2/10/2026

A.8.14. Public Meeting #3 Invitation on the Draft Plan In Madera Tribune on 2/14/2026

HELP YOUR COMMUNITY BE HAZARD-READY!

The Madera County Office of Emergency Services is requesting the community's participation in updating our 2018 Local Hazard Mitigation Plan (LHMP). Floods, drought, wildfires, and severe weather are just a few of the hazards of concern to Madera County. While natural hazards such as these cannot be prevented, a LHMP forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding.

The process began in March 2025 with the establishment of a Hazard Mitigation Planning Committee (HMPC) comprising County, City, and jurisdictional staff, as well as key agency and public stakeholders. The LHMP Update is scheduled to be finalized and submitted to Cal OES and FEMA in March 2026.

You are invited! We encourage the public and all interested stakeholders to attend and participate in our final public and planning committee meetings to review and provide comments on the Public Review Draft LHMP.

Public Meeting
Wednesday, February 18, 2026, 5:30-7:00 pm
Hazard Mitigation Planning Committee (HMPC) Meeting
Thursday. February 19, 2026, 9:00-12:00 pm

Both meetings will be held at:
Madera County Sheriff's Office
Emergency Operations Center
2725 Falcon Drive
Madera, CA 93637

For more information on this project, please visit: https://www.maderacounty.com/.../office-of.../lhmp-2026-1718

You may also contact Sergeant Joseph Wilder at (559) 675-7770 or email at jwilder@maderacounty.com

Printed Reference Copies of the full draft are available for review at the Madera County Libraries.

Madera - 121 N. G Street, Madera, CA 93637 - 559-675-7871
Chowchilla Branch Library - 300 Kings Avenue, Chowchilla, CA 93610 – 559-665-2630
Madera Ranchos Branch Library - 37398 Berkshire Drive, Madera, CA 93636 – 559-645-1214
North Fork Branch Library - 32908 Road 222, North Fork, CA 93643 - 559-877-2387
Oakhurst Branch Library - 49044 Civic Circle Drive, Oakhurst, CA 93644 – 559-683-4838

No. 9200 - February 14, 2026

A.8.15. Public Meeting #3 Invitation on the Draft Plan In Mariposa Gazette on 2/19/2026

MCSO's OHV grant request will be available for review from March 3 – May 4.

OHV grant application being sought by MCSO

The Madera County Sheriff's Office (MCSO) said it is preparing to submit the department's annual Off-Highway Vehicle (OHV) grant request.

The application will be available for a 60-day review by the public beginning March 3 and ending May 4.

MCSO said its OHV unit serves as a deterrent to illegal off-highway riding, providing extensive off-highway and on-road law enforcement throughout the county.

The unit enforces laws pertaining to off-highway vehicle operations, illegal shooting, stolen vehicles/OHVs and area searches and patrol checks at parks and other recreational areas.

The MCSO OHV unit is outfitted with specialized vehicles and equipment to respond to medical emergencies in remote and rugged terrain. The OHV unit will assist the department's Search and Rescue unit when requested.

The OHV unit additionally provides personnel and equipment to schools, county fairs and civic groups and frequently hosts public meetings and off-road events to address current state and local laws governing off-road vehicle riding.

Those who wish to participate in the Grant Request Public Review and Comment may do so by either contacting denice.mosier@maderacounty.com or logging onto the Park Service website at https://ohv.parks.ca.gov/

This information release is a requirement of the OHV Grant Application process for 2026.

OES agency seeking public's participation

The Madera County Office of Emergency Services is requesting the community's participation in updating its 2018 Local Hazard Mitigation Plan (LHMP).

Sheriff Tyson Pogue is the Director of Emergency Services pursuant to the Madera County Code.

Floods, drought, wildfires and severe weather are just a few of the hazards of concern to Madera County, said officials.

While natural hazards such as these cannot be prevented, a LHMP forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction.

Communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding.

The process began in March 2025 with the establishment of a Hazard Mitigation Planning Committee (HMPC) comprising county, city and jurisdictional staff as well as key agency and public stakeholders.

The LHMP Update is scheduled to be finalized and submitted to Cal OES and FEMA in March 2026.

You are invited

The public including all interested stakeholders are encouraged to attend and participate in the final public and planning committee meetings to review and provide comments on the Public Review Draft LHMP.

A public meeting will be held on Wednesday, Feb.18 from 5:30 – 7 p.m.

A Hazard Mitigation Planning Committee (HMPC) meeting will be held on Thursday, Feb.19, from 9 a.m. to noon.

Both meetings will be held at the Madera County Sheriff's Office Emergency Operations Center located at 2725 Falcon Drive in Madera.

For more information on this project visit www.maderacounty.com/government/sheriff/office-of-emergency-services or contact Sergeant Joseph Wilder at (559) 675-7770 or via email at jwilder@maderacounty.com.

Printed reference copies of the full draft are available for review at the Madera County libraries.

- Oakhurst Branch Library — 49044 Civic Circle Drive in Oakhurst. (559) 683-4838
- North Fork Branch Library — 32908 Road 222 in North Fork (559) 877-2387
- Madera — 121 N. G Street in Madera. (559) 675-7871
- Chowchilla Branch Library — 300 Kings Avenue in Chowchilla. (559) 665-2630
- Madera Ranchos Branch Library — 37398 Berkshire Drive in Madera. (559) 645-1214

A.8.16. Public Meeting #3 Agenda

AGENDA

MADERA COUNTY
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
Final Public Meeting #3: Draft Plan

Wednesday, February 18, 2026
5:30 - 7:00 pm

Sheriff's Office Emergency Operations Center
2725 Falcon Drive
Madera, CA 93637

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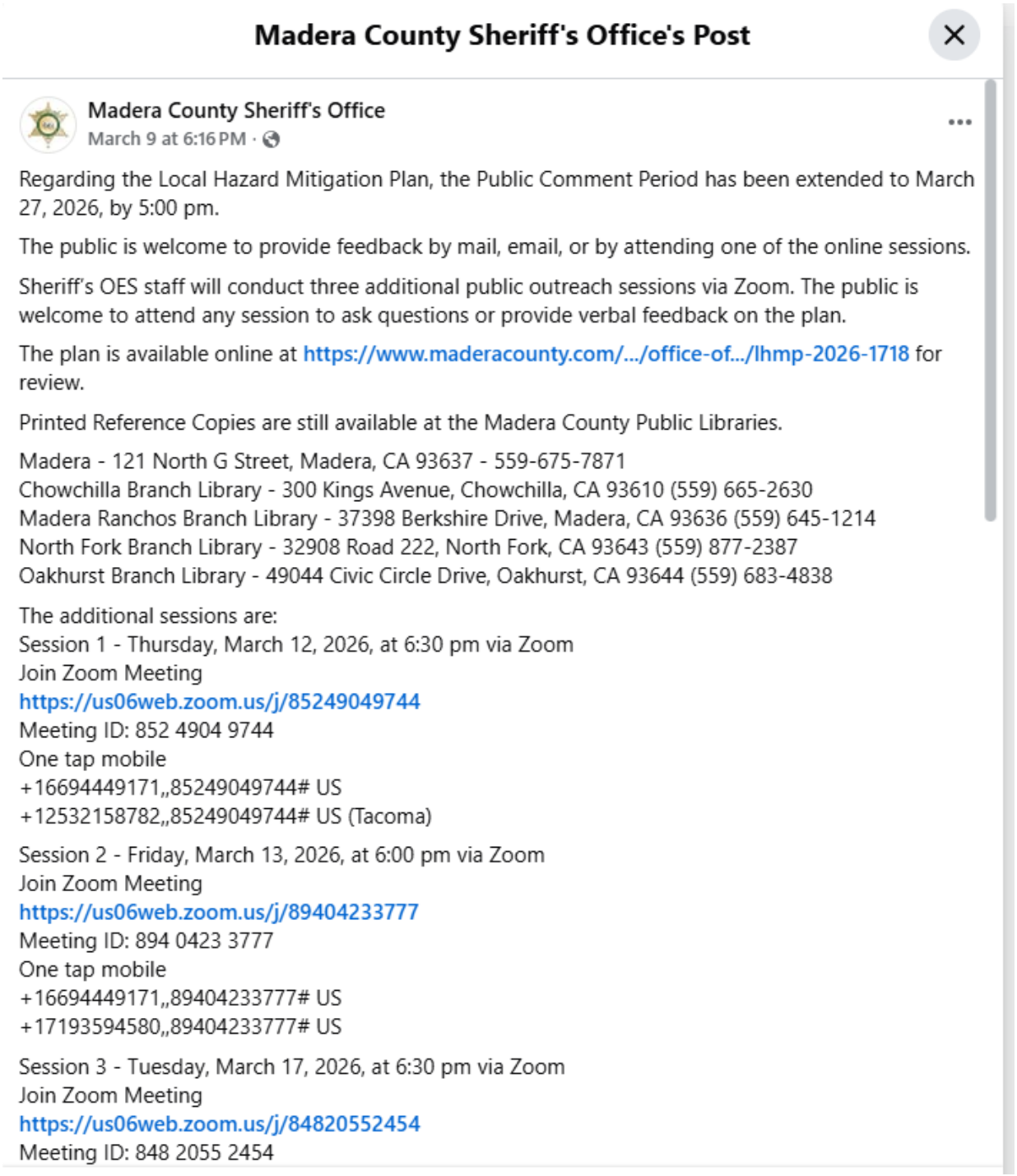
1. Introductions
2. Overview of the LHMP Development Process
3. Overview of the Madera County LHMP
4. Public Comments and Input
5. Next Steps
6. Questions

A.8.17. Public Meeting #3 Sign in Sheet

SIGN-IN SHEET
MADERA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
Public Meeting #3: Final Meeting – Draft Plan
February 18, 2026 (5:30-7:00 pm)
Sheriff's Office Emergency Operations Center | Madera, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Laura Unti	lufickling@sbcglobal.net		Citizen
Dave Fickling	DaveFickling@gmail.com		Citizen
Joseph Wilder	jwilder@maderacounty.com		Madera County Sheriff's OES

A.8.18. Virtual Public Meetings on Draft Plan – Invite on County Facebook Page



Madera County Sheriff's Office's Post

Madera County Sheriff's Office
March 9 at 6:16 PM ·

Regarding the Local Hazard Mitigation Plan, the Public Comment Period has been extended to March 27, 2026, by 5:00 pm.

The public is welcome to provide feedback by mail, email, or by attending one of the online sessions.

Sheriff's OES staff will conduct three additional public outreach sessions via Zoom. The public is welcome to attend any session to ask questions or provide verbal feedback on the plan.

The plan is available online at https://www.maderacounty.com/.../office-of.../lhmp-2026-1718 for review.

Printed Reference Copies are still available at the Madera County Public Libraries.

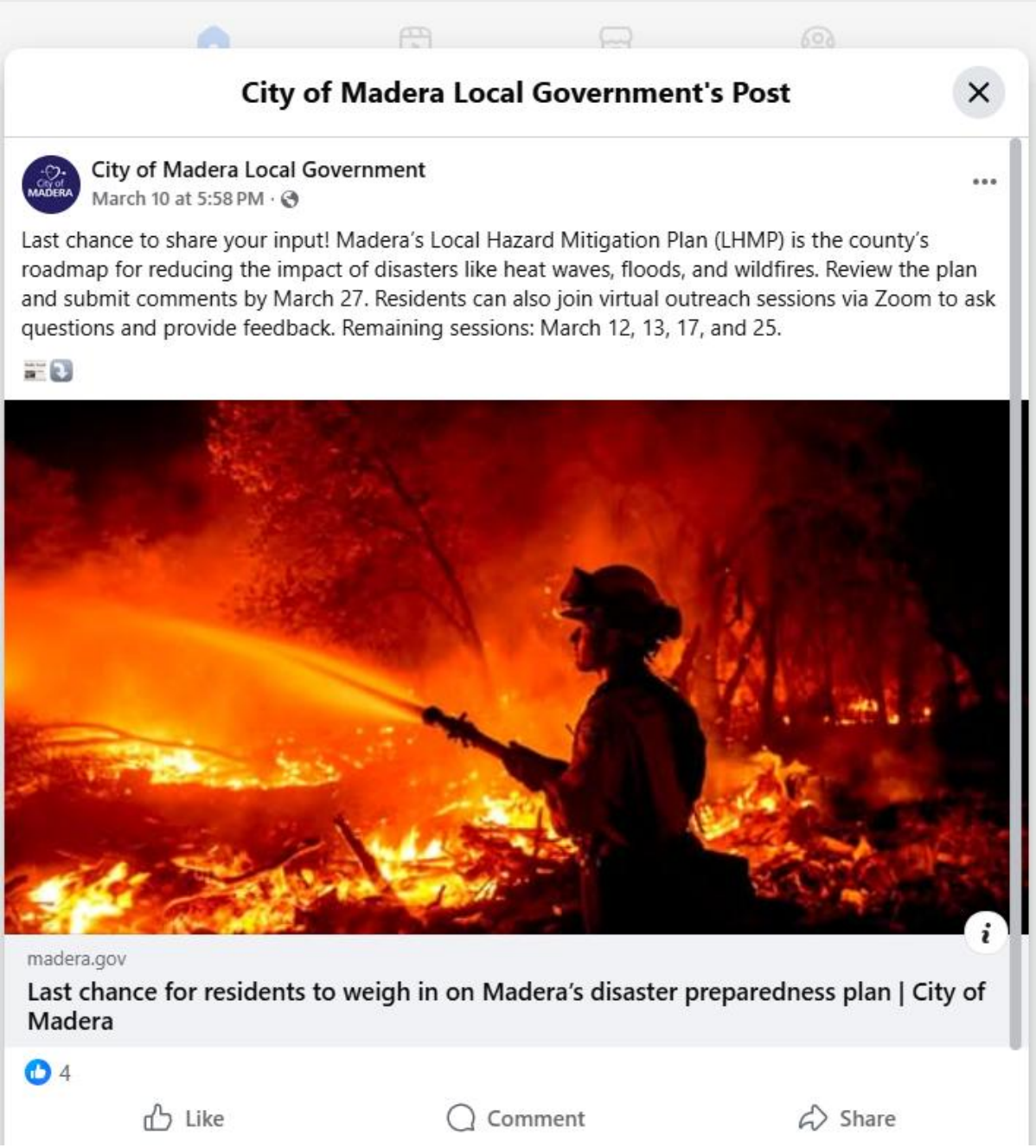
Madera - 121 North G Street, Madera, CA 93637 - 559-675-7871
Chowchilla Branch Library - 300 Kings Avenue, Chowchilla, CA 93610 (559) 665-2630
Madera Ranchos Branch Library - 37398 Berkshire Drive, Madera, CA 93636 (559) 645-1214
North Fork Branch Library - 32908 Road 222, North Fork, CA 93643 (559) 877-2387
Oakhurst Branch Library - 49044 Civic Circle Drive, Oakhurst, CA 93644 (559) 683-4838

The additional sessions are:
Session 1 - Thursday, March 12, 2026, at 6:30 pm via Zoom
Join Zoom Meeting
https://us06web.zoom.us/j/85249049744
Meeting ID: 852 4904 9744
One tap mobile
+16694449171,,85249049744# US
+12532158782,,85249049744# US (Tacoma)

Session 2 - Friday, March 13, 2026, at 6:00 pm via Zoom
Join Zoom Meeting
https://us06web.zoom.us/j/89404233777
Meeting ID: 894 0423 3777
One tap mobile
+16694449171,,89404233777# US
+17193594580,,89404233777# US

Session 3 - Tuesday, March 17, 2026, at 6:30 pm via Zoom
Join Zoom Meeting
https://us06web.zoom.us/j/84820552454
Meeting ID: 848 2055 2454

A.8.19. Virtual Public Meetings on Draft Plan – Invite on City of Madera Facebook Page



A.8.20. Virtual Public Meetings on Draft Plan – Article and Invite on City of Madera Website

Last chance for residents to weigh in on Madera's disaster preparedness plan

By City of Madera - Mar 10, 2026

News

The Local Hazard Mitigation Plan comment period has been extended through March 27, 2026

When summer temperatures climb into the triple digits across the Central Valley, the impacts reach far beyond discomfort. Power demand rises, outdoor work becomes dangerous, and vulnerable residents face serious health risks. Extreme heat, along with flooding, drought, and wildfire, is one of several natural hazards that communities across California must plan for long before emergencies occur.

In Madera County, that preparation is nearing completion.

Local officials have spent the past year developing the 2026 Local Hazard Mitigation Plan (LHMP), a countywide roadmap for identifying natural disaster risks and reducing their long-term impact on residents, infrastructure, and local services. The plan, led by the Madera County Office of Emergency Services in partnership with the cities of Madera and Chowchilla, analyzes the hazards most likely to affect the region and outlines strategies to strengthen community resilience.

With the plan now entering its final review phase, officials are encouraging residents to take part. The public comment period has been extended through March 27, 2026 at 5:00 p.m., giving community members additional time to review the document and share feedback before it moves toward final adoption.

Hazard mitigation planning focuses on reducing damage before disasters occur. By studying past events, infrastructure vulnerabilities, and community development patterns, the plan identifies projects and strategies that can help limit future losses. Maintaining an approved plan also keeps local governments eligible for certain federal mitigation grants that support preventative infrastructure and resilience projects.

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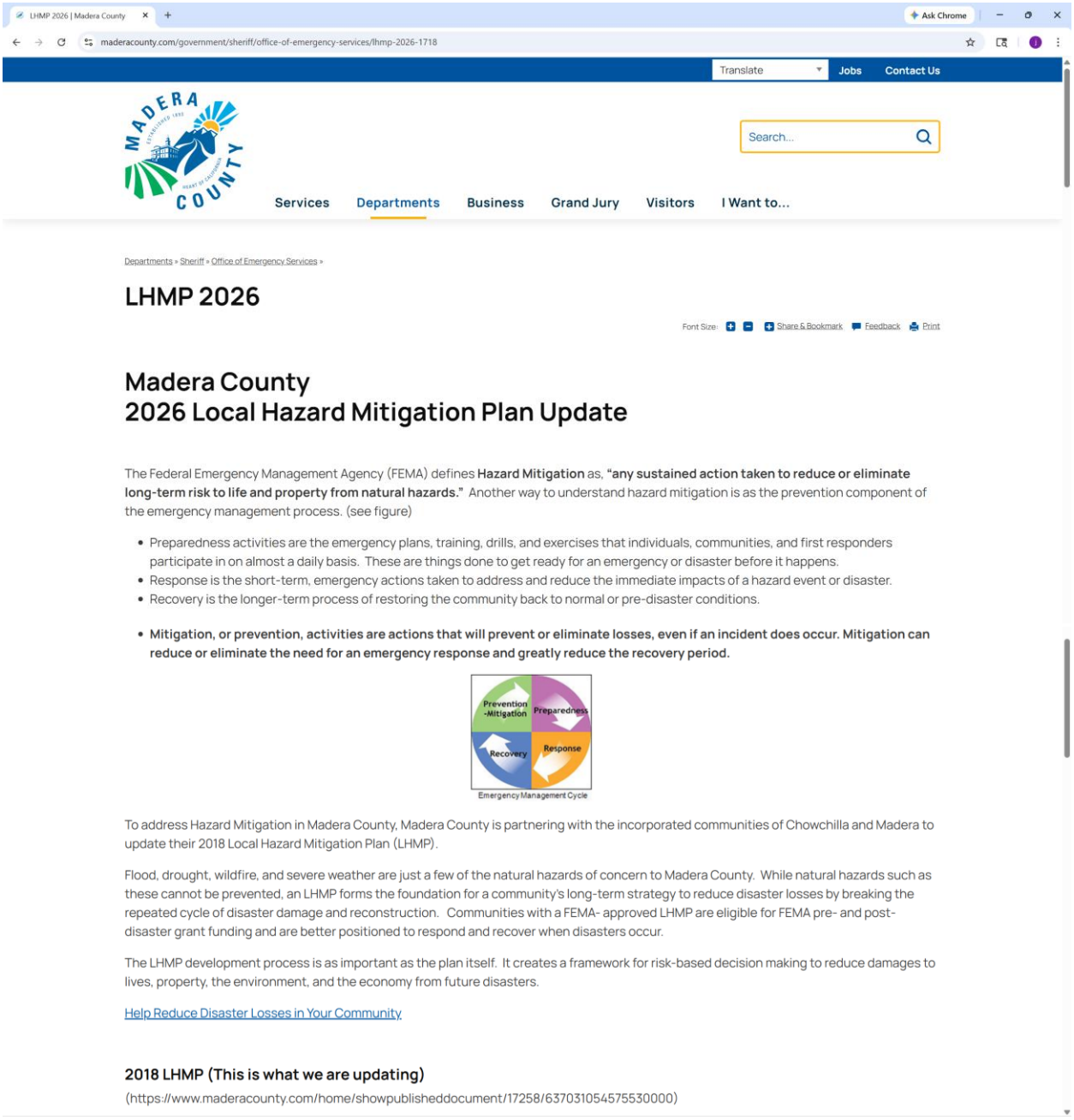
Contact Us

Madera City Hall
205 W 4th Street
Madera, CA 93637

(559) 661-5400

Hours:
Monday - Friday
8:00am - 5:00pm

A.8.21. Virtual Public Meetings on Draft Plan – Madera County Website Additions for Notice of Extension of Public Comment Period and Schedule of Virtual Meetings



LHMP 2026 | Madera County

maderacounty.com/government/sheriff/office-of-emergency-services/lhmp-2026-1718

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LHMP 2026

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Madera County
2026 Local Hazard Mitigation Plan Update

The Federal Emergency Management Agency (FEMA) defines **Hazard Mitigation** as, **"any sustained action taken to reduce or eliminate long-term risk to life and property from natural hazards."** Another way to understand hazard mitigation is as the prevention component of the emergency management process. (see figure)

- Preparedness activities are the emergency plans, training, drills, and exercises that individuals, communities, and first responders participate in on almost a daily basis. These are things done to get ready for an emergency or disaster before it happens.
- Response is the short-term, emergency actions taken to address and reduce the immediate impacts of a hazard event or disaster.
- Recovery is the longer-term process of restoring the community back to normal or pre-disaster conditions.

- **Mitigation, or prevention, activities are actions that will prevent or eliminate losses, even if an incident does occur. Mitigation can reduce or eliminate the need for an emergency response and greatly reduce the recovery period.**

Emergency Management Cycle

To address Hazard Mitigation in Madera County, Madera County is partnering with the incorporated communities of Chowchilla and Madera to update their 2018 Local Hazard Mitigation Plan (LHMP).

Flood, drought, wildfire, and severe weather are just a few of the natural hazards of concern to Madera County. While natural hazards such as these cannot be prevented, an LHMP forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Communities with a FEMA- approved LHMP are eligible for FEMA pre- and post-disaster grant funding and are better positioned to respond and recover when disasters occur.

The LHMP development process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, the environment, and the economy from future disasters.

Help Reduce Disaster Losses in Your Community

2018 LHMP (This is what we are updating)

(https://www.maderacounty.com/home/showpublisheddocument/17258/637031054575530000)

2026 LHMP Update

The LHMP Update process began in March 2025 with the establishment of a Hazard Mitigation Planning Committee (HMPC) comprised of County, City, jurisdictional staff, and key agency and public stakeholders. The 2026 LHMP includes an updated list of hazards, assesses the likely impacts of these hazards to the people and assets of the Madera County planning area, establishes updated goals, and prioritizes mitigation actions and projects to reduce the impacts of future disasters on people and property, critical facilities and infrastructure, and the environment, as well as to local economies. The LHMP Update is scheduled to be finalized and submitted to Cal OES and FEMA in March 2026.

Opportunities for Input

***** Public and Stakeholder Comment Period has been extended to Friday, March 27th, 2026 *****

The County will be hosting four additional sessions this month via Zoom. Please see below for dates and times.

Members of the community have a very important role in this process. A draft of the 2026 Madera County LHMP Update is available for review and comment by the public and all interested stakeholders.

See below link to the 2026 LHMP Public Review Draft.

Madera County 2026 LHMP Review Draft

Madera County LHMP Update Public Review Draft Complete
Madera County LHMP Update Public Review Draft Chapters Only
Madera County LHMP Update Public Review Draft Appendices Only
Madera County LHMP Update Annex B City of Madera
Madera County LHMP Update Annex A City of Chowchilla

Printed Reference Copies of the full draft are available for review at the Madera County Libraries.

Madera - 121 N. G Street, Madera, CA 93637 - 559-675-7871

Chowchilla Branch Library - 300 Kings Avenue, Chowchilla, CA 93610 – 559-665-2630

Madera Ranchos Branch Library - 37398 Berkshire Drive, Madera, CA 93636 – 559-645-1214

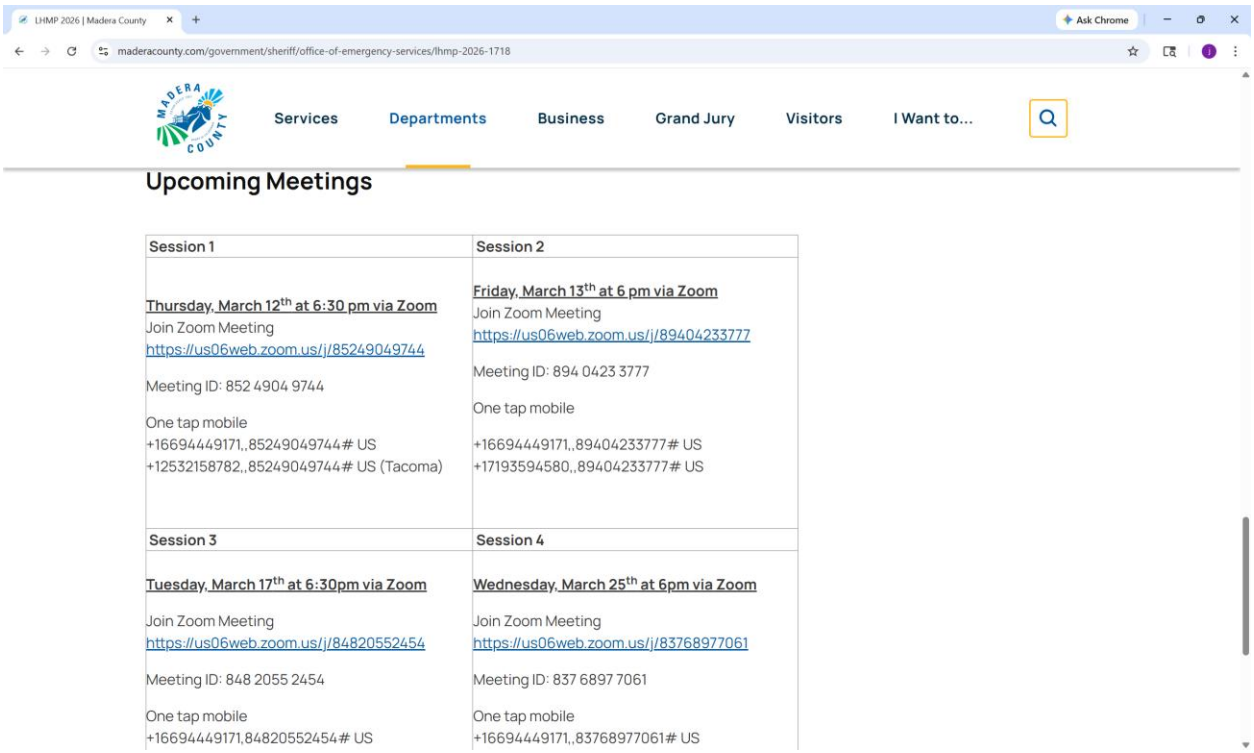
North Fork Branch Library - 32908 Road 222, North Fork, CA 93643 - 559-877-2387

Oakhurst Branch Library - 49044 Civic Circle Drive, Oakhurst, CA 93644 – 559-683-4838

Comments on the LHMP Public Review Draft

There are several options for providing comments on the LHMP Public Review Draft:

- Email comments to jeanine.foster@fostermorrison.com or jwilder@maderacounty.com
- Drop off written comments or send by mail to: Madera County Sheriff's Office, Office of Emergency Services, Attn. Sergeant Joseph Wilder, 2725 Falcon Drive, Madera, CA 93637
- Bring comments to one of the Zoom meetings


LHMP 2026 | Madera County
Ask Chrome
maderacounty.com/government/sheriff/office-of-emergency-services/lhmp-2026-1718
Services
Departments
Business
Grand Jury
Visitors
I Want to...
Upcoming Meetings
Session 1
Thursday, March 12th at 6:30 pm via Zoom
Join Zoom Meeting
https://us06web.zoom.us/j/85249049744
Meeting ID: 852 4904 9744
One tap mobile
+16694449171,,85249049744# US
+12532158782,,85249049744# US (Tacoma)
Session 2
Friday, March 13th at 6 pm via Zoom
Join Zoom Meeting
https://us06web.zoom.us/j/89404233777
Meeting ID: 894 0423 3777
One tap mobile
+16694449171,,89404233777# US
+17193594580,,89404233777# US
Session 3
Tuesday, March 17th at 6:30pm via Zoom
Join Zoom Meeting
https://us06web.zoom.us/j/84820552454
Meeting ID: 848 2055 2454
One tap mobile
+16694449171,84820552454# US
Session 4
Wednesday, March 25th at 6pm via Zoom
Join Zoom Meeting
https://us06web.zoom.us/j/83768977061
Meeting ID: 837 6897 7061
One tap mobile
+16694449171,,83768977061# US

A.8.22. Virtual Meeting on Draft Plan – Agenda

AGENDA

MADERA COUNTY
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
On-Line Public Meeting #1

Wednesday, March 13th, 2026
6:30 - 8:00 pm
Zoom Meeting
https://us06web.zoom.us/j/85249049744
Meeting ID: 852 4904 9744

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1. Introductions
2. Overview of the LHMP Development Process
3. Overview of the Madera County LHMP
4. Public Comments and Input
5. Next Steps
6. Questions

A.8.23. Virtual Meeting of Draft Plan – Sign in

No one attended the virtual meeting. No sign in sheet is presented here.

A.8.24. Public Comments

Public and private stakeholders were invited to provide comments and input throughout the LHMP development process as part of the public outreach efforts conducted for this project as described in the

Base Plan. Although seven separate public meetings were held during key plan development timeframes, public meeting participation and comments were extremely limited. Specifically, no public comments were received as part of the 2026 LHMP Update project.

A.9 Meeting Handouts

Below are the handouts for each meeting. Handouts specific to the Mitigation Strategy Meetings can be found in Appendix C.

A.9.1. HMPC Meeting #1: Kickoff Meeting Handouts

Madera County 2026 LHMP Update: Hazard Identification and Profiles

Madera County – Disaster Declarations 1950-2024

Year	Disaster Name	Disaster Type	Disaster Cause	State Declaration # and Date	Federal Declaration # and Date
2023	California Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	Storms	Storms	3/1/2023 3/8/2023	DR-4699 4/3/2023
2023	California Severe Winter Storms, Flooding, Landslides, and Mudslides	Storms	Storms	–	EM-3592 3/10/2023
2023	California Severe Winter Storms, Flooding, Landslides, and Mudslides	Storms	Storms	2023-01 1/4/2023	DR-4683 1/14/2023
2023	California Severe Winter Storms, Flooding, and Mudslides	Storms	Storms	2023-01 1/4/2023	EM-3591 1/9/2023
2022	Extreme heat and fires	Fire	Fire	2022-08 8/31/2022 (Extreme Heat) 9/8/2022 (Mosquito Fire) 9/2/2022 (Mill Fire)	–
2021	Mono Wind Event	Wind	Storms	2021-01 6/22/2021	–
2020	California Wildfires	Fire	Fire	2020-07 9/6/2020	DR-4569 10/16/2020

Year	Disaster Name	Disaster Type	Disaster Cause	State Declaration # and Date	Federal Declaration # and Date
2020	California Creek Fire	Fire	Fire	–	FM-5348 9/6/2020
2020	California Covid 19 Pandemic	Biological	Pandemic	3/4/2020	DR-4482
2020	California Covid 19	Biological	Pandemic	3/4/2020	EM-3428
2017	California Mission Fire	Fire	Fire	9/7/2017	FM-5204 9/4/2017
2017	California Railroad Fire	Fire	Fire	9/7/2017	FM-5202 9/2/2017
2016	Clayton Fire	Fire	Fire	2016-04 9/15/2016	–
2015	Drought and Tree Mortality	Drought	Drought	2015-05 10/30/2015	–
2014	California Junction Fire	Fire	Fire	–	FM-5074 8/19/2014
2014	Drought and water shortage	Drought	Drought	2014-03 9/18/2014	–
2014	California Courtney Fire	Fire	Fire	–	FM-5078 9/14/2014
2010	December 2010 Statewide Storms	Storms	Storms	2010-17 12/21/2010, 12/23/2010, 12/24/2010, 12/30/2010	–
2008	Central Valley Drought	Drought	Drought	2008-03 6/12/2008	–
2007	2007 Severe Freeze	Freeze	Freeze	2007-02 1/12/2007-1/26/2007	DR-1689 3/13/2007
2006	California Severe Storms, Flooding, Landslides, and Mudslides	Storms	Storms	2006-03 4/10/2006	DR-1646 6/5/2006
2005	Hurricane Katrina Evacuations	Hurricane	Hurricane	–	EM-3248 9/13/2005
2005	California Quartz Fire	Fire	Fire	–	FM-2571 7/25/2005
2001	Energy Emergency	Economic	Greed	1/1/2001	–

Year	Disaster Name	Disaster Type	Disaster Cause	State Declaration # and Date	Federal Declaration # and Date
1998	Severe Storms, Tornadoes, High Winds and Flooding in California	Freeze	Freeze	98-02 12/29/1998	DR-1267 2/9/1999
1997	California Severe Storms/flooding	Floods	Storms	97-01 1/2/1997-1/31/1997	DR-1155 1/4/1997
1997	Winter Storms	Storms	Storms	97-01 1/2/1997-1/31-1997	DR-1155 1/4/1997
1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	Flood	Storms	95-03-N 95-04-S 3/12/1995-3/24/1995	DR-1046 3/12/1995
1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	Storms	Storms	95-03 03/12/95 – 03/24/95	DR-1046 3/12/1995
1995	1995 Winter Storms (Northern CA)	Storms	Storms	95-01 1/9/1995-2/17/1995	DR-1044 1/10/1995
1992	California Severe Storm, Winter Storm, Mud & Landslides, Flooding	Storms	Storms	93-01 1/7/93 -2/19/93	DR-979 2/3/1993
1990	1990 Freeze	Freeze	Freeze	12/19/1990-1/18/1991	DR-894 2/11/1991
1986	California Severe Storms, Flooding	Storms	Storms	86-01 2/18/1986-3/12/1986	DR-758 2/21/1986
1982	Rains Causing Agricultural Losses	Flood	Storms	10/26/1982	–
1982	Heavy Rains and Flooding	Flood	Storms	82-03 4/1/1982	–
1982	1982-83 Floods	Flood	Storms	82-18 12/8/1982-3/21/1983	DR-677 2/9/1983
1977	California Drought	Drought	Drought	–	EM-3023 1/20/1977

Year	Disaster Name	Disaster Type	Disaster Cause	State Declaration # and Date	Federal Declaration # and Date
1976	1976 Drought	Drought	Drought	2/9/76, 2/13,76, 2/24/76, 3/26/76, 7/6/76	–
1972	1972 Freeze	Freeze	Freeze	4/17/72, 5/22/72, 5/31/72	–
1969	California Severe Storms, Flooding	Flood	Storms	1/23/69, 1/25,69, 1/28/69, 1/29/69, 2/8/69, 2/10/69, 2/16/69, 3/12/69	DR-253 1/26/1969
1964	Seismic Sea Wave	Other	Other	–	DR-169 4/1/1964
1963	Severe Storms, Heavy Rains and Flooding	Flood	Storms	–	DR-145 2/25/1963
1963	Severe Storms and Flooding	Flood	Storms	–	DR-138 10/24/1962
1961	1961 Major Fires (Madera)	Fire	Fire	–	–
1958	1958 April Storms & Floods	Flood	Storms	4/2/1958	DR-82 4/4/1958
1955	1955 Floods	Flood	Storms	12/22/1955	DR-47 12/23/1955
1950	Flood and Erosion	Flood	Storms	50-01 11/21/1950	DR-15 2/5/1950

Madera County State and Federal Disasters Disaster Declaration Summary by Hazard Type 1950-2024

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	4	1976, 2008, 2014, 2015	1	1977,
Economic	1	2001	0	–
Fire	5	2016, 2017 (twice), 2020, 2022	9	2005, 2014 (twice), 2015, 2016, 2017 (twice), 2020 (twice)
Flood (including heavy rains and storms)	20	1950, 1955, 1958, 1969, 1982 (twice), 1983, 1986, 1992, 1993, 1995 (three*), 1997 (twice), 2006*, 2010, 2023 (three*)	21	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1982, 1986, 1992, 1995 (three), 1997 (twice*), 2006*, 2010, 2023 (four*)

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Freeze	4	1972, 1990, 1998, 2007	3	1990, 1999, 2007
Hurricane	0		1	2005
Other	0		1	1964
Pandemic	2	2020 (twice)	2	2020 (twice)
Wind	1	2021	0	
Totals	**37**		**38**	

Source: Cal OES/ FEMA

* Landslides were also included in these flood disaster declarations.

Madera County Disasters since 2018 LHMP

- 2020 Fires (two federal and one state)
- 2020 Pandemic (two federal and two state)
- 2021 Mono Wind event (state)
- 2022 Extreme Heat and Fires (state)
- 2023 Severe Storms (four federal and three state)

Severe Weather Events

Madera County NCDC Storm Events 1950 to 7/31/2024

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Cold/Wind Chill	3	0	0	0	0	$0	$0
Debris Flows	20	0	0	0	0	$26,000	$0
Dense Fog	373	0	13	53	59	$5,073,000	$0
Drought	249	0	0	0	0	$0	$0
Dust Devil	1	0	0	0	0	$500	$0
Dust Storm	5	0	0	0	0	$100,000	$0
Excessive Heat	22	0	0	0	0	$0	$0
Extreme Cold/Wind Chill	4	0	0	0	0	$0	$0
Flash Flood	5	0	0	0	0	$25,000	$0
Flood	69	0	0	0	0	$6,118,000	$5,800,000
Frost/Freeze	190	0	0	0	0	$100,000	$402,955,000
Funnel Cloud	21	0	0	0	0	$0	$0
Hail	22	0	0	0	4	$110,000	$3,656,000
Heat	100	32	0	10	0	$170,000	$224,801,000
Heavy Rain	38	0	0	0	0	$201,000	$49,060,000
Heavy Snow	328	0	0	0	0	$0	$0
Heavy Wind	2	0	0	0	0	$0	$0
High Wind	91	0	0	0	4	$211,817,000	$150,000
Landslide	2	0	0	0	0	$28,000	$0
Lightning	7	0	0	0	0	$32,500	$0
Strong Wind	141	1	0	0	0	$2,174,900	$57,000
Thunderstorm Winds	16	0	0	0	0	$181,000	$7,800,000
Tornado	10	0	0	0	0	$147,750	$30,000
Wildfire	118	4	1	97	7	$47,328,000	$0
Winter Storm	183	2	1	0	0	$8,405,000	$0
Winter Weather	79	0	1	0	0	$282,000	$0
Total	**2,099**	**39**	**16**	**160**	**74**	**$282,319,650**	**$694,309,000**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of Madera County

FEMA's National Risk Index, 2024: List of 18 Hazards

FEMA's National Risk Index is a dataset and online tool that can be used to help communities better understand the natural hazard risk to their communities. FEMA requires LHMPs to utilize the 18 identified hazards as a starting point for determining hazards of concern in their Hazard Mitigation Planning Process.

- Avalanche
- Coastal Flooding
- Cold Wave
- Drought
- Earthquake
- Hail
- Heat Wave
- Hurricane
- Ice Storm
- Landslide
- Lightning
- Riverine Flooding
- Strong Wind
- Tornado
- Tsunami
- Volcanic Activity
- Wildfire
- Winter Weather

Madera County - Hazards Comparison List

2018 Madera County LHMP Hazards	Madera County General Plan Safety Element (Public Review Draft, 2025)	City of Chowchilla General Plan Safety Element (2010)	City of Madera General Plan Safety Element (2009)	2023 State of California Plan Applicable Hazards	Proposed 2026 Madera County LHMP Hazards*
Agricultural Hazards: Severe Weather/Insect/Pests	–	–	–	Invasive and Nuisance Species	Agricultural Hazards: Severe Weather/ Pests/Invasive Species
Climate Change	Climate Change Hazard	–	–	Climate Change & Related Hazards	Climate Change
Dam Failure	As part of Seismic and Flood Hazards	As part of Seismic and Flood Hazards	As a part of Flood Hazards	Dam Failure	Dam Failure
Drought & Water shortage	As a part of Climate Change	–	–	Droughts and Water Shortage	Drought & Water shortage
Earthquake (large damaging/small)	As part of Seismic Hazards	As part of Seismic Hazards	As a part of Geological Hazards	Earthquake	Earthquake (w/subhazards)

2018 Madera County LHMP Hazards	Madera County General Plan Safety Element (Public Review Draft, 2025)	City of Chowchilla General Plan Safety Element (2010)	City of Madera General Plan Safety Element (2009)	2023 State of California Plan Applicable Hazards	Proposed 2026 Madera County LHMP Hazards*
Floods: 1%/0.2% annual chance	Flood Hazards and Climate Change	Flood Hazards	Flood Hazards	Riverine, Stream, and Alluvial Flood	Floods: 1%/0.2% annual chance
Floods: Localized Stormwater	Flood Hazards and Climate Change	Flood Hazards	Flood Hazards	–	Floods: Localized Stormwater
Hazardous Materials Transportation	Hazardous Materials	Hazardous Materials	Hazardous Materials	Hazardous Materials	*Hazardous Materials Transportation*
Landslide, Mudslide, Debris Flow	As part of Seismic Hazards and Climate Change	–	–	Landslide, Debris Flow, and Other Earth Movements	Landslide, Mudslide, Debris Flow
Levee Failure	As a part of Flood Hazards	–	–	Levee Failure	Levee Failure
Severe Weather: Extreme Cold & Freeze	As a part of Climate Change	–	–	Extreme Cold or Freeze	Severe Weather: Extreme Cold, Freeze, and Snow
Severe Weather: Extreme Heat	As a part of Climate Change	–	–	Extreme Heat	Severe Weather: Extreme Heat
Severe Weather: Fog	–	–	–	As a part of Severe Weather	*Severe Weather: Fog*
Severe Weather: Heavy Rains and Storms (Wind, Hil, Lightning)	–	–	–	Severe Wind, Weather, and Storms	Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
Severe Weather: High Winds and Tornadoes	–	–	–	Part of Severe Wind, Weather, and Storms listed above	*Severe Weather: High Winds and Tornadoes* *(include in above Severe Weather: Heavy Rain and Storms)*
Severe Weather: Winter Storms/Snow	–	–	–	Part of Severe Wind, Weather, and Storms listed above	*(include in above Severe Weather: Extreme Cold, Freeze, and Snow)*
Volcano	As a part of Seismic Hazards	–	–	Volcano	*Volcano*
Wildfire	Fire Hazards and a part of Climate Change	Fire Hazards	Fire Hazards	Wildfire	Wildfire (w/smoke and air quality)

* Power Outages/PSPS will be discussed as a Common Vulnerability/Impact of all hazards

Madera County 2026 Hazard Identification Assessment

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Agricultural Hazard: Severe Weather/Pests/Invasive Species					Medium
Climate Change					--
Dam Failure					Medium
Drought & Water shortage					High
Earthquake (w/subhazards)					Low
Floods: 1%/0.2% annual chance					Medium
Floods: Localized Stormwater					Medium
Hazardous Materials Transportation					Low
Landslide, Mudslide, Debris Flow					Medium
Levee Failure					Medium
Severe Weather: Extreme Cold, Freeze, and Snow					Medium
Severe Weather: Extreme Heat					High
Severe Weather: Fog					Medium
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)					Medium
Volcano					Low
Wildfire (w/smoke and air quality)					Medium/High

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood 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 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic: More than 50 percent of property severely damaged; 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 and/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

Climate Change Influence
Low: Minimal potential impact
Medium: Moderate potential impact
High: Widespread potential impact

Madera County LHMP Update: 2024 Hazards

- Agricultural Hazard: Severe Weather/Pests/Invasive Species
- Climate Change
- Dam Failure
- Drought & Water shortage
- Earthquake (w/subhazards)
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Hazardous Materials Transportation
- Landslide, Mudslide, Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold, Freeze, and Snow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
- Wildfire (w/smoke and air quality)

Madera County LHMP Update: Historic Hazard Worksheet (Past Occurrences)

Please fill out one sheet for each significant hazard event with as much detail as possible. Attach supporting documentation, photocopies of newspaper articles, links, or other original sources.

Type of event	
Nature and magnitude of event	
Location	
Date of event	
Injuries	
Deaths	
Property damage	
Infrastructure damage	
Crop damage	
Business/economic impacts	
Road/school/other closures	
Other damage	
Insured losses	
Federal/state disaster relief funding	
Opinion on likelihood of occurring again	
Source of information	
Comments	

	Please return worksheets by mail, email, or fax to: Jeanine Foster, Foster Morrison 6095 Zang Way Arvada, CO 80004 fax: (720) 893-0863 email: jeanine.foster@fostermorrison.com
Prepared by:	
Phone:	
Email:	
Date:	

A.9.2. HMPC Meeting #2: Risk Assessment Meeting Handout

AGENDA

MADERA COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
Hazard Mitigation Planning Committee (HMPC)
Meeting #2 – Risk Assessment

July 9, 2025
1:00 - 4:00 pm
Sheriff's Office Emergency Operations Center
2725 Falcon Drive
Madera, CA 93637

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1. Introduction
2. Status of the Disaster Mitigation Act Planning Process
3. Review of Risk Assessment (PowerPoint)
4. Open Discussion and Input on the Risk Assessment (Handout)
5. Review of Data Needs
6. Next Steps
7. Questions?

Contact Info:

Jeanine Foster (jeanine.foster@fostermorrison.com) (303.717.7171)

FOSTER MORRISON CONSULTING

Foster Morrison Consulting, Ltd.

Status of the 2025 Madera County LHMP Update Project/Next Steps

FEMA's 4-Phase-10 Step DMA/CRS Planning Process

Phase I: Organize Resources

1) Get organized

2) Plan for public involvement

3) Coordinate with other departments and agencies

Phase II: Risk Assessment

4) Identify the hazard(s)

5) Assess the risks

Capability Assessment

Phase III: Mitigation Strategy

6) Set planning goals

7) Review mitigation alternatives

8) Draft an action plan

Phase IV: Adoption and Implementation

9) Adopt the plan

10) Implement the plan, evaluate its worth, and revise as needed

LHMP Update Project Schedule/Key Dates

2025 LHMP Update Meetings

- **July 9** (Wednesday) HMPC Meeting #2 (Risk Assessment) (1:00-4:00 pm)
- **July 9** (Wednesday) Public Meeting #2 (Risk Assessment) (5:30-7:00 pm)
- **Sept. 24** (Wednesday) HMPC Meeting #3 (Mitigation Strategy: Goals Development) (1:00-4:00 pm)
- **Sept. 25** (Thursday) HMPC Meeting #4 (Mitigation Strategy: Actions/Projects) (9:00 am -12:00 pm)
- **February 18** (Wednesday) Final Public Meeting #3 (Draft Plan) (5:30-7:00 pm)
- **February 19** (Thursday) HMPC Meeting #5 (9:00 am -12:00 pm)

LHMP Document Drafts

- **November 21** (Friday): HMPC (First) Draft LHMP to Madera/HMPC
- **January 9** (Friday): Madera/HMPC comments due on Draft Plan
- **January 23** (Friday): Comments incorporated into Public Review (Second) Draft to Madera/HMPC

- **January 28** (Wednesday): Public Review Draft on Madera website
- **February 27** (Friday**):** all final Madera, HMPC and Public input to Foster Morrison
- **March 13** (Friday): All final comments incorporated and LHMP submittal to Cal OES – March 2025

Hazard Identification & Profiles: Madera County

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Agricultural Hazard: Severe Weather/Pests/Invasives	Extensive	Likely	Critical	High	Medium
Climate Change	Extensive	Likely	Limited	Medium	--
Dam Failure	Significant	Unlikely	Critical	High	Medium
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake (w/subhazards)	Significant	Unlikely	Critical	Medium	Low
Floods: 1%/0.2% annual chance (w/levee failure)	Significant	Occasional/ Unlikely	Critical	High	Medium
Floods: Localized Stormwater	Extensive	Highly Likely	Limited	Medium	Medium
Hazardous Materials Transportation	Limited	Occasional	Limited	Medium	Low
Landslide, Mudslide, Debris Flow	Limited	Likely	Limited	Medium	Medium
Severe Weather: Extreme Cold, Freeze, and Snow	Significant	Highly Likely	Limited	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	Medium	High
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely	Limited	Medium	Medium
Wildfire (w/smoke and air quality)	Extensive	Highly Likely	Catastrophic	High	Medium/High

Geographic Extent

Limited: Less than 10% of planning area

Significant: 10-50% of planning area

Extensive: 50-100% of planning area

Likelihood 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 10 years or less.

Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

Catastrophic: More than 50 percent of property severely damaged; 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 and/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

Climate Change Influence

Low: Minimal potential impact

Medium: Moderate potential impact

High: Widespread potential impact

Risk Assessment Methodology

Calculating Likelihood of Future Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrence is categorized into one of the following classifications:

- **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 10 years or less.
- **Occasional**: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
- **Unlikely**: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Calculating Vulnerability

Vulnerability is measured in general, qualitative terms, and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential:

- **Extremely Low**: The occurrence and potential cost of damage to life and property is very minimal to non-existent.
- **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. Here 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 already occurred in the past.
- **Extremely High**: Very widespread and catastrophic impact.

Defining Significance (Priority) of a Hazard

Defining the significance or priority of a hazard to a community is based on a subjective analysis of several factors. This analysis is used to focus and prioritize hazards and associated mitigation measures for the plan. These factors include the following:

- **Past Occurrences**: Frequency, extent, and magnitude of historic hazard events.
- **Likelihood of Future Occurrences**: Based on past hazard events.
- **Ability to Reduce Losses through Implementation of Mitigation Measures**: This looks at both the ability to mitigate the risk of future occurrences as well as the ability to mitigate the vulnerability of a community to a given hazard event.

Risk Assessment Summary: Madera County Planning Area

Agricultural Hazard: Severe Weather/Pests/Invasives

- Agricultural losses occur on an annual basis and are usually associated with severe weather events, including heavy rains, flood, freeze, heat, and drought. Other agricultural hazards include freeze, crop and livestock disease, insects and noxious weeds.
- According to 2023 Crop Report, many commodities are grown in Madera County. The top three commodities for the County in 2022 were almonds, milk, and pistachios. According to the 2023 Crop Report, gross value of all production was $1,859,365,000; this is a decrease of $161,318,000 or 7.98% as compared to the revised 2022 production value of $2,020,683,000.
- One State Disaster Declaration related to Agricultural Disease in 1982.
- There have been 16 USDA declarations: 12 from drought, 2 from freeze, 1 from hailstorm, rain, cold temperatures, and 1 from excessive rain and hail.
- CAN COUNTY AG PROVIDE SPECIFIC EVENTS/DAMAGES TO THE AG INDUSTRY IN THE COUNTY?
- WHAT ARE THE BIGGEST AG CONCERNS/ISSUES?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium or High?
- Priority Hazard

Climate Change

- The 2023 State of California Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the year. Climate change has the potential to alter the nature and frequency of most hazards.
- DOES THE HMPC/JURISDICTIONS HAVE ADDITIONAL INFORMATION ON CLIMATE CHANGE IMPACTS OR SPECIFIC CONCERNS/ISSUES?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Dam Failure

- According to data provided by Madera County and Cal DWR,DSOD, there are 24 dams located in Madera County constructed for flood control, storage, electrical generation, and recreational purposes. Of the 24 dams, 2 are rated as Extremely High Hazard, 10 High Hazard, 2 as Significant Hazard, 1 as Low Hazard, and 6 were unknown. There are another 4 Extremely High Hazard dams, 1 High Hazard Dam, and 1 Significant Dam in Fresno County with the potential to impact the County. Only 6 Extremely High Hazzard, 6 High Hazard, and 2 Significant dams have available inundation data.

- The most significant dams of concern include the Extremely High and High Hazard dams where loss of life is possible.
- According to multiple sources, there have been no past dam failure events. TRUE, ANYTHING TO ADD?
- ARE THERE SPECIFIC DAMS OF CONCERN TO NOTE?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Unlikely
- Vulnerability: High
- Priority Hazard

Drought and Water Shortage

- The main water source in Madera County, California, is groundwater, primarily drawn from the Madera Subbasin, part of the larger San Joaquin Valley Groundwater Basin. This aquifer supplies water for domestic, agricultural, and industrial uses across the County, including the City of Madera, which operates 20 groundwater wells to serve its residents. ANYTHING TO ADD? ANY WATER SUPPLY ISSUES TO NOTE?
- Historical drought data for the Madera County Planning Area and region indicate there have been 5 significant droughts in the last 84 years.
- 1 federal (1977 for 1976 drought) and 4 state disaster declarations (1976, 2008, 2014, and 2015) for Madera County since 1950. There have been 249 NCDC drought events in Madera County. Most of these were from 2014-2024 drought, but no damages, injuries, or losses were reported in the NCDC database.
- CAN YOU PROVIDE DAMAGES OR RESTRICTIONS THAT HAVE OCCURRED IN THE COUNTY DUE TO THE MOST RECENT DROUGHT?
- IS THE CURRENT WATER SUPPLY SUFFICIENT TO WITHSTAND FUTURE DROUGHT CONDITIONS AND FUTURE GROWTH IN THE COUNTY?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Likely
- Vulnerability: High
- Priority Hazard

Earthquake (w/subhazards)

- Madera County is in the Central Valley, Foothill, and Sierra Nevada regions of California, and in an area crossed by very few faults. One fault does cross through the southeastern portion of Madera County; this is an unnamed fault that is part of the Hartley Springs Fault Zone. There are several nearby faults including the San Andreus fault, some 40 miles away.
- The western half of Madera County is in the lowest Earthquake Shaking Potential for California. It is likely that the region will be impacted by future seismic activity and with the exception of the far eastern edge of the County, the magnitude/severity of the incidents are not likely to be severe.
- There have been no disaster declarations in the County. No major earthquakes have been recorded within the County; although the County has felt ground shaking from earthquakes with epicenters located elsewhere. TRUE? October 25, 2022 5.06 event?
- WHAT ARE THE BIGGEST CONCERNS/ISSUES ASSOCIATED WITH EARTHQUAKE?
- HOW WILL THIS HAZARD BE MITIGATED?

- Likelihood of Future Occurrence: Unlikely – large, damaging earthquake; Occasional – minor earthquake
- Vulnerability: High
- Priority Hazard

Flood Hazards

1%/0.2% year (w/levee failure)

- Historically, portions of Madera County have always been at risk to flooding because of its annual percentage of rainfall, snowfall in the winter, and the number of watercourses that traverse the County.
- Madera County experienced 20 state and 21 federal declarations and 74 NCDC events for flood.
- Damaging floods in Madera County occur primarily in the developed areas of the County.
- No levees are certified as providing protection against the 1% annual chance flood. Approximately 90% of the levees are adjacent to agriculture. There is limited residential or commercial development occurring near leveed areas. The County is looking to certify levees in the future. ALL STILL TRUE?
- REVIEW RISK ASSESSMENT AND ADD INFORMATION ON MAJOR FLOOD EVENTS.
- HAVE THERE EVER BEEN LEVEE FAILURES CAUSING DAMAGE IN THE COUNTY?
- WHAT ARE THE BIGGEST CONCERNS/ISSUES/PROBLEM AREAS ASSOCIATED WITH THE FLOOD/LEVEE HAZARD?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: 1% annual chance-Occasional; 0.2% annual chance -Unlikely, Levee Failure-Unlikely
- Vulnerability: High
- Priority Hazard

Localized/Stormwater flooding

- Significant localized flood history in the County – occurs annually.
- CAN THE HMPC/JURISDICTIONS PROVIDE DETAILS ON THESE AREAS? PICTURES/DESCRIPTIONS?. NEED COMPLETED LOCALIZED FLOODING TABLE OF LOCATIONS FOR EACH JURISDICTION FROM THE RISK ASSESSMENT WORKSHEET.
- WHAT ARE THE BIGGEST CONCERNS/ISSUES/PROBLEM AREAS ASSOCIATED WITH LOCALIZED FLOODING?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Hazardous Materials Transportation

- Most of the hazardous materials transported through Madera County are carried by truck on State highways or by railway systems. Pipeline Systems also carry hazardous materials, but are not specifically profiled as part of this hazard.
- The United States Department of Transportation Pipeline and Hazardous Materials Safety Administration's (PHMSA) Office of Hazardous Materials Safety tracks transportation incidents: 20 rail and roadway incidents have occurred (been reported) since 1970.
- ARE THERE NOTABLE INCIDENTS/DAMAGES THAT SHOULD BE INCLUDED HERE?

- WHAT HIGHWAY OR RAILROAD SEGMENTS ARE OF GREATEST CONCERN? OTHER SPECIFIC ISSUES/CONCERNS TO NOTE?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Landslides, Mudslides, and Debris Flows

- There have been 7 federal and 7 state disaster declarations associated with floods and heavy rains and storms (where landslides damages) were noted in Madera County. CAN WE GET SPECIFICS/DAMAGES ON THESE OR OTHER EVENTS RELATED TO LANDSLIDES?
- ARE THERE SPECIFIC LANDSLIDE PROBLEM AREAS TO NOTE? ANY ACTIVE LANDSLIDES?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Severe Weather

FOR ALL SEVERE WEATHER HAZARDS – HAS THE COUNTY BEEN AFFECTED BY POWER OUTAGES? SIGNIGICANT EVENTS TO NOTE?

Note: in 2020, the state experienced rolling blackouts due to extreme heat conditions and numerous wildfires – was Madera affected by these or other events?

Extreme Cold, Freeze, and Snow

- Significant County history: annual occurrences. East side of County is where most snow occurs.
- 4 state and 3 federal disaster declarations related to freeze events. 3 USDA events.
- 787 severe winter weather and freeze events (NCDC) since 1993.
- REVIEW RISK ASSESSMENT AND PROVIDE DETAILS ON COLD, FREEZE, AND SNOW EVENTS IN THE COUNTY.
- WHAT ARE THE BIGGEST CONCERNS/ISSUES ASSOCIATED WITH EXTREME COLD, FREEZE, AND SNOW?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Extreme Heat

- Annual occurrences of hot weather.
- Heat domes have settled over the County in the past, which has caused the County to open cooling centers.

- No disaster decs (State, FEMA, USDA) from extreme heat. However, extreme heat contributes to the drought hazard which has been a significant issue in the County.
- 122 extreme heat events (NCDC) since 1993.
- REVIEW RISK ASSESSMENT TO PROVIDE DETAILS/IMPACTS ON HEAT EVENTS IN THE COUNTY.
- WHAT ARE THE BIGGEST CONCERNS/ISSUES ASSOCIATED WITH EXTREME HEAT?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Heavy rains and storms (Hail, Lightning, Wind)

- Significant County history: annual occurrences
- The NCDC data recorded 67 hail, heavy rain and storm incidents for Madera County since 1950.
- There have been 20 state and 21 federal declarations for storms (which caused flooding) since 1950. 2 USDA declarations from heavy rains.
- Severe storms/heavy rains are the primary cause of most major flooding.
- REVIEW RISK ASSESSMENT TO PROVIDE DETAILS ON HEAVY RAIN AND STORM EVENTS IN THE COUNTY.
- WHAT ARE THE BIGGEST CONCERNS/ISSUES/PROBLEM AREAS ASSOCIATED WITH HEAVY RAIN AND STORMS?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

High Wind and Tornadoes

- Significant County history: annual occurrences – primarily with high winds.
- The NCDC data recorded 271 high wind and tornado incidents for Madera County since 1950. No state, federal or USDA Disaster Declarations. This included 21 reported funnel clouds; no tornadoes.
- In addition to contributing to downed trees, power outages, and wildfire spread, the 2018 LHMP noted the concern with significant dust storms caused by wind events. STILL TRUE? OTHER ISSUES TO NOTE?
- CAN WE GET PAST OCCURRENCES AND DETAILS ON THESE ISSUES ASSOCIATED WITH HIGH WINDS? TORNADOES?
- WHAT ARE THE BIGGEST CONCERNS/ISSUES/PROBLEM AREAS ASSOCIATED WITH HIGH WINDS AND TORNADOS?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Wildfire (w/smoke and air quality)

- Wildfires occur on an annual basis in the Madera County Planning Area.

- Numerous named fires have caused a variety of damages in the County.
- Any ignition has the potential to become an out of control wildfire.
- 5 state and 9 federal disaster declarations for Wildfire since 1950 in the County. NCDC listed 118 wildfire events since 1993.
- There have been 4 PSPS events noted since the 2018 LHMP (2019, 2020, 2021, 2024); all but the 2019 event was cancelled prior to taking effect.
- There has been increased difficulty in obtaining home insurance and the cost of insurance premiums throughout wildfire prone communities in California. Many residents have experienced cancellations of their policies due to catastrophic and recent wildfires occurring throughout California which has reduced the risk tolerance of many insurance companies. TO WHAT EXTENT HAS THIS BEEN EXPERIENCED IN MADERA COUNTY?
- CAN WE GET IMPACTS/DAMAGES TO THE JURISDICTIONS ASSOCIATED WITH THE MOST RECENT CREEK FIRE (2020) AND THE MOSQUITO FIRE (2022) OCCURRING SINCE THE 2018 LHMP?
- WHAT ARE THE BIGGEST CONCERNS/ISSUES/PROBLEM AREAS ASSOCIATED WITH WILDFIRES?
- HAS SMOKE AND AIR QUALITY BEEN A SIGNIFICANT ISSUE RELATED TO WILDFIRES OCCURING BOTH INSIDE AND OUTSIDE OF THE COUNTY? ANY SPECIFIC FIRES/ISSUES TO NOTE?
- HOW WILL THIS HAZARD BE MITIGATED?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Extremely High
- Priority Hazard

A.9.3. HMPC #3 & #4: Mitigation Strategy Meeting Handouts

These can be found in Appendix C of this Plan.

A.9.4. HMPC #5: Final Meeting Handouts for HMPC

The handout used for the HMPC is in Section 2.2 of the Base Plan.

A second handout was also given. It is the same handout that is in Section A.9.7 below.

A.9.5. Public Meeting #1: Kickoff Meeting Handout

Madera County LHMP Update: 2024 Hazards

- Agricultural Hazard: Severe Weather/Pests/Invasive Species
- Climate Change
- Dam Failure
- Drought & Water shortage
- Earthquake (w/subhazards)
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Hazardous Materials Transportation
- Landslide, Mudslide, Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold, Freeze, and Snow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
- Wildfire (w/smoke and air quality)

Madera County LHMP Update: Historic Hazard Worksheet (Past Occurrences)

Please fill out one sheet for each significant hazard event with as much detail as possible. Attach supporting documentation, photocopies of newspaper articles, links, or other original sources.

Type of event	
Nature and magnitude of event	
Location	
Date of event	
Injuries	
Deaths	
Property damage	
Infrastructure damage	
Crop damage	
Business/economic impacts	
Road/school/other closures	
Other damage	
Insured losses	
Federal/state disaster relief funding	
Opinion on likelihood of occurring again	
Source of information	
Comments	

	Please return worksheets by mail, email, or fax to: Jeanine Foster, Foster Morrison 6095 Zang Way Arvada, CO 80004 fax: (720) 893-0863 email: jeanine.foster@fostermorrison.com
Prepared by:	
Phone:	
Email:	
Date:	

A.9.6. Public Meeting #2: Risk Assessment

*Madera County 2026 LHMP Update: Hazards**

- Agricultural Hazards (severe weather/pests/invasive species)
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake (w/ subhazards)
- Flood: 1%/0.2% annual chance (w/levee failure)
- Flood: Localized Stormwater
- Hazardous Materials Transportation
- Landslide, Mudslide, and Debris Flow
- Severe Weather: Extreme Cold, Freeze, and Snow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
- Severe Weather: High Winds and Tornadoes
- Wildfire (w/ smoke and air quality)

* Power Outages/PSPS will be treated as a common vulnerability/impact of above hazards

Madera County LHMP Update: Historic Hazard Worksheet (Past Occurrences)

Please fill out one sheet for each significant hazard event with as much detail as possible. Attach supporting documentation, photocopies of newspaper articles, links, or other original sources.

Type of event	
Nature and magnitude of event	
Location	
Date of event	
Injuries	
Deaths	
Property damage	
Crop damage	
Infrastructure damage	
Business/economic impacts	
Road/school/other closures	
Other damage	
Insured losses	
Federal/state disaster relief funding	
Opinion on likelihood of occurring again	
Source of information	
Comments	

	Please return worksheets by mail, email, or fax to: Jeanine Foster, Foster Morrison 6095 Zang Way Arvada, CO 80004 fax: (720) 893-0863 email: jeanine.foster@fostermorrison.com
Prepared by:	
Phone:	
Email:	
Date:	

A.9.7. Public Meeting #3: On the Draft Plan

*Participating Jurisdictions**

- Madera County
- City of Chowchilla
- City of Madera

* All participated in 2018 Madera County LHMP

*Hazards List**

- Agricultural Hazards (severe weather/pests/invasive species)
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake (w/ subhazards)
- Flood: 1%/0.2% annual chance (w/levee failure)
- Flood: Localized Stormwater
- Hazardous Materials Transportation
- Landslide, Mudslide, and Debris Flow
- Severe Weather: Extreme Cold, Freeze, and Snow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
- Severe Weather: High Winds and Tornadoes
- Wildfire (w/ smoke and air quality)

*Power Outages/PSPS is treated as a common vulnerability/impact of above hazards

Mitigation Strategy: Madera County Planning Area Goals

Goal 1: Reduce risk and vulnerability throughout Madera County to hazards and protect lives and prevent losses to property, public health and safety, economy, and the environment

- Reduce exposure and hazard related losses to residents, visitors, businesses, governmental, non-profit, and educational partners by implementing whole-community risk reduction and resilience strategies
- Provide protection for public health and safety including vulnerable and underserved populations
- Provide protection for the existing built environment and future development
- Strengthen and protect critical facilities, utilities, and services; and community lifelines; and minimize disruption through improved infrastructure resilience and redundancy
- Provide protection for the environmental, natural, cultural, and historical resources
- Protect economic stability and continuity from hazard impacts

Goal 2: Increase community education, outreach, and awareness of risk and vulnerability to hazards and promote preparedness, engagement, and readiness to reduce hazard-related losses

- Inform and educate residents and businesses about potential hazards they are exposed to, where they occur, and what they can do to mitigate exposure or damages through a multi-media, multi-agency outreach programs
- Improve accessible resources and education for underserved and vulnerable populations, including individuals with access and functional needs
- Emphasize preparedness and self-reliance to residents
- Educate and outreach on evacuation and shelter in place routes, locations, and procedures

Goal 3: Improve communities' capabilities to prevent/mitigate hazard-related losses and to be prepared for, respond to, and recover from a disaster event

- Continue to update and maintain hazard mitigation and disaster plans to minimize risk and potential harm from future disaster losses
- Promote equitable emergency management planning and risk reduction countywide
- Continued enhancements to alert and warning, evacuation, and sheltering procedures and information for residents, businesses, visitors, individuals with access and functional needs, and animals
- Protect and improve critical transportation corridors for EMS and evacuation during emergencies
- Improve and maintain interagency communications. Ensure functionality and redundancy of communications, information technology, and other critical systems
- Increase interoperability and use of shared resources and mutual aid among agencies operating in Madera County
- Make better use of technology and evidence-based solutions
- Build capacity and strategies to increase disaster resilience among historically underserved and vulnerable populations, individuals with access and functional needs, and communities disproportionately impacted by disasters
- Improve communication and training of staff for hazard mitigation, emergency preparedness, response, and recovery measures
- Improve methods and timeliness of communication during hazard events and address disinformation promptly
- Establish enhanced data collection and retention practices as required by law

- Improve and maintain communications with governing bodies, while maintaining compliance with the Ralph M. Brown Act
- Ensure pre-planning activities include anticipation of goods and services to meet basic community needs and advance arrangements/agreements are in place to ensure swift response
- Encourage conditions that facilitate public and private stewardship

Goal 4: Increase and maintain wildfire prevention and protection

- Promote community resiliency to wildfires by reducing wildfire risk and vulnerability countywide
- Reduce life safety issues, property loss, damages, and air quality impacts associated with wildfires through education and prevention
- Develop, implement, and maintain countywide fuel reduction strategies
- Promote tree mortality monitoring and mitigation
- Promote Firewise communities and individual responsibility for wildfire prevention and protection
- Increase public knowledge on home defensible space and fire hardening methods
- Educate residents of and visitors to Madera County with wildfire safe practices
- Increase the ability of underserved and vulnerable populations to survive a wildfire event with minimal property damage and prevent loss of life
- Identify and communicate solutions to assist homeowners with wildfire insurance alternatives
- Enhance the reliability and capacity of community water systems to ensure adequate resources for fire suppression
- Promote and enhance fire-fighting capabilities (e.g., access roads, water supply, etc.)

Goal 5: Improve community resiliency to drought conditions and water shortage including establishing a sustainable water supply

- Reduce drought/water shortage risk and vulnerability in Madera County
- Promote continued groundwater sustainability programs
- Identify and mitigate hazards to prevent long-term impacts to water quality
- Enhance the reliability, capacity, and redundancy of community water systems to ensure adequate resources for end users
- Increase water storage facilities to provide for consistent water supply and to mitigate flooding
- Develop comprehensive, countywide water plan(s) to provide for existing development and to guide future development opportunities
- Address drought impacts related to tree mortality to include dead tree removal that contributes to wildfire risk (i.e., increased fuel loads), flood risk (i.e., downed trees blocking flood control facilities), severe weather, and localized flooding
- Increase water recharge opportunities and facilities

Goal 6: Improve community resiliency to flooding

- Reduce flood risk and vulnerability
- Reduce life safety issues, property loss, and damages associated with flooding
- Promote multi-agency collaboration to protect and manage natural drainageways, waterways, floodplains, and retention basins
- Prioritize stormwater master plan updates, including flood management plans for local waterways and localized areas of concern, and project implementation with considerations for climate change
- Establish ongoing funding source(s) for Madera County Flood Control Agency and other local flood control agencies

- Review appropriate flood protection infrastructure improvements in both urban and non-urban areas to provide 100-year level of protection where feasible and address localized flooding caused by stormwater and weather events

Goal 7: Improve community education and resilience to climate-related impacts to life and safety

- Continue to update and maintain climate action plans and vulnerability assessments that include analysis of climate change impacts on other natural hazards and community resilience and provide opportunities to explore impact mitigation and/or reduction
- Improve community education and response to air quality and similar climate-related vulnerabilities caused by both climate-change and natural disasters

Goal 8: Maintain FEMA eligibility for grant funding

- Conformance to federal and state hazard mitigation initiatives and maximize potential for mitigation implementation
- Position jurisdictions for grant funding through monitoring and communicating available grant programs, timelines, and processes to all agencies and community mitigation partners
- Educate jurisdictions on grant eligibility and reimbursement requirements and strategies
- Reduce exposure to hazard-related losses through realistic mitigation project planning and implementation, ensuring that actions can be undertaken and sustained without excessive depletion of economic resources

Mitigation Strategy: Madera County Planning Area Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Madera County					
Multi-Hazard Actions					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	Previous Action	X	X	X	Prevention Public Education
Action 3. Secondary Evacuation Routes during Emergencies	New Action	X	X		Prevention Property Protection Natural Resource Protection Emergency Services Public Information

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 4. Establish Tactical Facilities for Firefighting, Floodfighting, etc. (Airports, Heliports, Water Facilities, and Others and to Include Sandbag Locations at Fire Stations, USFS Facilities, Maintenance Yards, and Other Locations; w/ Public Education Component	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services Public Information
Agricultural Hazard: Severe Weather/Pests/Invasives Actions					
Action 5. NEED ACTION					
Climate Change Actions					
Action 6. THERE ARE OTHER ACTIONS THAT COULD COVER CLIMATE CHANGE – WILL YOU HAVE A DIRECT ACTION FOR CLIMATE CHANGE?					
Dam Failure Action					
Action 7. NEED ACTION					
Drought and Water Shortage Actions					
Action 8. DWR Grant Program for SB 552 - Drought Task Force and County Drought Resiliency Planning and Project Implementation (Short term (i.e, Availability and Distribution of Water during Hazard Events) and Long-Term Planning (such as System Enhancements, Consolidation, etc.))	New Action	X	X		Prevention Property Protection
Action 9. Groundwater Recharge	New Action	X			Property Protection Natural Resource Protection
Action 10. Countywide Domestic Well Mitigation Programs (including Madera County – Madera GSA "White Area" DWMP).	Previous Action	X	X		Property Protection Natural Resource Protection
Action 11. Groundwater Sustainability Plans (GSPs)	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 12. Countywide Domestic Well Mitigation Programs (including Madera County – Madera GSA "White Area" DWMP).	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 13. Emergency Water Storage Tanks	New Action	X	X		Prevention Property Protection Natural Resource Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Earthquake Actions					
Action 14. NEED ACTION					
Flood, Localized Flood, Severe Weather: Heavy Rains and Storm Actions					
Action 15. Establish Tactical Facilities for firefighting, Floodfighting, etc. (Airports, Heliports, Water Facilities, and Others and to Include Sandbag Locations at Fire Stations, USFS Facilities, Maintenance Yards, and Other Locations; w/ Public Education Component	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services Public Information
Action 16. Stormwater Plan updates and Project Implementation w/ Considerations for Climate Change	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 17. Continue to Implement and Maintain Routine Maintenance Processes/SOPs/projects Contained in the Flood O & M Manuals to Include: Vegetation Removal, Rodent Control, Sediment Removal, Erosion Repair and Restoration, Rehabilitation of Levee Patrol Roads, Flood Channel and Levee Inspections	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services
Action 18. Localized Flood Mitigation	New Action	X	X	X	Prevention Property Protection Natural Resource Protection Emergency Services
Hazardous Materials Transportation Actions					
Action 19. NEED ACTION					
Landslide, Mudslide, and Debris Flow Action					
Action 20. THERE ARE OTHER ACTIONS THAT COULD COVER LANDSLIDE – WILL YOU HAVE A DIRECT ACTION FOR ?					
Severe Weather: Extreme Cold Actions					
Action 21. NEED ACTION					
Wildfire Actions (with Smoke and Air Quality, Drought and Water Shortage, Landslide, Severe Weather: Extreme Heat, and Severe Weather: High Winds and Tornados)					
Action 22. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Mudge Ranch/French Gulch Wildfire Fuels Reduction Project	New Action	X	X		Property Protection Natural Resource Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 23. Removal of Down & Dead Trees	New Action	X	X		Property Protection Natural Resource Protection
Action 24. Taylor Mountain Fuel Break	New Action	X	X		Property Protection Natural Resource Protection
Action 25. Eastern Madera County WUI Communities Landscape Vegetation Treatments	New Action	X	X		Property Protection Natural Resource Protection
Action 26. Fire Adapted Madera County Collaborative Planning and Outreach Initiative: Preparation, Mitigation, Response, and Recovery Action	New Action	X	X		Prevention Property Protection Natural Resource Protection Public Information
Action 27. Fuel Reduction within Recognized Firewise Communities & Growth/Development of the Firewise Program (subject to change)	Previous Action	X	X		Prevention Property Protection Natural Resource Protection Public Information
Action 28. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Konklin Road Wildfire Fuels Reduction Project	New Action	X	X		Property Protection Natural Resource Protection
Action 29. Mountain Area Strategic Wildfire Treatments (M.A.S.T Projects) Bass Lake South Wildfire Fuels Reduction Project	New Action	X	X		Property Protection Natural Resource Protection
Action 30. Eastern Madera County Strategic Home Hardening Program	New Action	X	X		Prevention Property Protection
Action 31. Eastern Madera County WUI Community Evacuation Route	New Action	X	X		Prevention Emergency Services
Action 32. Strategic Water Storage Infrastructure Project – Eastern Madera County WUI	New Action	X	X		Prevention Property Protection Structural Projects
Action 33. Fresno River Unsheltered Encampment Fire Risk	New Action	X	X		Prevention Property Protection Structural Projects
Action 34. Home Hardening against Wildfires	New Action	X	X		Prevention Property Protection Structural Projects
City of Chowchilla					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	Previous Action	X	X	X	Prevention Public Information
Action 3. Stormwater Pump Station Resilience Project	Previous Action	X	X	X	Property Protection
Action 4. Well Site Backup Generator Project	Previous Action	X	X		Property Protection Emergency Services
Action 5. SCADA System Modernization Project	New Action	X	X		Property Protection
Action 6. New Production Wells for Water Supply Redundancy	New Action	X	X		Property Protection Natural Resource Protection
Action 7. SR 99 / SR 233 Interchange and Bridge Expansion Project	New Action	X	X		Structural Projects
Action 8. Ventura Avenue Complete Streets and Evacuation Route Project	New Action	X	X		Structural Projects Emergency Services
Action 9. Citywide Tree Trimming and Vegetation Management Program	New Action	X	X		Property Protection Natural Resource Protection
Action 10. Truman Pond Flood Control and Stormwater Recharge Project	New Action	X	X	X	Property Protection Natural Resource Protection
Action 11. Wastewater Treatment Plant (WWTP) Electrical and Process Resilience Project	New Action	X	X		Property Protection Natural Resource Protection
Action 12. Airport Runway Drainage and Stormwater Improvements Project	New Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 13. Ash Slough/Berenda Slough Levee Improvement and Erosion Repair Project	Previous Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 14. Municipal Yard Fueling and Operations Resilience Project	New Action	X	X		Property Protection Natural Resource Protection
City of Madera					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	New Action	X	X	X	Prevention Public Education

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 3. Storm Drain Master Plan Update, Stormwater Retention Improvements, Debris Removal and Minimizing Localized Flooding	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection Structural Projects
Action 4. Basin/Water Storage Capacity	New Action	X	X	X	Property Protection Natural Resource Protection Structural Projects
Action 5. Pavement Management Systems	New Action	X	X		Property Protection
Action 6. Development of Climate Action Plans: i.e., Climate Action Plan, Climate Adaptation Plan, Climate Vulnerability Assessment	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 7. Supervisory Control and Data Acquisition (SCADA) Upgrade	New Action	X	X		Property Protection
Action 8. Tree Trimming Program/Urban Forestry Team	New Action	X	X		Property Protection Natural Resource Protection
Action 9. Participate in Update to Groundwater Sustainability Plan and Implement Plan Recommendations	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 10. Water Conservation Program Implementation	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 11. Water Tank Improvements	New Action	X	X		Property Protection Natural Resource Protection
Action 12. Update Urban Water Management Plan and Implement Plan Recommendations	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 13. Seismic Retrofit Programs	New Action	X	X		Prevention Property Protection Structural Projects
Action 14. Conduct Exploratory Studies Regarding Natural Waterways Related to Capacity-building, Bank Stability, and Property Preservation	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 15. Implement Communication System(s) to Ensure Information is Shared Timely and all Citizens have Access.	New Action	X	X		Public Information

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 16. Backup Power Redundancy & Fuel Tanks for Critical Infrastructure	New Action	X	X		Property Protection Emergency Services
Action 17. Update Safety Element	New Action	X	X		Prevention
Action 18. Debris Removal, Tree Trimming and Fresno River Restoration	New Action	X	X	X	Property Protection Natural Resource Protection
Action 19. Yellow Reflective Border on Traffic Signal Backplates	New Action	X	X		Emergency Services
Action 20. Heating and Cooling Centers and Buildings of Respite for Vulnerable Population	New Action	X	X		Prevention Emergency Services Public Information
Action 21. Target Hardening for Extreme Weather and Air Quality for Public Infrastructure and Buildings	New Action	X	X		Property Protection Emergency Services
Action 22. Grade Separation for Railroad Lines	New Action	X	X		Emergency Services

Appendix B References

1995 Madera County General Plan

2008 CWPP

2008 Madera County Flood Insurance Study

2011 California Geologic Survey Deep Seated Landslide Susceptibility

2014 California Natural Resources Report

2017 California Adaptation Planning Guide South Central Valley Region

2018 Madera County Hazard Mitigation Plan

2018 State of California Hazard Mitigation Plan

2021 California Climate Adaptation Study

2023 State of California Hazard Mitigation Plan

2023 US Census Bureau American Community Survey Average Household Size

2024 Climate Adaptation Study

2024 Madera County Parcel/Assessor Data

2024 review from UC Davis Health

2024-2032 Madera County Housing Element

2025 Madera County General Plan Safety Element

American Society of Civil Engineers

Bureau of Land Management

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CAL FIRE (FHSZ SRA 2024, FHSZ FRA 2007)

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Cal-Adapt

Cal-Adapt – Extended Drought Scenarios

Cal-Adapt – Number of Extreme Heat Days by Year

Cal-Adapt – Precipitation: Decadal Averages Map

Cal-Adapt 2017/2023

Cal-Adapt Climate Projections

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California Climate Adaptation Strategy

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California Department of Conservation's Farmland Mapping and Monitoring Program

California Department of Finance

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California Department of Fish and Wildlife Service

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California Department of Water Resources (CA DWR) Special Populations and Disadvantaged Community Mapping

California Department of Water Resources 2012-2016 California Drought: Historical Perspective

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California Department of Water Resources Division of Safety of Dams

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California Environmental Protection Agency (Cal EPA) Disadvantaged Communities

California Environmental Quality Act (CEQA)

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California Natural Diversity Database

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Federal Emergency Management Agency – Disaster Declaration Database

Federal Emergency Management Agency – Flood Insurance Study

Federal Emergency Management Agency – National Flood Hazard Layer

Federal Emergency Management Agency – National Risk Index

Federal Emergency Management Agency – Wind Zones in the United States

Federal Emergency Management Agency: Building Performance Assessment: Oklahoma and Kansas Tornadoes

FEMA

FEMA Community Disaster Resilience Zones

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Foxweather.com

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Madera County

Madera County Agricultural Commissioner

Madera County Agricultural Commissioner Crop Reports (2020-2023)

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Madera County Department of Agriculture

Madera County General Plan

Madera County General Plan Background Report

Madera County General Plan Land Use Element

Madera County General Plan Safety Element (Public Review Draft, 2025)

Madera County Geographic Information Services

Madera County GIS

Madera County Planning Team

Madera County Public Works Division

Multi-Hazard Identification and Risk Assessment, FEMA 1997

National Aeronautics and Space Administration

National Center for Atmospheric Research

National Climate Assessment

National Climatic Data Center Storm Events Database.

National Drought Mitigation Center

National Earthquake Information Center

National Environmental Policy Act (NEPA)

National Fire Plan

National Flood Insurance Program

National Hazardous Materials Routes Registry (2025)

National Integrated Drought Information System

National Inventory of Dams

National Oceanic and Atmospheric Administration

National Oceanic and Atmospheric Administration Storm Prediction Center

National Oceanic and Atmospheric Administration's National Climatic Data Center

National Park Service

National Performance of Dams Program

National Weather Service

National Weather Service HeatRisk

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PHMSA Database

Public Health Alliance

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San Joaquin Air Quality Management District

Smoke Impacts CA: 2020 Lessons – 2021 Actions

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Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011)

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US Army Corps of Engineers

US Census Bureau

US Department of Agriculture

US Department of Agriculture – Farm Service Agency Secretarial Disasters Declarations

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US Fish and Wildlife Service

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"Wildland fire management and air quality in the southern Sierra Nevada: Using the Lion Fire as a case study with a multi-year perspective on PM2.5 impacts and fire policy" by D. Schweizer and R. Cisneros

Appendix C Mitigation Strategy

Madera County
2026 Local Hazard Mitigation Plan (LHMP) Update
HMPC Meetings #3 & #4 - Mitigation Strategy
September 24 & 25, 2025

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AGENDA

MADERA COUNTY
MULTI-JURISDICTIONAL
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
Hazard Mitigation Planning Committee (HMPC)
Meetings #3 & #4 – Mitigation Strategy

Wednesday September 24, 2025 (1:00 - 4:00 pm)
Thursday September 25, 2025 (9:00 am - 12:00 pm)

Sheriff's Office Emergency Operations Center | Madera, California

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HMPC Meeting #3:

1. Introductions
2. LHMP Project Status and Next Steps/Timeline
3. Risk Assessment Status
4. Priority Hazards Review
5. Develop Plan Goals and Objectives
6. Introduction to HMPC Meeting #4: Mitigation Alternatives/Actions/Projects

HMPC Meeting #4:

7. Introductions
8. Review Mitigation Categories and Selection Criteria
9. Brainstorming of Mitigation Alternatives/Actions/Projects by Hazard
10. Prioritization of Mitigation Actions/Projects
11. Next Steps

Mitigation Strategy Meetings
September 24 & 25, 2025
Day 1

Status of the 2026 Madera County LHMP Update Project/Next Steps

FEMA's 4-Phase-10 Step DMA/CRS Planning Process

Phase I: Organize Resources

1) Get organized

2) Plan for public involvement

3) Coordinate with other departments and agencies

Phase II: Risk Assessment

4) Identify the hazard(s)

5) Assess the risks

Capability Assessment

Phase III: Mitigation Strategy

6) Set planning goals

7) Review mitigation alternatives

8) Draft an action plan

Phase IV: Adoption and Implementation

9) Adopt the plan

10) Implement the plan, evaluate its worth, and revise as needed

LHMP Project Schedule/Key Dates

2025 LHMP Update Meetings

- **September 24 (Wednesday):** HMPC Meeting #3 (Mitigation Strategy: Goals Development) (1:00 – 4:00 pm)
- **September 25 (Thursday):** HMPC Meeting #4 (Mitigation Strategy: Actions and Projects) (9:00 am – 12:00 pm)
- **February 18 (Wednesday):** Final Public Meeting #3 (5:30 – 7:00 pm)
- **February 19 (Thursday):** Final HMPC Meeting #5 (9:00 am – 12:00 pm)

Mitigation Strategy Meetings - Follow up

- **October 3 (Friday):** Mitigation Strategy (goals/actions) follow up processed and sent to Madera/HMPC
- **November 7 (Friday):** Mitigation Action (Project) Worksheets due to Foster Morrison

LHMP Document Drafts

- **November 21 (Friday):** HMPC (First) Draft LHMP to Madera /HMPC
- **January 9 (Friday):** Madera/HMPC comments due on Draft Plan
- **January 23 (Friday):** Comments incorporated into Public Review (Second) Draft to Madera
- **January 28 (Wednesday):** Public Review Draft on Madera website
- **February 27 (Thursday):** all Madera, HMPC, and Public input to Foster Morrison
- **March 13 (Friday):** Public and final comments incorporated and LHMP ready for submittal to Cal OES – **March 2026**

2026 Madera Hazard Identification & Profiles

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude / Severity	Significance	Climate Change Influence
Agricultural Hazard: Severe Weather/Pests/Invasives	Extensive	Likely	Critical	High	Medium
Climate Change	Extensive	Likely	Limited	Medium	--
Dam Failure	Significant	Unlikely	Critical	High	Medium
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake (w/subhazards)	Significant	Unlikely	Critical	Medium	Low
Floods: 1%/0.2% annual chance (w/levee failure)	Significant	Occasional/ Unlikely	Critical	High	Medium
Floods: Localized Stormwater	Extensive	Highly Likely	Limited	Medium	Medium
Hazardous Materials Transportation	Limited	Occasional	Limited	Medium	Low
Landslide, Mudslide, Debris Flow	Limited	Likely	Limited	Medium	Medium
Severe Weather: Extreme Cold, Freeze, and Snow	Significant	Highly Likely	Limited	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	Medium	High
Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely	Limited	Medium	Medium
Wildfire (w/smoke and air quality)	Extensive	Highly Likely	Catastrophic	High	Medium/High

Geographic Extent

Limited: Less than 10% of planning area

Significant: 10-50% of planning area

Extensive: 50-100% of planning area

Likelihood 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 10 years or less.

Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.

Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

Catastrophic: More than 50 percent of property severely damaged; 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 and/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

Climate Change Influence

Low: Minimal potential impact

Medium: Moderate potential impact

High: Widespread potential impact

Risk Assessment Methodology

Calculating Likelihood of Future Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrence is categorized into one of the following classifications:

- **Highly Likely**: Near 100% chance of occurrence in next year, or happens every year.
- **Likely**: Between 10 and 90% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
- **Occasional**: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
- **Unlikely**: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Calculating Vulnerability

Vulnerability is measured in general, qualitative terms, and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential:

- **Extremely Low**: The occurrence and potential cost of damage to life and property is very minimal to non-existent.
- **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. Here 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 already occurred in the past.
- **Extremely High**: Very widespread and catastrophic impact.

Defining Significance (Priority) of a Hazard

Defining the significance or priority of a hazard to a community is based on a subjective analysis of several factors. This analysis is used to focus and prioritize hazards and associated mitigation measures for the plan. These factors include the following:

- **Past Occurrences**: Frequency, extent, and magnitude of historic hazard events.
- **Likelihood of Future Occurrences**: Based on past hazard events.
- **Ability to Reduce Losses through Implementation of Mitigation Measures**: This considers both the ability to mitigate the risk of future occurrences as well as the ability to mitigate the vulnerability of a community to a given hazard event.

Risk Assessment Summary: Madera 2026 LHMP

Madera County Disasters since 2018 LHMP

- 2020 Fires (two federal and one state)
- 2020 Pandemic (two federal and two state)
- 2021 Mono Wind event (state)
- 2022 Extreme heat and fires (state)
- 2023 Severe Storms (four federal and three state)

Agricultural Hazard: Severe Weather/Pests/Invasives

- Agricultural losses occur on an annual basis and are usually associated with severe weather events, including heavy rains, flood, freeze, heat, and drought. Other agricultural hazards include freeze, crop and livestock disease, insects and noxious weeds.
- According to 2023 Crop Report, many commodities are grown in Madera County. The top three commodities for the County in 2022 were almonds, milk, and pistachios. According to the 2023 Crop Report, gross value of all production was $1,859,365,000; this is a decrease of $161,318,000 or 7.98% as compared to the revised 2022 production value of $2,020,683,000.
- One State Disaster Declaration related to Agricultural Disease in 1982.
- There have been 16 USDA declarations: 12 from drought, 2 from freeze, 1 from hailstorm, rain, cold temperatures, and 1 from excessive rain and hail.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium/High
- Priority Hazard

Climate Change

- The 2023 State of California Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the year. Climate change has the potential to alter the nature and frequency of most hazards.
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Dam Failure

- According to data provided by Madera County and Cal DWR, DSOD, there are 24 dams located in Madera County constructed for flood control, storage, electrical generation, and recreational purposes. Of the 24 dams, 2 are rated as Extremely High Hazard, 9 High Hazard, 2 as Significant Hazard, 8 as Low Hazard, and 3 were unknown. There are another 4 Extremely High Hazard dams, 1 High Hazard Dam, and 1 Significant Dam in Fresno County with the potential to impact the County. The dams of concern without inundation mapping include: High Hazard dams - Big Creek #6 and Friant dams and Significant Hazard dams – Black Hawk dam. All three of the dams without inundation mapping are located in Madera County.

- The most significant dams of concern include the Extremely High and High Hazard dams where loss of life is possible.
- According to multiple sources, there have been no past dam failure events.
- Likelihood of Future Occurrence: Unlikely
- Vulnerability: High
- Priority Hazard

Drought and Water Shortage

- The main water source in Madera County, California, is groundwater, primarily drawn from the Madera Subbasin, part of the larger San Joaquin Valley Groundwater Basin. This aquifer supplies water for domestic, agricultural, and industrial uses across the County, including the City of Madera, which operates 20 groundwater wells to serve its residents.
- Historical drought data for the Madera County Planning Area and region indicate there have been 5 significant droughts in the last 84 years.
- 1 federal (1977 for 1976 drought) and 4 state disaster declarations (1976, 2008, 2014, and 2015) for Madera County since 1950. There have been 249 NCDC drought events in Madera County. Most of these were from 2014-2024 drought, but no damages, injuries, or losses were reported in the NCDC database.
- Likelihood of Future Occurrence: Likely
- Vulnerability: High
- Priority Hazard

Earthquake (w/subhazards)

- Madera County is in the Central Valley, Foothill, and Sierra Nevada regions of California, and in an area crossed by very few faults. One fault does cross through the southeastern portion of Madera County; this is an unnamed fault that is part of the Hartley Springs Fault Zone. There are several nearby faults including the San Andreus fault, some 40 miles away.
- The western half of Madera County is in the lowest Earthquake Shaking Potential for California. It is likely that the region will be impacted by future seismic activity and with the exception of the far eastern edge of the County, the magnitude/severity of the incidents are not likely to be severe.
- There have been no disaster declarations in the County. No major earthquakes have been recorded within the County; although the County has felt ground shaking from earthquakes with epicenters located elsewhere.
- Likelihood of Future Occurrence: Unlikely – large, damaging earthquake; Occasional – minor earthquake
- Vulnerability: High
- Priority Hazard

Flood Hazards

1%/0.2% year (w/levee failure)

- Historically, portions of Madera County have always been at risk to flooding because of its annual percentage of rainfall, snowfall in the winter, and the number of watercourses that traverse the County.
- Madera County experienced 20 state and 21 federal declarations and 74 NCDC events for flood.
- Damaging floods in Madera County occur primarily in the developed areas of the County.

- No levees are certified as providing protection against the 1% annual chance flood. Approximately 90% of the levees are adjacent to agriculture. There is limited residential or commercial development occurring near leveed areas. The County is looking to certify levees in the future.
- Likelihood of Future Occurrence: 1% annual chance-Occasional; 0.2% annual chance -Unlikely, Levee Failure-Unlikely
- Vulnerability: High
- Priority Hazard

Localized/Stormwater flooding

- Significant localized flood history in the County – occurs annually.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Hazardous Materials Transportation

- Most of the hazardous materials transported through Madera County are carried by truck on State highways or by railway systems. Pipeline Systems also carry hazardous materials, but are not specifically profiled as part of this hazard.
- The United States Department of Transportation Pipeline and Hazardous Materials Safety Administration's (PHMSA) Office of Hazardous Materials Safety tracks transportation incidents: 20 rail and roadway incidents have occurred (been reported) since 1970.
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Landslides, Mudslides, and Debris Flows

- There have been 7 federal and 7 state disaster declarations associated with floods and heavy rains and storms (where landslides damages) were noted in Madera County.
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Severe Weather

Extreme Cold, Freeze, and Snow

- Significant County history: annual occurrences. East side of County is where most snow occurs.
- 4 state and 3 federal disaster declarations related to freeze events. 3 USDA events.
- 787 severe winter weather and freeze events (NCDC) since 1993.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Extreme Heat

- Annual occurrences of hot weather.
- Heat domes have settled over the County in the past, which has caused the County to open cooling centers.

- No disaster decs (State, FEMA, USDA) from extreme heat. However, extreme heat contributes to the drought hazard which has been a significant issue in the County.
- 122 extreme heat events (NCDC) since 1993.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Heavy rains and storms (Hail, Lightning, Wind)

- Significant County history: annual occurrences
- The NCDC data recorded 67 hail, heavy rain and storm incidents for Madera County since 1950.
- There have been 20 state and 21 federal declarations for storms (which caused flooding) since 1950. 2 USDA declarations from heavy rains.
- Severe storms/heavy rains are the primary cause of most major flooding.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

High Wind and Tornadoes

- Significant County history: annual occurrences – primarily with high winds.
- The NCDC data recorded 271 high wind and tornado incidents for Madera County since 1950. No state, federal or USDA Disaster Declarations. This included 21 reported funnel clouds; no tornadoes.
- In addition to contributing to downed trees, power outages, and wildfire spread, the 2018 LHMP noted the concern with significant dust storms caused by wind events.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Wildfire (w/smoke and air quality)

- Wildfires occur on an annual basis in the Madera County Planning Area.
- Numerous named fires have caused a variety of damages in the County.
- Any ignition has the potential to become an out of control wildfire.
- 5 state and 9 federal disaster declarations for Wildfire since 1950 in the County. NCDC listed 118 wildfire events since 1993.
- There have been 4 PSPS events noted since the 2018 LHMP (2019, 2020, 2021, 2024); all but the 2019 event was cancelled prior to taking effect.
- There has been increased difficulty in obtaining home insurance and the cost of insurance premiums throughout wildfire prone communities in California. Many residents have experienced cancellations of their policies due to catastrophic and recent wildfires occurring throughout California which has reduced the risk tolerance of many insurance companies.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Extremely High
- Priority Hazard

Madera County 2026 LHMP Update Priority Hazards

SHOULD ANY HAZARDS BE MOVED TO LOW PRIORITY – ARE THERE MITIGATION ACTIONS FOR EACH OF THESE HAZARDS?

Madera County

Priority Hazards:

- Ag Hazards: Severe Weather/Pests/Invasives
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake (w/subhazards)
- Flood: 1%/0.2% Annual Chance Flood (w/ levee failure)
- Flood: Localized Stormwater
- Hazardous Materials Transportation
- Landslide, Mudslide, and Debris Flow
- Severe Weather: Extreme Cold, Freeze, and Snow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
- Severe Weather: High Winds and Tornados
- Wildfire (w/smoke and air quality)

Non-Priority Hazards:

-
-
-

City of Chowchilla

Priority Hazards:

- Drought & Water Shortage
- Earthquake (w/ subhazards)
- Flood: 1%/0.2% annual chance (w/levee failure)
- Flood: Localized/Stormwater
- Hazardous Materials Transportation
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
- Severe Weather: High Winds and Tornadoes
- Wildfire (w/smoke and air quality)

Non-Priority Hazards:

- Ag Hazards: Severe Weather/Pests/Invasives
- Climate Change
- Dam Failure
- Landslide, Mudslide, and Debris Flow
- Severe Weather: Extreme Cold, Freeze, and Snow
-
-

City of Madera

Priority Hazards:

- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake (w/subhazards)
- Flood: 1%/0.2% annual chance (w/levee failure)
- Flood: Localized/Stormwater
- Severe Weather: Extreme Cold, Freeze, and Snow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
- Severe Weather: High Winds and Tornadoes
- Wildfire (w/smoke and air quality)

Non-Priority Hazards:

- Ag Hazards: Severe Weather/Pests/ Invasives
- Hazardous Materials Transportation
- Landslide, Mudslide, and Debris Flow
-
-

Mitigation Strategy: Goals

The most important element of the LHMP is the resulting mitigation strategy which serves as the long-term blueprint for reducing potential losses identified in the risk assessment. The mitigation strategy is comprised of three components:

12. Mitigation Goals
13. Mitigation Actions
14. Mitigation Action (Implementation) Plan

Mitigation Goals

Up to now, the Hazard Mitigation Planning Committee (HMPC) has been involved in collecting and providing data for the 2026 Madera County Local Hazard Mitigation Plan Update. From this information, a Risk Assessment has been developed that describes the risk and vulnerability of Madera to identified hazards and includes an assessment of the County's current capabilities for countering these threats through existing policies, programs, and projects.

This analysis identifies areas where improvements could or should be made. Formulating Goals should lead to incorporating these improvements into the Mitigation Strategy portion of the LHMP. Our planning goals should provide direction for what risk reduction activities can be undertaken to make the Madera County Planning Area more disaster resilient.

Mitigation Goals are general guidelines that represent the County's vision for reducing or avoiding losses from identified hazards. Goals are stated without regard for achievement, that is, implementation, cost, schedule, and means are not considered.

Goals are public policy statements that:

- **Represent basic desires of the jurisdiction;**
- **Encompass all aspects of planning area, 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.**
  - ✓ While goals are not specific (quantitative), they should not be so general as to be meaningless or unachievable.
  - ✓ Goal statements may form the basis for objectives. They should be stated in such a way as to develop one or more objectives related to each goal.
  - ✓ The key point in writing goals is to remember that they must deal with results, not the activities that produce those results.
  - ✓ Consider other planning area goals from other regional/county/city programs, plans and priorities.

Types/Sources of other area mitigation plans/ programs include:

- General Plans
- Master and Strategic Plans

- Stormwater Program and Plans
- Flood/Levee/Stormwater Management Plans and Studies
- Drought Plans, Urban/Integrated Regional Water Management Plans
- Earthquake Studies and Plans
- Community Wildfire Protection Plans
- Strategic Fire Plans
- Dam Emergency Action Plans
- Emergency Operations Plans
- Climate Plans
- Others?

2018 California State Hazard Mitigation Plan Goals

1. Significantly reduce life loss and injuries.

2. Minimize damage to structures and property, as well as minimizing interruption of essential services and activities.

3. Protect the environment.

4. Promote community resilience through integration of hazard mitigation with public policy and standard business practices.

2023 State Hazard Mitigation Plan Goals

GOAL 1—Significantly reduce risk to life, community lifelines, the environment, property, and infrastructure by planning and implementing whole-community risk reduction and resilience strategies.

GOAL 2—Build capacity and capabilities to increase disaster resilience among historically underserved populations, individuals with access and functional needs, and communities disproportionately impacted by disasters and climate change.

GOAL 3—Incorporate equity metrics, tools, and strategies into all mitigation planning, policy, funding, outreach, and implementation efforts.

GOAL 4—Apply the best available science and authoritative data to design, implement, and prioritize projects that enhance resilience to natural hazards and climate change impacts.

GOAL 5—Integrate mitigation principles into laws, regulations, policies, and guidance to support equitable outcomes to benefit the whole community.

GOAL 6— Significantly reduce barriers to timely, efficient, and effective hazard mitigation planning and action.

Goals from Other Madera/Regional Plans

2024, Madera County Emergency Operations Plan (EOP), Sheriff's OES

- Provide effective life saving measures.
- Reduce property loss and damage to the environment.

- Rapidly return essential government and business services to the public
- Address the needs of those affected by the emergency or disaster.

2024, Madera-Mariposa-Merced Fire Plan

The Madera-Mariposa-Merced Unit has developed its fire plan to align with the CAL FIRE Strategic Plan and the California Fire Plan. The focus of these goals is protection of life, property, and natural resources from wildland fire, as well as the improvement of Environmental Resilience to wildland fire. The Unit's specific goals target anticipation and reduction of wildfires within the boundaries of the three counties and are as follow:

- Improve operational effectiveness.
- Scale to budgetary and fiscal circumstances
- Foster a healthy ecosystem.
- Improve firefighter safety.

2023 Madera County Communities Wildfire Protection Plan (CWPP), Sheriff's OES

- Identify and obtain input from stakeholders and offer recommendations to the County Board of Supervisors (BOS).
- Establish a community risk assessment and prioritize Communities-At-Risk.
- Establish a realistic plan of action utilizing the established priorities to mitigate the wildfire threat.
- Establish an assessment strategy that monitors project progress and results.
- Establish a community outreach program that will increase public awareness of the wildfire problem within their community.

Madera County (Draft 2025) General Plan: Hazard Related Goals: Safety Element

Seismic and Geological Hazards

Goal A: Minimize the loss of life, injury, and property damage due to seismic and geological hazards.

Policies:

- Require the preparation of a soils engineering and geologic-seismic analysis prior to permitting development in areas prone to geological or seismic hazards (i.e., groundshaking, landslides, liquefaction, critically expansive soils).
- In landslide hazard areas, prohibit avoidable alteration of land in a manner that could increase the hazard, including concentration of water through drainage, irrigation, or septic systems; removal of vegetative cover; and steepening of slopes and undercutting the bases of slopes. Areas of known landslides should be designated for open space uses.
- Limit development in areas of steep or unstable slopes to minimize hazards from landslides. Development will be prohibited in areas with slopes of 30 percent or more unless it can be demonstrated by a registered engineer or registered engineering geologist that such development will not present a public safety hazard.
- Continue to support scientific geologic investigations that refine, enlarge, and improve the body of knowledge on active fault zones, unstable areas, severe groundshaking, and other hazardous conditions in Madera County.

Flood Hazards

Goal B: Minimize the risk of loss of life, injury, damage to property, and economic and social dislocations resulting from flood hazards.

Policies:

- Restrict uses in designated floodways to those that are tolerant of occasional flooding and do not restrict or alter flow of flood waters. Such uses may include agriculture, outdoor recreation, mineral extraction, and natural resource areas.
- The County shall require, for areas protected by levees, all new developments to include a notice within the deed that the property is protected from flooding by a levee and that the property can be subject to flooding if the levee fails or is overwhelmed.
- Require project applicants to secure an encroachment permit from the Central Valley Flood Protection Board for any project that falls within the jurisdiction regulated by the Board (e.g., levees, designated floodways).
- Require flood-proofing of structures in areas subject to flooding and require all development within FEMA special flood hazard areas (SFHA) be designed and constructed in a manner that will not cause floodwaters to be diverted onto adjacent property or increase flood hazards to other areas.
- Require adequate setbacks from flood control levees consistent with Federal, State, and local design and management standards, and for new development adjacent to an existing or planned levee to dedicate the levee footprint and necessary setback areas in a manner acceptable to the appropriate levee maintaining agency. The County shall prohibit new development from using levees as a primary access point.
- Provide assistance or other cost-effective measures for reducing flood risk to existing structures located in Federal, State, and/or local determined special flood hazard areas.
- Require new development and redevelopment projects incorporate low impact design measures for stormwater management, such as bioswales, permeable pavement, and onsite detention ponds.
- Strive to ensure that all levees protecting urban or urbanizing areas provide a minimum of 100-year flood protection in accordance with the Madera County Code (Title 14, Section IV. Flood Damage Prevention) and the Federal Emergency Management Agency (FEMA) standard of flood protection.
- Require flood management programs avoid alteration of waterways and adjacent areas, whenever possible.
- Continue to support Federal, State, and regional flood control management practices and flood control infrastructure improvements that increase Madera County's level of flood protection
- Continue to participate in the National Flood Insurance Program and the Community Rating System, including:
  - ✓ Maintain minimum National Flood Insurance Program requirements, and adopt more stringent standards to further promote sound flood plain management as feasible;
  - ✓ Promote the purchase of flood insurance;
  - ✓ Conduct outreach campaigns to inform the public of the risk of flooding; and
  - ✓ Coordinate with Federal, State, and local agencies on efforts to enhance the effectiveness of the implementation of the National Flood Insurance Program.
- Maintain and implement the following plans for dam failure and flood evacuation:
  - ✓ Madera County Emergency Action Plan
  - ✓ Madera County Local Hazard Mitigation Plan
- Coordinate with local, regional, State, and Federal agencies to define existing and potential flood problem areas associated with expected impacts from climate change and develop strategies to improve and maintain flood control facilities accordingly.
- Collaborate with State, regional, and local flood management agencies to provide relocation assistance or other cost-effective measures for reducing flood risk to existing economically disadvantaged communities located in non-urbanized areas.

Fire Hazards

Goal C: Minimize the risk of loss of life, injury, and damage to property and natural resources resulting from unplanned fires.

Policies:

- Restrict development in Very High Fire Hazard Severity Zones unless the applicant can demonstrate the project would be designed and constructed to minimize the risk from fire hazards and meets all applicable state and county fire standards. for development in VHFHSZs. In HFHSZs and VHFHSZs the County shall limit parcel sizes to 2 ½ acres or larger and require clustered or planned residential development with on-site fire suppression measures.
- Require all new development implement fire protection plans if development is to occur in a VHFSZ.
- Require all new development and redevelopment meet County minimum fire flow requirements.
- Ensure existing and new buildings of public assembly incorporate adequate fire protection measures to reduce the potential loss of life and property in accordance with state and local codes and ordinances.
- Coordinate with fire protection agencies to continue and expand education programs in schools, service clubs, organized groups, industry, utility companies, government agencies, press, radio, and television in order to increase public awareness of fire hazards within the county.
- Coordinate with the Fire District to maintain and update mutual aid agreements with fire agencies from adjacent cities and counties.
- Actively collaborate with regional, state and federal fire agencies to coordinate and implement wildfire mitigation measures and fuel load modifications reduction zones, including load clearing, prescribed burns, fire breaks, livestock grazing, and public and private road clearance and other mitigation activities for areas proximal to the county.
- Maintain adequate fire service and water supply, including fire equipment and infrastructure, to respond to wildfires and urban fires.
- Coordinate with utility providers to encourage undergrounding of existing and future utility infrastructure, including power lines, prioritizing areas of high wildfire risk.

Climate Change Hazards

Goal D: Minimize the risk of loss of life, injury, and damage to property from climate change impacts.

Policies:

Extreme Temperatures

- Broaden the functionality and expand the locations of cooling/warming sites, prioritizing communities with a combination of extreme temperature exposure and a high concentration of vulnerable populations , including communities in southeastern and southwestern areas of the county. Prioritize implementation of cooling and warming strategies in areas with an overlap of high temperatures or extreme cold and concentrated vulnerable populations, such as in southeast and southwest Madera County.
- Increase urban green spaces, and shading to reduce impacts of extreme heat on public health and infrastructure. Prioritize implementation of cooling strategies in areas with a high concentration of populations that are most vulnerable to extreme heat.
- Identify funding for and assess public spaces in the unincorporated parts of the county to convert buildings into additional resilience centers.
- Educate residents on energy-saving strategies, such as setting thermostats to comfortable yet efficient temperatures and running appliances at off-peak hours, that can be used during heat waves or extreme cold events to help reduce the demand on the electrical grid.

Drought

- Incentivize water conservation and efficiency techniques and provide conservation assistance to vulnerable populations.
- Collaborate with water agencies to identify and mitigate disparities in water rate structure changes, water supply deficiencies, and water distribution disruptions induced by climate change by creating a Water Equity Action Plan.
- Create a program to assist well owners with testing and remediation of their wells for contamination. Implement drought contingency supplies for those dependent on well water.
- Consider expanding use of greywater systems and increasing recycled water use.
- Encourage agricultural providers to apply for and utilize the County's Multi-benefit Land Repurposing Program to receive financial assistance in adopting water conserving irrigation methods on agricultural lands.

Air Quality

- Assist residents, especially those in vulnerable populations, in implementing home retrofits to improve indoor air quality and purchase indoor air filters.
- Reduce illegal burning by improving garbage pickup, particularly in rural areas with limited existing solid waste services, and incentivizing agricultural producers to report and track all burning on properties.

Public Health

- Collaborate with county health services (and other health services as appropriate) on communication and mitigation/adaptation strategies during public health crises, such as communicable and infectious diseases, extreme heat events, and other climate threats

Public Safety and Emergency Management

Goal F: Protect public health and safety through effective emergency preparedness, safe location of structures necessary for the protection of public safety and/or the provision of emergency services, and strategies to prepare for, respond to, recover from, and mitigate the effects of natural or technological disasters.

Policies:

- Maintain and update the County's Operational Area Emergency Plan and Local Hazard Mitigation Plan, at minimum every five years
- Coordinate emergency preparedness, response, recovery, and mitigation activities with special districts, service agencies, voluntary organizations, cities within the county, surrounding cities and counties, and state and federal agencies.
- Ensure that the siting of critical facilities such as hospitals, fire stations, sheriff's offices and substations, dispatch centers, emergency operations centers, and other emergency service facilities and utilities are located outside of flood, seismic and geological and wildfire hazard zones.
- Develop redundant and alternative infrastructure to ensure the uninterrupted provision of essential services in the event of a disaster, including electricity, water supply, communication networks, emergency services, and medical care.
- Establish multiple methods for disseminating emergency alerts and communication, including methods that target vulnerable populations, such as households without internet access and people with visual and auditory disabilities, and non-English speaking communities.
- Design new critical facilities and retrofit existing critical facilities to be resilient to climate hazards.

- Ensure all emergency information is provided in languages other than English that are spoken by at least 5 percent of the county's population.
- Upon updates to the Safety Element or LHMP, the County shall review and update the Land Use Element and Zoning Code to ensure land use and zoning designations align with current hazard mapping data.

Emergency Access and Evacuation

Goal G: Ensure that all community members are able to evacuate safety and efficiently in the event of a natural or human-made disaster.

Policies:

Planning

- Maintain and implement the County's comprehensive communication plan to disseminate evacuation instructions to residents.
- Identify areas of the county with concentrations of vulnerable populations that may need evacuation assistance, including persons with disabilities, seniors, persons with medical conditions, households without a vehicle, and non-English speaking households.
- Identify and implement alternative evacuation routes for single-access neighborhoods and areas with evacuation constraints.
- Identify traffic management solutions to increase evacuation capacity and ensure efficient and safe evacuation procedures.
- Ensure emergency response personnel have access to all neighborhoods within the county.
- Ensure roads used for emergency access are properly maintained and free of obstructions.
- Prioritize maintenance and updates of major evacuation roadways to prepare for an evacuation.
- Ensure all new development has a minimum of two points of ingress and egress that meet minimum road standards.

Outreach

- Provide annual emergency preparedness workshops and trainings for residents to inform residents of major evacuation routes and evacuation procedures.
- Engage with and empower rural communities by expanding self-sufficiency resources, such as directing residents making disaster preparedness plans and providing items or funding for preparing emergency kits, for disaster-isolated communities.

Equitable Community Safety

Goal H: County emergency preparedness and response resources, funds, infrastructure investments, and services are equitably allocated based on greatest sensitivity and need.

Policies:

- Engage with collaborative networks and community-based organizations in emergency planning, response, and recovery through providing resources and application assistance for funds to enhance community communication and increase access to emergency resources, especially for individuals facing financial, physical, social, documentation, and language barriers.
- Identify areas of the county with concentrations of vulnerable populations, including with low-income households, non-English speaking households, and persons disabilities, seniors, persons with medical conditions.

Hazardous Materials

Goal I: Minimize the risk of loss of life, injury, serious illness, damage to property, and economic and social dislocations resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous materials wastes.

Policies:

- Ensure the use, storage, and disposal of hazardous materials in the county complies with local, state, and federal safety standards
- Encourage source reduction, recycling, and on-site treatment of hazardous wastes to reduce hazardous waste generation and disposal.
- Require a buffer between sensitive land uses and facilities that store or use hazardous materials.
- Review all proposed development projects that manufacture, use, or transport hazardous materials for compliance with the County's Hazardous Waste Management Plan (CHWMP).
- Require uses that generate hazardous wastes or utilize hazardous materials prepare and implement a hazardous materials business plan to ensure the safe handling, storage, transport, and disposal of hazardous materials. The plan shall address emergency response procedures in the event of a release or threatened release of a hazardous material.
- Encourage the Department of Toxic Substances Control and the California Highway Patrol to review permits for radioactive materials on a regular basis and to promulgate and enforce public safety standards for the use of these materials, including the placarding of transport vehicles.
- Work with local fire protection and other agencies to ensure an adequate countywide response capability to hazardous materials emergencies.

City of Chowchilla (2040) General Plan: Hazard Related Goals: Public Safety Element

Goals

- Minimize community exposure to harmful impacts caused by natural or manmade hazards.
- Minimize community exposure to risks associated with the transport, distribution, use and storage of hazardous materials.
- Minimize community exposure to toxic air pollutant emissions and noxious odors from industrial, manufacturing and processing facilities.
- Provide adequate public safety facilities and services in a timely manner to meet existing and planned growth requirements.

Objectives and Policies

Seismic (Earthquake)

Objective 1: Minimize risks of potential property damage and personal injury posed by geologic or seismic activity.

- Policy PS 1.1. Areas within the 2040 General Plan Planning Area know to be subject to geologic or seismic instability (e.g., liquefaction, slumping) shall be designated as Open Space to prohibit development and avoid creating a potential public safety hazard.
- Policy PS 1.2. Geologic and engineering studies are required for all new and redevelopment projects where known or questionable geological or seismic hazard conditions exist.

- Policy PS 1.3. Geologic and engineering studies are required for all public and critical facility projects (e.g., school, hospital, utility substation, water storage reservoir, wastewater treatment facility, public safety building, bridges and overpasses).
- Policy PS 1.4. Ensure new and redevelopment projects comply with adopted seismic and geotechnical requirements of the Uniform Building Code.
- Policy PS 1.5. Support and encourage seismic upgrades to older homes and structures in the City of Chowchilla that may be structurally deficient.

Flooding

Objective 2: Minimize risks of potential property damage and personal injury from flooding.

- Policy PS 2.1. The City of Chowchilla shall cooperate with appropriate local, state and federal agencies to address local and regional flood issues.
- Policy PS 2.2 Development of urban uses, with the exception of passive recreation use areas and pedestrian / bicycle trails within a floodway or floodplain subject to a 100-year flood event shall be prohibited.
- Policy PS 2.3. Preserve floodways and floodplains for non-urban uses with the exception of passive or active recreational development may be allowed in a floodplain with appropriate measures that avoid or minimize damage to recreation or structural improvements.
- Policy PS 2.4. Ensure that potential flooding impacts, including on-site flood damage, and potential inundation, are adequately addressed through the environmental review process and appropriate mitigation is imposed.
- Policy PS 2.5. Establish and maintain evacuation routes for areas that could be affected by flooding or dam failure, with special emphasis on critical and emergency facilities.

Objective 3: Minimize risks of potential property damage and personal injury in the event of a dam failure.

- Policy PS 3.1. The City of Chowchilla, in cooperation with the County of Madera, shall continue to maintain a disaster relief plan that addresses potential flood inundation in the areas of Eastman Lake or Berenda Reservoir in the event of a dam failure.

Fire Prevention and Response

Objective 4: Minimize risks of potential property damage and personal injury from wildland fires.

- Policy PS 4.1. New and redevelopment projects in a designated moderate fire hazard severity zone shall comply with the Wildland-Urban Interface Fire Area Building Standards.
- Policy PS 4.2. New and redevelopment projects in which the elimination of a wildland fire hazard would require the significant removal of, or damage to, established trees and other riparian vegetation associated with Ash Slough or Berenda Slough shall not be permitted.

Objective 5: Protect property in urbanized areas from fire hazards.

- Policy PS 5.1. Ensure that new fire stations, personnel and equipment are provided to sufficiently meet the needs of the City as it grows in size and population.
- Policy PS 5.2. New and redevelopment projects shall mitigate fire hazards related to urban development or patterns of urban development as they are identified.
- Policy PS 5.3. Ensure that potential fire impacts are adequately addressed through the environmental review process and appropriate mitigation is imposed.
- Policy PS 5.4. Pursue strategies to improve the City of Chowchilla's Insurance Service Office (ISO) rating.
- Policy PS 5.5. The City of Chowchilla shall continue to cooperate with the Madera County Fire Department in the provision of fire protection services through a mutual aid agreement.

- Policy PS 5.6. The City of Chowchilla shall require that new development provide adequate access for emergency vehicles, particularly firefighting equipment, as well as provide evacuation routes, where applicable.
- Policy PS 5.7. The City of Chowchilla shall ensure adequate fire flow requirements are maintained throughout the City.
- Policy PS 5.8. The City of Chowchilla shall consider protection from fire hazards in all planning, regulatory and capital improvement programs.
- Policy PS 5.9. The City shall continue to promote public awareness and prevention of fire hazards through fire prevention programs.
- Policy PS 5.10. The City of Chowchilla shall maintain a weed abatement program to ensure clearing of dry vegetation. Weed abatement activities shall be conducted in a manner consistent with all applicable environmental regulations.

Objective 6: Provide high quality emergency services to protect life and property in the City of Chowchilla.

- Policy PS 6.1. Provide for efficient and cost effective fire and emergency medical service to minimize potential injury, loss or destruction to persons or property.
- Policy PS 6.2. Minimize urban fire hazards within the Chowchilla Planning Area.

New Development Responsibility

Objective PS 10: Protect the City of Chowchilla and its environment from harmful effects of hazardous materials.

- Policy PS 10.7. The City of Chowchilla shall require that all new habitable structures be setback at least 85 feet from the nearest railroad track. These setback areas shall be measured from the edge of the outermost railroad track.
- Policy PS 10.8. The City shall require that hazardous materials are used, stored, transported and disposed of within the City in a safe manner and incompliance with local, state and federal regulations.

Transportation Networks

Objective PS 13: Protect the community from potential airport and air transportation hazards.

- Policy PS 13.10. To the extent feasible, locate new buildings of high public occupancy – particularly schools, medical, civic and institutional uses – at an adequate distance from main railroad alignments and the highway to minimize risks to life and property in the event of a hazardous cargo accident.

Emergency Services (Fire, Police, and Public Works)

- Policy PS 14.3. Maintain an Emergency Preparedness Plan.

Objective PS 15: Protect Chowchilla from hazards associated with the natural environment.

- Policy PS 15.1 Minimize risks of personal injury and property damage associated with natural hazards.

Objective PS 16: To maintain emergency preparedness programs to protect the public.

- Policy PS 16.1. The City of Chowchilla shall coordinate with local, state and federal agencies to maintain and test a coordinated emergency response system that addresses a variety of public safety challenges.
- Policy PS 16.2. The City of Chowchilla shall support and periodically update its emergency preparedness programs to meet current local, state and federal requirements.
- Policy PS 16.3. The City shall ensure that major access and evacuation corridors are available and unobstructed in case of a major emergency or disaster.

- Policy PS 16.4. The City of Chowchilla shall ensure that the siting of critical emergency response facilities (i.e., public safety facilities, medical, emergency operations center, substations) have minimal exposure to flooding, seismic, fire and explosions.
- Policy PS 16.5. The City shall seek to minimize vulnerability of its infrastructure.
- Policy PS 16.6. The City shall complete regularly scheduled reviews and updates of its emergency management plans.

Flood Considerations

Objective PS 17: Ensure and improve safety and protection in areas that are likely to experience flooding.

- Policy PS 17.1. Any areas that have experienced burn shall be cleared and replanted with native vegetation to limit and/or prevent flooding in these areas.
- Policy PS 17.2. Continue the ongoing eradication of Arundo donax (giant cane) from sloughs to reduce the risk of flooded waterways and hard-to-control fires.
- Policy PS 17.3. All wildfire burned areas shall be treated to control storm water runoff prior to winter rains.

Existing Development

Objective PS 18: Public and private landowners shall minimize the risk of fire.

- Policy PS 18.1. Public and private landowners for all existing land uses shall comply with all applicable state and local requirements and implement site-specific safety measures that mitigate to a low-risk condition around or near public facilities, infrastructure, and natural resources such as the city's sloughs.
- Policy PS 18.2. Public and private landowners shall minimize the risk of fire moving from property to property, by increasing structural hardening measures (e.g., fire-rated roofing and fire-resistant construction materials and techniques), maintaining and improving defensible space on site, and supporting vegetation management in adjacent undeveloped areas.

Fire Safety and Emergency Preparedness

Objective PS 19: Employ the many safety opportunities available to reduce the risks of fire and to plan for emergencies.

- Policy PS 19.1. All residential, commercial, and industrial construction and development shall comply with the statewide Fire Safe Regulations (see CCR, Title 14, Sections 1270 et seq.) relating to roads, water, signing, and fuel modification.
- Policy PS 19.2. Public open spaces should be used as demonstration areas and examples to neighborhood residents for fire-adapted and drought tolerant landscapes.
- Policy PS 19.3. Update site landscaping standards to be fire-adapted using native vegetation or fire-resistant planting palettes and prohibit flammable landscape plantings or materials storage within the structure ignition zone (e.g., within 0-5 feet of the structure).
- Policy PS 19.4. Work cooperatively with other agencies and private interests to educate private landowners on fire-safe and defensible measures to increase compliance with existing regulations to achieve a low-risk condition.
- Policy PS 19.5. Review and update emergency response and evacuation plans and procedures at least every five (5) years to reflect current conditions and community needs.
- Policy PS 19.6. Incorporate forecasted impacts from climate change into trends and projections of future fire risk and consideration of policies to address identified risk.
- Policy PS 19.7. As the City continues to grow and its boundaries expand, if the need arises, plan for the future for a new fire station and equipment.

- Policy PS 19.8. Mitigate the impacts of train-related emergency response vehicle delays by planning for a city roadway grade separation.

Environmental Justice Policies for Emergency Preparedness Element

Objective PS 20: Ensure completeness and availability of identified emergency supplies, resources, and programs to all segments of the population.

- Policy PS 20.1. Ensure completeness and availability of identified emergency supplies and resources to all segments of the population, focusing especially on vulnerable and disadvantaged communities, including but not limited to temporary shelter or housing, and items such as medical supplies and services, water main repair parts, generators, pumps, sandbags, road clearing, and communication facilities.
- Policy PS 20.2. Identify or develop programs to provide financial incentives or assistance to low-income households for defensible space maintenance, home hardening, and other measures to reduce risk.

City of Madera (2009/2020) General Plan: Hazard Related Goals: Health and Safety Element

Goals

- A safe and healthy environment for all Maderans that includes: clean air and water; adequate levels of police and fire protection; safe housing; and safe places to work and play.
- A healthy and fit population with access to health care, healthful food, and places to be active and exercise.
- Working with other agencies to protect residents and businesses from hazards caused by flooding.
- Working with other agencies to protect and manage natural drainage ways, floodplains and flood retention basins, to maintain flood carrying capacity in harmony with environmental, recreational and open space objectives.

Policies

Safety

Seismic Hazards

- The City supports efforts by federal, state, and other local organizations to investigate local seismic and geological hazards and support those programs that effectively mitigate these hazards.
- The City shall seek to ensure that new structures are protected from damage caused by earthquakes, geologic conditions, or soil conditions.

Release and Transportation of Hazardous Materials

- The City of Madera will work with responsible agencies to identify and prevent potential hazardous waste releases.
- The City will regulate the storage of hazardous and waste materials consistent with state and federal law. The City shall not permit above ground tanks without considering the potential hazards that would result from the release of stored liquids caused by possible rupture or collapse, and may request applicants to have an emergency response plan.
- The City will work with responsible agencies to ensure that all industrial facilities are constructed and operated in accordance with the most current safety and environmental protection standards.

- The City will consider the potential impacts of facilities which propose to store and/or process significant quantifies of hazardous or toxic materials on the public and nearby properties. The City shall require such projects to prepare a site specific hazard and threat assessment when determined necessary by the City's emergency services department(s) or appropriate consulting agencies. The hazard and threat assessment shall consider the likelihood of reasonably foreseeable events and their potential to create physical effects at off-site locations resulting in death, significant injury, or significant property damage.
- For the purpose of implementing the policy above, the City considers an event to be "reasonably foreseeable" when the probability of the event occurring is greater than of one in one million (1 * 10-6) per year.
- Industries which store and process significant quantities of hazardous or toxic materials shall provide a buffer zone between the installation that houses such substances and the property boundaries of the facility sufficient to protect the public in the event of the release or leak of the materials.
- The City will coordinate with the California Highway Patrol, the Madera County Department of Environmental Health Services, the Madera County Sheriff's Department, and all other appropriate local, state and federal agencies in hazardous materials route planning, notifications, and incident response to ensure appropriate first response to hazardous material incidents.
- The City will work with other responsible agencies on efforts to clean up or contain identified soil or water contamination identified in the city limits. This policy will extend to the former Oberti salt ponds and other related facilities at such time as they are annexed to the city.
- The City shall seek to avoid and minimize exposure of sensitive land uses to potentially hazardous emissions along truck routes and rail lines which may be used by surface vehicles and rail cars carrying hazardous or toxic substances. These truck routes include Avenue 12 and Highways 99 and 145. Rail corridors include the two primary lines running north-south through Madera, as well as the spur line which serves the industrial area in the southwest portion of the City.
- The City shall require written confirmation from applicable local, regional, state, and federal agencies that known contaminated sites have been deemed remediated to a level appropriate for land uses proposed prior to the City approving site development or provide an approved remediation plan that demonstrates how contamination will be remediated prior to site occupancy. This documentation shall specify the extent of development allowed on the remediated site as well as any special conditions and/or restrictions on future land uses.

Drainage and Flooding

- The City shall not permit new development projects to result in new or increased flooding impacts on adjoining parcels in either upstream or downstream areas.
- The City's first priority in preventing risks to life and property resulting from flooding shall be to designate appropriate land uses in areas subject to flooding. Only when this land use-based approach is not sufficient to reduce hazards to life and property to acceptable levels will the City support the construction of new flood control projects.
- The City shall require any development on land subject to a 100-year flood event, based on Federal Emergency Management Agency (FEMA) or on other updated mapping acceptable to the City, to conform to NFIP standards.
- Creation of lots whose access will be inundated by flows resulting from a 10-year or greater storm shall not be allowed. Bridges or similar structures may be used to provide flood-free access.
- The City shall limit the number of crossings of natural streams in order to reduce potential flooding, degradation, hydrological changes and property access problems. Among the methods which may be used to reduce the number of crossings is a shared access drive serving two or more parcels.
- Parcels shall not be created on which the presence of easements, floodplain, marsh or riparian habitat, or other features would leave insufficient land to build and operate structures. This policy shall not

apply to open space lots specifically created for dedication to the City or another appropriate party for habitat protection, flood control, drainage, or wetland maintenance.

- New and modified bridge structures shall not cause an increase in water surface elevations of the 100-year floodplain exceeding one foot, unless analysis clearly indicates that the physical and/or economic use of upstream or downstream property will not be adversely affected.
- The City shall require all new urban development projects to incorporate runoff control measures to minimize peak flows of runoff and/or assist in financing or otherwise implementing comprehensive drainage plans. All such control measures will consider potential affects to adjacent property owners.
- Upon adoption of the Central Valley Flood Protection Plan, and this General Plan, the City shall review the consistencies of City flood-related planning documents for consistency with the current General Plan with the provisions of Central Valley Flood Protection Plan and the policies of the General Plan.
- The City shall continue to cooperate with Madera County and other agencies in pre-disaster planning activities for potential dam breach and similar potential disasters.

Fire Protection

- The City shall ensure the safety and protection of Madera and its community members by providing adequate first response capabilities to emergencies and by maintaining sufficient resources to expand protection as the community grows.
- The City shall continue to maintain and update emergency service plans, including the Madera City Fire Department Emergency Operations Plan and the Hazardous Material Spills Emergency Response Plan.

Madera County Goals from Previous 2018 LHMP (This is what we are updating)

Goal 1: Minimize risk and vulnerability of Madera County to hazards and protect lives and prevent losses to property, public health and safety, economy, and the environment.

- Identify strategies for mitigating hazards to reduce adverse impacts and hazard related losses.
- Provide protection for existing and future development.
- Provide protection for critical facilities, utilities, and services and minimize disruption.
- Provide protection for the environment and natural and cultural resources.
- Prevent repetitive losses and reoccurring damages from happening.
- Minimize hazard related losses through master planning of communities.

Goal 2: Increase community outreach, education, and awareness of risk and vulnerability to hazards and promote preparedness and engagement to reduce hazard-related losses.

- Inform and educate residents and businesses about all hazards they are exposed to, where they occur, and what they can do to mitigate exposure or damages.
- Emphasize preparedness and self-responsibility to residents.

Goal 3: Improve communities' capabilities to prevent/mitigate hazard-related losses and to be prepared for, respond to, and recover from a disaster event.

- Continued improvements to emergency services and public safety capabilities.
- Maintain coordination of disaster/emergency response plans and exercises with changing Department of Homeland Security/FEMA needs and with all agencies operating in Madera County.

- Develop/improve warning, evacuation, and sheltering procedures and information for residents, businesses, visitors, individuals with access and functional needs, and animals, with a focus on high risk areas.
- Improve/Maintain interagency communications. Ensure functionality and redundancy of communications, information technology, and other critical systems.
- Increase interoperability and use of shared resources and mutual aid among agencies operating in Madera County.
- Establish enhanced data collection and retention practices.
- Minimize the over dependence on governmental regulation and allow the public and markets to implement reasonable measures.
- Encourage more stable conditions that facilitate public and private stewardship.

Goal 4: Increase and maintain wildfire prevention and protection in Madera County.

- Reduce the wildfire risk and vulnerability in Madera County
- Reduce life safety issues, property loss, and damages associated with wildfires.
- Develop a countywide fuels reduction implementation strategy.
- Promote tree mortality mitigation activities.
- Promote and enhance fire-fighting capabilities (e.g., access roads, water supply, etc.)

Goal 5: Improve community resiliency to drought conditions including establishing a sustainable water supply in Madera County.

- Reduce the drought/water shortage risk and vulnerability in Madera County.
- Develop a comprehensive, countywide water plan to provide for existing development, to foster preservation of economic base, and to guide future development opportunities.
- Promote continued groundwater conservation.
- Increase water storage facilities to provide for consistent water supply and to mitigate flooding.
- Address drought impacts related to tree mortality to include dead tree removal that contributes to wildfire risk (i.e., increased fuel loads) and flood risk (i.e., downed trees blocking flood control facilities).

Goal 6: Improve community resiliency to flooding in Madera County

- Reduce the flood risk and vulnerability in Madera County.
- Reduce life safety issues, property loss, and damages associated with flooding.
- Review appropriate flood protection infrastructure improvements in both urban and non-urban areas to provide 100-year level of protection where feasible.

Goal 7: Maintain FEMA eligibility for grant funding

- Assure conformance to federal and state hazard mitigation initiatives and maximize potential for mitigation implementation.
- Position jurisdictions for grant funding through monitoring and communicating available grant programs, timelines, and processes to all communities.
- Reduce exposure to hazard-related losses through realistic mitigation project planning and implementation, ensuring that actions can be undertaken and sustained without excessive depletion of economic resources.

Other Example Goal Statements

- Minimize risk and vulnerability from natural hazards
- Increase communities' awareness of vulnerability to hazards
- Increase the use of shared resources
- Improve communities' capabilities to mitigate losses
- Maintain coordination of disaster plans with changing DHS/FEMA needs
- Maintain FEMA eligibility/position jurisdictions for grant funding
- Maintain/enhance the flood mitigation program to provide 200/500-year flood protection
- Maintain current service levels
- Provide protection for existing buildings from hazards
- Provide protection for future development from hazards
- Provide protection for natural and cultural resources from hazard impacts
- Provide protection for people's lives from hazards
- Provide protection for public health
- Provide protection for critical services (fire, police, etc.) from hazard impacts
- Provide protection for critical lifeline utilities from hazard impacts
- Reduce exposure to hazard related losses
- Reduce the number of emergency incidents
- Make better use of technology

General Recommendation for Categories of Goals

- Reduce Losses/Protection of Life, Property, Public Health, and the Environment from all Hazards
- Reduce Losses/Protection of Critical Facilities and Infrastructure from all Hazards
- Public Education
- Increase City Capabilities to all Hazards
- Any Hazard-specific goals
- Integrate strategies for the protection of underserved and vulnerable populations

Goals Development

The purpose of goal's development is to reach a consensus on goals for the Madera County 2026 LHMP Update. Provided above are numerous example goals for this LHMP. ***You may reword those above or develop your own goals.*** These goal statements should serve as examples. It is vital that our HMPC establish its own goals for this update.

You will each be given 3 sticky notes. On each note you will write what you think the goals for this LHMP Update should be. Use one sticky note for each goal.

When done, we will:

- Pin/tape them to the wall/easel-chart and arrange them by category
- Combine and reword them into 3-5 goals for the plan and send them out to the HMPC for further review and refinement

Mitigation Strategy Meetings
September 24 & 25, 2025
Day 2

Mitigation Strategy Action Development: Ground Rules

Rule 1: All participating jurisdictions MUST have a Mitigation Action/Project to address each of their Priority Hazards (those rated as a high or medium significance in their Hazard Identification table).

Rule 2: Every Mitigation Action/Project MUST be supported by Risk Assessment Data contained within Chap 4 of the Base Plan and Jurisdictional Annexes. Note: this might necessitate backfilling the hazard risk assessment data.

Rule 3: The Mitigation Actions/Projects for this 2026 LHMP should reflect each jurisdiction's WISH LIST for mitigation, regardless of funding source.

Rule 4: Any Mitigation Action/Project that might be considered for FEMA mitigation grant funding over the next 5-years covered by this LHMP MUST be included in this 2026 LHMP.

Rule 5: While the updated Mitigation Strategy should include all potential Mitigation Actions/Projects for the participating jurisdictions (regardless of funding source), keep in mind that the jurisdictions are NOT obligated to implement ANY of the identified Mitigation Actions/Projects – all are always subject to funding and changing priorities.

Rule 6: Each Mitigation Action/Project to be included in this LHMP MUST have a Mitigation Action Worksheet completed by the owning jurisdiction, department or agency. This applies to Mitigation Actions/Projects being carried forward from the County's/City's previous 2018 LHMP.

REMEMBER: Having a FEMA approved LHMP for Madera County and participating jurisdictions is a prerequisite for being eligible to apply for FEMA pre and post disaster mitigation funding.

Mitigation Strategy: Actions

Mitigation Actions are specific projects and activities that help achieve the LHMP goals and accomplish risk reduction in the community.

Categories of Mitigation Actions

PREVENTION: Preventive measures are designed to keep the problem from occurring or getting worse. Their objective is to ensure that future development is not exposed to damage and does not increase damage to other properties.

- Planning
- Zoning
- Open Space Preservation
- Land Development Regulations
  - ✓ Subdivision regulations
  - ✓ Building Codes
    - Fire-Wise Construction
  - ✓ Floodplain development regulations
  - ✓ Geologic Hazard Areas development regulations (for roads too!)
- Storm Water Management
- Fuels Management, Fire-Breaks

EMERGENCY SERVICES: protect people during and after a disaster. A good emergency services program addresses all hazards. Measures include:

- Warning (flooding, tornadoes, winter storms, geologic hazards, fire)
  - ✓ NOAA Weather Radio
  - ✓ Sirens
  - ✓ "Reverse 911" (Emergency Notification System)
- Emergency Response
  - ✓ Evacuation & Sheltering
  - ✓ Communications
  - ✓ Backup power supply/generators
  - ✓ Emergency Planning
    - Activating the EOC (emergency management)
    - Closing streets or bridges (police or public works)
    - Shutting off power to threatened areas (utility company)
    - Holding/releasing children at school (school district)
    - Ordering an evacuation (mayor)
    - Opening emergency shelters (Red Cross)
    - Monitoring water levels (engineering)
    - Security and other protection measures (police)
- Critical Facilities Protection (Buildings or locations vital to the response and recovery effort, such as police/fire stations, hospitals, sewage treatment plants/lift stations, power substations)

- ✓ Buildings or locations that, if damaged, would create secondary disasters, such as hazardous materials facilities and nursing homes
- ✓ Lifeline Utilities Protection

➢ Post-Disaster Mitigation

➢ Building Inspections

- ✓ ID mitigation opportunities & funding before reconstruction

PROPERTY PROTECTION: Property protection measures are used to modify buildings subject to damage rather than to keep the hazard away. A community may find these to be inexpensive measures because often they are implemented by or cost-shared with property owners. Many of the measures do not affect the appearance or use of a building, which makes them particularly appropriate for historical sites and landmarks.

➢ Retrofitting/disaster proofing

- ✓ Floods
  - Wet/Dry floodproofing (barriers, shields, backflow valves)
  - Relocation/Elevation
  - Acquisition
  - Retrofitting
- ✓ High Winds/Tornadoes
  - Safe Rooms
  - Securing roofs and foundations with fasteners and tie-downs
  - Strengthening garage doors and other large openings
- ✓ Winter Storms
  - Immediate snow/ice removal from roofs, tree limbs
  - "Living" snow fences
- ✓ Geologic Hazards (Landslides, earthquakes, sinkholes)
  - Anchoring, bracing, shear walls
  - Dewatering sites, agricultural practices
  - Catch basins
- ✓ Drought
  - Improve water supply (transport/storage/conservation)
  - Remove moisture competitive plants (Tamarisk/Salt Cedar)
  - Water Restrictions/Water Saver Sprinklers/Appliances
  - Grazing on CRP lands (no overgrazing-see Noxious Weeds)
  - Create incentives to consolidate/connect water services
  - Recycled wastewater on golf courses
- ✓ Wildfire, Grassfires
  - Replacing building components with fireproof materials
  - Roofing, screening
  - Create "Defensible Space"
  - Installing spark arrestors
  - Fuels Modification
- ✓ Noxious Weeds/Insects

- Mowing
- Spraying
- Replacement planting
- Stop overgrazing
- Introduce natural predators

- Insurance

NATURAL RESOURCE PROTECTION: Natural resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. In so doing, these activities enable the natural beneficial functions of floodplains and watersheds to be better realized. These natural and beneficial floodplain functions include the following:

- storage of floodwaters
- absorption of flood energy
- reduction in flood scour
- infiltration that absorbs overland flood flow
- groundwater recharge
- removal/filtering of excess nutrients, pollutants, and sediments from floodwaters
- habitat for flora and fauna
- recreational and aesthetic opportunities

Methods of protecting natural resources include:

- Wetlands Protection
- Riparian Area/Habitat Protection/Threatened-Endangered Species
- Erosion & Sediment Control
- Best Management Practices

Best management practices ("BMPs") are measures that reduce nonpoint source pollutants that enter the waterways. Nonpoint source pollutants come from non-specific locations. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams. BMPs can be implemented during construction and as part of a project's design to permanently address nonpoint source pollutants. There are three general categories of BMPs:

1. Avoidance: Setting construction projects back from the stream.
2. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
3. Cleanse: Stopping pollutants after they are en route to a stream, such as using grass drainageways that filter the water and retention and detention basins that let pollutants settle to the bottom before they are drained:

- Dumping Regulations
- Set-back regulations/buffers
- Fuels Management
- Water Use Restrictions

- Landscape Management
- Weather Modification

STRUCTURAL: Projects that have traditionally been used by communities to control flows and water surface elevations. Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. These measures are popular with many because they "stop" flooding problems. However, structural projects have several important shortcomings that need to be kept in mind when considering them for flood hazard mitigation:

- They are expensive, sometimes requiring capital bond issues and/or cost sharing with Federal agencies, such as the U.S. Army Corps of Engineers or the Natural Resources Conservation Service.
- They disturb the land and disrupt natural water flows, often destroying habitats or requiring Environmental Assessments.
- They are built to a certain flood protection level that can be exceeded by a larger flood, causing extensive damage.
- They can create a false sense of security when people protected by a structure believe that no flood can ever reach them.
- They require regular maintenance to ensure that they continue to provide their design protection level.

Structural measures include:
- Detention/Retention structures
- Erosion and Sediment Control
- Basins/Low-head Weirs
- Channel Modifications
- Culvert resizing/replacement/Maintenance
- Levees and Floodwalls
- Anchoring, grading, debris basins (for landslides)
- Fencing (for snow, sand, wind)
- Drainage System Maintenance
- Reservoirs (for flood control, water storage, recreation, agriculture)
- Diversions
- Storm Sewers

PUBLIC INFORMATION: A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take protection:

- Hazard Maps and Data
- Outreach Projects (mailings, media, web, speakers, displays)
- Library Resources
- Real Estate Disclosure
- Environmental Education

Mitigation Actions/Projects from 2018 Madera County LHMP (This is what we are updating)

Action Title	Complete	Ongoing	Not Yet Started	In 2025 Update*
Madera County				
Multi-Hazard Actions				
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Action 2. Improved Public Outreach				
Action 3. Review and Bring Current County Plans				
Action 4. Shelter Emergency Plan				
Action 5. Training & Exercises				
Action 6. Recovery Plan				
Action 7. Countywide GIS Data Base				
Action 8. Community Pet Education and Disaster Preparedness				
Agricultural Hazards Actions				
Action 9. Agriculture Emergency Plan				
Climate Change Actions				
Action 10. Climate Adaptation Plan				
Dam Failure Actions				
Action 11. Dam Monitoring				
Drought Actions				
Action 12. Well Rehabilitation Program				
Action 13. Public Water Systems				
Action 14. Expand Surface Water Locations				
Earthquake Actions				
Action 15. Bridge Retrofits and Replacements				
Flood Actions				
Action 16. Relocate County fire station out of floodplain				
Action 17. Relocation of Government Facilities in the Floodplain				
Action 18. Erosion Repair and Restoration Projects				
Action 19. Woody Debris Removals				
Action 20. Flood Insurance Promotion				
Action 21. Stormwater Management Plan				
Action 22. Flood Studies and Action Project				
Action 23. Ash Slough Arundo Removal and Channel Clearing				
Action 24. Berenda Creek Arundo Removal, Channel Clearing and Levee Repairs				
Action 25. Berenda Slough Arundo Removal and Channel Clearing				
Action 26. Cottonwood Creek Channel Clearing and Levee Repairs				

Action Title	Complete	Ongoing	Not Yet Started	In 2025 Update*
Action 27. Dry Creek Channel Clearing and Levee/Embankment Repairs				
Action 28. Fresno River Channel Clearing and Levee/Embankment Repairs				
Hazardous Materials Actions				
Action 29. Crude Oil Emergency Response				
Action 30. Hazardous Materials Decontamination Kits				
Action 31. Ethanol Emergency Response				
Action 32. Madera County ICS typing of Hazardous Materials Team				
Action 33. Mutual Aid Agreements				
Action 34. HAZ-MAT Response				
Extreme Heat/Cold Actions				
Action 35. Cooling/Warming Centers				
Wind and Tornado Actions				
Action 36. Woody Debris Removal - Roadway				
Winter Storms/Snow Actions				
Action 37. Snow Removal Plan				
Wildfire Actions				
Action 38. Educate the public on fire safety and hazard reduction				
Action 39. Fuel Reduction				
Action 40. Pre-suppression plan and Wildland urban interface map				
Action 41. Fire Fighting Access Issues				
Action 42. Tree Mortality				
Action 43. FireWise Communities				
Action 44. Community Chipping Program				
Action 45. Reforestation Projects				

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update*
City of Chowchilla Actions				
All Hazard Actions				
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Action 2. Public awareness, education, outreach, and preparedness program enhancements for all hazards (simplify, multi-media, educate and clarify various emergency systems, messaging and training; promote self-responsibility)				
Action 3. Conduct evacuation and shelter planning for all communities and populations (to include all critical hazards, at risk populations, medical, ADA, animals, and with outreach and security components)				

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update*
Action 4. Enhance and maintain GIS mapping of City assets and critical facilities				
Action 5. Explore additional surface water resources for City				
Action 6. Provide backup generators for wells				
Action 7. Evaluate joining the National Flood Insurance Program				
Action 8. Erosion repair				
Action 9. Implement stormwater master plans				
Action 10. Undergrounding of stormwater system – Downtown area				

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update*
City of Madera Actions				
All Hazard Mitigation Actions				
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Action 2. Installation of variable frequency drives onto wells to increase capacity				
Action 3. Install backup motors for wells with an emphasis on critical facilities. Provide backup generators for wells.				
Action 4. Install Variable Frequency Drives (VFD) on Existing City Wells to Increase Capacity				
Action 5. Provide Backup Generators for City Wells				
Action 6. Implement Improvements Recommended in the Storm Drainage System Master Plan				
Action 7. 4th Street Flooding Improvements Installed in accordance with that recommended in the Storm Drainage System Master Plan				
Action 8. Conduct New Studies/Modeling and Mapping of the Fresno River within the City's Growth Boundary				

Mitigation Strategy: Action (Implementation) Plan

The mitigation action plan describes how the mitigation actions will be implemented, including how those actions will be prioritized, administered, and incorporated into the community's existing planning mechanism. Each participating jurisdiction must have a mitigation action(s) and an action plan specific to that jurisdiction and its priority hazards and vulnerabilities.

Mitigation Criteria

For use in selecting and prioritizing Proposed Mitigation Measures

1. STAPLEE

Social: Does the measure treat people fairly? (different groups, different generations)

- Community Acceptance
- Effect on Segment of Population
- Social Benefits

Technical: Will it work? (Does it solve the problem? Is it feasible?)

- Technical Feasibility
- Reduce Community Risk
- Long Term Solution/Sustainable
- Secondary Impacts

Administrative: Do you have the capacity to implement & manage project?

- Staffing
- Funding Allocated
- Maintenance/Operations

Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support?

- Political Support
- Local Champion
- Public Support
- Achieves Multiple Objectives
- Supported by a broad array of Stakeholders

Legal: Does your organization have the authority to implement? Is it legal? Are there liability implications?

- Existing Local Authority
- State Authority
- Potential Legal Challenges

Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?

- Benefit of Action
- Cost of Action
- Cost Effective/Economic Benefits
- Economically Viable
- Outside Funding Required

Environmental: Does it comply with Environmental regulations?

- Effect on Land/Water
- Effect on Endangered Species
- Effect on Cultural Resources
- Effect on Hazmat sites
- Consistent with Community Environmental Goals
- Consistent with Environmental Laws
- Environmental Benefits

2. SUSTAINABLE DISASTER RECOVERY

- Quality of Life
- Social Equity
- Hazard Mitigation
- Economic Development
- Environmental Protection/Enhancement
- Community Participation

3. SMART GROWTH PRINCIPLES

- Infill versus Sprawl
- Efficient Use of Land Resources
- Full Use of Urban Resources
- Mixed Uses of Land
- Transportation Options
- Detailed, Human-Scale Design

4. OTHER

- Does measure address area with highest risk?
- Does measure protect …
  - ✓ The largest # of people exposed to risk?
  - ✓ The largest # of buildings?
  - ✓ The largest # of jobs?
  - ✓ The largest tax income?
  - ✓ The largest average annual loss potential?
  - ✓ The area impacted most frequently?
  - ✓ Critical Infrastructure (access, power, water, gas, telecommunications)
- Timing of Available funding
- Visibility of Project
- Community Credibility

Mitigation Action Prioritization Instructions

The HMPC's brainstormed list of mitigation actions and projects are organized by hazard and posted on flip-chart paper around the room.

You each have 3 sets of colored dots:

- 3 red dots
- 3 blue dots
- 3 green dots

The red dots are for high priority (5 points each)

The blue dots are for medium priority (3 points each)

The green dots are for low priority (1 point each)

Place your dots on any mitigation action/project, using the different colors to indicate your priority. You may use as many of your dots, of any color, on any mitigation action/project --- or you may spread them out using as few of your dots as you wish. The scored dots will indicate the consensus of the HMPC.

Use the list of mitigation selection criteria (above) to help you make your determinations.

Your votes will indicate the consensus of the team.

After the totals are counted, we will discuss them further to confirm or modify any of the results as necessary to best meet the goals of this LHMP Update.

Madera County
Mitigation Action Worksheet

Mitigation Action/Project Title:	
Hazards Addressed:	
Issue/Background (Problem Statement):	
Project Description:	
Other Alternatives:	
Existing Planning Mechanism(s) through which Action Will Be Implemented:	
Responsible Office/Partners:	
Benefits (Losses Avoided):	
Potential Funding (Local Budgets, Grant Funds, etc.):	
Timeline:	
Project Priority (High, Medium, Low):	

Worksheet completed by:	
Name and Title:	
Phone:	

Madera County 2026 LHMP Update

Mitigation Strategy Meetings – Action Prioritizationv.1

Actions Sorted by Hazards

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	1. Develop/Enhance Public Education and Outreach program for all hazards (priority and non-priority). Key components include: Multi-agency approach; Multi-media and traditional platforms; Multiple languages; Accessibility of all end users; Focus on self-reliance of all community members: Communication enhancements; Air quality/smoke component; Seasonal components for all hazards; Annual safety fair; Training and exercises; Firewise promotion; Enhanced fire regulations; Home defensible space and hardening; Weatherizing homes and vehicles; Disaster prep (go-bags, animal evac resources; Preventive Search and Rescue (PSAR); National weather spotter classes; and other	Multi-Hazard	99
	2. Backup power redundancy projects for critical facilities and infrastructure and key public facilities (e.g., generators, batteries, solar, etc.)	Multi-Hazard	36
	3. Critical facility and infrastructure replacements, improvements, hardening, etc.	Multi-Hazard	N/A
	4. Develop and maintain a standardized communication platform (using latest technologies) for the different agency emergency responders to communicate timely and accurate emergency notifications through during emergencies	Multi-Hazard	N/A
	5. Communication system upgrades for City of Madera	Multi-Hazard	13
	6. Communication/Alert & Warning system enhancements for sending out mass communications to the public during hazard events (to include backup power, redundancy, hardening, compatibility, etc.)	Multi-Hazard	N/A
	7. Develop program to prevent illegal dumping in high fire hazard areas and drainageways to reduce the risk of flooding and fires	Multi-Hazard	N/A
	8. Conduct regular agency/partner coordination meetings for emergency management collaboration	Multi-Hazard	3
	9. Ongoing Evacuation planning & implementation, education, outreach, training, and exercises -increase community education and awareness including routes and signage -evacuation for large events -educate out of County homeowners, rentals, and visitors on hazard mitigation and evacuation procedures	Multi-Hazard	27
	10. Assessment and hardening/seismic retrofits of Transportation facilities and infrastructure: bridges, tunnels, roads, evacuation routes	Multi-Hazard/ Earthquake	N/A

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	11. Utilize Pavement Management System to identify major roadways at increased risk of pavement wear and implement program to address accelerated wear	Climate Change	33
	12. Mass care shelter planning to establish accessible shelters/centers for cooling/heating/air quality protection in key County/City locations, well equipped, with training, signage and public education	Multi-Hazard	11
	13. Animal care response, sheltering, and evacuation planning for hazard events to include identification and upgrades to staging/evacuation and sheltering location(s) w/public education	Multi-Hazard	18
	14. Continued use and outreach of Shelterly database for identification of community animals in advance of disasters	Multi-Hazard	9
	15. Establish tactical facilities for firefighting, flood fighting, etc. (airports, heliports, water facilities, and others	Multi-Hazard	5
	16. Establish and man information hubs for the public to access during disasters	Multi-Hazard	N/A
	17. Technology enhancements to support hazard mitigation planning and project implementation and for use in disaster mitigation, preparedness, response, and recovery efforts	Multi-Hazard	N/A
	18. Enhance and maintain GIS capabilities countywide	Multi-Hazard	10
	19. Replace all traffic signals backboard with yellow reflective material to reduce impacts from power outages at night or during severe weather conditions (i.e., storms, fog, etc.)	Multi-Hazard	N/A
	20. Update permitting for battery facilities	Multi-Hazard	N/A
	21. General Plan Updates to Health and Safety, Conservation, Land use, and other Elements to reflect new hazard goals, policies and implementation measures and AB 2140 compliance	Multi-Hazard/ Climate Change	3
	22. Integration of ag uses with groundwater sustainability and resilience planning	Agricultural Hazards	7
	23. Invasive Species/Pests management projects	Agricultural Hazards	1
	24. Mitigation measures to address severe weather and other hazard impacts to Ag industry such as drought, freeze, heavy rains, wildfire, and others	Agricultural Hazards	N/A
	25. Mitigation/management of crop damage	Agricultural Hazards / Multi-hazard	N/A
	26. Development of Climate Plans: i.e., Climate Action Plan, Climate Adaptation Plan, Climate Vulnerability Assessment	Climate Change	0
	27. Add water recharge basins, increase capacity and connectivity of existing basins, to mitigate reduce snowpack	Climate Change/ Drought & Water Shortage	37
	28. Continued Coordination, Dam EAP review, planning and exercises w/ Dam owners	Dam Failure	5

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	29. Integrate inundation maps with evacuation planning and maps	Dam Failure	9
	30. Dam Monitoring/Expansion of County Program/ Installation of additional gages/monitoring equipment	Dam Failure	3
	31. Public Education	Dam Failure	8
	32. Assess and repair Hidden dam for seepage/leak issues as warranted	Dam Failure/Flood	0
	33. Add flow meters at well sites to monitor recharge	Climate Change/ Drought & Water Shortage	3
	34. DWR grant program for SB 552 - Drought Task Force and County Drought resiliency Planning and Project Implementation (Short term (i.e, availability and distribution of water during hazard events) and long term planning (such as system enhancements, consolidation, etc.)	Drought & Water Shortage	6
	35. Update Groundwater Sustainability Plan	Drought & Water Shortage	7
	36. Add new basins and increase capacity of existing basins for drought and water shortage, flood control, climate change, and other	Drought & Water Shortage	44
	37. Upgrade Supervisory Control and Data Acquisition (SCADA) systems serving WWTPs, water wells, stormwater facilities, sewer lift stations, and other facilities. Include updating of hardware, upgrading software to best available technology to improve functionality, cybersecurity and resilience	Drought & Water Shortage/ Flood	25
	38. Water well improvements (associated with drop in water table) to include increase capacity through deepening, addressing increased wear on pumps, water quality issues, and others	Drought & Water Shortage	0
	39. Identify and establish additional water storage tanks, wells, and others	Drought & Water Shortage/ Wildfire	3
	40. Tree Trimming Program	Drought & Water Shortage	13
	41. Evaluate and install purple pipe infrastructure	Drought & Water Shortage	1
	42. Groundwater recharge projects	Drought & Water Shortage	6
	43. Turf replacement programs	Drought & Water Shortage	N/A
	44. Diversification of water resources	Drought & Water Shortage	1
	45. Update and implement Urban Water Management Plan	Drought & Water Shortage	0
	46. Domestic well tracking and mitigation projects	Drought & Water Shortage	0
	47. Continue water conservation program to encourage use reduction	Drought & Water Shortage	N/A

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	48. Increase collection of stormwater into City facilities	Drought & Water Shortage	N/A
	49. Water tank improvements to sustain water pressure and to maintain consistent (pressure and volume) supply	Drought & Water Shortage	N/A
	50. Assessment and hardening/seismic retrofits of critical facilities and infrastructure to EQ to include hospitals, schools, and all other identified critical facilities	Earthquake	5
	51. Establish program to identify public and private Un-Reinforced Masonry (URM) and other seismically vulnerable buildings for building preservation, retrofitting, other	Earthquake	3
	52. Deepen Fresno River and lower infrastructure that crosses river	Flood: All	5
	53. Fresno River fuels mitigation/ restoration projects	Flood/ Severe Weather: Heavy Rain and Storms	N/A
	54. Support and equip sandbag locations at fire stations, USFS facilities, maintenance yards, and other locations; w/ public education component	Flood/ Severe Weather: Heavy Rain and Storms	9
	55. Fresno River fuels mitigation/ restoration projects	Flood/ Severe Weather: Heavy Rain and Storms	N/A
	56. Stormwater master plan updates and project implementation w/ considerations for climate change (i.e., conduct surveys, updated hydrology standards, culvert upgrades, storm drain improvements, storm pumps, stormwater retention capabilities, etc.)	Climate Change/ Flood/ Severe Weather: Heavy Rain and Storms	5
	57. Conduct study to identify and map (GIS) and create database for culverts, pipes and related infrastructure countywide and implement resulting projects	Flood/ Severe Weather: Heavy Rain and Storms	3
	58. Replace and upgrade stormwater pumps	Flood/ Severe Weather: Heavy Rain and Storms	23
	59. Debris removal and clearing (vegetation management) in creeks, drainages, storm basins, and others	Flood/ Severe Weather: Heavy Rain and Storms	30
	60. Add new basins and increase capacity of existing stormwater basins to accommodate runoff	Flood/ Severe Weather: Heavy Rain and Storms	15
	61. Flood channel and levee inspections – vegetation, rodent control and other issues	Flood/ Severe Weather: Heavy Rain and Storms	13
	62. Resurface levee roadways	Flood/ Severe Weather: Heavy Rain and Storms	5
	63. Channel, river, creek, levee embankments – erosion repair and restoration	Flood/ Severe Weather: Heavy Rain and Storms	3

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	64. Continue to implement and maintain processes/ SOPs/ projects contained in Flood O & M manuals	Flood/ Severe Weather: Heavy Rain and Storms	9
	65. Continued program to underground stormwater systems in Chowchilla	Flood/ Severe Weather: Heavy Rain and Storms	8
	66. Continue modeling and mapping of Fresno River	Flood/ Severe Weather: Heavy Rain and Storms	1
	67. Flood protection projects for debris flows, bridge scour, etc. to include bridge replacement projects	Flood/ Severe Weather: Heavy Rain and Storms	6
	68. Maintain trained haz mat personnel/Establish and maintain mutual aid agreements for incidence response	Hazardous Materials Transportation	6
	69. Equip and maintain haz mat response equipment in strategic places near railroad and highway haz mat transportation corridors	Hazardous Materials Transportation	6
	70. Establish alert and warning system for haz mat incidents w/ public education component to include shelter in place, evacuation and other orders	Hazardous Materials Transportation	7
	71. Slope stabilization and restoration projects in post fire burn areas and other sloped areas prone to landslides	Landslide, Mudslide, Debris Flow/ Wildfire	12
	72. Modify/engineer slope in areas vulnerable to landslides	Landslide, Mudslide, Debris Flow	10
	73. Coordination with other agencies/entities on landslide repairs (e.g. Cal Trans, others)	Landslide, Mudslide, Debris Flow	3
	74. GIS mapping of critical slide locations	Landslide, Mudslide, Debris Flow	3
	75. Maintain, enhance, and outreach senior firewood program	Severe Weather: Extreme Cold, Freeze, and Snow	0
	76. Continued operation and enhancements of cooling/warming centers w/transportation contingency planning	Severe Weather: Extreme Heat/ Extreme Cold, Freeze, and Snow	1
	77. Identify and mitigate critical facilities and infrastructure vulnerable to extreme temperatures	Severe Weather: Extreme Heat/ Extreme Cold, Freeze, and Snow	4
	78. Establish a real time monitoring system and program for severe weather data collection and reporting, and develop/ implement needed mitigation actions	Severe Weather: All	1

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	79. Establish potable water sources for extreme weather conditions	Severe Weather: All	7
	80. Urban forest management to include tree planting, maintenance, other	Severe Weather: All	0
	81. Turf Replacement projects	Drought & Water Shortage/ Severe Weather: All	4
	82. Tree Mortality Management	Drought/Severe Weather: All/ Wildfire	14
	83. Hazardous tree removal	Drought/Severe Weather: All/ Wildfire	13
	84. Hazardous tree trimming	Drought/Severe Weather: All/ Wildfire	19
	85. Undergrounding power lines (PG&E)	Severe Weather: All	1
	86. Develop and implement a snow plan to include: snow removal, snow storage locations, equipment, snow fences, shelter, and others	Severe Weather: Extreme Cold, Freeze, and Snow	8
	87. Continued promotion/establishment of FireWise communities	Wildfire	10
	88. Expand current fuel reduction methods and project implementation (goats, prescribed burns, vegetation management, clearing of evacuation areas, and others)	Wildfire	12
	89. Implement fuels reduction projects in rivers, creeks, canals, evacuation routes, forested areas, and others	Wildfire	17
	90. Continued CWPP updates using best available science and technologies and project implementation	Wildfire	2
	91. Community Chipping programs	Wildfire	0
	92. Identify and establish water supply sources/tanks/facilities for firefighting and fire suppression efforts	Wildfire	23
	93. Continue to adopt and update building fire codes	Wildfire	7
	94. Defensible space and fuel reduction on private property w/ public education	Wildfire	12
	95. Fire Adaptive Madera County, Eastern Madera County Collaborative: continue to build and fund to support community members and wildfire mitigation objectives	Wildfire	0
	96. Continue to implement reforestation projects	Wildfire	3
	97. Continue tree mortality operations/program	Wildfire	2
	98. Enhance firefighting access (ingress-egress issues) to communities (i.e., one way neighborhoods, narrow roads, addressing, signage, road repairs, access to private/USFS roads, and others)	Wildfire	22
	99. Mitigation of RR crossings with lack of grade separation	Wildfire	3

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	100. Establish and maintain firebreaks in high vegetation areas	Wildfire	1
	101. Reduce illegal burning by improving garbage pickup in rural areas and by incentivizing ag producers to report and track burning	Wildfire	N/A
	102. Establish and implement green waste management and infrastructure program countywide	Wildfire	N/A
	103. Develop a monitoring system to further understand current fuel load conditions	Wildfire	N/A
	104. Identify key air monitoring locations; acquire and install air monitoring equipment	Severe Weather: Extreme Heat/ Wildfire (smoke and air quality)	4
	105. Establish and equip (clean rooms) safe spaces/centers to provide relief from poor air quality	Severe Weather: Extreme Heat/ Wildfire (smoke and air quality)	5
	106. Conduct air scrubber inventory and identify key at risk facilities/populations for installation of air scrubbers and other equipment to reduce air quality impacts (e.g., schools, long term care facilities, others)	Severe Weather: Extreme Heat/ Wildfire (smoke and air quality)	0
	107. Forest Health projects: habitat and fire ecology restoration	Wildfire	N/A

N/A (Column 4): Actions identified after action prioritization process

Actions Sorted by Prioritization (Voting) Results

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	1. Develop/Enhance Public Education and Outreach program for all hazards (priority and non-priority). Key components include: Multi-agency approach; Multi-media and traditional platforms; Multiple languages; Accessibility of all end users; Focus on self-reliance of all community members: Communication enhancements; Air quality/smoke component; Seasonal components for all hazards; Annual safety fair; Training and exercises; Firewise promotion; Enhanced fire regulations; Home defensible space and hardening; Weatherizing homes and vehicles; Disaster prep (go-bags, animal evac resources; Preventive Search and Rescue (PSAR); National weather spotter classes; and other	Multi-Hazard	99
	2. Add new basins and increase capacity of existing basins for drought and water shortage, flood control, climate change, and other	Drought & Water Shortage	44
	3. Add water recharge basins, increase capacity and connectivity of existing basins, to mitigate reduce snowpack	Climate Change/ Drought & Water Shortage	37
	4. Backup power redundancy projects for critical facilities and infrastructure and key public facilities (e.g., generators, batteries, solar, etc.)	Multi-Hazard	36
	5. Utilize Pavement Management System to identify major roadways at increased risk of pavement wear and implement program to address accelerated wear	Climate Change	33
	6. Debris removal and clearing (vegetation management) in creeks, drainages, storm basins, and others	Flood/ Severe Weather: Heavy Rain and Storms	30
	7. Ongoing Evacuation planning & implementation, education, outreach, training, and exercises -increase community education and awareness including routes and signage -evacuation for large events -educate out of County homeowners, rentals, and visitors on hazard mitigation and evacuation procedures	Multi-Hazard	27
	8. Upgrade Supervisory Control and Data Acquisition (SCADA) systems serving WWTPs, water wells, stormwater facilities, sewer lift stations, and other facilities. Include updating of hardware, upgrading software to best available technology to improve functionality, cybersecurity and resilience	Drought & Water Shortage/ Flood	25
	9. Replace and upgrade stormwater pumps	Flood/ Severe Weather: Heavy Rain and Storms	23
	10. Identify and establish water supply sources/tanks/facilities for firefighting and fire suppression efforts	Wildfire	23

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	11. Enhance firefighting access (ingress-egress issues) to communities (i.e., one way neighborhoods, narrow roads, addressing, signage, road repairs, access to private/USFS roads, and others)	Wildfire	22
	12. Hazardous tree trimming	Drought/Severe Weather: All/ Wildfire	19
	13. Animal care response, sheltering, and evacuation planning for hazard events to include identification and upgrades to staging/evacuation and sheltering location(s) w/public education	Multi-Hazard	18
	14. Implement fuels reduction projects in rivers, creeks, canals, evacuation routes, forested areas, and others	Wildfire	17
	15. Add new basins and increase capacity of existing stormwater basins to accommodate runoff	Flood/ Severe Weather: Heavy Rain and Storms	15
	16. Tree Mortality Management	Drought/Severe Weather: All/ Wildfire	14
	17. Communication system upgrades for City of Madera	Multi-Hazard	13
	18. Tree Trimming Program	Drought & Water Shortage	13
	19. Flood channel and levee inspections – vegetation, rodent control and other issues	Flood/ Severe Weather: Heavy Rain and Storms	13
	20. Hazardous tree removal	Drought/Severe Weather: All/ Wildfire	13
	21. Slope stabilization and restoration projects in post fire burn areas and other sloped areas prone to landslides	Landslide, Mudslide, Debris Flow/ Wildfire	12
	22. Expand current fuel reduction methods and project implementation (goats, prescribed burns, vegetation management, clearing of evacuation areas, and others)	Wildfire	12
	23. Defensible space and fuel reduction on private property w/ public education	Wildfire	12
	24. Mass care shelter planning to establish accessible shelters/centers for cooling/heating/air quality protection in key County/City locations, well equipped, with training, signage and public education	Multi-Hazard	11
	25. Enhance and maintain GIS capabilities countywide	Multi-Hazard	10
	26. Modify/engineer slope in areas vulnerable to landslides	Landslide, Mudslide, Debris Flow	10
	27. Continued promotion/establishment of FireWise communities	Wildfire	10
	28. Continued use and outreach of Shelterly database for identification of community animals in advance of disasters	Multi-Hazard	9

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	29. Integrate inundation maps with evacuation planning and maps	Dam Failure	9
	30. Support and equip sandbag locations at fire stations, USFS facilities, maintenance yards, and other locations; w/ public education component	Flood/ Severe Weather: Heavy Rain and Storms	9
	31. Continue to implement and maintain processes/ SOPs/ projects contained in Flood O & M manuals	Flood/ Severe Weather: Heavy Rain and Storms	9
	32. Public Education	Dam Failure	8
	33. Continued program to underground stormwater systems in Chowchilla	Flood/ Severe Weather: Heavy Rain and Storms	8
	34. Develop and implement a snow plan to include: snow removal, snow storage locations, equipment, snow fences, shelter, and others	Severe Weather: Extreme Cold, Freeze, and Snow	8
	35. Integration of ag uses with groundwater sustainability and resilience planning	Agricultural Hazards	7
	36. Update Groundwater Sustainability Plan	Drought & Water Shortage	7
	37. Establish alert and warning system for haz mat incidents w/ public education component to include shelter in place, evacuation and other orders	Hazardous Materials Transportation	7
	38. Establish potable water sources for extreme weather conditions	Severe Weather: All	7
	39. Continue to adopt and update building fire codes	Wildfire	7
	40. DWR grant program for SB 552 - Drought Task Force and County Drought resiliency Planning and Project Implementation (Short term (i.e, availability and distribution of water during hazard events) and long term planning (such as system enhancements, consolidation, etc.)	Drought & Water Shortage	6
	41. Groundwater recharge projects	Drought & Water Shortage	6
	42. Flood protection projects for debris flows, bridge scour, etc. to include bridge replacement projects	Flood/ Severe Weather: Heavy Rain and Storms	6
	43. Maintain trained haz mat personnel/Establish and maintain mutual aid agreements for incidence response	Hazardous Materials Transportation	6
	44. Equip and maintain haz mat response equipment in strategic places near railroad and highway haz mat transportation corridors	Hazardous Materials Transportation	6
	45. Establish tactical facilities for firefighting, floodfighting, etc. (airports, heliports, water facilities, and others	Multi-Hazard	5
	46. Continued Coordination, Dam EAP review, planning and exercises w/ Dam owners	Dam Failure	5

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	47. Assessment and hardening/seismic retrofits of critical facilities and infrastructure to EQ to include hospitals, schools, and all other identified critical facilities	Earthquake	5
	48. Deepen Fresno River and lower infrastructure that crosses river	Flood: All	5
	49. Stormwater master plan updates and project implementation w/ considerations for climate change (i.e., conduct surveys, updated hydrology standards, culvert upgrades, storm drain improvements, storm pumps, stormwater retention capabilities, etc.)	Climate Change/ Flood/ Severe Weather: Heavy Rain and Storms	5
	50. Resurface levee roadways	Flood/ Severe Weather: Heavy Rain and Storms	5
	51. Establish and equip (clean rooms) safe spaces/centers to provide relief from poor air quality	Severe Weather: Extreme Heat/ Wildfire (smoke and air quality)	5
	52. Identify and mitigate critical facilities and infrastructure vulnerable to extreme temperatures	Severe Weather: Extreme Heat/ Extreme Cold, Freeze, and Snow	4
	53. Turf Replacement projects	Drought & Water Shortage/ Severe Weather: All	4
	54. Identify key air monitoring locations; acquire and install air monitoring equipment	Severe Weather: Extreme Heat/ Wildfire (smoke and air quality)	4
	55. Conduct regular agency/partner coordination meetings for emergency management collaboration	Multi-Hazard	3
	56. General Plan Updates to Health and Safety, Conservation, Land use, and other Elements to reflect new hazard goals, policies and implementation measures and AB 2140 compliance	Multi-Hazard/ Climate Change	3
	57. Dam Monitoring/Expansion of County Program/ Installation of additional gages/monitoring equipment	Dam Failure	3
	58. Add flow meters at well sites to monitor recharge	Climate Change/ Drought & Water Shortage	3
	59. Identify and establish additional water storage tanks, wells, and others	Drought & Water Shortage/ Wildfire	3
	60. Establish program to identify public and private Un-Reinforced Masonry (URM) and other seismically vulnerable buildings for building preservation, retrofitting, other	Earthquake	3
	61. Conduct study to identify and map (GIS) and create database for culverts, pipes and related infrastructure countywide and implement resulting projects	Flood/ Severe Weather: Heavy Rain and Storms	3

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	62. Channel, river, creek, levee embankments – erosion repair and restoration	Flood/ Severe Weather: Heavy Rain and Storms	3
	63. Coordination with other agencies/entities on landslide repairs (e.g. Cal Trans, others)	Landslide, Mudslide, Debris Flow	3
	64. GIS mapping of critical slide locations	Landslide, Mudslide, Debris Flow	3
	65. Continue to implement reforestation projects	Wildfire	3
	66. Mitigation of RR crossings with lack of grade separation	Wildfire	3
	67. Continued CWPP updates using best available science and technologies and project implementation	Wildfire	2
	68. Continue tree mortality operations/program	Wildfire	2
	69. Invasive Species/Pests management projects	Agricultural Hazards	1
	70. Evaluate and install purple pipe infrastructure	Drought & Water Shortage	1
	71. Diversification of water resources	Drought & Water Shortage	1
	72. Continue modeling and mapping of Fresno River	Flood/ Severe Weather: Heavy Rain and Storms	1
	73. Continued operation and enhancements of cooling/warming centers w/transportation contingency planning	Severe Weather: Extreme Heat/ Extreme Cold, Freeze, and Snow	1
	74. Establish a real time monitoring system and program for severe weather data collection and reporting, and develop/ implement needed mitigation actions	Severe Weather: All	1
	75. Undergrounding power lines (PG&E)	Severe Weather: All	1
	76. Establish and maintain firebreaks in high vegetation areas	Wildfire	1
	77. Development of Climate Plans: i.e., Climate Action Plan, Climate Adaptation Plan, Climate Vulnerability Assessment	Climate Change	0
	78. Assess and repair Hidden dam for seepage/leak issues as warranted	Dam Failure/Flood	0
	79. Water well improvements (associated with drop in water table) to include increase capacity through deepening, addressing increased wear on pumps, water quality issues, and others	Drought & Water Shortage	0
	80. Update and implement Urban Water Management Plan	Drought & Water Shortage	0
	81. Domestic well tracking and mitigation projects	Drought & Water Shortage	0

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	82. Maintain, enhance, and outreach senior firewood program	Severe Weather: Extreme Cold, Freeze, and Snow	0
	83. Urban forest management to include tree planting, maintenance, other	Severe Weather: All	0
	84. Community Chipping programs	Wildfire	0
	85. Fire Adaptive Madera County, Eastern Madera County Collaborative: continue to build and fund to support community members and wildfire mitigation objectives	Wildfire	0
	86. Conduct air scrubber inventory and identify key at risk facilities/populations for installation of air scrubbers and other equipment to reduce air quality impacts (e.g., schools, long term care facilities, others)	Severe Weather: Extreme Heat/ Wildfire (smoke and air quality)	0
	87. Critical facility and infrastructure replacements, improvements, hardening, etc.	Multi-Hazard	N/A
	88. Develop and maintain a standardized communication platform (using latest technologies) for the different agency emergency responders to communicate timely and accurate emergency notifications through during emergencies	Multi-Hazard	N/A
	89. Communication/Alert & Warning system enhancements for sending out mass communications to the public during hazard events (to include backup power, redundancy, hardening, compatibility, etc.)	Multi-Hazard	N/A
	90. Develop program to prevent illegal dumping in high fire hazard areas and drainageways to reduce the risk of flooding and fires	Multi-Hazard	N/A
	91. Assessment and hardening/seismic retrofits of Transportation facilities and infrastructure: bridges, tunnels, roads, evacuation routes	Multi-Hazard/ Earthquake	N/A
	92. Establish and man information hubs for the public to access during disasters	Multi-Hazard	N/A
	93. Technology enhancements to support hazard mitigation planning and project implementation and for use in disaster mitigation, preparedness, response, and recovery efforts	Multi-Hazard	N/A
	94. Replace all traffic signals backboard with yellow reflective material to reduce impacts from power outages at night or during severe weather conditions (i.e, storms, fog, etc.)	Multi-Hazard	N/A
	95. Update permitting for battery facilities	Multi-Hazard	N/A
	96. Mitigation measures to address severe weather and other hazard impacts to Ag industry such as drought, freeze, heavy rains, wildfire, and others	Agricultural Hazards	N/A
	97. Mitigation/management of crop damage	Agricultural Hazards / Multi-hazard	N/A

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	98. Turf replacement programs	Drought & Water Shortage	N/A
	99. Continue water conservation program to encourage use reduction	Drought & Water Shortage	N/A
	100. Increase collection of stormwater into City facilities	Drought & Water Shortage	N/A
	101. Water tank improvements to sustain water pressure and to maintain consistent (pressure and volume) supply	Drought & Water Shortage	N/A
	102. Fresno River fuels mitigation/ restoration projects	Flood/ Severe Weather: Heavy Rain and Storms	N/A
	103. Fresno River fuels mitigation/ restoration projects	Flood/ Severe Weather: Heavy Rain and Storms	N/A
	104. Reduce illegal burning by improving garbage pickup in rural areas and by incentivizing ag producers to report and track burning	Wildfire	N/A
	105. Establish and implement green waste management and infrastructure program countywide	Wildfire	N/A
	106. Develop a monitoring system to further understand current fuel load conditions	Wildfire	N/A
	107. Forest Health projects: habitat and fire ecology restoration	Wildfire	N/A

N/A (Column 4): Actions identified after action prioritization process

Appendix D Adoption Resolution

Note to Reviewers: When this plan has been reviewed and approved pending adoption by FEMA Region IX, the adoption resolution will be signed by each participating jurisdiction and added to this appendix. A model adoption resolution is provided below. For the County and incorporated communities this adoption resolution also includes compliance with AB 2140 requiring adoption by reference or incorporation into the Safety Element of the General Plan.

Sample County/Incorporated Community Adoption Resolution

(LOCAL GOVERNMENT: County, Incorporated Communities)

RESOLUTION NO.

A RESOLUTION OF (LOCAL GOVERNMENT) ADOPTING THE (TITLE AND DATE OF MITIGATION PLAN).

WHEREAS the (local governing body) recognizes the threat that natural hazards pose to people and property within (local government); and

WHEREAS the (local government) has prepared a multi-hazard mitigation plan, hereby known as (title and date of mitigation plan) in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS (title and date of mitigation plan) identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in (local government) from the impacts of future hazards and disasters; and

WHEREAS adoption by the (local governing body) demonstrates its commitment to hazard mitigation and achieving the goals outlined in the (title and date of mitigation plan).

WHEREAS, the (local governing body) seeking FEMA approval of hazard mitigation plan desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the (title and date of mitigation plan) by reference into the Safety Element of the General Plan in accordance with the requirements of AB 2140; and

NOW THEREFORE, BE IT RESOLVED BY THE (LOCAL GOVERNMENT), (STATE), THAT:

In accordance with (local rule for adopting resolutions), the (local governing body) adopts the (title and date of mitigation plan). *While content related to (local government) may require revisions to meet the plan approval requirements, changes occurring after adoption will not require (local government) to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.*

BE IT RESOLVED, that the (Name of Government/District/Organization seeking FEMA approval of hazard mitigation plan) adopts the (title and date of mitigation plan) by reference into the safety element of their general plan in accordance with the requirements of AB 2140; and

BE IT FURTHER RESOLVED, the (local governing body) will submit this adoption resolution to the California Office of Emergency Services and FEMA Region IX officials to enable the plan's final approval in accordance with the requirements of the Disaster Mitigation Act of 2000 and to establish conformance with the requirement of AB 2140.

ADOPTED by a vote of ____ in favor and ____ against, and ____ abstaining, this _____ day of _____, _____.

By: _____ (print name)

ATTEST: By: _____ (print name)

APPROVED AS TO FORM: By: _____ (print name)

Appendix E Threatened and Endangered Species

Table E–1 Special Status Species in Madera County

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Animals - Amphibians					
Ambystoma californiense pop. 1	California tiger salamander - central California DPS	Threatened	Threatened	WL	–
Ambystoma californiense pop. 2	California tiger salamander - Santa Barbara County DPS	Endangered	Threatened	WL	–
Anaxyrus californicus	arroyo toad	Endangered	None	SSC	–
Anaxyrus canorus	Yosemite toad	Threatened	None	SSC	–
Hydromantes platycephalus	Mount Lyell salamander	None	None	WL	–
Rana boylii pop. 5	foothill yellow-legged frog - south Sierra DPS	Endangered	Endangered	–	–
Rana draytonii	California red-legged frog	Threatened	None	SSC	–
Rana sierrae	Sierra Nevada yellow-legged frog	Endangered	Threatened	WL	–
Spea hammondii	western spadefoot	Proposed Threatened	None	SSC	–
Animals - Birds					
Accipiter atricapillus	American goshawk	None	None	SSC	–
Accipiter cooperii	Coopers hawk	None	None	WL	–
Aquila chrysaetos	golden eagle	None	None	FP | WL	–
Buteo swainsoni	Swainsons hawk	None	Threatened	–	–
Circus hudsonius	northern harrier	None	None	SSC	–
Elanus leucurus	white-tailed kite	None	None	FP	–
Haliaeetus leucocephalus	bald eagle	Delisted	Endangered	FP	–
Eremophila alpestris actia	California horned lark	None	None	WL	–
Ardea alba	great egret	None	None	–	–
Ardea herodias	great blue heron	None	None	–	–
Gymnogyps californianus	California condor	Endangered	Endangered	FP	–
Charadrius montanus	mountain plover	None	None	SSC	–
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Threatened	Endangered	–	–
Falco columbarius	merlin	None	None	WL	–
Falco mexicanus	prairie falcon	None	None	WL	–
Falco peregrinus anatum	American peregrine falcon	Delisted	Delisted	–	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Riparia riparia	bank swallow	None	Threatened	–	–
Agelaius tricolor	tricolored blackbird	None	Threatened	SSC	–
Xanthocephalus xanthocephalus	yellow-headed blackbird	None	None	SSC	–
Lanius ludovicianus	loggerhead shrike	None	None	SSC	–
Pandion haliaetus	osprey	None	None	WL	–
Setophaga petechia	yellow warbler	None	None	SSC	–
Spizella breweri	Brewers sparrow	None	None	–	–
Nannopterum auritum	double-crested cormorant	None	None	WL	–
Picoides arcticus	black-backed woodpecker	None	None	–	–
Numenius americanus	long-billed curlew	None	None	WL	–
Athene cunicularia	burrowing owl	None	Candidate Endangered	SSC	–
Psiloscops flammeolus	flammulated owl	None	None	–	–
Strix nebulosa	great gray owl	None	Endangered	–	–
Strix occidentalis occidentalis	California Spotted Owl	Proposed Endangered; Proposed Threatened	None	SSC	–
Plegadis chihi	white-faced ibis	None	None	WL	–
Selasphorus rufus	rufous hummingbird	None	None	–	–
Contopus cooperi	olive-sided flycatcher	None	None	SSC	–
Empidonax traillii	willow flycatcher	None	Endangered	–	–
Animals – Crustaceans					
Calasellus longus	An isopod	None	None	–	–
Branchinecta lynchi	vernal pool fairy shrimp	Threatened	None	–	–
Branchinecta mesovallensis	midvalley fairy shrimp	None	None	–	–
Linderiella occidentalis	California linderiella	None	None	–	–
Lepidurus packardi	vernal pool tadpole shrimp	Endangered	None	–	–
Animals - Fish					
Acipenser transmontanus	white sturgeon	None	Candidate Threatened	SSC	–
Lavinia exilicauda exilicauda	Sacramento hitch	None	None	SSC	–
Mylopharodon conocephalus	hardhead	None	None	SSC	–
Oncorhynchus clarkii henshawi	Lahontan cutthroat trout	Threatened	None	SSC	–
Oncorhynchus clarkii seleniris	Paiute cutthroat trout	Threatened	None	SSC	–
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Threatened	None	SSC	–
Acipenser transmontanus	white sturgeon	None	Candidate Threatened	SSC	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Animals - Insects					
Andrena macswaini	An andrenid bee	None	None	–	–
Bombus crotchii	Crotchs bumble bee	None	Candidate Endangered	–	–
Bombus occidentalis	western bumble bee	None	Candidate Endangered	–	–
Bombus pensylvanicus	American bumble bee	None	None	–	–
Efferia antiochi	Antioch efferian robberfly	None	None	–	–
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Threatened	None	–	–
Hydroporus leechi	Leechs skyline diving beetle	None	None	–	–
Desmona bethula	amphibious caddisfly	None	None	–	–
Lytta moesta	moestan blister beetle	None	None	–	–
Lytta molesta	molestan blister beetle	None	None	–	–
Tetrix sierrana	Sierra pygmy grasshopper	None	None	–	–
Neothremma genella	golden-horned caddisfly	None	None	–	–
Animals - Mammals					
Aplodontia rufa californica	Sierra Nevada mountain beaver	None	None	SSC	–
Ovis canadensis sierrae	Sierra Nevada bighorn sheep	Endangered	Endangered	FP	–
Canis lupus	gray wolf	Endangered	Endangered	–	–
Vulpes macrotis mutica	San Joaquin kit fox	Endangered	Threatened	–	–
Vulpes vulpes necator pop. 2	Sierra Nevada red fox - Sierra Nevada DPS	Endangered	Threatened	–	–
Erethizon dorsatum	North American porcupine	None	None	–	–
Dipodomys heermanni dixoni	Merced kangaroo rat	None	None	–	–
Dipodomys nitratoides exilis	Fresno kangaroo rat	Endangered	Endangered	–	–
Perognathus inornatus	San Joaquin pocket mouse	None	None	–	–
Eumops perotis californicus	western mastiff bat	None	None	SSC	–
Gulo gulo	wolverine	Threatened	Threatened	FP	–
Martes caurina sierrae	Sierra marten	None	None	–	–
Mustela frenata xanthogenys	San Joaquin long-tailed weasel	None	None	–	–
Pekania pennanti pop. 2	Fisher - southern Sierra Nevada ESU	Endangered	Threatened	SSC	–
Taxidea taxus	American badger	None	None	SSC	–
Ochotona princeps schisticeps	gray-headed pika	None	None	–	–
Bassariscus astutus raptor	northern California ringtail	None	None	FP	–
Neotamias alpinus	Alpine chipmunk	None	None	–	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Antrozous pallidus	pallid bat	None	None	SSC	–
Euderma maculatum	spotted bat	None	None	SSC	–
Lasionycteris noctivagans	silver-haired bat	None	None	–	–
Lasiurus cinereus	hoary bat	None	None	–	–
Lasiurus frantzii	western red bat	None	None	SSC	–
Myotis evotis	long-eared myotis	None	None	–	–
Myotis volans	long-legged myotis	None	None	–	–
Myotis yumanensis	Yuma myotis	None	None	–	–
Animals – Mollusks					
Margaritifera falcata	western pearlshell	None	None	–	–
Gonidea angulata	western ridged mussel	None	None	–	–
Animals - Reptiles					
Anniella pulchra	Northern California legless lizard	None	None	SSC	–
Gambelia sila	blunt-nosed leopard lizard	Endangered	Endangered	FP	–
Actinemys marmorata	northwestern pond turtle	Proposed Threatened	None	SSC	–
Thamnophis gigas	giant gartersnake	Threatened	Threatened	–	–
Phrynosoma blainvillii	coast horned lizard	None	None	SSC	–
Community - Aquatic					
–	Central Valley Drainage Hardhead/Squawfish Stream	None	None	–	–
–	Central Valley Drainage Rainbow Trout/Cyprinid Stream	None	None	–	–
–	Central Valley Drainage Resident Rainbow Trout Stream	None	None	–	–
Community - Terrestrial					
–	Big Tree Forest	None	None	–	–
–	Great Valley Mixed Riparian Forest	None	None	–	–
–	Northern Claypan Vernal Pool	None	None	–	–
–	Northern Hardpan Vernal Pool	None	None	–	–
–	Valley Sacaton Grassland	None	None	–	–
–	Valley Sink Scrub	None	None	–	–
Plants - Bryophytes					
Bruchia bolanderi	Bolander's bruchia	None	None	–	4.2

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Bryum chryseum	brassy bryum	None	None	–	4.3
Plagiobryoides vinosula	wine-colored tufa moss	None	None	–	4.2
Fissidens aphelotaxifolius	brook pocket moss	None	None	–	2B.2
Meesia longiseta	long seta hump moss	None	None	–	2B.3
Meesia triquetra	three-ranked hump moss	None	None	–	4.2
Didymodon californicus	California beard-moss	None	None	–	4.2
Plants - Lichens					
Peltigera gowardii	western waterfan lichen	None	None	–	4.2
Plants - Vascular					
Sagittaria sanfordii	Sanfords arrowhead	None	None	–	1B.2
Allium abramsii	Abrams onion	None	None	–	1B.2
Eryngium spinosepalum	spiny-sepaled button-celery	None	None	–	1B.2
Calycadenia hooveri	Hoovers calycadenia	None	None	–	1B.3
Eriophyllum lanatum var. obovatum	southern Sierra woolly sunflower	None	None	–	4.3
Eriophyllum nubigenum	Yosemite woolly sunflower	None	None	–	1B.3
Hulsea brevifolia	short-leaved hulsea	None	None	–	1B.2
Jensia yosemitana	Yosemite tarplant	None	None	–	3.2
Lasthenia chrysantha	alkali-sink goldfields	None	None	–	1B.1
Layia munzii	Munzs tidy-tips	None	None	–	1B.2
Pentachaeta fragilis	fragile pentachaeta	None	None	–	4.3
Pseudobahia bahiifolia	Hartwegs golden sunburst	Endangered	Endangered	–	1B.1
Wyethia elata	Halls wyethia	None	None	–	4.3
Cryptantha glomeriflora	clustered-flower cryptantha	None	None	–	4.3
Cryptantha hooveri	Hoovers cryptantha	None	None	–	1A
Boechera tularensis	Tulare rockcress	None	None	–	1B.3
Sabulina stricta	bog sandwort	None	None	–	2B.3
Atriplex cordulata var. cordulata	heartscale	None	None	–	1B.2
Atriplex minuscula	lesser saltscale	None	None	–	1B.1
Atriplex persistens	vernal pool smallscale	None	None	–	1B.2
Atriplex subtilis	subtle orache	None	None	–	1B.2
Cuscuta jepsonii	Jepsons dodder	None	None	–	1B.2
Carex buxbaumii	Buxbaums sedge	None	None	–	4.2
Carex congdonii	Congdons sedge	None	None	–	4.3
Carex geyeri	Geyers sedge	None	None	–	4.2
Carex tahoensis	Tahoe sedge	None	None	–	4.3
Eriophorum gracile	slender cottongrass	None	None	–	4.3

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Astragalus kentrophyta var. danaus	Sweetwater Mountains milk-vetch	None	None	–	4.3
Lupinus citrinus var. citrinus	orange lupine	None	None	–	1B.2
Lupinus gracilentus	slender lupine	None	None	–	1B.3
Trifolium bolanderi	Bolanders clover	None	None	–	1B.2
Carpenteria californica	tree-anemone	None	Threatened	–	1B.2
Erythronium pluriflorum	Shuteye Peak fawn lily	None	None	–	1B.3
Pityopus californicus	California pinefoot	None	None	–	4.2
Calyptridium pulchellum	Mariposa pussypaws	Threatened	None	–	1B.1
Claytonia megarhiza	fell-fields claytonia	None	None	–	2B.3
Claytonia parviflora ssp. grandiflora	streambank spring beauty	None	None	–	4.2
Lewisia disepala	Yosemite lewisia	None	None	–	1B.2
Myrica hartwegii	Sierra sweet bay	None	None	–	4.3
Camissonia sierrae ssp. alticola	Mono Hot Springs evening-primrose	None	None	–	1B.2
Camissonia sierrae ssp. sierrae	Yosemite evening-primrose	None	None	–	4.3
Clarkia australis	Smalls southern clarkia	None	None	–	1B.2
Clarkia rostrata	beaked clarkia	None	None	–	1B.3
Epilobium howellii	subalpine fireweed	None	None	–	4.3
Botrychium minganense	Mingan moonwort	None	None	–	4.2
Botrychium montanum	western goblin	None	None	–	2B.1
Botrychium paradoxum	paradox moonwort	None	None	–	2B.1
Cypripedium montanum	mountain ladys-slipper	None	None	–	4.2
Piperia colemanii	Colemans rein orchid	None	None	–	4.3
Platanthera yosemitensis	Yosemite bog orchid	None	None	–	1B.2
Castilleja campestris var. succulenta	succulent owls-clover	Threatened	Endangered	–	1B.2
Chloropyron palmatum	palmate-bracted birds-beak	Endangered	Endangered	–	1B.1
Cordylanthus rigidus ssp. brevibracteatus	short-bracted birds-beak	None	None	–	4.3
Erythranthe acutidens	Kings River monkeyflower	None	None	–	3
Erythranthe gracilipes	slender-stalked monkeyflower	None	None	–	1B.2
Erythranthe grayi	Grays monkeyflower	None	None	–	4.3
Erythranthe laciniata	cut-leaved monkeyflower	None	None	–	4.3
Gratiola heterosepala	Boggs Lake hedge-hyssop	None	Endangered	–	1B.2
Veronica cusickii	Cusicks speedwell	None	None	–	4.3
Agrostis humilis	mountain bent grass	None	None	–	2B.3

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Cinna bolanderi	Bolanders woodreed	None	None	–	1B.2
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	Threatened	Endangered	–	1B.1
Orcuttia pilosa	hairy Orcutt grass	Endangered	Endangered	–	1B.1
Puccinellia simplex	California alkali grass	None	None	–	1B.2
Tuctoria greenei	Greenes tuctoria	Endangered	Rare	–	1B.1
Collomia rawsoniana	Rawsons flaming trumpet	None	None	–	1B.2
Leptosiphon oblanceolatus	Sierra Nevada leptosiphon	None	None	–	4.3
Leptosiphon serrulatus	Madera leptosiphon	None	None	–	1B.2
Navarretia myersii ssp. myersii	pincushion navarretia	None	None	–	1B.1
Navarretia nigelliformis ssp. radians	shining navarretia	None	None	–	1B.2
Eriogonum prattenianum var. avium	Kettle Dome buckwheat	None	None	–	4.2
Goodmania luteola	golden goodmania	None	None	–	4.2
Potamogeton epihydrus	Nuttalls ribbon-leaved pondweed	None	None	–	2B.2
Potamogeton praelongus	white-stemmed pondweed	None	None	–	2B.3
Potamogeton robbinsii	Robbins pondweed	None	None	–	2B.3
Delphinium hansenii ssp. ewanianum	Ewans larkspur	None	None	–	4.2
Delphinium recurvatum	recurved larkspur	None	None	–	1B.2
Ceanothus fresnensis	Fresno ceanothus	None	None	–	4.3
Ivesia unguiculata	Yosemite ivesia	None	None	–	4.2
Bolandra californica	Sierra bolandra	None	None	–	4.3
Mitellastra caulescens	leafy-stemmed mitrewort	None	None	–	4.2
Viola pinetorum ssp. grisea	grey-leaved violet	None	None	–	1B.2

Sources: California Natural Diversity Database BIOS Viewer Tool

Federal Status

Endangered: The classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

Threatened: The classification provided to an animal or plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Proposed Endangered: The classification provided to an animal or plant that is proposed for federal listing as Endangered in the Federal Register under Section 4 of the Endangered Species Act.

Proposed Threatened: The classification provided to an animal or plant that is proposed for federal listing as Threatened in the Federal Register under Section 4 of the Endangered Species Act.

Candidate: The classification provided to an animal or plant that has been studied by the United States Fish and Wildlife Service, and the Service has concluded that it should be proposed for addition to the Federal Endangered and Threatened species list.

None: The plant or animal has no federal status.

Delisted: The plant or animal was previously listed as Endangered or Threatened, but is no longer listed on the Federal Endangered and Threatened species list.

CDFW Status

FP: Fully Protected: This classification was the State of California's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction.

SSC: Species of Special Concern: To this end, the Department has designated certain vertebrate species as "Species of Special Concern" because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as "Species of Special Concern" is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long–term viability.

WL: Watch List: Species that were previously designated as "Species of Special Concern" but no longer merit that status, or which do not yet meet SSC criteria, but for which there is concern and a need for additional information to clarify status.

CA Rare Plant Rank

1A: Plants presumed extinct in California and rare/extinct elsewhere

1B.1: Plants rare, threatened, or endangered in California and elsewhere; seriously threatened in California

1B.2: Plants rare, threatened, or endangered in California and elsewhere; fairly threatened in California

1B.3: Plants rare, threatened, or endangered in California and elsewhere; not very threatened in California

2A: Plants presumed extirpated in California, but more common elsewhere

2B.1: Plants rare, threatened, or endangered in California, but more common elsewhere; seriously threatened in California

2B.2: Plants rare, threatened, or endangered in California, but more common elsewhere; fairly threatened in California

2B.3: Plants rare, threatened, or endangered in California, but more common elsewhere; not very threatened in California

3.1: Plants about which we need more information; seriously threatened in California

3.2: Plants about which we need more information; fairly threatened in California

3.3: Plants about which we need more information; not very threatened in California

4.1: Plants of limited distribution; seriously threatened in California

4.2: Plants of limited distribution; fairly threatened in California

4.3: Plants of limited distribution; not very threatened in California

Appendix F Critical Facilities

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Madera County Telecommunications	Essential Services Facilities	Communications	Auberry (Fresno County)	No Data Available	No Data Available	No Data Available	Unknown				
Musick Mountain Tower	Essential Services Facilities	Communications	Auberry (Fresno County)	No Data Available	No Data Available	No Data Available	Unknown				
Chowchilla Skilled Nursing/Chowchilla Nursing Center	At Risk Populations Facilities	Health / Medical	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Chowchilla Avalon Care Center / Palms Care Center	At Risk Populations Facilities	Health / Medical	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Central California Women's Facility	At Risk Populations Facilities	Jail / Prison	City of Chowchilla	Zone AE	Outside of State and Federal Responsibility Area	Non-Wildland	VII		Railroads		
Valley State Prison	At Risk Populations Facilities	Jail / Prison	City of Chowchilla	Zone AE	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Chowchilla High School	At Risk Populations Facilities	School	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Wilson Middle School	At Risk Populations Facilities	School	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
Fuller Elementary School	At Risk Populations Facilities	School	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
Stephens Elementary School	At Risk Populations Facilities	School	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Ronald Reagan Elementary School	At Risk Populations Facilities	School	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Chowchilla Municipal Airport	Essential Services Facilities	Communications	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Chowchilla (AT&T)	Essential Services Facilities	Communications	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Chowchilla Library	Essential Services Facilities	Community Center	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
City of Chowchilla Civic Center	Essential Services Facilities	Community Services	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera County Social Services Department	Essential Services Facilities	Community Services	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera County Fire Station 5	Essential Services Facilities	Fire Station	City of Chowchilla	Zone AE	Outside of State and Federal Responsibility Area	Non-Wildland	VII		Railroads		
Madera County Fire Station 2	Essential Services Facilities	Fire Station	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
City of Chowchilla Fire Department	Essential Services Facilities	Fire Station	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
City of Chowchilla / Police HQ / Dispatch	Essential Services Facilities	Public Safety Facility / 911 PSAP	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Chowchilla Water District	Essential Services Facilities	Public Utility Plant Facilities	City of Chowchilla	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
FRANK BERGON SENIOR CENTER	At Risk Populations Facilities	Community Church	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
JOHN W. WELLS YOUTH CENTER	At Risk Populations Facilities	Community Recreation Center	City of Madera	Zone AE: Regulatory Floodway	Outside of State and Federal Responsibility Area	Non-Wildland	VII	Highways	Railroads		High Dam Inundation Area
PAN-AM PARK	At Risk Populations Facilities	Community Recreation Center	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Parkwood Elementary School	At Risk Populations Facilities	School	City of Madera	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Cesar Chavez Elementary School	At Risk Populations Facilities	School	City of Madera	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Furman Elementary	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Furman High School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera South High School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Alpha Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Norman M. Gould School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madison Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera County Independent Academy	At Risk Populations Facilities	School	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Sierra Vista Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera High School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Adams Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Madera Technical Exploration Center	At Risk Populations Facilities	School	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Lincoln Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
Saint Joachim Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Jefferson Middle School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Martin Luther King Jr. Middle School	At Risk Populations Facilities	School	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Washington Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Virginia Lee Rose Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Millview Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Mountain Vista High School	At Risk Populations Facilities	School	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Monroe Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
Sherman Thomas Charter School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
Desmond Middle School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Matilda Torres High School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
Nishimoto Elementary School	At Risk Populations Facilities	School	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		
POLICE ANNEX BUILDING	Essential Services Facilities	Cogeneration Power	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
MELANIE MEADOWS SEWER LIFT STATION Generator	Essential Services Facilities	Cogeneration Power	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
FAIR GROUNDS LIFT STATION	Essential Services Facilities	Cogeneration Power	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #38	Essential Services Facilities	Cogeneration Power	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Fire Station 58 - GENERATOR	Essential Services Facilities	Cogeneration Power	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
FIRE STATION #57	Essential Services Facilities	Communications	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
Road 28 Tower	Essential Services Facilities	Communications	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
FIRE STATION #56	Essential Services Facilities	Communications	City of Madera	Zone AE: Regulatory Floodway	Outside of State and Federal Responsibility Area	Non-Wildland	VII	Highways	Railroads		High Dam Inundation Area
Madera Water Tower	Essential Services Facilities	Communications	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera Municipal Airport	Essential Services Facilities	Communications	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
MADERA WWTP - ADMINISTRATION	Essential Services Facilities	Community Services	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
CORPORATE YARD	Essential Services Facilities	Community Services	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera County Department of Social Services and Public Health	Essential Services Facilities	Community Services	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera County Administration Office	Essential Services Facilities	Community Services	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera City Hall	Essential Services Facilities	Community Services	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
COMMUNITY DEVELOPMENT OFFICES	Essential Services Facilities	Community Services	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Madera County Sheriff Center HQ / OES / Sheriff's Dispatch	Essential Services Facilities	Emergency Dispatch Center	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
Madera County Fire Department HQ	Essential Services Facilities	Fire Command Center	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Fire Station 57	Essential Services Facilities	Fire Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
Madera County Fire Station 1	Essential Services Facilities	Fire Station	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Fire Station 56	Essential Services Facilities	Fire Station	City of Madera	Zone AE: Regulatory Floodway	Outside of State and Federal Responsibility Area	Non-Wildland	VII	Highways	Railroads		High Dam Inundation Area
Fire Station 58	Essential Services Facilities	Fire Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Madera Community Hospital	Essential Services Facilities	Health / Medical	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera County Jail	Essential Services Facilities	Jail / Prison	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
MELANIE MEADOWS SEWER LIFT STATION SHELTER	Essential Services Facilities	Pavilion	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
POLICE ANNEX BUILDING	Essential Services Facilities	Police	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
POLICE ANNEX BUILDING - CELL TOWER	Essential Services Facilities	Police	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Madera City / Police HQ / Dispatch	Essential Services Facilities	Police	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
MADERA WWTP - WATER SUPPLY PUMP & WELL#2	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
STORM LIFT STATION #10	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
STORM LIFT STATION #10	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
STORM LIFT STATION #13	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #14	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #6	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
STORM LIFT STATION #8	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #7	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #9	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #15	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #16	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #5	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
STORM LIFT STATION #4	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #21	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #20	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #2	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
STORM LIFT STATION #19	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #3	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
MELANIE MEADOWS SEWER LIFT STATION	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
STORM LIFT STATION #1	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone AE	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
SOUTH STREET SEWER LIFT STATION	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
STORM LIFT STATION #18	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
FAIR GROUNDS LIFT STATION	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
MADERA AIRPORT - STORM LIFT STATION #22	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
MADERA AIRPORT - SEWAGE LIFT STATION	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
MADERA AIRPORT - SEWER LIFT STATION	Essential Services Facilities	Wastewater Lift Station	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
WATER WELL #33	Essential Services Facilities	Water Treatment	City of Madera	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #33	Essential Services Facilities	Water Treatment	City of Madera	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #33	Essential Services Facilities	Water Treatment	City of Madera	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #27	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
WATER WELL #27	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
WATER WELL #27	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
WATER WELL #21	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #21	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #34	Essential Services Facilities	Water Treatment	City of Madera	Zone AH	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #34	Essential Services Facilities	Water Treatment	City of Madera	Zone AH	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
WATER WELL #34	Essential Services Facilities	Water Treatment	City of Madera	Zone AH	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
LIONS TOWN & COUNTRY PARK	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
LIONS TOWN & COUNTRY PARK	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
WATER WELL #17	Essential Services Facilities	Water Treatment	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #17	Essential Services Facilities	Water Treatment	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #15	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
WATER WELL #15	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		High Dam Inundation Area
WATER WELL #31	Essential Services Facilities	Water Treatment	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #31	Essential Services Facilities	Water Treatment	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #32	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
WATER WELL #32	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
WATER WELL #32	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
PUMP SHELTER (OLD WELL)	Essential Services Facilities	Water Treatment	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #22	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #22	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #29	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #29	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #18	Essential Services Facilities	Water Treatment	City of Madera	Zone AE: Regulatory Floodway	Outside of State and Federal Responsibility Area	Non-Wildland	VII	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
LOY E. COOK WATER STORAGE FACILITY	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
COLUMBIA PUMP HOUSE	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
COLUMBIA PUMP HOUSE	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #24	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	VII	Highways	Railroads		High Dam Inundation Area
WATER WELL #24	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	VII	Highways	Railroads		High Dam Inundation Area
WATER WELL #28	Essential Services Facilities	Water Treatment	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
WATER WELL #20	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #20	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #28	Essential Services Facilities	Water Treatment	City of Madera	Zone X (shaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #25	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #25	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #16	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	VII	Highways			High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
WATER WELL #16	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	VII	Highways			High Dam Inundation Area
WATER WELL #23	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
WATER WELL #23	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
MADERA AIRPORT - WELL BOOSTER HOUSE	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
WATER WELL #26	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
WATER WELL #26	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
WATER WELL #38	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
WATER WELL #38	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
WATER WELL #38	Essential Services Facilities	Water Treatment	City of Madera	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
Mount Bullion Tower	Essential Services Facilities	Communications	Mariposa (Mariposa County)	No Data Available	No Data Available	No Data Available	Unknown				
Madera / Mariposa / Merced Unit - Cal Fire - State of California	Essential Services Facilities	Fire Command Center / Dispatch Center	Mariposa (Mariposa County)	No Data Available	No Data Available	No Data Available	Unknown				
Country Rose Guest Home	At Risk Populations Facilities	Health / Medical	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	III				
Majestic Mountain Care Center	At Risk Populations Facilities	Health / Medical	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0	Highways			
Oakhurst Board & Care for the Elderly	At Risk Populations Facilities	Health / Medical	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Ripperdan Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
Eastin-Arcola School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
La Vina Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
Valley Children's Hospital School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Moderate	VII				
Stone Creek Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	VIII				
Centennial Independent Study	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Lincoln Community Day School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
Independence Continuation High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
Liberty High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
Webster Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE: Regulatory Floodway	Outside of State and Federal Responsibility Area	Non-Wildland	V				
Ranchos Middle School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE: Regulatory Floodway	Outside of State and Federal Responsibility Area	Non-Wildland	V				
Howard Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Hillside Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Moderate	Outside of Local Responsibility Area	V				
Freedom Home High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	V				
Pershing Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
Sierra View Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
Sierra View Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
Dixieland Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE	Outside of State and Federal Responsibility Area	Non-Wildland	VII				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Dairyland Elementary	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
Berenda Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0		Railroads		
Alview Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
Seventh Day Adventist School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways			High Dam Inundation Area
Fairmead Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
Spring Valley Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	III				
Minarets High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	VI	Highways			

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Rivergold Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	VI				
Raymond Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	III				
Cougar Springs Community Day School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VII				High Dam Inundation Area
Manzanita Community Day School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VII				High Dam Inundation Area
Cedar Continuation High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VII				High Dam Inundation Area
Mountain Oaks High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VI				High Dam Inundation Area
Matilda Torres High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VI				High Dam Inundation Area
North Fork Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VIII				High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Coarsegold Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	III	Highways			
Meadowbrook Community Day School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	III	Highways			
Raymond Granite High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	VIII				
Ahwahnee High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE	High	Outside of Local Responsibility Area	0				
Campbell High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE: Regulatory Floodway	High	Outside of Local Responsibility Area	VI	Highways			
Yosemite High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE: Regulatory Floodway	High	Outside of Local Responsibility Area	VI	Highways			
Evergreen High School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE: Regulatory Floodway	High	Outside of Local Responsibility Area	VI	Highways			
Oakhurst Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0	Highways			

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Oakcreek Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE: Regulatory Floodway	High	Outside of Local Responsibility Area	VI	Highways			
Bass Lake Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VI				
Bailey Flat Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone AE	High	Outside of Local Responsibility Area	VIII				
Wasuma Elementary School	At Risk Populations Facilities	School	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0				
Mercer Mountain Tower	Essential Services Facilities	Communications	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	VIII				
Ponderosa Telephone	Essential Services Facilities	Communications	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	III				
Trabucco Mountain Tower	Essential Services Facilities	Communications	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	VII	Highways			
Goat Mountain Tower	Essential Services Facilities	Communications	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VIII				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Deadwood Mountain Tower	Essential Services Facilities	Communications	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	VIII				
Sierra Telephone	Essential Services Facilities	Communications	Unincorporated Madera County	Zone AE: Regulatory Floodway	Moderate	Outside of Local Responsibility Area	III	Highways			
Shuteye Mountain Tower	Essential Services Facilities	Communications	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VIII				
Owens Mountain Tower	Essential Services Facilities	Communications	Unincorporated Madera County	No Data Available	No Data Available	No Data Available	Unknown				
Madera Ranchos Library	Essential Services Facilities	Community Center	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	V				
North Fork Library	Essential Services Facilities	Community Center	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	III				
North Fork Town Hall	Essential Services Facilities	Community Center	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VI				High Dam Inundation Area
North Fork Rancheria Community Center	Essential Services Facilities	Community Center	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VII				High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Coarsegold Community Center	Essential Services Facilities	Community Center	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	VI	Highways			
Oakhurst Community Center	Essential Services Facilities	Community Center	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0	Highways			
Sierra Senior Center	Essential Services Facilities	Community Center	Unincorporated Madera County	Zone AE: Regulatory Floodway	High	Outside of Local Responsibility Area	III	Highways			
Oakhurst Library	Essential Services Facilities	Community Center	Unincorporated Madera County	Zone AE: Regulatory Floodway	Moderate	Outside of Local Responsibility Area	0	Highways			
Madera County Government Center	Essential Services Facilities	Community Center	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0	Highways			
MD28 Ripperdan Water System ID # 2000553	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
MD28 Ripperdan Sewer System	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
MD36 Eastin Arcola Water System ID # 2000727	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
MD37 La Vina Water System ID # 2000728	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
MD10A Madera Ranchos Water System ID # 2010008	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
MD95 Ranchos West Water System ID # 2000692	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
MD19 Parkwood Water System ID # 2010004	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
SA3 Parksdale Water System ID # 2010006	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
SA16 Sumner Hill Water System ID # 2000729	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	IX				
SA14 Chuckchanse Water System ID # 2000724	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
MD1 Hidden Lakes Water System ID # 2000544	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	VII				
Fairmead Landfill Water System ID # 2000384	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone AE	Outside of State and Federal Responsibility Area	Non-Wildland	VII	Highways	Railroads		
MD33 Fairmead Water System # ID 2000554	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		
MD85 Valeta Water System ID # 2000511	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways			High Dam Inundation Area
MD5 Mountain Ranches Water System ID # 2000549	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	III				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
MD73 Quartz Mountain Water System ID # 2000690	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	VII				
SA1 Indian Lakes Estates Water System ID # 2010011	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	VI				
MD40 Sunset Ridge Water System ID # 2000851	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	VII	Highways			
MD8 North Fork Water System ID # 2000561	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VI				High Dam Inundation Area
MD63 Meadow Springs Ranch Water System ID # 2000757	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	VII				
MD58 Sierra Highlands Water System ID # 2000865	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	VI				
MD24 Teaford Meadows Water System ID # 2000552	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VII				
MD7 Marina View Water System ID # 2000551	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	III				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
SA2 Wishon Cove Water System ID # 2000542	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VII				
MD42 Stillmeadow II Water System ID # 2000737	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	III				
MD6 Lakeshore Park Water System ID # 2000550	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VIII				
MD27 Goldside Sewer System	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	0				
Madera County Bass Lake Government Center Water System ID # 2000385	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VII				
MD43 Laurin Lane Water System ID # 2000557	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0				
MD60 Dillon Estates Water System ID # 2000849	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0				
MD46 Ahwahnee Resorts Water System ID # 2000293	Essential Services Facilities	Drinking Water Infrastructure	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	III				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Madera County Fire Station 9	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
Madera County Fire Station 7	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	V				
Madera County Fire Station 19	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Moderate	V				
Madera County Fire Station 3	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
Madera County Fire Station 10	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0				
CAL-FIRE Station - Raymond	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0				
CAL-FIRE Station - Rancheria	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	VI				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Madera County Fire Station 8	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0	Highways			
Madera County Fire Station 11	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	0				
CAL-FIRE Station - Coarsegold	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	III	Highways			
CAL-FIRE Station - Bass Lake	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VIII				
Madera County Fire Station 14	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VII				
Madera County Fire Station 12	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	Moderate	Outside of Local Responsibility Area	III	Highways			
CAL-FIRE Station - Ahwahnee	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	VII				
Madera County Fire Station 18	Essential Services Facilities	Fire Station	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VI	Highways			

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Valley Children's Hospital	Essential Services Facilities	Health / Medical	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Moderate	VII				
California Highway Patrol - Oakhurst	Essential Services Facilities	Police	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0	Highways			
Madera County Sheriff / Oakhurst OEC	Essential Services Facilities	Rural Emergency Operations	Unincorporated Madera County	Zone X (unshaded)	Moderate	Outside of Local Responsibility Area	III	Highways			
MD37 La Vina Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0				High Dam Inundation Area
SA22C Gunner Ranch West	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Moderate	V				
MD19 Parkwood Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone AO	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area
SA3 Parksdale Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0	Highways	Railroads		High Dam Inundation Area

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
SA16 Sumner Hill Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	IX				
SA14 Chuckchanse Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Outside of State and Federal Responsibility Area	Non-Wildland	0				
MD8 North Fork Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	0				High Dam Inundation Area
MD24 Teaford Meadows Sewer Sytem	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VII				
MD7 Marina View Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VIII				
MD6 Lakeshore Park Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VI				
SA2 Bass Lake Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	III				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
MD22A Sewer System	Essential Services Facilities	Sanitary Sewer System Infrastructure	Unincorporated Madera County	Zone X (unshaded)	Moderate	Outside of Local Responsibility Area	0	Highways			
North Fork Wastewater Treatment Plant (MD-8)	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VIII				High Dam Inundation Area
North Fork Water Treatment Plant (MD-8)	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone D (unmapped)	High	Outside of Local Responsibility Area	VII				High Dam Inundation Area
Sierra Highlands Water Plant (MD-58)	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	VI				
Sierra Highlands Water Treatment Plant (MD-58)	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone X (unshaded)	High	Outside of Local Responsibility Area	0				
Teaford Meadows Water Treatment Plant (MD-24)	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VII				
Marina View Water Treatment Plant (MD-7)	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VIII				
Wishon Cove Water Treatment Plan (MD-2)	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VII				

Critical Facility Name	Critical Facility Category	Critical Facility Type	Jurisdiction	DFIRM Flood Zone	SRA/ FRA FHSZ	LRA FHSZ	Deep-Seated Landslide Class	Hazardous Materials Route	Hazardous Materials Route	Extremely High Hazard Dam Inundation	High Hazard Dam Inundation
Lakeshore Water Treatment Plan (MD-6)	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VIII				
Bass Lake Drinking Water Plant	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VII				
Bass Lake Drinking Water Storage Plant	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VIII				
Bass Lake Wastewater Treatment Plant	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone D (unmapped)	Very High	Outside of Local Responsibility Area	VI				
Bass Lake Wastewater Spray Field	Essential Services Facilities	Treatment Plant	Unincorporated Madera County	Zone X (unshaded)	Very High	Outside of Local Responsibility Area	VIII				

Source: Madera County GIS

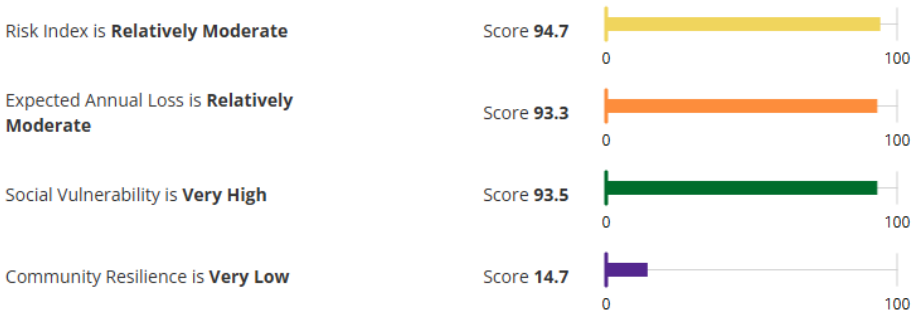
Appendix G Madera County FEMA National Risk Index Report

National Risk Index

January 10, 2025

Madera County, California

Summary

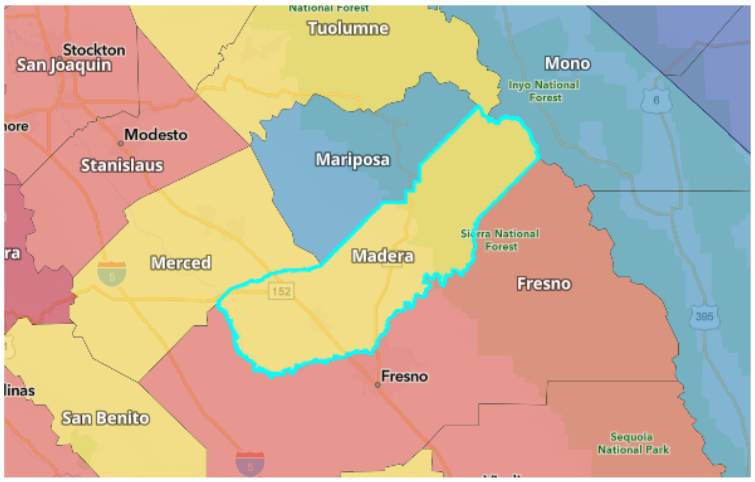


While reviewing this report, keep in mind that low risk is driven by lower loss due to natural hazards, lower social vulnerability, and higher community resilience.

For more information about the National Risk Index, its data, and how to interpret the information it provides, please review the **About the National Risk Index** and **How to Take Action** sections at the end of this report. Or, visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

Risk Index

The Risk Index rating is **Relatively Moderate** for **Madera County, CA** when compared to the rest of the U.S.



Score	94.65

National Percentile
94.65

Percentile Within California
41.40

0 100

95% of U.S. counties have a lower Risk Index

41% of counties in California have a lower Risk Index

Risk Index Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Rating | Not Applicable | Insufficient Data

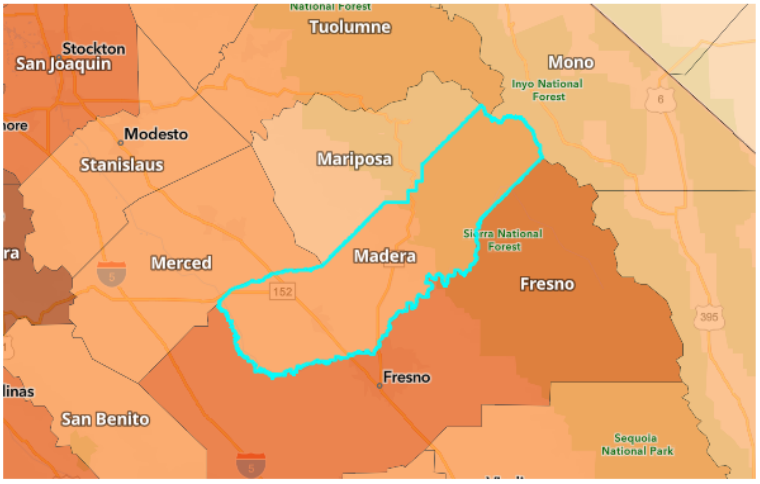
Hazard Type Risk Index

Hazard type Risk Index scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value.

Hazard Type	Risk Index Rating	Risk Index Score	National Percentile
Avalanche	Very Low	8.7	0 100
Coastal Flooding	Not Applicable	--	
Cold Wave	No Rating	0	0 100
Drought	Relatively High	98.9	0 100
Earthquake	Relatively Moderate	96.5	0 100
Hail	Relatively Low	70.4	0 100
Heat Wave	Relatively High	99	0 100
Hurricane	Not Applicable	--	
Ice Storm	Not Applicable	--	
Landslide	Relatively Moderate	82.1	0 100
Lightning	Relatively Low	53.1	0 100
Riverine Flooding	Relatively High	98.8	0 100
Strong Wind	Very Low	2.7	0 100
Tornado	Very Low	18.9	0 100
Tsunami	Not Applicable	--	
Volcanic Activity	Relatively Low	53.9	0 100
Wildfire	Relatively High	99.6	0 100
Winter Weather	Very Low	23	0 100

Expected Annual Loss

In **Madera County, CA**, expected loss each year due to natural hazards is **Relatively Moderate** when compared to the rest of the U.S.



Score	93.31

National Percentile: 93.31

Percentile Within California: 39.70

0 — 100

93% of U.S. counties have a lower Expected Annual Loss

40% of counties in California have a lower Expected Annual Loss

Expected Annual Loss Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Expected Annual Losses | Not Applicable | Insufficient Data

Composite Expected Annual Loss	**$63,720,373.04**
Composite Expected Annual Loss Rate National Percentile	**77.6**

Building EAL	**$44,594,157.22**	Population EAL	**0.94** fatalities
Building EAL Rate	**$1 per $620.44 of building value**	Population EAL Rate	**1 per 165.46K people**
Agriculture EAL	**$8,179,085.83**	Population Equivalence EAL	**$10,947,129.99**
Agriculture EAL Rate	**$1 per $209.32 of agriculture value**		

Expected Annual Loss for Hazard Types

Expected Annual Loss scores for hazard types are calculated using data for only a single hazard type, and reflect a community's relative expected annual loss for only that hazard type.

14 of 18 hazard types contribute to the expected annual loss for **Madera County, CA**.

Hazard Type	Expected Annual Loss Rating	EAL Value	Score
Wildfire	Relatively High	$20,122,138	99.2
Riverine Flooding	Relatively High	$16,775,085	98.4
Earthquake	Relatively Moderate	$13,095,612	95.9
Heat Wave	Relatively High	$7,522,714	98.5
Drought	Relatively High	$5,516,976	98.9
Hail	Relatively Low	$197,349	66.9
Tornado	Very Low	$141,258	18.8
Volcanic Activity	Relatively Low	$105,133	62.3
Landslide	Relatively Moderate	$104,901	79.4
Lightning	Relatively Low	$83,010	48.0
Avalanche	Very Low	$36,967	12.0
Winter Weather	Relatively Low	$14,311	23.6
Strong Wind	Very Low	$4,919	4.8
Cold Wave	No Expected Annual Losses	$0	0.0
Coastal Flooding	Not Applicable	--	--
Hurricane	Not Applicable	--	--
Ice Storm	Not Applicable	--	--
Tsunami	Not Applicable	--	--

Expected Annual Loss Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	$36,967	$47	$36,920	0.00	n/a
Coastal Flooding	--	--	--	--	--
Cold Wave	$0	$0	$0	0.00	$0
Drought	$5,516,976	n/a	n/a	n/a	$5,516,976
Earthquake	$13,095,612	$10,682,434	$2,413,178	0.21	n/a
Hail	$197,348	$7,097	$50,220	0.00	$140,032
Heat Wave	$7,522,714	$712	$6,197,727	0.53	$1,324,275
Hurricane	--	--	--	--	--
Ice Storm	--	--	--	--	--
Landslide	$104,901	$23,022	$81,879	0.01	n/a
Lightning	$83,010	$240	$82,770	0.01	n/a
Riverine Flooding	$16,775,085	$13,585,281	$1,996,604	0.17	$1,193,200
Strong Wind	$4,919	$1,984	$952	0.00	$1,983
Tornado	$141,258	$97,656	$40,989	0.00	$2,613
Tsunami	--	--	--	--	--
Volcanic Activity	$105,133	$97,353	$7,780	0.00	n/a
Wildfire	$20,122,138	$20,091,662	$30,468	0.00	$7
Winter Weather	$14,311	$6,669	$7,642	0.00	$0

Exposure Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	$59,000,000	$1,000,000	$58,000,000	5.00	n/a
Coastal Flooding	--	--	--	--	--
Cold Wave	$0	$0	$0	0.00	$0
Drought	$1,324,067,118	n/a	n/a	n/a	$1,324,067,118
Earthquake	$1,840,225,739,000	$27,667,739,000	$1,812,558,000,000	156,255.00	n/a
Hail	$1,840,673,726,093	$27,668,098,560	$1,811,293,600,000	156,146.00	$1,712,027,533
Heat Wave	$1,840,673,022,470	$27,668,088,869	$1,811,292,906,069	156,145.94	$1,712,027,532
Hurricane	--	--	--	--	--
Ice Storm	--	--	--	--	--
Landslide	$98,349,856,746	$2,733,417,677	$95,616,439,069	8,242.80	n/a
Lightning	$1,838,961,698,560	$27,668,098,560	$1,811,293,600,000	156,146.00	n/a
Riverine Flooding	$136,332,743,514	$1,970,599,566	$133,650,036,622	11,521.55	$712,107,325
Strong Wind	$1,840,673,726,093	$27,668,098,560	$1,811,293,600,000	156,146.00	$1,712,027,533
Tornado	$1,840,673,726,093	$27,668,098,560	$1,811,293,600,000	156,146.00	$1,712,027,533
Tsunami	--	--	--	--	--
Volcanic Activity	$166,861,399,407	$4,650,664,479	$162,210,734,928	13,983.68	n/a
Wildfire	$279,242,420,215	$5,070,560,016	$274,126,337,688	23,631.58	$45,522,510
Winter Weather	$315,404,147,429	$7,134,585,268	$308,269,306,069	26,574.94	$256,092

Annualized Frequency Values

Hazard Type	Annualized Frequency	Events on Record	Period of Record
Avalanche	0 events per year	0	1960-2019 (60 years)
Coastal Flooding	--	--	--
Cold Wave	0 events per year	0	2005-2021 (16 years)
Drought	64.3 events per year	1,449	2000-2021 (22 years)
Earthquake	0.525% chance per year	n/a	2021 dataset
Hail	0.2 events per year	7	1986-2021 (34 years)
Heat Wave	2.2 events per year	36	2005-2021 (16 years)
Hurricane	--	--	--
Ice Storm	--	--	--
Landslide	0.1 events per year	3	2010-2021 (12 years)
Lightning	2 events per year	45	1991-2012 (22 years)
Riverine Flooding	1.7 events per year	40	1996-2019 (24 years)
Strong Wind	0 events per year	2	1986-2021 (34 years)
Tornado	0.2 events per year	10	1950-2021 (72 years)
Tsunami	--	--	--
Volcanic Activity	0 events per year	1	9310BC-2022 (11331 years)
Wildfire	0.789% chance per year	n/a	2021 dataset
Winter Weather	6.9 events per year	111	2005-2021 (16 years)

Historic Loss Ratios

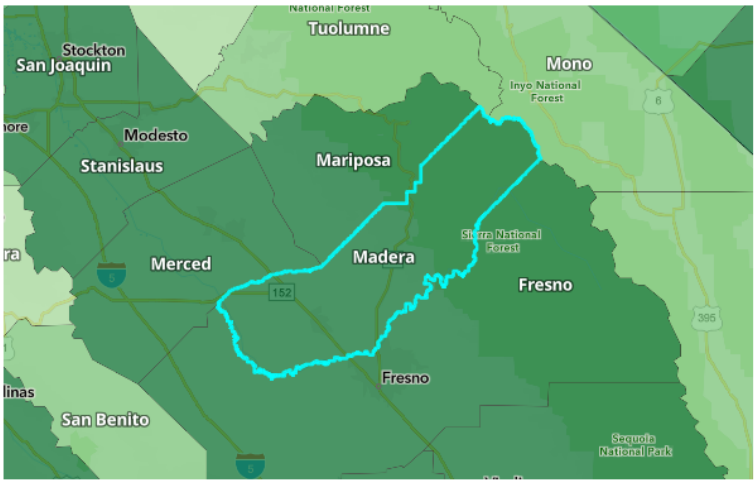
Hazard Type	Overall Rating
Avalanche	Relatively Moderate
Coastal Flooding	--
Cold Wave	No Rating
Drought	Very Low
Earthquake	Relatively Moderate
Hail	Relatively Moderate
Heat Wave	Relatively Low
Hurricane	--
Ice Storm	--
Landslide	Very Low
Lightning	Relatively High
Riverine Flooding	Relatively Low
Strong Wind	Very Low
Tornado	Very Low
Tsunami	--
Volcanic Activity	Relatively Moderate
Wildfire	Relatively Moderate
Winter Weather	Very Low

Expected Annual Loss Rate

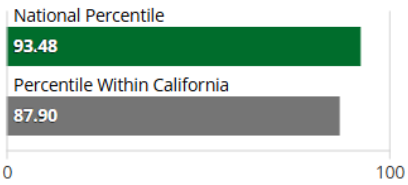
Hazard Type	Building EAL Rate (per building value)	Population EAL Rate (per population)	Agriculture EAL Rate (per agriculture value)
Avalanche	$1 per $582.68M	1 per 49.06M	--
Coastal Flooding	--	--	--
Cold Wave	--	--	--
Drought	--	--	$1 per $310.32
Earthquake	$1 per $2.59K	1 per 750.58K	--
Hail	$1 per $3.90M	1 per 36.07M	$1 per $12.23K
Heat Wave	$1 per $38.84M	1 per 292.25K	$1 per $1.29K
Hurricane	--	--	--
Ice Storm	--	--	--
Landslide	$1 per $1.20M	1 per 22.12M	--
Lightning	$1 per $115.43M	1 per 21.88M	--
Riverine Flooding	$1 per $2.04K	1 per 907.19K	$1 per $1.43K
Strong Wind	$1 per $13.94M	1 per 1.90B	$1 per $863.52K
Tornado	$1 per $283.32K	1 per 44.19M	$1 per $655.21K
Tsunami	--	--	--
Volcanic Activity	$1 per $284.20K	1 per 232.81M	--
Wildfire	$1 per $1.38K	1 per 59.45M	$1 per $234.86M
Winter Weather	$1 per $4.15M	1 per 237.02M	$1 per $371.63T

Social Vulnerability

Social groups in **Madera County, CA** have a **Very High** susceptibility to the adverse impacts of natural hazards when compared to the rest of the U.S.



Score **93.48**



93% of U.S. counties have a lower Social Vulnerability

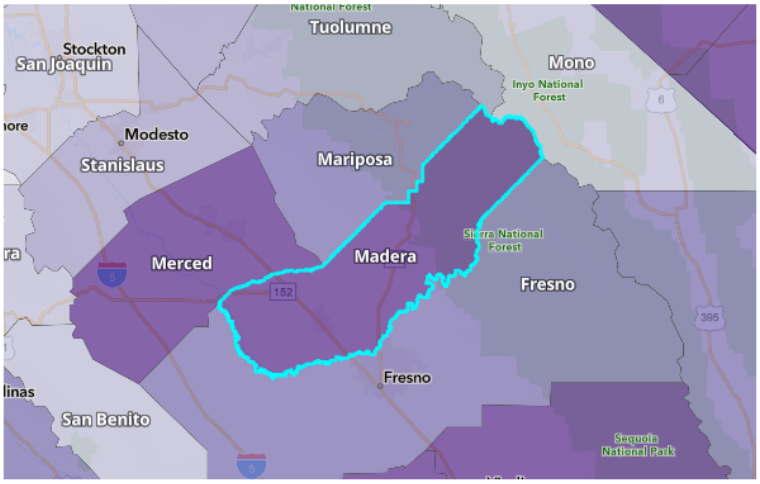
88% of counties in California have a lower Social Vulnerability

Social Vulnerability Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

Community Resilience

Communities in **Madera County, CA** have a **Very Low** ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the U.S.



Score **14.74**

National Percentile
14.74

Percentile Within California
6.90

0 100

85% of U.S. counties have a higher Community Resilience

93% of counties in California have a higher Community Resilience

Community Resilience Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

Data Unavailable

About the National Risk Index

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Explore the National Risk Index Map at **hazards.fema.gov/nri/map**.

Visit the National Risk Index website at **hazards.fema.gov/nri/learn-more** to access supporting documentation and links.

Calculating the Risk Index

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience:

$$\text{Risk Index} = \text{Expected Annual Loss} \times \text{Social Vulnerability} \div \text{Community Resilience}$$

Risk Index scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit hazards.fema.gov/nri/determining-risk.

Calculating Expected Annual Loss

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios for 18 hazard types:

> **Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio**

Expected Annual Loss scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit **hazards.fema.gov/nri/expected-annual-loss**.

Calculating Social Vulnerability

Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).

For more information, visit **hazards.fema.gov/nri/social-vulnerability**.

Calculating Community Resilience

Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

For more information, visit **hazards.fema.gov/nri/community-resilience**.

How to Take Action

There are many ways to reduce natural hazard risk through mitigation. Communities with high National Risk Index scores can take action to reduce risk by decreasing Expected Annual Loss due to natural hazards, decreasing Social Vulnerability, and increasing Community Resilience.

For information about how to take action and reduce your risk, visit **hazards.fema.gov/nri/take-action**.

Disclaimer

The National Risk Index (the Risk Index or the Index) and its associated data are meant for planning purposes only. This tool was created for broad nationwide comparisons and is not a substitute for localized risk assessment analysis. Nationwide datasets used as inputs for the National Risk Index are, in many cases, not as accurate as available local data. Users with access to local data for each National Risk Index risk factor should consider substituting the Risk Index data with local data to recalculate a more accurate risk index. If you decide to download the National Risk Index data and substitute it with local data, you assume responsibility for the accuracy of the data and any resulting data index. Please visit the **Contact Us** page if you would like to discuss this process further.

The methodology used by the National Risk Index has been reviewed by subject matter experts in the fields of natural hazard risk research, risk analysis, mitigation planning, and emergency management. The processing methods used to create the National Risk Index have produced results similar to those from other natural hazard risk analyses conducted on a smaller scale. The breadth and combination of geographic information systems (GIS) and data processing techniques leveraged by the National Risk Index enable it to incorporate multiple hazard types and risk factors, manage its nationwide scope, and capture what might have been missed using other methods.

The National Risk Index does not consider the intricate economic and physical interdependencies that exist across geographic regions. Keep in mind that hazard impacts in surrounding counties or Census tracts can cause indirect losses in your community regardless of your community's risk profile.

Nationwide data available for some risk factors are rudimentary at this time. The National Risk Index will be continuously updated as new data become available and improved methodologies are identified.

The National Risk Index Contact Us page is available at **hazards.fema.gov/nri/contact-us**.

Appendix H Hazus Scenarios

The following pages contain the full Hazus scenario reports for the four Hazus earthquake runs:

- Hartley Springs Fault 6.77 Hazus Scenario
- Orgalita Fault 7.01 Hazus Scenario
- Owens Valley 7.38 Hazus Scenario
- San Andreas 7.15 Hazus Scenario

Hazus: Earthquake Global Risk Report

Region Name: Madera2025

Earthquake Scenario: DETERM HartleySprings 6.77M EQ CT

Print Date: August 12, 2025

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,154.20 square miles and contains 34 census tracts. There are over 45 thousand households in the region which has a total population of 156,255 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 50 thousand buildings in the region with a total building replacement value (excluding contents) of 27,667 (millions of dollars). Approximately 90.00 % of the buildings (and 65.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,656 and 3,290 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 50 thousand buildings in the region which have an aggregate total replacement value of 27,667 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 86% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 462 beds. There are 86 schools, 25 fire stations, 6 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 5,946.00 (millions of dollars). This inventory includes over 232.39 miles of highways, 245 bridges, 7,470.12 miles of pipes.

Table 1: Transportation System Lifeline Inventory

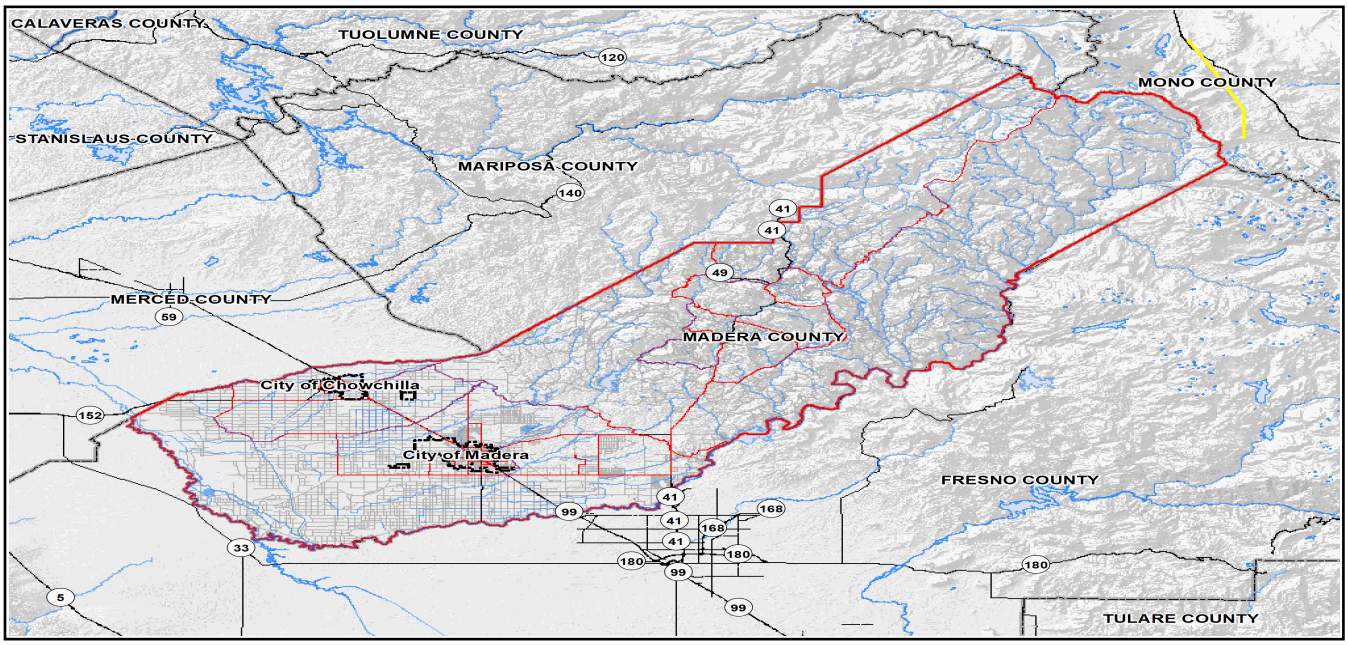
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	245	585.2514
	Segments	130	1667.7562
	Tunnels	0	0.0000
		Subtotal	**2253.0076**
Railways	Bridges	35	199.1500
	Facilities	1	2.6630
	Segments	30	165.1451
	Tunnels	0	0.0000
		Subtotal	**366.9581**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	1	2.1686
		Subtotal	**2.1686**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	2	10.6000
	Runways	3	24.0375
		Subtotal	**34.6375**
		Total	**2,656.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	149.6462
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**149.6462**
Waste Water	Distribution Lines	NA	89.7877
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**89.7877**
Natural Gas	Distribution Lines	NA	59.8585
	Facilities	0	0.0000
	Pipelines	5	180.6640
		Subtotal	**240.5225**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	8	2810.3549
		Subtotal	**2810.3549**
Communication	Facilities	5	0.5900
		Subtotal	**0.5900**
		Total	**3,290.90**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	DETERM HartleySprings 6.77M EQ CT
Type of Earthquake	Source
Fault Name	Hartley Springs
Historical Epicenter ID #	103
Probabilistic Return Period	NA
Longitude of Epicenter	-119.00
Latitude of Epicenter	37.69
Earthquake Magnitude	6.77
Depth (km)	0.00
Rupture Length (Km)	28.83
Rupture Orientation (degrees)	0.00
Attenuation Function	West US, Extensional 2008 - Normal

Direct Earthquake Damage

Building Damage

Hazus estimates that about 43 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

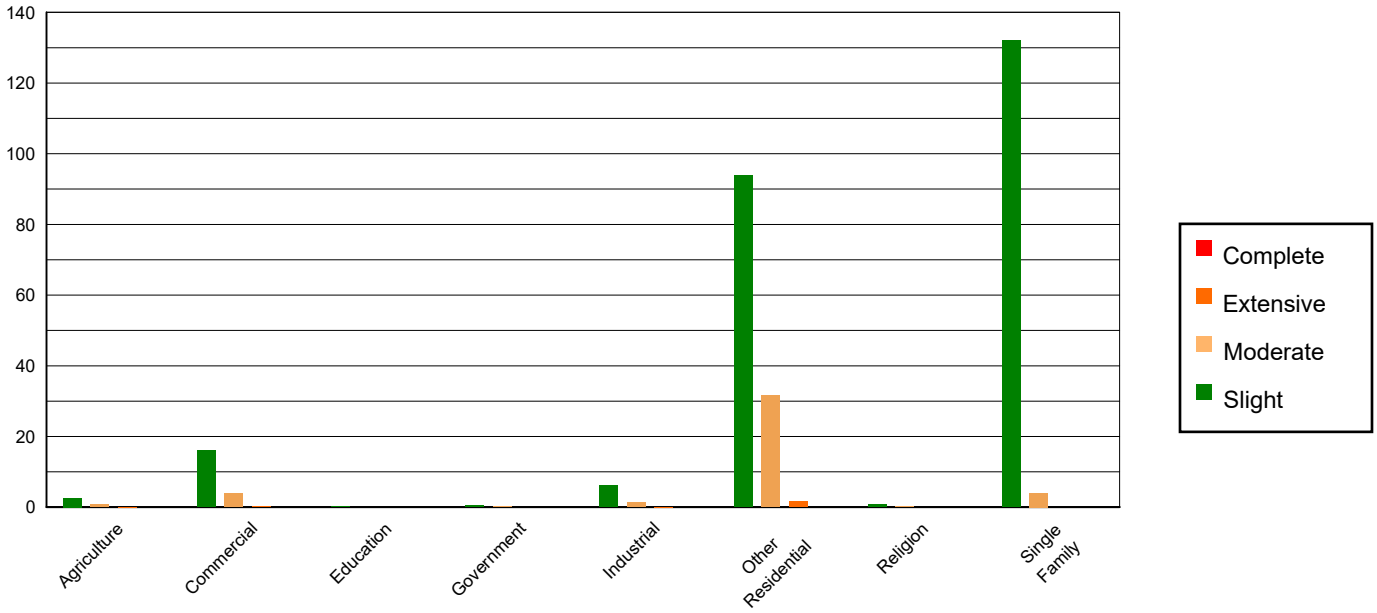


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	630.71	1.26	2.59	1.03	0.66	1.57	0.04	2.26	0.00	1.27
Commercial	2884.87	5.77	16.03	6.36	3.90	9.32	0.20	10.67	0.00	40.83
Education	114.81	0.23	0.16	0.06	0.03	0.07	0.00	0.05	0.00	0.00
Government	110.29	0.22	0.57	0.23	0.14	0.32	0.01	0.34	0.00	0.00
Industrial	895.48	1.79	6.18	2.45	1.29	3.09	0.05	2.97	0.00	2.58
Other Residential	6508.01	13.01	93.80	37.21	31.64	75.62	1.54	83.20	0.00	54.04
Religion	118.02	0.24	0.79	0.31	0.18	0.44	0.01	0.51	0.00	1.28
Single Family	38776.02	77.49	131.98	52.35	4.00	9.56	0.00	0.00	0.00	0.00
Total	**50,038**		**252**		**42**		**2**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	43332.55	86.60	148.09	58.74	4.61	11.02	0.00	0.00	0.00	0.00
Steel	1034.89	2.07	7.46	2.96	2.21	5.29	0.11	6.13	0.00	0.00
Concrete	984.05	1.97	5.84	2.32	1.04	2.50	0.04	2.13	0.00	0.00
Precast	771.69	1.54	5.68	2.25	1.74	4.15	0.07	3.96	0.00	0.00
RM	1322.36	2.64	5.15	2.04	1.68	4.02	0.08	4.33	0.00	0.00
URM	72.52	0.14	2.06	0.82	0.81	1.93	0.12	6.26	0.01	100.00
MH	2520.15	5.04	77.81	30.87	29.75	71.09	1.43	77.19	0.00	0.00
Total	**50,038**		**252**		**42**		**2**		**0**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 462 hospital beds available for use. On the day of the earthquake, the model estimates that only 460 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	2	0	0	2
Schools	86	0	0	86
EOCs	1	0	0	1
PoliceStations	6	0	0	6
FireStations	25	0	0	25

Transportation Lifeline Damage

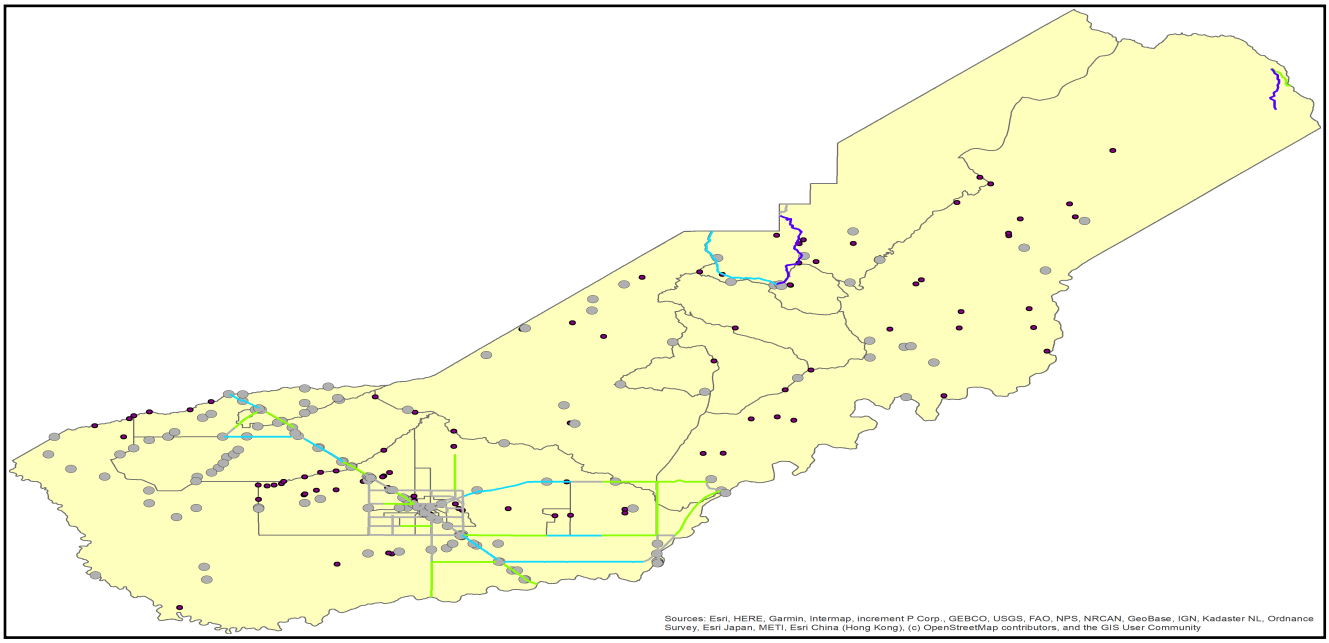


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	130	0	0	130	130
	Bridges	245	0	0	245	245
	Tunnels	0	0	0	0	0
Railways	Segments	30	0	0	30	30
	Bridges	35	0	0	35	35
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
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	2	0	0	2	2
	Runways	3	0	0	3	3

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	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	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	8	0	0	8	8
Communication	5	0	0	5	5

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	4,649	13	3
Waste Water	2,790	7	2
Natural Gas	32	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	45,607	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

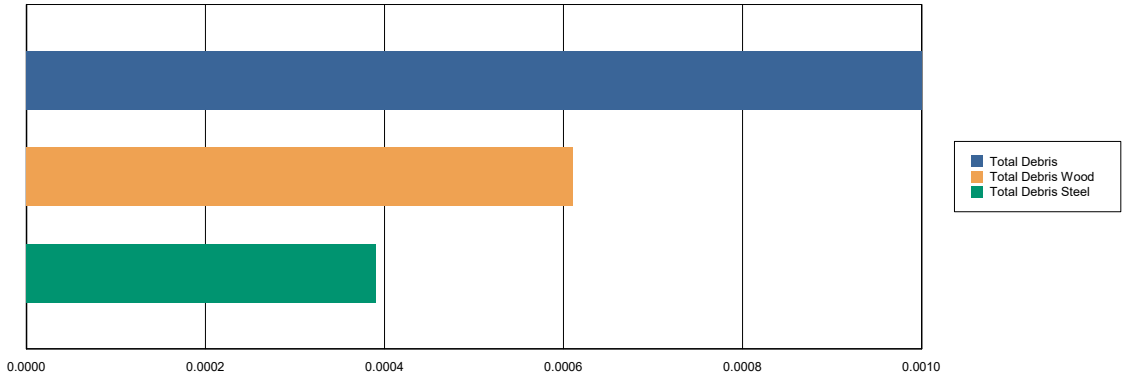
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 61.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 40 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	40 (@25 tons/truck)

Social Impact

Shelter Requirement

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 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 156,255) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter

Displaced households as a result of the earthquake	Persons seeking temporary public shelter
0	0

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.00	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	0.01	0.00	0.00	0.00
	Other-Residential	0.44	0.04	0.00	0.00
	Single Family	0.15	0.00	0.00	0.00
	Total	**1**	**0**	**0**	**0**
2 PM	Commercial	0.32	0.02	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.06	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.04	0.00	0.00	0.00
	Other-Residential	0.16	0.02	0.00	0.00
	Single Family	0.05	0.00	0.00	0.00
	Total	**1**	**0**	**0**	**0**
5 PM	Commercial	0.22	0.02	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	0.16	0.02	0.00	0.00
	Single Family	0.05	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**

Economic Loss

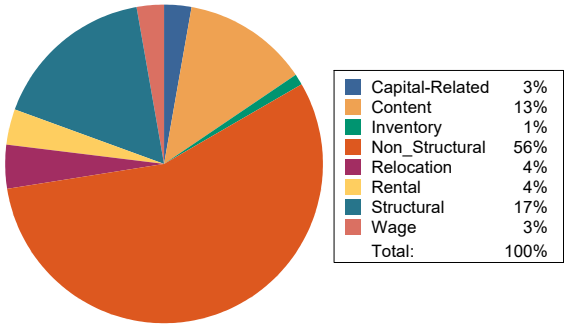
The total economic loss estimated for the earthquake is 51.09 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

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 business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 6.74 (millions of dollars); 14 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 61 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

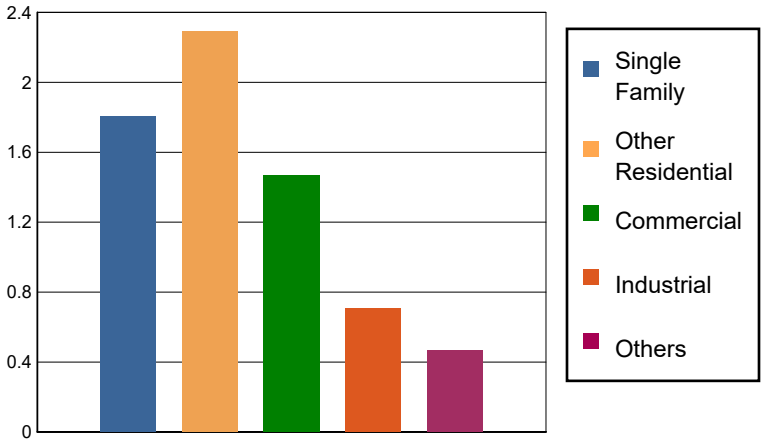


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0134	0.1537	0.0085	0.0111	0.1867
	Capital-Related	0.0000	0.0057	0.1653	0.0051	0.0028	0.1789
	Rental	0.0161	0.1276	0.0869	0.0079	0.0046	0.2431
	Relocation	0.0288	0.1226	0.0915	0.0252	0.0337	0.3018
	Subtotal	**0.0449**	**0.2693**	**0.4974**	**0.0467**	**0.0522**	**0.9105**
Capital Stock Losses							
	Structural	0.2465	0.4834	0.1700	0.0968	0.1208	1.1175
	Non_Structural	1.2710	1.3544	0.5880	0.3387	0.2129	3.7650
	Content	0.2441	0.1867	0.1802	0.1921	0.0592	0.8623
	Inventory	0.0000	0.0000	0.0296	0.0317	0.0205	0.0818
	Subtotal	**1.7616**	**2.0245**	**0.9678**	**0.6593**	**0.4134**	**5.8266**
	Total	**1.81**	**2.29**	**1.47**	**0.71**	**0.47**	**6.74**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1667.7562	0.0000	0.00
	Bridges	585.2514	0.0031	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**2253.0076**	**0.0031**	
Railways	Segments	165.1451	0.0000	0.00
	Bridges	199.1500	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.0050	0.19
	Subtotal	**366.9581**	**0.0050**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	2.1686	0.0034	0.16
	Subtotal	**2.1686**	**0.0034**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	10.6000	0.0130	0.12
	Runways	24.0375	0.0000	0.00
	Subtotal	**34.6375**	**0.0130**	
	Total	**2,656.77**	**0.02**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	149.6462	0.0601	0.04
	Subtotal	**149.6462**	**0.0601**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	89.7877	0.0302	0.03
	Subtotal	**89.7877**	**0.0302**	
Natural Gas	Pipelines	180.6640	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	59.8585	0.0103	0.02
	Subtotal	**240.5225**	**0.0103**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	2810.3549	44.2276	1.57
	Subtotal	**2810.3549**	**44.2276**	
Communication	Facilities	0.5900	0.0011	0.19
	Subtotal	**0.5900**	**0.0011**	
	Total	**3,290.90**	**44.33**	

Appendix A: County Listing for the Region

Madera,CA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
California					
	Madera	156,255	18,025	9,641	27,667
Total Region		**156,255**	**18,025**	**9,641**	**27,667**

Hazus: Earthquake Global Risk Report

Region Name: Madera2025

Earthquake Scenario: DETERM OrtigalitaSouth 7.01M EQ CT

Print Date: August 12, 2025

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,154.20 square miles and contains 34 census tracts. There are over 45 thousand households in the region which has a total population of 156,255 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 50 thousand buildings in the region with a total building replacement value (excluding contents) of 27,667 (millions of dollars). Approximately 90.00 % of the buildings (and 65.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,656 and 3,290 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 50 thousand buildings in the region which have an aggregate total replacement value of 27,667 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 86% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 462 beds. There are 86 schools, 25 fire stations, 6 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 5,946.00 (millions of dollars). This inventory includes over 232.39 miles of highways, 245 bridges, 7,470.12 miles of pipes.

Table 1: Transportation System Lifeline Inventory

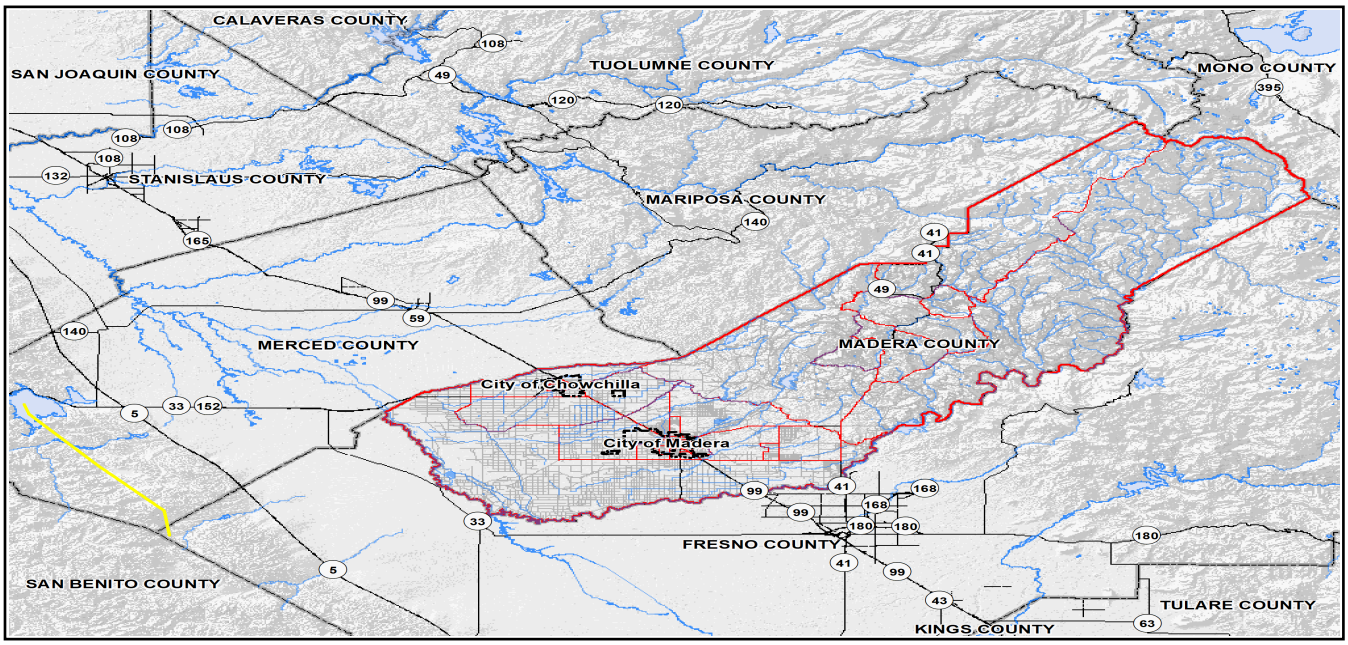
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	245	585.2514
	Segments	130	1667.7562
	Tunnels	0	0.0000
		Subtotal	**2253.0076**
Railways	Bridges	35	199.1500
	Facilities	1	2.6630
	Segments	30	165.1451
	Tunnels	0	0.0000
		Subtotal	**366.9581**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	1	2.1686
		Subtotal	**2.1686**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	2	10.6000
	Runways	3	24.0375
		Subtotal	**34.6375**
		Total	**2,656.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	149.6462
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**149.6462**
Waste Water	Distribution Lines	NA	89.7877
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**89.7877**
Natural Gas	Distribution Lines	NA	59.8585
	Facilities	0	0.0000
	Pipelines	5	180.6640
		Subtotal	**240.5225**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	8	2810.3549
		Subtotal	**2810.3549**
Communication	Facilities	5	0.5900
		Subtotal	**0.5900**
		Total	**3,290.90**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	DETERM OrtigalitaSouth 7.01M EQ CT
Type of Earthquake	Source
Fault Name	Ortigalita
Historical Epicenter ID #	170
Probabilistic Return Period	NA
Longitude of Epicenter	-120.99
Latitude of Epicenter	36.88
Earthquake Magnitude	7.01
Depth (km)	0.00
Rupture Length (Km)	43.39
Rupture Orientation (degrees)	0.00
Attenuation Function	West US, Extensional 2008 - Strike Slip

Direct Earthquake Damage

Building Damage

Hazus estimates that about 90 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

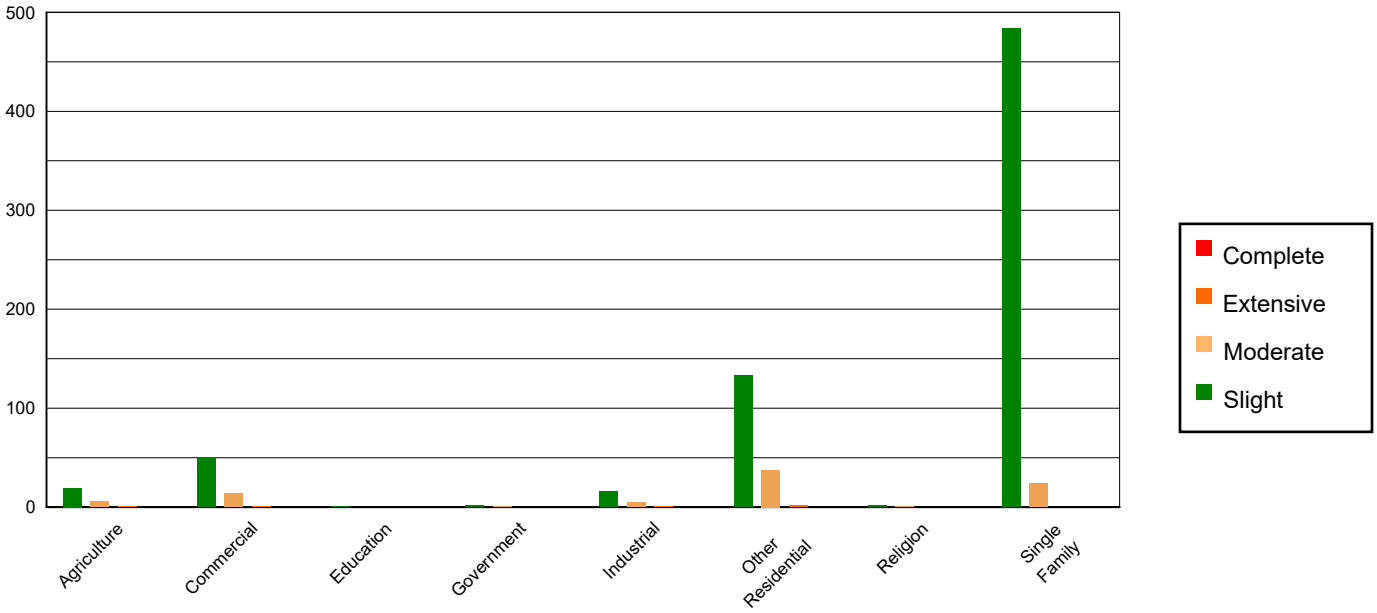


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	608.43	1.23	19.24	2.72	5.70	6.57	0.60	14.85	0.03	27.70
Commercial	2839.70	5.73	50.48	7.15	13.73	15.85	1.05	25.89	0.04	38.57
Education	114.53	0.23	0.39	0.05	0.08	0.09	0.00	0.05	0.00	0.00
Government	109.28	0.22	1.36	0.19	0.34	0.39	0.02	0.45	0.00	0.00
Industrial	881.68	1.78	16.20	2.29	4.79	5.53	0.33	8.26	0.00	4.58
Other Residential	6462.11	13.05	133.39	18.88	37.47	43.24	2.01	49.63	0.03	28.22
Religion	116.47	0.24	2.03	0.29	0.47	0.55	0.03	0.78	0.00	0.94
Single Family	38404.55	77.53	483.36	68.42	24.08	27.79	0.00	0.08	0.00	0.00
Total	**49,537**		**706**		**87**		**4**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	42915.96	86.63	541.99	76.72	27.31	31.52	0.00	0.00	0.00	0.00
Steel	1007.61	2.03	26.88	3.80	9.44	10.89	0.76	18.68	0.00	3.68
Concrete	966.73	1.95	19.50	2.76	4.45	5.13	0.30	7.28	0.00	0.00
Precast	755.10	1.52	17.55	2.48	6.15	7.10	0.38	9.26	0.00	1.86
RM	1307.84	2.64	15.61	2.21	5.47	6.31	0.35	8.70	0.00	0.00
URM	63.24	0.13	7.60	1.08	3.81	4.40	0.76	18.82	0.09	94.46
MH	2520.29	5.09	77.31	10.94	30.02	34.65	1.51	37.26	0.00	0.00
Total	**49,537**		**706**		**87**		**4**		**0**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 462 hospital beds available for use. On the day of the earthquake, the model estimates that only 455 hospital beds (99.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	2	0	0	2
Schools	86	0	0	86
EOCs	1	0	0	1
PoliceStations	6	0	0	6
FireStations	25	0	0	25

Transportation Lifeline Damage

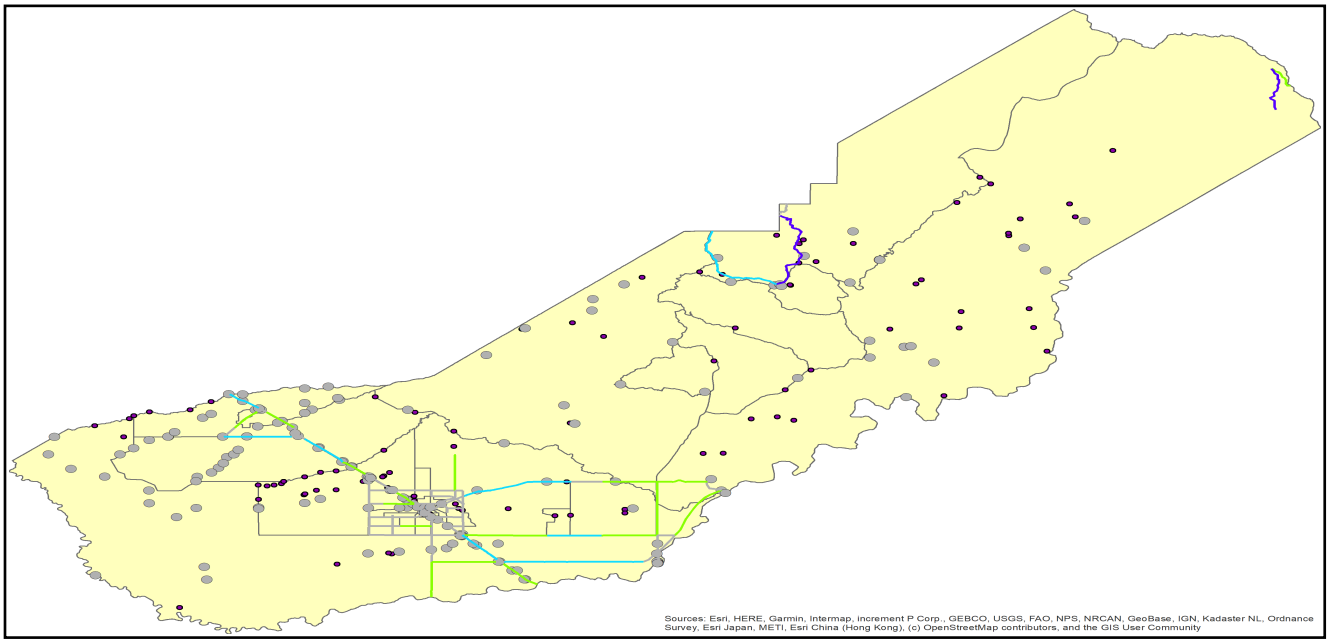


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	130	0	0	130	130
	Bridges	245	0	0	245	245
	Tunnels	0	0	0	0	0
Railways	Segments	30	0	0	30	30
	Bridges	35	0	0	35	35
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
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	2	0	0	2	2
	Runways	3	0	0	3	3

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	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	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	8	0	0	8	8
Communication	5	0	0	5	5

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	4,649	36	9
Waste Water	2,790	18	4
Natural Gas	32	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	45,607	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

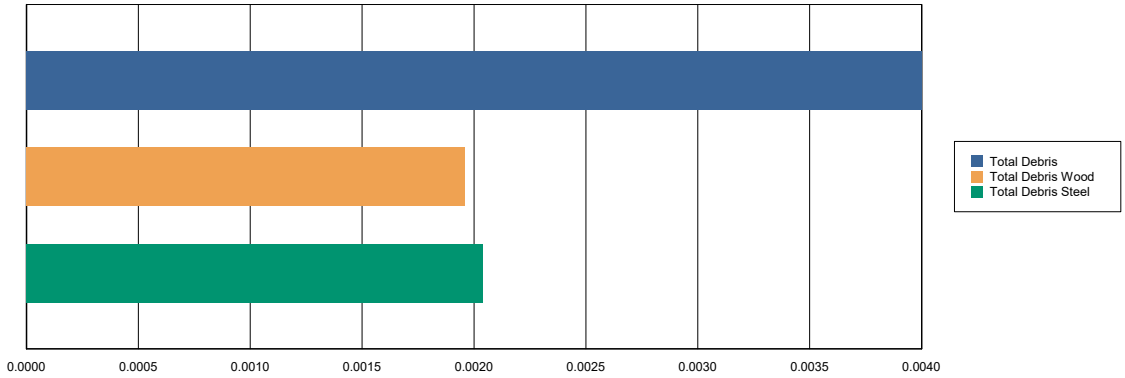
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 4,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 49.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 160 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



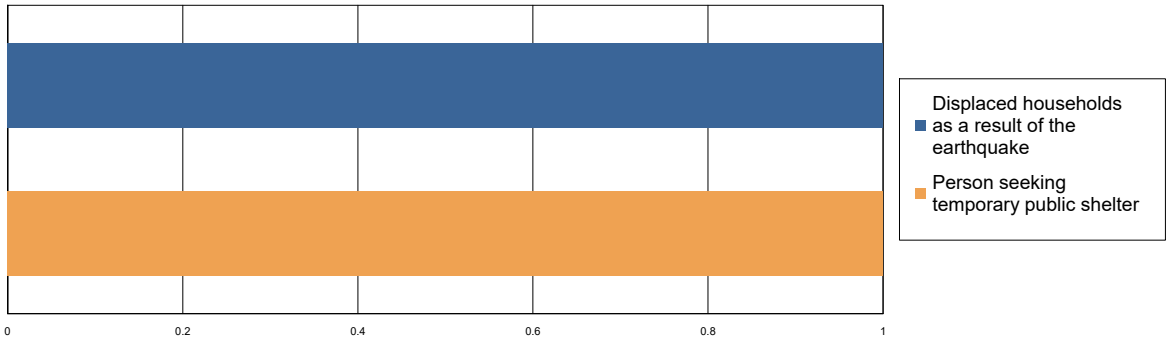
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	160 (@25 tons/truck)

Social Impact

Shelter Requirement

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 households to be displaced due to the earthquake. Of these, 1 people (out of a total population of 156,255) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
1	1

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	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	1.34	0.13	0.01	0.01
	Single Family	0.85	0.02	0.00	0.00
	Total	**2**	**0**	**0**	**0**
2 PM	Commercial	1.61	0.15	0.01	0.01
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.25	0.02	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.22	0.02	0.00	0.00
	Other-Residential	0.45	0.04	0.00	0.00
	Single Family	0.25	0.01	0.00	0.00
	Total	**3**	**0**	**0**	**0**
5 PM	Commercial	1.19	0.11	0.00	0.01
	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	0.14	0.01	0.00	0.00
	Other-Residential	0.50	0.05	0.00	0.01
	Single Family	0.30	0.01	0.00	0.00
	Total	**2**	**0**	**0**	**0**

Economic Loss

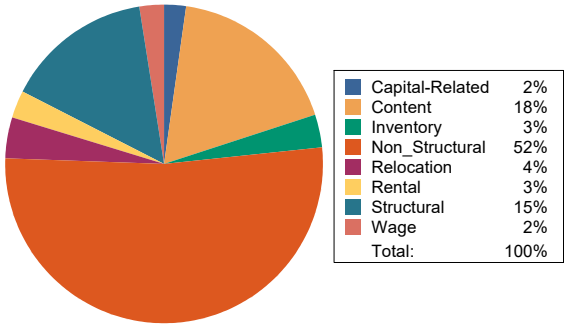
The total economic loss estimated for the earthquake is 38.66 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

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 business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 30.30 (millions of dollars); 12 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 47 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

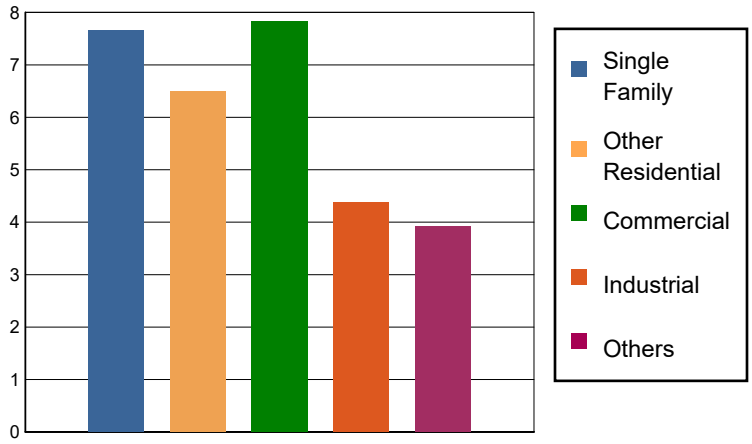


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0279	0.6251	0.0615	0.0427	0.7572
	Capital-Related	0.0000	0.0118	0.6110	0.0370	0.0145	0.6743
	Rental	0.0745	0.3137	0.4022	0.0335	0.0207	0.8446
	Relocation	0.1723	0.2324	0.4811	0.1586	0.1852	1.2296
	Subtotal	**0.2468**	**0.5858**	**2.1194**	**0.2906**	**0.2631**	**3.5057**
Capital Stock Losses							
	Structural	0.9773	1.0793	0.9373	0.5680	0.9717	4.5336
	Non_Structural	5.1772	4.0485	3.1640	2.0336	1.4609	15.8842
	Content	1.2599	0.7881	1.3384	1.2605	0.7330	5.3799
	Inventory	0.0000	0.0000	0.2777	0.2318	0.4835	0.9930
	Subtotal	**7.4144**	**5.9159**	**5.7174**	**4.0939**	**3.6491**	**26.7907**
	Total	**7.66**	**6.50**	**7.84**	**4.38**	**3.91**	**30.30**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1667.7562	0.0000	0.00
	Bridges	585.2514	0.0413	0.01
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**2253.0076**	**0.0413**	
Railways	Segments	165.1451	0.0000	0.00
	Bridges	199.1500	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.0492	1.85
	Subtotal	**366.9581**	**0.0492**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	2.1686	0.0454	2.09
	Subtotal	**2.1686**	**0.0454**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	10.6000	0.2906	2.74
	Runways	24.0375	0.0000	0.00
	Subtotal	**34.6375**	**0.2906**	
	Total	**2,656.77**	**0.43**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	149.6462	0.1603	0.11
	Subtotal	**149.6462**	**0.1603**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	89.7877	0.0805	0.09
	Subtotal	**89.7877**	**0.0805**	
Natural Gas	Pipelines	180.6640	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	59.8585	0.0276	0.05
	Subtotal	**240.5225**	**0.0276**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	2810.3549	7.6650	0.27
	Subtotal	**2810.3549**	**7.6650**	
Communication	Facilities	0.5900	0.0008	0.14
	Subtotal	**0.5900**	**0.0008**	
	Total	**3,290.90**	**7.93**	

Appendix A: County Listing for the Region

Madera,CA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
California					
	Madera	156,255	18,025	9,641	27,667
Total Region		**156,255**	**18,025**	**9,641**	**27,667**

Hazus: Earthquake Global Risk Report

Region Name: Madera2025

Earthquake Scenario: DETERM OwensValley 7.38M EQ CT

Print Date: August 12, 2025

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,154.20 square miles and contains 34 census tracts. There are over 45 thousand households in the region which has a total population of 156,255 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 50 thousand buildings in the region with a total building replacement value (excluding contents) of 27,667 (millions of dollars). Approximately 90.00 % of the buildings (and 65.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,656 and 3,290 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 50 thousand buildings in the region which have an aggregate total replacement value of 27,667 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 86% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 462 beds. There are 86 schools, 25 fire stations, 6 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 5,946.00 (millions of dollars). This inventory includes over 232.39 miles of highways, 245 bridges, 7,470.12 miles of pipes.

Table 1: Transportation System Lifeline Inventory

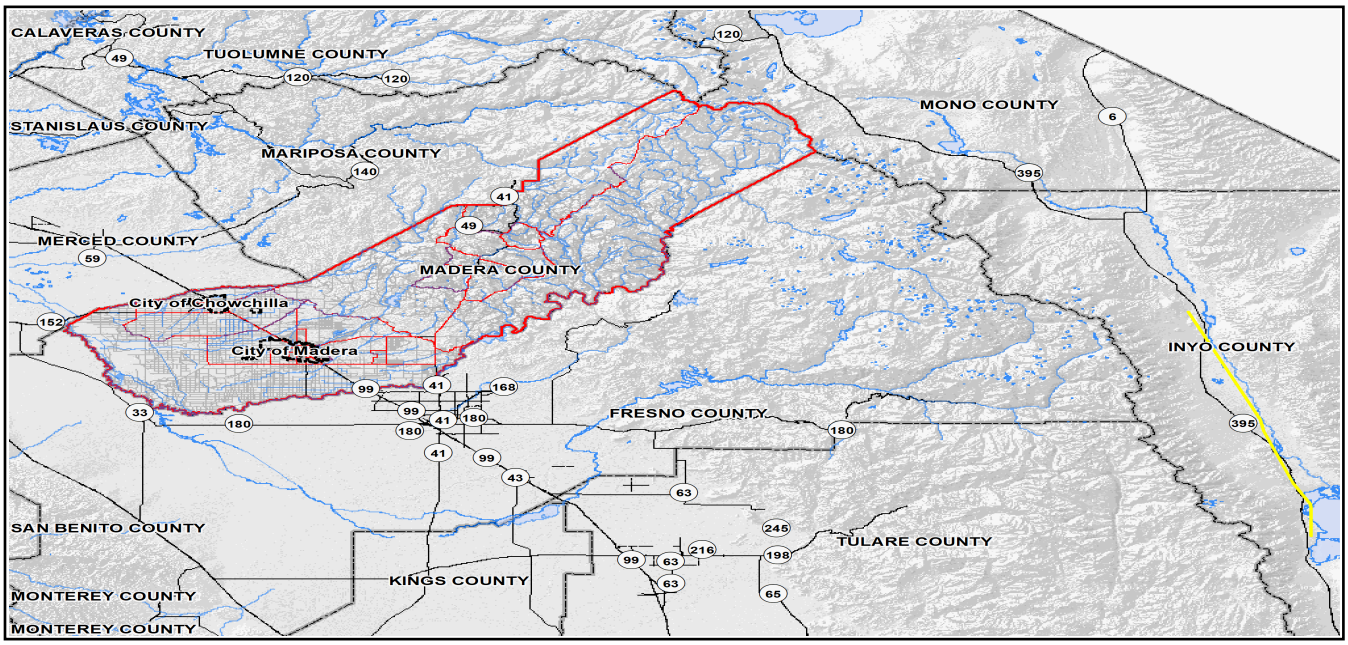
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	245	585.2514
	Segments	130	1667.7562
	Tunnels	0	0.0000
		Subtotal	**2253.0076**
Railways	Bridges	35	199.1500
	Facilities	1	2.6630
	Segments	30	165.1451
	Tunnels	0	0.0000
		Subtotal	**366.9581**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	1	2.1686
		Subtotal	**2.1686**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	2	10.6000
	Runways	3	24.0375
		Subtotal	**34.6375**
		Total	**2,656.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	149.6462
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**149.6462**
Waste Water	Distribution Lines	NA	89.7877
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**89.7877**
Natural Gas	Distribution Lines	NA	59.8585
	Facilities	0	0.0000
	Pipelines	5	180.6640
		Subtotal	**240.5225**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	8	2810.3549
		Subtotal	**2810.3549**
Communication	Facilities	5	0.5900
		Subtotal	**0.5900**
		Total	**3,290.90**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	DETERM OwensValley 7.38M EQ CT
Type of Earthquake	Source
Fault Name	Owens Valley
Historical Epicenter ID #	43
Probabilistic Return Period	NA
Longitude of Epicenter	-118.11
Latitude of Epicenter	36.74
Earthquake Magnitude	7.38
Depth (km)	0.00
Rupture Length (Km)	81.51
Rupture Orientation (degrees)	0.00
Attenuation Function	West US, Extensional 2008 - Strike Slip

Direct Earthquake Damage

Building Damage

Hazus estimates that about 22 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

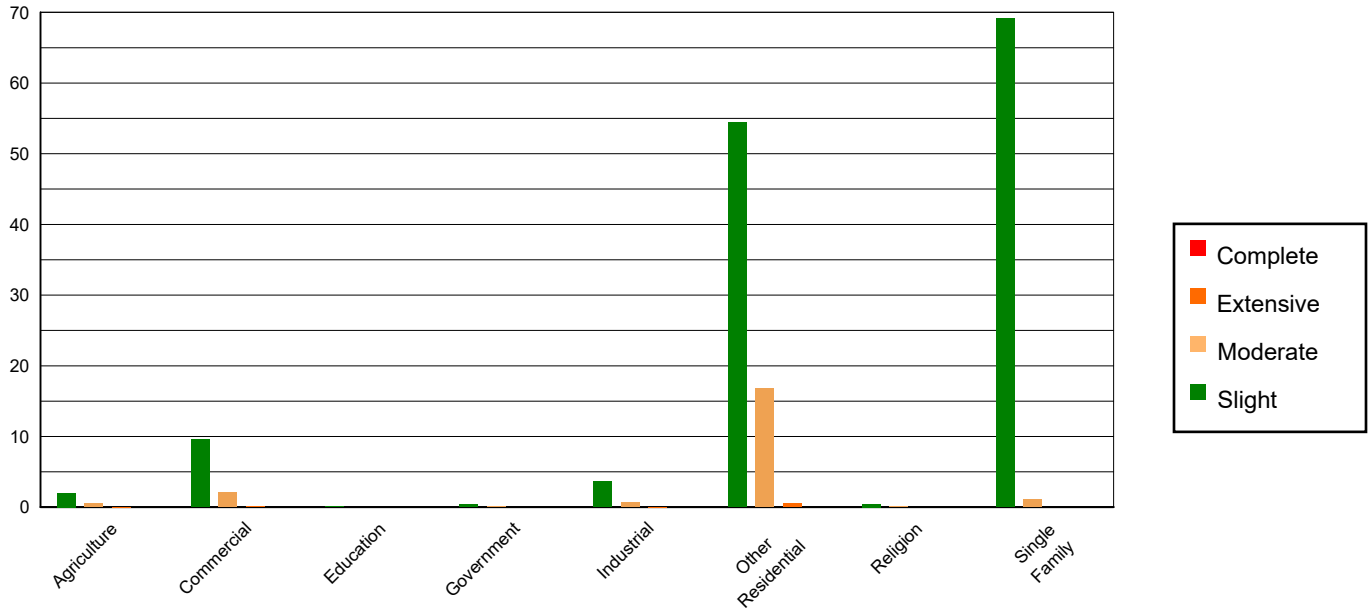


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	631.50	1.26	1.99	1.43	0.48	2.26	0.03	4.54	0.00	0.00
Commercial	2893.25	5.77	9.60	6.88	2.08	9.75	0.07	9.72	0.00	42.90
Education	114.92	0.23	0.07	0.05	0.01	0.04	0.00	0.01	0.00	0.00
Government	110.60	0.22	0.33	0.23	0.07	0.32	0.00	0.21	0.00	0.00
Industrial	898.63	1.79	3.64	2.60	0.71	3.35	0.02	3.20	0.00	2.47
Other Residential	6563.25	13.08	54.40	38.95	16.79	78.75	0.55	81.84	0.00	52.19
Religion	118.44	0.24	0.46	0.33	0.10	0.45	0.00	0.48	0.00	2.44
Single Family	38841.75	77.42	69.17	49.53	1.08	5.07	0.00	0.00	0.00	0.00
Total	**50,172**		**140**		**21**		**1**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	43406.26	86.51	77.74	55.67	1.25	5.87	0.00	0.00	0.00	0.00
Steel	1038.56	2.07	4.80	3.44	1.27	5.96	0.05	6.97	0.00	0.00
Concrete	986.70	1.97	3.69	2.64	0.57	2.67	0.01	1.34	0.00	0.00
Precast	774.69	1.54	3.53	2.53	0.94	4.39	0.02	3.09	0.00	0.00
RM	1325.40	2.64	2.99	2.14	0.87	4.08	0.01	1.45	0.00	0.00
URM	72.93	0.15	1.82	1.30	0.67	3.13	0.09	12.88	0.00	100.00
MH	2567.79	5.12	45.09	32.29	15.76	73.90	0.50	74.27	0.00	0.00
Total	**50,172**		**140**		**21**		**1**		**0**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 462 hospital beds available for use. On the day of the earthquake, the model estimates that only 460 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	2	0	0	2
Schools	86	0	0	86
EOCs	1	0	0	1
PoliceStations	6	0	0	6
FireStations	25	0	0	25

Transportation Lifeline Damage

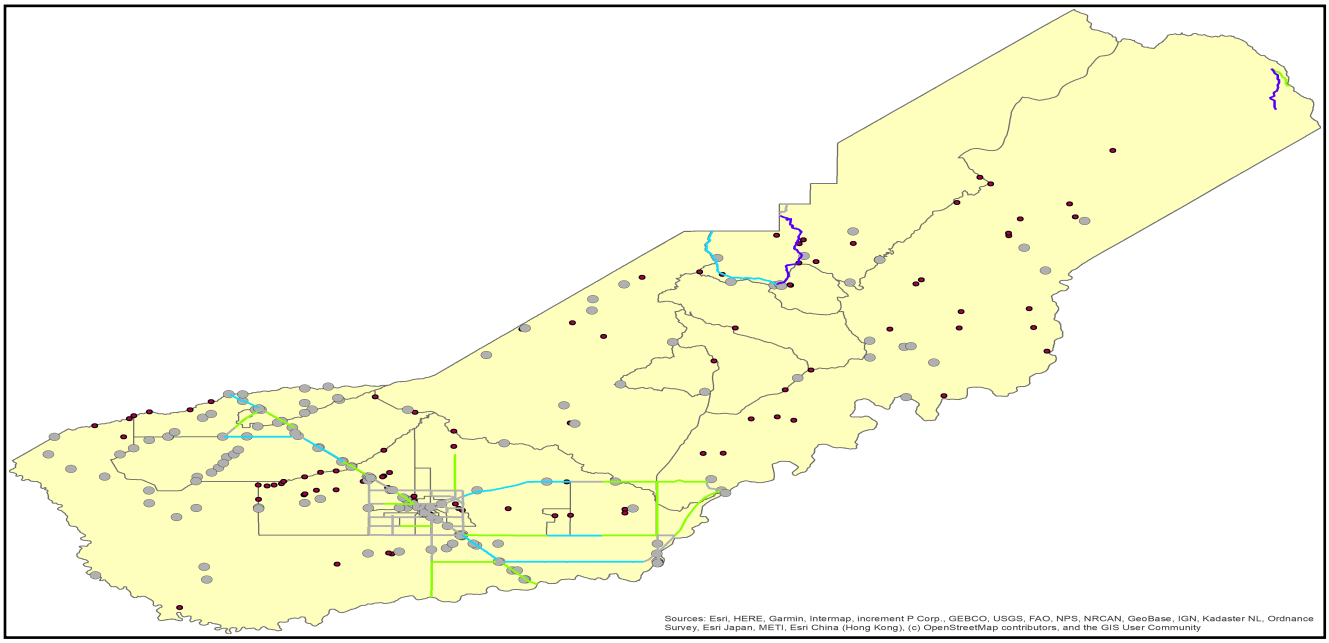


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	130	0	0	130	130
	Bridges	245	0	0	245	245
	Tunnels	0	0	0	0	0
Railways	Segments	30	0	0	30	30
	Bridges	35	0	0	35	35
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
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	2	0	0	2	2
	Runways	3	0	0	3	3

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	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	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	8	0	0	8	8
Communication	5	0	0	5	5

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	4,649	21	5
Waste Water	2,790	11	3
Natural Gas	32	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	45,607	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 tons of debris will be generated. Of the total amount, Brick/Wood comprises 63.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)

Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	0 (@25 tons/truck)

Social Impact

Shelter Requirement

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 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 156,255) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter

Displaced households as a result of the earthquake	Persons seeking temporary public shelter
0	0

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.00	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	0.00	0.00	0.00	0.00
	Other-Residential	0.25	0.02	0.00	0.00
	Single Family	0.08	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0.20	0.01	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.03	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	0.09	0.01	0.00	0.00
	Single Family	0.03	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**
5 PM	Commercial	0.14	0.01	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	0.02	0.00	0.00	0.00
	Other-Residential	0.09	0.01	0.00	0.00
	Single Family	0.03	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**

Economic Loss

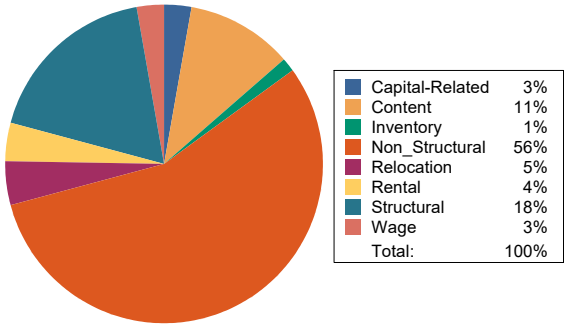
The total economic loss estimated for the earthquake is 28.07 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

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 business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 3.39 (millions of dollars); 14 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 60 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

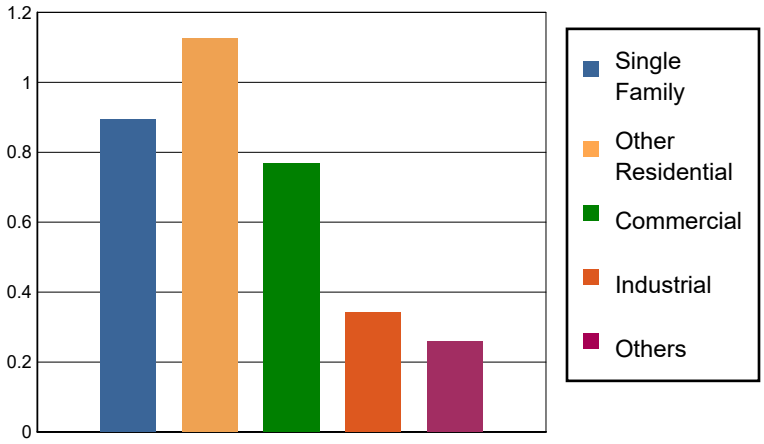


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0046	0.0816	0.0048	0.0059	0.0969
	Capital-Related	0.0000	0.0019	0.0870	0.0029	0.0015	0.0933
	Rental	0.0066	0.0634	0.0494	0.0042	0.0025	0.1261
	Relocation	0.0078	0.0636	0.0493	0.0148	0.0183	0.1538
	Subtotal	**0.0144**	**0.1335**	**0.2673**	**0.0267**	**0.0282**	**0.4701**
Capital Stock Losses							
	Structural	0.1215	0.2528	0.0974	0.0575	0.0830	0.6122
	Non_Structural	0.6465	0.6660	0.3117	0.1607	0.1102	1.8951
	Content	0.1124	0.0721	0.0782	0.0831	0.0265	0.3723
	Inventory	0.0000	0.0000	0.0132	0.0138	0.0111	0.0381
	Subtotal	**0.8804**	**0.9909**	**0.5005**	**0.3151**	**0.2308**	**2.9177**
	Total	**0.89**	**1.12**	**0.77**	**0.34**	**0.26**	**3.39**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1667.7562	0.0000	0.00
	Bridges	585.2514	0.0033	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**2253.0076**	**0.0033**	
Railways	Segments	165.1451	0.0000	0.00
	Bridges	199.1500	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.0062	0.23
	Subtotal	**366.9581**	**0.0062**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	2.1686	0.0044	0.20
	Subtotal	**2.1686**	**0.0044**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	10.6000	0.0112	0.11
	Runways	24.0375	0.0000	0.00
	Subtotal	**34.6375**	**0.0112**	
	Total	**2,656.77**	**0.03**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	149.6462	0.0963	0.06
	Subtotal	**149.6462**	**0.0963**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	89.7877	0.0484	0.05
	Subtotal	**89.7877**	**0.0484**	
Natural Gas	Pipelines	180.6640	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	59.8585	0.0166	0.03
	Subtotal	**240.5225**	**0.0166**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	2810.3549	24.4927	0.87
	Subtotal	**2810.3549**	**24.4927**	
Communication	Facilities	0.5900	0.0004	0.07
	Subtotal	**0.5900**	**0.0004**	
	Total	**3,290.90**	**24.65**	

Appendix A: County Listing for the Region

Madera,CA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
California					
	Madera	156,255	18,025	9,641	27,667
Total Region		**156,255**	**18,025**	**9,641**	**27,667**

Hazus: Earthquake Global Risk Report

Region Name: Madera2025

Earthquake Scenario: DETERM SanAndreas 7.15M EQ CT

Print Date: August 12, 2025

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,154.20 square miles and contains 34 census tracts. There are over 45 thousand households in the region which has a total population of 156,255 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 50 thousand buildings in the region with a total building replacement value (excluding contents) of 27,667 (millions of dollars). Approximately 90.00 % of the buildings (and 65.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,656 and 3,290 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 50 thousand buildings in the region which have an aggregate total replacement value of 27,667 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 86% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 462 beds. There are 86 schools, 25 fire stations, 6 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 5,946.00 (millions of dollars). This inventory includes over 232.39 miles of highways, 245 bridges, 7,470.12 miles of pipes.

Table 1: Transportation System Lifeline Inventory

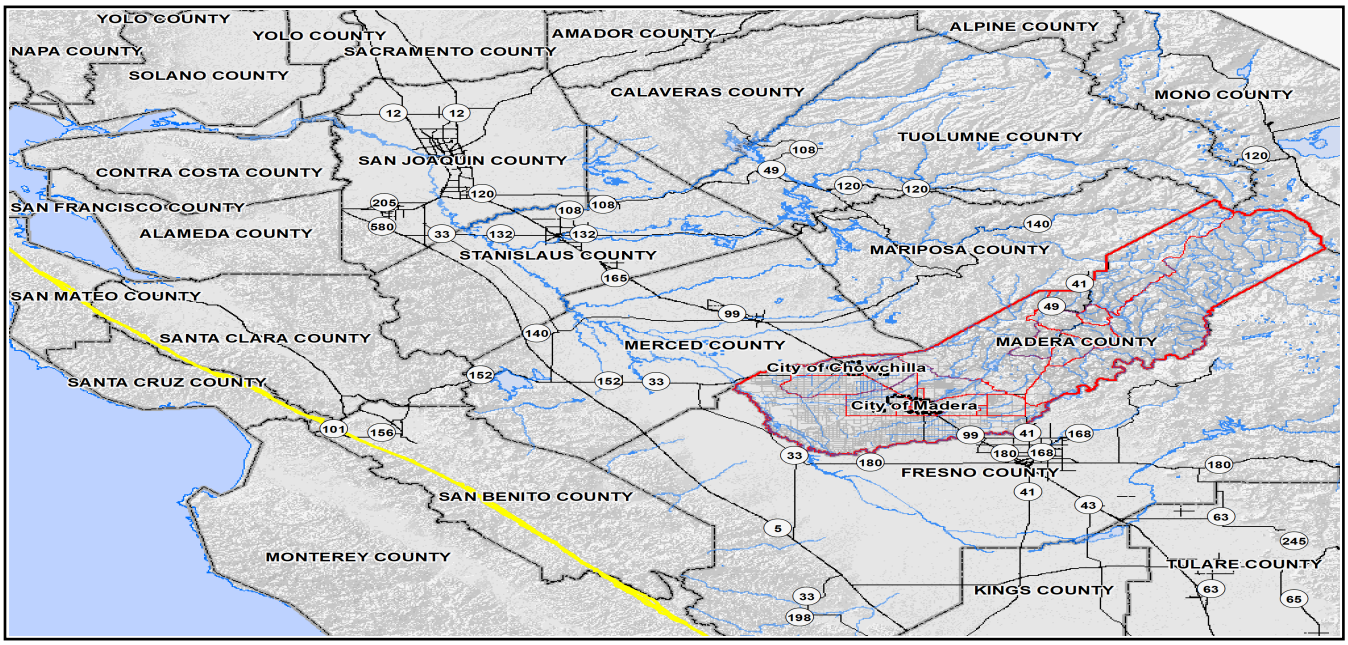
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	245	585.2514
	Segments	130	1667.7562
	Tunnels	0	0.0000
		Subtotal	**2253.0076**
Railways	Bridges	35	199.1500
	Facilities	1	2.6630
	Segments	30	165.1451
	Tunnels	0	0.0000
		Subtotal	**366.9581**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	1	2.1686
		Subtotal	**2.1686**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	2	10.6000
	Runways	3	24.0375
		Subtotal	**34.6375**
		Total	**2,656.80**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	149.6462
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**149.6462**
Waste Water	Distribution Lines	NA	89.7877
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**89.7877**
Natural Gas	Distribution Lines	NA	59.8585
	Facilities	0	0.0000
	Pipelines	5	180.6640
		Subtotal	**240.5225**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	8	2810.3549
		Subtotal	**2810.3549**
Communication	Facilities	5	0.5900
		Subtotal	**0.5900**
		Total	**3,290.90**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	DETERM SanAndreas 7.15M EQ CT
Type of Earthquake	Source
Fault Name	scz+pn+ncs+ncn --sas+sap+sa
Historical Epicenter ID #	356
Probabilistic Return Period	NA
Longitude of Epicenter	-121.73
Latitude of Epicenter	36.99
Earthquake Magnitude	7.15
Depth (km)	0.00
Rupture Length (Km)	55.08
Rupture Orientation (degrees)	0.00
Attenuation Function	West US, Extensional 2008 - Strike Slip

Direct Earthquake Damage

Building Damage

Hazus estimates that about 11 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

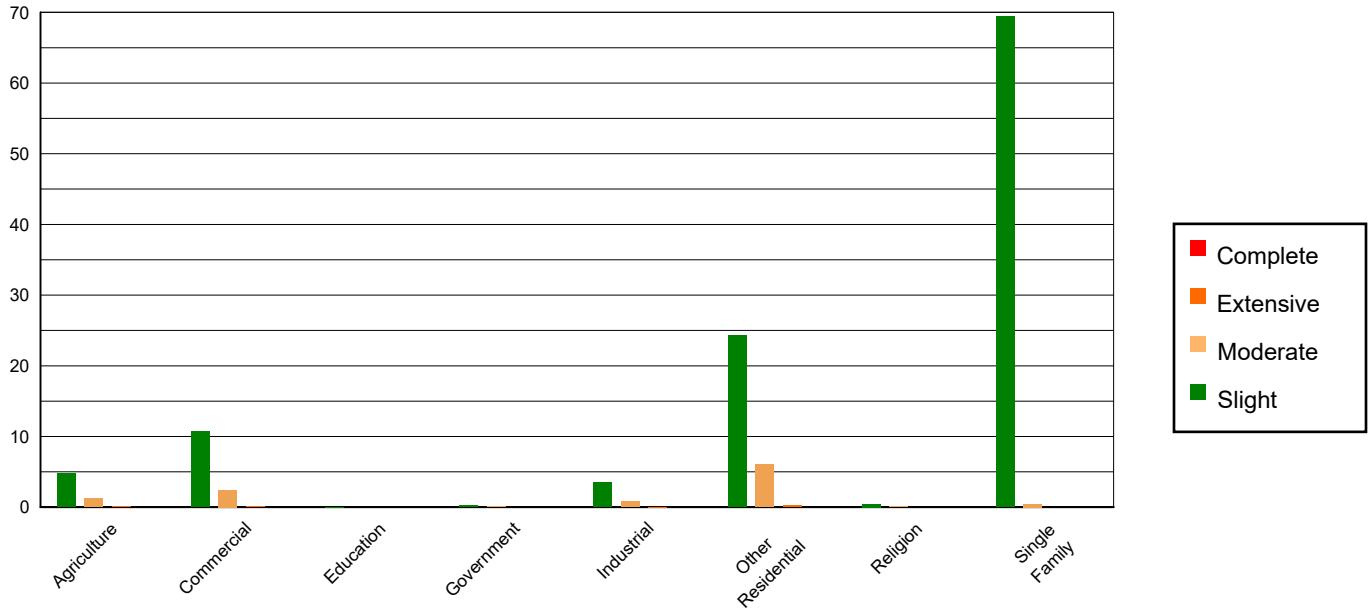


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	627.97	1.25	4.74	4.18	1.19	10.76	0.10	22.65	0.00	24.24
Commercial	2891.74	5.76	10.73	9.46	2.42	21.86	0.11	26.04	0.00	42.26
Education	114.96	0.23	0.04	0.04	0.00	0.04	0.00	0.00	0.00	0.00
Government	110.71	0.22	0.24	0.21	0.05	0.44	0.00	0.16	0.00	0.00
Industrial	898.64	1.79	3.51	3.09	0.83	7.49	0.03	6.62	0.00	4.53
Other Residential	6604.48	13.15	24.29	21.43	6.04	54.59	0.19	43.85	0.00	28.09
Religion	118.49	0.24	0.43	0.38	0.08	0.72	0.00	0.68	0.00	0.89
Single Family	38842.15	77.36	69.40	61.21	0.45	4.10	0.00	0.00	0.00	0.00
Total	**50,209**		**113**		**11**		**0**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	43406.45	86.45	78.23	69.00	0.57	5.14	0.00	0.00	0.00	0.00
Steel	1036.56	2.06	6.31	5.57	1.72	15.54	0.09	20.78	0.00	0.00
Concrete	985.58	1.96	4.58	4.04	0.79	7.14	0.02	5.03	0.00	0.00
Precast	774.64	1.54	3.57	3.15	0.96	8.65	0.01	2.05	0.00	0.00
RM	1325.53	2.64	2.92	2.57	0.83	7.46	0.00	1.06	0.00	0.00
URM	70.59	0.14	3.38	2.98	1.33	12.03	0.19	43.97	0.01	100.00
MH	2609.77	5.20	14.38	12.68	4.87	44.04	0.12	27.11	0.00	0.00
Total	**50,209**		**113**		**11**		**0**		**0**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 462 hospital beds available for use. On the day of the earthquake, the model estimates that only 460 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	2	0	0	2
Schools	86	0	0	86
EOCs	1	0	0	1
PoliceStations	6	0	0	6
FireStations	25	0	0	25

Transportation Lifeline Damage

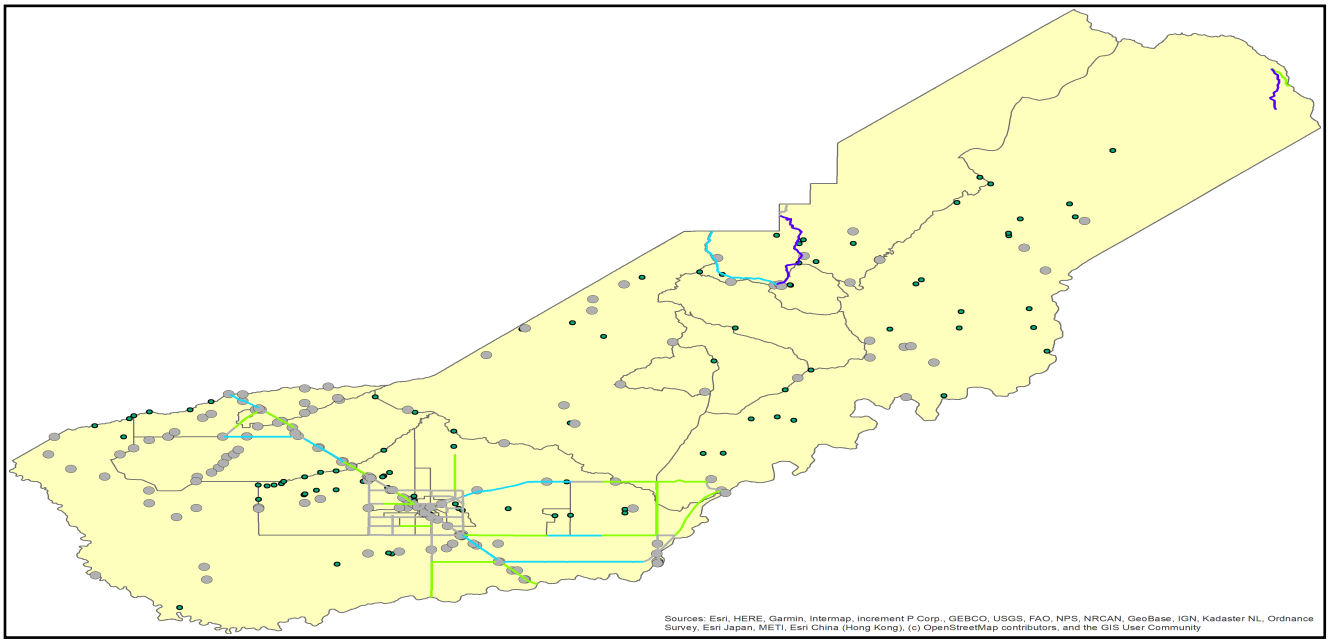


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	130	0	0	130	130
	Bridges	245	0	0	245	245
	Tunnels	0	0	0	0	0
Railways	Segments	30	0	0	30	30
	Bridges	35	0	0	35	35
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
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	2	0	0	2	2
	Runways	3	0	0	3	3

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	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	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	8	0	0	8	8
Communication	5	0	0	5	5

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	4,649	15	4
Waste Water	2,790	8	2
Natural Gas	32	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	45,607	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 tons of debris will be generated. Of the total amount, Brick/Wood comprises 56.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)

Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	0 (@25 tons/truck)

Social Impact

Shelter Requirement

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 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 156,255) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter

Displaced households as a result of the earthquake	Persons seeking temporary public shelter
0	0

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.00	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	0.01	0.00	0.00	0.00
	Other-Residential	0.27	0.02	0.00	0.00
	Single Family	0.10	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0.30	0.02	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.04	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.04	0.00	0.00	0.00
	Other-Residential	0.09	0.01	0.00	0.00
	Single Family	0.03	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**
5 PM	Commercial	0.22	0.02	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	0.02	0.00	0.00	0.00
	Other-Residential	0.10	0.01	0.00	0.00
	Single Family	0.04	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**

Economic Loss

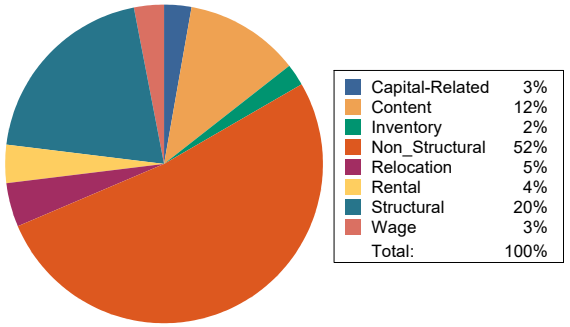
The total economic loss estimated for the earthquake is 4.43 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

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 business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 3.86 (millions of dollars); 14 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 47 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

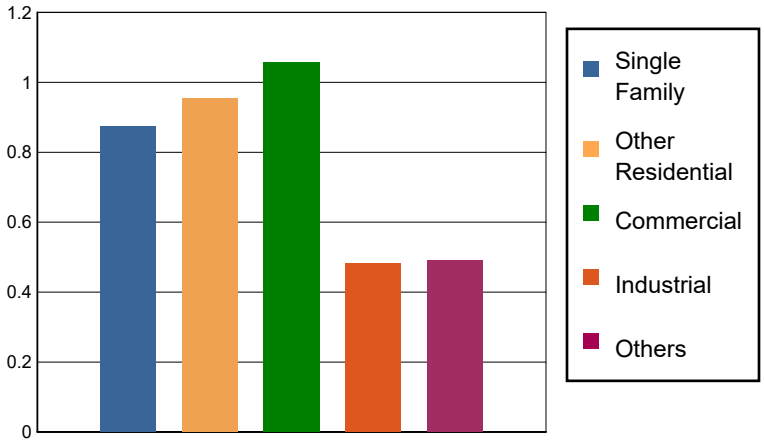


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0037	0.0987	0.0103	0.0061	0.1188
	Capital-Related	0.0000	0.0015	0.0966	0.0062	0.0022	0.1065
	Rental	0.0056	0.0575	0.0698	0.0056	0.0029	0.1414
	Relocation	0.0033	0.0399	0.0774	0.0252	0.0290	0.1748
	Subtotal	**0.0089**	**0.1026**	**0.3425**	**0.0473**	**0.0402**	**0.5415**
Capital Stock Losses							
	Structural	0.1174	0.2093	0.1616	0.0985	0.1877	0.7745
	Non_Structural	0.6397	0.5727	0.4165	0.2127	0.1596	2.0012
	Content	0.1077	0.0684	0.1118	0.1049	0.0602	0.4530
	Inventory	0.0000	0.0000	0.0236	0.0192	0.0425	0.0853
	Subtotal	**0.8648**	**0.8504**	**0.7135**	**0.4353**	**0.4500**	**3.3140**
	Total	**0.87**	**0.95**	**1.06**	**0.48**	**0.49**	**3.86**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1667.7562	0.0000	0.00
	Bridges	585.2514	0.0029	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**2253.0076**	**0.0029**	
Railways	Segments	165.1451	0.0000	0.00
	Bridges	199.1500	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.0088	0.33
	Subtotal	**366.9581**	**0.0088**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	2.1686	0.0082	0.38
	Subtotal	**2.1686**	**0.0082**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	10.6000	0.0579	0.55
	Runways	24.0375	0.0000	0.00
	Subtotal	**34.6375**	**0.0579**	
	Total	**2,656.77**	**0.08**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	149.6462	0.0688	0.05
	Subtotal	**149.6462**	**0.0688**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	89.7877	0.0346	0.04
	Subtotal	**89.7877**	**0.0346**	
Natural Gas	Pipelines	180.6640	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	59.8585	0.0118	0.02
	Subtotal	**240.5225**	**0.0118**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	2810.3549	0.3776	0.01
	Subtotal	**2810.3549**	**0.3776**	
Communication	Facilities	0.5900	0.0000	0.00
	Subtotal	**0.5900**	**0.0000**	
	Total	**3,290.90**	**0.49**	

Appendix A: County Listing for the Region

Madera,CA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
California					
	Madera	156,255	18,025	9,641	27,667
Total Region		**156,255**	**18,025**	**9,641**	**27,667**

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