Colusa County
Local Hazard Mitigation Plan Update
August 2024

FOSTER MORRISON
CONSULTING

Executive Summary

Colusa County, the two incorporated cities, and six special districts comprise the participating jurisdictions to the 2024 Colusa county Local Hazard Mitigation Plan (LHMP or Plan) Update. This Colusa County LHMP is a multi-jurisdictional plan that geographically covers the entire area within Colusa 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:

- Colusa County*
- City of Colusa*
- City of Williams*
- Colusa County RCD
- Cortina Community Services District
- Kletsel Dehe Wintun Nation
- Reclamation District 108*
- RD 479
- Sacramento River West Side Levee District*

* Participated in 2018 Colusa County LHMP

The purpose of this 2024 Colusa County LHMP Update and 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.

2024 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 2024 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 Colusa 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. Colusa 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 Colusa 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 Colusa County Planning Area and specific to each participating jurisdiction. Once approved by Cal OES and FEMA, this 2024 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 Colusa County Planning Area and to each participating jurisdiction, assessed the vulnerability of the Colusa County Planning Area and jurisdictions to these hazards, and examined the existing jurisdictional capabilities to mitigate identified hazards.

The Colusa County Planning Area is vulnerable to numerous hazards that are identified, profiled, and analyzed in this 2024 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 2024 LHMP Update.

Table ES-2 Colusa County Planning Area Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Extensive	Highly Likely	Catastrophic	High	Medium
Climate Change	Extensive	Highly Likely	Limited	Medium	–
Dam Failure	Extensive	Occasional	Catastrophic	High	Medium
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake	Extensive	Unlikely	Critical	Medium	Low
Floods: 1%/0.2% annual chance	Extensive	Occasional/ Unlikely	Catastrophic	High	Medium
Floods: Localized Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, and Debris Flow	Limited	Likely	Limited	Medium	Medium
Levee Failure	Extensive	Occasional	Catastrophic	High	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: High Winds and Tornados	Extensive	Highly Likely / Occasional	Limited	Medium	Low
Stream Bank Erosion	Significant	Highly Likely	Limited	Medium	Medium
Subsidence	Limited	Likely	Limited	Medium	Low
Wildfire	Significant	Highly Likely	Critical	High	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 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 Colusa 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 2024 LHMP Update Goals and Objectives are detailed below followed by a summary table of the 2024 mitigation actions and projects.

Goal 1: Minimize risk and vulnerability of Colusa County to natural hazards (including climate change considerations) and protect lives and prevent losses to property, public health, economy, and the environment

- Provide protection for existing and future development
- Provide protection for critical facilities, infrastructure, and services and minimize disruptions
- Provide protection for natural resources
- Reduce the number of emergency incidents
- Consider future impacts of climate change in natural hazard mitigation
- Foster an economy that promotes and values a proactive approach to mitigation
- Preserve the functionality of property, economy, and commerce, that may be affected by infrastructure vulnerability

Goal 2: Increase community/public outreach, education, and awareness for all hazards to minimize hazard-related losses

- Increase public awareness of hazard risk, vulnerability, and mitigation
- Enhance outreach and education of community members to promote a hazard resilient community
- Educate citizens and farmers on water conservation methods to provide protection from future hazard events and build support for water storage projects
- Educate and increase awareness and understanding of migrant and other transient residents on hazards and natural hazard mitigation
- Increase education and awareness and ensure adequate resources among historically underserved populations, individual with access and functional needs, and populations impacted by natural hazards and disasters

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

- Increase communities' capabilities to respond to increased climate impacts, (e.g., legislation, education, projects)
- Make better use of technology to predict and mitigate damage
- Increase the use of shared resources and multi-agency efforts
- Continued improvements to emergency services and public safety capabilities
- Increase participation by all County entities and agencies operating in Colusa County in disaster planning activities to improve hazard awareness, intra-and inter-agency communications, mitigation action implementation, and coordinated response and recovery efforts
- Enhance Tribal coordination for disasters
- Maintain Colusa County communities' eligibility for FEMA grant funding and other FEMA programs

Goal 4: 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

- Increase education, outreach, and awareness of natural hazards and disasters and ensure adequate resources with a focus on the whole community
- Reduce hazard risk and vulnerability and increase disaster resilience through the equitable and accessible planning and implementation of hazard mitigation actions and priorities
- Enhance natural hazard mitigation strategies to protect the most rural, vulnerable areas

Goal 5: Improve community resiliency to flooding in Colusa County

- Reduce the flood risk and vulnerability in Colusa County
- Reduce life safety issues, property loss, and damages associated with flooding
- Reduce flooding adjacent to streams, residential areas, and areas with critical infrastructure
- Improve stream flow to reduce bank erosion
- Maintain/improve flood protection and control measures, including maintenance and improvements to the levee systems, to minimize future flood related impacts and damages

Goal 6: Continue to protect and promote Colusa County agriculture by ensuring safe and effective farming practices that protect the citizens and environment and that minimize future hazard related losses

- Reduce the impacts to and loss of agricultural resources from natural hazards and disasters
- Support and implement water projects that replenish the aquifer, increase available agricultural water during critical times of need for local crops, and ensure a consistent water supply and distribution to County residents.
- Educate County citizens as to how they can help protect Colusa's agriculture from noxious weeds and pests
- Work with local farmers to keep canals, ditches, and streambeds clear of debris reducing downstream flooding and other impacts

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 Colusa County Planning Area and specific to each participating jurisdiction.

Table ES-3 Colusa County Planning Area Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Colusa County					
Multi-Hazard Actions					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Public Education and Community Outreach Countywide	Previous Action	X	X	X	Public Education
Action 3. Alert and Warning System for Sheriff's Office and Public Health	New Action	X	X		Emergency Services
Action 4. Technology Enhancements to Support Hazard Mitigation Planning and Project Implementation and for use in Disaster Preparedness, Response, and Recovery Efforts (e.g., GIS Application Enhancements)	New Action	X	X	X	Prevention Public Information Emergency Services Property Protection
Action 5. Vulnerable Population Planning	New Action	X	X		Prevention Public Information Emergency Services
Action 6. Update 211 system	New Action	X	X		Emergency Services
Action 7. Coordinate with the American Red Cross (ARC) for Mass Care Planning	New Action	X	X		Prevention Public Information Emergency Services
Action 8. Vulnerable Population Planning (with a focus on Access and Functional Needs)	New Action	X	X		Prevention Public Information Emergency Services
Action 9. Coordination with Community Based Organizations	New Action	X	X		Prevention Public Information Emergency Services
Action 10. Enhance Tribal Coordination for Disasters	New Action	X	X		Prevention Emergency Services
Action 11. Generator Purchases to Enhance Project Power for Colusa County	New Action	X	X	X	Emergency Services Property Protection
Action 12. EOP Update & Implementation	New Action	X	X		Prevention Emergency Services
Action 13. Evacuation Planning Countywide	Previous Action	X	X		Emergency Services
Action 14. Migrant Center Improvements/House Vulnerable Populations During Disaster	New Action	X	X		Emergency Services
Action 15. Install Road Closure Infrastructure	New Action	X	X		Emergency Services

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Agricultural Hazards: Severe Weather/Invasive Species (Pests and Weeds)					
Action 16. Pest and Rodent Prevention Project for Infrastructure Protection	New Action	X	X		Prevention Property Protection
Action 17. Development of Ordinance and Zoning to Limit/Manage Pest Introduction into Colusa County	New Action	X	X		Prevention
Action 18. Abandoned Agricultural Lands Pest Management (joint with RCD)	New Action	X	X		Property Protection Natural Resource Protection
Climate Change Actions					
Action 19. Climate Change Mitigation Adaptation Action Plan	New Action	X	X	X	Prevention
Action 20. Climate-smart Agricultural Planning (joint with RCD)	New Action	X	X		Property Protection Natural Resource Protection
Dam Failure Actions					
Action 21. Continue Communication about Dam Safety and Awareness County-wide	New Action	X	X	X	Prevention Public Information Emergency Services
Action 22. Dam Failure Mitigation, Education, and Awareness	Previous Action	X	X	X	Prevention Public Information Emergency Services
Drought and Water Shortage Actions					
Action 23. Groundwater Recharge (joint with RCD)	New Action	X	X		Property Protection Structural Projects Natural Resource Protection
Action 24. Invasive Species Removal from Waterways (joint with RCD)	New Action	X	X	X	Property Protection Natural Resource Protection
Action 25. Irrigation Efficiency Technical Assistance (joint with RCD)	New Action	X	X		Property Protection Natural Resource Protection
Action 26. On-farm Water Storage Projects (joint with RCD)	New Action	X	X		Property Protection Structural Projects Natural Resource Protection
Earthquake Actions					
Action 27. Earthquake Vulnerability Study and Retrofitting of County Structural Assets	Previous Action	X	X		Prevention Structural

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Flood, Localized Flood, Levee Failure, and Heavy Rains and Storm Actions					
Action 28. Flood ordinance updates		X	X	X	Prevention
Action 29. Localized Stormwater Management and Streambank Erosion Mitigation (joint with RCD)	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 30. Princeton Storm Water Drainage Assessment	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 31. Roadway Flood Prevention	New Action	X	X	X	Prevention Property Protection Structural Projects Natural Resource Protection
Severe Weather Actions					
Action 32. Sheltering for Unhoused (winter weather)	New Action	X	X		Prevention Emergency Services
Action 33. Sheltering for Unhoused (Extreme Heat)	New Action	X	X		Prevention Emergency Services
Action 34. Severe Weather Plan Update	New Action	X	X	X	Prevention Emergency Services
Wildfire Actions					
Action 35. Beetle-killed Tree Removal (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 36. Update and Implement Community Wildfire Protection Plan (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 37. Colusa County Fire Mitigation Plan of 2024 Implementation (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 38. Colusa County Fire Safe Council (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
City of Colusa					
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	New Action	X	X	X	Public Education
Action 3. Evacuation Training for the Community of Colusa	New Action				Emergency Services
Action 4. Fire and sanitation water is needed in case of emergency in the City of Colusa during a drought	New Action	X	X		Prevention Emergency Servies Property Protection
Action 5. URM Mapping and Identification	Previous Action	X	X		Prevention Property Protection
Action 6. Project improvements to Decrease Flooding	New Action	X	X	X	Property Protection Structural Projects
Action 7. Levee Mitigation	New Action	X	X	X	Property Protection Structural Projects
Action 8. Colusa Basin Drain	New Action	X	X	X	Property Protection Structural Projects
City of Williams					
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	Public Information
Action 3. Aquifer Recharge Project	New Action	X	X		Property Protection Natural Resource Protection
Action 4. Storm Drain Master Plan	Previous Action	X	X	X	Property Protection Structural Projects Natural Resource Protection
Action 5. Salt Creek Erosion Control	New Action	X	X	X	Property Protection Natural Resource Protection
Action 6. Underground Powerlines	New Action	X	X		Property Protection Structural Projects
Action 7. Healthy Trees Program	New Action	X	X		Property Protection Natural Resource Protection
Action 8. EQ Vulnerability Study and Retrofit of City Assets	Previous Action	X	X		Property Protection
Action 9. Detention Basin Construction (continuing from the 2018 LHMP)	Previous Action	X	X	X	Natural Resource Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Colusa County RCD					
Action 1. Abandoned Agricultural Lands Pest Management	New Action	X	X		Property Protection Natural Resource Protection
Action 2. Beetle-killed Tree Removal	New Action	X	X		Property Protection Natural Resource Protection
Action 3. Climate Action Plan	New Action	X	X	X	Prevention
Action 4. Climate-smart Agricultural Planning	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 5. Update and Implement Community Wildfire Protection Plan	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 6. Colusa County Fire Mitigation Plan of 2024 Implementation	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 7. Colusa County Fire Safe Council	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 8. Groundwater Recharge	New Action	X	X		Property Protection Natural Resource Protection
Action 9. Invasive Species Removal from Waterways	New Action	X	X	X	Property Protection Natural Resource Protection
Action 10. Irrigation Efficiency Technical Assistance	New Action	X	X		Property Protection Natural Resource Protection
Action 11. Localized Stormwater Management and Streambank Erosion Mitigation	New Action	X	X	X	Property Protection Natural Resource Protection
Action 12. On-farm Water Storage Projects	New Action	X	X		Property Protection Natural Resource Protection
Cortina Community Services District					
Action 1. Armor the Salt Creek Bank	New Action	X	X	X	Property Protection Natural Resource Protection
Kletsel Dehe Wintun Nation					
Action 2. Update Cortina Rancheria Climate Change Adaptation Plan (2017)	New Action	X	X	X	Prevention

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 3. Water Tank	New Action	X	X		Property Protection Structural Project
Action 4. Emergency Generator	New Action	X	X		Emergency Services Property Protection
Action 5. Improve Erosion Control Management Practices	New Action	X	X	X	Property Protection Natural Resource Protection
Action 6. Secondary Evacuation Route	New Action	X	X		Emergency Services
Action 7. Fuel Reduction and Defensible Space Projects	New Action	X	X		Property Protection Natural Resource Protection
Action 8. Enhanced Mapping and Assessing Rancheria Vulnerability to Hazards	New Action	X	X		Prevention Emergency Services Property Protection
Action 9. Public Education and Outreach	New Action	X	X	X	Public Information
RD 108					
Action 10. Emergency Generator Maintenance and Upkeep - District Office	Previous Action	X	X	X	Emergency Services Property Protection
Action 11. Emergency Generator - Pump Stations	Previous Action	X	X	X	Emergency Services Property Protection
Action 12. Stabilization of Colusa Basin Drain Levee	Previous Action	X	X	X	Property Protection Structural Projects
RD 479					
Action 13. RD 479 Integrity Preservation	New Action	X	X	X	Property Protection Structural Projects
Sacramento Westside Levee District					
Action 14. Seepage Mitigation of Sacramento River Levee	Previous Action	X	X	X	Property Protection Structural Projects
Action 15. Hardening of Sacramento River Levee	Previous Action	X	X	X	Property Protection Structural Projects
Action 16. BRIC Project EMF-2021-BR-089-0008: Grimes Floodplain Restoration and Levee Resiliency Project	New Action	X	X	X	Property Protection Structural Projects

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Abbreviations and Acronyms

Acronym	Definition
AB	Assembly Bill
AF	Acre-feet
ALERT	Automated Local Evaluation in Real Time
APG	California Adaptation Planning Guide
AQI	Air Quality Index
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
BRIC	Building Resilient Infrastructure and Communities
CA-DWR	California Department of Water Resources
CAISO	California Independent System Operator
Cal EPA	Environmental Protection Agency
Cal OES	California Office of Emergency Services
CAP	Climate Adaptation Plan
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
CEMP	Comprehensive Emergency Management Program
CEQA	California Environmental Quality Act
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
CGS	California Geological Survey
CIP	Capital Improvements Plan
CLOMR	Conditional Letter of Map Revision
CNPS	California Native Plant Society
CNRA	California Natural Resource Agency
COG	Continuity of Government
COO	Continuity of Operations

Acronym	Definition
CPUC	California Public Utilities Commission
CRIL	Community Resources for Independent Living
CRS	(National Flood Insurance Program's) Community Rating System
CRV	Contents Replacement Value
CVP	Central Valley Project
CWPP	Community Wildfire Protection Plan
DAC	Disadvantaged Community
DFIRM	Digital Flood Insurance Rate Map
DMA	Disaster Mitigation Act of 2000
DOF	Department of Finance
DSOD	Division of Safety of Dams
EF	Enhanced Fujita
EOC	Emergency Operations Center
EPSS	Enhanced Powerline Safety Settings
ESPM	University of California, Berkeley's Department of Environmental Science, Policy, and Management
ETSU	Enhanced Treatment and Site Upgrade
F	Fujita
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance Program
FPA	Floodplain Administrator
FRA	Federal Responsibility Area
FRAP	Fire and Resource Assessment Program
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
HHPD	High Hazard Potential Dam
HI	Heat Index
HMGP	Hazard Mitigation Grant Program
HMPC	Hazard Mitigation Planning Committee
ICS	Incident Command System
IPCC	Intergovernmental Panel on Climate Change
IRWM	Integrated Regional Water Management
LHMP	Local Hazard Mitigation Plan

Acronym	Definition
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
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
NGVD	National Geodetic Vertical Datum
NIDIS	National Integrated Drought Information System
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NWS	National Weather Service
OHP	Office of Historic Preservation
PDM	Pre-Disaster Mitigation Program
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
RHNA	Regional Housing Need Allocation
SAC-SJ	Sacramento-San Joaquin Valley
SB	Senate Bill
SBA	Small Business Administration
SEMS	Standard Emergency Management System
SFHA	Special Flood Hazard Area
SGMA	Sustainable Groundwater Management Act
SHBC	State Historical Building Code
SRA	State Responsibility Area
SVI	Social Vulnerability Index
SWP	State Water Project
UAV	Unmanned Aerial Vehicle

Acronym	Definition
UBC	Uniform Building Code
UCERF	Uniform California Earthquake Rupture Forecast
UFMP	Urban Forest Management Plan
UHF	Ultra High Frequency
UNFCCC	United Nations Framework Convention on Climate Change
UPRR	Union Pacific Railroad
URM	Unreinforced Masonry
USACE	US Army Corp of Engineers
USD	Union Sanitary District
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
UWMP	Urban Water Management Plan
VHFHSZ	Very High Fire Hazard Severity Zone
WCD	Water Control District
WRCC	Western Regional Climate Center
WSOC	Wildfire Safety Operations Center
WUI	Wildland Urban Interface
WWTP	Wastewater Treatment Plant

Chapter 1 Introduction

1.1 Purpose

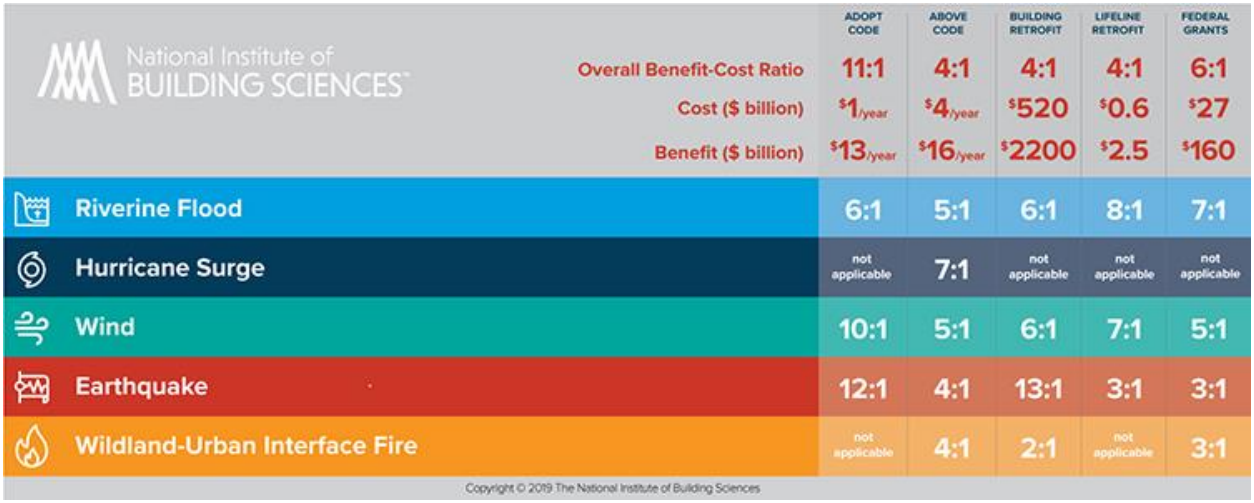
Colusa County, two incorporated communities, and six special districts prepared this Local Hazard Mitigation Plan (LHMP) Update to the Federal Emergency Management Agency (FEMA) approved 2018 Colusa County LHMP. The purpose of this LHMP Update is to guide hazard mitigation planning to better protect 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 Colusa 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.

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 Colusa 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 Colusa County LHMP is a multi-jurisdictional plan that geographically covers the entire area within Colusa 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:

- Colusa County*
- City of Colusa*
- City of Williams*
- Colusa County RCD
- Cortina Community Services District
- Kletsel Dehe Wintun Nation
- Reclamation District 108*
- RD 479
- Sacramento River West Side Levee District*

* Participated in 2018 Colusa County LHMP

All plan participants from the 2018 Colusa County Plan are participating in this LHMP Update.

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 19, 2023. While DMA 2000 emphasized the need for mitigation plans and more coordinated mitigation planning and implementation

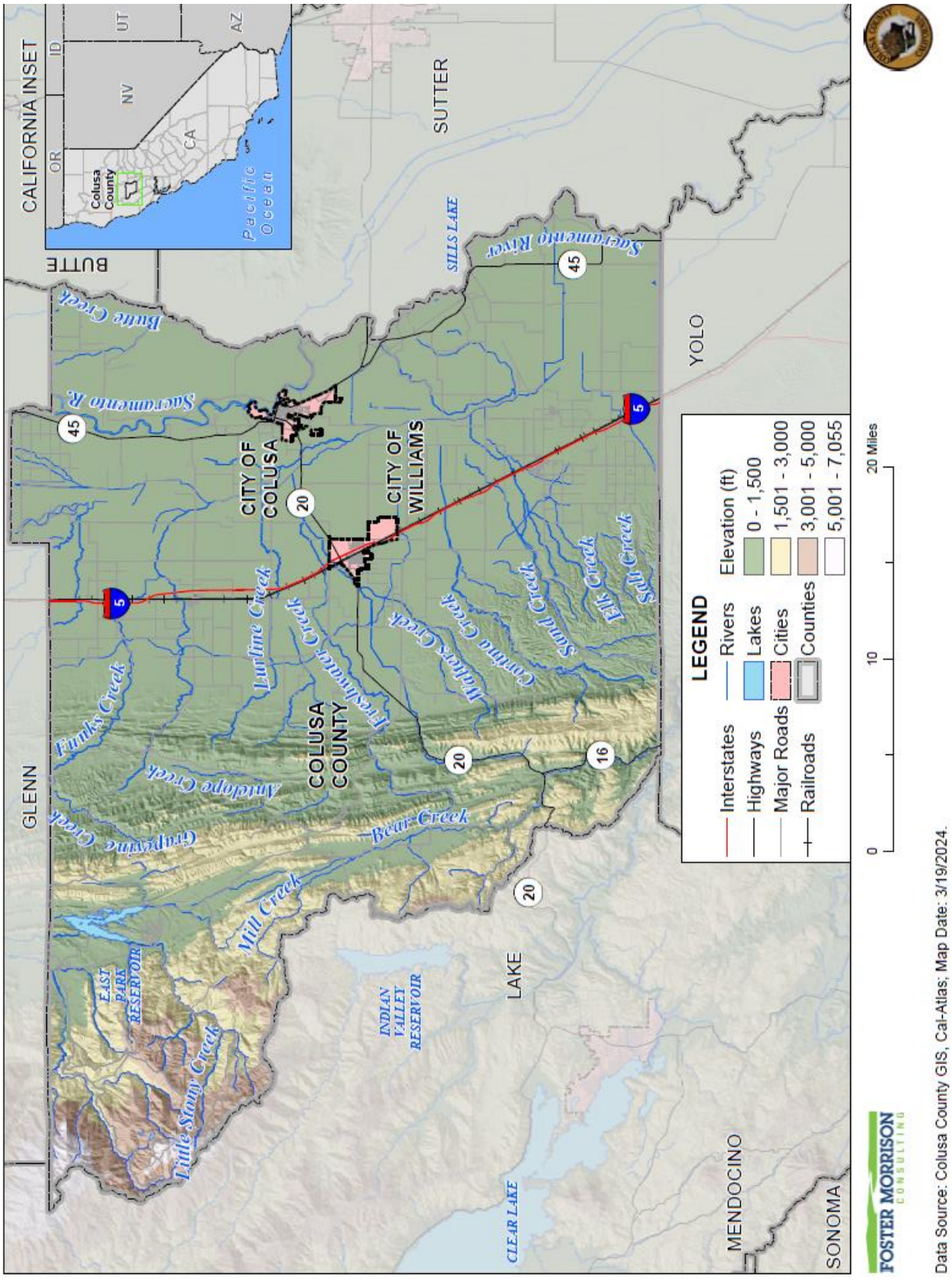
efforts, the regulations establish the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the Colusa 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 Colusa 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 Colusa County Profile

Colusa County is located along the western side of the Sacramento Valley and comprises an area of 1,152 square miles. There are two incorporated communities – the City of Colusa, and the City of Williams. The primary transportation route is Interstate Highway 5 (I-5), which runs north to south through the approximate center of Colusa County, serving Williams, Maxwell, and Arbuckle. State Highway 45, located approximately 20 miles to the west of l-5, follows the Sacramento River through Grimes, Colusa, and Princeton. State Highway 20 (SH 20) crosses the County from west to east, passing through the Cities of Williams and Colusa. A main line of the Southern Pacific Railroad crosses the middle of the County from north to south. Shallow draft boats can use the Sacramento River channel. There are small General aviation airports in the cities of Colusa and Williams. Figure 1-2 shows the Colusa County Planning Area.

Figure 1-2 Colusa County Planning Area



1.3.1. History

The history of Colusa County is rich in tradition, dating back to the first settler in 1846, William Bryant. This was after the first exploration of the area by white men in 1843 as authenticated by General Bidwell.

The first house built in Colusa County was on the banks of the Sacramento River in 1847 near the present site of Princeton. These were the first permanent inhabitants of Colusa.

The topography of the Sacramento Valley was depicted as a gentle slope of the land from the low mountains to a natural trough running through it. Some described it as plains. Seasonal changes had a marked effect on the appearance of the countryside in the early days. Luxurious vegetation was found in the spring and early summer. The timberlands that edged the river and the western boundary were called "tule lands," with a profusion of wildfowers in the foothills and alkali lands on the valley floor which were called "goose lands." An abundance of wildlife flourished in the area before the settlers inhabited it.

There were three settlements within the current boundaries of Colusa County when the first of the Forty - Niners arrived. Boundaries were made and properties transferred between Colusa, Glenn and Tehama Counties until Colusa and Glenn County were permanently divided in 1891.

According to the Colusa County website, Colusa County was established in 1850 as one of the original 27 counties created by the first state legislature. It once encompassed all of what is now Glenn County and a portion of Tehama County. In 1891, the counties of Glenn and Colusa were split. The County was named after the 1844 Rancho Colus Mexican land grant to John Bidwell. The name of the County in the original state legislative act of 1850 was spelled Colusi, and often in newspapers was spelled Coluse. The word is derived from the name of a Native American tribe living on the west side of the Sacramento River. The name was changed to Colusa shortly after. This, however, is disputed. The actual origin of the name is unknown.

1.3.2. Geography and Climate

Colusa County is bordered by Lake, Glenn, Butte, Sutter, and Yolo Counties to the west, north, east, and south, respectively. The County seat is located in the City of Colusa, which is located approximately 70 miles north of the State Capitol in the City of Sacramento.

The 2024 FEMA Flood Insurance Study (FIS) notes that elevations range from approximately 30 feet along the Sacramento River at the southeast comer of the County to a maximum of approximately 7,040 feet in the coastal ranges in the northwestern portion of the County. A large number of streams drain the County, including Elk Creek, Salt Creek, Stony Creek and Bear Creek. The County's eastern boundary is formed, in part, by the Sacramento River.

The climate in the region is characterized by hot, dry summers and cool winters. Temperatures in the City of Colusa average 45°F and 77°F in January and July, respectively. Peak high temperature in the County was 113°F. The average growing season is approximately 270 days. Annual precipitation averages approximately 16 inches in the City of Colusa. Flood-producing rainstorms normally occur between November and April. Peak flows in the streams, originating in the coastal ranges on the west side of the

County and in the Colusa Basin Drain (the primary north-to-south drainage channel), will result from winter rainstorms. Peak flow in the Sacramento River can result from winter rainstorms and winter and spring snowmelt.

1.3.3. Population and Demographics

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

Table 1-1 Colusa County Population by Jurisdiction, 2024

Jurisdiction	Total Population
City of Colusa	6,447
City of Williams	5,528
Unincorporated County	9,768
Total	**21,743**

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

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

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

Statistic	Number
Populations	
Population under 5	6.8%
Population over 65	15.1%
Median Age	36.0
White	42.9%
Black or African American	0.9%
American Indian or Alaska Native	2.3%
Asian	1.3%
Native Hawaiian or Pacific Islander	0.4%
Some Other Race	32.7%
Two or more races	19.5%
Median income	$69,619
Mean Income	$91,248
Poverty rate – All families	9.5%
Poverty rate – All people	10.9%
Unemployment Rate (February 2024)	20.1%

Source: 2020 US Census, 2021 US Census Bureau American Community Survey, California Employment Development Department

1.3.4. Economy and Tax Base

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

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

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	2,144	22.0%
Construction	461	4.7%
Manufacturing	1,202	12.4%
Wholesale trade	212	2.2%
Retail trade	852	8.8%
Transportation and warehousing, and utilities	754	7.8%
Information	41	0.4%
Finance and insurance, and real estate and rental and leasing	166	1.7%
Professional, scientific, and management, and administrative and waste management services	400	4.1%
Educational services, and health care and social assistance	1,541	15.8%
Arts, entertainment, and recreation, and accommodation and food services	827	8.5%
Other services, except public administration	449	4.6%
Public administration	679	7.0%

Source: US Census Bureau American Community Survey 2021 Estimates

Table 1-4 Unincorporated Colusa County – Income and Benefits

Income Bracket	Percent
<$10,000	2.5%
$10,000 – $14,999	0.6%
$15,000 - $24,9999	4.9%
$25,000 – $34,999	8.1%
$35,000 – $49,999	11.5%
$50,000 – $74,999	15.3%
$75,000 – $99,999	17.8%
$100,000 – $149,999	17.7%
$150,000 – $199,999	11.0%
$200,000 or more	9.6%

Source: US Census Bureau American Community Survey 2021 Estimates

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

Table 1-5 Major Employers in Colusa County Planning Area

Employer Name	Location	Industry
Adams Grain Co	Arbuckle	Grain Brokers
Adams Vegetable Oils Inc	Arbuckle	Oils-Vegetable
ADM Milling Co	Arbuckle	Flour Mills
Alsco-Geyer Irrigation Inc	Arbuckle	Irrigation Systems & Equipment
Arbuckle Elementary School	Arbuckle	Schools
Colusa Casino Resort	Colusa	Casinos
Colusa County Coroner	Colusa	Government Offices-County
Colusa County Health & Human	Colusa	Government Offices-County
Colusa County Sheriff Dept	Colusa	Government Offices-County
De Pue Warehouse Co	Williams	Warehouses-Merchandise & Self Storage
De Pue Warehouse Co Inc	Maxwell	Rice-Wholesale
Enid Prine Continuation Hs	Maxwell	Schools
George T Egling Middle School	Colusa	Schools
Granzella's	Williams	Restaurants
James Burchfield Primary Sch	Colusa	Schools
Myers & Charter Inc	Arbuckle	Rice Mills
Pierce Joint Unified School	Arbuckle	Schools
Premier Mushrooms	Colusa	Fruits & Vegetables-Wholesale
Princeton Elementary	Princeton	Schools
Social Services-Eligibility	Colusa	Human Services Organizations
Sun VALLEY Rice Co LLC	Arbuckle	Investments
Sunsweet Dryers	Colusa	Fruits & Vegetables-Growers & Shippers
Valley West Care Ctr	Williams	Health Services
Williams Elementary School	Williams	Schools

Source: America's Labor Market Information System (ALMIS) Employer Database, 2021 1st Edition.

Colusa County has a wide and varied tax base. Tax base information is tracked and maintained by the Colusa County Assessor's Office. The following tables show the tax base for the unincorporated County as well as for the incorporated jurisdictions. Table 1-6 shows the secured real property value by property use for the entire Colusa County Planning Area. Table 1-7 shows the secured real property value by jurisdiction.

*Table 1-6 2023 Colusa County Planning Area Distribution of Value by Property Use**

Property Use	2023 Value ($)	Percent of Current Roll
Agricultural	$1,827,249,503	46.76%
Commercial	$327,309,074	8.38%
Government	$154,674,257	3.96%

Property Use	2023 Value ($)	Percent of Current Roll
Industrial	$284,737,477	7.29%
Institutional	$33,076,413	0.85%
Miscellaneous	$57,015,223	1.46%
Residential	$1,223,367,221	31.31%
Totals	**$3,907,429,168**	**100.00%**

Source: 2023 Colusa County Assessor's Office data
*includes land, structure, and other values

Table 1-7 Colusa County Planning Area Local Assessment Roll Totals by Jurisdiction*

Jurisdiction	2023 Value ($)	Percent of Current Roll
City of Colusa	$637,299,874	16.31%
City of Williams	$586,538,497	15.01%
Unincorporated Area	$2,683,590,797	68.68%
Total Value	**$3,907,429,168**	**100.0%**

Source: 2023 Colusa County Assessor's Office data
*includes land, structure, and other values

1.4 Plan Organization

The 2024 Colusa 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 Colusa
  - ✓ Annex B: City of Williams
  - ✓ Annex C: Colusa County RCD
  - ✓ Annex D: Cortina Community Services District
  - ✓ Annex E: Kletsel Wintun Dehe Nation
  - ✓ Annex F: RD 108
  - ✓ Annex G: RD 479
  - ✓ Annex H: Sacramento Westside Levee District

- 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

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 Plans (LHMP), being updated as part of this 2024 Colusa County LHMP Update, contained descriptions of planning processes, 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 2024 Colusa 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 LHMPs 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 Colusa 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 Colusa 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 Colusa 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 Colusa 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 2024 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 includes the following:

- 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.
- An updated critical facility GIS layer was provided by the County for the Colusa County Planning Area. This allowed for an updated analysis of critical facilities for each mapped hazard in the Colusa County Planning Area.
- Community lifelines were added to all hazard discussions.
- 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 each participating jurisdiction's annex.
- A new section on Power Shortage/Failure was added. Public Safety Power Shutoff events were also added.

- Each section of the hazard profiles and vulnerability assessment looked at how at risk, underserved, and socially vulnerable populations could be affected by each hazard.
- Impacts of climate change, changes in population patterns, and changes in land use and development was reviewed and discussed for each hazard.
- 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.
- 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 two separate earthquake shake scenarios for the Colusa County Planning Area.
- New DFIRM data was used as it became available during this LHMP Update. The decertification of the levees put many additional residents and values into the 1% annual chance floodplain.
- 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).
- Levee failure was analyzed based on new data. All levees in the County were decertified. The County utilized Levee Flood Protection Zone (LFPZ) data for analysis. An analysis was performed on assets at risk (including populations, structures, critical facilities and community lifelines, and future development) in the LFPZs.
- Economic assets and community activities of value discussions were added to the vulnerability assessment of all hazards.
- 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.
- A greater study of all jurisdiction's mitigation capabilities was added.
- Public outreach efforts were expanded to include an enhanced focus on education and outreach to vulnerable and underserved populations, including holding an additional Public Meeting on the LHMP Public Review Draft geared specifically towards local and regional providers of vulnerable populations.
- 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, Colusa County Planning Area vulnerabilities, and resulting modifications to the Colusa 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 jurisdictions 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 2024 LHMP Update.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Agricultural Hazards: Severe Weather/Invasive Species (Pests/Plants)			X

- Recent drought conditions have stressed local crops and grazing lands making them more susceptible to insect infestation, severe weather events and other issues.
- Noxious weeds can be more drought tolerant – better able to compete for water over local crops and vegetation and also increases wildfire risk.
- Access and availability of water due to recent drought conditions impacts water supply for all uses, including agriculture.
- Successful crop production relies on predictable weather patterns. For example, walnuts are affected by extreme heat occurring at differing times; almonds are likewise affected by rain occurring at the wrong times.
- Transition from rice to trees has impacted the County's agricultural industry. Trees are susceptible to new problems, such as squirrels, which create a public health issue. Trees, compared to rice, also increases the fire risk and can be an issue during periods of drought as they require more water.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Climate Change			X

- NWS data indicates temperatures are increasing resulting in more extreme heat days. Recent years (2021, 2022, 2023, 2024) have been some of the hottest years on record.
- Snowpack levels have been occurring at higher elevations in recent years.
- Weather extremes, including precipitation, have been increasing and becoming much more variable – the Colusa County Planning Area is seeing increased precipitation and intensity as well as abnormally dry conditions. Other examples of weather extremes include the numerous atmospheric river events that have occurred over the last several years.
- Changing climate conditions influence multiple hazards, such as heat, flooding, wildfire and others, identified in the Planning Area as described in this LHMP Update.
- Increased temperatures associated with climate change increases the use and costs of energy leaving critical systems and infrastructures more vulnerable.
- Other ongoing impacts include impacts to food sources and food-related diseases, eco-system changes, impacts to cultural resources, public health issues, etc.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Dam Failure		X	

- 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. However, population

growth in the last five years has been limited in Colusa County, thus not notably affecting dam vulnerability in the Planning Area.

- The risk of dam failure 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.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Drought and Water Shortage			X

- Recent drought conditions, including water supply issues, have had an impact on the Colusa County Planning Area and California. As a result, the drought hazard has become a significant priority for mitigation planning.
- State drought mandates, including conservations measures, to protect water supply throughout California have been implemented and continue within the Planning Area.
- Drought conditions have impacted the water supply to the Planning Area, as evidenced by the number of wells going dry.
- Drought conditions have contributed to an increase in tree mortality issues and a general increase in dry fuels and wildfire conditions.
- Noxious weeds are more drought tolerant – better able to compete for water over local vegetation
- Water quality issues have been more of an issue with less flows in streams, combined with drawing down of water tables. Further, dry wells are now dirty, sandy water; there is not as much ground water available to act as a filter to these water supply sources.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Earthquake		X	

- Overall, Colusa County is in a relatively low to moderate seismically active area.
- The primary factor that might change the earthquake vulnerability is additional development and more people moving to the area. However, adherence to California building codes should ensure sound development in new development areas.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Flood: 1%/0.2% events			X

- Overall, the net increase or decrease in vulnerability depends on the location within the Planning Area.
- The risk and vulnerability of 1% and 0.2% flood events remain somewhat constant, but are unpredictable, changing from year to year based on weather and new development in the Planning Area.
- Recent years of heavy rains, including atmospheric river events, resulted in full reservoirs and high rivers. This contributed to flooding around the County, including within identified FEMA floodplains.

- Land use planning, flood control measures, and adherence to development requirements in identified floodplains have minimized additional exposure to this hazard in the Planning Area, even in years of heavy storms.
- With the new DFIRMs effective in 2024, the levees in the Planning Area have all been decertified. This resulted in additional development and residents subject to the 1% annual chance flood and to NFIP insurance requirements.
- Flood insurance is becoming much more difficult to obtain with many insurance companies pulling out of California Communities.

2024 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.
- New 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.
- Several years of heavy rains and atmospheric river events resulted in more localized flooding throughout the Planning Area. Generally, damage occurred in low lying areas around the rivers. Road damage and closures continue to occur during heavy storm events.
- During large storm events, power issues occur and pumps go out resulting in greater localized flooding.
- Outdated drainage systems also contribute to a greater vulnerability to localized, stormwater flooding.
- The changing of crops from rice fields to trees have also increased the localized flooding issue in the Planning Area. The trees don't have the capacity to absorb flood waters like the rice fields.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Landslides, Mudslides, and Debris Flows			X

- Over the last couple of 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 and atmospheric river events contributing to saturated soils, the landslide potential increased in the Planning Area, especially in post fire areas.
- Climate change brings renewed concern moving forward for heavy and more intense rains, storms and associated issues to the Colusa County Planning Area, which include a greater potential for landslides and mudslides.
- Although as further noted, these landslide areas often occur in remote, undeveloped areas that would have limited damages during a landslide.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Levee Failure			X

- An increase in seepage issues further away from the levees has caused additional concern.
- The new, 2024 DFIRMs reflect the decertification of all Planning Area levees. Thus, more people are located in the 1% annual chance floodplain subject to NFIP flood insurance requirements. However, even though the floodplains may change due to the levee certification issue, the fact remains that the levees still provide a significant level of protection to Planning Area communities.
- Similar to other hazards, increased development in areas protected by levees could result in an increase in vulnerability.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: Extreme Cold and Freeze		X	

- Similar to other weather hazards, the overall vulnerability of the Planning Area changes from year to year depending on the season.
- The HMPC further noted, that extreme cold and freeze and their impacts are mostly an agricultural issue.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: Extreme Heat			X

- According to the NWS, there has been an increase in severe heat days in recent years. 2021, 2022, 2023, and 2024 were some of the hottest years on record.
- Climate change issues will continue to increase heat related impacts and vulnerabilities. Air quality issues increase with more extreme heat days.
- Vulnerable populations are at the greatest risk to this hazard. Low income residents may not be able to afford air conditioning. Seniors, the very young, medically vulnerable, and unhoused are not as resilient to this hazard.
- Extreme heat events are resulting in more power outages and related issues. This has resulted in well pumps going out and people not having access to water for extended periods of time.
- The heat, combined with drought (tree die back) conditions, has increased the potential for wildfires and contributes to fire weather conditions triggering a PSPS.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: Heavy Rains and Storms			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 significant and heavy rains, and an increase in atmospheric river events causing flooding and other adverse impacts to the County. Storms continue to be more intense and more frequent than in years proceeding this last drought.
- During large storm events, power issues occur and pumps go out resulting in greater localized flooding.
- Climate change brings renewed concern moving forward for heavy rains, storms and associated issues to the County.

2024 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 greater impact in recent years following several years of drought combined with a year of heavy rains. With trees getting older in the Planning Area, drought has a greater impact on their stability, with compromised trees often falling over during high wind events.
- Stream and levee banks see more wave action and erosion during high wind events.
- Severe wind events exacerbate the wildfire hazard and contribute to an increase in PSPS events.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Streambank Erosion			X

- Recent years have seen significant and heavy rains, and an increase in atmospheric river events causing flooding and other adverse impacts to the County. Storms continue to be more intense and more frequent. This contributes to flooding and an increase in streambank erosion.
- Climate change brings renewed concern moving forward for heavy rains, storms and streambank erosion in the County.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Subsidence			X

- This hazard has seen some change since the last plan, with subsidence issues related to groundwater pumping during years of drought.
- Some wells in certain areas such as Arbuckle have starting pumping sand. Heavy rain years do help to recharge water. These types of occurrences show that something is moving.
- Groundwater recharge programs can limit future subsidence issues related to groundwater pumping and drawdown.

2024 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Wildfire			X

- Compounded by current 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 now a year around concern.
- While still limited, the increased development in WUI areas within the County also contributes to an increase in vulnerability.
- 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.
- Colusa County also experienced significant wildfire activity within the County since the 2018 LHMP.
- Wind has been a major contributor to the potential for a catastrophic wildfire.
- Catastrophic wildfires in northern counties has created an issue in Colusa as evacuees flee the fires and look to nearby communities, such as Colusa, for shelter. As well, many of the shelter and other areas set up for evacuees, Cal Fire uses these areas as staging areas for nearby fires.

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 Colusa County to hazards and protect lives and prevent losses to property, public health, economy, and the environment

- Provide protection for existing and future development
- Provide protection for critical facilities, infrastructure, and services and minimize disruption
- Prevent repetitive losses and reoccurring damages from happening

Goal 2: Increase community/public outreach, education, and awareness for all hazards to minimize hazard-related losses

- Improve the understanding of Colusa County residents, business owners, and visitors to hazards of concern and how to effectively be prepared and take action to mitigate the impacts of future hazard events

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
- Increase participation by all County entities and agencies operating in Colusa County in disaster planning activities to improve hazard awareness, intra-and inter-agency communications, mitigation action implementation, and coordinated response and recovery efforts

Goal 4: Improve community resiliency to flooding in Colusa County

- Reduce the flood risk and vulnerability in Colusa County
- Reduce life safety issues, property loss, and damages associated with flooding
- Minimize impact of heavy rains and localized flooding
- Maintain/improve flood protection and control measures, including maintenance and improvements to the levee systems, to minimize future flood related impacts and damages

Goal 5: Continue to protect and promote Colusa County agriculture by ensuring safe and effective farming practices that protect the citizens and environment and that minimize future hazard related losses

- Support water projects that increase available agricultural water during critical times of need for local crops while ensuring a consistent water supply and distribution to County residents.
- Educate County citizens as to how they can help protect Colusa's agriculture from noxious weeds and pests

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.

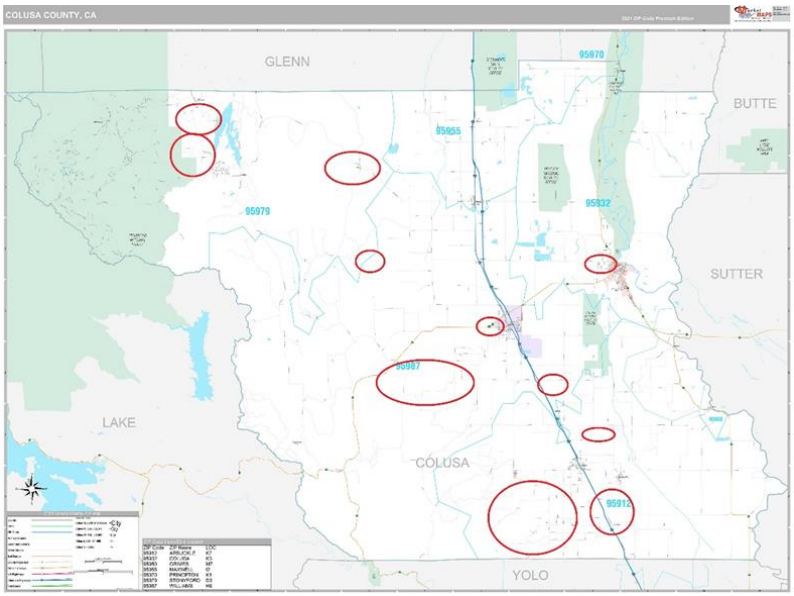
Drought Water Tank and Hauling Program

As a result of recent Drought conditions, in November 2021, Colusa County through their Local Drought Emergency Proclamation, developed and implemented a Bottled and Hauled Water Project to provide temporary assistance to residents with failed domestic wells. The project comprised the purchase and installation of potable water tanks on the premises, connection to the household water delivery system, and water deliveries provided as needed based on a state average conservative consumption during drought. The project was funded by a California Department of Water Resources Grant.

The project was implemented in various areas of the County of Colusa at residences experiencing dry wells. These include mountainous areas, low-lying foothills, and flatlands in the south region of the county or anywhere else where groundwater levels have declined and left domestic wells dry. At its peak, this project served 31 homes. Throughout project a total of 1,222,500 gallons equivalent to 3.751715395 acre-feet of water was delivered.

Many homes' wells recharged during the 2022-2023 winter storms. In early 2024, it was determined that drought conditions no longer exist in most of these areas following two wet winters. The total budget for this project was $718,750.00, of which only 26% of budget was utilized over the duration of the project. The project was considered a success and was completed on March 31, 2024.

Figure 2-1 Locations of dry wells with participation in Emergency Water Tank & Hauling Program



Source: Colusa County

Figure 2-2 Delivery of Potable Water and Storage Tanks

Source: Colusa County

Flood Risk Reduction Project for the Unincorporated Town of Grimes

As detailed in the 2018 LHMP, a Flood Risk Reduction Feasibility Study was undertaken and completed in February 2020, and a feasible alternative was identified for flood risk reduction. The Sacramento River West Side Levee District took the lead for the second phase of this project, and secured two additional grants: DWR Small Community Flood Risk Reduction – Phase II and FEMA Building Resilient Infrastructure Communities (BRIC Project EMF-2021-BR-089-0008: Grimes Floodplain Restoration and Levee Resiliency Project). The two grants will help advance permitting, design, and construction of the preferred risk reduction alternative.

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 68 separate mitigation actions for the jurisdictions. Of these, 6 are complete, 3 have portions that are complete and portions that are ongoing, 18 are ongoing, and 31 have not been started. 30 actions have been identified for inclusion 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.

Table 2-1 2018 LHMP: Mitigation Action Status Summary

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update*
Colusa County				
All Hazard Actions				
Action 1.Integrate Local Hazard Mitigation Plan into Safety Element of General Plan		X		Y
Action 2.Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness		X		Y
Action 3.Access to Locked Gate on Green Rd.			X	N
Action 4.Backup Generator		X		Y
Action 5.Alert and Warning System for Sheriff's Office		X		Y
Action 6.Generator Purchases to Enhance Project Power for Colusa County		X		Y
Action 7.Hard Road Closure Mechanisms, River Road			X	Y
Action 8.Conduct Evacuation and Shelter Planning for All Communities Countywide			X	Y
Agricultural Hazards Actions				
Action 9.Domestic Pets and Livestock Plan review and update	X			N
Climate Change Actions				
Action 10. Climate Change Mitigation Activities and Education		X		Y
Dam Failure Actions				
Action 11. Ensure Communication about Dam Safety and Awareness Countywide		X		Y
Drought & Water Shortage Actions				
Action 12. Drought Tolerance and Resilience Project County-wide, including Public Education		X		N
Earthquake Actions				
Action 13. Earthquake Vulnerability Study and Retrofitting of County Assets			X	Y
Flood, Localized Flood, Heavy Rain and Storms Actions				
Action 14. Corbin Road Repair			X	N
Action 15. Seepage Mitigation, East Clay Street, Colusa (between city and county)			X	N

Action Title		Complete	Ongoing	Not Yet Started	In 2024 Update*
Action 16.	Highway 20 Flood Prevention			X	N
Action 17.	Repair and Enhance Banks at Indian Creek in Lodoga			X	N
Action 18.	Lone Star Road Flood-Prevention			X	N
Action 19.	Powell Slough Phase II			X	N
Action 20.	Repair and Enhance Banks at Salt Creek in Arbuckle			X	N
Action 21.	San Jose Road Elevation Project			X	N
Action 22.	Colusa County Storm Water Plan Update			X	N
Action 23.	Lurline Avenue Culvert Replacement Project			X	N
Action 24.	Lonestar Road Culvert Project			X	N
Action 25.	Sandbagging Training for county and city personnel; purchase Sandbagging Stations		X		N
Action 26.	Leesville Road elevation project, Williams			X	N
Action 27.	Princeton Drainage Assessment and Revision			X	N
Flooding, Landslide, High Winds Actions					
Action 28.	Goat Mountain Road Erosion Control Project			X	N
Action 29.	Fouts Springs Road Drainage Modification and Erosion Control Project			X	N
Action 30.	Brim Road Drainage Modification and Erosion Control Project			X	N
Action 31.	Cook Springs Road Drainage Modification and Erosion Control Project			X	N
Action 32.	Sites Lodoga Road Drainage Modification and Erosion Control Project			X	N
Action 33.	Lodoga Stonyford Road Drainage Modification and Erosion Control Project			X	N
Action 34.	Ground Surface Soil Stabilization, Western Colusa County in Burn Scar Areas			X	N
Hazardous Materials Actions					
Action 35.	Hazardous Materials Area Response Plan Evaluation and Update	X			N
Levee Failure, Flood, Localized Flooding, and Streambank Erosion					
Action 36.	Flood Risk Reduction Project for the Unincorporated Town of Princeton			X	Y**
Action 37.	Flood Risk Reduction Project for the City of Colusa	X	X		Y**
Action 38.	Flood Risk Reduction Project for the Unincorporated Town of Grimes			X	Y**
Action 39.	Map and Assess County-wide Vulnerability to Riverbank Erosion		X		Y**
Action 40.	Seepage Mitigation Projects Countywide			X	N
Action 41.	Levee Repair- Rip Rap Maintenance		X		Y**

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update*
Levee Failure and Agricultural Pests and Diseases Actions				
Action 42. Public Awareness Campaign and Weed Abatement Patrols for Squirrel Population Management		X		N
Action 43. Public Awareness Campaign and Weed Abatement Patrols for Soil Absorption Effectiveness		X		Y**
Severe Weather: Extreme Cold and Freeze Actions				
Action 44. Evaluate Extreme Cold Plan (Including Damage Mitigation; Winter Storm, High Wind and Freeze Communication Actions)		X		N
Subsidence (with Drought and Flood) Actions				
Action 45. Map and Assess Countywide Vulnerability to Subsidence		X		N
Action 46. Surface Water Storage Project Countywide			X	Y**
Wildfire Actions				
Action 47. Maintain Defensive Space	X			N
Action 48. Fire Fuel Modification and Defensible Space Projects	X			N
Action 49. Wildfire Mitigation			X	Y
Wildfire and Drought Actions				
Action 50. 50,000 Gallon Water Tank			X	N
City of Colusa Actions				
All Hazard Actions				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan		X		Y
Earthquake Actions				
URM Mapping and Identification			X	Y
Flood, Localized Flood, and Heavy Rain and Storms Actions				
Central City Flood Hazard Mitigation Project	X	X		N
City of Williams Actions				
All Hazard Mitigation Actions				
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	X			Y
Drought and Water Shortage Actions				
Action 2. Develop Drought Program Plan			X	N
Earthquake Actions				
Action 3. EQ Vulnerability Study and Retrofit of City Assets			X	Y
Flood: 100/200/500; Localized Flooding; Levee Failure; Stream Bank Erosion, Heavy Rains and Storms Actions				
Action 4. Levee Construction			X	N
Action 5. Hwy 99W and Hwy 20 Flood Wall or Similar Construction			X	N
Action 6. Detention Basin Construction			X	Y
Action 7.Improve Stormwater Management Planning	X			Y

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update*
RD 108 Actions				
All Hazard Actions				
Emergency Generator – District Office	X	X		Y
Drought and Water Shortage Actions				
Groundwater Wells		X		N
Climate Change, Flood, Localized Flood, Dam Failure, Levee Failure, Streambank Erosion, Heavy Rains and Storms, Winds and Tornado Actions				
Emergency Generator – Pump Stations		X		Y
Stabilization of Colusa Basin Drain Levee		X		Y
Hardening of Colusa Basin Drain Levee		X		Y
Invasive Species Removal in Canals				N
Sacramento River West Side Levee District Actions				
Climate Change, Flood, Localized Flood, Dam Failure, Levee Failure, Heavy Rains and Storms, High Winds, Stream Bank Erosion Actions				
Seepage Mitigation of Sacramento River Levee		X		Y
Hardening of Sacramento River Levee		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.

** These actions were combined into a single action in this LHMP Update. This action in Chapter 5 is titled Roadway Flood Protection.

Colusa County Mitigation Actions

All Hazard Actions

Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Expect to have LHMP integrated in plan before completion of LHMP 2024 update. Due to its ongoing nature, this project is being brought forward into this LHMP Update.

Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): As of 2023 OES has been participating in various community events to provide information related to Multi-Hazards preparedness. Due to its ongoing nature, this project is being brought forward into this LHMP Update.

Action 3. Access to Locked Gate on Green Rd.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project has not been started yet due to lack of resources and higher priority safety issues. It is being lumped in with other roads in order to create a larger project for ease of securing and managing funding and economy of scale of the larger project.

Action 4. Action 4. Backup Generator

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): OES purchased generators through PSPS grants for OES, DHHS and continues to look for additional funding to purchase generators to provide assistance to facilities during major power outages.

Action 5. Alert and Warning System for Sheriff's Office

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Working with DHHS in obtaining approval for use of IPAWS. Currently using RAVES located and budgeted by DHHS. Expect to conduct drills countywide verify system works properly and reaching majority of communities.

Action 6. Generator Purchases to Enhance Project Power for Colusa County

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): OES has generators to deploy in the event of power outages. Will continue to purchase generators as funding becomes available.

Action 7. Hard Road Closure Mechanisms, River Road

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project has not been started yet due to lack of resources and higher priority safety issues. It is being lumped in with other roads in order to create a larger project for ease of securing and managing funding and economy of scale of the larger project.

Action 8. Conduct Evacuation and Shelter Planning for All Communities Countywide

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Project not started due to funding, expect to contract consultant to assist with plan.

Agricultural Hazards Actions

Action 9. Domestic Pets and Livestock Plan review and update

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Domestic Pets and Livestock Plan is complete.

Plan incorporated into the EOP Annexes-Appendices. To date there has not been the need to follow plan procedures.

Climate Change Actions

Action 10. Climate Change Mitigation Activities and Education

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Portions of this are complete, and portions are ongoing. The ongoing portions are being carried forward in this LHMP Update.

Dam Failure Actions

Action 11. Ensure Communication about Dam Safety and Awareness Countywide

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is not started.

Drought & Water Shortage Actions

Action 12. Drought Tolerance and Resilience Project County-wide, including Public Education

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing, but is not being carried forward in this Plan Update.

Earthquake Actions

Action 13. Earthquake Vulnerability Study and Retrofitting of County Assets

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing, and is not being carried forward in this Plan Update.

Flood, Localized Flood, Heavy Rain and Storms Actions

Action 14. Corbin Road Repair

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to see the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads.

Action 15. Seepage Mitigation, East Clay Street, Colusa (between city and county)

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project has not been started yet due to the

need to work with the adjacent private property owners in order to come to an agreement for a solution. This needs to be done prior to determining the details necessary to put together and estimate and project plans. With a lack of staffing resources, this discussion with the landowners has not been able to take place.

Action 16. Highway 20 Flood Prevention

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project. The road is owned by Caltrans and there has not been a funding opportunity available to approach the State with for a partnered project. In addition the resources for a project this large, not only fiscally, but staff resources as well have not been available.

Action 17. Repair and Enhance Banks at Indian Creek in Lodoga

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to oversee the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 18. Lone Star Road Flood-Prevention

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to oversee the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 19. Powell Slough Phase II

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No Progress has been made on this project as there are no resources currently available for the initiation of it and it is part of a larger future effort in working with Caltrans to address the overall flooding issues affecting State Route 20. This would be included in the Stater Route 20 flood prevention project.

Action 20. Repair and Enhance Banks at Salt Creek in Arbuckle

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made to this point due to a lack of resources to complete the project. The environmental work is complicated and very costly, which the County does not currently have funding to complete. As the County looks to address streambed flooding at different locations and State or Federal funding becomes available for project development to address these issues, the County will pursue these funding opportunities and this project may be coupled with other locations for economy of scale.

Action 21. San Jose Road Elevation Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to oversee the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 22. Colusa County Storm Water Plan Update

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing.

Action 23. Lurline Avenue Culvert Replacement Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to see the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 24. Lonestar Road Culvert Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to see the process and acquisition of funding. It is also a low priority for the County due to the low volume of traffic on this road. This project may be included with other projects for an economy of scale.

Action 25. Sandbagging Training for county and city personnel; purchase Sandbagging Stations

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): For County personnel, on the job training is completed as needed as new employees are hired and as the flood season approaches. Further training could be done including and coordinated with other county agencies as time and resources allow.

Action 26. Leesville Road elevation project, Williams

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to see the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 27. Princeton Drainage Assessment and Revision

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): The effort necessary to complete this work has not been able to be undertaken due to staffing constraints. Future efforts will likely be done through contracted services when funding is available.

Flooding, Landslide, High Winds Actions

Action 28. Goat Mountain Road Erosion Control Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): During the spring of 2023, some emergency work was done in coordination with OES and FEMA to repair an isolated area. However, work on the larger overall effort of the road in its entirety has not been initiated at this point. This is a larger effort which will require significant efforts and resources.

Action 29. Fouts Springs Road Drainage Modification and Erosion Control Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to see the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 30. Brim Road Drainage Modification and Erosion Control Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to see the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 31. Cook Springs Road Drainage Modification and Erosion Control Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to see the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 32. Sites Lodoga Road Drainage Modification and Erosion Control Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to see the process and acquisition of funding. It is also not as high

of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 33. Lodoga Stonyford Road Drainage Modification and Erosion Control Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No progress has been made on this project due to lack of resources, funding and personnel to see the process and acquisition of funding. It is also not as high of a priority for the County due to the low volume of traffic on this road compared to other County roads. This project may be included with other projects for an economy of scale.

Action 34. Ground Surface Soil Stabilization, Western Colusa County in Burn Scar Areas

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project has not yet been started due to funding issues.

Hazardous Materials Actions

Action 35. Hazardous Materials Area Response Plan Evaluation and Update

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Hazardous Materials Area Plan has been completed see below link to county website for plan.

https://www.countyofcolusa.org/DocumentCenter/View/10374/HMAP-September-2018-Update?bidId

Levee Failure, Flood, Localized Flooding, and Streambank Erosion

Action 36. Flood Risk Reduction Project for the Unincorporated Town of Princeton

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Not started due to funding. At this point no work has been done to improve the infrastructure within the town. Signs have been put up to warn of standing water, however this is the limit of work completed to this point. Further work will require additional resources the County does not currently have. This project could potentially be combined with flood protection efforts within the town of Grimes for economy of scale in design, environmental and other aspects of project development.

Action 37. Flood Risk Reduction Project for the City of Colusa

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): the Flood Risk Reduction Feasibility Study was completed in February 2020, and a feasible alternative was identified. Ongoing: looking for a project champion and funding source to assist design, permitting, and construction.

Action 38. Flood Risk Reduction Project for the Unincorporated Town of Grimes

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): At this point no work has been done to improve the infrastructure within the town. Signs have been put up to warn of standing water, however this is the limit of work completed to this point. Further work will require additional resources the County does not currently have. This project could potentially be combined with flood protection efforts within the town of Princeton for economy of scale in design, environmental and other aspects of project development.

Action 39. Map and Assess County-wide Vulnerability to Riverbank Erosion

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): In the past, this has been County OES, Sacramento River Westside Levee District. PW does not have the resources to complete this effort. As such, this project is ongoing.

Action 40. Seepage Mitigation Projects Countywide

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): No work on this project has been done to date. This is a large project in which all areas of concern need to be identified through a study. Once identified, plans would need to be developed, environmental work done, and funding secured. Currently the County does not have the resources to start project development necessary for this project. Locations such as Clay street and others would be lumped into one larger effort within a study.

Action 41. Levee Repair- Rip Rap Maintenance

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing, but it led by the reclamation districts. It will not be carried forward by the County in this Plan Update.

Levee Failure and Agricultural Pests and Diseases Actions

Action 42. Public Awareness Campaign and Weed Abatement Patrols for Squirrel Population Management

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): County Ag Commissioner provides the public various information on their website and office. Colusa County Department of Agriculture | Colusa County, CA - Official Website (countyofcolusa.org)

Action 43. Public Awareness Campaign and Weed Abatement Patrols for Soil Absorption Effectiveness

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): County Ag Commissioner provides the public

various information on their website and office. Colusa County Department of Agriculture | Colusa County, CA - Official Website (countyofcolusa.org)

Severe Weather: Extreme Cold and Freeze Actions

Action 44. Evaluate Extreme Cold Plan (Including Damage Mitigation; Winter Storm, High Wind and Freeze Communication Actions)

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Completed, have established procedures during severe weather. Agency collaboration is in place to provide assistance to vulnerable population and/or in general all within county.

Subsidence (with Drought and Flood) Actions

Action 45. Map and Assess Countywide Vulnerability to Subsidence

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): 2021 Drought caused wells in the Arbuckle, Stonyford, Williams, Sites and Maxwell to dry. The county received CDAA and DWR assistance. Arbuckle and Stonyford were affected the most. Stonyford resident's wells recharged after the 2023 Winter Storms. The majority of Arbuckle residents had new wells installed due to the depth of their previous wells. During the time County was able to identify these areas and track where the recharge occurred and new wells installed. OES has documentation of these locations for future reference. Residents have been provided with Drought Preparedness information.

Action 46. Surface Water Storage Project Countywide

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Not Started, starting point will be to review process-based Senate Bill 122 which was subsequently passed which added Water Code section 1242.1 which sets out a process to divert floodwaters. It expires January 1, 2029.

Wildfire Actions

Action 47. Maintain Defensive Space

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This has been completed. The Rancheria takes care of clearing brush and grass away on a yearly basis before fire season.

Action 48. Fire Fuel Modification and Defensible Space Projects

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Not started due to funding.

Action 49. Wildfire Mitigation

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Not started due to funding.

Wildfire and Drought Actions

Action 50. 50,000 Gallon Water Tank

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): Not completed due to funding.

City of Colusa Actions

All Hazard Actions

Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): The project was implemented and has been ongoing due to insufficient staffing and time to promptly administer the general plan updates. We have gradually completed portions of the updates from our planning department. We do not have enough data collection to provide evidence of loss or avoidance due to a lack of staff time and financial resources.

Earthquake Actions

URM Mapping and Identification

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project was not implemented due to a lack of staff hours, funding, and trained personnel to perform the mapping and identification. There is no evidence of loss or avoidance.

Flood, Localized Flood, and Heavy Rain and Storms Actions

Central City Flood Hazard Mitigation Project

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): The city implemented this project with the county and districts and developed a flood response plan that maps out actions and trigger points for flood responses within the city and county. Though we have not had to activate the flood response plan since its creation, I believe it will reduce the loss of life and property if needed. This project should continue to be listed as in progress due to the updated FEMA flood mapping; the city has not yet fully evaluated the impact of this remapping and will most definitely need to update and improve on the flood response plans and actions given the new data.

City of Williams Actions

All Hazard Mitigation Actions

Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): The LHMP was integrated into the Safety Element of the General Plan in September of 2023. The City does not have data to support evidence of loss avoidance.

Drought and Water Shortage Actions

Action 2. Develop Drought Program Plan

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project has not started yet. The City will need to investigate funding to develop a drought program plan.

Earthquake Actions

Action 3. EQ Vulnerability Study and Retrofit of City Assets

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project has not started yet due to lack of funding availability for the project.

Flood: 100/200/500; Localized Flooding; Levee Failure; Stream Bank Erosion, Heavy Rains and Storms Actions

Action 4. Levee Construction

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project has not been implemented due to lack of funding.

Action 5. Hwy 99W and Hwy 20 Flood Wall or Similar Construction

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project has not been implemented due to lack of funding.

Action 6. Detention Basin Construction

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): The detention basin for the Business Park section

of the City is currently in the engineering phase. The City expects to complete review of the plans and start construction within the next 2 years. Once construction is completed, any avoidance of loss will be evident.

Action 7. Improve Stormwater Management Planning

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project has not yet started. The City will pursue grant funding to create a new Storm Water Master Plan as the previous plan has been deemed infeasible.

RD 108 Actions

All Hazard Actions

Emergency Generator – District Office

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is complete, but a maintenance portion of the project is being carried forward into this Plan Update.

Drought and Water Shortage Actions

Groundwater Wells

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing, but is not being carried forward in this Plan Update.

Climate Change, Flood, Localized Flood, Dam Failure, Levee Failure, Streambank Erosion, Heavy Rains and Storms, Winds and Tornado Actions

Emergency Generator – Pump Stations

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing. Waiting on funding. It is being carried forward into this Plan Update.

Stabilization of Colusa Basin Drain Levee

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing. Waiting on funding. It is being carried forward into this Plan Update.

Hardening of Colusa Basin Drain Levee

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing. Waiting on funding. It is being carried forward into this Plan Update.

Invasive Species Removal in Canals

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing, but is not being carried forward in this Plan Update.

Sacramento River West Side Levee District Actions

Climate Change, Flood, Localized Flood, Dam Failure, Levee Failure, Heavy Rains and Storms, High Winds, Stream Bank Erosion Actions

Seepage Mitigation of Sacramento River Levee

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing and is included in the LHMP Update.

Hardening of Sacramento River Levee

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?): This project is ongoing and is included in the LHMP Update.

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.

Colusa County, as the project lead, and the other participating jurisdictions to this 2024 Colusa County LHMP Update, recognized the need for and importance of the update process for their 2018 LHMP and initiated its development. After securing funding for this LHMP Update, Colusa 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

Colusa County and the other participating jurisdictions made a commitment to this 2024 Colusa 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 Colusa 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 Colusa 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 provides 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 the Colusa 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 19, 2023. 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 2024 Colusa 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 2024 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 Colusa County's, 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 2024 LHMP Update.

The initial project kick-off meeting was held on December 13, 2023. 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 Colusa County Hazard Mitigation Planning Committee

Agency	Name
Participating Jurisdictions and Agencies	
Colusa County Ag Commissioner	Anastacia Allen
Dir., Colusa County Planning & Building	Greg Plucker
Colusa Fire Chief	Logan Conley
Asst. Colusa County DHHS	Abigale Henderson
Colusa County Sheriff's Office	Jackie Olivares
Colusa County Sheriff's Office	Kris Cooper
Colusa County Sheriff's Office	Mike Bradwell
Colusa County Planning	Steve Geiger
Colusa DHHS	Ted Mamoulelis
Colusa	Amilcar Avendaño
City of Williams Administrator,	Frank Kennedy
City of Williams Public Works	Colt Esenwein

Agency	Name
City of Williams Planning	Tracy Byee
Reclamation District 108	Meegan Nagy, Program Manager
Reclamation District 479	Derick Strain
Colusa County Board of Supervisors	Janice Bell, District 5
Williams Police Department	Chris Miller
Kletsel Dehe Wintun	Kelly Baucom
RD108/Sac River West Side Dist.	Elizabeth Ramos
Colusa Med Center	Rhonda Anderson
Cortina Community Service District	Karl Drexel
City of Williams	Katheryn Ramsaur
RD 108	Brenna Howell
Sacramento River Westside Levee District	Brenna Howell
City of Colusa Planning	Mark Tomey
Colusa County RCD	Margot Flynn?
Sacramento River Fire	Patrick Trotter
Colusa County Board	Victor Zarate
Colusa PD	Sara Martin
Colusa County Planning	Alison Cunningham
Colusa Co DHHS	Stacy Woods
RD 479	Sadie Strain
Colusa County RCD	Eduardo Blancos-Alcontara
Colusa Co DHHS	Ricky Carmona
Cal Fire Battalion Chief	Trevyn Close
Colusa County Ag Dept	Mike Bowles
Colusa County Water District	Shelly Murphy
Colusa County DHHS	Sofia Becerra
Colusa County Public Works	Brian Mickelson
Colusa County RCD	Ben King
Emergency Management Agencies	
Cal OES	Kyle Noderer
Other Agencies/Districts	
Cal Fire	Miguel Watson
Resource Conservation Districts	Liz Harper
PG&E	Mike Weber
CHP	Joe Monsingi
Arbuckle Park & Rec	Mary Grimmer

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 9 separate meetings) on the same Plan development element(s), which for this Plan would have resulted in 45 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 small rural nature of Colusa County, the two cities, and participating special districts was best suited for a common plan development process.
- Common group of stakeholders to all participating jurisdictions necessitated a common plan development process.
- Many 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 Colusa County Planning Area as a whole by promoting a comprehensive and regional approach to mitigation.

Additionally, Colusa County, as the project lead, has been developing successful multi-jurisdictional LHMPs and LHMP Updates for nearly 20 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 held on December 13, 2023, 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 2024 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 Colusa County LHMP website (as shown on Figure 3-1) can be accessed online at: https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan.

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

Source: Colusa County

The HMPC met formally five times during the planning period (December 2023 – August 2024) 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 Colusa County Internal and HMPC Meetings

Meeting Type	Meeting Topic	Meeting Date	Meeting Location(s)
Colusa 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	November 7, 2023	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	December 13, 2023	Colusa County Sheriff's Office, Training Room Colusa, CA
Colusa County Internal Risk Assessment Meeting	1) Risk Assessment Worksheet review and input 2) Review of other project data needs	February 15, 2024	Virtual Zoom Meeting
HMPC #2	1) Risk assessment overview and work session -CRS Step 4: Assess the Hazard -CRS Step 5: Assess the Problem	March 27, 2024	Colusa County Sheriff's Office, Training Room Colusa, CA
HMPC #3	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	April 24, 2024	Colusa County Sheriff's Office, Training Room Colusa, CA
HMPC #4	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	April 25, 2024	Colusa County Sheriff's Office, Training Room Colusa, CA
HMPC #5	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	August 15, 2024	Colusa County Sheriff's Office, Training Room Colusa, CA

Planning Step 2: Involve the Public

Public stakeholders are generally defined as any stakeholders not attached to local government in the Colusa County Planning Area. Up-front coordination discussions with Colusa 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 2024 LHMP webpage and outreach on the LHMP development process through a variety of mechanisms as described below:

- Development of a Colusa County 2024 LHMP Update webpage
- Posting of LHMP Public Information Flyer at County Post Offices in Grimes, Arbuckle, Williams, Maxwell, Princton, Colusa, Stonyford
- Posting of LHMP Public Information Flyer at County Libraries in Grimes, Arbuckle, Williams, Maxwell, Princton, Colusa, Stonyford
- Outreach on Colusa County social media sites: Facebook and Instagram
- Outreach on Colusa County Sheriff's social media sites: Facebook and Instagram
- Outreach via an early public meeting press release
- Outreach on the Colusa County Sun Herald Electronic Publication
- Outreach on the Colusa County Pioneer Review Publication Print Edition

The purpose of this outreach was to inform the public and other stakeholders of the Colusa County LHMP Update project, how they could get involved, and how to provide comments on the draft LHMP prior to submittal to Cal OES/FEMA. 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.

Public Meetings

Three public meetings were planned for this LHMP Update project, during key times of the LHMP development process:

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 to inform the public of the purpose of the DMA and the hazard mitigation planning process for Colusa 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 Sun Herald news article that was published as a result of this press release.

Figure 3-2 Public Invitation News Article

Source: Colusa County

Public Meeting #2: Underserved and Vulnerable Populations - On the Draft LHMP

The first draft of the LHMP Update was provided to the HMPC in June 2024, with a public review draft provided in July 2024. A public meeting for the LHMP Update, developed in conjunction with the Colusa County, Department of Health and Human Services (DHHS), focused on soliciting feedback on the LHMP Public Review Draft from local and regional providers serving vulnerable and underserved populations in Colusa County. This meeting was held in the afternoon of August 14, 2024, to present the draft LHMP and to collect public comments on the public review draft prior to finalization and submittal to Cal OES/FEMA. This focused public meeting utilized direct emails to invite attendees and was also advertised on the Colusa County LHMP webpage to the public at large.

Public Meeting #3: On the Draft LHMP

The first draft of the LHMP Update was provided to the HMPC in June 2024, with a public review draft provided in July 2024. A public meeting was held on the evening of August 14, 2024, 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 an advertisement in 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 Colusa County LHMP website in advance of these meetings, hard copies of the draft Plan were made available at various public locations in the Colusa County Planning Area. 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 Colusa County Planning Area. The majority of these people reside in the Colusa 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 Colusa County and all participating jurisdictions to this 2024 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
- Website additions announcing the final HMPC and Public meetings and how to provide comments on the Draft LHMP
- Posting of LHMP Public Information Flyer at County Post Offices in Colusa, Grimes, Arbuckle, and Maxwell
- Posting of LHMP Public Information Flyer at the following County locations: Colusa County Clerk and Recorder; Ace Hardware, Arbuckle; City of Williams, Finance and Utility Department; and the Maxwell Bulletin Board (outside the local post office)
- Posting of LHMP Public Information Flyer at several community events: National Night Out, Williams (86/2024), Ampla Health Event, Arbuckle (8/5/2024), and Ampla Health Event, Colusa (8/7/2024)
- Outreach on the Colusa County Pioneer Review Publication Print Edition – 2 dates (8/2/2024 and 8/7/2024)

The formal 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	1) Intro to DMA, CRS and mitigation planning 2) 2024 LHMP Update Process	December 13, 2023	Veterans Hall Colusa, CA
Public Meeting #2 of the Draft LHMP: Providers Serving Underserved and Vulnerable Populations	1) Presentation of Draft LHMP and solicitation of public and stakeholder comments	August 144, 2024	Colusa Main Library Colusa, CA Hybrid Meeting Format
Final Public Meeting #3 on the Draft LHMP	1) Presentation of Draft LHMP and solicitation of public and stakeholder comments	August 14, 2024	Williams Elementary School Williams, CA

Where appropriate, stakeholder and public comments and recommendations were incorporated into the final LHMP throughout the Plan development process, including the sections that address the risk assessment and mitigation goals and strategies. Public comments were obtained throughout the planning process and prior to LHMP submittal to Cal OES and FEMA. No public comments were received as part of the 2024 LHMP Update project. 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 Colusa County website at: https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan.

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 Colusa 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:

- American Red Cross
- Arbuckle Park & Rec
- Arbuckle Cemetery
- Cal DWR
- CAL FIRE
- Cal OES
- Cal Trans
- California Department of Education
- California Department of Fish and Wildlife
- California Native Plant Society
- City of Colusa
- City of Williams
- Colusa Med Center
- Cortina Community Service District
- Federal Emergency Management Agency, Region IX
- Kletsel Dehe Wintun
- National Weather Service
- PG&E
- Reclamation District 108
- Reclamation District 479
- Reclamation District 1004
- Reclamation District 2047
- U.S Bureau of Reclamation
- U.S. Geological Survey
- U.S. Army Corps of Engineers
- United States Forest Service

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 Colusa 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 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 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 and 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 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. Colusa 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 – Colusa 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 f 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 2023 LHMP guidance, the LHMP development process should utilize the Whole Community approach to hazard mitigation planning. Engagement and coordination with a variety of community-based organizations that work directly with or provide support to underserved communities and socially vulnerable populations, including individuals with disabilities and access and functional needs, is a critical component 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. Given the small, rural nature of Colusa County, some of the more standard agencies supporting these underserved and vulnerable populations groups were not present at the city or county level. In a few instances, regional agencies that supported Colusa County were identified. But for the most part, support for these groups fell to applicable local government agencies, primarily the County. Thus, reaching out to the County departments providing these types of services was the most effective approach to meeting this element. The Colusa County DHHS further assisted with efforts to reach out to vulnerable and underserved populations in the community, including coordination of a final public meeting on the Draft Plan focused on providers serving vulnerable populations as previously described.

As part of the planning process, efforts made to identify and engage these groups in the Colusa County 2024 LHMP Update project included the following:

- **Listos California** – Anchored at the Governor's Office of Emergency Services (Cal OES) since 2019, Listos California engages a statewide network of community-based organizations, Tribal Governments, and Community Emergency Response Teams across the state to boost resiliency, provide accessible in-language information and advance a new culture of disaster preparedness. The managing director of Listos indicated that they are not allowed to give out any local names/subgrantees to anyone and to look at their website to see a list of participating groups.
- **California Independent Living Resources** – In collaboration with the State Network of Independent Living Centers (ILCs) and the State Designated Entity (California Department of Rehabilitation), the California State Independent Living Council (SILC) prepares a State Plan for Independent Living which sets the policy and funding levels for the state's network of ILCs and services. Independent Living Resources' main goal is to incorporate those with disabilities into the community- eliminating all institutional, social, and attitudinal barriers that hinder progress. In addition, most centers include services to assist with disaster planning and preparedness for those with disabilities and access and functional needs. While most Counties are served by these ILCs, as part of the LHMP outreach efforts, it was determined that Colusa County was not affiliated with any ILC.
- **Alta California Regional Center** - Alta California Regional Center (ACRC), located in Sacramento, is part of a service delivery system established by the Lanterman Act that works in partnership with clients and their families, vendors who provide services, advocacy groups and state and federal agencies. The goal of regional center services is to provide quality services and supports that address an individuals' unique strengths and needs and enable them to live independent, productive and satisfying lives as active members of their community. As part of the Colusa LHMP Update,

representatives from ACRC were invited to provide input into the Plan development process, and comment on the Plan drafts. Direct invites were also sent to several staff inviting them to the Public Meeting on the Draft Plan focused on Providers Serving Vulnerable Populations.

- **Regional Housing Authority** – The regional housing authority (RHA) serves Yuba, Sutter, Colusa, and Nevada counties. The mission of the RHA is to enhance communities by creating and sustaining decent, safe and affordable living environments that foster stability and increase self-sufficiency for people with lower incomes. Many of the older adults and community members with functional needs that live in Colusa County are housed in subsidized housing units that the RHA manages. As part of the Colusa LHMP Update, RHA representatives were invited to provide input into the Plan development process, and comment on the Plan drafts.
- **Colusa Medical Center** – The Colusa Medical Center (CMC) has a long history of serving the health care needs of the people of Colusa County, California, and surrounding areas. From its beginnings in January of 1877 as a small, rural medical facility, CMC has grown to become a vital regional medical center, providing a level of service found only in the best rural community hospitals in the country. As part of the LHMP Update, representatives of the CDM were invited to participate in the LHMP process and review and provide comments on the Public Review Draft LHMP.
- **Tri-County Community Action Partnership** – The Tri-County Community Action Partnership (TCCAP) Cal AIM/LICN is an agency whose mission is: Empowering community members to reach their highest level of wellness and prosperity through partnership, advocacy and education. As part of the LHMP Update, representatives of TCCAP were invited to participate in the LHMP process and review and provide comments on the Public Review Draft LHMP.
- **Karen's House DV Center** – Karen's House, a non-profit organization, has been committed to building the first domestic violence program for Colusa County and advocating on behalf of domestic violence victims and their children since 2018. As part of the LHMP Update, representatives of Karen's House were invited to participate in the LHMP process and review and provide comments on the Public Review Draft LHMP.
- **Red Cross** –The California Gold Country Region of Red Cross serves more than 3.7 million people across 26 counties. The Northern California Chapter includes Del Norte, Siskiyou, Modoc, Humboldt, Trinity, Shasta, Lassen, Tehama, Plumas, Butte, Glenn, Mendocino, Lake and Colusa counties. As part of the LHMP Update, Red Cross representatives were invited to participate in the LHMP process and review and provide comments on the Public Review Draft LHMP.
- **Ministerial Association/Pneumacare** – The Ministerial Association of Colusa County is an association of 21 churches and parishes, along with their ministers, that coordinates charitable endeavors, extends Christian benevolence, and advocates for affiliated ministries and mission partners throughout Colusa County. As part of the LHMP Update, Ministerial Association representatives were invited to participate in the LHMP process and review and provide comments on the Public Review Draft LHMP.
- **Safe Haven Adult Center** – The Safe Haven Adult Center is a peer supported drop-in center that serves adults and older adults who are in recovery from substance use, dealing with mental health issues, and or avoiding isolation. The center provides a number of recovery and resiliency focused groups run by peers and Behavioral Health staff. A peer support specialist is funded to provide support in linking members to other services in the community through collaboration and outreach events, which allow for increased awareness around mental health and reduce stigma and discrimination in the community. As part of the LHMP Update, Safe Haven representatives were invited to participate in the LHMP process and review and provide comments on the Public Review Draft LHMP.

- **Colusa County Migrant Housing** – California's Office of Migrant Services operates 24 migrant housing centers that are scattered throughout the state and open during peak harvest season. The Williams Migrant Center is among the three largest in the state, operating 100 units and serving as many families. The Williams migrant housing community was constructed in 1999 to replace a then 30-year-old aging facility. While the Migrant Center is a state-owned facility, Colusa County owns the land and manages the community under an annually renewed contractual agreement going back to the 1960s. As part of the LHMP Update, Williams Migrant Center representatives were invited to participate in the LHMP process and review and provide comments on the Public Review Draft LHMP.
- **Colusa County Health and Human Service** –The mission of Colusa County's Department of Health and Human Services (DHHS) is to provide Colusa County residents with services to improve their health, promote their well being, and help them become productive and independent contributors to the community. As part of the Colusa County LHMP Update, representatives from the DHHS were invited to be on the HMPC and provide input into the Plan development process. Numerous (6) DHHS representatives, with varying roles and responsibilities, participated on the HMPC and provided input into the LHMP Update, including input on mitigation actions. Colusa County DHHS includes the following Divisions and Programs:

  - ✓ **Public Assistance Division -** Responsible for determining eligibility and providing assistance for CalWORKs, CalFresh (formerly Food Stamps), Health Care, General Assistance, Refugee and Immigrant Programs and Homeless Programs. This Division is also responsible for securing grant funding to support housing for Colusa County residents.
  - ✓ **Social Services Division –** Responsible for overseeing child and adult protective services as well as public guardians. This Division also coordinates in home supportive services.
  - ✓ **Public Health Division –** The mission of the Public Health Division is to protect and promote the health of all Colusa County residents. This includes administering services under California Children's Services that is a state/county program caring for children with special medical needs, such as those with certain diseases physical limitations, or chronic health problems; senior nutrition services; car seat check up; tobacco education; and an oral health program.
  - ✓ **People Services and Community Resources –** This program maintains a list of services and resources to serve a wide range of underserved and vulnerable populations to both residents and visitors.
  - ✓ **Veteran Services -** The CVSO is a county department established by the Board of Supervisors to assist veterans, their dependents and survivors with obtaining entitlements from the federal, state and local agencies administering programs for veterans.
  - ✓ **Fraud Division -** The Colusa County DHHS and the Colusa County District Attorney's Office have made a collaborative effort to help deter fraud, and to prosecute fraud related cases for Colusa County public assistance programs such as CalFresh, CalWORKs, General Assistance, In Home Support Services (IHSS), and Medi-Cal.

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 Colusa 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 Colusa 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 the Colusa County and each participating jurisdictions' current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing County/City/District 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 2024 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. However, it should be noted that this applies only to eligible NFIP communities. Participating special districts to this LHMP Update do not address their compliance with the NFIP as they are not eligible jurisdictions for purposes of the NFIP. While Tribal governments are eligible for participation in the NFIP, very few actually participate. The Kletsel Dehe Winton Nation, as a Tribal government participating in this LHMP Update, does not have any identified flood-prone areas, and thus does not participate in the NFIP.

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, all of 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 Colusa 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 Colusa County Planning Area and is addressed further in Chapter 7.

Implementation and Maintenance Process: 2018 Colusa 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, no formal process was followed for annual reviews. This 2024 LHMP Update, once approved and adopted, will meet the DMA formal 5-year update requirement for all participating jurisdictions.

In addition, the 2018 LHMP was relied on and integrated into other planning mechanisms in the Colusa County Planning Area. Table 3-5 lists the planning mechanism the 2018 LHMP Update was integrated into by unincorporated Colusa 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 Colusa County Incorporation of 2018 Colusa County LHMP into Other Planning Mechanisms

Planning Mechanism 2018 LHMP Was Incorporated or Implemented Through	Details
Safety Element of the General Plan	In accordance with AB 2140, the 2018 LHMP Update was incorporated by reference via County Board of Supervisor's adoption resolution.

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 Colusa County 2024

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 to a four-step process:

1. Identify Hazards;
2. Profile Hazard Events;
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: Natural Hazards** identifies the natural hazards that threaten the Colusa County Planning Area and unincorporated Colusa County and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Colusa County Planning Area Assets Inventory and Growth and Development Trends** identifies the populations; structures and values; critical facilities and community lifelines; and cultural, historical, and natural resources; and economic and community activities of value. It also identifies past growth in the Colusa County Planning Area and reviews future development trends. This information is not hazard specific and covers the entire Colusa County Planning Area and unincorporated Colusa 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 Colusa County Planning Area and unincorporated Colusa County. The hazard profile also describes previous occurrences of hazard events and the likelihood of future occurrences. The vulnerability assessment evaluates the Colusa 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 Colusa County Planning Area and unincorporated Colusa 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 Colusa County (i.e., the Colusa County Planning Area) and unincorporated Colusa County. And as required by FEMA, this risk assessment for the Colusa 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 risk assessment. 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 Colusa 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:

- National Climatic Data Center Storm Events Database
- 2018 Colusa County Hazard Mitigation Plan
- 2012 Colusa County General Plan
- 2023 State of California Hazard Mitigation Plan
- FEMA Disaster Declaration Database
- 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 Colusa County Planning Area. Hazards data from the California Office of Emergency Services (Cal OES), FEMA, California Department of Water Resources, 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 LHMP Update. As a starting point, the 2018 Colusa 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 Colusa 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 hazardous materials and volcano. No new hazards were added.

Table 4-1 Colusa County Hazard Identification and Comparison between 2018 and 2024 LHMP

2024 Hazards	2018 Hazards	Comment
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Ag Hazards: Severe Weather/Insect Pests	This hazard was kept and slightly renamed.
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	Earthquake (minor/major)	This hazard was kept and slightly renamed.
Floods: 1%/0.2% annual chance	Flood: 100/500-year	This hazard was kept and slightly renamed.
Floods: Localized Stormwater	Flood: Localized/Stormwater	This hazard was kept.
–	Hazardous Materials Transportation	This hazard was dropped. It is covered in other County planning mechanisms.
Landslide, Mudslide, and Debris Flow	Landslide, Mudslide, and Debris Flows	This hazard was kept.
Levee Failure	Levee Failure	This hazard was kept.
Severe Weather: Extreme Cold and Freeze	Severe Weather: Extreme Cold and Freeze	This hazard was kept.
Severe Weather: Extreme Heat	Severe Weather: Extreme Heat	This hazard was kept.
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Severe Weather: Heavy Rains and Storms (winds, hail, lightning)	This hazard was kept.
Severe Weather: High Winds and Tornados	Severe Weather: High Winds/Tornadoes	This hazard was kept.
Stream Bank Erosion	Stream Bank Erosion	This hazard was kept.
Subsidence	Subsidence	This hazard was kept.
–	Volcano	This hazard was dropped due to the low chance of occurrence and limited mitigation actions the County can take.
Wildfire	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 Colusa County – Excluded Hazards

Hazard Excluded	Why Excluded
Avalanches	The County does not have sufficient snowfall to have avalanche as a hazard.
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.

Table 4-3 Colusa County Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Extensive	Highly Likely	Catastrophic	High	Medium
Climate Change	Extensive	Highly Likely	Limited	Medium	–
Dam Failure	Extensive	Occasional	Catastrophic	High	Medium
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake	Extensive	Unlikely	Critical	Medium	Low
Floods: 1%/0.2% annual chance	Extensive	Occasional/ Unlikely	Catastrophic	High	Medium
Floods: Localized Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, and Debris Flow	Limited	Likely	Limited	Medium	Medium
Levee Failure	Extensive	Occasional	Catastrophic	High	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: High Winds and Tornados	Extensive	Highly Likely / Occasional	Limited	Medium	Low
Stream Bank Erosion	Significant	Highly Likely	Limited	Medium	Medium
Subsidence	Limited	Likely	Limited	Medium	Low
Wildfire	Significant	Highly Likely	Critical	High	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 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 Colusa 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, Colusa 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 federal disasters shows 25 federal disaster declarations. Of these 25 federal declarations: 17 were associated with severe winter storms, heavy rains, or flooding; 2 were for freeze; 2 were from pandemic, 1 for drought; 1 for fire; 1 was for seismic sea wave (which was declared for the entire State of California); and 1 was for hurricane (a nationwide declaration for Katrina evacuations). A review of state declared disasters indicates that Colusa County received 32 state declarations between 1950 and 2024. Of the 31 state declarations: 19 were associated with severe winter storms, heavy rains, or flooding; 3 were for freeze and severe weather conditions; 3 were for drought; 2 were from economic disasters; 2 were from pandemic; 2 were for fire; and 1 was for road damage. A summary of these events by disaster type is shown in Table 4-5.

Table 4-4 Colusa County Federal and State Disaster Declarations, 1950-2024

Year	Disaster Name	Disaster Type	Disaster Cause	Federal Declaration # and Date	State Declaration # and Date
2023	California Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	DR-4683 1/14/2023	–
2023	California Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	EM-3591 1/9/2023	–
2021	2021 Drought	Drought	Drought	–	2022-05 4/21/2021
2020	California Covid 19 Pandemic	Biological	Pandemic	DR-4482 3/22/2020	2020-01 3/4/2020
2020	California Covid 19	Biological	Pandemic	EM-3428 3/13/2020	2020-01 3/4/2020
2019	California Severe Winter Storms, Flooding, Landslides, and Mudslides	Flood	Storms	DR-4434 5/17/2019	2019-03 5/18/2019
2019	California Severe Winter Storms, Flooding, Landslides, and Mudslides	Flood	Storms	DR-4431 5/1/2019	2019-02 5/1/2019
2018	Summer 2018 California Wildfires and High Winds	Fire	Fire	DR-4382 8/4/2018	2018-06 7/28/2018
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4308 4/1/2017	–
2017	February 2017 Storms	Severe Storms	Storms	–	2017-03 3/7/2017
2014	California Drought	Drought	Drought	–	GP 2014-13 1/17/2014
2008	2008 January Storms	Flood	Storms	–	GP-2008-1 1/5/2008
2005/2006	2005/06 Winter Storms	Flood	Storms	DR-1628 2/3/2006	GP 2006-01 1/12/2006
2005	Hurricane Katrina Evacuations	Economic	Hurricane	EM-3248 9/13/2005	–
2003	State Road Damage	Road Damage	Flood	–	GP 2003 1/1/2003

Year	Disaster Name	Disaster Type	Disaster Cause	Federal Declaration # and Date	State Declaration # and Date
2001	Energy Emergency	Economic	Greed	–	GP 2001 1/1/2001
1998	1998 El Nino Floods	Flood	Storms	DR-1203 2/19/1998	98-01 Proclaimed
1997	1997 January Floods	Flood	Storms	DR-1155 1/4/1997	97-01 1/2/97-1/31/97
1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	Flood	Storms	DR-1046 3/12/1995	Proclaimed
1995	1995 Severe Winter Storms	Flood	Storms	DR-1044 1/13/1995	1/6/95-3/14/95
1990	1990 Freeze	Freeze	Freeze	DR-894 2/11/1991	12/19/90
1987	1987 Fires	Fire	Fire	–	GP 9/10/87, 9/3/87
1986	1986 Storms	Flood	Storms	DR-758 2/18/1986	86-01 2/18-86-3/12/86
1983	Winter Storms	Flood	Flood	DR-677 2/9/1983	82-18 12/8/82-3/21/83
1979	Gasoline Shortage	Economic	OPEC	–	5/8/1979-11/13/79
1978	Heavy Rains	Flood	Storms	–	DC 78-06-11 2/13/1978
1977	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
1973	1973 Storms and Floods	Flood	Storms	–	2/28/1973
1972	1972 Freeze	Freeze	Freeze	–	7/13/1972
1970	1970 Northern California Flooding	Flood	Flood	DR 283 2/16/1970	1/27/1970 - 3/2/1970
1964/1965	Seismic Sea Wave	Other	Other	DR-169 4/1/1964	–
1964	1964 Late Winter Storms	Flood	Storms	DR-183 12/24/1964	–
1963	Severe Storms and Flooding	Flood	Storms	DR-138 10/24/1962	–

Year	Disaster Name	Disaster Type	Disaster Cause	Federal Declaration # and Date	State Declaration # and Date
1963	1963 Floods and Rains	Flood	Storms	DR-145 2/25/63	2/7/63, 2/26/63, 2/29/63, & 4/22/63
1963	1963 Floods	Flood	Storms	–	2/14/1964
1958	1958 April Storms and Floods	Flood	Storms	DR-82 4/4/1958	4/5/1958
1958	1958 February Storms and Floods	Flood	Storms	–	CDO 58-03 2/26/1958
1955	1955 Floods	Flood	Flood	DR-47 12/23/1955	12/22/1955
1950	1950 Floods	Flood	Flood	–	OCD 50-01 11/21/1950

Source: Cal OES, FEMA

Table 4-5 Colusa County – Federal and State Disaster Declarations Summary 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Drought	1	1977	3	1976, 2014, 2021
Economic	0	–	2	1979, 2001
Fire	1	2018	2	1987, 2018
Flood (including heavy rain and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)
Freeze	2	1972, 1990	3	1970, 1972, 1990
Hurricane	1	2005	0	–
Pandemic	2	2020 (twice)	2	2020 (twice)
Road Damage	0	–	1	2003
Seismic Sea Wave	1	1964/1965	0	–
Totals	**25**	–	**32**	**–**

Source: Cal OES, FEMA

Colusa County Disasters since 2018 LHMP

- 2019 Floods (two federal and two state)
- 2020 Pandemic (two federal and two state)
- 2021 Drought (state)
- 2023 Floods (including heavy rain and storms) (two federal)

4.1.3. EOC Activations

The County maintains a list of EOC activations by hazard. EOC activations from 2008 to 2024 are shown in Table 4-6.

Table 4-6 Colusa County – EOC Activations Summary 2008-2024

Disaster Type	EOC Activations	
	Count	Date
Drought	3	6/2015; 10/2017, 1/2019
Flood and Storms	6	1/2008; 1/2010, 3/2011; 11/2012; 2/2017, 1/2019
Hazardous Materials	3	3/2008; 8/2008; 5/2009
Pandemic	1	3/2020
Subsidence	1	4/2014
Wildfire	3	8/2012, 7/2016, 8/2020, 6/2024
Winter Storm	2	1/2021, 1/2023
Totals	**19**	–

Source: Colusa County OES

4.2 Colusa County Asset Inventory and Growth and Development Trends

As a starting point for analyzing the Colusa 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 Colusa 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 Colusa County Planning Area's and unincorporated Colusa 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 Colusa County Planning Area and unincorporated Colusa 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 Colusa County Planning Area with a focus on unincorporated Colusa County, both current and future, is presented.

Data Sources

- 2010 Colusa County General Plan Background Report
- 2020-2028 Colusa County Housing Element
- 2023 Colusa County Parcel/Assessor Data
- 2030 Colusa County General Plan Land Use Element
- CalAtlas

- California Department of Conservation
- California Department of Finance
- 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 Natural Diversity Database
- Center for Disease Control (CDC) Social Vulnerability Index
- Colusa County Building Department and Planning Department
- Colusa County GIS
- FEMA Community Disaster Resilience Zones
- FEMA National Risk Index
- Hazus-MH 6.1
- State of California Department of Conservation
- US Census Bureau

4.2.1. Assets Inventory

If a catastrophic disaster was to occur in the Colusa 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 Colusa 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 Colusa County (both incorporated communities and the unincorporated County) for January 1, 2024 was 21,171. Populations potentially at risk are described in the Table 4-7 based on California Department of Finance estimates. The most recent estimates are dated 1/1/2024, which are shown in the table below.

Table 4-7 Colusa County Planning Area – Populations

Jurisdiction	Population
Colusa	6,447
Williams	5,528

Jurisdiction	Population
Unincorporated Colusa County	9,768
Total	**21,743**

Source: Cal DOF E-1. 1/1/2024

Table 4-8 illustrates the pace of population growth in the Colusa County Planning Area dating back to 1940. The data on population and housing growth shows that Colusa County saw growth through 2010. The County has seen smaller population growth since 2010, with small losses in recent population. Details on population growth in the cities are included in their respective annexes to this Plan Update.

Table 4-8 Colusa County Planning Area – Population Growth 1940-2023

Year	Population	Percent Increase
1940	9,788	–
1950	11,651	19.0%
1960	12,075	3.6%
1970	12,430	2.9%
1980	12,791	2.9%
1990	16,275	27.2%
2000	18,804	15.5%
2010	21,419	13.9%
2020	21,839	2.0%
2024	21,743	-0.5%

Sources: 2022-2030 Colusa County Housing Element, California Department of Finance, US Census Bureau

Vulnerable and Underserved Populations

Vulnerable populations are those who may need additional help or accommodation during a hazard event. The vulnerable and underserved populations discussion for the Colusa County Planning Area is based on the following sources:

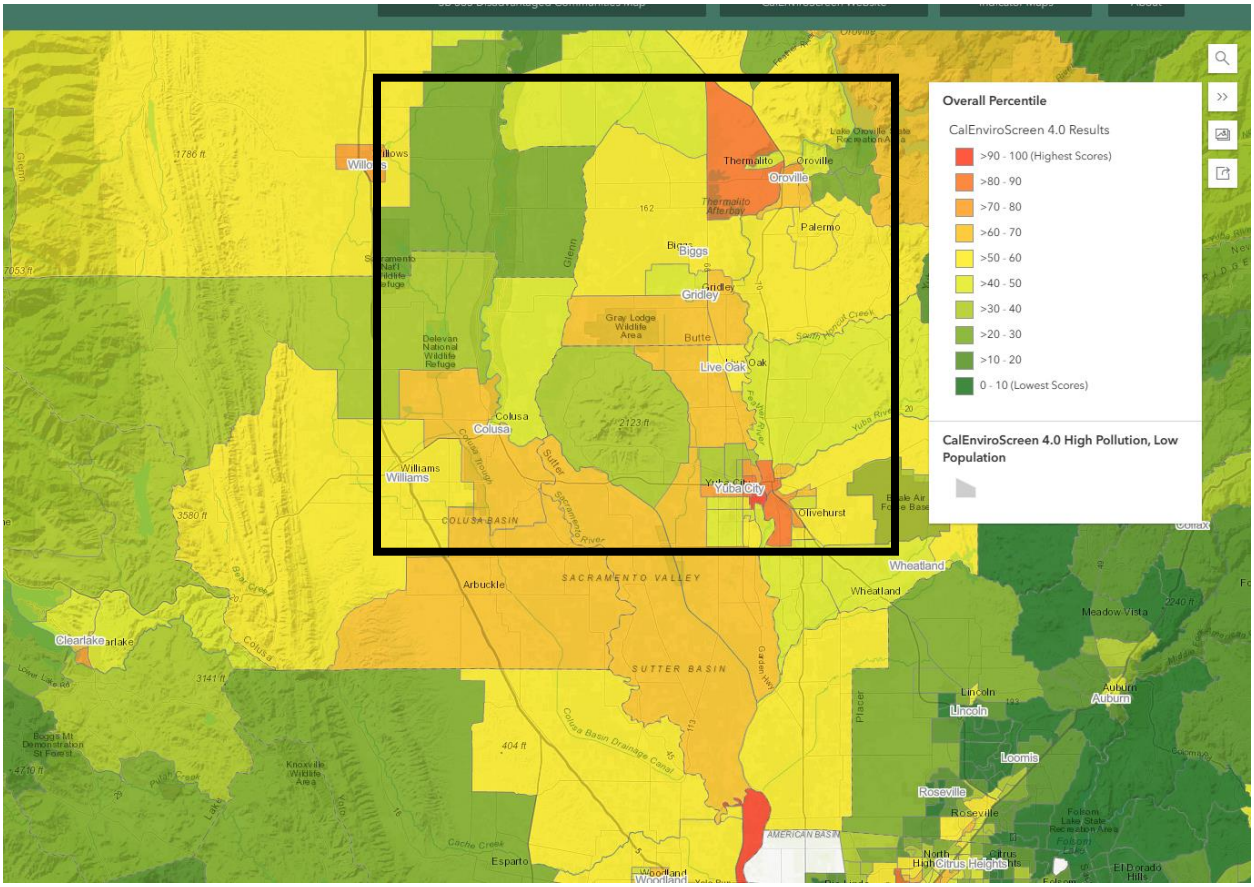
- California Environmental Protection Agency (Cal EPA) Disadvantaged Communities
- Center for Disease Control (CDC) Social Vulnerability Index
- California Department of Water Resources (CA DWR) Special Populations and Disadvantaged Community Mapping
- FEMA Community Disaster Resilience Zones
- FEMA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

Note: These sources below show information for the Colusa County Planning Area and unincorporated Colusa 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.

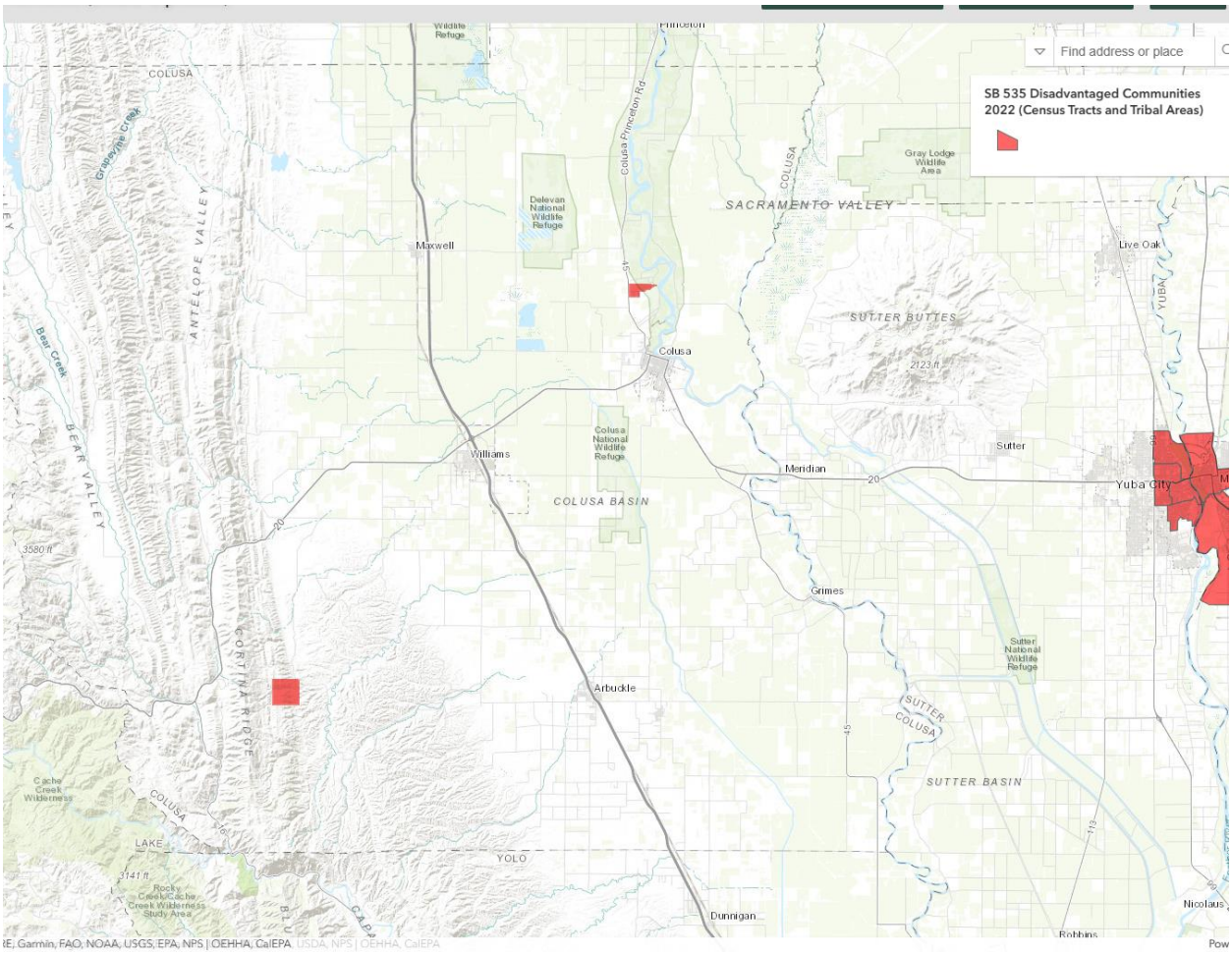
Figure 4-1 Colusa County Planning Area – Cal EPA Disadvantaged Communities



Source: Cal EPA, map retrieved 03/18/2024

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 a 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 Colusa County are shown on Figure 4-2.

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



Source: Cal EPA, map retrieved 03/18/2024

CDC Social Vulnerability Index

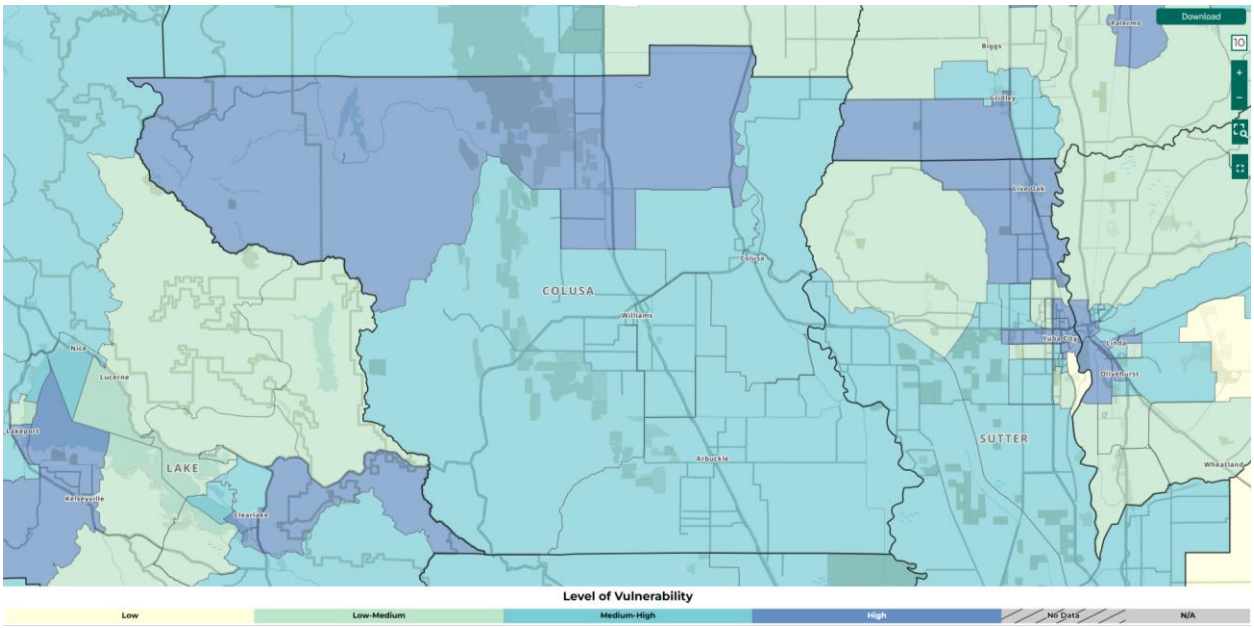
Every community must prepare for and respond to hazardous events, whether a natural disaster like a tornado or disease outbreak, or a human-made event such as a harmful chemical spill. A number of factors, including poverty, lack of access to transportation, and crowded housing may weaken a community's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

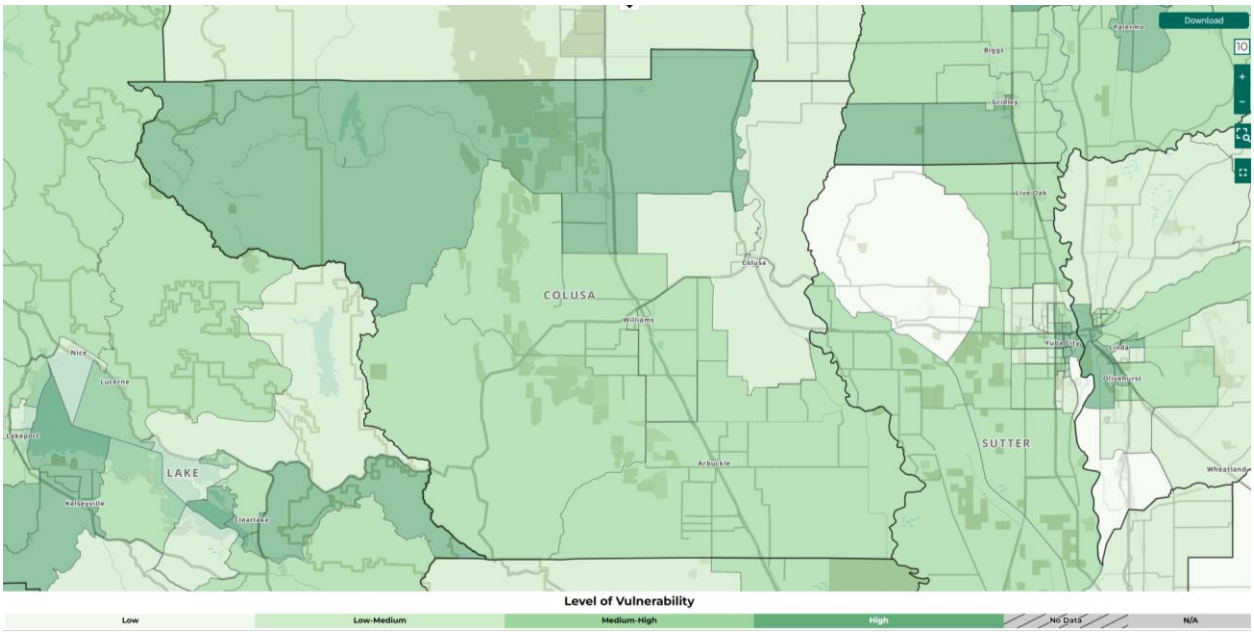
tract. Census tracts are subdivisions of counties for which the Census collects statistical data. The CDC SVI ranks each tract on 15 social factors, including poverty, lack of vehicle access, and crowded housing, and groups them into four related themes. Each tract receives a separate ranking for each of the four themes, as well as an overall ranking. Maps of the four themes are shown in the figure 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.

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



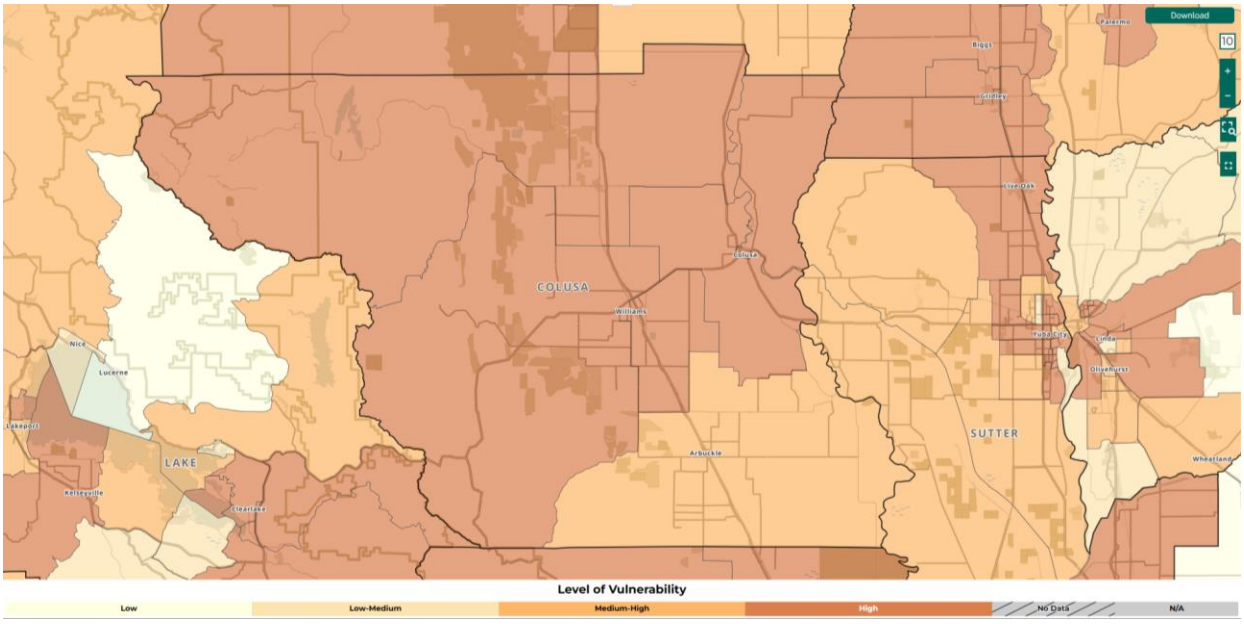
Source: CDC Social Vulnerability Index – map retrieved 3/14/2023
Level of Vulnerability Rating: **Yellow** – Low; **Green** – Low/Medium; **Aqua** – Medium/High; **Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

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



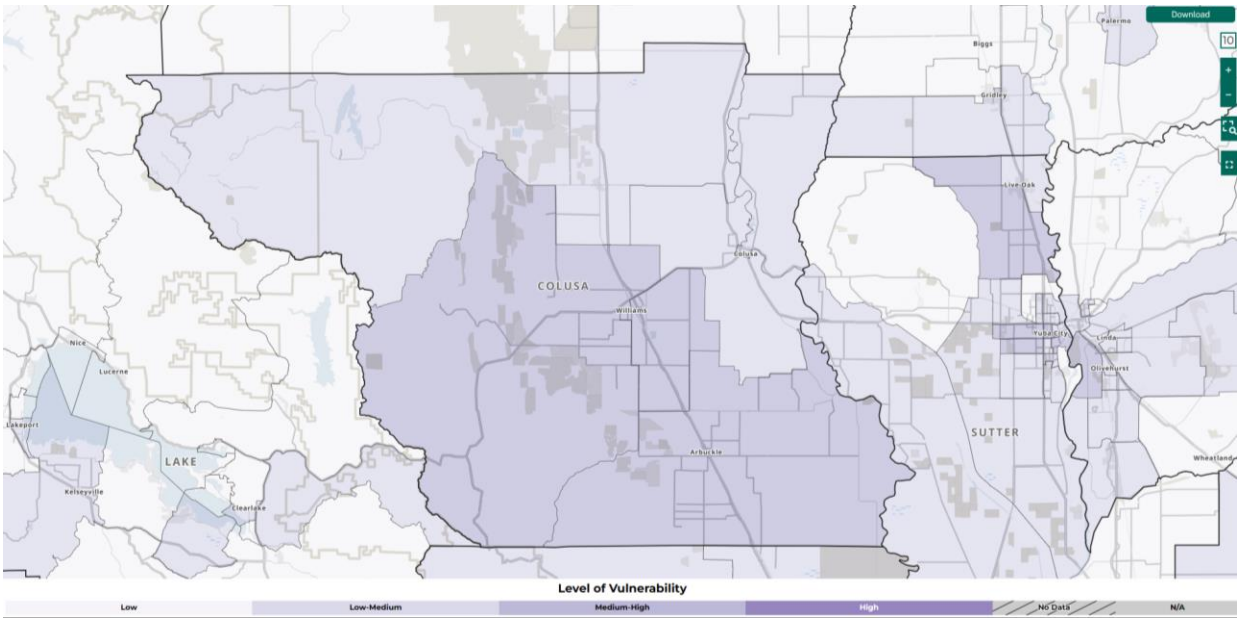
Source: CDC Social Vulnerability Index – map retrieved 3/14/2023
Level of Vulnerability Rating: **Faint Green** – Low; **Light Green** – Low/Medium; **Green** – Medium/High; **Dark Green** – High; **Grey Hatched** – No Data; **Grey** – Not Available

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



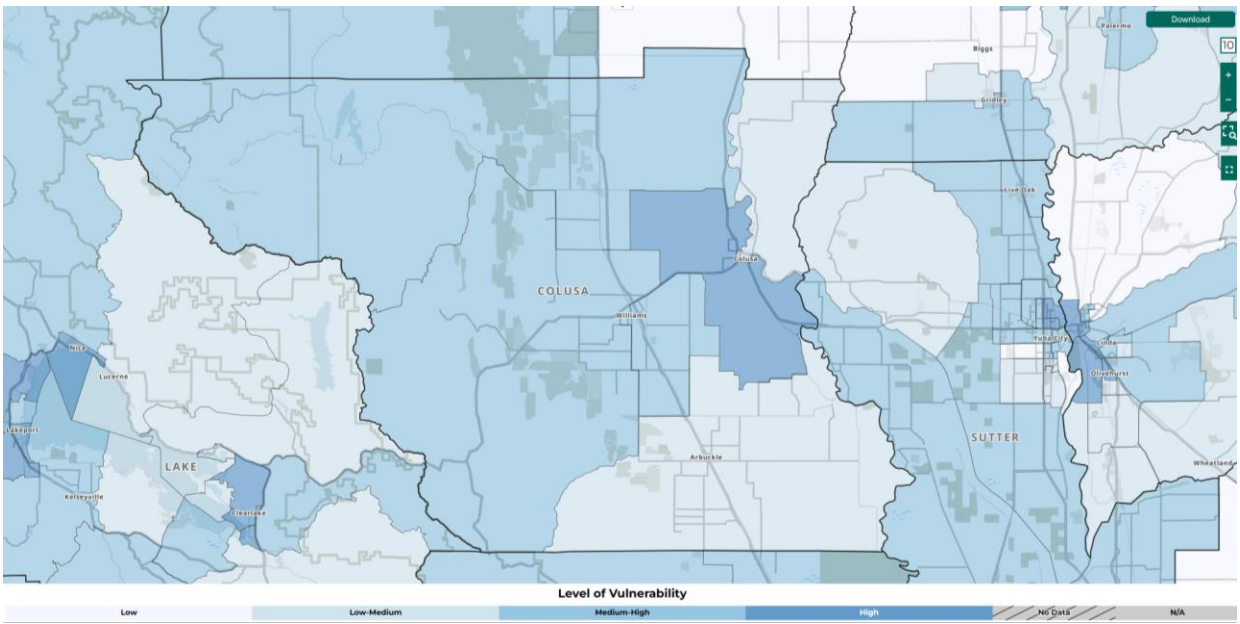
Source: CDC Social Vulnerability Index – map retrieved 3/14/2023
Level of Vulnerability Rating: **Faint Orange** – Low; **Light Orange**– Low/Medium; **Orange** – Medium/High; **Dark Orange** – High; **Grey Hatched** – No Data; **Grey** – Not Available

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



Source: CDC Social Vulnerability Index – map retrieved 3/14/2023
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 Colusa County Planning Area – Housing/Transportation Social Vulnerability

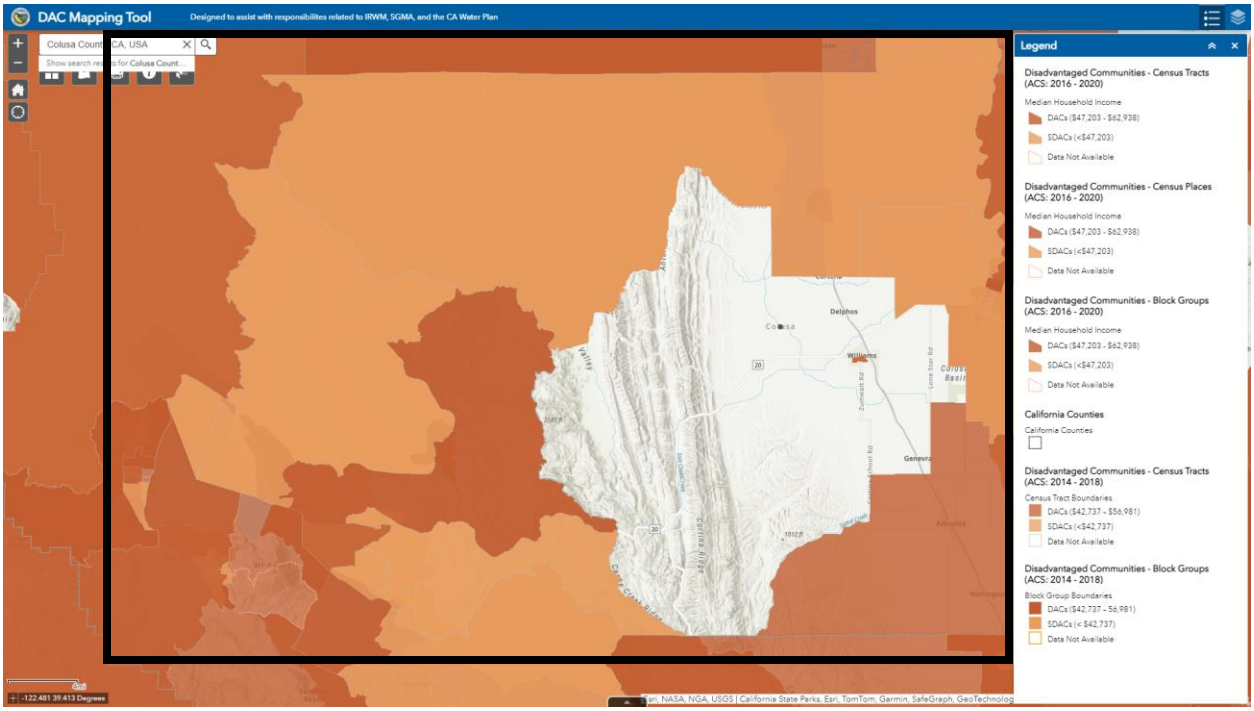


Source: CDC Social Vulnerability Index – map retrieved 3/14/2023
Level of Vulnerability Rating: **Faint Blue** – Low; **Light Blue** – Low/Medium; **Blue** – Medium/High; **Dark Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

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 Colusa County Planning Area – Disadvantaged Areas

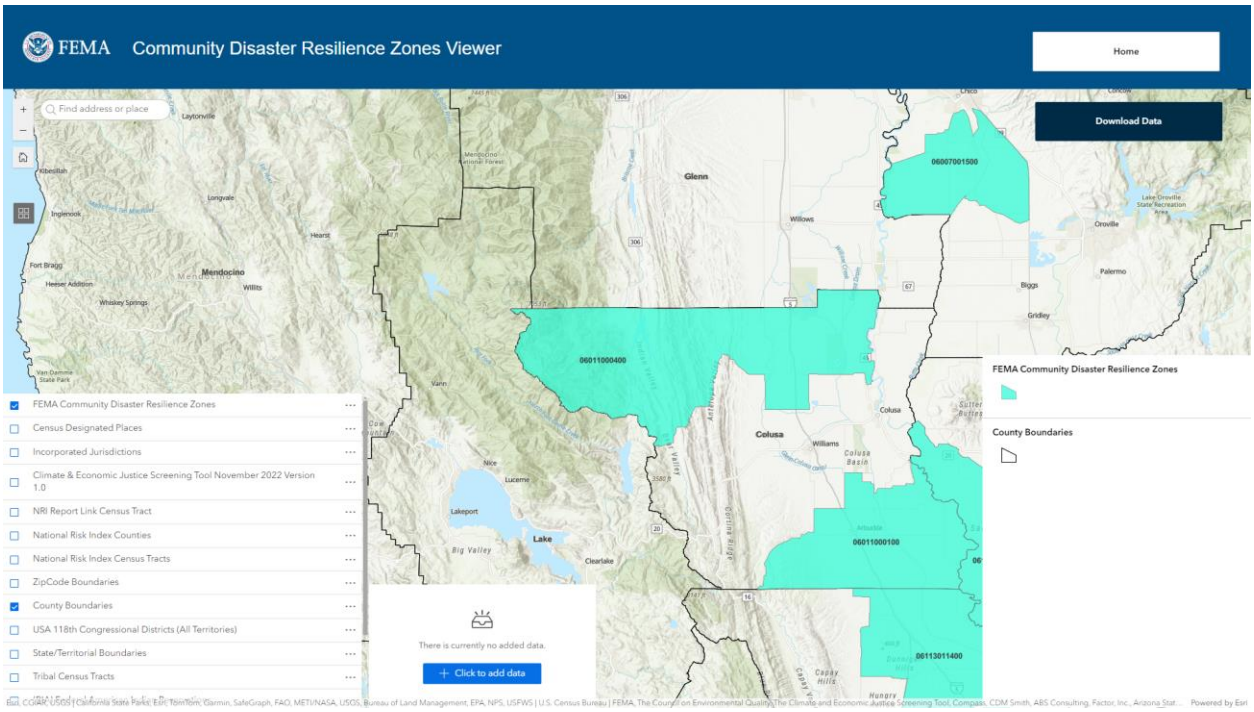


Source: Cal DWR DAC Mapping Tool – retrieved 3/14/2023

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 4-9 shows these zones in teal green.

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



Source: FEMA. Map retrieved 3/15/2024.

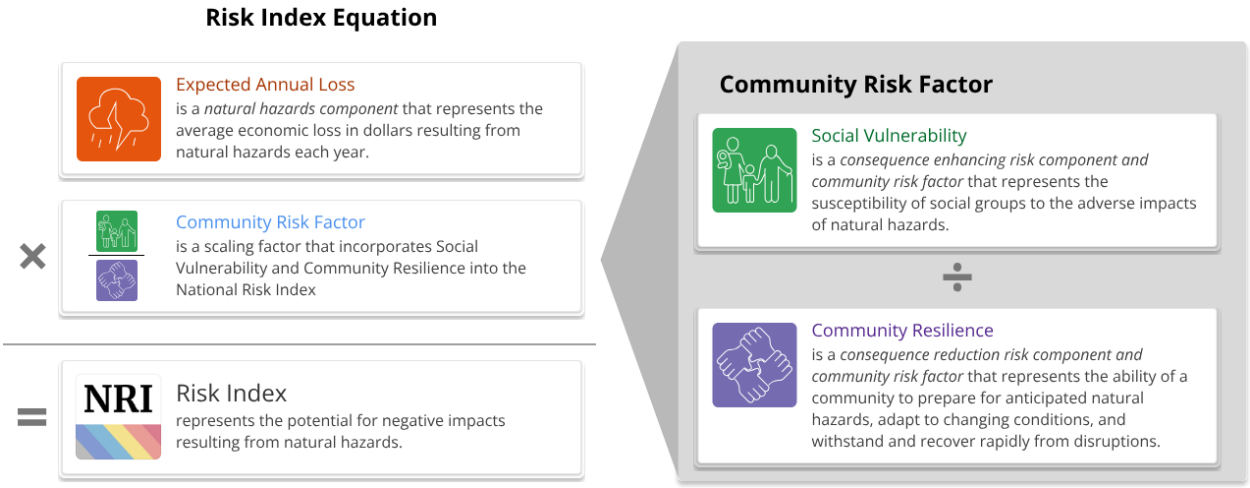
FEMA National Risk Index

Beginning in 2016, FEMA's Natural Hazards Risk Assessment Program (NHRAP) 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 National Risk Index 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



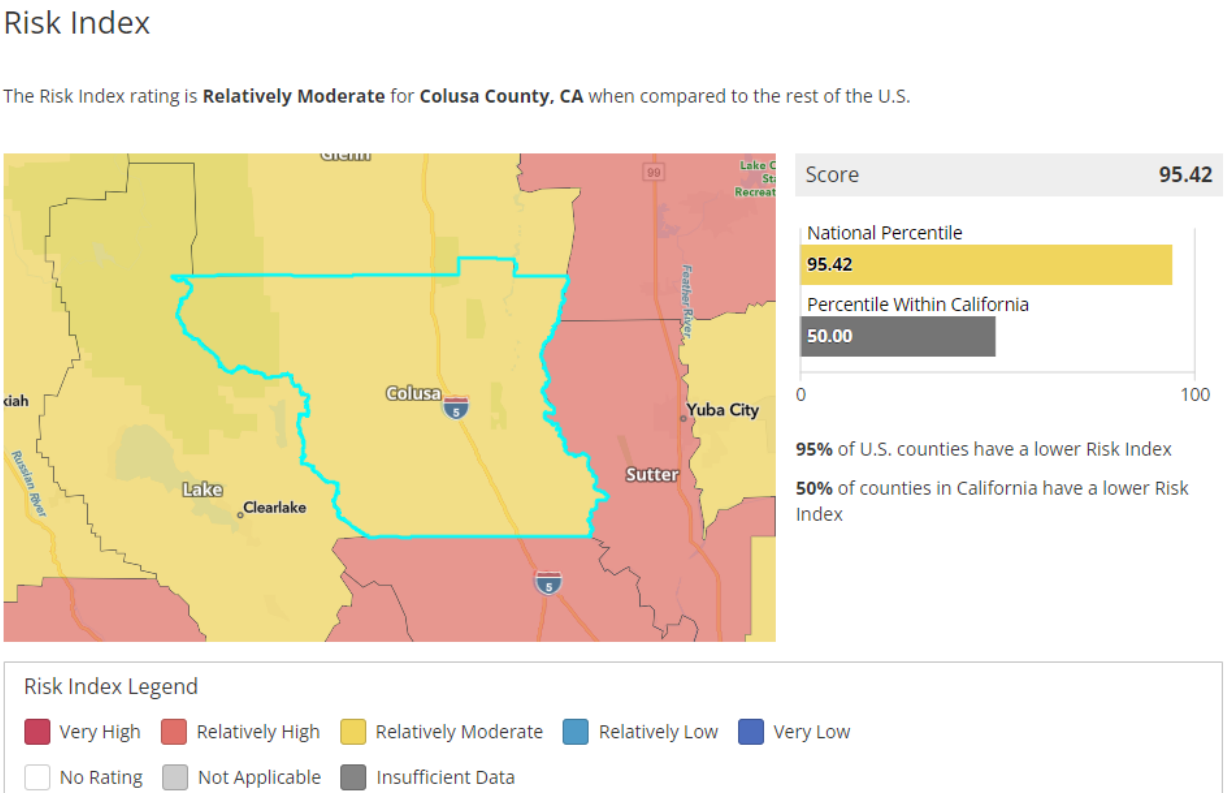
Source: FEMA National Risk Index

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

The Colusa County FEMA National Risk Index Report is included in its entirety in Appendix G.

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

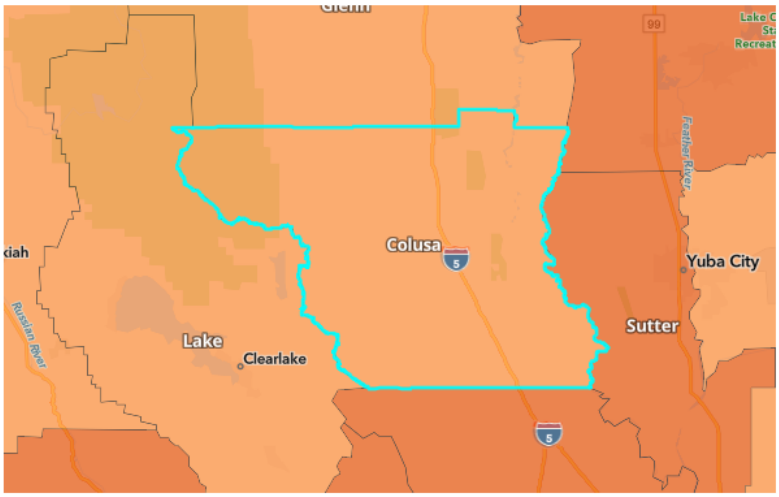


Source: FEMA National Risk Index, retrieved 3/26/2024.

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

Expected Annual Loss

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



Score **93.96**

National Percentile
93.96
Percentile Within California
46.60
0 100

94% of U.S. counties have a lower Expected Annual Loss

47% of counties in California have a lower Expected Annual Loss

Expected Annual Loss Legend

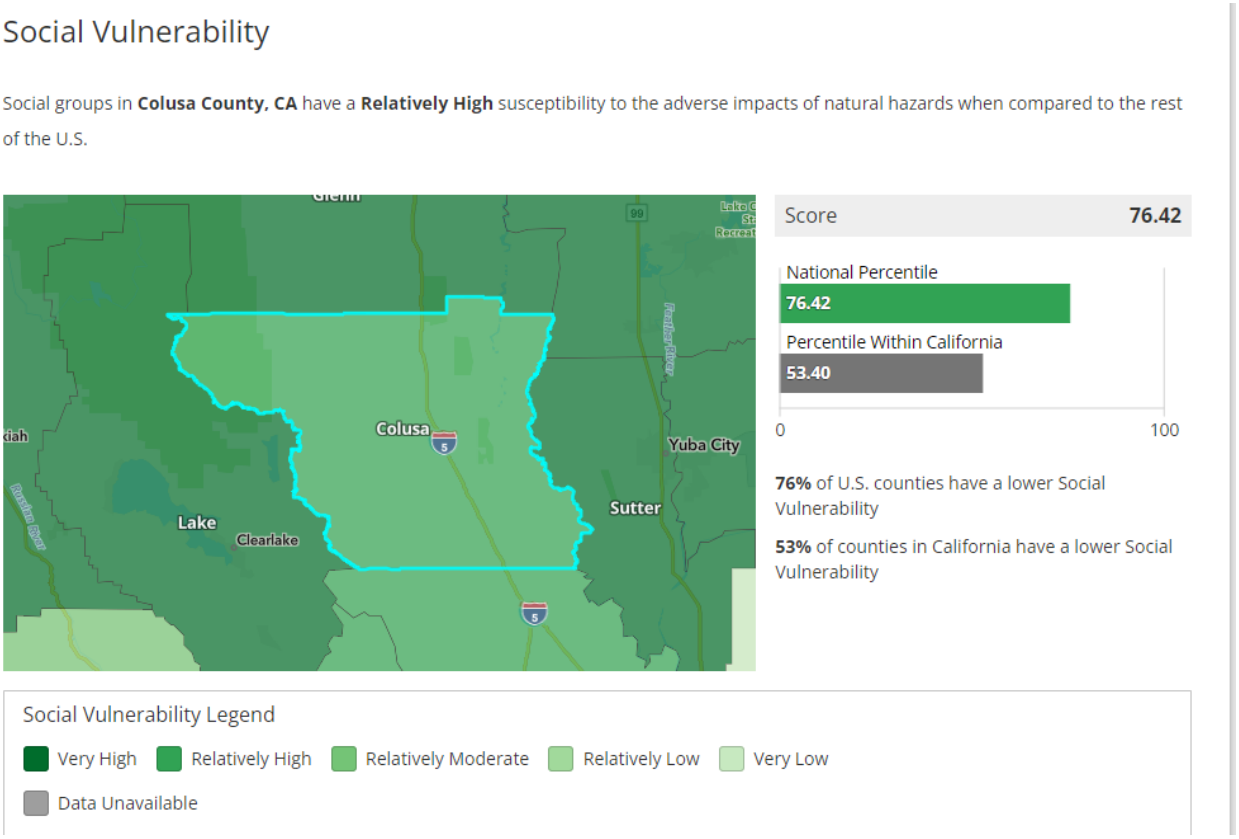
Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | No Expected Annual Losses | Not Applicable | Insufficient Data

Composite Expected Annual Loss	**$71,260,808.48**
Composite Expected Annual Loss Rate National Percentile	**99.6**

Building EAL	**$7,109,815.34**	Population EAL	**0.20** fatalities
Building EAL Rate	**$1 per $600.42 of building value**	Population EAL Rate	**1 per 106.95K people**
Agriculture EAL	**$61,785,303.30**	Population Equivalence EAL	**$2,365,689.84**
Agriculture EAL Rate	**$1 per $10.28 of agriculture value**		

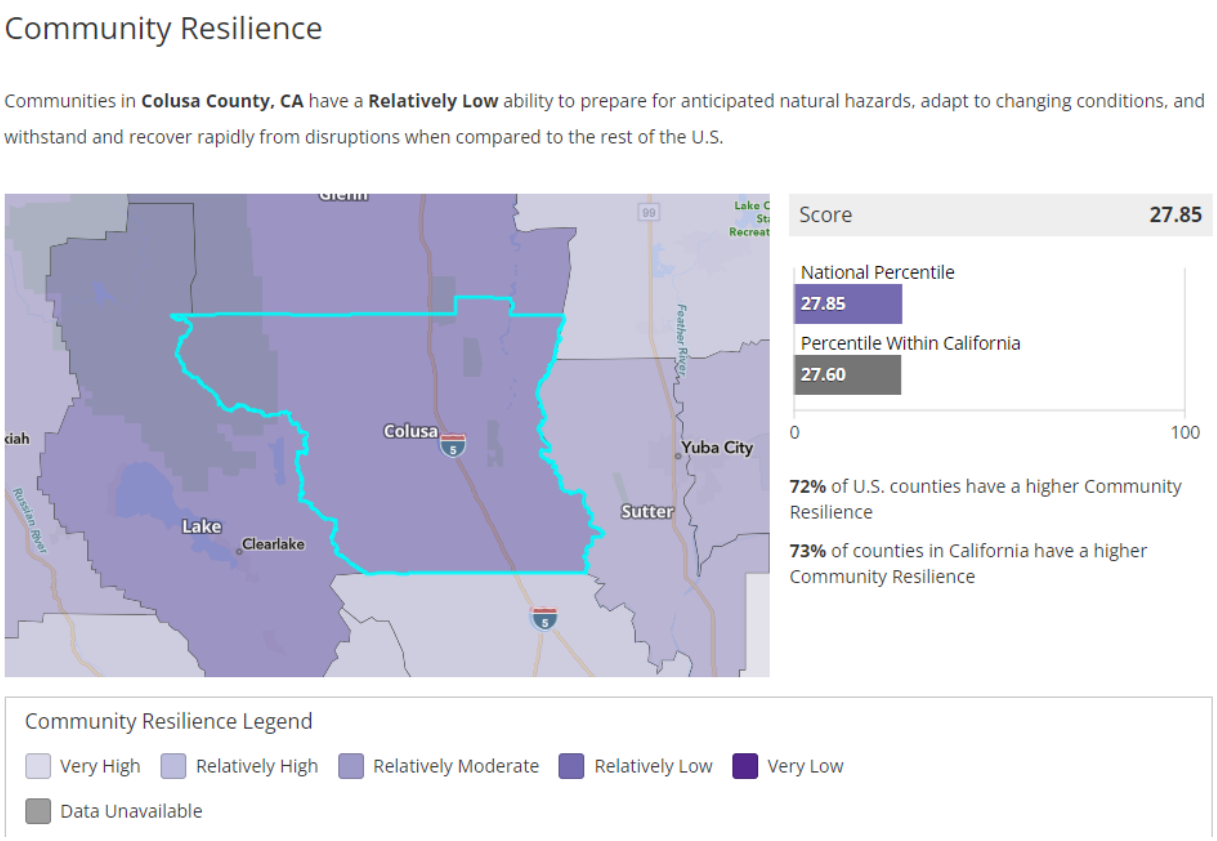
Source: FEMA National Risk Index, retrieved 3/26/2024.

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



Source: FEMA National Risk Index, retrieved 3/26/2024.

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



Source: FEMA National Risk Index, retrieved 3/26/2024.

Local Input

The County noted multiple types and locations of vulnerable populations, including those with access and functional needs, and associated issues.

- Colusa County has one migrant farm worker housing community at 400 Theatre Road, Williams, while all other special needs populations are dispersed throughout the County. The County has a number of Spanish speaking first responders, translation services and volunteers to serve the needs of the Williams Migrant Camp.
- There are a few senior care and skilled nursing care facilities in Colusa County, all within the jurisdictions of the cities of Colusa and Williams. The local Department of Health and Human Services works closely with the OES and First Responders to meet the needs of these communities during disaster events.

In addition, the Cortina Rancheria is located in the County. There are multiple issues that affect the vulnerability of that area of the County. That is discussed in their respective annex to this Plan Update.

Housing Element Special Populations

The County Planning Team noted that the Colusa County 2020-2028 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 County has seen an increase in the number of seniors, age 65 and older, as long-time residents continue to age. In 2017, approximately 1,699 persons in unincorporated Colusa County (15 percent) were 65 years and older. Of the senior population, 1,071 were 65 to 74, 480 were 75 to 84, and 148 were 85 or older. From 2010 to 2017, the 65 to 74 age group increased by 67 percent, the 75 to 84 age group increase by 17 percent, and the 85 years and older age group increased by 16 percent; this rate of increase is significantly greater than that of the overall population which increased by 1 percent.

Most senior households (over 65) own their home, 82 percent while 17 percent of senior households rent. There are no affordable senior housing complexes in unincorporated Colusa County. There is one long-term residential care facility for the elderly, Countryside Manor Guest Home (15 beds) in Williams. There are affordable senior apartments in the cities of Colusa and Williams. County staff have explored and encouraged several senior housing projects with landowners, but these projects have yet to move forward. However, there are three skilled care senior facilities in the Colusa area: the Colusa Regional Medical Center in Colusa; Valley West Care Center in Williams, and the Sun bridge Care Center in Willows.

Disabled Citizens

A "disability" includes, but is not limited to, any physical or mental disability as defined in California Government Code Section 12926. Physical, mental, and/or developmental disabilities could prevent a person from working, restrict a person's mobility or make caring for oneself difficult. Therefore, disabled persons often require special housing needs related to potential limited earning capacity, the lack of accessible and affordable housing, and higher health costs associated with disabilities. Colusa County has 730 residents that are defined as disabled according to the ACS Census Data.

Large Family Households

In unincorporated Colusa County, 501 households have five or more persons. On average, most of these large family households own their homes according to the Census, however, large households that rent have a disproportionate rate of housing problems including overcrowding, units lacking complete kitchen facilities, and units lacking complete plumbing facilities. In unincorporated Colusa County, there appears to be an adequate amount of housing units available to provide units with enough bedrooms both for larger households that own or rent their home. While there is not a shortfall of adequately sized units, there is only an excess of 11 four-bedroom units available for rent, which indicates that large families may have a difficult time finding housing units large enough to meet their needs due to limited choices.

Single Parent and Female-Headed Households

While the majority of households in the County are either married couple or single person households, 13 percent of family households are headed by a single male or single female. Single parent households are homes with children under the age of 18 at home and include both male and female headed households. These households generally have a higher ratio between their income and their living expenses. Therefore, finding affordable, decent, and safe housing is often more difficult for single parent and female-headed households. Additionally, single parent and female-headed households have special needs involving access to daycare or childcare, health care and other supportive services. There are 188 male heads of household with no wife present (5 percent of all households) and 285 female heads of household with no husband present (8 percent of all households).

Agricultural Workers

There is a significant amount of agricultural production in Colusa County. According to the 2013-2017 ACS Census, approximately 33 percent of all workers in unincorporated Colusa County were employed in occupations related to agriculture, forestry, fishing/hunting, and mining. This data does not indicate how many individuals are employed only in farm industries or if the employment is seasonal or permanent, however, it gives a beginning indication about this population. Agriculture continues to be Colusa County's major producing industry, however, the number of farm workers in Colusa County has declined over the last two decades from 5,356 in 1992 to 3,684 in 2002 to 3,058 in 2007. Migrant farm workers have also been included in the Census of Agriculture in 2002 and 2007. In 2002, 100 farms (26%) hired migrant workers. In 2007, 62 farms (18%) hired migrant workers. By assuming that the 268 farms hiring seasonal workers (less than 150 days) also hired migrant workers at the same ratio of farms hiring migrant workers there would be approximately 248 migrant workers in Colusa County in 2012.

There are four registered farm labor camps in Colusa County with a capacity for 70 persons. There is also a 100-unit seasonal camp located in Williams. While the number of farm workers has declined since 1997, farm workers and their families represent a significant portion of the County's population. It is not anticipated that there will be an increase in the number of farmworkers requiring housing, but the County should make an effort to continue to provide year-round and migrant housing opportunities.

Extremely Low Income

Providing housing for Extremely Low Income (ExLI) families and individuals is an issue for all jurisdictions within California. This group has the most potential to become homeless due to fluctuations in the economy and/or personal issues such as job loss and illness. The County currently estimates the total number of ExLI households at 417 and of this amount 135 households are seniors.

Existing ExLI housing units include the Alexander Apartments and Alexander Center which currently provide 85 units for the extremely low-income group. Colusa County's current zoning regulations allow for the use of mobile and modular homes (new and used) for single family residential uses by right in all zoning districts where residential uses are allowed. In addition, Colusa County does provide opportunities for multifamily units which may also provide ExLI units.

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. Similar to every other community in California, Colusa County has a portion of its population experiencing homelessness. Every two years, there is a Point in Time count (PIT) of those who are homeless on a selected day in January. The counts derived from this effort not only establish funding thresholds for federal and state funds, but they also provide a snapshot of who is experiencing homelessness in each community.

The 2019 PIT was able to count 57 persons in total. Traditionally, the PIT is considered to likely undercount the number of people who are homeless, since it relies on volunteers canvassing communities to find individuals who are willing to participate in the survey on that one day. Therefore, the number of homeless in Colusa County may be somewhat higher than shown. In addition to people and households that are homeless, there are also households at risk of becoming homeless due to various circumstances. The need for one-bedroom affordable units for single individuals will contribute significantly to long-term solutions.

Structures

Structures include buildings used for a variety of purposes and reflect the Colusa 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, and associated land and contents values, which comprise the Colusa County Planning Area's and unincorporated Colusa County's existing built environment.

Parcel and Structure Inventory and Assessed Values

An inventory of structures located within the Colusa County Planning Area was developed utilizing data from the Colusa County Assessor's Office. It is based on the 2023 Assessor's data/Parcel layer provided by Colusa County GIS. This data represents best available data.

While conducting an inventory of structure assets within the Colusa 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 Colusa County 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 Colusa County Planning Area.

Methodology

Data from the Colusa County Assessor's Office is based on the 2023 Assessor's data is the basis for the inventory of assessed values for both improved and unimproved parcels within the Colusa County Planning Area. This data provides the land and improved values assessed for each parcel, along with key information

such as property use. Other GIS data, such as jurisdictional boundaries, roads, streams, and area features, was also obtained from Colusa County and CalAtlas to support mapping and analysis of values at risk.

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 Colusa 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 Colusa 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 Colusa 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.

Property Use Categories

The Colusa County Planning Area Assessor data used 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 Colusa County Planning Area include:

- Agricultural
- Commercial
- Government
- Industrial
- Institutional
- Miscellaneous
- Residential

Once property uses were grouped into categories, the number of total and improved parcels and land and improved values were inventoried for the Colusa County Planning Area by property use. ***Note***: The other value is present in the tables as a total value of the miscellaneous property values, such as personal property, mobile home personal property, fixture, and other exempt values. The total values in the analysis were then the summation of the land, improved, and other values.

Estimated Content Replacement Values

The Colusa 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 4-9 shows the breakdown of the different property uses in the Colusa County Planning Area and their estimated CRV factors.

Table 4-9 Colusa County Planning Area – Content Replacement Factors by Property use

Colusa 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%
Miscellaneous	Miscellaneous	100%
Residential	Residential	50%

Source: Hazus 6.1

Parcel and Structure Asset Inventory with Values Results

Values associated with land and improved structures were identified and summed in order to determine assessed values at risk in the Colusa 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 values at risk in the Planning Area.

Table 4-10 shows the total values or exposure for the entire Colusa County Planning Area (using CRV multipliers from Table 4-9) broken out by jurisdiction. Table 4-11 shows the values for the unincorporated Colusa County broken out by property use. Tables showing the property use breakouts for the jurisdictions are included in their respective annexes to this LHMP Update.

Table 4-10 Colusa County Planning Area – Total Parcels (and Structures) by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Values	Estimated Contents Value	Total Value
City of Colusa	2,334	2,077	$144,303,544	$443,767,787	$49,228,543	$309,495,963	$946,795,837
City of Williams	1,755	1,477	$110,173,986	$349,462,550	$126,901,961	$254,199,840	$840,738,337

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Values	Estimated Contents Value	Total Value
Unincorporated Colusa County	10,882	5,598	$1,565,670,152	$918,573,263	$199,347,382	$758,464,131	$3,442,054,928
Grand Total	**14,971**	**9,152**	**$1,820,147,682**	**$1,711,803,600**	**$375,477,886**	**$1,322,159,934**	**$5,229,589,102**

Source: 2023 Colusa County Parcel/Assessor Data

Table 4-11 Colusa County Planning Area – Total Parcels (and Structures) by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	5,577	2,702	$1,347,205,591	$365,825,843	$114,218,069	$365,825,843	$2,193,075,346
Commercial	712	491	$77,142,322	$197,029,707	$53,137,045	$197,029,707	$524,338,781
Government	619	112	$42,416,392	$72,765,210	$39,492,655	$72,765,210	$227,439,467
Industrial	130	63	$24,815,691	$130,833,491	$129,088,295	$196,250,240	$480,987,717
Institutional	105	57	$3,878,678	$17,981,793	$11,215,942	$17,981,793	$51,058,206
Miscellaneous	561	35	$37,916,796	$17,246,754	$1,851,673	$17,246,754	$74,261,977
Residential	7,267	5,692	$286,772,212	$910,120,802	$26,474,207	$455,060,387	$1,678,427,608
Colusa County Planning Area Total	**14,971**	**9,152**	**$1,820,147,682**	**$1,711,803,600**	**$375,477,886**	**$1,322,159,934**	**$5,229,589,102**

Source: 2023 Colusa County Parcel/Assessor Data

The values for unincorporated Colusa County are broken out by property use category and are provided in Table 4-12. More information on parcels and structures at risk for each jurisdiction can be found in their respective annexes.

Table 4-12 Unincorporated Colusa County – Total Parcels (and Structures) by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	5,490	2,678	$1,324,956,575	$363,251,125	$113,557,305	$363,251,125	$2,165,016,130
Commercial	260	179	$20,969,259	$71,537,065	$32,023,644	$71,537,065	$196,067,033
Government	426	39	$31,957,809	$7,529,186	$37,449	$7,529,186	$47,053,630
Industrial	51	30	$9,988,390	$71,506,449	$41,684,579	$107,259,676	$230,439,094
Institutional	55	26	$1,306,968	$7,927,162	$3,449,752	$7,927,162	$20,611,044
Miscellaneous	532	29	$36,912,062	$5,097,569	$1,851,673	$5,097,569	$48,958,873
Residential	4,068	2,617	$139,579,089	$391,724,707	$6,742,980	$195,862,348	$733,909,124
Unincorporated Colusa County Total	**10,882**	**5,598**	**$1,565,670,152**	**$918,573,263**	**$199,347,382**	**$758,464,131**	**$3,442,054,928**

Source: 2023 Colusa 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 and (2) At-Risk Populations Facilities:

- **Essential Service Facility**: A facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions.
- **At-Risk Populations**: Pre-schools, public and private primary and secondary schools, before and after school care centers, daycare centers, group homes, and assisted living residential or congregate care facilities with multiple residents.

Critical facilities in the Colusa County Planning Area are shown on Figure 4-15. A summary of critical facilities in the Planning Area is shown in Table 4-13 and detailed in Table 4-14. Additional details of individual critical facilities can be found in Appendix F of this Plan Update.

Figure 4-15 Colusa County Planning Area – Critical Facilities

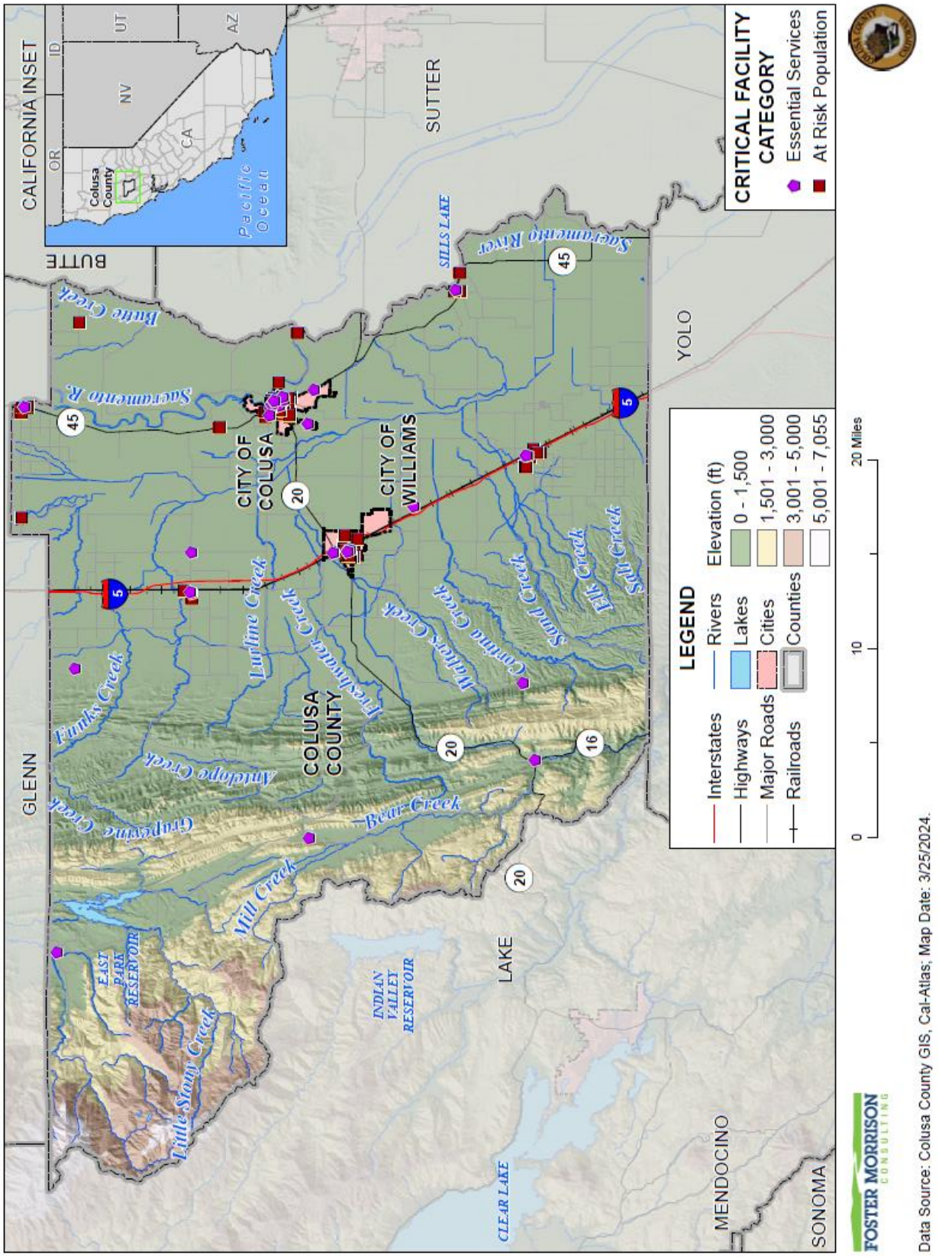


Table 4-13 Colusa County Planning Area - Critical Facilities by Jurisdiction and Critical Facility Category

Jurisdiction / Critical Facility Category	Facility Count
City of Colusa	
Essential Services Facilities	10
At Risk Population Facilities	40
City of Colusa Total	**50**
City of Williams	
Essential Services Facilities	5
At Risk Population Facilities	22
City of Williams Total	**27**
Unincorporated Colusa County	
Essential Services Facilities	13
At Risk Population Facilities	25
Unincorporated Colusa County Total	**38**
Grand Total	**115**

Source: Colusa County GIS

Table 4-14 Colusa County Planning Area - Critical Facilities by Jurisdiction and Critical Facility Category and Facility Type

Jurisdiction/ Critical Facility Category	Facility Type	Facility Count
City of Colusa		
Essential Services Facilities	Emergency Response	1
	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	3
	Utility Facility	2
	Essential Services Facilities Total	**10**
At Risk Population Facilities	Apartment Complex	22
	Assisted-Living	1
	Hotel or Motel	2
	Jail	1
	Mobile Home Park	5
	School	8
	Senior Living Facility	1

Jurisdiction/ Critical Facility Category	Facility Type	Facility Count
	At Risk Population Facilities Total	**40**
City of Colusa Total		**50**
City of Williams		
Essential Services Facilities	Emergency Response	2
	Fire Station	1
	Public Services	1
	Utility Facility	1
	Essential Services Facilities Total	**5**
At Risk Population Facilities	Apartment Complex	4
	Hotel or Motel	8
	Migrant Housing	1
	Mobile Home Park	2
	School	4
	Senior Living Facility	3
	At Risk Population Facilities Total	**22**
City of Williams Total		**27**
Unincorporated Colusa County		
Essential Services Facilities	Native American Reservation	1
	Utility Facility	5
	Essential Services Facilities Total	**13**
At Risk Population Facilities	Apartment Complex	5
	Casino	1
	Hotel or Motel	1
	Mobile Home Park	9
	School	9
	At Risk Population Facilities Total	**25**
Unincorporated Colusa County Total		**38**
Grand Total		**115**

Source: Colusa County GIS

Community Lifelines

Assessing the vulnerability of the Colusa 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 Colusa 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.

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

Natural, Historical, and Cultural Resources

Assessing the vulnerability of the Colusa 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.

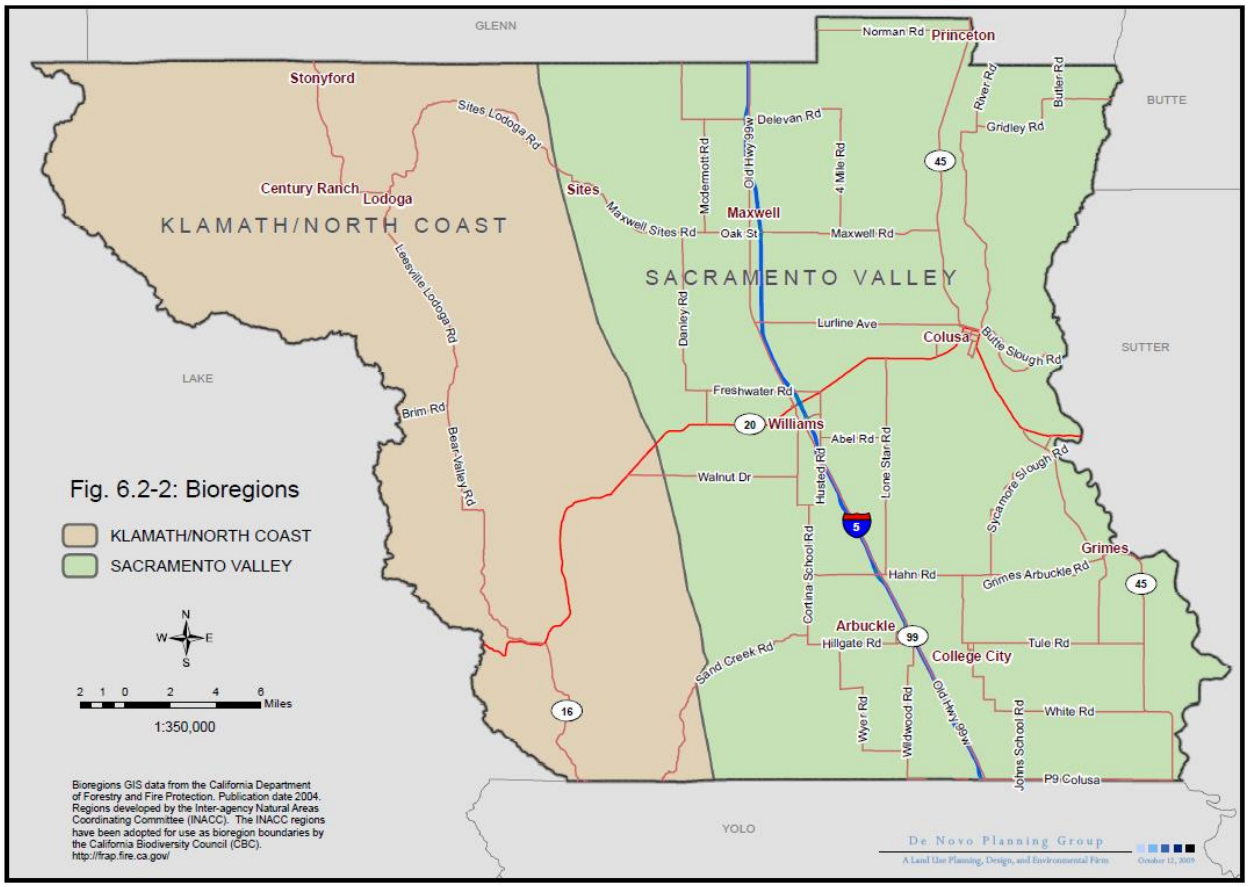
Natural Resources

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 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 County is defined by two different bioregions including the Sacramento Valley, and Klamath/North Coast. Figure 4-16 illustrates the boundaries of the bioregions within Colusa County. A brief description of each bioregion is presented below.

- **Sacramento Valley**. The Sacramento Valley Bioregion is a watershed of the Sierra Nevada that encompasses the northern end of the great Central Valley, stretching from Redding to the southeast corner of Sacramento County. The bioregion is generally flat and is rich in agriculture. The eastern portion of the County falls within this bioregion, which has a climate that is characterized by hot dry summers and cool wet winters. Oak woodlands, riparian forests, vernal pools, freshwater marshes, and grasslands provide the major natural vegetation of the bioregion. This bioregion is the most prominent wintering area for waterfowl, attracting significant numbers of ducks and geese to its seasonal marshes along the Pacific Flyway. Species include northern pintails, snow geese, tundra swans, sandhill cranes, mallards, grebes, peregrine falcons, heron, egrets, and hawks. Black-tailed deer, coyotes, river otters, muskrats, beavers, ospreys, bald eagles, salmon, steelhead, and swallowtail butterflies are some of the wildlife that are common in this bioregion.
- **Klamath/North Coast**. The Klamath/North Coast Bioregion in California's northwestern corner extends roughly one-quarter of the way down the 1,100-mile coast and east across the Coastal Range and into the Cascades. Much of this bioregion is covered by forest and is the state's wettest climate, with rainfall distribution varying widely from an average annual 38 to 80 or more inches. The western portion of the County falls within this bioregion, which is considered “Inland” with a climate that is drier with low rainfall in winter and hot, dry summers. Vegetation includes mixed conifer habitat of white fir, Douglas fir, ponderosa pine, Sierra lodgepole pine, incense cedar, sugar pine, red fir, Jeffrey pine, mountain hemlock, knobcone pine, western red cedar, red alder, redwood, tanoak, Pacific madrone, and chaparral. Wildlife in the bioregion includes deer, fox, black bear, mountain lion, California clapper rail, Aleutian Canada geese, elk, osprey, fisher, bank swallow, salmon, Otis blue butterfly, bald eagle, Point Arena mountain beaver, Swainson's hawk, willow flycatcher, western sandpiper, and Oregon silverspot butterfly.

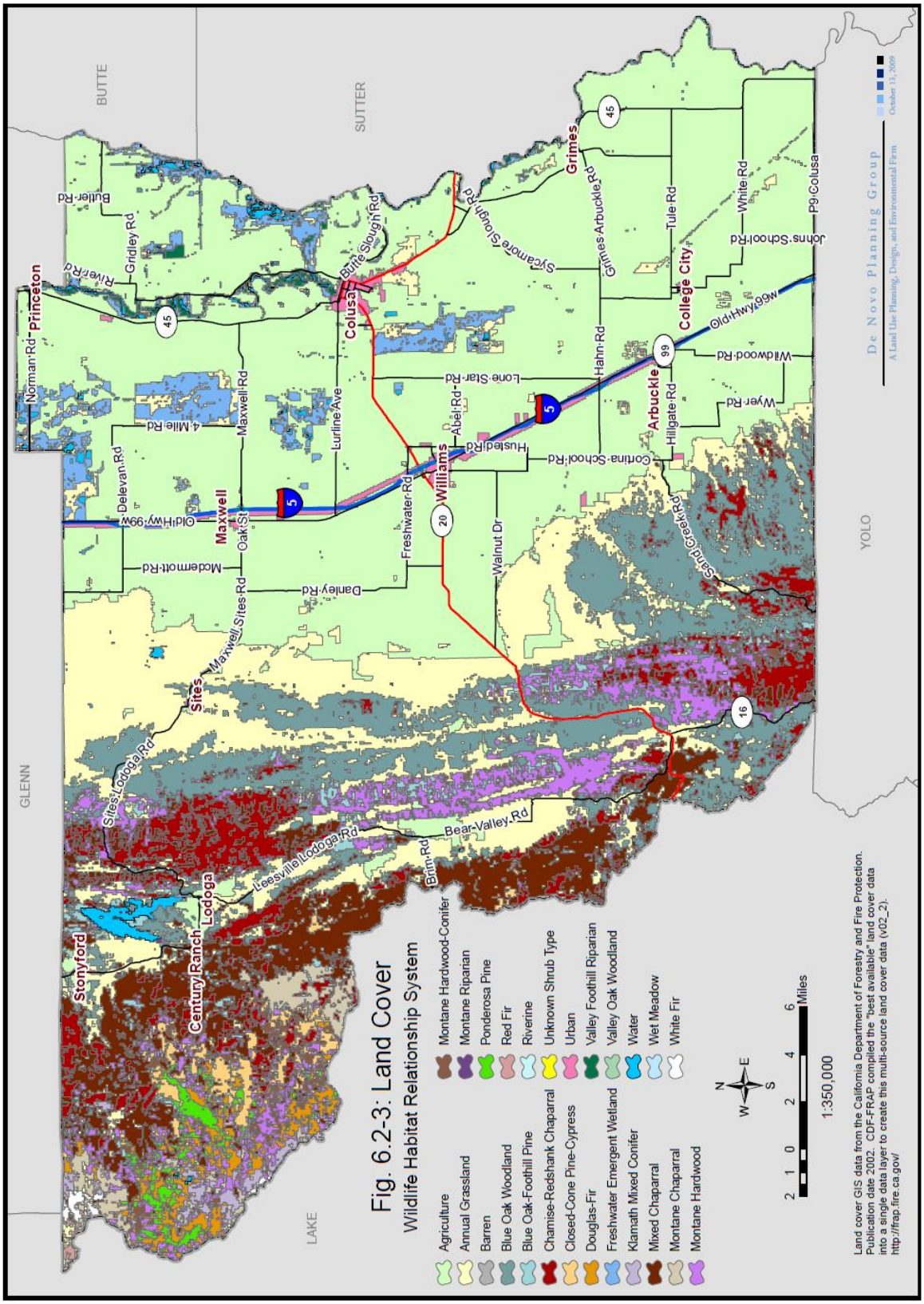
Figure 4-16 Colusa County – Bioregions



Source: 2010 Colusa County General Plan Background Report

Natural and agricultural communities both provide a variety of habitat for the biological resources in Colusa County. Sensitive habitats include those that are of special concern to resource agencies or those that are protected under federal, state, or local regulations. Colusa County is a biologically diverse part of the state. According to the California Wildlife Habitat Relationship System there are 24 cover types (wildlife habitat classifications) in Colusa County out of 59 found in the state. These include: Agricultural, Annual Grassland, Barren, Blue Oak Woodland, Blue Oak-Foothill Pine, Chamise-Redshank Chaparral, Closed-Cone Pine-Cypress, Douglas Fir, Fresh Emergent Wetland, Klamath Mixed Conifer, Mixed Chaparral, Montane Chaparral, Montane Hardwood, Montane Hardwood-Conifer, Montane Riparian, Ponderosa Pine, Red Fir, Riverine, Urban, Valley Foothill Riparian, Valley Oak Woodland, Water, Wet Meadow, and White Fir. Figure 4-17 illustrates the location of each cover type (wildlife habitat classification) within the County.

Figure 4-17 Colusa County – Land Cover and Wildlife Habitats



Source: 2010 Colusa County General Plan Background Report

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 Colusa County. A summary list of these species is found below in Table 4-15. Appendix E lists the name, federal status, state status, California Department of Fish and Wildlife status, and the California Rare Plant rank of species in Colusa County.

Table 4-15 Colusa County Planning Area – Summary of Special Status Species

Type	Number
Animals - Amphibians	3
Animals - Birds	32
Animals - Crustaceans	3
Animals - Fish	10
Animals - Insects	7
Animals - Mammals	15
Animals – Mollusks	3
Animals – Reptiles	3
Community – Terrestrial	8
Plants – Vascular	84

Source: California Natural Diversity Database

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 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.

Fresh emergent wetland habitats occur in Colusa 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 US Fish and Wildlife Service has maps of wetlands in the United States. Those wetlands that fall in Colusa County are shown on Figure 4-18. They are detailed in Table 4-16 and are shown separated by jurisdiction. More information on the locations of wetlands in each City can be found in their respective annexes to this LHMP Update.

Figure 4-18 Colusa County Planning Area – Wetlands Locations

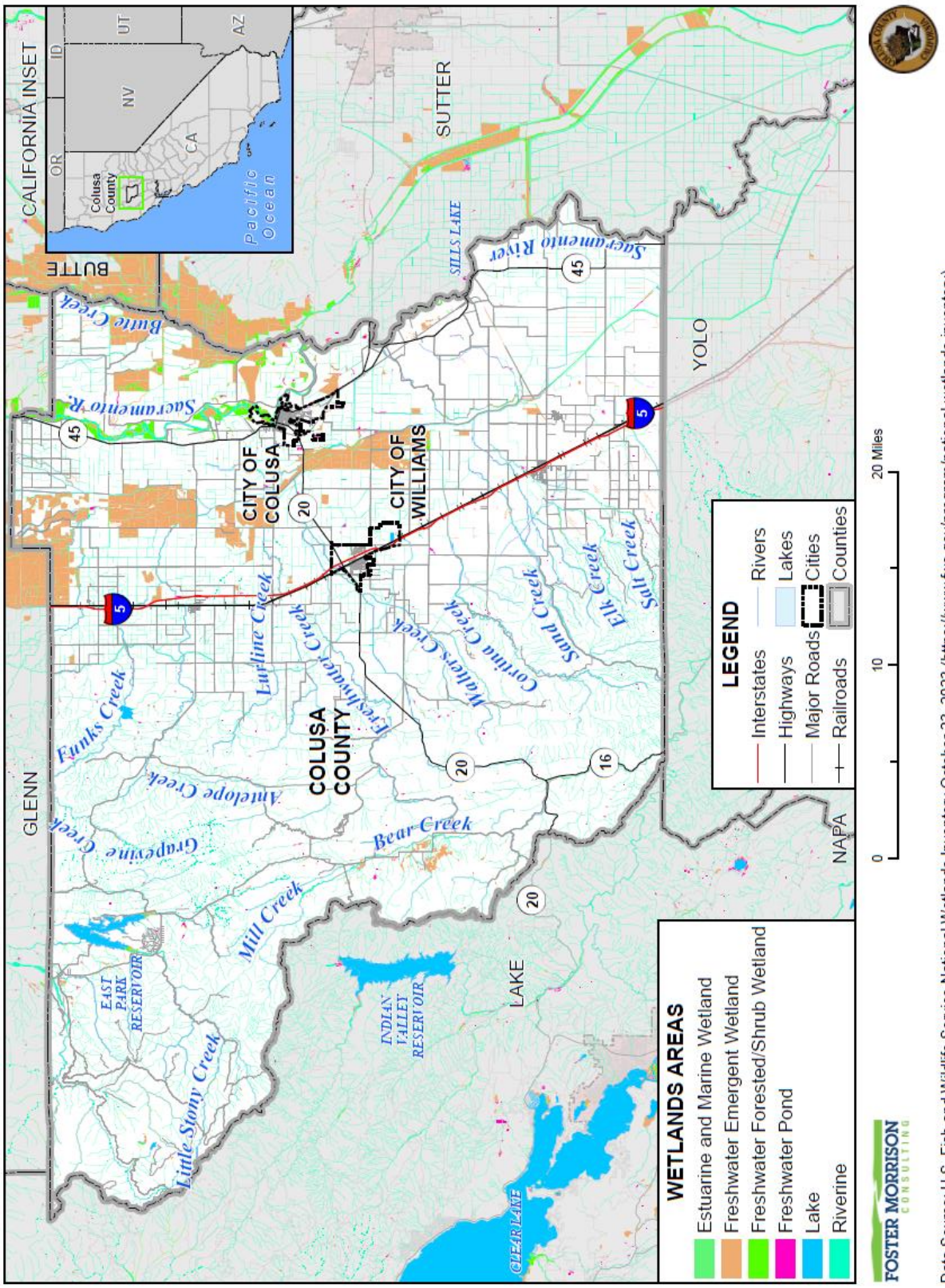


Table 4-16 Colusa County Planning Area – Wetlands

Jurisdiction/ Wetlands Area Type	Wetlands Count	Wetlands Area (in Acres)
City of Colusa		
Freshwater Emergent Wetland	27	56
Freshwater Forested/Shrub Wetland	12	87
Freshwater Pond	29	67
Lake	0	0
Riverine	52	11
Estuarine and Marine Wetland	0	0
City of Colusa Total	**120**	**221**
City of Williams		
Freshwater Emergent Wetland	1	1
Freshwater Forested/Shrub Wetland	0	0
Freshwater Pond	7	18
Lake	1	55
Riverine	102	27
Estuarine and Marine Wetland	0	0
City of Williams Total	**111**	**101**
Unincorporated Colusa County		
Freshwater Emergent Wetland	3,970	30,022
Freshwater Forested/Shrub Wetland	1,616	4,339
Freshwater Pond	773	748
Lake	34	1,722
Riverine	10,335	8,451
Estuarine and Marine Wetland	3	11
Unincorporated Colusa County Total	**16,731**	**45,294**
Grand Total	**16,962**	**45,616**

Source: USFWS 10/23/2023

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.

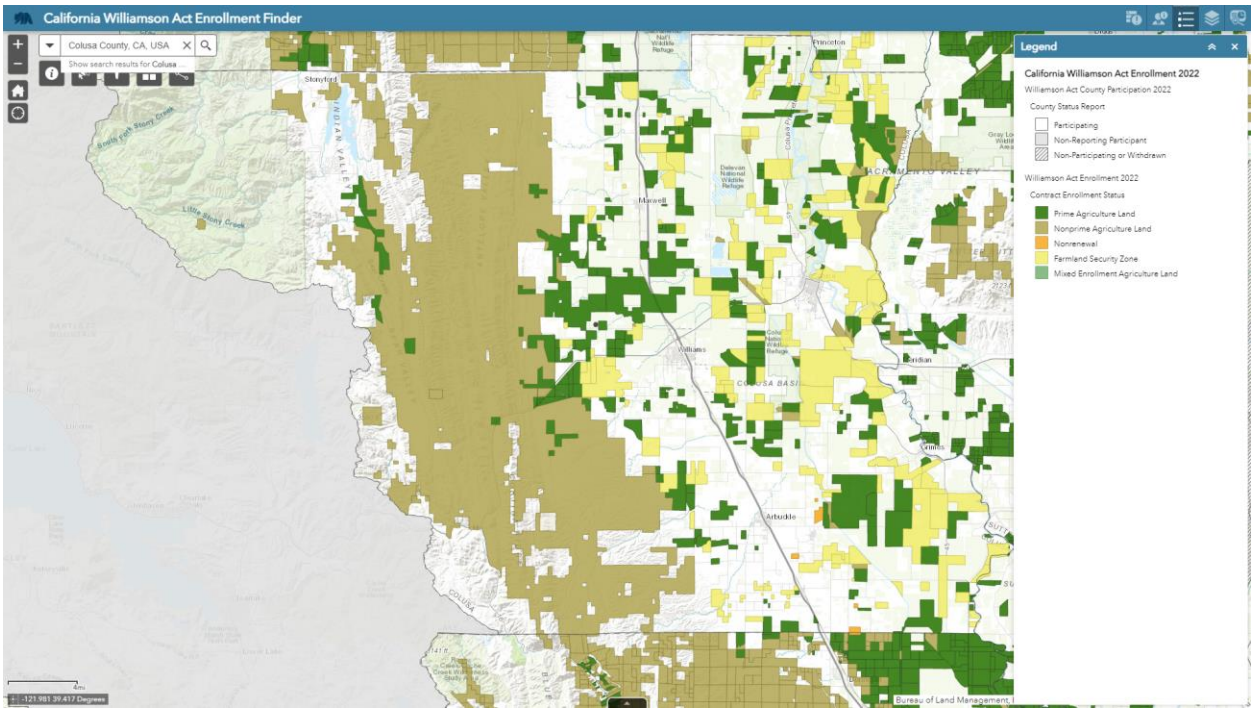
These natural floodplain functions associated with the natural or relatively undisturbed floodplain that moderates flooding, such as wetland areas, are critical for maintaining water quality, recharging groundwater, reducing erosion, redistributing sand and sediment, and providing fish and wildlife habitat. Preserving and protecting these areas and associated functions are a vital component of sound floodplain management practices for the Colusa 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 2022) can be seen on Figure 4-19.

Figure 4-19 Colusa County – Williamson Act Lands



Source: California Department of Conservation. Retrieved 3/18/2022.

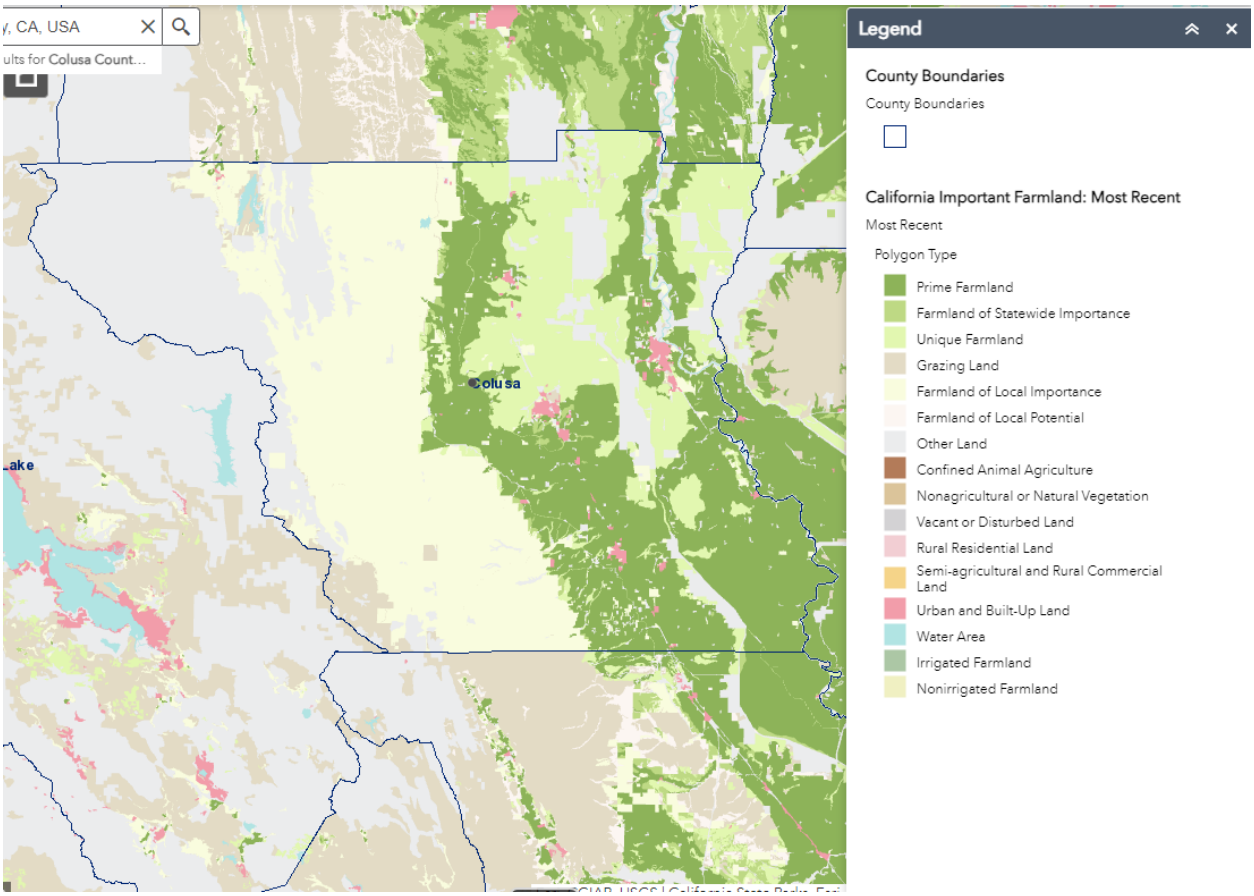
State Inventory of Important Farmland

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 2022 maps are the most recent versions. These lands are shown in Figure 4-20.

Figure 4-20 Colusa County – Map of Important Farmlands 2022



Source: State of California Department of Conservation

Cultural and Historical Resources

Colusa County has a large stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the HMPC collected information 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, 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. 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 4-17.

Table 4-17 Colusa County Planning Area – Historical Resources

Resource Name (Plaque Number)	National Register	State Landmark	Point of Interest	Date Listed	City/ Community
Cecil Ranch (N2238)	X			5/14/2004	Grimes
Colusa Carnegie Library (N1657)	X			12/10/1990	Colusa
Colusa County Courthouse (890)		X		12/29/1975	Colusa
Colusa Grammar School (N632)	X			6/13/1978	Colusa
Colusa High School and Grounds (N434)	X			8/13/1976	Colusa
Colusa IOOF Hall / Odd Fellows Building (P505)			X	7/28/1977	Colusa
Grand Island Shrine (P329)	X		X	5/15/1974	Colusa
Letts Valley (736)		X		5/25/1960	Stonyford
Nowi Rancheria (N68)	X			3/24/1971	Grimes
Original Williams High School, Sacramento Valley Museum (P550)			X	6/6/1980	Williams
Swift's Stone Corral (238)		X		6/10/1936	Maxwell

Source: California Department of Parks and Recreation Office of Historic Preservation. Retrieved 3/18/2022.

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 Colusa County Planning Area to natural hazards and disasters also involves inventorying the economic assets and community activities of value to the Colusa 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

In Colusa County, the agricultural industry is the primary economic asset. This includes many industries tied to agriculture – mills, canneries, nut processors, and ancillary ag industries. There is a small hotel base. Many of these hotels are full seasonally due to the presence of migrant workers. When the migrant camp fills, the hotels see increased usage. The Colusa Casino Resort does bring people to the area (though the Casino itself is revenue neutral to the County as it pays no income taxes).

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 Colusa 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

The County noted there were multiple larger events in the County that fall under these categories:

- Farm Show (February).
- County Fair (June).
- Duck Calling Contest (April or May).
- Tourism for fishing and hunting occurs. Striper fishing season is large. Hunting (waterfowl) also occurs as the County is in the Pacific Migratory Flyway.
- Stonyford Rodeo (May).
- Maxwell High School Rodeo (May).
- Lantern Festival (East Park Reservoir in April).

- Craft Fair (in November at the Colusa Fairgrounds).

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

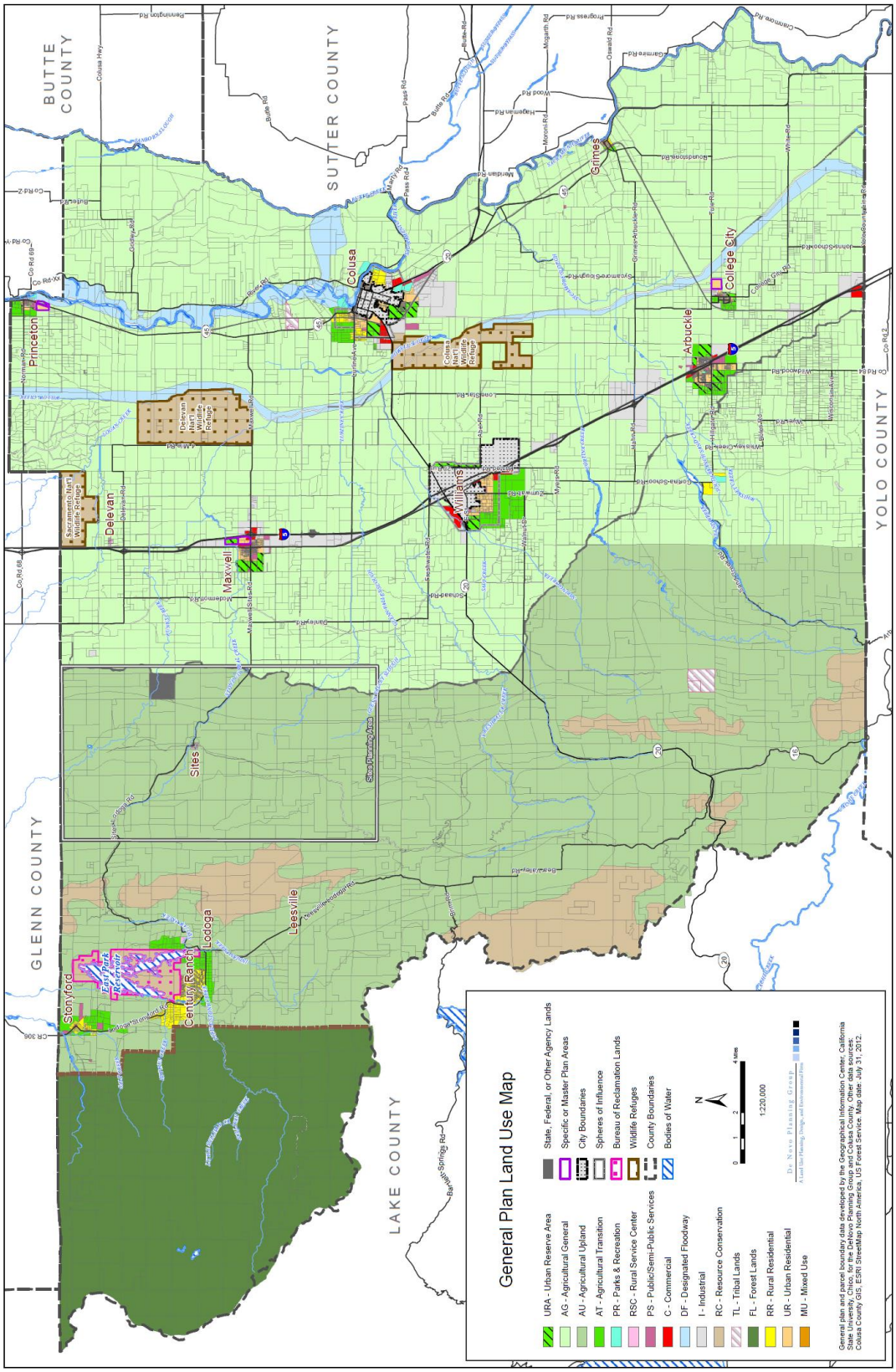
4.2.2. Growth and Development Trends

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 Colusa 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 2030 Colusa County General Plan Land Use Element (dated 2012). Figure 4-21 is sourced from the Land Use Element.

Figure 4-21 Colusa County General Plan Land Use Designations



Source: 2030 Colusa County General Plan Land Use Element

Population Projections

As indicated in the previous section, Colusa County had been steadily growing from 1940 to 2010, with a recent slowing in population growth. Long term forecasts by the California Department of Finance project population growth in Colusa County continuing through 2060. Table 4-18 shows the population projections for the County as a whole through 2060. As shown, populations are expected to shrink slowly over time. The average annual growth rate is expected to be -0.36%.

Table 4-18 Population Projections for the Colusa County Planning Area (incorporated and unincorporated), 2025-2060

	2025	2030	2035	2040	2045	2050	2055	2060
Colusa County	22,050	22,135	21,953	21,532	21,020	20,406	19,903	19,454

Source: California Department of Finance, P-1 Report

Development since 2018 Plan

The Colusa County Building Department sought to track total building permits issued since 2018 for unincorporated Colusa County. A summary of this development is shown in Table 4-19. Development by known flood and fire hazard areas is shown in Table 4-20. All development in the identified hazard areas, including the 1% annual chance floodplains and high wildfire risk areas, were completed in accordance with all current and applicable development codes and standards. 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 4-19 Unincorporated Colusa County Development 2018-2023 Summary

Property Use	2018	2019	2020	2021	2022	2023
Residential	18	5	29	23	28	27
Agricultural	12	13	12	11	14	23
Commercial/ Industrial	28	18	18	11	10	8
Total	**58**	**36**	**59**	**45**	**52**	**58**

Source: Colusa County Building Department and Planning Department

Table 4-20 Unincorporated Colusa County Development in Hazard Areas since 2018

Property Use	1% Annual Chance Flood	Wildfire Risk Area
Residential	7	7
Commercial	6	6
Industrial	2	8
Total	**15**	**21**

Source: Colusa County Building Department and Planning 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 hazards.

GIS Analysis

Colusa County provided 53 future development areas which were used as the basis for the inventory of future development for unincorporated Colusa County. These were mapped in GIS. Figure 4-22 show the locations of the future development areas. Figure 4-23 is a key to show more details on the future development areas shown on Figure 4-22. Table 4-21 shows the details of the future development areas by acreage and parcel count.

Figure 4-22 Unincorporated Colusa County – Future Development Areas

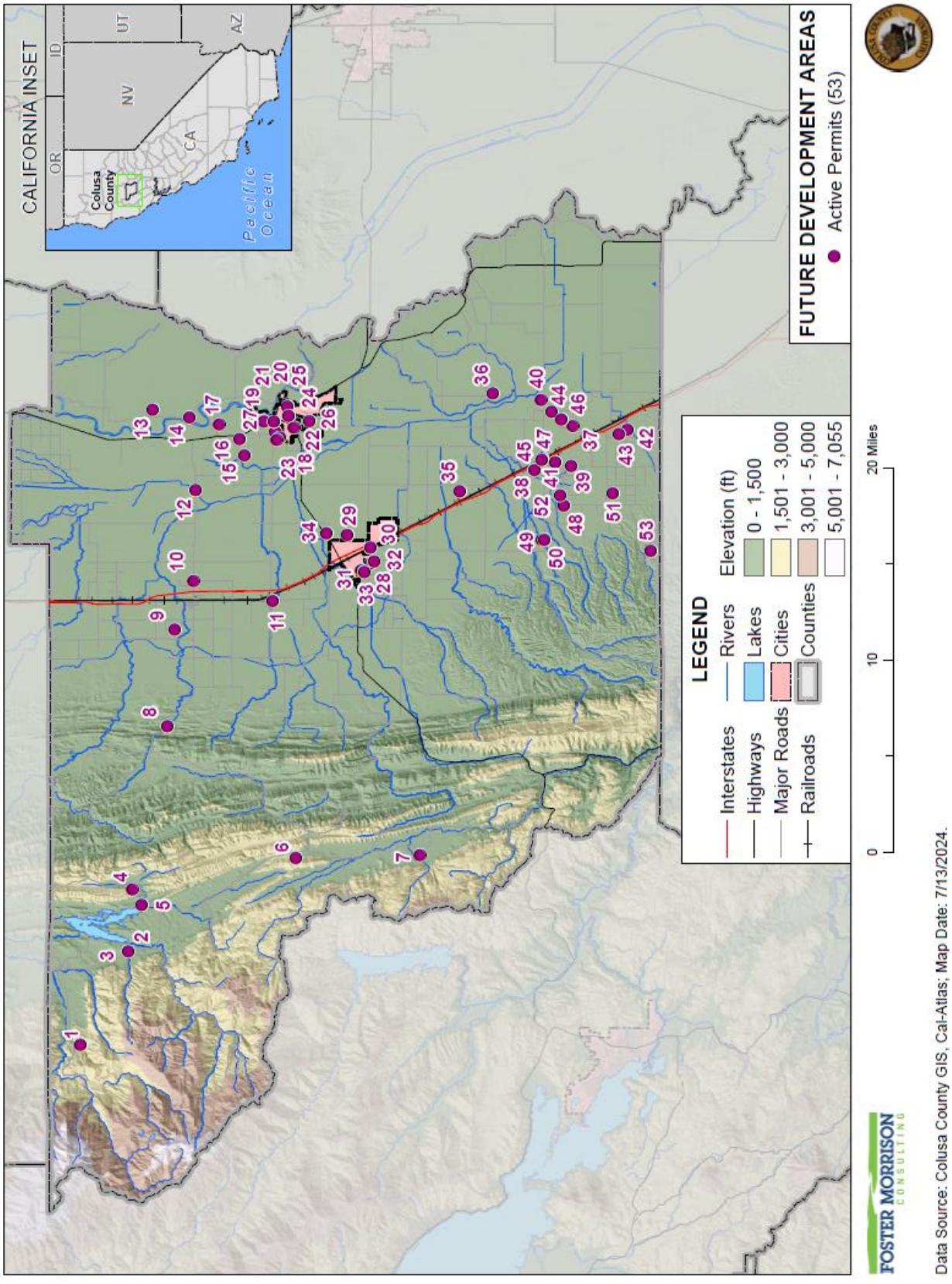


Figure 4-23 Unincorporated Colusa County – Future Development Locations Map Key

FUTURE DEVELOPMENT LOCATIONS

1 - 010-200-001-000	19 - 015-310-050-000	37 - 7020 FRIEL RD
2 - 4564 LODOGA STONYFORD RD	20 - 022-200-066-000	38 - 805 GAIL AVE
3 - 4564 LODOGA STONYFORD RD	21 - 022-200-066-000	39 - 758 WILDWOOD RD
4 - 010-280-079-000	22 - 3145 WILL S GREEN RD	40 - 7251 TULE RD
5 - 4481 SITES LODOGA RD	23 - 3286 RANCH RD	41 - 887 WILDWOOD RD
6 - 014-250-019-000	24 - 1232 FIFTH ST	42 - 021-290-070-000
7 - 2001 BEAR VALLEY RD	25 - 002-101-004-000	43 - 6901 HARRINGTON AVE
8 - 011-200-012-000	26 - 015-380-019-000	44 - 507 MAIN ST
9 - 4105 RIORDAN RD	27 - 1773 LURLINE AVE	45 - 707 FIRST ST
10 - 5603 MAXWELL RD	28 - 016-230-101-000	46 - 7072 PERKINS RD
11 - 5498 LURLINE AVE	29 - 2668 HUSTED RD	47 - 720 FIFTH ST
12 - 6458 MAXWELL RD	30 - 2461 OLD HIGHWAY 99W	48 - 821 WYER RD
13 - 4374 RIVER RD	31 - 2533 VENICE AVE	49 - 6031 HILLGATE RD
14 - 4073 RIVER RD	32 - 016-230-065-000	50 - 6011 HILLGATE RD
15 - 015-060-091-000	33 - 016-220-099-000	51 - 6439 MARINE AVE
16 - 6892 HARBISON RD	34 - 017-010-045-000	52 - 853 JENSEN AVE
17 - 015-030-094-000	35 - 1707 LONE STAR RD	53 - 5875 SILLS RD
18 - 3258 MCCOY RD	36 - 019-090-058-000	

Table 4-21 Unincorporated Colusa County – Future Development Names, Parcels, and Acreages

Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
1	010-200-001-000	1	161.29
2	4564 LODOGA STONYFORD RD	1	2.49
3	4564 LODOGA STONYFORD RD	1	2.49
4	010-280-079-000	1	13.90
5	4481 SITES LODOGA RD	1	86.68
6	014-250-019-000	1	219.76
7	2001 BEAR VALLEY RD	1	637.09
8	011-200-012-000	1	282.12
9	4105 RIORDAN RD	1	76.26
10	5603 MAXWELL RD	1	30.89
11	5498 LURLINE AVE	1	12.18
12	6458 MAXWELL RD	1	319.89
13	4374 RIVER RD	1	402.44
14	4073 RIVER RD	1	10.32
15	015-060-091-000	1	497.11
16	6892 HARBISON RD	1	11.00
17	015-030-094-000	1	17.03

Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
18	3258 MCCOY RD	1	6.01
19	015-310-050-000	1	11.97
20	022-200-066-000	1	0.45
21	022-200-066-000	1	0.45
22	3145 WILL S GREEN RD	1	7.48
23	3286 RANCH RD	1	1.85
24	1232 FIFTH ST	1	0.60
25	002-101-004-000	1	4.48
26	015-380-019-000	1	1.00
27	1773 LURLINE AVE	1	3.40
28	016-230-101-000	1	2.49
29	2668 HUSTED RD	1	10.00
30	2461 OLD HIGHWAY 99W	1	8.53
31	2533 VENICE AVE	1	2.06
32	016-230-065-000	1	1.45
33	016-220-099-000	1	1.37
34	017-010-045-000	1	56.35
35	1707 LONE STAR RD	1	121.30
36	019-090-058-000	1	10.00
37	7020 FRIEL RD	1	9.92
38	805 GAIL AVE	1	0.38
39	758 WILDWOOD RD	1	25.08
40	7251 TULE RD	1	2.64
41	887 WILDWOOD RD	1	1.89
42	021-290-070-000	1	30.47
43	6901 HARRINGTON AVE	1	15.16
44	507 MAIN ST	1	0.47
45	707 FIRST ST	1	0.13
46	7072 PERKINS RD	1	9.29
47	720 FIFTH ST	1	0.55
48	821 WYER RD	1	10.79
49	6031 HILLGATE RD	1	9.65
50	6011 HILLGATE RD	1	9.72
51	6439 MARINE AVE	1	27.77
52	853 JENSEN AVE	1	9.92
53	5875 SILLS RD	1	618.41

Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
Grand Total		**53**	**3,816.40**

Source: Colusa County

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 Colusa County Planning Area and unincorporated Colusa 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 a 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 Colusa 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 Colusa County Planning Area. 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 Colusa County Planning Area as a whole and specific to unincorporated Colusa County.

As part of the vulnerability assessment, an estimate of the vulnerability of the Colusa County Planning Area and unincorporated Colusa County to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. 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.

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 Colusa County Planning Area and unincorporated Colusa County to that hazard.

The vulnerability assessment identified six hazards in the Colusa 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
- Flood: 1%/0.2%
- Landslide, Mudslides, and Debris Flows
- Levee Failure
- Wildfire

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

The vulnerability and potential impacts from the seven 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 Hazards
- 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
- Severe Weather: High Winds and Tornadoes
- Stream Bank Erosion
- Subsidence

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 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).

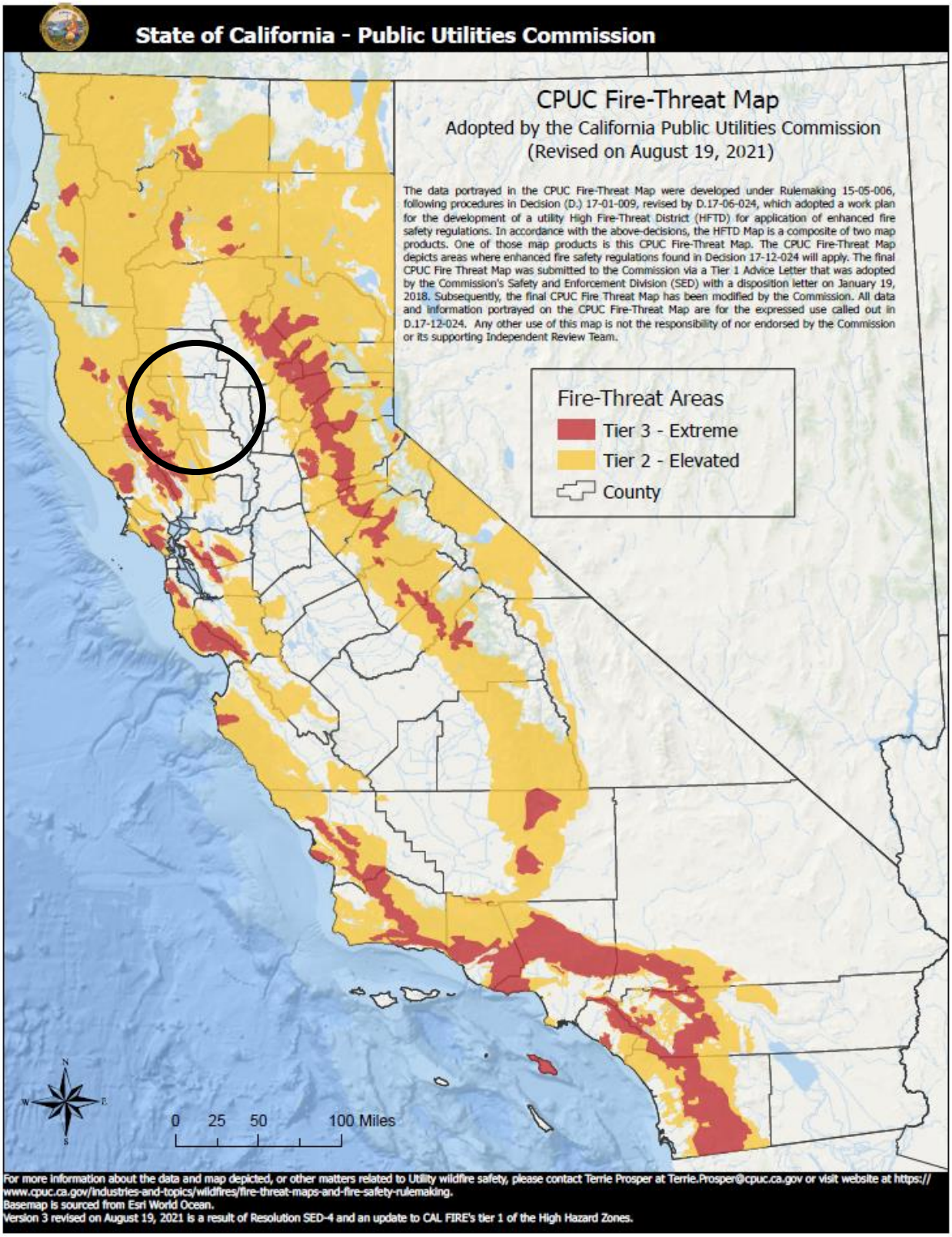
Public Safety Power Shutoff Criteria

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 4-24). 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 Colusa 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 4-24, Colusa County has areas inside the Tier 2 and Tier 3 areas, as well as areas outside of them.

Figure 4-24 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

According to records provided by jurisdictions in the Colusa County Planning Area, there have been past PSPS events.

- 2018 – 0
- 2019 – 3
- 2020 – 2
- 2021 – 3
- 2022 – 0
- 2023 – 1
- 2024 – 1

These are also discussed in each jurisdiction's respective annex to this Base Plan.

It was 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 Colusa 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 Colusa 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. 2023 was a remarkably hot year as well. In addition, the 2016-2017 year broke the record as the wettest ever recorded in the northern Sierra Nevada Mountains.

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 Colusa 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 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.

- 2010 General Plan Background Report
- 2012 Colusa County General Plan
- 2012 Sacramento River Individual Agency Summary Reports
- 2017 California Adaptation Planning Guide
- 2018 Colusa County LHMP Update
- 2020 US Census Bureau Average Household Size
- 2021 California Climate Adaptation Study
- 2021 Colusa County Community Wildfire Protection Plan
- 2021 Colusa County Groundwater Sustainability Report
- 2023 Colusa County Parcel/Assessor Data
- 2023 Fire Plan
- 2023 State of California Hazard Mitigation Plan
- 2024 Colusa County Flood Insurance Study
- Cal Adapt – Extended Drought Scenarios
- CAL FIRE (FHSZ SRA 2024, FRA & LPA 2007)
- CAL FIRE Fire History (4/13/2018)
- CAL FIRE Wildfire History Database

- Cal-Adapt
- Cal-Adapt – Number of Extreme Heat Days by Year
- Cal-Adapt – Precipitation: Decadal Averages Map
- Cal-Adapt – Temperature: Decadal Averages Map
- Cal-Atlas
- California Climate Adaptation Strategy
- California Department of Conservation, Office of Mine Reclamation
- 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 Department of Water Resources Groundwater Information Center
- California Division of Mines and Geology
- California Geological Survey
- California Geological Survey
- California Invasive Plant Council
- California Natural Resource Agency
- California Office of Emergency Services
- California's Drought of 2007-2009, An Overview. State of California Natural Resources Agency, California Department of Water Resources.
- Climate Change and Health Profile Report – Colusa County
- Climate Change Impacts in the United States
- Colusa County Agricultural Commissioner
- Colusa County Agricultural Commissioner Crop Reports (2018-2023)
- Colusa County Digital Flood Insurance Rate Map
- Colusa County Emergency Management
- Colusa County Emergency Operations Plan
- Colusa County Flood Insurance Study
- Colusa County General Plan Background Report
- Colusa County Geographic Information Services
- Colusa County Housing Element
- DSOD/Cal OES/NID Dam Status 03/24
- Enhanced Fujita Scale. National Oceanic and Atmospheric Administration Storm Prediction Center.
- Federal Emergency Management Agency – Disaster Declaration Database
- Federal Emergency Management Agency – National Flood Hazard Layer
- Federal Emergency Management Agency – Wind Zones in the United States
- Federal Emergency Management Agency: Building Performance Assessment: Oklahoma and Kansas Tornadoes
- Federal Emergency Management Agency: Multi-Hazard Identification and Risk Assessment.
- Galloway, Jr Dr. Gerald E. Levees in History: The Levee Challenge. Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR.
- Hazus-MH 6.1
- Intergovernmental Panel on Climate Change
- Levees in History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR

- LFPZ BAM (2023)
- 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 Flood Insurance Program
- National Integrated Drought Information System
- National Inventory of Dams
- National Levee Database
- 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
- Public Policy Institute of California. If drought continues: Environment and poor rural communities most likely to suffer. [press release].
- Science Magazine
- State of California Department of Conservation Farmland Mapping and Monitoring Program
- Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011)
- Underwood, E. Models predict longer, deeper US droughts. Science, 347(6223) 707 DOI: 10.1126/science.347.6223.707. 2015.
- United State Geologic Survey. Earthquake Intensity Zonation and Quaternary Deposits, Miscellaneous Field Studies Map 9093, 1977.
- US Army Corps of Engineers
- US Bureau of Reclamation
- US Department of Agriculture
- US Department of Agriculture – Farm Service Agency Secretarial Disasters Declarations
- US Department of Transportation Pipeline and Hazardous Materials Safety Administration
- US Drought Monitor
- US Farm Service Agency
- US Fish and Wildlife Service
- US Forest Service
- US Geological Survey – Biological Resource Division
- US Geological Survey – Volcanic Ash: Effect & Mitigation Strategies
- 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 Open File Report 2015-3009
- US Geological Survey Publication 2014-3120
- US Natural Resource Conservation Service
- USA Today

- USGS Quaternary Faults 03/24
- Vaisala National Lightning Detection Network
- Western Regional Climate Center

4.3.1. Severe Weather: General

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

The National Oceanic and Atmospheric Administration's (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 202 severe weather events that occurred in Colusa County between January 1, 1950, and August 31, 2023. Table 4-22 summarizes these events.

Table 4-22 NCDC Severe Weather Events for Colusa County 1950-8/31/2023*

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Cold/Wind Chill	2	0	0	0	0	$0	$0
Dense Fog	3	0	7	0	1	$0	$0
Drought	58	0	0	0	0	$0	$0
Excessive Heat	21	0	0	0	0	$0	$0
Flash Flood	1	0	0	0	0	$0	$0
Flood	13	0	0	0	0	$32,900,000	$0
Frost/Freeze	2	0	0	0	0	$0	$0
Funnel Cloud	2	0	0	0	0	$0	$0
Hail	1	0	0	0	0	$0	$0
Heat	17	0	0	0	0	$0	$0
Heavy Rain	5	0	0	0	0	$0	$0
Heavy Snow	5	0	0	0	0	$100,000	$0
High Wind	22	0	0	0	0	$35,000	$0
Strong Wind	7	0	0	0	0	$50,000	$0
Thunderstorm Wind	2	0	0	0	0	$0	$0
Tornado	4	0	0	0	0	$70,000	$0
Wildfire	13	7	1	37	5	$0	$0
Winter Storm	21	0	0	0	0	$0	$0
Winter weather	3	0	0	0	0	$0	$0
Total	**202**	**7**	**8**	**37**	**6**	**$33,155,000**	**$0**

Source: NCDC

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

The NCDC table above summarizes severe weather events that occurred in Colusa 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 Colusa 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:

- Extreme Cold and Freeze
- Extreme Heat
- Heavy Rains and Storms
- High Winds and Tornadoes

4.3.2. Severe Weather: Extreme Cold and Freeze

Hazard Profile

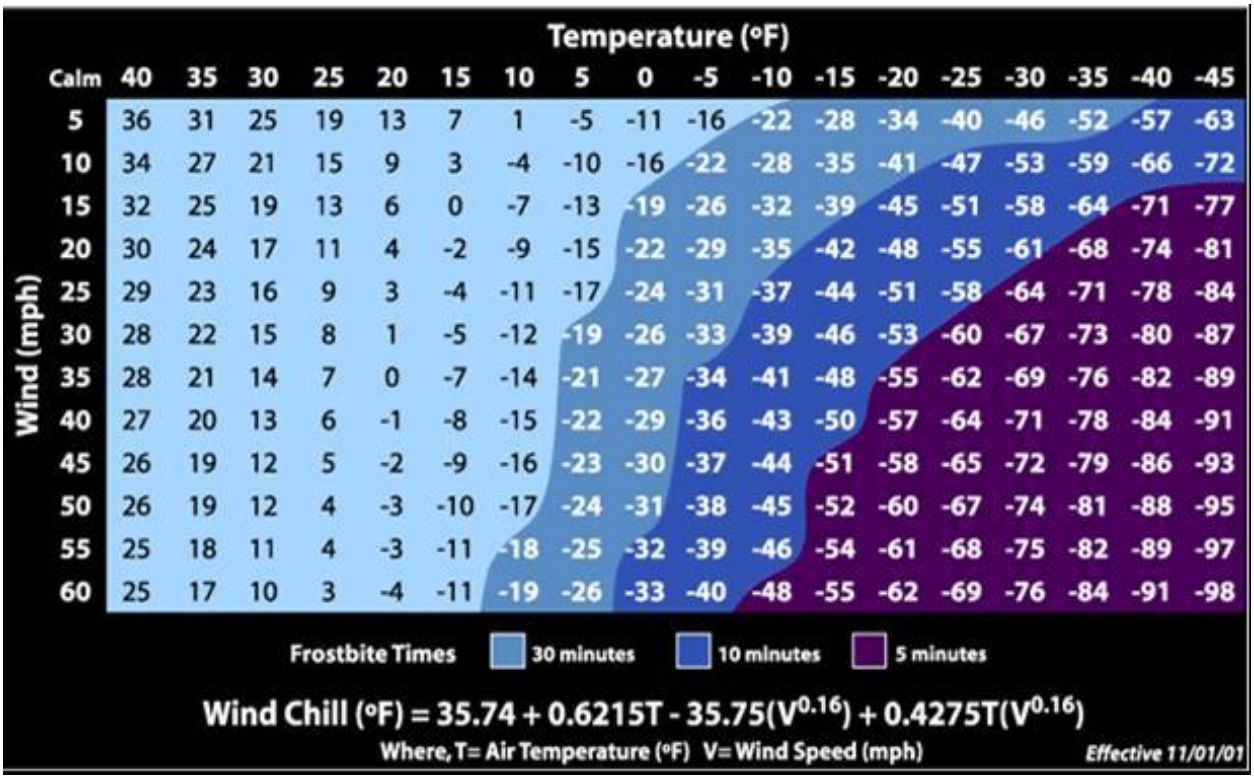
This hazard profile contains multiple sections that detail how this hazard can affect the Colusa County Planning Area and unincorporated Colusa County. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can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

Hazard/Problem Description

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. 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 Colusa County are discussed further in Section 4.3.6 Agricultural Hazards.

In 2001, the NWS implemented an updated Wind Chill Temperature index (shown in Figure 4-25), 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 4-25 Wind Chill Temperature Chart



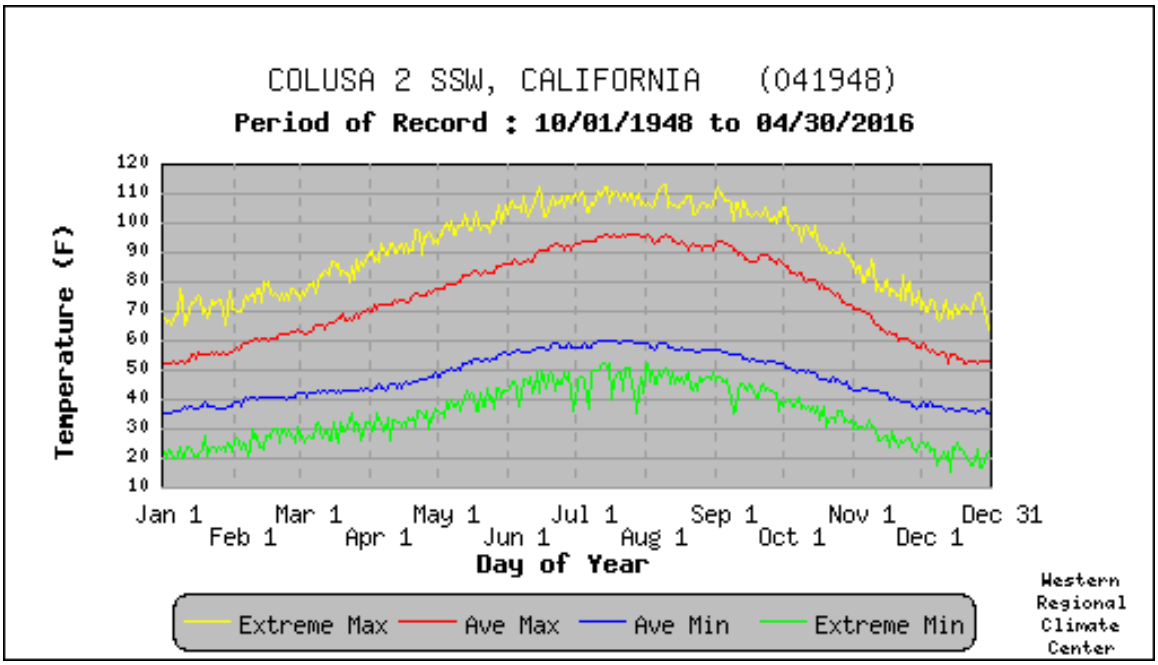
Source: National Weather Service

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 present. Therefore, both data sets are shown below. WRCC and NWS data for the County is summarized below.

Colusa County—WRCC Colusa 2 SSW Weather Station, Period of Record 1948 to 2016

According to the WRCC, in Colusa County monthly average minimum temperatures from November through April range from the mid-30s to mid-40s. The lowest recorded daily extreme was 15°F on December 12, 1972. In a typical year, minimum temperatures fall below 32°F on 25.1 days with no days falling below 0°F. Table 4-23 shows the record low temperatures by month for Colusa County. Average daily temperatures for Colusa County are shown in Figure 4-26. Snowfall is rare in the County and occurs infrequently in upper elevations of the County.

Figure 4-26 Colusa County— Colusa Daily Temperature Averages and Extremes 1948 to 2016



Source: Western Regional Climate Center

Table 4-23 Colusa County – Colusa Record Low Temperatures 1948 to 2016

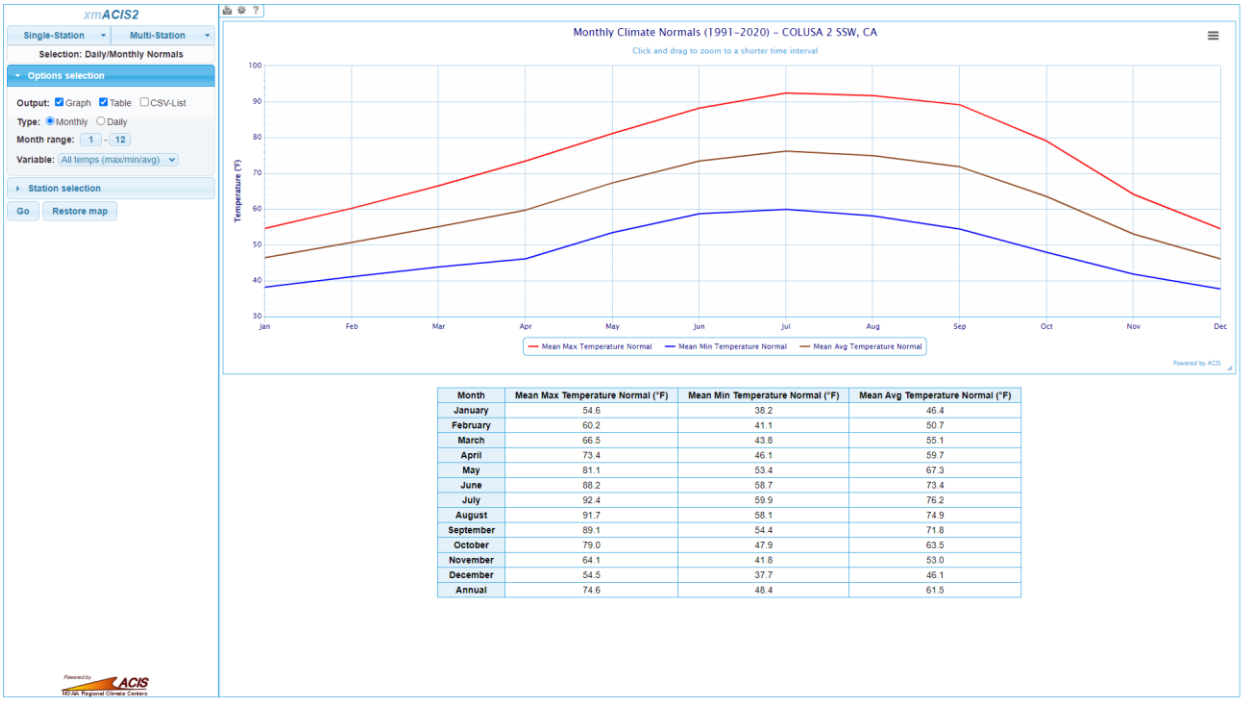
Month	Record Low	Date	Month	Record Low	Date
January	20°	1/5/1950	July	40°	7/17/1987
February	21°	2/7/1989	August	43°	8/22/1983
March	25°	3/3/1966	September	35°	9/9/1983
April	26°	4/10/1953	October	31°	10/20/1949
May	34°	5/4/1975	November	22°	11/29/1948
June	38°	6/6/1984	December	15°	12/14/1972

Source: Western Regional Climate Center

Colusa County—NWS Colusa 2 SSW Weather Station, Period of Record 1948 to 2024

According to the NWS, monthly average minimum temperatures in the coldest months (December through February) range from the mid-30s to mid-40s. The lowest recorded daily extreme was 14°F on December 16, 2022. Figure 4-27 shows the average daily low temperatures and extremes for the County. Table 4-24 shows the record low temperatures for the County.

Figure 4-27 Colusa County –Colusa 2 SSW Daily Temperature Averages and Extremes, 1991-2020



Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	54.6	38.2	46.4
February	60.2	41.1	50.7
March	66.5	43.8	55.1
April	73.4	46.1	59.7
May	81.1	53.4	67.3
June	88.2	58.7	73.4
July	92.4	59.9	76.2
August	91.7	58.1	74.9
September	89.1	54.4	71.8
October	79.0	47.9	63.5
November	64.1	41.8	53.0
December	54.5	37.7	46.1
Annual	74.6	48.4	61.5

Source: National Weather Service XMAC site. Retrieved 3/19/2024

Table 4-24 Colusa County – Colusa Record Low Temperatures 1948 to 2024

Temperature	Date
14.0°	12/16/2022
14.0°	12/15/2022
15.0°	12/19/2022
15.0°	12/18/2022
15.0°	12/14/1972
15.0°	12/11/2023
17.0°	12/10/2023
17.0°	12/9/2023
17.0°	12/14/2022
17.0°	12/28/1956

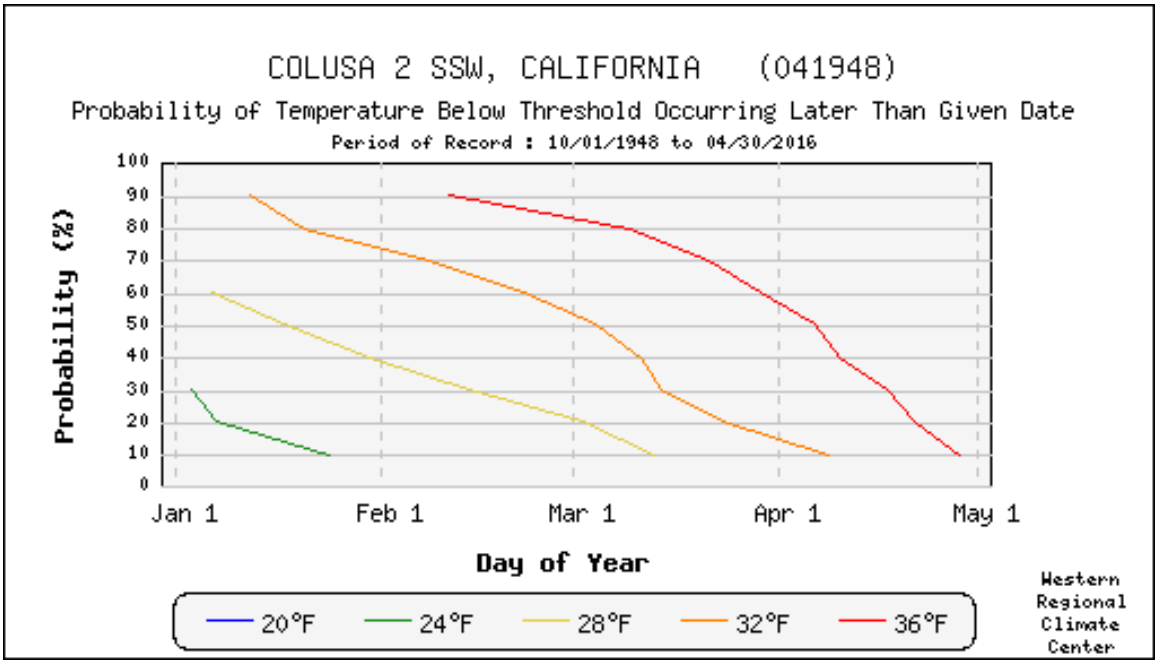
Source: National Weather Service XMAC site. Retrieved 3/19/2024

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 at greater risk. Extreme cold can affect agricultural products in the County. Freeze damages reduce the values of agricultural crops. While there is no scale (i.e. Richter, Enhanced Fujita) to measure the effects of freeze,

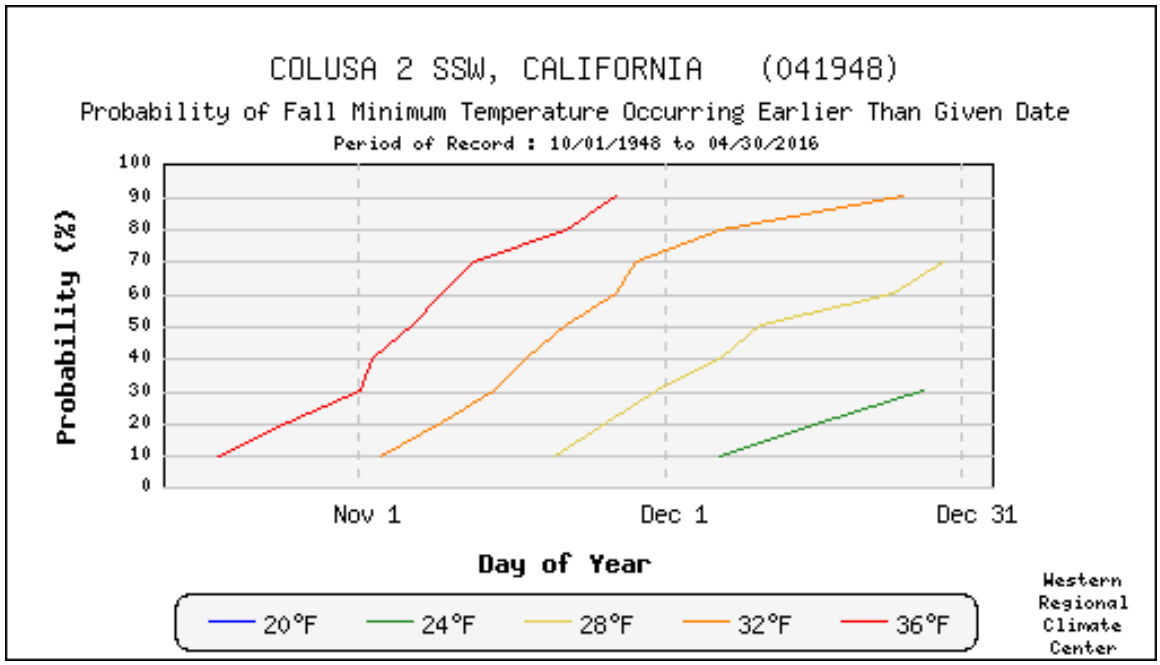
temperature data from the County from the WRCC indicates that there are 25.1 days that fall below 32°F. Freeze has a slow onset and can generally be predicted in advance for the County. Freeze events can last for hours (in a cold overnight), or for days to weeks at a time. Figure 4-28 and Figure 4-29 show the probabilities in the 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 4-28 Colusa County – Colusa Spring Freeze Probabilities



Source: Western Regional Climate Center. Retrieved 3/19/2024.

Figure 4-29 Colusa County – Fall Freeze Probabilities



Source: Western Regional Climate Center. Retrieved 3/19/2024.

Past Occurrences

Disaster Declaration History

The County has had two past federal and three past state disaster declarations for extreme cold and freeze. Table 4-25 shows the dates of the disaster declarations. More information on USDA disaster declarations (in 2017 and twice in 2022) from cold and freeze can be found in Table 4-42 in the Past Occurrences in Section 4.3.6.

Table 4-25 Colusa County – Federal and State Disaster Declarations for Freeze 1950-2018

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Freeze	2	1972, 1990	3	1970, 1972, 1990

Source: Cal OES, FEMA

NCDC Events

The NCDC data shows 4 extreme cold and freeze incidents for Colusa County since 1993. Information for these events is shown in Table 4-26.

*Table 4-26 NCDC Cold and Freeze Events for Colusa County 1950-8/31/2023**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Cold/Wind Chill	2	0	0	0	0	$0	$0
Frost/Freeze	2	0	0	0	0	$0	$0
Total	**4**	**0**	**0**	**0**	**0**	**$ 0**	**$0**

Source: NCDC

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

Hazard Mitigation Planning Committee Events

The HMPC noted that cold and freeze events occur on a regular basis in the winter months in the County. The following specific events were noted by the HMPC:

February 2022 - Colusa experienced record low temperatures in February of 2022. These lows were especially devastating due to the length of time the temperatures stayed below freezing. Multiple monitors throughout the county registered 23.8° F for 9 hours. For 5 days, the icy weather persisted during the peak of the non-peril bloom.

Goat Mountain 2023 Winter Storm - Goat Mountain Road is a mountainous, rural gavel road, located in western Colusa County. The subject location is approximately 20 wide with a 24" corrugated galvanized culvert. The culvert failed during the event which was exasperated by the recurrence of natural spring in the toe of the roadway cutback up gradient of the culvert failure. The spring then began saturating the remaining road prism at the culvert failure, destabilizing the entire slope. In order to preserve the roadway, a 'French Drain' was installed up gradient of the failed culvert to intercept the subsurface water from the spring. This water was then directed across the road and away from the failed 24' culvert by way of a new 18" culvert. The 24" cross culvert was replaced and both the new 18" and 24" culverts were backfilled with native material and class II road base.

Likelihood of Future Occurrence

Highly Likely—Extreme cold and freeze are likely to continue to occur annually in the Colusa County Planning Area. According to the WRCC, in a typical year, minimum temperatures fall below 32°F on 25.1 days. 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 and freeze 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.

Vulnerability Assessment

Vulnerability—Medium

Extreme cold and freeze events happen in the Colusa 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 and freeze. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

The varying elevations in the County, in part, determine the extent to which a given area is affected by freeze and cold. 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 several USDA disaster declarations including the ones noted above in the Past Occurrences section.

Assets at Risk

Assets at risk from extreme cold and freeze 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 Colusa County Planning Area and unincorporated Colusa County.

People and Populations

All populations within the Colusa County Planning Area are vulnerable to extreme cold and freeze, but this hazard generally affects people 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.

Structures

Structures in the Colusa County Planning Area have some measure of risk from extreme cold and freeze. 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. Structures can also be damaged by downed trees during freeze and winter storm events.

Critical Facilities and Infrastructure

Winter storms (though rare in the County) typically involve snow and ice, occasionally accompanied by high winds, 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 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.

Community Lifelines

Secondary impacts of freeze can affect the supporting mechanisms or systems of a community's infrastructure. For example, when extreme cold is coupled with high winds or ice storms, power lines may be downed, resulting in an interruption in the transmission of that power shutting down electric furnaces, which may lead to frozen pipes in homes and businesses. Community lifelines are likely to be affected to some degree by extreme cold and freeze events. Impacts to these lifelines include:

- **Safety and Security** – Police and fire personnel may see additional demand during periods of extreme cold.
- **Food, Hydration, Shelter** – Warming centers and other public shelters will need to be open and staffed.
- **Health and Medical** – Though rare, hypothermia may cause additional strains on medical facilities in the area.
- **Energy** – Freezing rain can cause power outages as power lines get heavy from the additional weight of ice.
- **Water Systems** – Water lines (both fresh and wastewater) above ground can freeze, causing burst pipes. This is true when temperatures are below freezing for a longer period of time.

Due to the limited nature of extreme cold and freeze in the Colusa County Planning Area, community lifelines are unlikely to be overwhelmed.

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 Colusa 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.

Economic Assets and Community Activities of Value

Many economic assets within the Colusa County Planning Area are not highly vulnerable to extreme cold events. However, during periods of extreme cold and freeze, the economy may slow as people stay home or inside. The greatest economic asset at risk is the agricultural industry. The varying elevations in the County, in part, determine the extent to which a given area is affected by freeze and cold. 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 several USDA disaster declarations in Colusa County. Additionally, commercial business revenue, including taxable shopping revenue may be reduced during periods of extreme cold (though this is expected to be limited in Colusa County). Extreme cold and freeze causes power costs borne by individuals and businesses in the Colusa County Planning Area to increase, which reduces the amount of money available to circulate inside the local economy. Community activities of value may see a reduction in attendance, impacting revenues associated with these events, especially those that occur outdoors.

Impacts from Severe Weather: Extreme Cold and Freeze

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 Colusa County Planning Area. Infrastructure such as roads and utilities are at risk to freezing temperatures, 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 a 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 Colusa County include the following:

- Climate change is unlikely to exacerbate extreme cold and freeze and their associated impacts to the County.
- The population of Colusa County is expected to decrease as time progresses. 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, 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 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. County 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 County to this hazard.

Future development built to code should be able to withstand extreme cold and freeze. 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 Colusa 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

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. 2023 was considered the hottest on record. Extreme heat can also affect the agricultural industry. Extreme heat as it affects agriculture in Colusa 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.

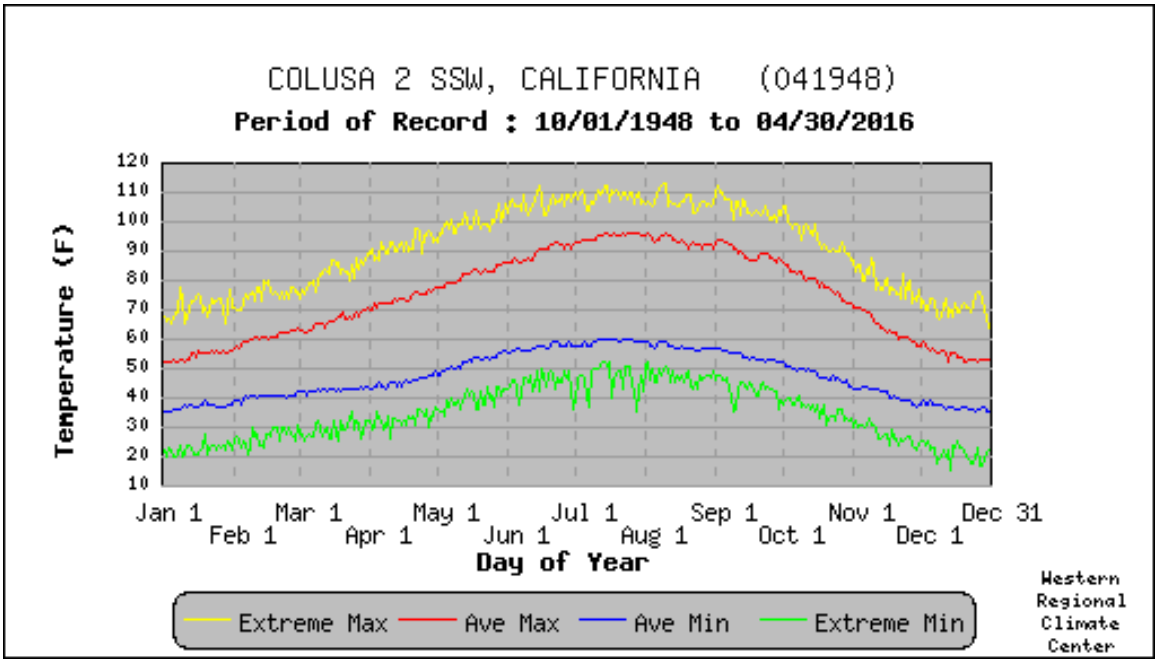
Location and Extent

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 Western Regional Climate Center (WRCC) and National Weather Service (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 present. Therefore, both data sets are shown below. WRCC and NWS data for the County is summarized below.

Colusa County— WRCC Colusa 2 SSW Weather Station, Period of Record 1948 to 2016

According to the WRCC, in Colusa County, monthly average maximum temperatures in the warmest months (May through October) range from the mid-70s to the low 90s. The highest recorded daily extreme was 113°F on August 9, 1978. In a typical year, maximum temperatures exceed 90°F on 88.9 days. Figure 4-30 shows the average daily high temperatures and extremes for the County. Table 4-27 shows the record high temperatures by month for the County.

Figure 4-30 Colusa County— Colusa Daily Temperature Averages and Extremes 1948 to 2016



Source: Western Regional Climate Center. Retrieved 3/19/2024

Table 4-27 Colusa County – Colusa Record High Temperatures 1948 to 2016

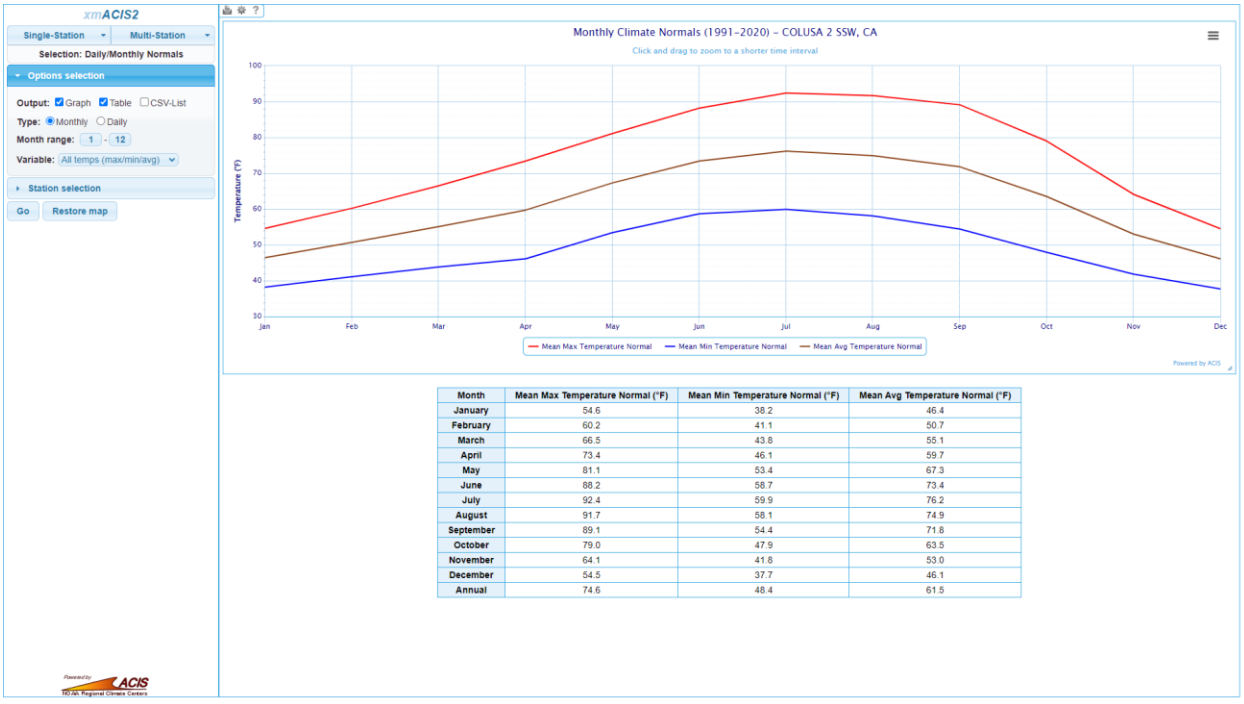
Month	Record High	Date	Month	Record High	Date
January	78°	1/8/1962	July	112°	7/14/1972
February	80°	2/14/1977	August	113°	8/9/1978
March	89°	3/31/1966	September	112°	9/2/1950
April	98°	4/21/2009	October	105°	10/2/2001
May	106°	5/31/1950	November	89°	11/27/1949
June	112°	6/15/1961	December	76°	12/26/1967

Source: Western Regional Climate Center

Colusa County—NWS Colusa 2 SSW Weather Station, Period of Record 1948 to 2024

According to the NWS, monthly average maximum temperatures in the warmest months (May through October) range from the mid-70s to the low 90s. The highest recorded daily extreme was 113°F on August 9, 1978. Figure 4-31 shows the average daily high temperatures and extremes for the County. Table 4-24 shows the record low temperatures for the County.

Figure 4-31 Colusa County –Colusa 2 SSW Daily Temperature Averages and Extremes, 1991-2020



Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	54.6	38.2	46.4
February	60.2	41.1	50.7
March	66.5	43.8	55.1
April	73.4	46.1	59.7
May	81.1	53.4	67.3
June	88.2	58.7	73.4
July	92.4	59.9	76.2
August	91.7	58.1	74.9
September	89.1	54.4	71.8
October	79.0	47.9	63.5
November	64.1	41.8	53.0
December	54.5	37.7	46.1
Annual	74.6	48.4	61.5

Source: National Weather Service XMAC site. Retrieved 3/19/2024

Table 4-28 Colusa County – Colusa Record High Temperatures 1948 to 2024

Temperature	Date
114.0°	9/7/2022
113.0°	8/10/1978
113.0°	8/9/1978
112.0°	9/6/2022
112.0°	8/8/1978
112.0°	7/15/1972
112.0°	7/14/1972
112.0°	6/15/1961
112.0°	9/2/1950
111.0°	7/4/1991

Source: National Weather Service XMAC site. Retrieved 3/19/2024

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 4-29.

Table 4-29 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.

NCDC Events

The NCDC data shows 38 extreme heat incidents for Colusa County since 1993. Information for these events are shown in Table 4-30.

*Table 4-30 NCDC Extreme Heat Events in Colusa County 1993 to 8/31/2023**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Excessive Heat	21	0	0	0	0	$0	$0
Heat	17	0	0	0	0	$0	$0
Total	**38**	**0**	**0**	**0**	**0**	**$ 0**	**$0**

Source: NCDC

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

Hazard Mitigation Planning Committee Events

2014 to 2016 – The HMPC did indicate that between 2014 and 2016, some trees within the County experience Sudden Limb Drop which can occur during hot weather.

2022 – a heat dome settled over the County. It ruined the quality (but not the production) of the walnut crop. There were limits on charging electric cars due to brownouts. Requirements were removed for air pollution so generators could be run longer. The Sacramento Basin could run their generators longer because of grid issues. Fortunately for Colusa County, the rural nature of the County meant that only minor air quality issues occurred.

Likelihood of Future Occurrence

Highly Likely—Temperature extremes are likely to continue to occur annually in the Colusa County Planning Area. Temperatures at or above 90°F are common most summer days in the County. It is likely that climate change will increase the chance of future occurrence as well as future impacts. 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

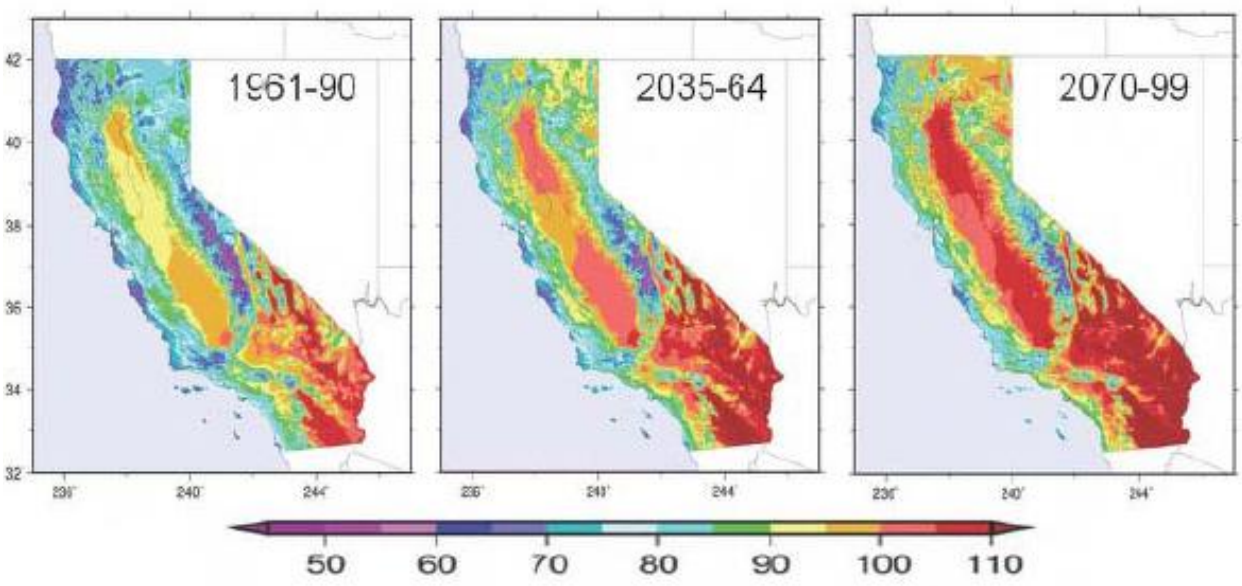
Climate change and its effect on extreme heat in the County has been discussed by three sources:

- California Climate Adaptation Strategy (CAS) – 2021
- Climate Change and Health Profile Report –Colusa County
- Cal-Adapt

Climate Adaptation Strategy

The 2021 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 4-32.

Figure 4-32 California Historical and Projected Temperature Increases – 1961 to 2099



Source: Dan Cayan; California Climate Adaptation Strategy

As temperatures increase, California and Colusa 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 2021 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 Colusa County.

Climate Change and Health Profile Report – Colusa County

The CCHPR noted for Colusa 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.

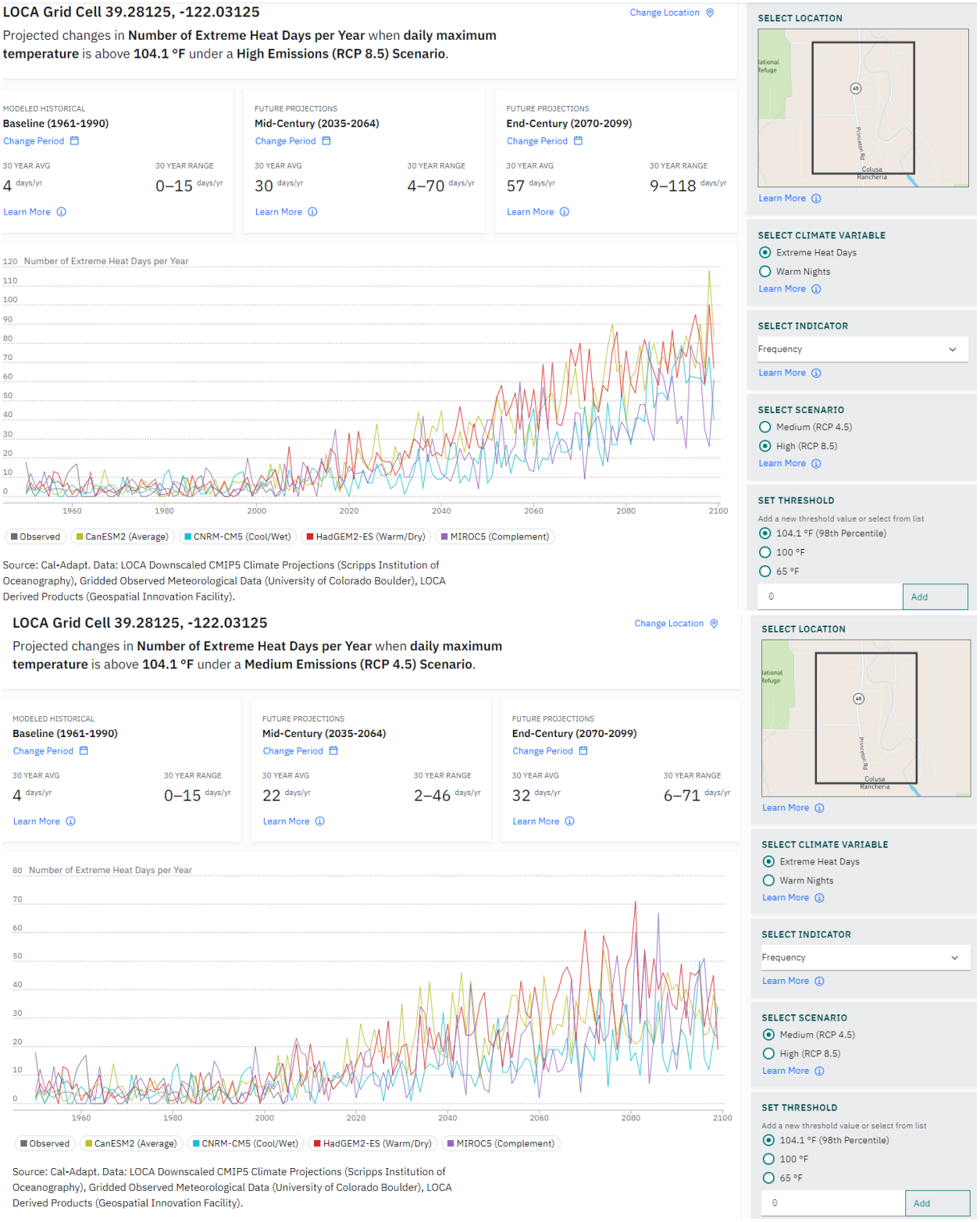
Cal-Adapt

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 Colusa County Planning are shown in Figure 4-33. It shows the following:

- The upper chart shows number of days in a year when daily maximum temperature is above the extreme heat threshold of 90.0°F. Data is shown for Colusa County under the RCP 8.5 scenario in which emissions continue to rise strongly through 2050 and plateau around 2100.
- The lower chart shows number of days in a year when daily maximum temperature is above the extreme heat threshold of 90.0 °F. Data is shown for Colusa County under the RCP 4.5 scenario in which emissions peak around 2040, then decline.

Figure 4-33 Colusa County – Future Temperature Estimates in Low and High Emission Scenarios



Source: Cal-Adapt – Number of Extreme Heat Days by Year. Retrieved 3/5/2024.

Vulnerability Assessment

Vulnerability—Medium

Extreme heat is becoming more frequent, intense, longer lasting and geographically widespread. Extreme heat occurs on an annual basis in the Colusa County Planning Area. In recent years, compounded by climate change conditions, summer months continue to get a bit hotter.

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 Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

The HMPC 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. Heat domes have settled over the County in the past, which have caused the County to open cooling centers.

Assets at Risk

Assets at risk from extreme heat 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 Colusa County Planning Area and unincorporated Colusa County.

People and Populations

All populations within the Colusa 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 Colusa 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.

Community Lifelines

Community lifelines are likely to be affected to some degree by extreme heat events. Impacts to these lifelines include:

- **Safety and Security** – Police and fire personnel may see additional demand during periods of extreme heat. This may also cause emergency responders to be exposed to the effects of higher heat.
- **Food, Hydration, Shelter** – Water distribution may need to occur during extreme heat events. Cooling centers and other public shelters will need to be open and staffed.
- **Health and Medical** – Heat stroke and exhaustion may occur with greater frequency. This can cause EMS and medical personnel to have a large influx of those needing medical attention.
- **Energy** – Power outages can occur in extreme heat situations. Power outages during extreme heat can cause air conditioning systems to go offline, causing injuries or deaths. PSPS events can also occur during times of extreme heat, causing the electric grid to temporarily go offline.
- **Communication**s – Communication infrastructure may be impacted during extreme heat events. Alert warnings and messages may need to be given to the general public. These systems can be temporarily overloaded during emergency events. They also could be affected during related power outages. Communications and IT equipment located inside these facilities may also be at risk to extreme heat.
- **Water Systems** – Water and wastewater systems can be taxed during extreme heat events.

While community lifelines can be affected by extreme heat events, they are not likely to be overwhelmed with the exception of the power grid. As discussed above, extreme heat can contribute to power interruptions and outages that can lead to additional impacts and concerns. Backup power sources should be in place to keep critical facilities and community lifelines online and functioning.

Natural, Historic, and Cultural Resources

Park areas and natural resource assets in the Colusa 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 Colusa 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.

Economic Assets and Community Activities of Value

Most economic assets within the Colusa County Planning Area are not vulnerable to extreme heat events. One of the larger economic drivers in Colusa County is the agricultural sector. During periods of extreme temperatures, crops may be damaged. This is discussed in more detail in Section 4.3.6. During periods of extreme heat, the economy may slow as people stay home or inside. Commercial business revenue, including taxable shopping revenue may be lost during periods of extreme heat. Additionally, extreme heat causes power costs borne by individuals and businesses in the Planning Area to increase, which reduces the amount of money available to circulate inside the local economy. Community activities of value may see a reduction in attendance, impacting revenues associated with these events, especially those that occur outdoors. This includes the County Fair, Farm Show, rodeos, craft fairs, and hunting and fishing seasons.

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. During these times, drought conditions may worsen and the Planning Area may see an increase in dry fuels contributing to wildfires. Also, power outage and PSPS events may occur during these times as well. 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.

Extreme heat may also cause drought-like conditions. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist. Drought is discussed further in Section 4.3.9 and wildfire in Section 4.3.17. Extreme heat can also contribute to initiation of PSPS events.

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 Colusa 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 decrease for Colusa County; however, the vulnerability to this hazard may increase 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. 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. Components of such a plan might include forecasting and monitoring, education and awareness, and heat wave preparedness and response.

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 Colusa 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

Storms in the Colusa 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 Colusa 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.

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

Location and Extent

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. Most of these rains occur during the winter months, as discussed below.

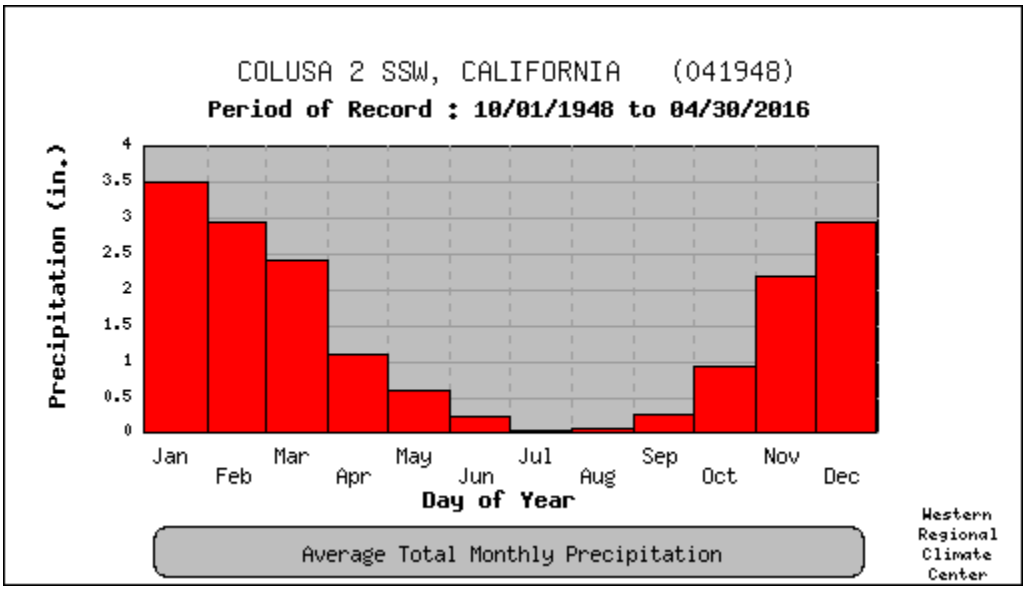
There is no scale by which heavy rains are measured – usually it is measured in terms of rainfall amounts. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. 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 Western Regional Climate Center (WRCC) and National Weather Service (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 present. Therefore, both data sets are shown below. WRCC and NWS data for the County is summarized below.

Colusa County—WRCC Colusa 2 SSW Weather Station, Period of Record 1948 to 2016

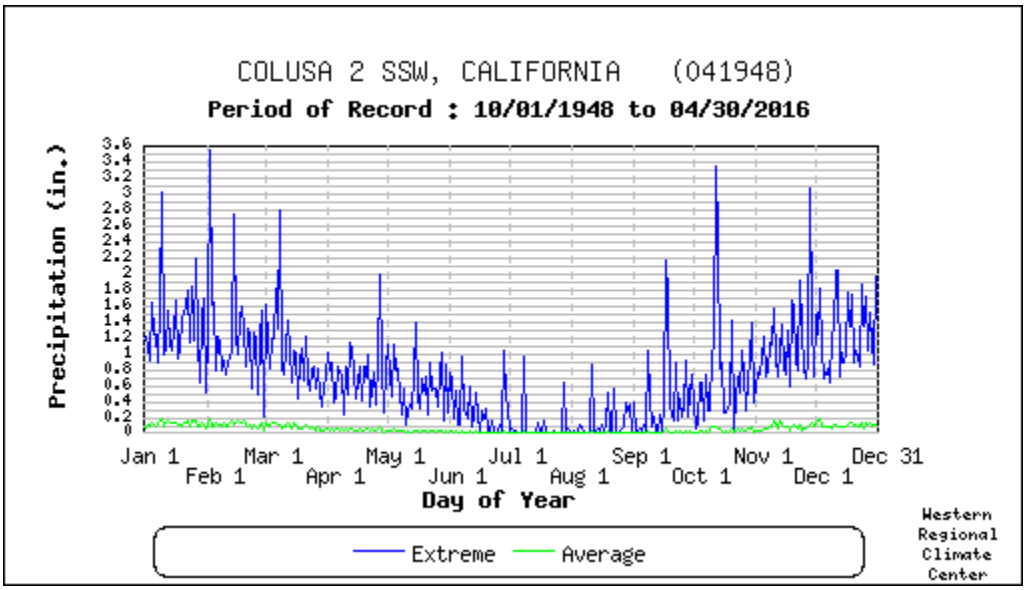
According to the WRCC, average annual precipitation in Colusa County is 16.22 inches per year. The highest recorded annual precipitation is 35.68 inches in 1983; the highest recorded precipitation for a 24-hour period is 3.56 inches on February 2, 1998. The lowest recorded annual precipitation was 4.20 inches in 1976. Average monthly precipitation for Colusa County is shown in Figure 4-34. Daily average and extreme precipitations are shown in Figure 4-35.

Figure 4-34 Colusa County—Colusa Monthly Average Total Precipitation 1948 to 2016



Source: Western Regional Climate Center. Retrieved 3/19/2024

Figure 4-35 Colusa County—Colusa Daily Average and Extreme Precipitation 1948 to 2016

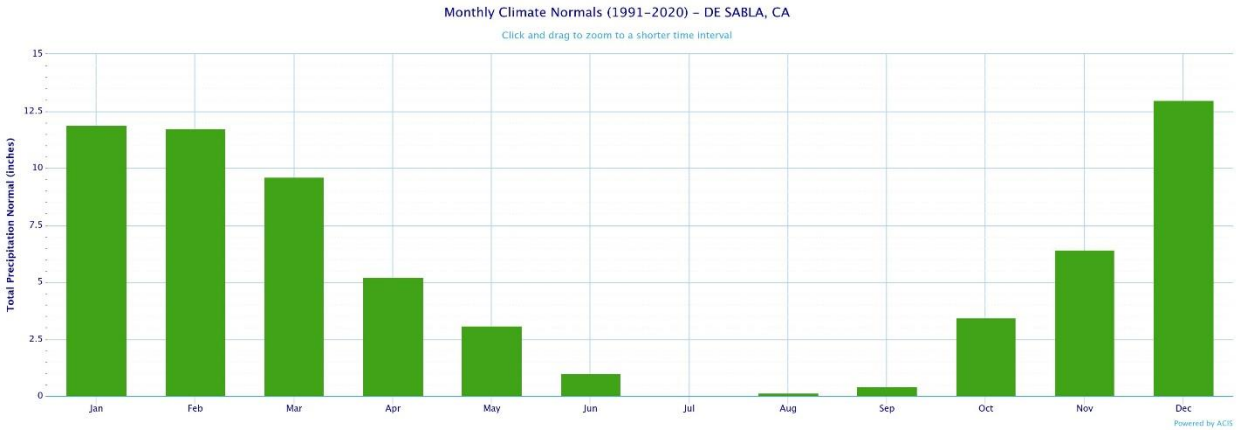


Source: Western Regional Climate Center. Retrieved 3/19/2024.

Colusa County—NWS Colusa 2 SSW Weather Station, Period of Record 1948 to 2024

According to the NWS, average annual precipitation in Colusa County is 16.2 inches per year. Average monthly precipitation for Colusa County is shown in Figure 4-36. One day extreme precipitations are shown on Table 4-31.

Figure 4-36 Colusa County— Colusa Monthly Average Total Precipitation 1991 to 2020



Source: National Weather Service XMAC site. Retrieved 3/18/2024.

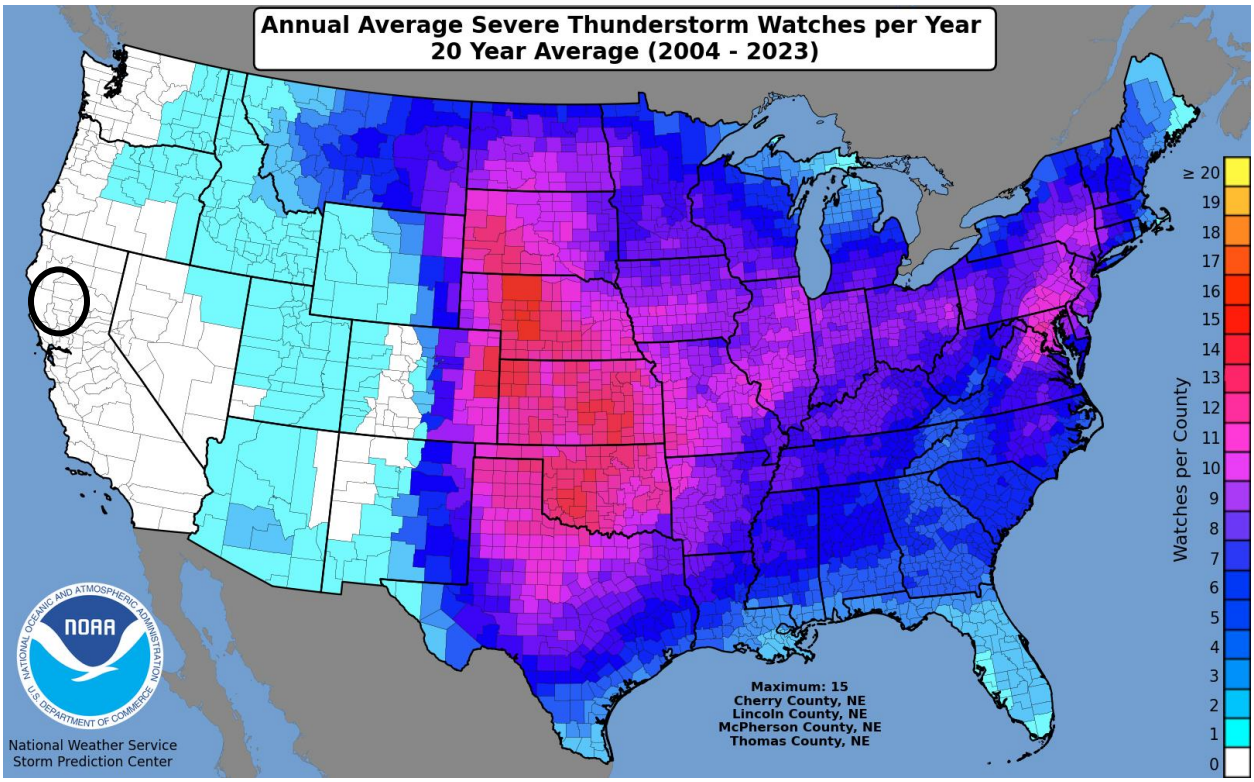
Table 4-31 Colusa County – Colusa 24 Hour Rainfall Extremes from 1948 to 2024

One Day Rainfall Totals	Date
3.56	2/2/1998
3.35	10/2/1962
3.07	11/28/1970
3.03	1/9/1995
2.80	3/8/1995
2.74	2/14/1986
2.50	2/18/2017
2.45	10/13/1962
2.31	2/14/2019
2.20	1/26/2008

Source: National Weather Service XMAC site. Retrieved 3/18/2024.

The NOAA Storm Prediction Center tracks thunderstorm watches on a county basis. Figure 4-37 shows thunderstorm watches in Colusa County and the United States for a 20-year period between 2004 and 2023.

Figure 4-37 Colusa County – Average Thunderstorm Watches per Year (2004 to 2023)



Source: NOAA Storm Prediction Center. Retrieved 3/5/2024.

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 Colusa 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 National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4-32 indicates the hailstone measurements utilized by the National Weather Service.

Table 4-32 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

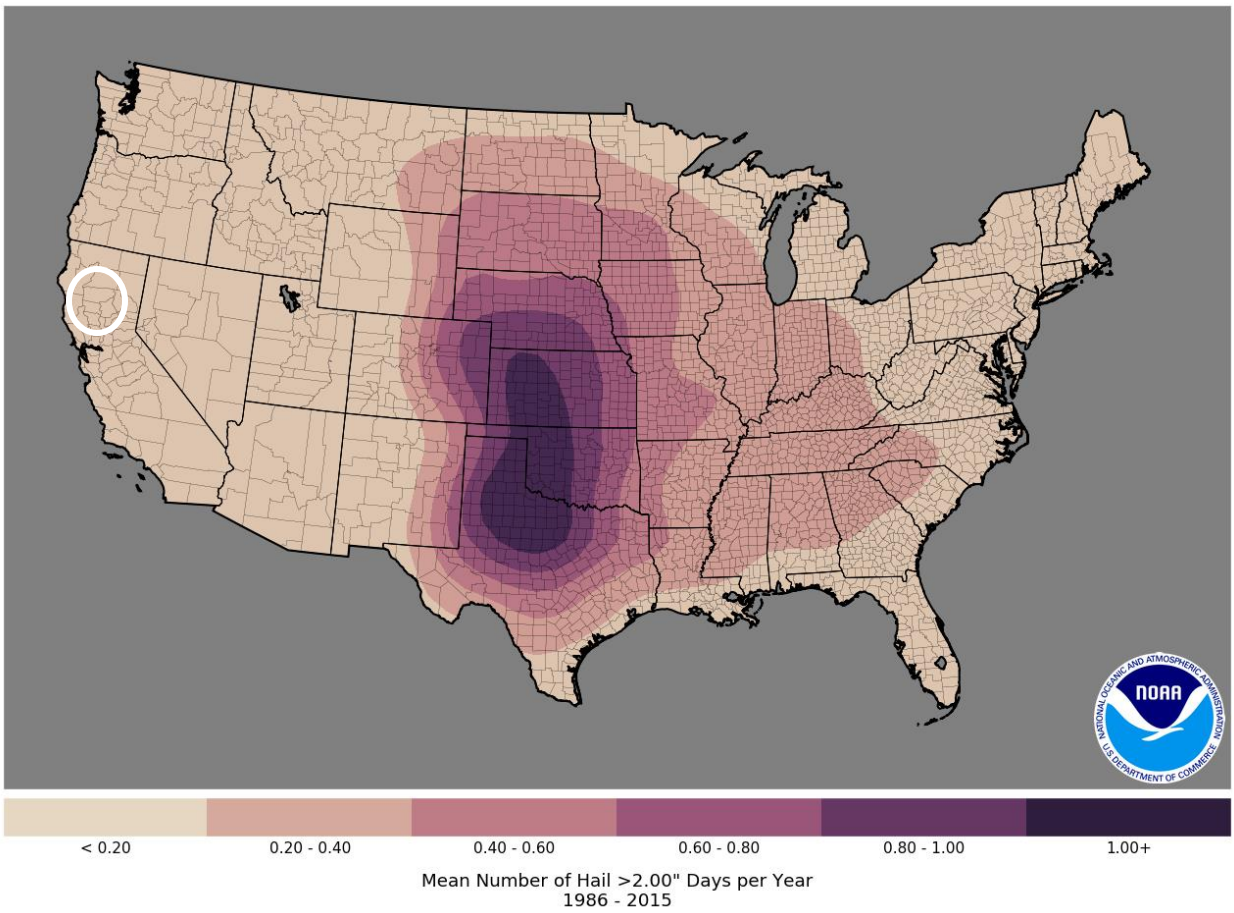
Average Diameter	Corresponding Household Object
1.5 inch	Ping-pong ball
1.75 inch	Golf-Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

Location and Extent

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 National Weather Service tracks hail events. Figure 4-38 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 4-38 Colusa County – Average Hail Days per Year (1986 to 2015)



Source: National Weather Service

Lightning

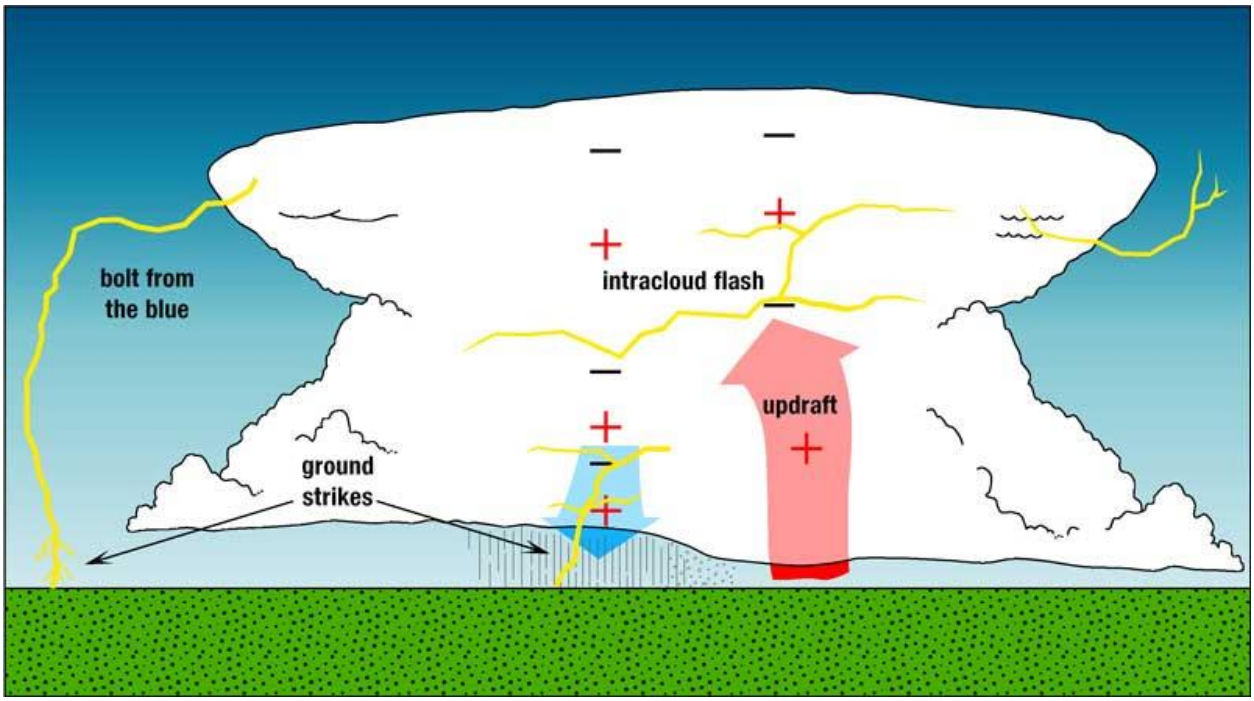
Lightning can occur throughout the County during storm events. Lightning is defined by the NWS as any and all of the various forms of visible electrical discharge caused by thunderstorms. Thunderstorms and lightning are usually (but not always) accompanied by rain. Cloud-to-ground lightning can kill 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 4-39). 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 4-39 Cloud to Ground Lightning



Source: National Weather Service

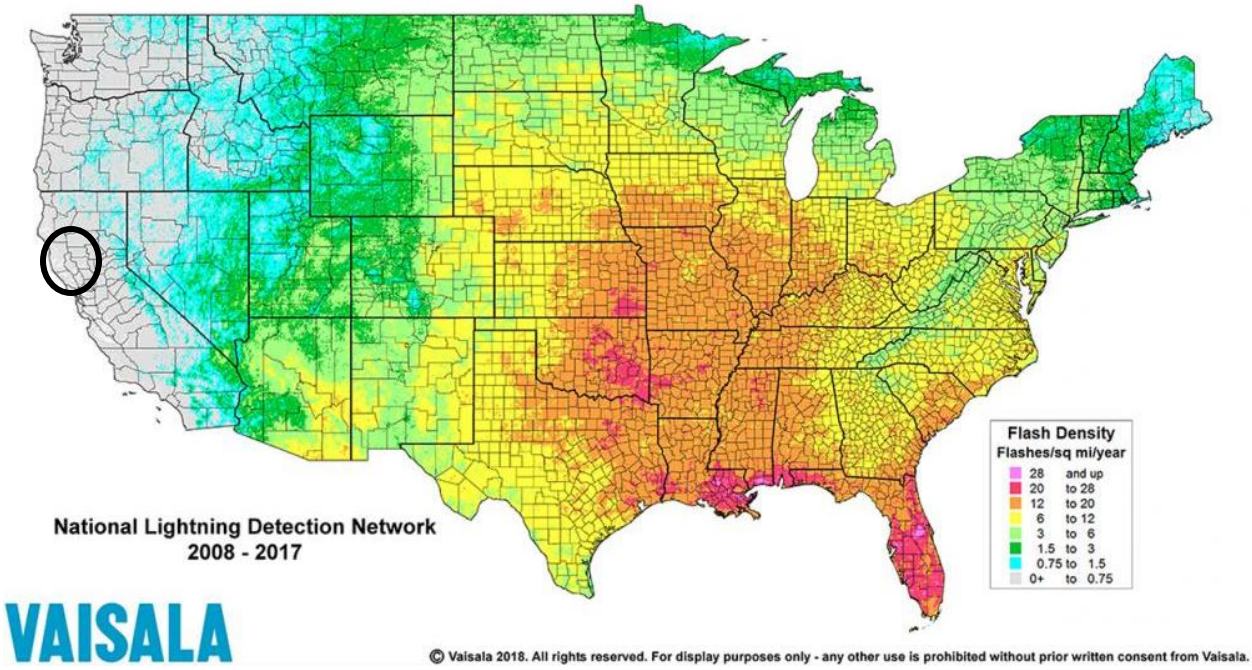
Lightning in the County is also a concern due to the number of fires that are started by lightning strikes. Wildfire is discussed in more detail in Section 4.3.17.

Location and Extent

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 rare in the County, as discussed in the extent section below.

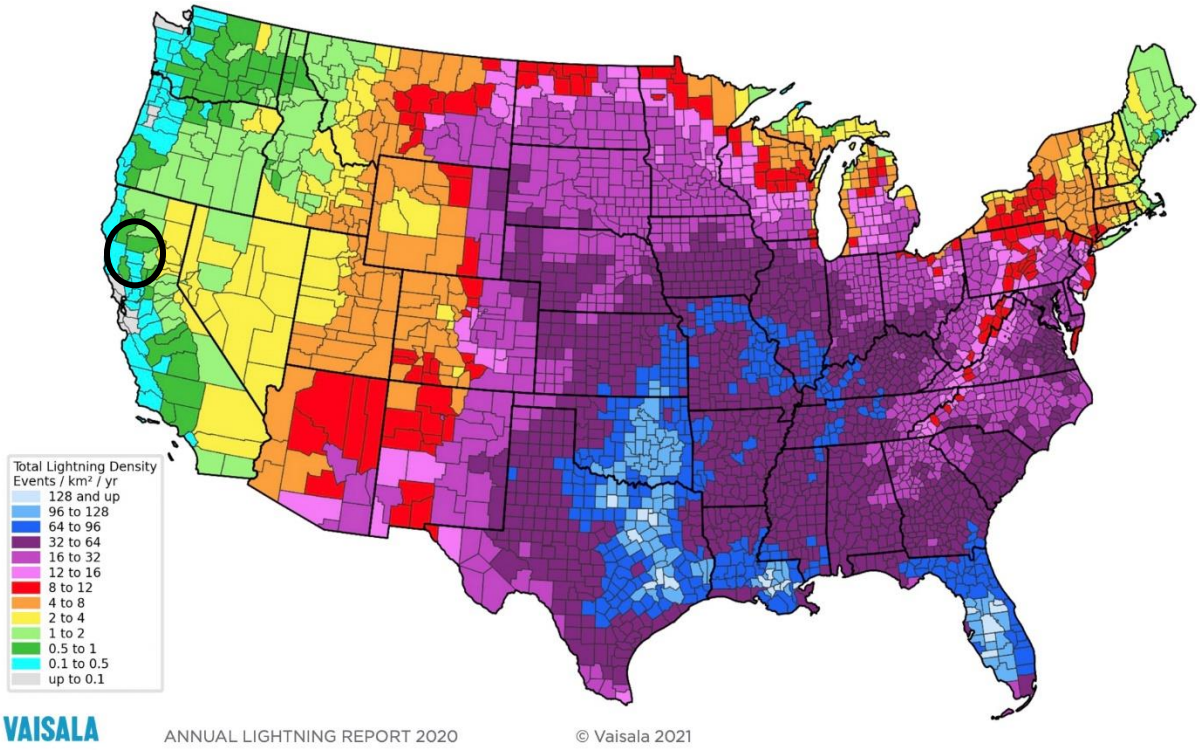
Lightning in the County can occur during thunderstorms. The speed of onset of thunderstorms that can cause lightning can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of thunderstorms in California is often short, ranging from minutes to hours. 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 4-40 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 4-41 shows a more recent lightning density by county map.

Figure 4-40 Colusa County – Lightning Incidence Map 2008 to 2017



Source: Vaisala National Lightning Detection Network. Retrieved 3/5/2024.

Figure 4-41 Colusa County – Average US Total Lightning Density per County 2015-2019



Source: Vaisala National Lightning Detection Network. Retrieved 3/5/2024.

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 4-33. More information on USDA disaster declarations from heavy rain and storms (twice in 2016) can be found in Table 4-42 in the Past Occurrences in Section 4.3.6.

Table 4-33 Colusa County – Disaster Declarations from Heavy Rain and Storms 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: FEMA, Cal OES

NCDC Events

The NCDC data recorded 30 hail, heavy rain, and winter storm and weather incidents for Colusa County since 1950. Winter weather events tend to be rain in the lower elevations of the County, while relatively rare, snow can fall in the upper elevations. No incidents of lightning were found in the NCDC database for the County. A summary of these events is shown in Table 4-34

*Table 4-34 NCDC Severe Weather Events in Colusa County 1950-8/31/2023**

	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Hail	1	0	0	0	0	$0	$0
Heavy Rain	5	0	0	0	0	$0	$0
Winter Storm	21	0	0	0	0	$0	$0
Winter Weather	3	0	0	0	0	$0	$0
Total	**30**	**0**	**0**	**0**	**0**	**$ 0**	**$0**

Source: NCDC

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

Hazard Mitigation Planning Committee Events

The County maintains a list of EOC activations by hazard. EOC activations from 2008 to 2024 are shown in Table 4-35.

Table 4-35 Colusa County – EOC Activations for Heavy Rains 2008-2024

Disaster Type	EOC Activations	
	Count	Date
Flood and Storms	6	1/2008; 1/2010, 3/2011; 11/2012; 2/2017, 1/2019

Source: Colusa County OES

The HMPC also noted the following events:

- **January 17th to 21st, 2010**. Periods of heavy rain (up to 8 inches in some areas of the valley) and high winds (logged as high as 56 mph) pounded the county fairly steadily during this time period. Power outages in various locations began on 1/20/10 from about 10:00 AM, with Sutton Road in Maxwell being the last area to have power restored at 11:00 PM on the 21st. Several road closures were made in typical low lying areas. Highway 20 closed, first with one-way controlled traffic, then east and westbound lanes closed around 3:00PM on the 21st.

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.

Likelihood of Future Occurrence

Highly Likely – Based on NCDC data and HMPC input, 30 heavy rain and storm incidents over a 73-year period (1950-2023) equates to a severe storm event every 2.4 years. As noted, this database likely doesn't capture all heavy rain, hail, lightning, and winter weather events. Severe weather is a well-documented seasonal occurrence that will continue to occur often in the Colusa 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.

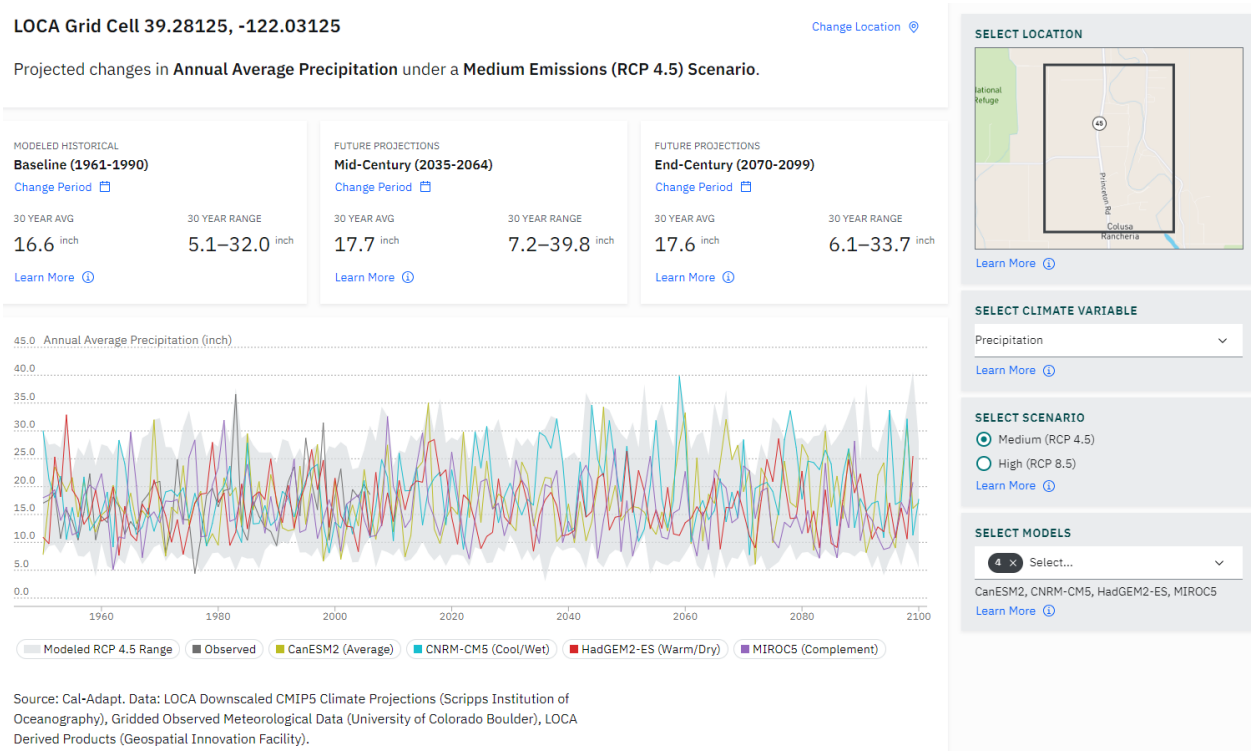
Climate Change and Heavy Rains and Storms

According to the 2021 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.

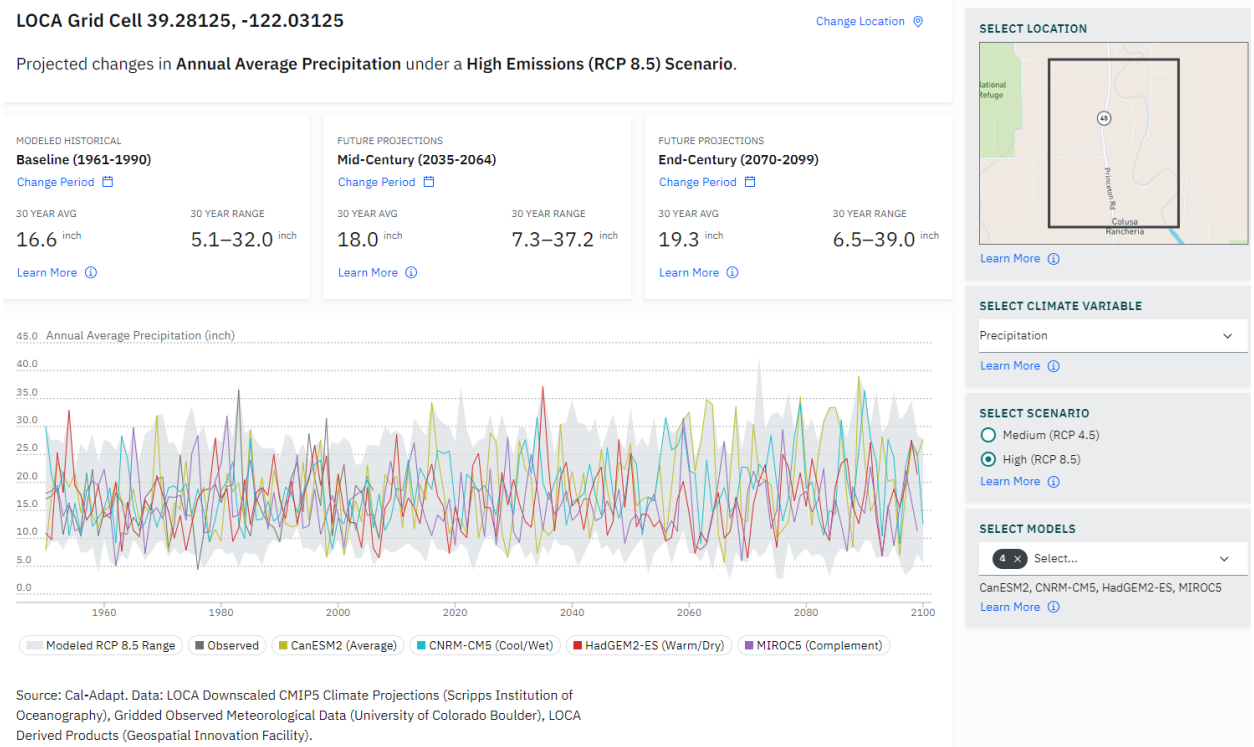
Cal-Adapt noted that, on average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century. The Mediterranean seasonal precipitation pattern is expected to continue, 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 4-42.

- 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 4-42 Colusa County– Future Precipitation Estimates: High and Low Emission Scenarios



Source: Cal-Adapt. Data: LOCA Downscaled CMIP5 Climate Projections (Scripps Institution of Oceanography), Gridded Observed Meteorological Data (University of Colorado Boulder), LOCA Derived Products (Geospatial Innovation Facility).



Source: Cal-Adapt. Data: LOCA Downscaled CMIP5 Climate Projections (Scripps Institution of Oceanography), Gridded Observed Meteorological Data (University of Colorado Boulder), LOCA Derived Products (Geospatial Innovation Facility).

Source: Cal-Adapt – Precipitation: Decadal Averages Map. Retrieved 3/5/2024.

Vulnerability Assessment

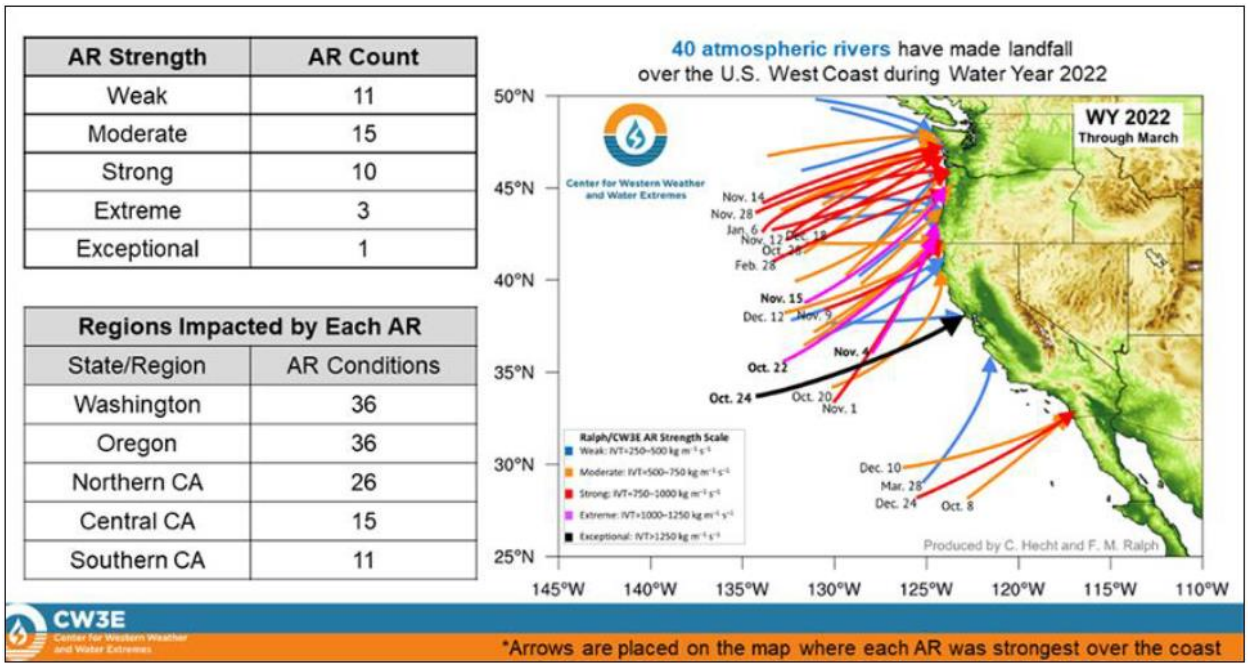
Vulnerability—Medium

According to historical hazard data, heavy rains and storms, including hail and lightning, are an annual occurrence in the Colusa 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 as seen above in 2022, in the winter storms of 2022/2023, as well as the winter storms of 2023/2024. Impacts can be felt by both the population of the Planning Area as well as the structures that have been built in the Planning Area. An example of this is shown in Figure 4-43. These are from the winter of 2022/2023.

Figure 4-43 2022 Atmospheric Rivers by Strength and Count

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: CW3E

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

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 4-94

The County noted that a large concern is the recent changes in the mapped FEMA floodplain. Many properties that were once outside the 1% annual chance floodplain have now been mapped into the 1% annual chance floodplain. This has caused citizens to worry about floodplain insurance. Climate instability has led to increased extreme precipitation events. Due to the prevalence of extreme precipitation events, Colusa County is looking for ways to adapt natural lands to be more resilient to flooding and waterway erosion. During heavy or long duration rain events, standing and ponding water are experienced in residential areas within the town of Princeton.

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 Colusa County Planning Area and unincorporated Colusa County.

People and Populations

All populations in the Colusa 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 Colusa 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. 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 affected 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.

Community Lifelines

Community lifelines likely to have some vulnerability to heavy rains and storms include:

- **Safety and Security** – Search and rescue and swiftwater teams may be called on to perform riskier duties during times of heavy rains and flooding. Police, Fire, EMS, and Public Works personnel are often called on to respond during flood emergencies taxing these resources.
- **Food, Hydration and Shelter** – Those displaced by heavy rains and flooding and the unsheltered may have needs for food and water.
- **Health and Medical** – Injuries can occur during storm events. Patient movement from accident scenes by EMS may have to be rerouted around inundated and closed streets. Public health can be at risk from contaminated floodwaters caused by heavy rains.
- **Energy** –Significant storms can cause power outages throughout the Planning Area. Downed trees can fall on electric lines in the Planning Area, causing power outages. High winds and other lightning strikes can cause transformers and other infrastructure to be damaged. Fuel supplies can be temporarily cut off, until flooding subsides.
- **Communications** – Communication systems may be damaged during severe storm events. An influx of service calls to dispatch centers for reporting of flooding, power outages, downed trees, or other issues can occur. Messaging systems need to be deployed during these times to let the public know about road and closures, washouts, and debris or flooding on roads.
- **Transportation** – Highways, local roads, and bridges may be impacted by heavy rains and flooding causing road closures. These closures can affect response personnel (EMS, Fire, Police) as well as cause additional traffic issues for residents.
- **Hazardous Material** – Hazardous material facilities can be affected by heavy rains and flooding. Releases during these times can contaminate the environment, affecting drinking water and natural systems.
- **Water Systems** – Water, drainage, and wastewater systems can experience storm related impacts, including excessive water intrusion which can affect the operations of these systems.

Short-term, heavy rains and storms can cause both widespread flooding as well as extensive localized drainage issues throughout the Colusa County Planning Area. As storms continue to increase in intensity, existing drainage and stormwater systems may be overwhelmed at least temporarily contributing to an increase in flooding related impacts. While components of these lifelines may be damaged or otherwise impacted, it is unlikely that large storm events would overwhelm and take out any of these lifelines in the Colusa County Planning Area as a whole.

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.

Economic Assets and Community Activities of Value

Heavy rain and storm events can cause direct damage to economic assets such as businesses and commercial centers. One of the larger economic drivers in Colusa County is the agricultural sector. During periods of heavy rains and storms, crops may be damaged by both hail and heavy rains. This is discussed in more detail in Section 4.3.6. During extreme events, the economy may slow as people stay home or inside. Business revenue may be reduced during extended storm events. Community activities of value may see a reduction in attendance, impacting revenues associated with these events, especially those that occur outdoors. Events may be cancelled or rescheduled. This includes the County Fair, Farm Show, rodeos, craft fairs, and hunting and fishing seasons.

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 4-94, Section 4.3.8 Dam Failure, Section 4.3.13 Landslide, and Section 4.3.14 Levee Failure).

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 Colusa 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 decrease for Colusa County;

however, the vulnerability may change depending on changes to the makeup of more vulnerable populations. Certain vulnerable populations, such as the unhoused, 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. 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 Colusa 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

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 4-44 shows the Beaufort wind scale.

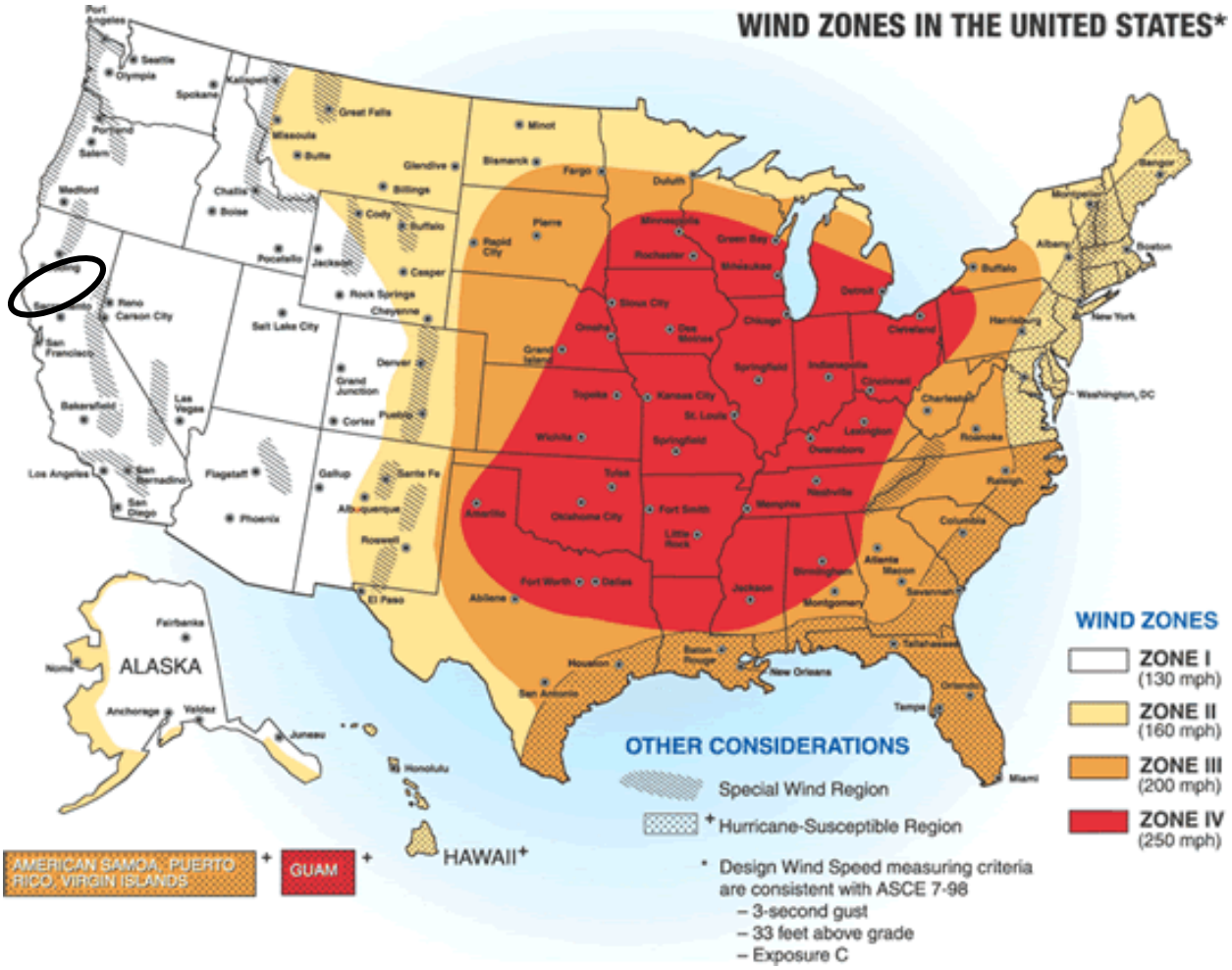
Figure 4-44 Beaufort Wind Scale

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 4-45 depicts wind zones for the United States. The map denotes that Colusa County falls into Zone I, which is characterized by high winds of up to 130 mph.

Figure 4-45 Wind Zones in the United States

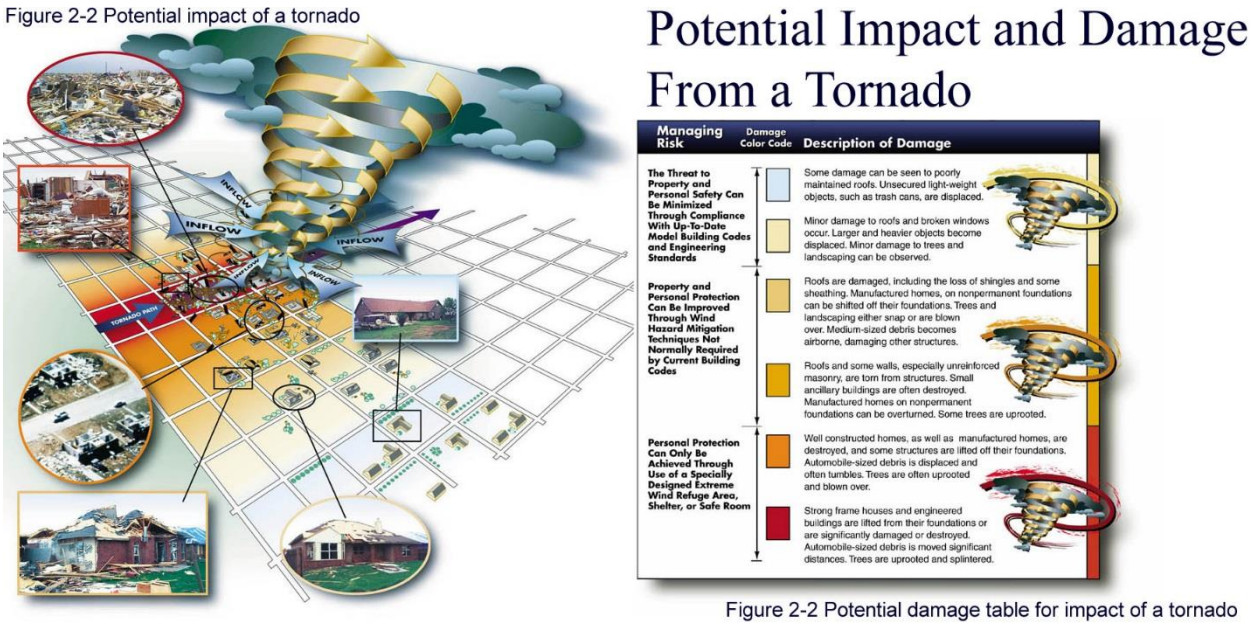


Source: FEMA

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 Colusa County Planning Area, primarily during the rainy 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 4-46 illustrates the potential impact and damage from a tornado.

Figure 4-46 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. 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 4-36 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at different levels of intensity. Table 4-37 shows the wind speeds associated with the Enhanced Fujita Scale ratings.

Table 4-36 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 4-37 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.

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.

NCDC Events

The NCDC data recorded 31 high wind and 4 tornado incidents for Colusa County since 1950. A summary of these events is shown in Table 4-38. It should be noted that all tornado events were EF0 intensities.

Table 4-38 NCDC High Wind and Tornado Events in Colusa County 1950-8/31/2023

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
High Wind	22	0	0	0	0	$35,000	$0
Strong Wind	7	0	0	0	0	$50,000	$0
Thunderstorm Wind	2	0	0	0	0	$0	$0

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Tornado	4	0	0	0	0	$70,000	$0
Total	**35**	**0**	**0**	**0**	**0**	**$155,000**	**$0**

Source: NCDC

Hazard Mitigation Planning Committee Events

The HMPC noted that during high wind events, the County experiences down trees, fences blown over, power outages and down powerlines. The agricultural industry is also affected by high winds. Almond trees can be extremely susceptible to high wind events. High winds are an annual occurrence, and specific events are not always tracked by the County.

The HMPC also noted the following tornado events:

- **Tuesday, March 22, 2011** – At approximately 3:23 PM a funnel cloud developed into a tornado and touched down in a field in the area of Maxwell Sites Road and McDermott Road in Maxwell, as reported by a witness to the news media. No damage was done. No emergency response was required.
- **Wednesday, March 23, 2011** – At approximately 3:00 PM a tornado reportedly touched down on Nicolaus Drive, E Street and Davis Roads in Williams with some damage, and one vehicle with damage. It was reported that approximately 3 residences sustained damage to the Spanish tile roofs, and 2 vacant mobile homes were damaged.

The HMPC noted that no other damaging tornadoes could be recalled, including tornadoes since 2018.

Likelihood of Future Occurrence

Highly Likely/Occasional – Based on NCDC data and HMPC input, 35 wind and tornado incidents over a 69-year period (1955-2023) equates to a severe wind/tornado event every 1.9 years. However, as noted, this database likely doesn't capture all wind events. High winds are a well-documented seasonal occurrence that will continue to occur annually in the Colusa 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 2021 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 Colusa 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 Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

The County noted that while there has been some scattered record keeping describing the impacts of windstorms, there is little information to indicate that straight-line winds are little more than a nuisance. 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. 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.

Assets at Risk

Assets at risk from winds and tornadoes 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 Colusa County Planning Area and unincorporated Colusa County.

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 working or caught outdoors during a wind or tornado event.

Structures

All structures in the Colusa 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 by falling trees caused by wind. A tornado could also damage power lines. 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 in the Colusa 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.

Community Lifelines

Community lifelines likely to have some vulnerability from wind and tornado include:

- **Safety and Security** – Winds and tornadoes can increase fire spread and also lead to down trees and blocked roads, which causes issues for firefighters, police, dispatch, and EMS in the Planning Area.
- **Food, Hydration, Shelter** – Significant damage caused by tornadoes can increase the need for those who need shelter. This is true for the unsheltered populations as well as for those whose homes may be damaged or rendered unusable.
- **Health and Medical** – Winds and tornadoes can cause injuries or deaths to residents. Trees may be downed during these times, causing EMS to need to reroute ambulance or emergency services around areas where roads may be closed while tree materials are removed.
- **Energy** – Downed trees and other wind impacts may cause power grid issues. If a tornado were to strike a power station or large transmission lines, power outages may occur in the Planning Area.
- **Communications** – 911, dispatch, and emergency responder communications see marked increase during times of high winds and tornadoes.
- **Transportation** – Transportation routes may be blocked by downed trees, downed power wires, or downed poles and signs.
- **Hazardous Materials** – Hazardous materials facilities may be compromised during periods of high winds and tornadoes. Trucks carrying hazardous materials may be overturned on roads in the Planning Area during high wind and tornado events.
- **Water Systems** – Above ground water infrastructure may be damaged by high winds and tornadoes.

Backup power sources to these critical facilities that comprise the community lifelines should be in place to reduce possible impacts from these lifelines going offline. During periods of high wind and tornadoes, the electric system could be overwhelmed, causing brownouts and power outages to occur. Power outages

and PSPS events can also occur during times of high winds, causing the electric grid to temporarily go offline. It is unlikely that whole community lifelines would be overwhelmed by this hazard.

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 erosion and 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.

Economic Assets and Community Activities of Value

One of the larger economic drivers in Colusa County is the agricultural sector. During periods of high winds or tornadoes, crops may be damaged. This is discussed in more detail in Section 4.3.6. During periods of high winds and tornadoes, the economy may slow temporarily as people stay home or inside. High winds and tornadoes can damage economic assets in the Planning Area. Should high winds or tornadoes damage businesses and commercial centers, long term economic issues may occur.

All community activities of value have some measure of vulnerability to high wind and tornado. High winds and tornadoes can cause life safety issues. Activities may be cancelled, postponed, or rescheduled due to high wind and tornado events. This includes the County Fair, Farm Show, rodeos, craft fairs, and hunting and fishing seasons.

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 Colusa 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 Colusa County has recently slowed. 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. 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.

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 Colusa 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

Farming and related agricultural industries are not only the backbone of Colusa 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 Colusa County and has continually grown and changed along with the County. Today, the soils and climate of Colusa County make it an ideal area to sustain many agricultural endeavors. Agriculture in Colusa County is a mosaic of farmland intermingled with other uses in the rural setting which typifies the County. This land provides marketable products, open space, wildlife habitat, watershed and an aesthetic environment. According to the California Department of Conservation's Farmland Mapping and Monitoring Program (FMPP), in 2020 the County has 197,122 acres of prime farmland, 2,762 acres of farmland of statewide importance, 115,022 acres of unique farmland, 227,939

acres of farmland of local importance, and 15,965 acres of grazing land. These numbers have been reduced since 1998 due in part to increased development in the County. (see Table 4-39).

Table 4-39 Colusa County Farmland Inventory, 1998, 2020

Soil Category	1998 Acres	2020 Acres	1998-2020 NET ACREAGE CHANGED
Prime Farmland	201,910	197,122	-4,788
Farmland of Statewide Importance	1,746	2,762	1,016
Unique Farmland	125,083	115,022	-10,061
Farmland of Local Importance	239,966	227,939	-12,027
Grazing Land	7,684	15,965	8,281
Urban and Built-Up Land	4,293	5,537	1,244
Other Land	157,872	172,668	14,796
Water area	1,838	3,366	1,528
Total Area Inventoried	**740,392**	**740,381**	**-11**

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

According to the 2023 Colusa County Crop Report, many commodities are grown in Colusa County. This includes vegetable crops; nursery and flower products; timber products; fruit and nut crops; livestock and poultry; apiary, eggs, and wool products; and pasture and rangeland. The top three commodities for the County in 2022 were almonds, rice, and walnuts.

According to the 2023 Crop Report, the gross value of Colusa County's agricultural production in 2022 was $433,189,000. This is a decrease of 47.7% in comparison to the estimated value in 2021. Colusa County's agriculture industry faced devastatingly low crop production for multiple commodities in 2022. Crop production hit unprecedented lows. The drought conditions throughout California led to some of the lowest water allocations ever seen in Colusa County. The allotments of water were so low that many growers were forced to fallow fields while others pulled orchards. The crop values presented in this report are a reflection of a year that will always be remembered as a year of tribulations.

The 2023 Crop Report also noted that the County was hit with disastrous drought, freeze and heat, all three of Colusa's historical top crops felt the brunt of these weather conditions. The water allocations took rice down by 80%, the freeze reduced harvested almonds by 62% while the late season heat affected walnut quality dropping their value by 49%.

A summation of crop production values, sourced from the Colusa County Agricultural Commissioner's Annual Crop Reports, from 2018-2022 for Colusa County is shown in Table 4-40.

Table 4-40 Colusa County – Value of Agricultural Production 2018-2022

Crop	2019	2020	2021	2022
Apiary	32,035,000	20,101,000	$27,262,000	$26,099,000

Crop	2019	2020	2021	2022
Fruit and Vegetable	$69,276,000	$74,078,000	$76,925,000	$94,004,000
Fruit & Nut	$435,388,000	$423,511,000	$335,605,000	$160,198,000
Field Crops	$312,217,000	313,511,000	$301,116,000	$83,665,000
Livestock Productions	$20,445,000	$23,595,000	$25,572,000	$24,486,000
Livestock & Poultry Products	$50,000	$50,000	$0	$0
Timber	$0	$0	$0	$0
Certified Seed Crops	$28,560,000	$31,223,000	$29,935,000	$16,920,000
Non-certified Seed Crops	$27,502,000	$23,743,000	$22,713,000	$20,087,000
Organic Crops	$7,490,000	$7,000,000	$8,800,0000	$7,730,000
Total	**$932,963,000**	**$920,110,930**	**$827,928,00**	**$433,189,00**

Source: Colusa County Agricultural Commissioner

According to the HMPC, agricultural losses occur on an annual basis and are usually associated with severe weather events, including heavy rains, floods, 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.

Natural Disasters and Severe Weather

According to the US Department of Agriculture (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.

Invasive Species (Animal Pests)

The HMPC noted that invasive species in the animal groups like wild pigs are causing extensive damage to both residential areas and also agricultural areas.

Invasive Species (Insect Pests)

Colusa 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 the gypsy moth, Japanese beetle, light brown apple moth, Mediterranean fruit flies, Oriental fruit flies, melon flies, khapra beetle, and glassy-winged sharpshooter. Pest detection is a proactive program that seeks to identify exotic, invasive insects. These pests have wide host ranges and are difficult and costly

to manage once established. Early detection is essential for quick and efficient eradication. Public participation is critical to the success of this program, since staff relies on the goodwill of property owners who allow traps to be placed on their properties. The Colusa County Department of Agriculture traps and monitors all of these agricultural pests.

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 4-41.

Table 4-41 Colusa County Weeds of Concern

Species of Concern					
Barb Goatgrass	Giant Reed	Downybrome	Yellow Starthistle	Jubatagrass	Pampasgrass
Scotch Broom	Brazilian Egeria	Fennel	Perrenial pepperweed	Urugray and creeping water primrose	Purple loosestrife
Parrotfeather	Eurasian watermilfoil	Himalayan blackberry	Red sesbania	Spanish broom	Medusahead
Italian Thistle	Smallflower tamarisk	Saltcedar	Tamarix	Yellow Starthistle	

Source: California Invasive Plant Council

The Colusa County Department of Agriculture uses mechanical and chemical control measures to contain all of these agricultural pests.

Location and Extent

Agricultural hazards occur throughout the County where lands are used for farming and grazing. The County has large swaths of agricultural lands. These are shown in the Land Use Map for the County on Figure 4-21 above. Areas not as greatly affected by severe weather, insects, and pests are the cities of Williams and Colusa, as well as the forest lands in the northwestern portion 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 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 Colusa County have historically been affected by weather related events such as 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 2012 through 2023. These are shown in Table 4-42.

*Table 4-42 Colusa County – USDA Disaster Declarations 2012 to 2023**

Year	Declaration Number	Primary or Contiguous County	Disaster Type
2012	S3246	Contiguous	Freezing temperatures
2012	S3268	Contiguous	Drought-FAST TRACK
2012	S3379	Contiguous	Drought
2012	S3452	Contiguous	Drought
2013	S3569	Primary	Drought-FAST TRACK
2014	S3637	Primary	Drought-FAST TRACK
2014	S3743	Primary	Drought
2014	S3797	Primary	Drought
2015	S3784	Primary	Drought-FAST TRACK
2016	S3952	Primary	Drought-FAST TRACK
2016	S4163	Contiguous	Drought-FAST TRACK
2016	S4164	Contiguous	Severe weather including excessive rainfall and high winds
2016	S4170	Contiguous	Excessive rain, high winds, cold temperatures, and hail
2020	S4691	Primary	Drought-FAST TRACK
2020	S4697	Contiguous	Drought-FAST TRACK
2021	S5146	Primary	Drought-FAST TRACK
2022	S5299	Contiguous	Freeze
2022	S5332	Contiguous	Freeze
2023	S5371	Primary	Drought-FAST TRACK

Source: Colusa County Agricultural Commissioner, US Farm Service Agency

NCDC Events

The NCDC does not track agriculture events.

Hazard Mitigation Planning Committee Events

2022 - The HMPC noted that agriculture events occur yearly, though with varying levels of damages to a variety of crops. The 2022 Colusa County Crop Report noted that 2022 saw multiple issues that affected the agricultural industry in the County. Drought had large impacts in the County.

> ***Due to little to no water allocation Colusa County experienced one of the worst environmental and economical disasters the Sacramento Valley has ever endured. Colusa saw nearly half of their 456,000 farmable acres sit fallow. This hurt farmers, processors, farmworkers, wildlife and the entire community.***
>
> ***Colusa fell victim to an environmental war. A war that began with environmental good intentions has led to conflicting regulations that has caused this environmental crisis. This example of single species management resulted in the suffering of all species during this unprecedented drought situation.***
>
> ***Throughout the farming season, there was a clear distinction between the California water project consisting of the Feather River watershed and the Federal water project along the Sacramento River watershed. With the Sacramento River Water Contractors reduced to only 18% of their contracted water allotments farming became an impossible task in 2022.***

The following statistics show how the County was affected:

- Rice production value dropped 80%
- Overall crop values fell by $394,739,000
- Over 350,000 acres of farmland fallowed in the Sacramento Valley
- Water allocations cut to 18% of contracted amounts

February 2022 - In addition to drought, there were issues with freeze. Colusa experienced record low temperatures in February of 2022. These lows were especially devastating due to the length of time the temperatures stayed below freezing. Multiple monitors throughout the county registered 23.8° F for 9 hours. For 5 days, the icy weather persisted during the peak of the non-peril bloom. The Agricultural Commissioner's Office conducted a county wide survey of all growers and found the damages were estimated at 65% of crop loss. Some farmers reported their entire crop was lost. Other farmers left what little crop the trees produced unharvested due to the cost of harvesting exceeding the value of crop. A USDA disaster declaration was requested and granted from the Secretary of the United States Department of Agriculture.

Fall 2022 - Finally, in the Fall of 2022 a late season heat wave hit during a critical time of the growing cycle for Walnuts. These extreme temperatures caused darkening of the walnut meats, resulting in an unmarketable product, with low quality directly affecting prices. Walnut producers were operating below cost of production and some orchards in Colusa County were left unharvested.

Likelihood of Future Occurrence

Highly Likely—As long as severe weather events, insects, pests, and weeds continue to be an ongoing concern to the Colusa 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 2021 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—Extremely High

According to historical hazard data, severe weather affecting agriculture and agricultural pests are an annual occurrence in the Colusa County Planning Area. If left unchecked, 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.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

The HMPC noted a recent report from the Intergovernmental Panel on Climate Change shows that the climate crisis has already affected or resulted in the loss of ecosystems, and global warming will likely reach or exceed 1.5°C in the near-term. Agricultural experts warn that these changes are already threatening crop productivity worldwide. Extreme heat has a significant impact on crops, particularly affecting grain crops like wheat, rice, and maize. Unusually hot temperatures cause smaller harvests and rising food prices, a phenomenon known as "heatflation". This is also true with almonds and other high value Colusa County crops.

Assets at Risk

Assets at risk from agricultural hazards 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 Colusa County Planning Area and unincorporated Colusa County.

People and Populations

Agricultural hazards (both severe weather and invasive species) have a minimal effect on people and populations in Colusa 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 Colusa 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 invasive species and pests. 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 invasive plant species have been known to clog culverts and streams, increasing flooding risk.

Critical Facilities and Infrastructure

Critical facilities and infrastructure in Colusa 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 invasive species and pests. 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 invasive 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.

Community Lifelines

The effects of severe weather on community lifelines are included in the discussions on severe weather above. This section focuses then on invasive species and pests. While individually critical facilities and infrastructure can be impacted as discussed above, community lifelines should be minimally affected by agricultural hazards of invasive species and pests.

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 invasive species and pests. Negative impacts of 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.

Economic Assets and Community Activities of Value

The effects of severe weather on economic assets and community activities of value are included in the discussions on severe weather above. This section focuses then on invasive species and pests. Invasive species and noxious weeds have been introduced in the Planning Area by a variety of means. An absence of natural controls, combined with the aggressive growth characteristics and unpalatability of many of these weeds, allows these weeds to dominate and replace more desirable native vegetation. Negative impacts of weeds and invasive species include the following:

- Reduced livestock grazing capacity;
- Increased wildfire risk;
- Reduced cropland and farmland production; and
- Reduced land value and sale potential.

Severe weather and agricultural pests can cause direct damage to economic assets. The largest economic driver in Colusa County is the agricultural sector. During periods of severe weather, crops may be damaged by dam failure, drought, hail, high winds, floods, levee failures, tornadoes, and wildfires. Should there be significant revenue drop (as was seen in 2022), there will be significant decline in money in the County's economy. Community activities of value will be minimally affected by agricultural hazards.

Impacts from Agricultural Hazards

According to the HMPC, 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 Colusa 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 Colusa County include the following:

- Climate change is likely to exacerbate future conditions that may impact the agricultural industry in Colusa 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 Colusa County has recently slowed. 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. Limited growth is occurring in the County, which should result in limited changes to land uses that would 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 Colusa 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, the HMPC did note that 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 Colusa 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.

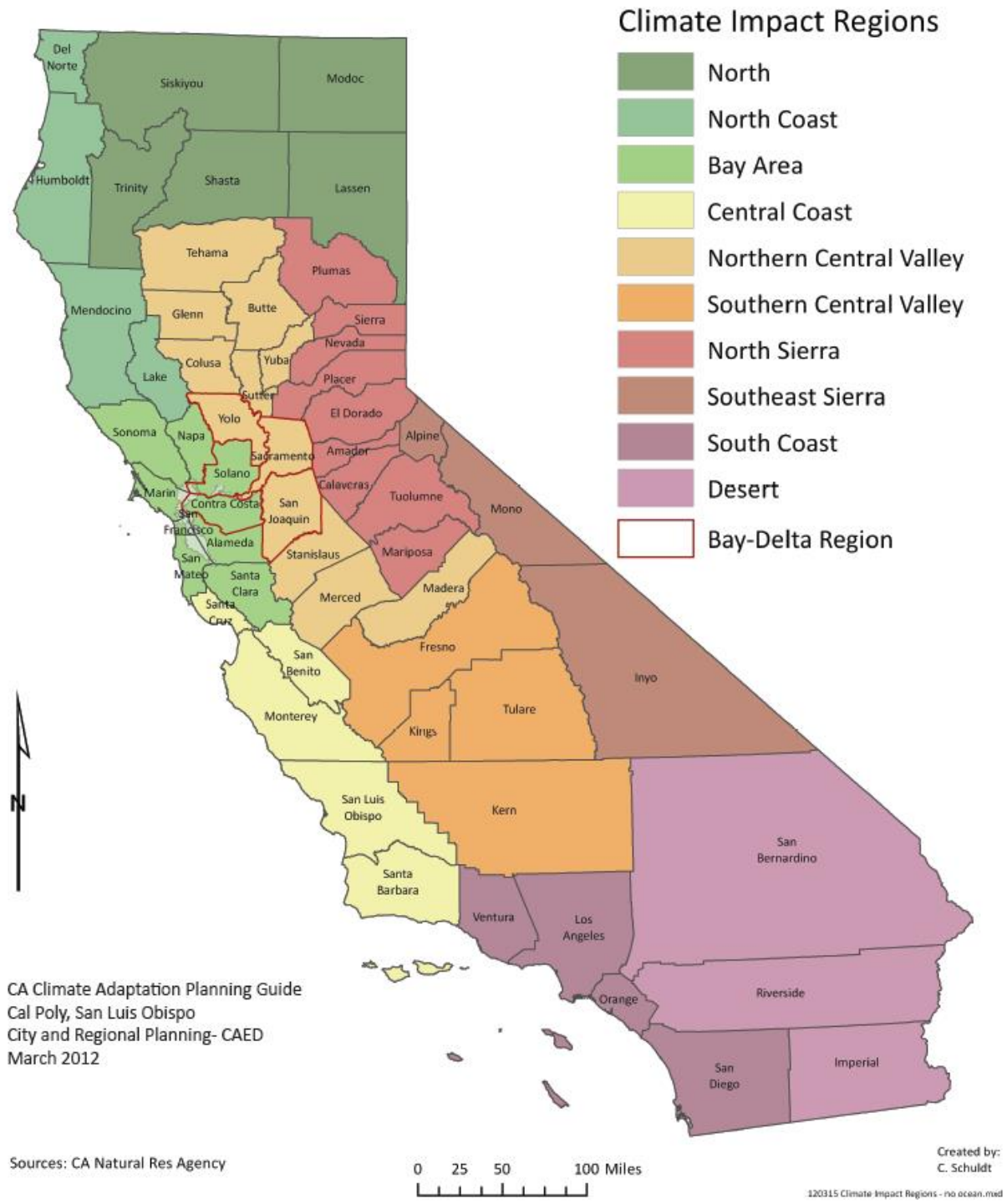
Hazard/Problem Description

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 Colusa County, the HMPC noted that each year it seems to get a bit warmer. It was also noted that 2022 and 2023 were some one of the wettest years ever. 2023 was one of the hottest on record. California's Adaptation Planning Guide: Understanding Regional Characteristics has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations (as shown in Figure 4-47). Colusa County falls within the Northern Central Valley Region characterized as an agricultural, inland region with over 3.7 million people, with substantial cities, the largest being the state capitol, Sacramento. Agriculture is the predominant economic activity. The agricultural operations in this region include rice, dairy, and nut trees (almond and walnut). The region's agricultural activity is one of the most productive in the nation. Table 4-43 provides a summary of Cal-Adapt Climate Projections for the North Central Valley Region.

Figure 4-47 Colusa County – Climate Impact Regions



Source: Cal-Adapt 2017/2023

Table 4-43 Colusa County – North 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 average temperatures; high emissions scenario)
Precipitation	Annual precipitation is projected to decline by approximately one to two inches by 2050 and three to six inches by 2100. (Community Climate System Model Version 3 (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. (Geophysical Fluid Dynamics Laboratory (GFDL) climate model; high carbon emissions scenario)

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. HMPC members noted that the strength of storms does seem to be increasing and the temperatures seem to be getting hotter.

Likelihood of Future Occurrence

Highly Likely – Climate change is virtually certain to continue without immediate and effective global action. According to NASA, 2021 was one of the hottest years on record as was 2023. Without significant global action to reduce greenhouse gas emissions, the 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.

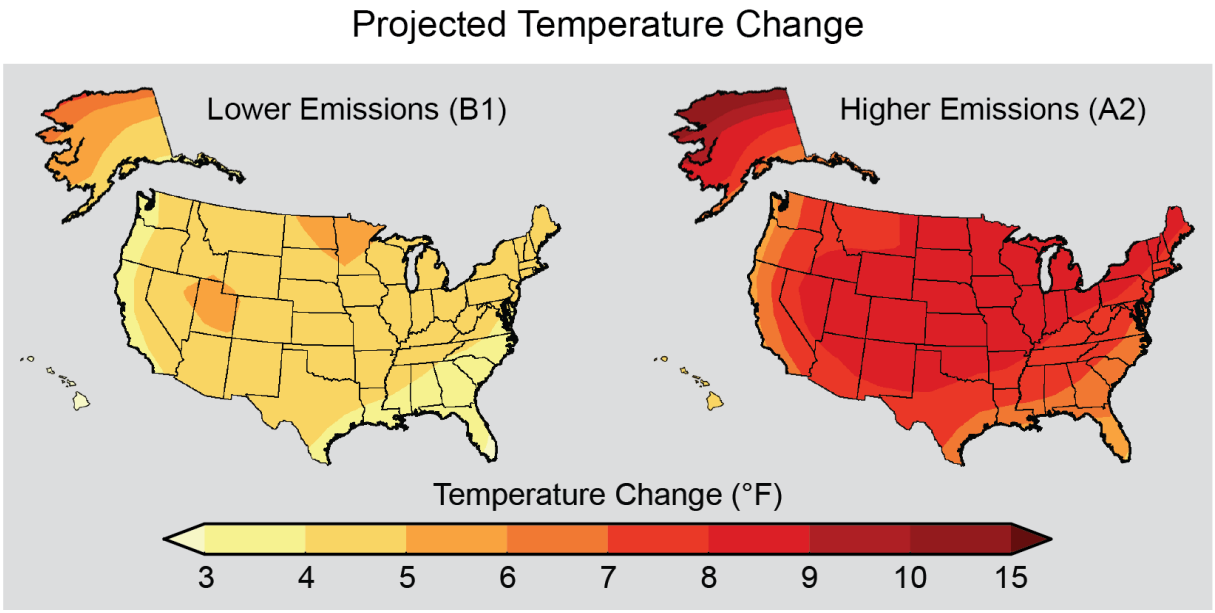
Key Uncertainties Associated with Climate Projections

- 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 4-48.

Figure 4-48 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 2021 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 Colusa 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—High

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 Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

Anthropogenic and other greenhouse gasses will continue to cause more extreme climate change conditions unless steps taken to minimize greenhouse gases and carbon footprints. The County's roadways, infrastructure in flood zones, disadvantaged communities, agriculture sector and sensitives species habitat are among the most vulnerable to climate change impacts.

Climate change threatens the food security and economic viability of agriculture in Colusa 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 our region.

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 Colusa County Planning Area and unincorporated Colusa County.

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.

Community Lifelines

Due to its slow onset, community lifelines in the County should not be overwhelmed by climate change. During the slow onset of climate change, 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.

Economic Assets and Community Activities of Value

All economic assets and community activities of value in the County are at some measure of risk to hazards exacerbated by climate change. The 2023 State of California Hazard Mitigation Plan document noted that the frequency of large storm sequences (i.e., atmospheric rivers) over short timeframes is projected to increase, causing flooding events that could affect portions of the County. Should storms or other climate-related hazard events occur, certain economic assets and activities could be adversely affected.

Impacts from Climate Change

The 2017 California Adaptation Planning Guide (APG) North Central Valley Region identifies area specific impacts and vulnerabilities to the Colusa 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 Colusa 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. 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. While there are currently no formal studies of specific migration patterns expected to impact the 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. So while changes in population and population patterns are not expected to increase the impacts associated with this hazard, climate change may instead influence future population growth in the County.
- Land use planning should be proactive to address future hazard conditions. 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 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 Colusa 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. CA DWR DSOD assigns hazard ratings to large "jurisdictional sized" dams within the State. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in 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 Colusa County, CA DWR DSOD, and Cal OES, there are six dams in Colusa County that were constructed for flood control, storage, treatment impoundments, electrical generation, and recreational purposes. Of the six dams in the County, three are rated as High Hazard, one is rated as Significant Hazard, and two are rated as Low Hazard. Additionally, according to the HMPC and the General Plan Background Report, eight dams outside of the County retain water from tributaries of the Sacramento or Feather River and could cause damage in Colusa County if their dams were to fail: Black Butte Lake, Davis Creek Reservoir, Indian Valley, Lake Almanor, Lake Oroville, Lake Shasta, Thermalito, and Whiskeytown Lake. Figure 4-49 identifies the dams that have inundation areas located in the Colusa County Planning Area. Table 4-44 gives information on each of the dams in the County, and the dams outside the County that could affect areas in Colusa County.

Figure 4-49 Colusa County Dam Inventory

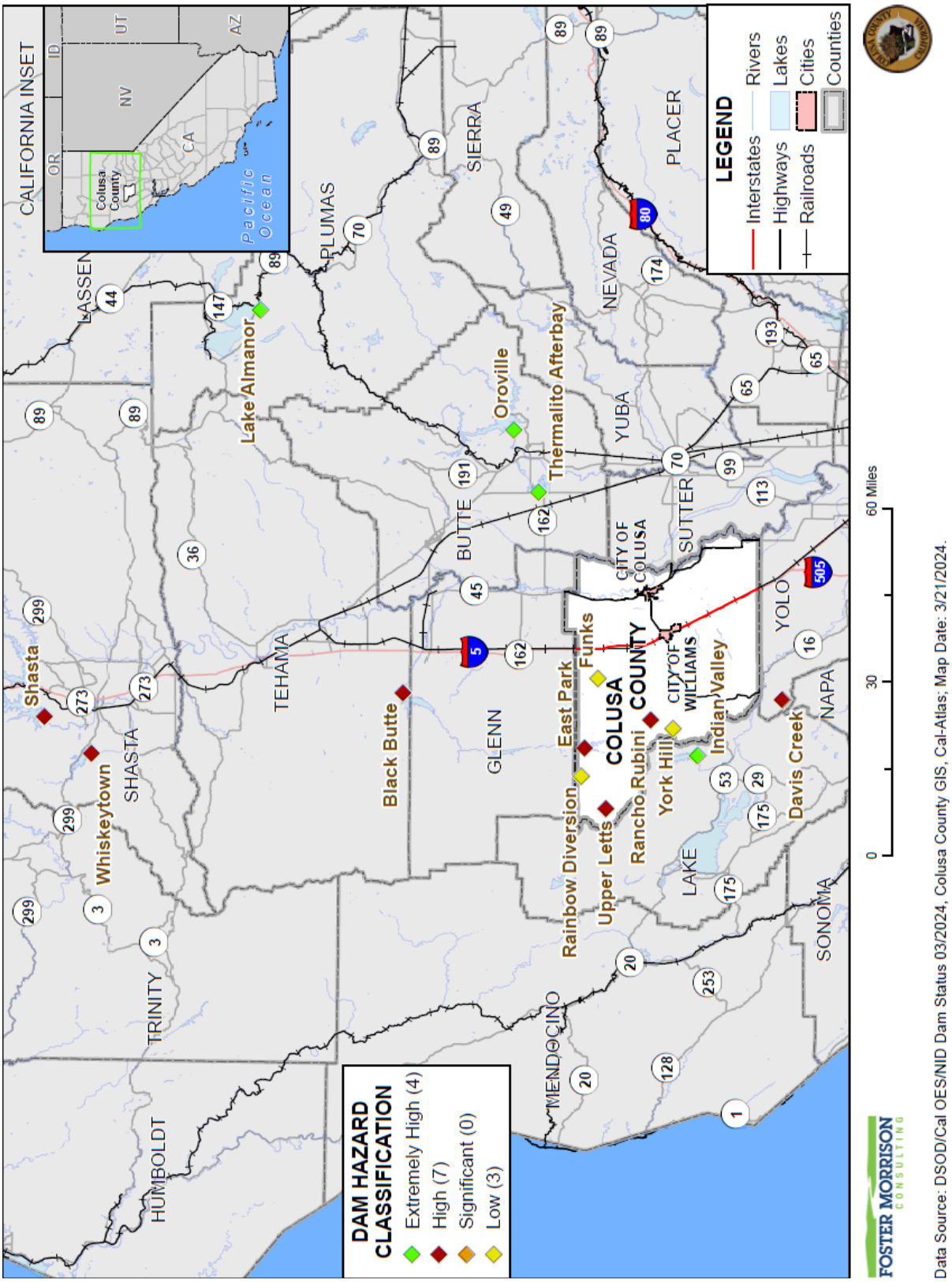


Table 4-44 Colusa County – Dam Inventory

Name	Hazard Classification	Dam Type	River/Stream	Structural Height (ft)	Maximum Storage (acre-ft)	Emergency Action Plan
Dams Inside Colusa County						
East Park	High	Concrete Arch	Little Stony Creek	141	505,992	Y
Funks	Low	Earth	Funks Creek	81	20,820	N
Rainbow Diversion	Low	Unknown	Stony Creek	55	1,000	N
Rancho Rubini	High	Rockfill	Tributary of Bear Creek	31	1,060	Y
Upper Letts	High	Concrete Arch	Letts Creek	21	3,190	N
York Hill	Significant	Unknown	Tributary of Bear Creek	39	2,450	N
Dams Outside Colusa County with Inundation Areas in Colusa County						
Black Butte	High	Earth	Stoney Creek	142	143,700	Y
Davis Creek	High	Earth	Davis Creek	105	6,079	Y
Indian Valley	High	Earth	North Fork Cache Creek	210	261,000	Y
Lake Almanor	Extremely High	Hydraulic Fill	North Fork Feather River	130	1,308,000	Y
Oroville	High	Rockfill	Feather River	782	3,540,000	Y
Shasta	High	Concrete	Sacramento River	612	4,552,090	Y
Thermalito	High	Earth	Feather River	40	57,000	Y
Whiskeytown	High	Earth	Clear Creek	286	241,096	Y

Source: DSOD/Cal OES/NID Dam Status 03/24, National Performance of Dams Program
*One Acre Foot=326,000 gallons

Though not yet built, the proposed Sites Reservoir would be located in Colusa County, 10 miles from the area of Maxwell. The proposed Sites Reservoir would be a large offstream reservoir in the Sacramento Valley in Northern California, a project of Cal DWR. Its primary purpose is to collect winter flood flows from the Sacramento River, diverting the water upstream of the Sacramento–San Joaquin River Delta and pumping it into an artificial lake located west of Colusa. The estimated water yield would be between 470,000 to 640,000 acre feet per year, depending on yearly rainfall and environmental regulations.

The County noted they are most vulnerable to the following dams:

- Black Butte Lake
- Davis Creek
- East Park Reservoir
- Indian Valley
- Lake Almanor

- Lake Oroville
- Lake Shasta
- Thermalito Afterbay
- Whiskeytown Lake

All of these dams are located outside of the County, with the exception of East Park Reservoir.

Once a list of dams was established, dam inundation layers were obtained from DSOD and Cal OES in GIS. Dams with an inundation area in the Colusa County Planning Area are shown on Figure 4-50 for extremely high hazard dams, and Figure 4-51 for high hazard dams. Geographic flood extents as shown on the dam inundation maps are detailed by dam in Table 4-45 for high hazard dams. Only extremely high and high hazard dams were analyzed for this LHMP due to the potential for these dams to cause loss of life in the Colusa County Planning Area should a dam failure occur.

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 Colusa County Planning Area would be affected for as long as the flood waters from the dam failure takes to drain downstream.

Figure 4-50 Colusa County Planning Area – Extremely High Hazard Dam Inundation Areas

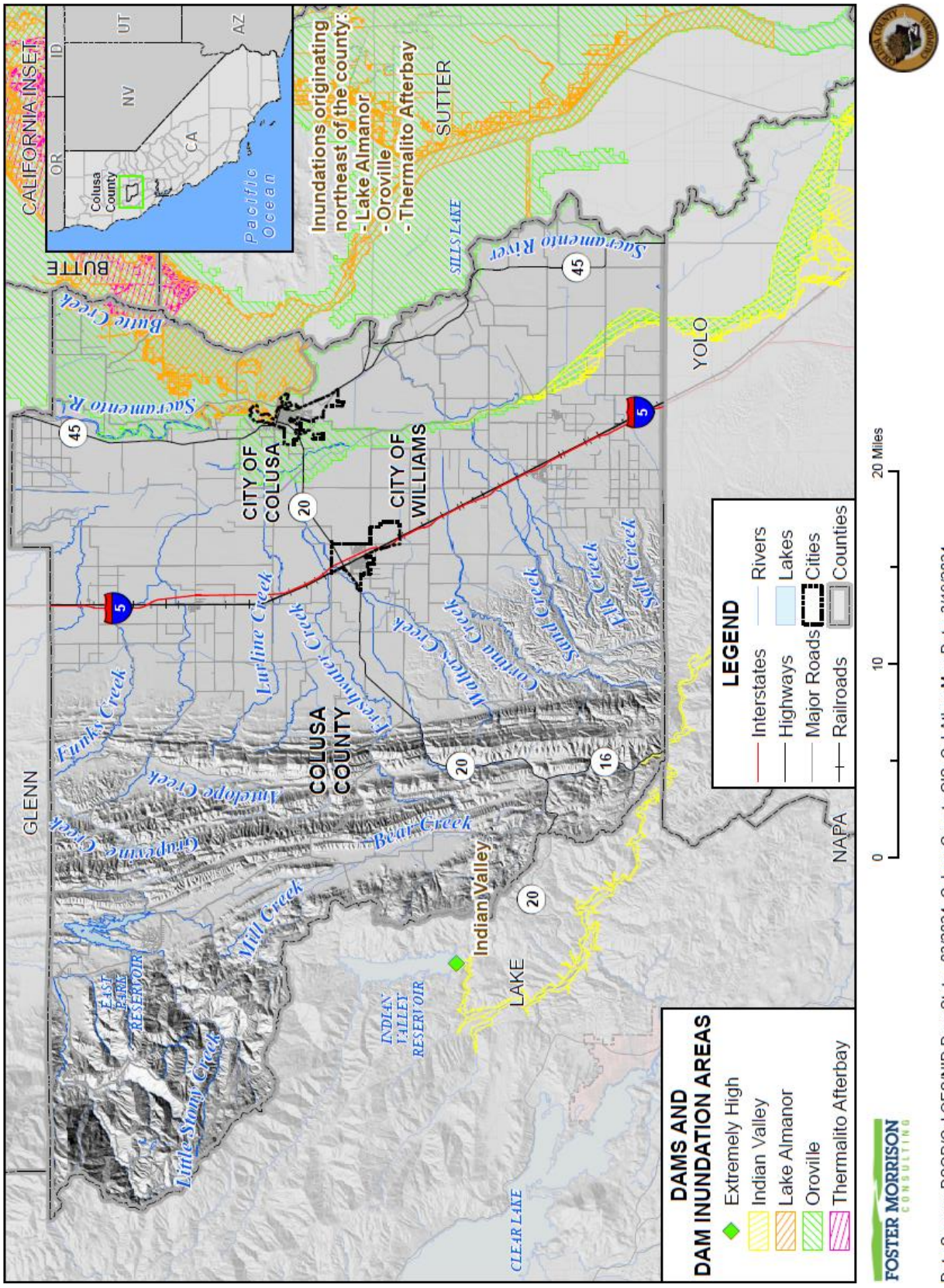


Figure 4-51 Colusa Planning Area – High Hazard Dam Inundation Areas

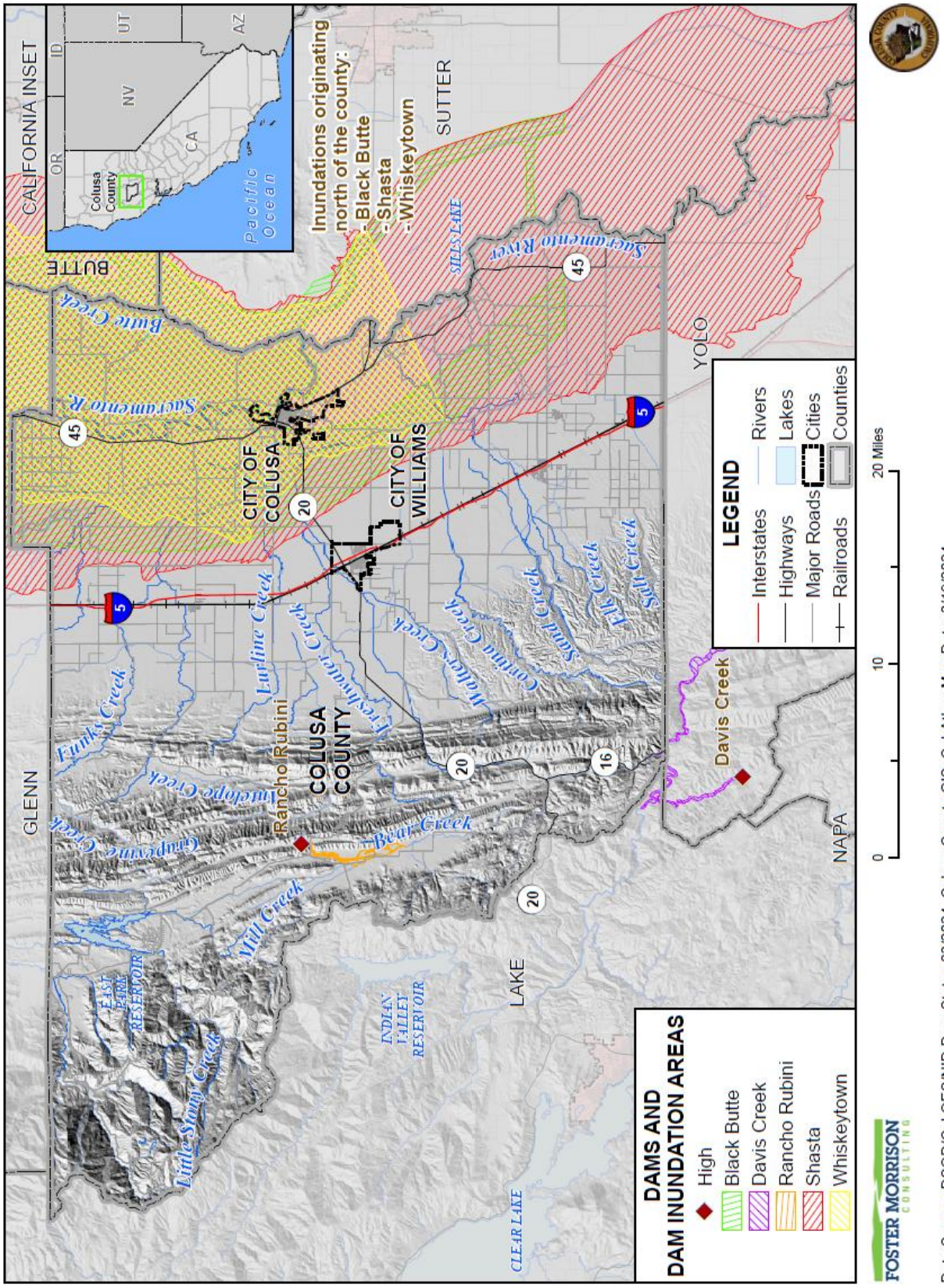


Table 4-45 Colusa County Planning Area –Geographical Dam Inundation Extents by Jurisdiction

Jurisdiction / Dam Inundation Area	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Colusa						
Lake Almanor	81	3.349%	0	0.005%	81	7.887%
Oroville	1,283	53.180%	811	58.430%	471	46.057%
Shasta	2,412	100.000%	1,388	100.000%	1,023	100.000%
Thermalito Afterbay	0	0.000%	0	0.000%	0	0.000%
Unincorporated Colusa County						
Lake Almanor	16,348	2.257%	8,087	3.276%	8,261	1.730%
Oroville	58,892	8.129%	29,389	11.905%	29,504	6.177%
Shasta	203,392	28.074%	91,173	36.932%	112,219	23.495%
Thermalito Afterbay	1,096	0.151%	741	0.300%	356	0.074%

Source: DSOD/Cal OES/NID Dam Status 03/24

Past Occurrences

Disaster Declaration History

There have been no disasters declarations related to dam failure in Colusa County, as shown in Table 4-4.

NCDC Events

There have been no NCDC dam failure events in Colusa 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 Colusa County.

Hazard Mitigation Planning Committee Events

February 2017 - In February 2017, Oroville Dam's main and emergency spillways were damaged, prompting the evacuation of more than 180,000 people living downstream along the Feather River and the relocation of a fish hatchery. Heavy rainfall during the 2017 California floods damaged the main spillway on February 7, so Cal DWR stopped the spillway flow to assess the damage and contemplate its next steps. The rain eventually raised the lake level until it flowed over the emergency spillway, even after the damaged main spillway was reopened. As water flowed over the emergency spillway, headward erosion threatened to undermine and collapse the concrete weir, which could have sent a 30-foot wall of water into the Feather River below and flooded communities downstream. No collapse occurred, but the water further damaged

the main spillway and eroded the bare slope of the emergency spillway. Evacuees fled to the town of Colusa. As they were panicking and either not following or not receiving media information about location of shelters for them, they stopped at a local strip mall and began sheltering in their vehicles, as well as parking on the streets. No shelter or staging area would be opened in Colusa: Colusa Medical Center, the only hospital in the County, was closed for an indefinite period of time. There would be no Red Cross presence in Colusa to staff a shelter as all resources were committed to open shelters. In addition, if the dam or auxiliary dam had failed, the City of Colusa would need to be evacuated within an 8-10 hour inundation time period. People were provided with information on where open shelters were and if they accepted pets.

The Oroville Dam EAP in the Colusa EOC was consulted to determine inundation times. Evacuation planning was made with local government and first responders. Local law enforcement responded to a Law Enforcement Mutual Aid request by Sutter County to patrol evacuated areas.

No other events of dam failure were noted to have occurred in Colusa County.

Likelihood of Future Occurrence

Occasional—The County remains at risk to dam breaches/failures from numerous dams under a variety of ownership and control and of varying ages and conditions. Although, there is no history of past dam failures, given the Oroville spillway event and the number and types of dams of concern to the County and their ages, a potential exists for future dam issues, including failures, in the Colusa County Planning Area. Thus, the HMPC determined the likelihood of future occurrence to be occasional. In addition to the aging dam infrastructure, this ranking was based on the recent issues with the nearby Oroville dam, that was at risk of a spillway failure during the winter storms in 2017. There is concern that many of the State's older dams, including those in Colusa County, could start experiencing similar problems.

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 Colusa County.

Vulnerability Assessment

Vulnerability—Extremely 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.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

The 2010 General Plan Background Report noted that Lake Oroville, which is located in Butte County, would represent the most immediate threat to Colusa County in the event of a dam failure, as flood waters could reach the County within eight hours. Lake Shasta, in Shasta County, could cause the most extensive inundation, reaching as far west as Maxwell and College City in a period of 42 hours. Inundation from Whiskeytown Lake, located in Trinity County, would take over three days to reach Colusa County. Failure of the dam of Black Butte Lake, which is on the border of Glenn and Tehama Counties, could result in some inundation within a period of about 35 hours. The inundation from a failure of this dam would be less extensive than if the other above referenced dams were to fail.

Failure of the dam at East Park Reservoir could cause minor inundation at the reservoir's outlet. The flood waters would flow into Glenn County; thus, its failure would not likely impact areas of Colusa County. In Glenn County, the flooding could extend up to one-quarter mile on either side of Stony Creek at its widest point. The water could cause an overflow of Stony Gorge Reservoir, which is located on Stony Creek. Black Butte Reservoir would retain the excess inundation.

Assets at Risk from Dam Failure

Assets at risk from dam failure include people and populations; structures; critical facilities and infrastructure and community lifelines; natural, historic, and cultural resources, economic assets, and community activities of value). These are discussed in the following sections for the Colusa County Planning Area and unincorporated Colusa County.

Methodology and Results

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 2023 Colusa County Parcel/Assessor Data was provided by Colusa County and was used as the basis for the inventory of assessed values for both improved and unimproved parcels within the Colusa County Planning Area. The dam inundation areas, obtained from DSOD and Cal OES, 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 significant hazard dam analysis was performed, as it was determined no significant hazard dams intersect the County.

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.

Colusa 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 hazard events. To further evaluate the impact to the Colusa 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 Cal OES dam inundation areas were overlayed on the parcel layer and linked to the 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 4-46.

Table 4-46 Colusa County Planning Area – Improved Residential Parcels and Population by Dam Inundation Area (Extremely High and High Hazard) and Jurisdiction

Dam Classification/Dams	City of Colusa		City of Williams		Unincorporated Colusa County	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Extremely High Hazard Dams						
Indian Valley	0	0	0	0	0	0
Lake Almanor	0	0	0	0	0	0
Oroville	982	2,848	0	0	330	1,181
Thermalito Afterbay	0	0	0	0	0	0
High Hazard Dams						
Black Butte	76		0	0	343	1,228
Rancho Rubini	0	0	0	0	1	4

Dam Classification/Dams	City of Colusa		City of Williams		Unincorporated Colusa County	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Shasta	1,778	5,156	0	0	558	1,998
Whiskeytown	1,778	5,156	0	0	449	1,607

Source: Cal OES, DSOD, 2023 Colusa County Parcel/Assessor Data, 2020 US Census Bureau Average Household Size– City of Colusa (2.90); City of Williams (2.55); Unincorporated Colusa County (3.58).

These numbers may reflect low end estimates as the property use categories based on the Assessor data utilized for this LHMP Update assumes all residential properties are single family residences. However, many of the residential parcels actually include multi-family units, including apartments, condominiums, as well as duplexes and triplexes. These variations in residential property use were not accounted for in the analysis, which skews populations results to be lower.

Structures

Many structures in the Colusa County Planning Area have some measure of risk to dam failure. Dam failure flooding can affect the built environment of many locations in the Colusa 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 hazard dam and high hazard dam follows.

Extremely High Hazard Dam Analysis

Parcel counts, land, and improved values (i.e., those with a structure improvement on the parcel), estimated content replacement values, other values and total values that fall within each extremely high hazard dam inundation areas in the Planning Area are presented below by hazard class and by dam. The results are presented in tables below by:

- Table 4-47 shows the count and value of parcels in the Indian Valley dam inundation area summarized for each jurisdiction in the Planning Area. Table 4-48 breaks down Table 4-47 to show the parcel counts by property use in the inundation area for unincorporated Colusa County.
- Table 4-49 shows the count and value of parcels in the Lake Almanor dam inundation area summarized for each jurisdiction in the Planning Area. Table 4-50 breaks down Table 4-49 to show the parcel counts by property use in the inundation area for unincorporated Colusa County.
- Table 4-51 shows the count and value of parcels in the Lake Oroville dam inundation area summarized for each jurisdiction in the Planning Area. Table 4-52 breaks down Table 4-51 to show the parcel counts by property use in the inundation area for unincorporated Colusa County.
- Table 4-53 shows the count and value of parcels in the Thermalito Dam inundation area summarized for each jurisdiction in the Planning Area. Table 4-54 breaks down Table 4-53 to show the parcel counts by property use in the inundation area for unincorporated Colusa County.

Breakdowns of parcel counts by property use in each inundation area for the incorporated jurisdictions in the County are shown in their respective annexes to this LHMP Update.

Table 4-47 Colusa County Planning Area – Count and Value of Parcels in Indian Valley Dam Inundation Area by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa	0	0	$0	$0	$0	$0	$0
City of Williams	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County	42	17	$10,800,745	$1,207,213	$7,360	$1,207,213	$13,222,531
Grand Total	**42**	**17**	**$10,800,745**	**$1,207,213**	**$7,360**	**$1,207,213**	**$13,222,531**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-48 Unincorporated Colusa County – Count and Value of Parcels in Indian Valley Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	32	13	$8,900,090	$1,172,864	$7,360	$1,172,864	$11,253,178
Commercial	0	0	$0	$0	$0	$0	$0
Government	2	0	$74,922	$0	$0	$0	$74,922
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	8	4	$1,825,733	$34,349	$0	$34,349	$1,894,431
Residential	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County Total	**42**	**17**	**$10,800,745**	**$1,207,213**	**$7,360**	**$1,207,213**	**$13,222,531**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-49 Colusa County Planning Area – Count and Value of Parcels in Lake Almanor Dam Inundation Area by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa	2	0	$930	$0	$0	$0	$930
City of Williams	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County	110	41	$37,397,541	$7,230,520	$787,680	$7,230,520	$52,646,261
Grand Total	**112**	**41**	**$37,398,471**	**$7,230,520**	**$787,680**	**$7,230,520**	**$52,647,191**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-50 Unincorporated Colusa County – Count and Value of Parcels in Lake Almanor Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	93	38	$35,928,124	$5,545,567	$774,550	$5,545,567	$47,793,808
Commercial	3	2	$272,977	$1,379,730	$13,130	$1,379,730	$3,045,567
Government	12	1	$708,626	$305,223	$0	$305,223	$1,319,072
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	0	$480,440	$0	$0	$0	$480,440
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	1	0	$7,374	$0	$0	$0	$7,374
Unincorporated Colusa County Total	**110**	**41**	**$37,397,541**	**$7,230,520**	**$787,680**	**$7,230,520**	**$52,646,261**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-51 Colusa County Planning Area – Count and Value of Parcels in Lake Oroville Dam Inundation Area by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa	1,380	1,227	$79,509,222	$223,006,030	$21,416,768	$153,838,006	$477,770,026
City of Williams	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County	1,183	684	$213,537,009	$113,589,418	$14,666,038	$88,293,392	$430,085,857
Grand Total	**2,563**	**1,911**	**$293,046,231**	**$336,595,448**	**$36,082,806**	**$242,131,398**	**$907,855,883**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-52 Unincorporated Colusa County – Count and Value of Parcels in Lake Oroville Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	609	285	$172,531,882	$45,525,933	$8,702,741	$45,525,933	$272,286,489
Commercial	69	49	$4,522,086	$10,595,186	$2,762,578	$10,595,186	$28,475,036
Government	70	7	$8,081,883	$848,620	$890	$848,620	$9,780,013
Industrial	12	7	$1,355,403	$2,895,584	$169,198	$4,343,376	$8,763,561
Institutional	5	1	$864,247	$196,057	$345,687	$196,057	$1,602,048
Miscellaneous	23	5	$4,827,703	$40,381	$1,579,253	$40,381	$6,487,718
Residential	395	330	$21,353,805	$53,487,657	$1,105,691	$26,743,839	$102,690,992

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Unincorporated Colusa County Total	**1,183**	**684**	**$213,537,009**	**$113,589,418**	**$14,666,038**	**$88,293,392**	**$430,085,857**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-53 Colusa County Planning Area – Count and Value of Parcels in Thermalito Afterbay Dam Inundation Area by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa	0	0	$0	$0	$0	$0	$0
City of Williams	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County	5	3	$3,515,286	$1,235,230	$557,400	$1,235,230	$6,543,146
Grand Total	**5**	**3**	**$3,515,286**	**$1,235,230**	**$557,400**	**$1,235,230**	**$6,543,146**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-54 Unincorporated Colusa County – Count and Value of Parcels in Thermalito Afterbay Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	5	3	$3,515,286	$1,235,230	$557,400	$1,235,230	$6,543,146
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	0	0	$0	$0	$0	$0	$0
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County Total	**5**	**3**	**$3,515,286**	**$1,235,230**	**$557,400**	**$1,235,230**	**$6,543,146**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

High Hazard Dam Analysis

Parcel counts, land, and improved values (i.e., those with a structure improvement on the parcel), estimated content replacement values, and total values that fall within each high hazard dam inundation areas in the Planning Area are presented below by hazard class and by dam. The results are presented in tables below by:

- Table 4-55 shows the count and value of parcels in the Black Butte dam inundation area summarized for each jurisdiction in the Planning Area. Table 4-56 breaks down Table 4-55 to show the parcel counts by property use in the inundation area for unincorporated Colusa County.
- Table 4-57 shows the count and value of parcels in the Rancho Rubini dam inundation area summarized for each jurisdiction in the Planning Area. Table 4-58 breaks down Table 4-57 to show the parcel counts by property use in the inundation area for unincorporated Colusa County.
- Table 4-59 shows the count and value of parcels in the Shasta dam inundation area summarized for each jurisdiction in the Planning Area. Table 4-60 breaks down Table 4-59 to show the parcel counts by property use in the inundation area for unincorporated Colusa County.
- Table 4-61shows the count and value of parcels in the Whiskeytown dam inundation area summarized for each jurisdiction in the Planning Area. Table 4-62 breaks down Table 4-61 to show the parcel counts by property use in the inundation area for unincorporated Colusa County.

Breakdowns of parcel counts by property use in each inundation are for the incorporated jurisdictions in the County are shown in their respective annexes to this LHMP Update.

Table 4-55 Colusa County Planning Area – Count and Value of Parcels in Black Butte Dam Inundation Area by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa	132	103	$13,962,858	$14,526,257	$161,962	$10,684,843	$39,335,920
City of Williams	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County	1,892	954	$441,769,205	$149,096,279	$22,171,704	$126,743,701	$739,780,889
Grand Total	**2,024**	**1,057**	**$455,732,063**	**$163,622,536**	**$22,333,666**	**$137,428,544**	**$779,116,809**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-56 Unincorporated Colusa County – Count and Value of Parcels in Black Butte Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	1,180	529	$371,320,240	$77,247,487	$14,807,437	$77,247,487	$540,622,651
Commercial	64	48	$4,276,861	$9,622,062	$2,290,634	$9,622,062	$25,811,619
Government	109	12	$19,808,816	$809,514	$3,485	$809,514	$21,431,329
Industrial	14	8	$1,780,800	$7,901,410	$1,330,878	$11,852,115	$22,865,203
Institutional	16	3	$885,398	$293,916	$424,813	$293,916	$1,898,043
Miscellaneous	92	11	$23,345,721	$615,300	$1,669,923	$615,300	$26,246,244
Residential	417	343	$20,351,369	$52,606,590	$1,644,534	$26,303,307	$100,905,800
Unincorporated Colusa County Total	**1,892**	**954**	**$441,769,205**	**$149,096,279**	**$22,171,704**	**$126,743,701**	**$739,780,889**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-57 Colusa County Planning Area – Count and Value of Parcels in Rancho Rubini Dam Inundation Area by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa	0	0	$0	$0	$0	$0	$0
City of Williams	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County	2	2	$209,011	$176,093	$0	$104,980	$490,084
Grand Total	**2**	**2**	**$209,011**	**$176,093**	**$0**	**$104,980**	**$490,084**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-58 Unincorporated Colusa County – Count and Value of Parcels in Rancho Rubini Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	1	1	$140,744	$33,866	$0	$33,866	$208,476
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	0	0	$0	$0	$0	$0	$0
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	1	1	$68,267	$142,227	$0	$71,114	$281,608
Unincorporated Colusa County Total	**2**	**2**	**$209,011**	**$176,093**	**$0**	**$104,980**	**$490,084**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-59 Colusa County Planning Area – Count and Value of Parcels in Shasta Dam Inundation Area by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa	2,334	2,077	$144,303,544	$443,767,787	$49,228,543	$309,495,963	$946,795,837
City of Williams	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County	3,067	1,490	$711,435,016	$222,619,493	$42,124,385	$187,464,749	$1,163,643,643
Grand Total	**5,401**	**3,567**	**$855,738,560**	**$666,387,280**	**$91,352,928**	**$496,960,712**	**$2,110,439,480**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-60 Unincorporated Colusa County – Count and Value of Parcels in Shasta Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	1,939	810	$620,417,954	$108,865,792	$30,538,004	$108,865,792	$868,687,542
Commercial	97	68	$6,004,719	$16,825,221	$4,029,204	$16,825,221	$43,684,365
Government	149	19	$22,817,179	$1,307,058	$4,375	$1,307,058	$25,435,670
Industrial	26	12	$2,279,116	$11,423,870	$1,856,608	$17,135,805	$32,695,399
Institutional	19	6	$916,273	$1,723,486	$1,885,258	$1,723,486	$6,248,503
Miscellaneous	158	17	$27,154,618	$740,683	$1,669,923	$740,683	$30,305,907
Residential	679	558	$31,845,157	$81,733,383	$2,141,013	$40,866,704	$156,586,257
Unincorporated Colusa County Total	**3,067**	**1,490**	**$711,435,016**	**$222,619,493**	**$42,124,385**	**$187,464,749**	**$1,163,643,643**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-61 Colusa County Planning Area – Count and Value of Parcels in Whiskeytown Dam Inundation Area by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa	2,334	2,077	$144,303,544	$443,767,787	$49,228,543	$309,495,963	$946,795,837
City of Williams	0	0	$0	$0	$0	$0	$0
Unincorporated Colusa County	1,937	1,064	$392,883,131	$173,034,903	$34,043,357	$142,614,065	$742,575,456
Grand Total	**4,271**	**3,141**	**$537,186,675**	**$616,802,690**	**$83,271,900**	**$452,110,028**	**$1,689,371,293**

Source: Cal OES/DSOD, 2023 Colusa County Parcel/Assessor Data

Table 4-62 Unincorporated Colusa County – Count and Value of Parcels in Whiskeytown Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	1,138	528	$334,977,775	$77,682,482	$24,607,844	$77,682,482	$514,950,583
Commercial	73	53	$5,180,898	$10,224,497	$2,882,914	$10,224,497	$28,512,806
Government	100	14	$12,991,666	$1,154,477	$4,375	$1,154,477	$15,304,995
Industrial	20	10	$2,045,713	$10,665,718	$1,493,698	$15,998,577	$30,203,706
Institutional	17	4	$910,879	$1,673,371	$1,829,749	$1,673,371	$6,087,370
Miscellaneous	44	6	$8,473,978	$126,943	$1,579,253	$126,943	$10,307,117
Residential	545	449	$28,302,222	$71,507,415	$1,645,524	$35,753,718	$137,208,879

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Unincorporated Colusa County Total	**1,937**	**1,064**	**$392,883,131**	**$173,034,903**	**$34,043,357**	**$142,614,065**	**$742,575,456**

Source: Cal OES/DSOD, 2023 Colusa 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 wiped out, 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. It is separated by extremely high hazard and high hazard dams.

Extremely High Hazard Dam Inundation Analysis

A separate analysis was performed on the critical facility inventory in the City to determine critical facilities in the extremely high hazard dam inundation areas. Using GIS, each extremely high hazard dam inundation area was overlayed on the critical facility GIS layer. This is shown on Figure 4-52. Table 4-63 details which critical facilities fall in the extremely high hazard dam inundation area. As seen, only Oroville Dam has critical facilities in its inundation area. Details of critical facility categories, type, name, and address by dam inundation area are listed in Appendix F.

Figure 4-52 Colusa County Planning Area – Critical Facilities in Extremely High Hazard Dam Inundation Zones

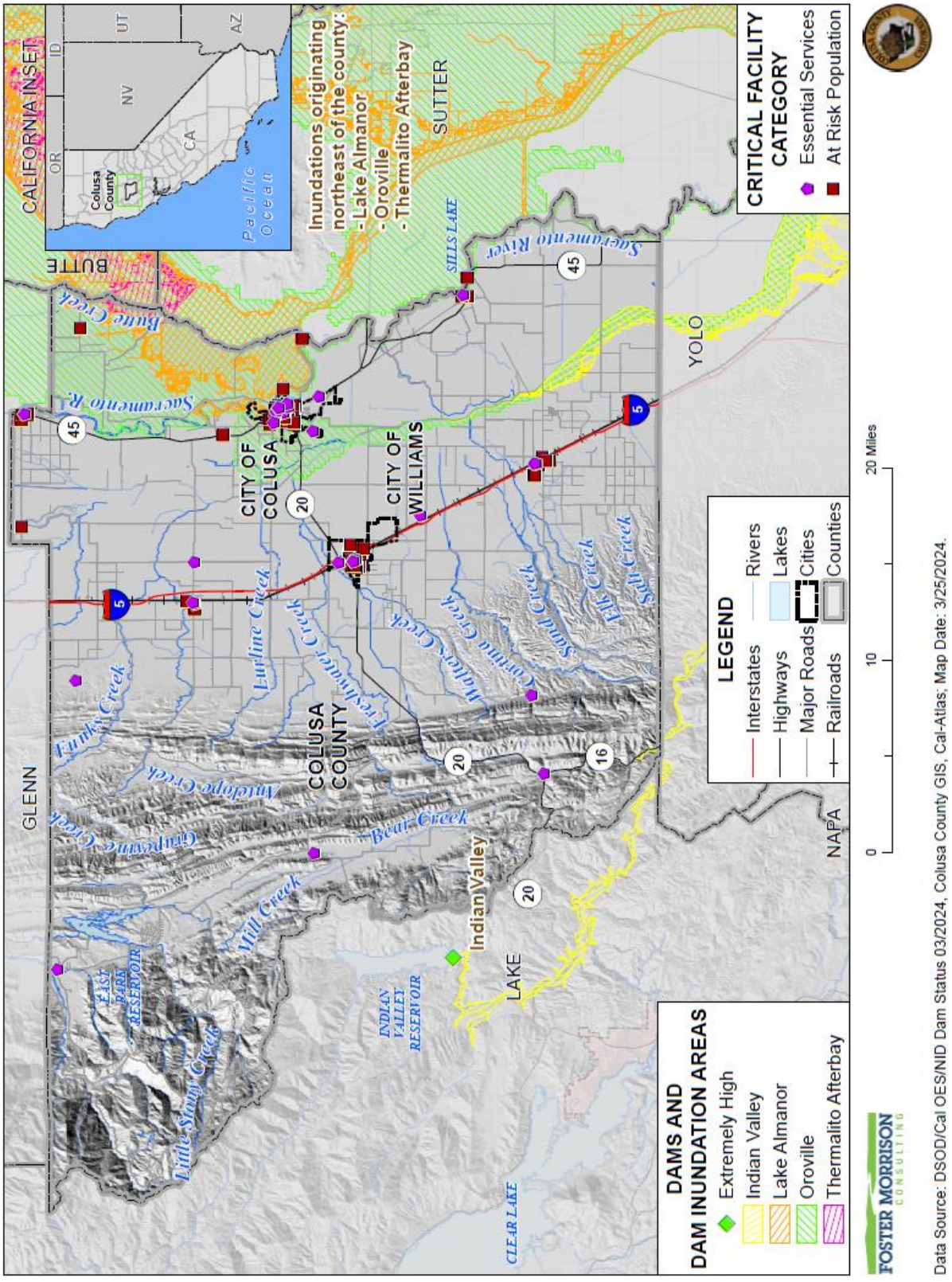


Table 4-63 Colusa County Planning Area – Critical Facilities in Oroville Dam Inundation Zones by Critical Facility Category, Type, and Jurisdiction

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
City of Colusa		
Essential Services Facilities	Emergency Response	1
	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	2
	Utility Facility	2
	Total	**9**
At Risk Population Facilities	Apartment Complex	19
	Assisted-Living	1
	Hotel or Motel	2
	Jail	1
	Mobile Home Park	4
	School	8
	Senior Living Facility	1
	Total	**36**
City of Colusa Total		**45**
Unincorporated Colusa County		
At Risk Population Facilities	Apartment Complex	1
	Mobile Home Park	5
	Total	**6**
Unincorporated Colusa County Total		**6**
Grand Total		**51**

Source: DSOD/Cal OES/NID Dam Status 03/24, Colusa County GIS

High Hazard Dam Inundation Analysis

A separate analysis was performed on the critical facility inventory in the County to determine critical facilities in the high hazard dam inundation areas. Using GIS, each high hazard dam inundation area was overlayed on the critical facility GIS layer. This is shown on Figure 4-53. Three dams have inundation areas that affect critical facilities in the Colusa County Planning Area: Black Butte (see Table 4-64), Shasta (see Table 4-65), and Whiskeytown (see Table 4-66). These tables detail which critical facilities fall in the high hazard dam inundation area. Details of critical facility categories, type, name, and address by dam inundation area are listed in Appendix F.

Figure 4-53 Colusa County Planning Area – Critical Facilities in the High Hazard Dam Inundation Areas

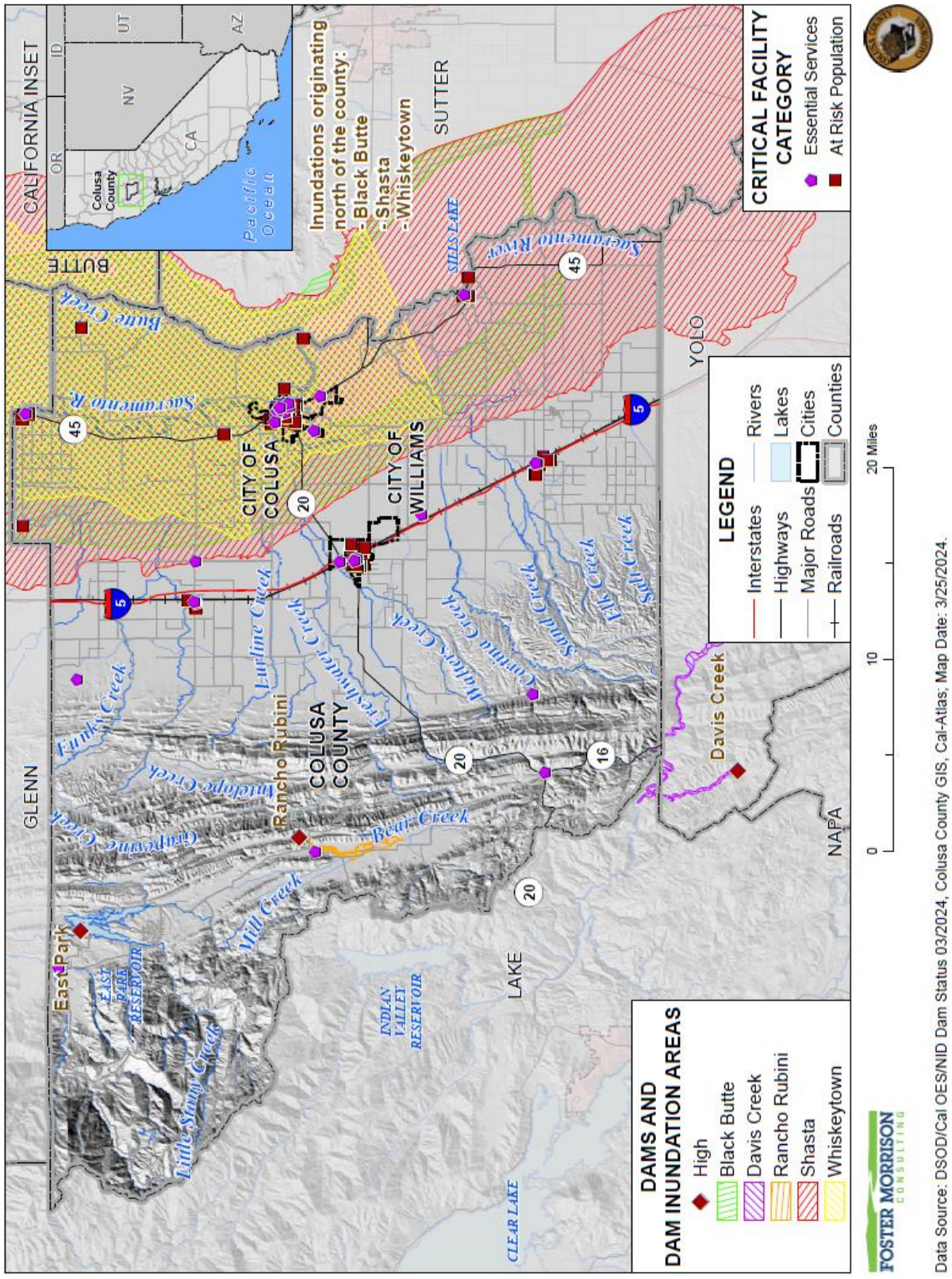


Table 4-64 Colusa County Planning Area – Critical Facilities in Black Butte Dam Inundation Zones by Critical Facility Category, Type, and Jurisdiction

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
City of Colusa		
Essential Services Facilities	Emergency Response	1
	Public Services	1
	Utility Facility	1
	Total	**3**
At Risk Population Facilities	Mobile Home Park	2
	Total	**2**
City of Colusa Total		**5**
Unincorporated Colusa County		
Essential Services Facilities	Fire Station	1
	Total	**1**
At Risk Population Facilities	Apartment Complex	1
	Casino	1
	Hotel or Motel	1
	Mobile Home Park	5
	School	2
	Total	**10**
Unincorporated Colusa County Total		**11**
Grand Total		**16**

Source: DSOD/Cal OES/NID Dam Status 03/24, Colusa County GIS

Table 4-65 Colusa County Planning Area – Critical Facilities in Shasta Dam Inundation Zones by Critical Facility Category, Type, and Jurisdiction

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
City of Colusa		
Essential Services Facilities	Emergency Response	1
	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	3
	Utility Facility	2
	Total	**10**
At Risk Population Facilities	Apartment Complex	22

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
	Assisted-Living	1
	Hotel or Motel	2
	Jail	1
	Mobile Home Park	5
	School	8
	Senior Living Facility	1
	Total	**40**
City of Colusa Total		**50**
Unincorporated Colusa County		
Essential Services Facilities	Fire Station	2
	Total	**2**
At Risk Population Facilities	Apartment Complex	3
	Casino	1
	Hotel or Motel	1
	Mobile Home Park	7
	School	3
	Total	**15**
Unincorporated Colusa County Total		**17**
Grand Total		**67**

Source: DSOD/Cal OES/NID Dam Status 03/24, Colusa County GIS

Table 4-66 Colusa County Planning Area – Critical Facilities in Whiskeytown Dam Inundation Zones by Critical Facility Category, Type, and Jurisdiction

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
City of Colusa		
Essential Services Facilities	Emergency Response	1
	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	3
	Utility Facility	2
	Total	**10**
At Risk Population Facilities	Apartment Complex	22
	Assisted-Living	1
	Hotel or Motel	2

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
	Jail	1
	Mobile Home Park	5
	School	8
	Senior Living Facility	1
	Total	**40**
City of Colusa Total		**50**
Unincorporated Colusa County		
Essential Services Facilities	Fire Station	1
	Total	**1**
At Risk Population Facilities	Apartment Complex	2
	Casino	1
	Hotel or Motel	1
	Mobile Home Park	5
	School	2
	Total	**11**
Unincorporated Colusa County Total		**12**
Grand Total		**62**

Source: DSOD/Cal OES/NID Dam Status 03/24, Colusa County GIS

Community Lifelines

Dam failure flooding presents a threat to life and property, including community lifelines in the Colusa County Planning Area. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Community lifelines that would be at risk to dam failure flooding include:

- **Safety and Security** – Police, Fire, EMS, and Public Works personnel are often called on to respond during flood emergencies. This would be especially true in a dam failure event. Search and rescue and swiftwater teams may be called on to perform riskier duties during times of heavy rains and flooding.
- **Food, Hydration, Shelter** – a dam failure would displace many residents in the Planning Area. Some would need shelter, as well as food and water.
- **Health and Medical** – There is the potential for multiple injuries and deaths from a catastrophic dam failure taxing health and medical facilities. Casualty and patient movement from the inundation areas and unrelated incidents by EMS may be significantly impacted and have to be rerouted. Public health facilities can also be at risk from flooding caused by dam failures.
- **Energy** – Dam failure could impact large areas of above ground electric infrastructure, causing widespread power outages. Dam failure could also affect fueling stations, as well as electric car charging stations.
- **Communications** – An influx of service calls to dispatch centers for reporting of flooding, power outages, and rescues or other issues can occur resulting in communication networks going down for extended periods of time. Messaging systems need to be deployed during these events to let the public

know about road closures, washouts, debris on roads, or lane closures. Calls to and from family and friends during a hazard event can further overwhelm communication systems such as cell towers and other infrastructure. Demand may exceed the capacity of these systems to remain operational during response efforts.

- **Transportation** – Highways and local roads may see extensive flooding. Bridges can be damaged or destroyed. This can cause lane closures or road closures and limit available routes altogether. These closures can affect response personnel (EMS, Fire, Police) as well as cause additional traffic issues for residents. Evacuation efforts may be difficult and further put people at risk of death or injury.
- **Hazardous Material** – Hazardous material facilities can be affected by flooding. Releases during these events can contribute to the dangers of floodwaters and cause contamination of potable water sources, as well as additional exposure to the environment.
- **Water Systems** – Any water (or wastewater) system located in a dam inundation area may be affected by dam failure flooding. The Planning Area's stormwater drainage system and facilities may also be affected.

A large dam failure event could overwhelm many community lifelines in the Colusa County Planning Area. As shown on the maps and tables above, there are multiple dams that would affect large swaths of the Planning Area. A failure of many of these dams could, at least temporarily, overwhelm the community lifelines in place in affected areas of the Planning Area.

Natural, Historic, and Cultural Resources

A major dam failure event and associated flooding could have a devastating impact on the Colusa 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 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 flood events.

Economic Assets and Community Activities of Value

As shown on the maps and tables above, there are multiple dams that would affect large swaths of the Colusa County Planning Area should they fail. Many economic assets of the Planning Area would be at least temporarily disrupted. Many of these would come back online relatively quickly after a dam failure flood event, but some would take longer to re-engage in business. Some economic assets may be damaged to the point where the business or area would no longer be economically viable to continue to operate. Depending on the time of year the dam failure occurs, the agricultural sector in the County could see significant damages. This is discussed in more detail in Section 4.3.6. Depending on the dam that failed, most community activities of value would be affected if they occurred during a dam failure event. This includes the County Fair, Farm Show, rodeos, craft fairs, and hunting and fishing seasons.

Impacts from Dam Failure

Impacts to the Colusa 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 are 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

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 Colusa 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 Colusa County has recently slowed; however, 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. 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. 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 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 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

Colusa County provided 53 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 assigned are based on the centroid of the polygon. Figure 4-54 and Figure 4-55 show the locations of the future development areas overlayed on the extremely high and high hazard dam inundation areas, respectively. Table 4-67 shows the details of the future development areas that are located in both the extremely high and high hazard dam inundation areas.

Figure 4-54 Unincorporated Colusa County – Future Development Areas in Extremely High Hazard Dam Inundation Areas

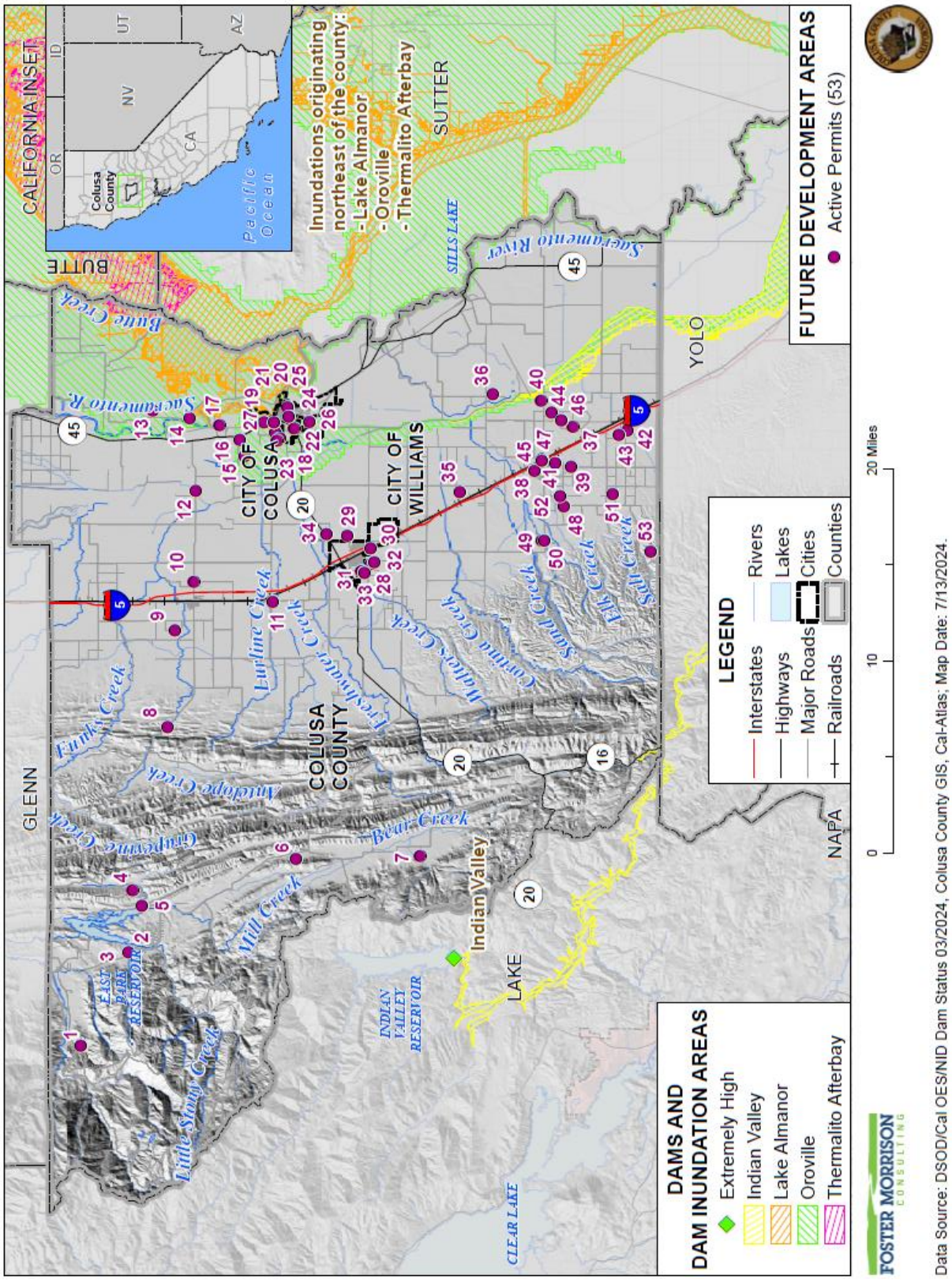


Figure 4-55 Unincorporated Colusa County – Future Development Areas in High Hazard Dam Inundation Areas

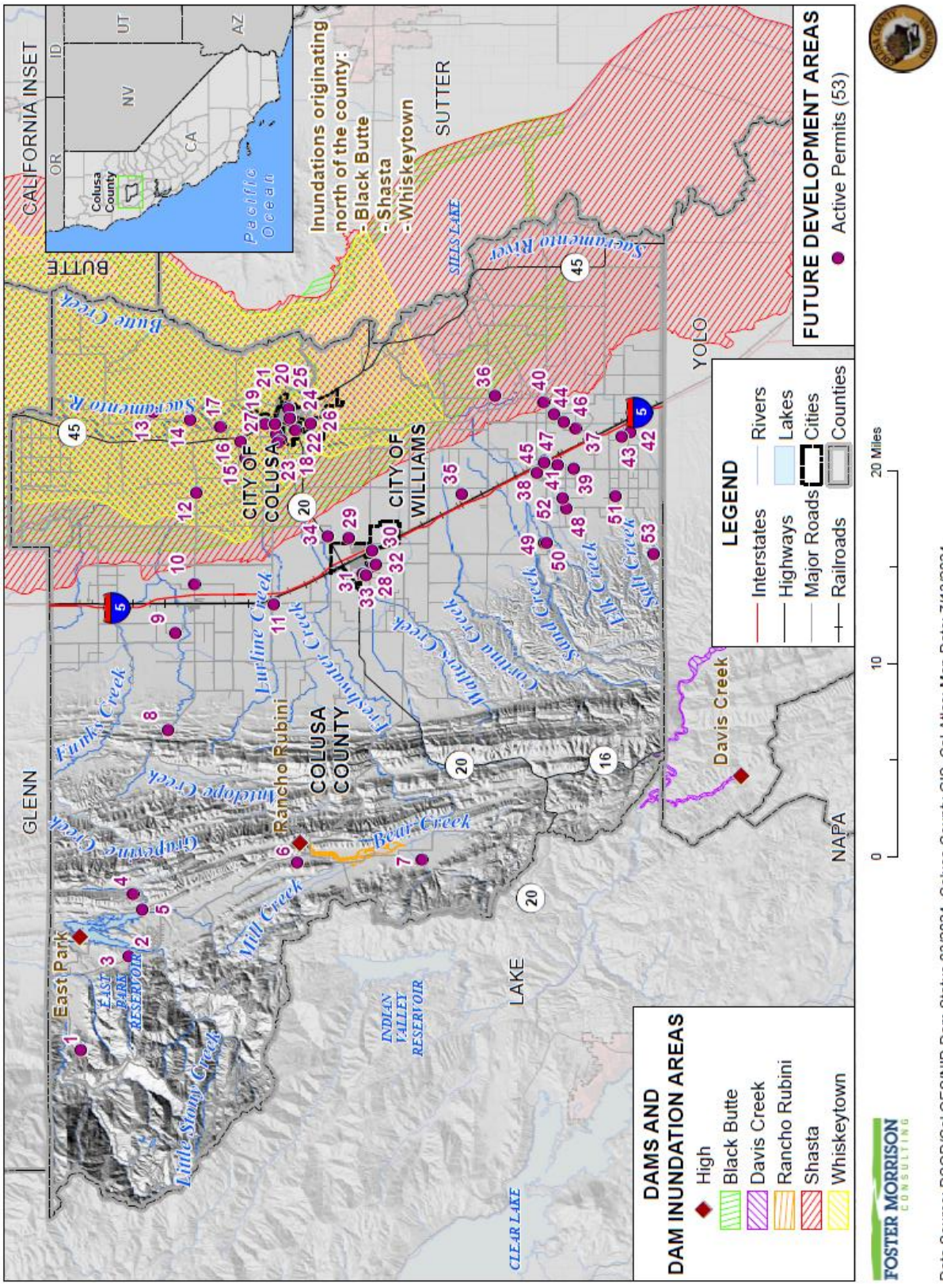


Table 4-67 Unincorporated Colusa County – Future Development Areas in Extremely High and High Hazard Dam Inundation Areas with Parcel Counts and Acreages

Dam Classification/ Dam	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
Extremely High Dam Inundation Area				
	13	4374 RIVER RD	1	402.44
	14	4073 RIVER RD	1	10.32
	15	015-060-091-000	1	497.11
	16	6892 HARBISON RD	1	11.00
	18	3258 MCCOY RD	1	6.01
	19	015-310-050-000	1	11.97
	20	022-200-066-000	1	0.45
	21	022-200-066-000	1	0.45
	22	3145 WILL S GREEN RD	1	7.48
	23	3286 RANCH RD	1	1.85
	24	1232 FIFTH ST	1	0.60
	25	002-101-004-000	1	4.48
	27	1773 LURLINE AVE	1	3.40
Oroville Total			13	957.55
High Dam Inundation Area				
Black Butte	12	6458 MAXWELL RD	1	319.89
	13	4374 RIVER RD	1	402.44
	14	4073 RIVER RD	1	10.32
	15	015-060-091-000	1	497.11
	16	6892 HARBISON RD	1	11.00
	17	015-030-094-000	1	17.03
	18	3258 MCCOY RD	1	6.01
	19	015-310-050-000	1	11.97
	20	022-200-066-000	1	0.45
	21	022-200-066-000	1	0.45
	22	3145 WILL S GREEN RD	1	7.48
	23	3286 RANCH RD	1	1.85
	27	1773 LURLINE AVE	1	3.40
	Black Butte Total		**13**	**1,289.39**
Shasta	12	6458 MAXWELL RD	1	319.89
	13	4374 RIVER RD	1	402.44
	14	4073 RIVER RD	1	10.32

Dam Classification/ Dam	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
	15	015-060-091-000	1	497.11
	16	6892 HARBISON RD	1	11.00
	17	015-030-094-000	1	17.03
	18	3258 MCCOY RD	1	6.01
	19	015-310-050-000	1	11.97
	20	022-200-066-000	1	0.45
	21	022-200-066-000	1	0.45
	22	3145 WILL S GREEN RD	1	7.48
	23	3286 RANCH RD	1	1.85
	24	1232 FIFTH ST	1	0.60
	25	002-101-004-000	1	4.48
	26	015-380-019-000	1	1.00
	27	1773 LURLINE AVE	1	3.40
	36	019-090-058-000	1	10.00
	40	7251 TULE RD	1	2.64
	Shasta Total		**18**	**1,308.12**
Whiskeytown	12	6458 MAXWELL RD	1	319.89
	13	4374 RIVER RD	1	402.44
	14	4073 RIVER RD	1	10.32
	15	015-060-091-000	1	497.11
	16	6892 HARBISON RD	1	11.00
	17	015-030-094-000	1	17.03
	18	3258 MCCOY RD	1	6.01
	19	015-310-050-000	1	11.97
	20	022-200-066-000	1	0.45
	21	022-200-066-000	1	0.45
	22	3145 WILL S GREEN RD	1	7.48
	23	3286 RANCH RD	1	1.85
	24	1232 FIFTH ST	1	0.60
	25	002-101-004-000	1	4.48
	26	015-380-019-000	1	1.00
	27	1773 LURLINE AVE	1	3.40
	Whiskeytown Total		**16**	**1,295.47**

Source: Cal OES/DSOD, Colusa County GIS

4.3.9. Drought and Water Shortage

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Colusa 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

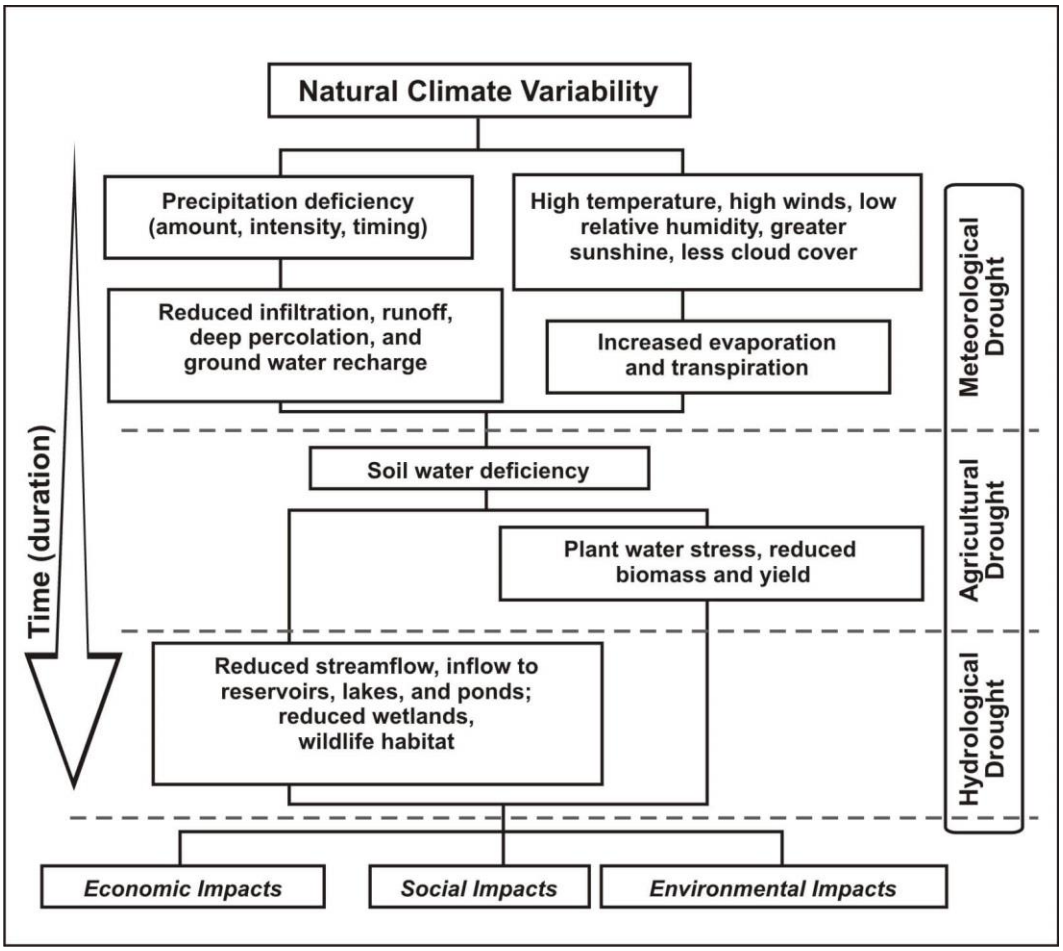
Drought

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 4-56) 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 4-56 Causes and Impacts of Drought

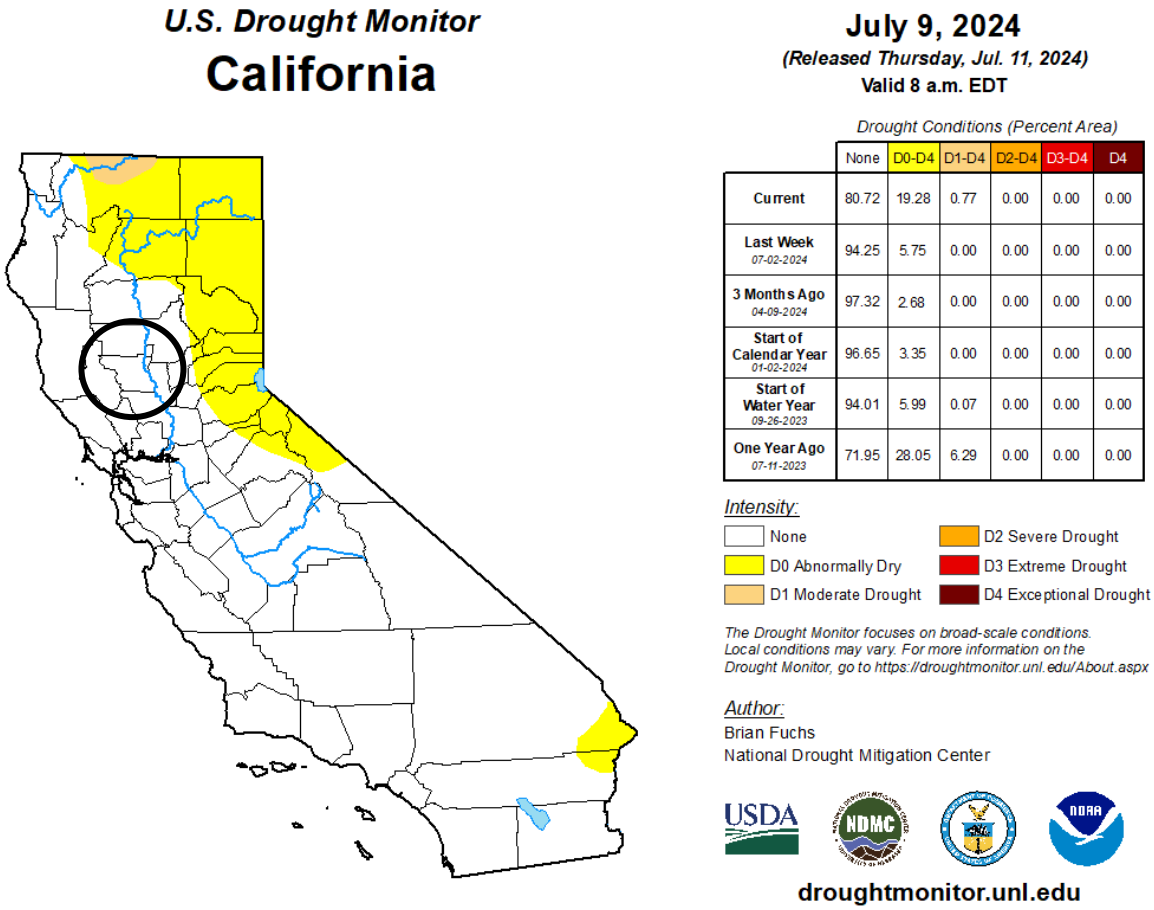


Source: National Drought Mitigation Center (NDMC)

Location and Extent of Drought

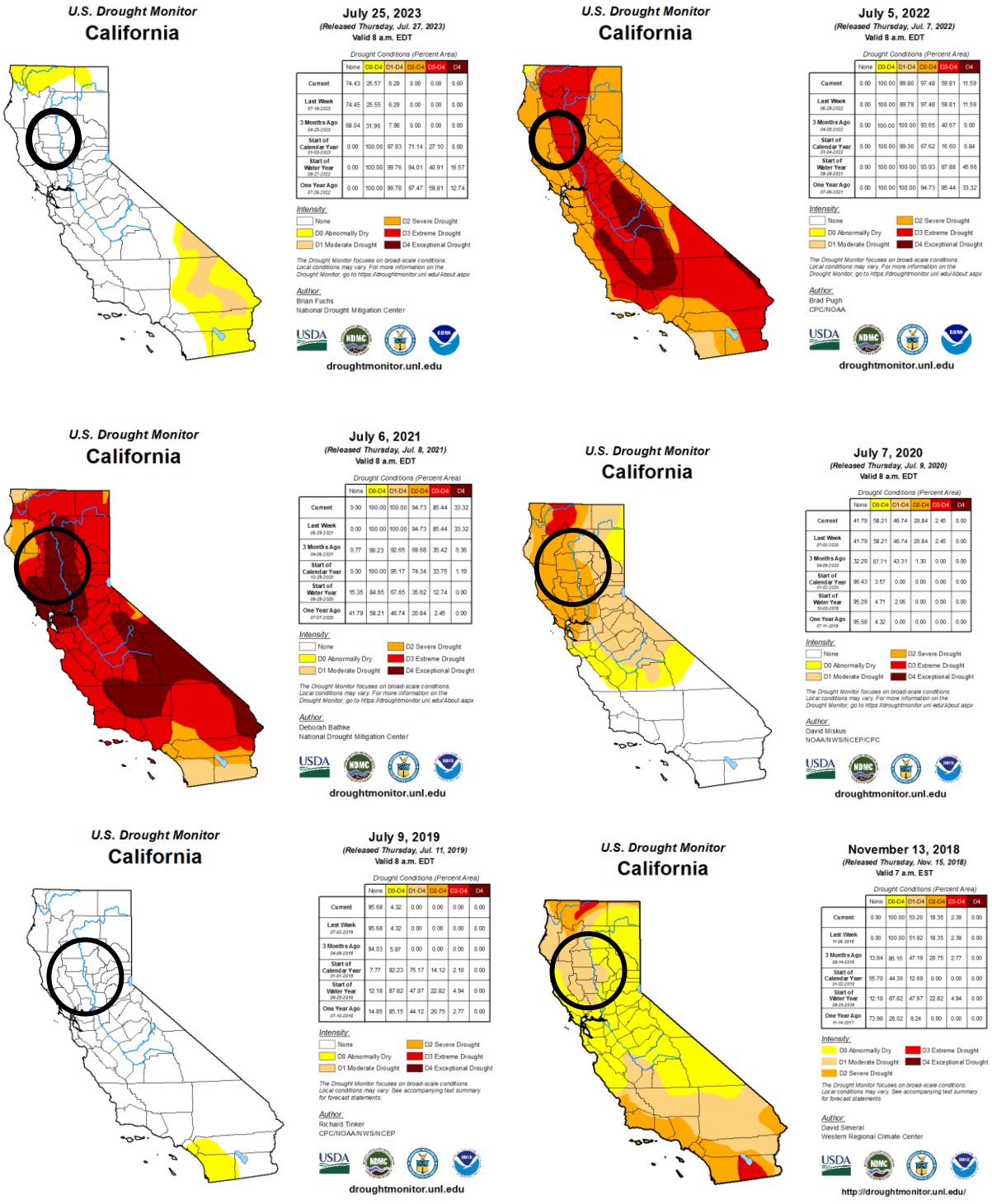
Drought is a regional phenomenon that affects the entire Colusa County Planning Area. Drought in the United States is monitored by the National Integrated Drought Information System (NIDIS). A major component of this portal is the U.S. Drought Monitor. The Drought Monitor concept was developed jointly 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 2023 drought conditions in California and the Colusa County Planning Area can be found in Figure 4-57. Snapshots from 2014 to 2023 are shown in Figure 4-58 and Figure 4-59. 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 4-57 Colusa County Planning Area – Current Drought Status



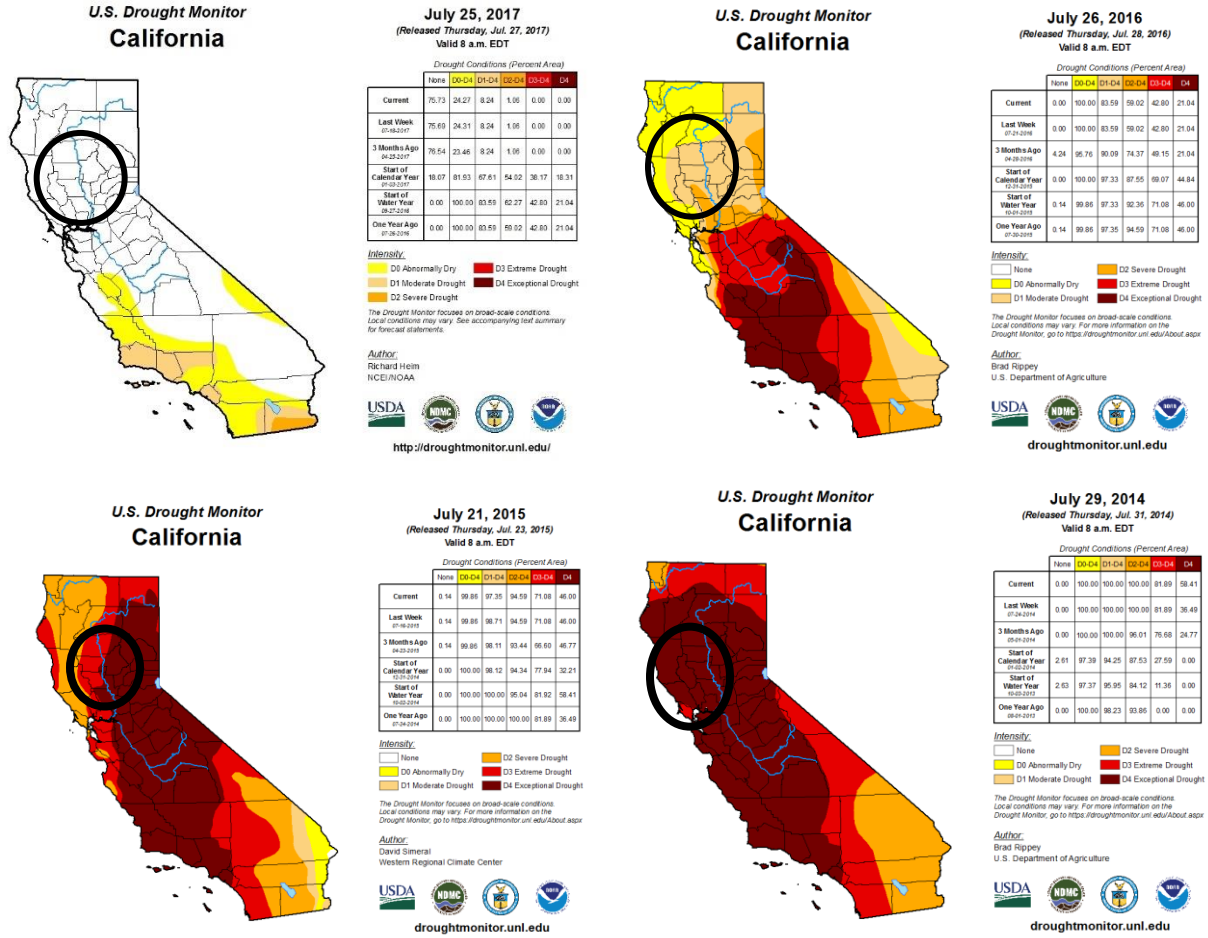
Source: US Drought Monitor

Figure 4-58 Previous Drought Status in Colusa County (2018-2023)



Source: US Drought Monitor

Figure 4-59 Previous Drought Status in Colusa 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 Colusa County Planning Area.

Water Shortage

Northern California communities, including the Colusa County Planning Area, 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 2010 General Plan Background Report and the 2021 Colusa County Groundwater Sustainability Report noted that water supplied to Colusa County comes from two sources: groundwater and surface water. All domestic water systems in the County are supplied with groundwater, while most irrigation systems are supplied with surface water from the Tehama-Colusa or Glenn-Colusa Canals, the Colusa Drain, or the Sacramento River. The surface water supplies available for use in Colusa County are significant. Surface water is used on 74 to 86 percent of the irrigated land within the Sacramento Valley portion of the County. Whereas, groundwater is used on 10 to 22 percent of that land. Of the land where groundwater is used, 6 to 11 percent is not within the service area of any organized entity. There are community water systems located in Arbuckle, Maxwell, Princeton, Grimes, Stonyford, and the Cities of Colusa and Williams. There are also numerous private groundwater wells located throughout the County that serve individual parcels throughout the unincorporated areas of the County. Colusa County's access to water makes water shortage a less threatening hazard to the Planning Area.

Location and Extent of Water Shortage

Since water shortage generally happens on a regional scale, the entirety of the Colusa 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 sufficient water supply from water supplies, which lessens the extent of water shortage impacts in the Planning Area.

Past Occurrences

Disaster Declaration History

There have been three state and one federal disaster declarations for Colusa County. These are shown on Table 4-68. More information on USDA disaster declarations from drought (fourteen events) can be found in Table 4-42 in the Past Occurrences in Section 4.3.6.

Table 4-68 Colusa County – Federal and State Drought Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Drought	1	1977	3	1976, 2014, 2021

Source: Cal OES, FEMA

NCDC Events

There have been 58 NCDC drought events in Colusa County. This is shown on Table 4-69.

*Table 4-69 NCDC Drought Events for Colusa County 1950-8/31/2023**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Drought	58	0	0	0	0	$0	$0

Source: NCDC

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

EOC Activations

The HMPC noted that there have been times where the County EOC has been activated for drought response. This is shown on Table 4-70.

Table 4-70 Colusa County – EOC Activations from Drought 2008-2024

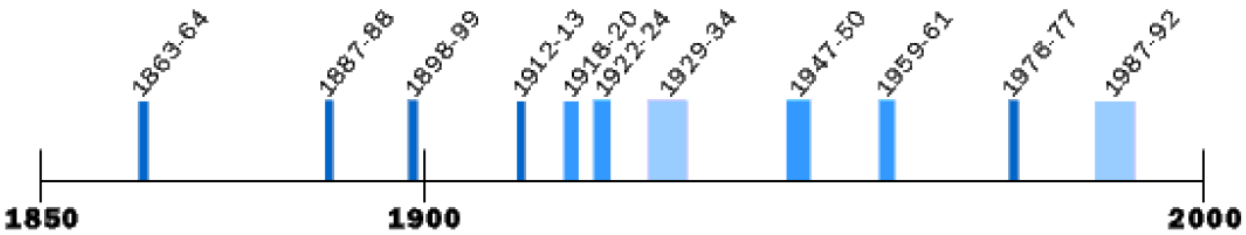
Disaster Type	EOC Activations	
	Count	Date
Drought	3	6/2015; 10/2017, 1/2019

Source: Colusa County

CA DWR Events (with Hazard Mitigation Planning Team Input)

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 4-60 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 4-61 compares the 1929-34 drought to the 1976-77, 1987-92, 2007-09, and 2012-2016 droughts.

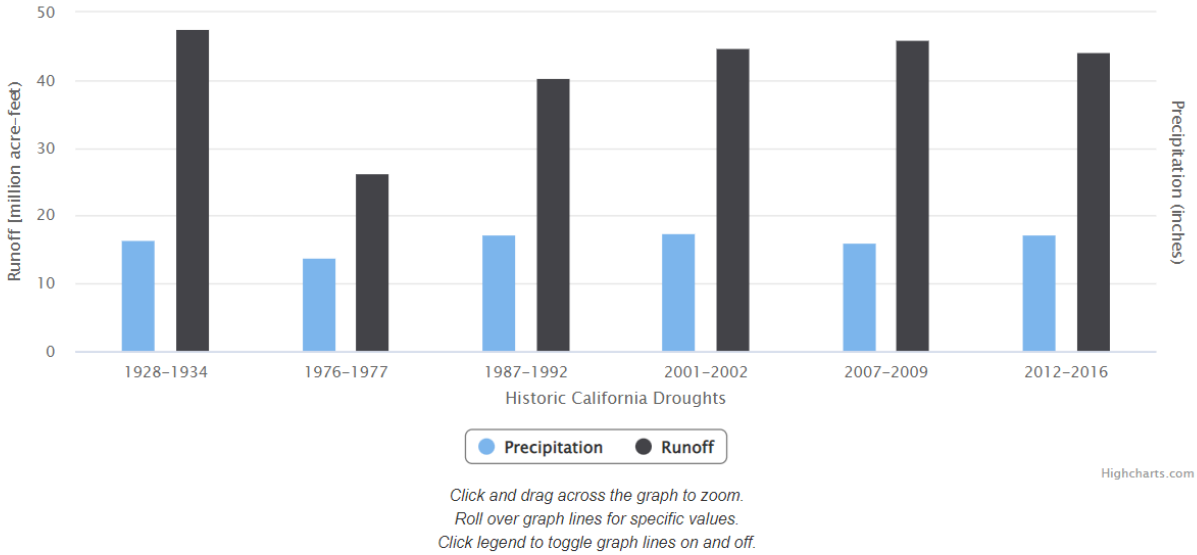
Figure 4-60 California's Multi-Year Historical Dry Periods, 1850-2000



Source: Cal DWR

Notes: Dry periods prior to 1900 estimated from limited data; covers dry periods of statewide or major regional extent

Figure 4-61 Average Annual Runoff and Precipitation for Historic Droughts

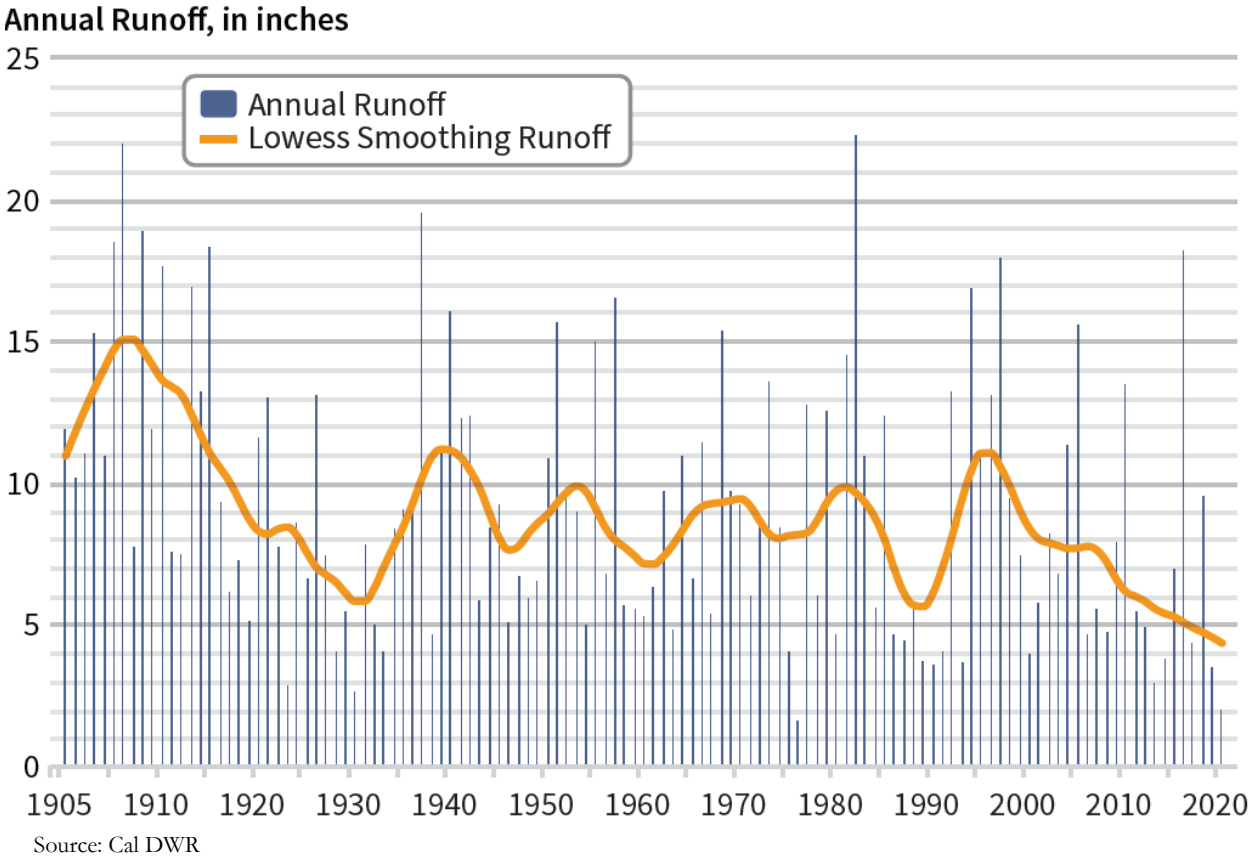


Runoff and precipitation conditions for California's six historical droughts. The most severe drought both in terms of precipitation and runoff was the drought of 1976-77. However, because it was just a two-year drought, the water supply impacts were not as severe as those associated with the longer 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 4-62 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 4-62 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 2012-2017 Drought (which carried forward until 2023 after a pause in 2017)

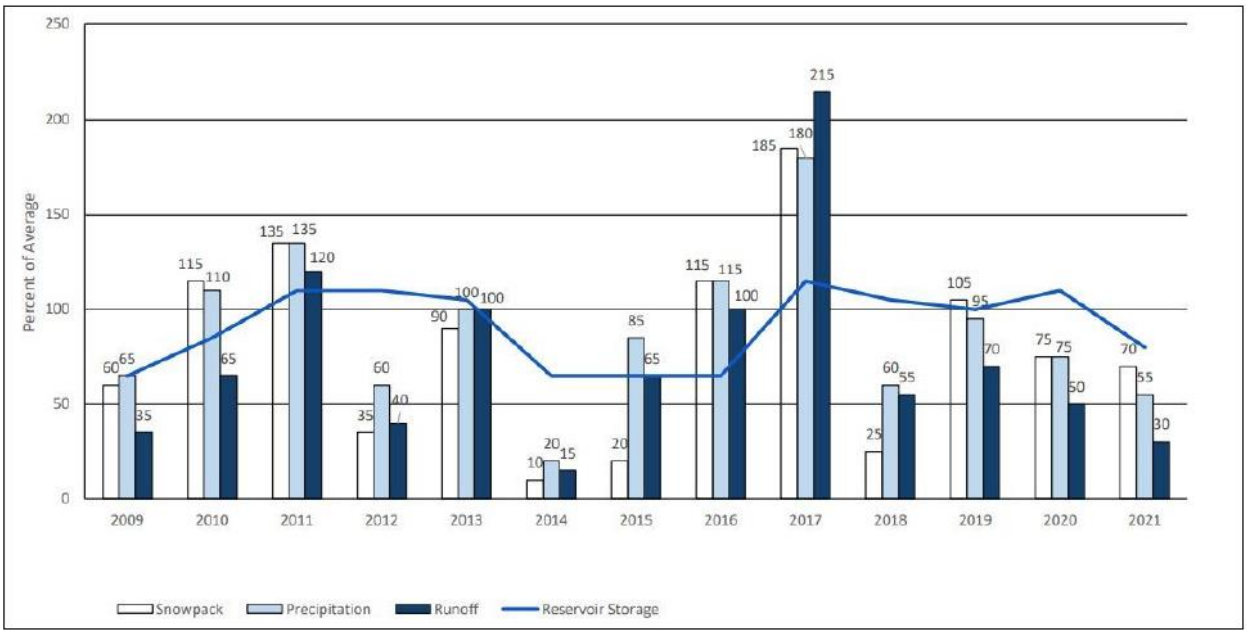
The statewide drought of 2012-2017, which is still ongoing, will be remembered as one of the most severe and costliest droughts of record in California. The drought that spanned water years 2012 through 2017 included the driest four-year statewide precipitation on record (2012-2015) and the smallest 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.

Colusa County issues a local proclamation for drought on March 5, 2021. This coincides with many of the drought declarations from the USDA (discussed in more detail in Section 4.3.6 above).

Water Shortage

Figure 4-63 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 2007 and 2021. The chart illustrates the cyclical nature of weather patterns in California.

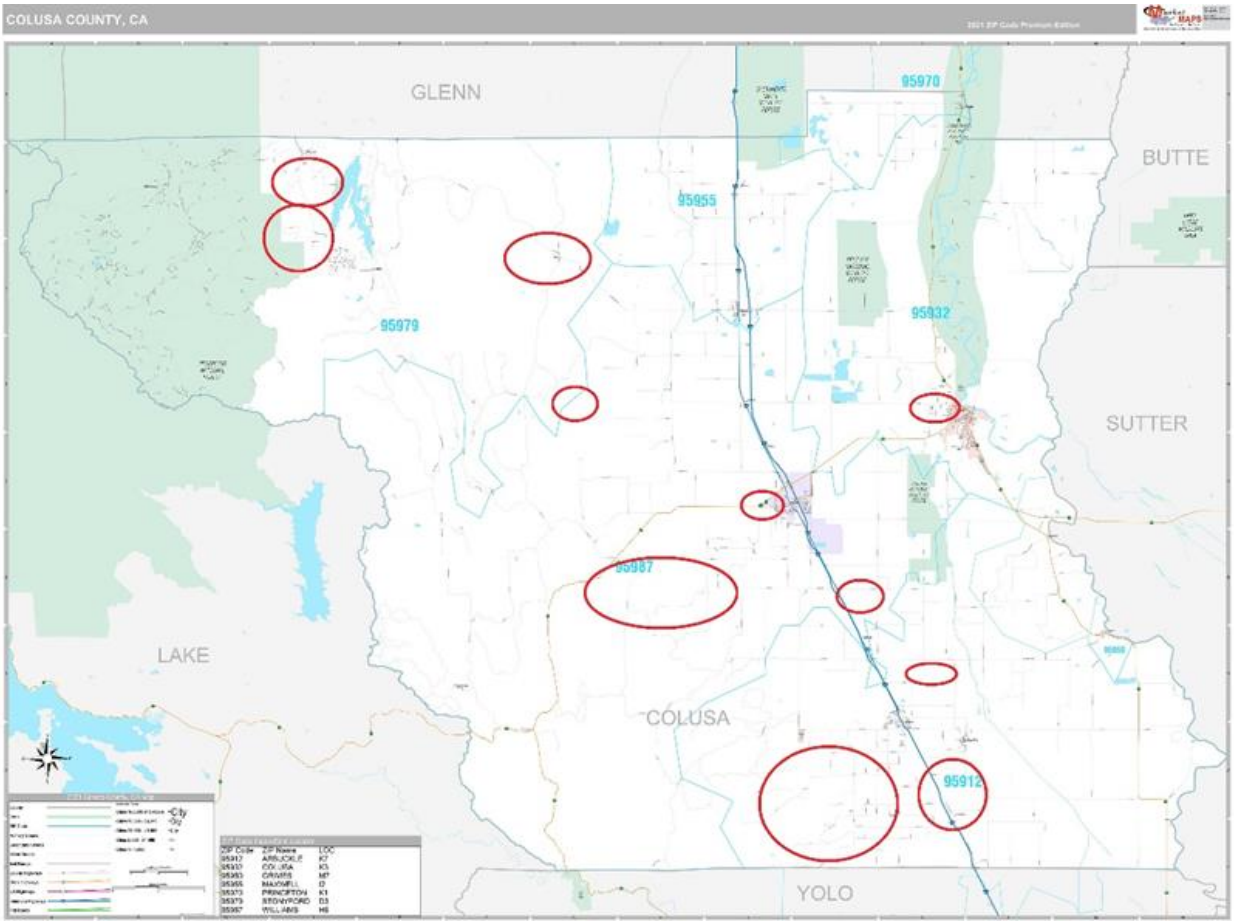
Figure 4-63 Water Supply Conditions, 2009 to 2021



Source: 2023 State of California Hazard Mitigation Plan

The County noted that during drought conditions in 2021 to 2023, wells in areas went dry. These areas can be seen in Figure 4-64. During this time 20 wells were reported as dry in 2021 and 1 was reported as dry in 2022. Many of these dry wells affected individuals who could not afford the additional costs of drilling a deeper well. Additionally, pumping from deeper wells requires larger pumps, which add to the costs of well drilling and deepening.

Figure 4-64 Colusa County – Drought Affected Well Locations from 2021/2022



Source: Colusa County OES

Dry wells caused County residents to have to rely on water deliveries. From June 2021 – November 3, 2021, there were 241,539 gallons of water delivered. From November 2021 – July 2022 533,000 gallons of water delivered. Beginning in August of 2022 the County tracked monthly deliveries:

- 35,500 gallons August 2022
- 41,000 gallons September 2022
- 57,000 gallons October 2022
- 57,600 gallons November 2022
- 42,000 gallons December 2022
- 64,500 gallons January 2023
- 58,500 gallons February 2023
- 41,000 gallons March 2023
- 39,500 gallons April 2023
- 31,000 gallons May 2023
- 36,500 gallons June 2023
- 14,000 gallons July 2023
- 15,000 gallons August 2023
- 2,000 gallons September 2023

- 5,000 gallons October 2023
- 9,500 gallons November 2023
- 2,500 gallons December 2023

Likelihood of Future Occurrence

Drought

Likely—Historical drought data for the Colusa County Planning Area indicate there have been 5 significant droughts in the last 86 years. This equates to a drought every 16.8 years on average or a 6.0 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 Colusa County Planning Area determined that future drought occurrence continues to be likely.

Water Shortage

Occasional — Recent historical data for water shortage indicates that California and the Colusa County Planning Area 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 Planning Area in the future during extreme drought conditions. New development, landscaping, and road paving put stress on water resources. The supply of water is currently sufficient, but as population grows and land use patterns shift, it will be necessary to consider the added stress that new development will put on water demand and quality.

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 2021 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.

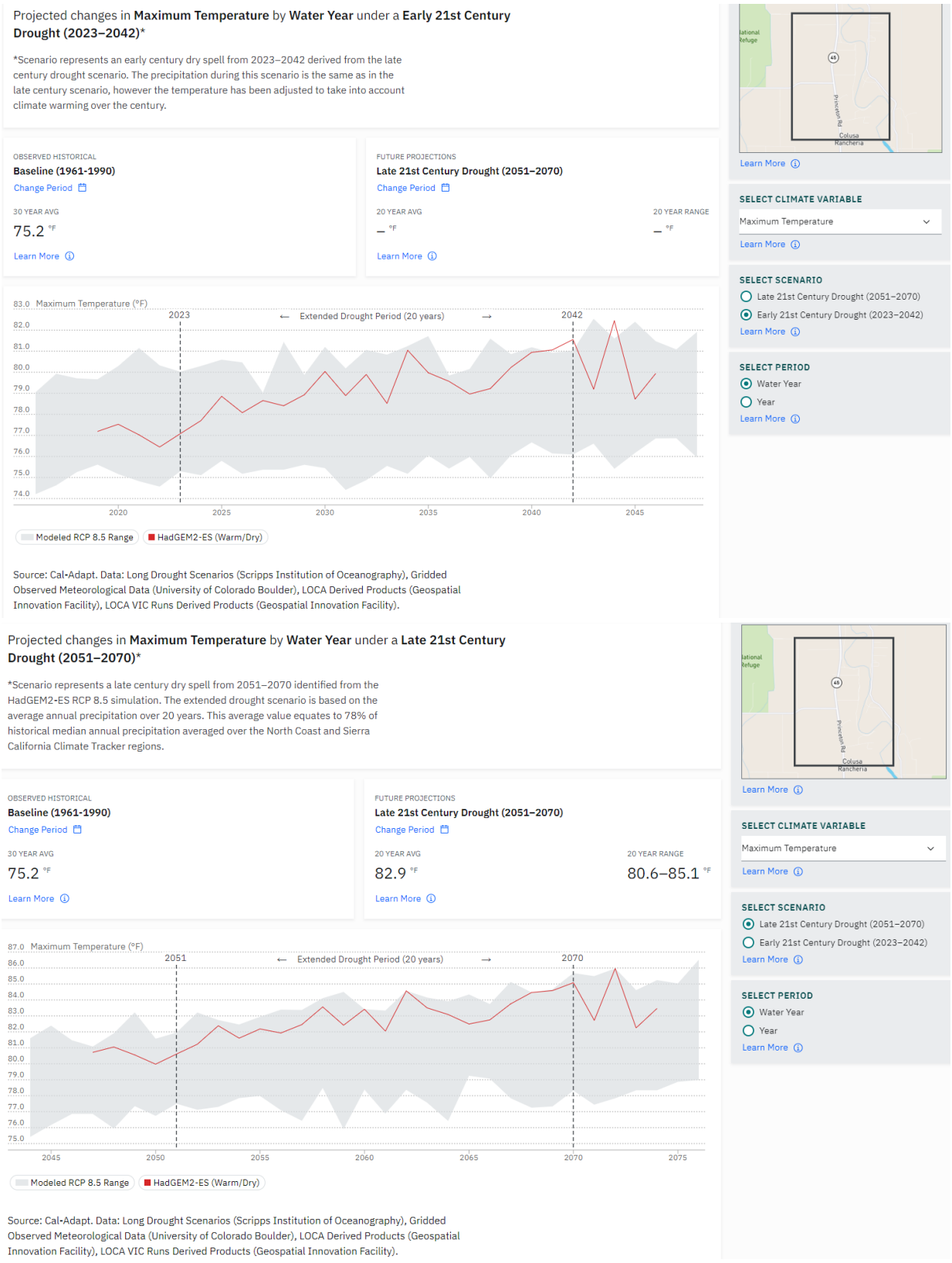
A 2018 report from the Public Policy Institute of California noted that thousands of Californians – mostly in rural, small, disadvantaged communities – already face acute water scarcity, contaminated groundwater, or complete water loss. Climate change would make these effects worse.

Cal-Adapt 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 Colusa in Figure 4-65) 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 4-65 Colusa County Planning Area – Future Extended Drought Scenarios



Source: Cal Adapt – Extended Drought Scenarios (retrieved 3/20/2023)

Vulnerability Assessment

Vulnerability—High

Based on historical information, the occurrence of drought in California, including the Colusa 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 Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

Local Concerns (unincorporated Colusa 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.

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. Land subsidence (discussed in Section 4.3.16) can also occur when the groundwater table is depleted.

Assets at Risk

Assets at risk from drought and water shortage 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 Colusa County Planning Area and unincorporated Colusa County.

People and Populations

The people and populations of the Colusa 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 have an effect on 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 hazard of drought (increased 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. These trees may fall on critical infrastructure adjacent to them and impact power lines and other utilities.

Community Lifelines

While limited, community lifelines can have a vulnerability to drought and water shortage. This includes:

- **Safety and Security** – Agencies may need to assist in providing alternative water supplies. Agencies may also need to staff locations where water is distributed.
- **Food, Hydration, Shelter** – Drought can limit agricultural production, including timber and grazing activities. Additional water supplies may need to be procured.
- **Health and Medical –** Additional water supplies may be required for these facilities to remain fully operational during drought and water shortages.
- **Energy –** Sufficient water is required to generate electricity and power. Additional fuels and power may be required to move water to and from locations that need it.
- **Communications** – Most communication systems will not be affected. In extreme instances, additional messaging may be required during drought and water shortages.
- **Water Systems** – During period of drought and water shortage, additional pressure may be put on water companies to secure additional supplies. With reductions in available water, the ability of wastewater systems to effectively treat wastewater may be impacted.

It is unlikely that any of these community lifelines would be overwhelmed by drought and water shortages, especially given the current state of water supply reliability in the Colusa County Planning Area.

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. 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.

Economic Assets and Community Activities of Value

Economic assets and community activities in the Colusa County Planning Area generally have a limited vulnerability to drought and water shortage, with the exception of the agricultural industry. Drought is a problem which predominantly affects rural small business owners such as farmers and agricultural contractors who rely on water for their crops. More information on drought and agriculture can be found in the discussion in Section 4.3.9. Additionally, supply issues can also affect businesses such as cafes and restaurants in more urban areas. Drought impacts to the agricultural industry can affect the supply chain and increase the cost of food and water, and adversely impact businesses tied to these industries. Reduction in or interruption of the water supply could also lead to lower productivity or closure of manufacturing facilities. Other economic sectors with a heavy reliance on water may also be affected. Depending upon how severe the conditions get and how long they last, drought can restrict recreational and community activities, all of which can stress businesses and local economies over time.

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 can cause 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 Colusa 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.

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.

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 4-71 show drought impacts for County from 1850 to June 2023. The data represented is skewed, with the majority of these impacts from records within the past ten years.

Table 4-71 Colusa County Drought Impacts 1850-3/1/2024

Category	Colusa County Number of Impacts
Agriculture	58
Business and Industry	9
Energy	6
Fire	17
Plants & Wildlife	47
Relief, Response, and Restrictions	83
Society and Public Health	35
Tourism and Recreation	7
Water Supply and Quality	94
Total	**356**

Source: National Drought Mitigation Center. Retrieved 3/20/2024.

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 Colusa 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 Colusa County has recently slowed. According to the HMPC, Colusa County has access to large 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 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 Colusa County's water access for agricultural production, but state- and nation-wide with regard to food production. Should the County 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 County continues to grow, more cropland will be taken out of production to provide housing to accommodate for population growth. As Colusa'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 Colusa 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

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 Northern California near active faults, much of Colusa 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) 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.

The General Plan Background Report noted that the Sacramento River corridor presents the greatest likelihood of loose sediment and saturated soils within Colusa County. In contrast, eastern Colusa County is the least prone to strong seismic ground shaking and associated liquefaction.

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 in urban regions 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 withing 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 - 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

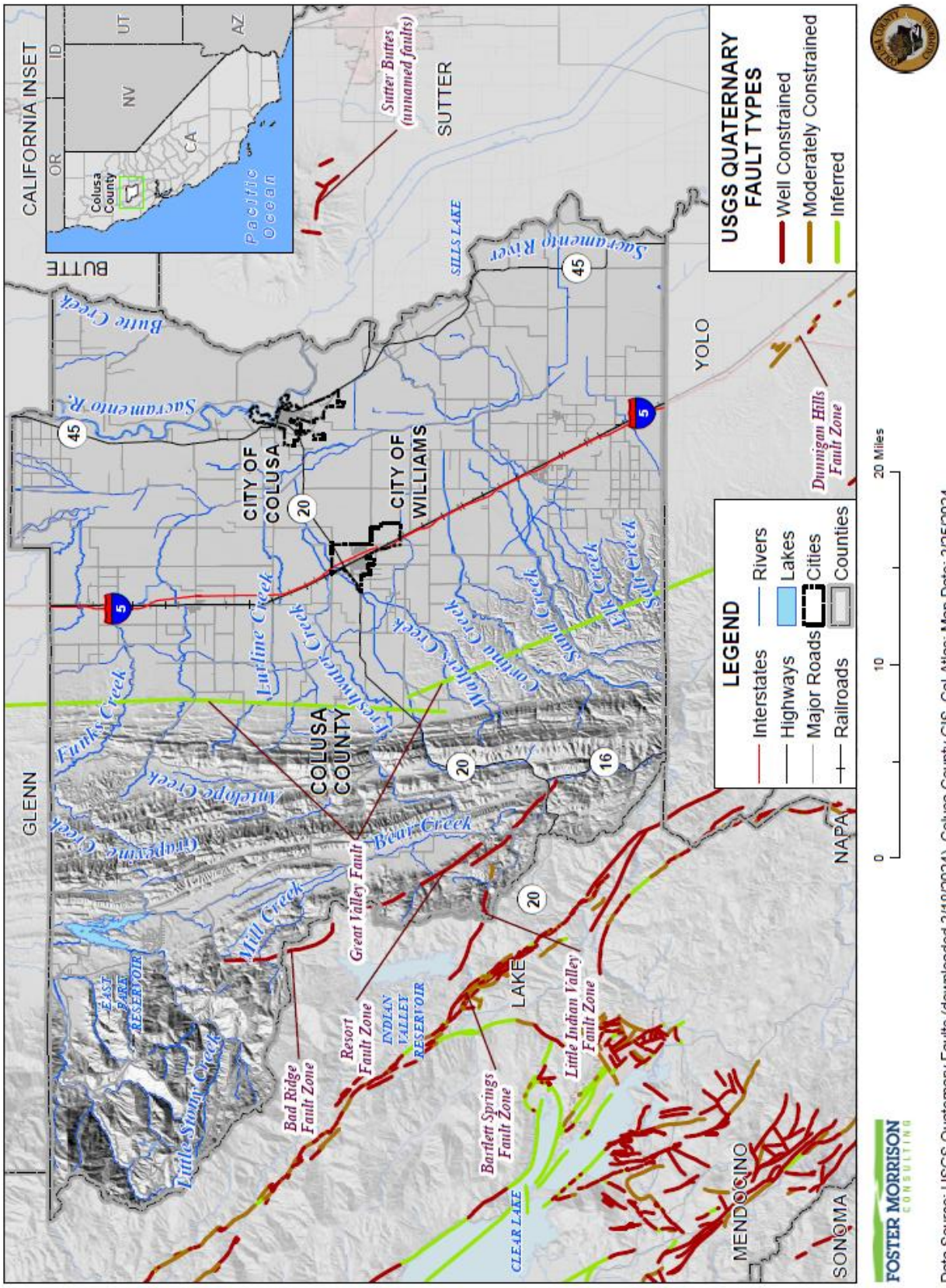
A fault is defined as "a fracture or fracture zone in the earth's crust along which there has been displacement of the sides relative to one another." For the purpose of planning there are two types of faults, active and inactive. Active faults have experienced displacement in historic time, suggesting 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.

The 2010 General Plan Background Report noted that there are no known active faults within the County. However, the Great Valley Fault, an inferred fault, is located within Colusa County and has the potential to produce a magnitude 7.03 earthquake. Further, Colusa County could experience considerable ground shaking generated by faults outside Colusa County. For example, southeastern Colusa County could experience intensities of MM VII to VIII generated by seismic events occurring in Sutter and Lake Counties.

Figure 4-66 shows fault locations in and near Colusa County.

Figure 4-66 Faults in and near Colusa 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 4-72). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4-72 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 4.3.14)

Past Occurrences

Disaster Declaration History

There have been no disaster declarations in the County related to earthquakes, as shown on Table 4-4.

NCDC Events

Earthquake events are not tracked by the NCDC database.

USGS Events

The USGS National Earthquake Information Center database contains data on earthquakes in the Colusa County area. Table 4-73 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 Colusa in Colusa County. These results are detailed in Table 4-74.

Table 4-73 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 4-74 Magnitude 5.0 Earthquakes or greater within 90 Miles of Colusa County**

Date	Richter Magnitude	Location
12/14/2016	5.01	5 miles NW of The Geysers, California
8/10/2016	5.09	12 miles NNE of Upper Lake, California
8/24/2014	6.02	South Napa
5/24/2013	5.69	6 miles WNW of Greenville, California
8/10/2001	5.2	Northern California
8/10/2001	6.2	Northern California
9/3/2000	5	Northern California
11/28/1980	5.1	Northern California
11/22/1977	5.2	Northern California
8/2/1975	5.2	Northern California
8/2/1975	5.2	Northern California
8/2/1975	5.1	Northern California
8/1/1975	5.7	0km WSW of Palermo, California

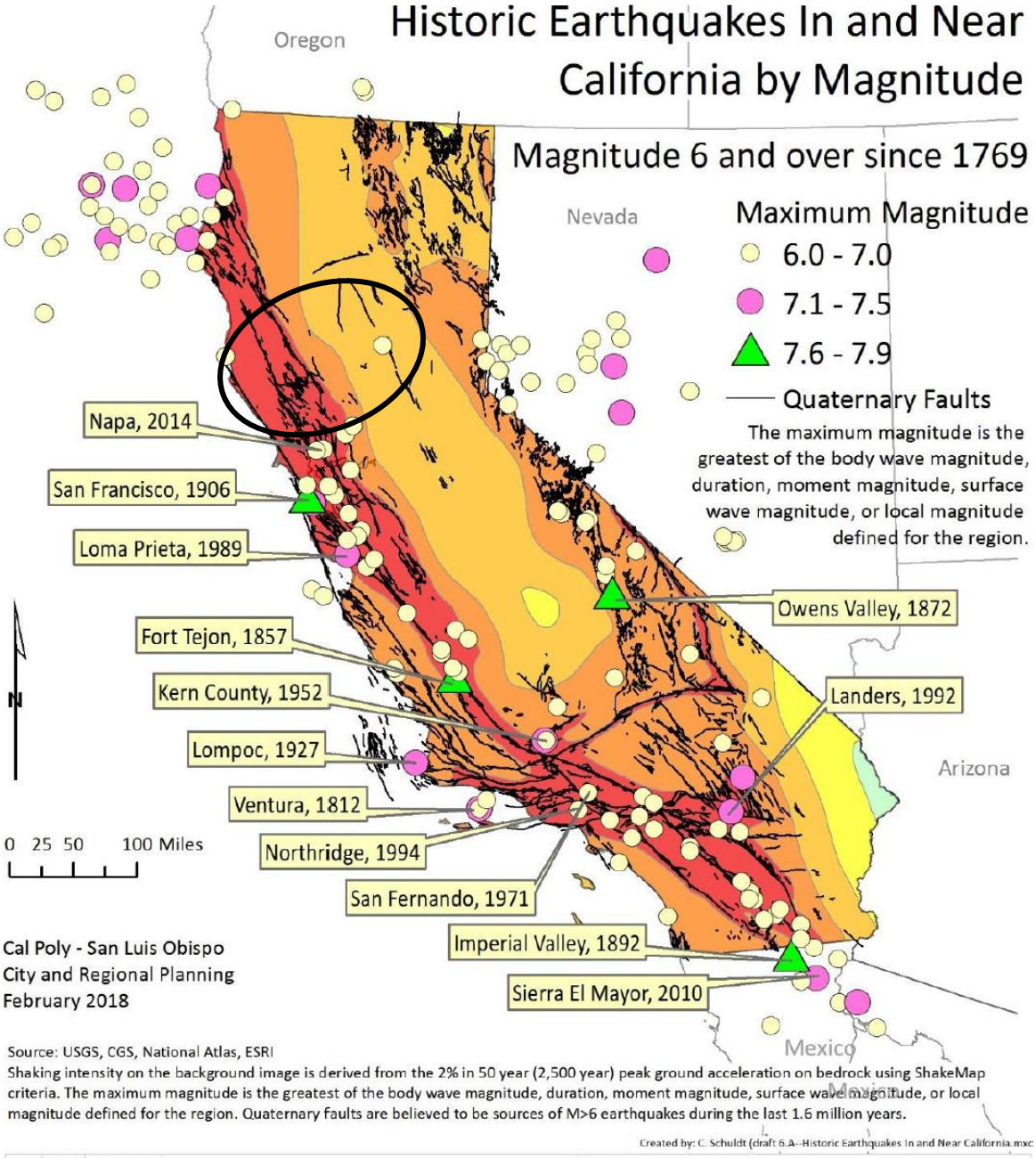
Source: USGS, National Earthquake Information Center
*Search dates 1950 – March 1, 2024

Figure 4-67 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 Colusa County Planning Area.

Figure 4-67 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 during past regional earthquake events, Colusa County has experienced groundshaking. In addition, in some instances, nearby earthquake events have caused cracking in the plaster on walls and in windowsills.

Likelihood of Future Occurrence

Unlikely (major earthquake); Likely (minor earthquake)—Colusa County seismic activity within the past two hundred years has shown absence of any major or damaging earthquake occurring within Colusa County. However, the possibility of an earthquake is an ever-present phenomenon in California and Colusa 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.

It is likely that climate change will not affect the chance of future occurrence as well as future impacts. 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

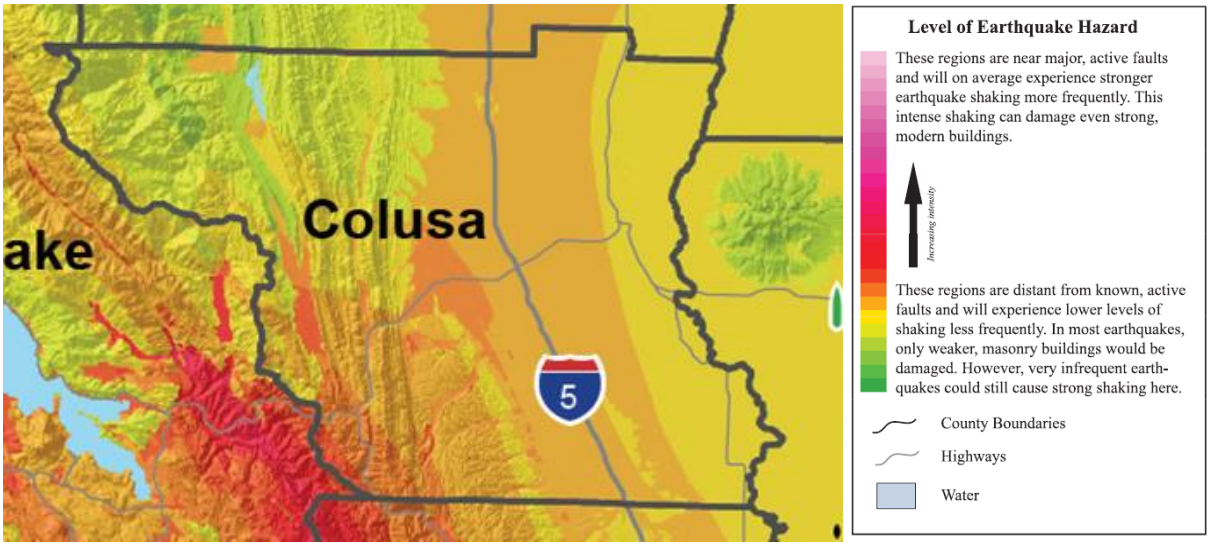
Mapping of future occurrences is presented in the following sections:

- CGS Analysis
- UCERF Analysis

CGS Analysis

Maps indicating the maximum expectable intensity of ground shaking for the County are available through several sources. Figure 4-68, 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. Although the greatest hazard is in areas of highest intensity as shown on the map, no region is immune from potential earthquake damage.

Figure 4-68 Maximum Expectable Earthquake Intensity – 2% Chance in 50 Years

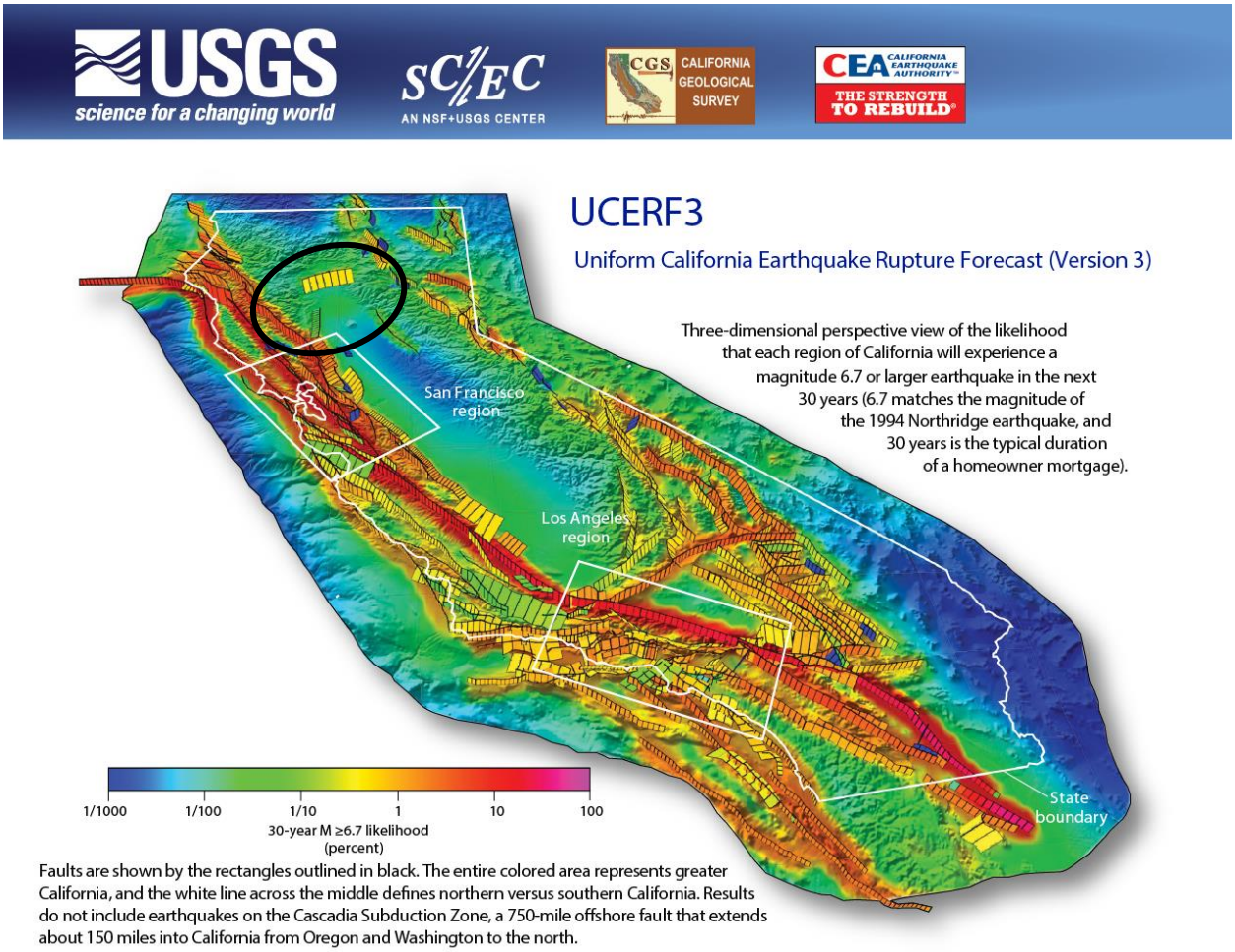


Source: California Division of Mines and Geology (2016)

UCERF Analysis

In 2014, the USGS and the California Geological Survey (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 4-69 and indicates that Colusa County has a low to moderate risk of earthquake occurrence.

Figure 4-69 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—Extremely 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 Colusa are less vulnerable. The primary impacts of concern are life safety and property damage. Several faults are in and near the Colusa 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 Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

Seismic events can have particularly negative effects on older buildings constructed of URM, including materials such as brick, concrete, and stone, as well as soft story buildings and tilt-up concrete. 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 Planning Area is within the less hazardous Zone 3.

A concern identified by Colusa County is the risk of an earthquake event aggravating the artesian up coning of salt water and mercury at some locations in Colusa County. USGS Open-File Report 2013-1056 stated that regarding the source of methylmercury contamination in the Bear Creek watershed near the abandoned Clyde and Elgin mines. It was determined that although the old mines were a likely source of mercury contamination, the more dominant source was from the effluent salt water that came from salt water hot springs about fault lines. It was noted that this area is subject to earthquake risk since this site is west of the public supply system for the City of Williams and it is not clear how the water held in the proposed Sites Reservoir may impact ground water quality generally or how it would impact the presence of artesian salt water in this portion of Colusa County. Irrespective of current conditions an earthquake could change fault lines and future trends of artesian up coning of salt water with potential contaminants such as mercury (which is discussed in greater detail in the Section 4.3.11 Flood: 1%/0.2% Annual Chance).

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 Colusa County Planning Area and unincorporated Colusa County.

People and Populations

All people and populations are at risk from earthquake shaking. Those at heightened risk include:

- The unsheltered
- Infants and children under age five and their caregivers
- Elderly (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 Colusa County Planning Area are vulnerable to earthquakes, depending on the severity and location of the shake. Older buildings, unreinforced masonry 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.

Community Lifelines

Community lifelines at risk to earthquake include:

- **Safety and Security** – Many personnel from the Planning Area would be involved in response and recovery efforts. This includes police, fire, EMS, public works, and other personnel. Due to the potential for widespread and major damages citywide, these resources can be stretched and quickly overwhelmed.
- **Food, Hydration, and Shelter** – As homes are damaged, shelter needs would significantly increase. Temporary housing would be to be established. Water supplies could be offline for an extended period. Residents, visitors and others caught in a large event would need to find sources of food and water until the Planning Area recovers.
- **Health and Medical** – Substantial numbers of injuries and deaths can occur. This causes EMS calls and ER visits to spike. Portable morgues and refrigeration units may need to be brought in. Transporting patients to medical facilities may be difficult. Depending on the extent of injuries and deaths the capacity of medical facilities could be strained and eventually overwhelmed.
- **Energy** – The power grid may be damaged from earthquake. Damages to natural gas pipelines that feed homes and businesses in the Planning Area may also be disrupted. Restoring these systems may take longer during a widespread event.
- **Communications** – Communications systems may be damaged during shaking events. Once the shaking ceases, responder communications need to be back online quickly to coordinate response efforts in the Planning Area. Messaging boards and alerts need to be then put into place to ensure public safety and order. Calls to and from family and friends during a hazard event can further overwhelm communication systems such as cell towers and other infrastructure. Demand may exceed the capacity of these systems to remain operational during response efforts.
- **Transportation** – Major damage can occur to roads and bridges in the Planning Area. Damage can also occur to rail lines and airports in and near the Planning Area. Roads may be closed due to damage,

or to debris on the roads from earthquake events. These closures could be place for an extended period while debris clearing efforts are undertaken to allow repairs to be made.

- **Hazardous Material** – Hazardous materials facilities can be compromised during times of earthquake events causing releases of contaminants into the environment. Natural gas pipelines can be affected by earthquakes. This can affect not only residents, but those who are charged with responding to or resolving the spill/rupture.
- **Water Systems** – Damages to underground pipes may occur. These take time to locate and fix in normal circumstances. During periods of earthquake, this becomes even more difficult. Water and wastewater systems and their respective piping can be damaged and systems may become inoperable for extended periods of time.

All community lifelines in the Colusa County Planning Area are vulnerable to earthquakes, depending on the severity and location of the shake. A major earthquake event could cause these lifelines to be overwhelmed. Some of these would be able to be restored to service quickly, while others would take more time having a prolonged impact on the people and structures within the Planning Area. More information on community lifelines 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.

Economic Assets and Community Activities of Value

All economic assets in the County are vulnerable to earthquakes, depending on the severity and location of the shake and associated cascading hazards and impacts. More information on economic assets at risk can be seen in the Hazus scenarios below. All community activities of value would be affected by an earthquake if they were underway during an earthquake event and may be postponed or cancelled until the County has sufficiently recovered. This includes the County Fair, Farm Show, rodeos, craft fairs, and hunting and fishing seasons. This includes the County Fair, Farm Show, rodeos, craft fairs, and hunting and fishing seasons.

Hazus Analysis

Earthquake losses will vary across the Colusa 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, two Hazus-MH earthquake scenarios were run for this 2024 LHMP Update:

- A deterministic Great Valley Fault 7.03 earthquake event
- A probabilistic 7.0 earthquake event

These events were chosen from data gathered from the 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. A probabilistic approach is not scenario based, but considers all possible and relevant deterministic earthquake scenarios as well as all possible ground motion probability levels.

Great Valley Fault 7.03 Hazus Scenario

Hazus-MH 6.1 was utilized to model earthquake losses for the County. Level 1 analyses were run, meaning that only the default data was used and not supplemented with local building inventory or hazard data. There are certain data limitations when using the default data, so the results should be interpreted accordingly; this is a planning level analysis. The Great Valley Fault deterministic scenario was developed based on a seismic scenario obtained from the USGS seismic scenario catalog.

The results of the deterministic scenario are captured in Table 4-75 and shown on Figure 4-70. Key losses included the following:

- Total economic loss estimated for the earthquake was $624,160,000, which includes building losses and lifeline losses based on the Hazus-MH inventory.
- The total building-related losses were $257,320,000; 18% 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 38 % of the total loss.
- 942 buildings in the County were at least moderately damaged. 23 buildings were completely destroyed.
- Before the earthquake, the region had 48 hospital beds available for use. On the day of the earthquake, the model estimates that only 27 hospital beds (58.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 88.00% of the beds will be back in service. By 30 days, 99.00% will be operational.
- The mid-day earthquake had the highest number of casualties at 1.
- 411 households experienced a loss of potable water the first day after the earthquake.
- 1,427 households experienced a loss of electricity the first day after the earthquake.

Table 4-75 Colusa County Planning Area – Great Valley Fault 7.03 Magnitude Deterministic Scenario Results

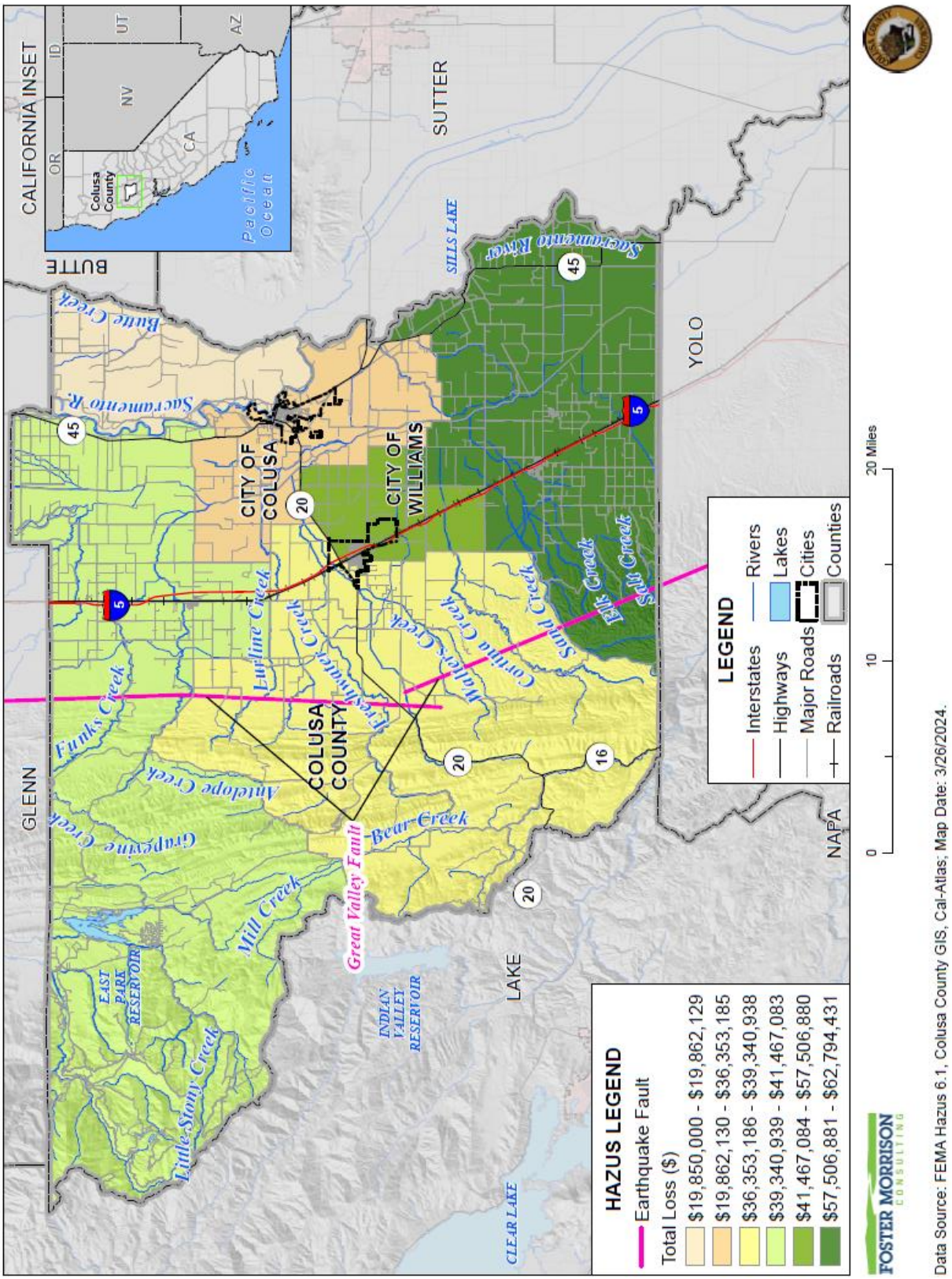
Type of Impact	Great Valley 7.03 Deterministic Scenario
Total Buildings Damaged (based on 8,000 buildings)	Slight: 2,125 Moderate: 799 Extensive: 120 Complete: 23
Building and Income Related Losses	$257,320,000
Total Economic Losses (Includes building, income and lifeline losses)	$624,160,000
Casualties (Based on 2 a.m. time of occurrence)	Without requiring hospitalization: 15 Requiring hospitalization: 2 Life threatening: 0

Type of Impact	Great Valley 7.03 Deterministic Scenario	
	Fatalities: 0	
Casualties (Based on 2 p.m. time of occurrence)	Without requiring hospitalization: 27 Requiring hospitalization: 5 Life threatening: 1 Fatalities: 1	
Casualties (Based on 5 p.m. time of occurrence)	Without requiring hospitalization: 19 Requiring hospitalization: 4 Life threatening: 1 Fatalities: 1	
Damage to Transportation Systems	None with at least moderate damage	
Damage to Essential Facilities	None with at least moderate damage	
Damage to Utility Systems	1 electrical power facility with at least moderate damage. 101 potable water line breaks, 51 wastewater line breaks, and 3 natural gas line breaks.	
Households without Power/Water Service (Based on 7,227 total households)	Power loss, Day 1: 1,427 Power loss, Day 3: 802 Power loss, Day 7: 272 Power loss, Day 30: 16 Power loss, Day 90: 2	Water loss, Day 1: 411 Water loss, Day 3: 16 Water loss, Day 7: 0 Water loss, Day 30: 0 Water loss, Day 90: 0
Displaced Households	55 displaced households	
Shelter Requirements	35 persons	
Debris Generation	38,000 tons	

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 4-70 Colusa County Planning Area – Great Valley 7.03 Magnitude Hazus Total Loss



7.0 Probabilistic Hazus Scenario

Hazus-MH 6.1 was utilized to model earthquake losses for the County. Level 1 analyses were run, meaning that only the default data was used and not supplemented with local building inventory or hazard data. There are certain data limitations when using the default data, so the results should be interpreted accordingly; this is a planning level analysis.

The methodology for running the probabilistic earthquake scenario used seismic hazard contour maps developed by the USGS for the 2002 update of the National Seismic Hazard Maps that are included with Hazus-MH. The USGS maps provide estimates of potential ground acceleration and spectral acceleration at periods of 0.3 second and 1.0 second, respectively. The 2,500-year return period analyzes ground shaking estimates with a 2 percent probability of being exceeded in 50 years, from the various seismic sources in the area. The International Building Code uses this level of ground shaking for building design in seismic areas and is more of a worst-case scenario.

The results of the probabilistic scenario are captured in Table 4-76 and shown on Figure 4-71. Key losses included the following:

- Total economic loss estimated for the earthquake was $2,151,030,000, which includes building losses and lifeline losses based on the Hazus-MH inventory.
- The total building-related losses were $1,174,080,000; 19% 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 35 % of the total loss.
- 3,500 buildings in the County were at least moderately damaged. 310 buildings were completely destroyed.
- Before the earthquake, the region had 48 hospital beds available for use. On the day of the earthquake, the model estimates that only 1 hospital beds (3.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 16.00% of the beds will be back in service. By 30 days, 61.00% will be operational.
- The mid-day earthquake had the highest number of casualties at 17.
- 4,522 households experienced a loss of potable water the first day after the earthquake.
- 6,098 households experienced a loss of electricity the first day after the earthquake.

Table 4-76 Colusa County Planning Area – 7.0 Probabilistic Scenario Results

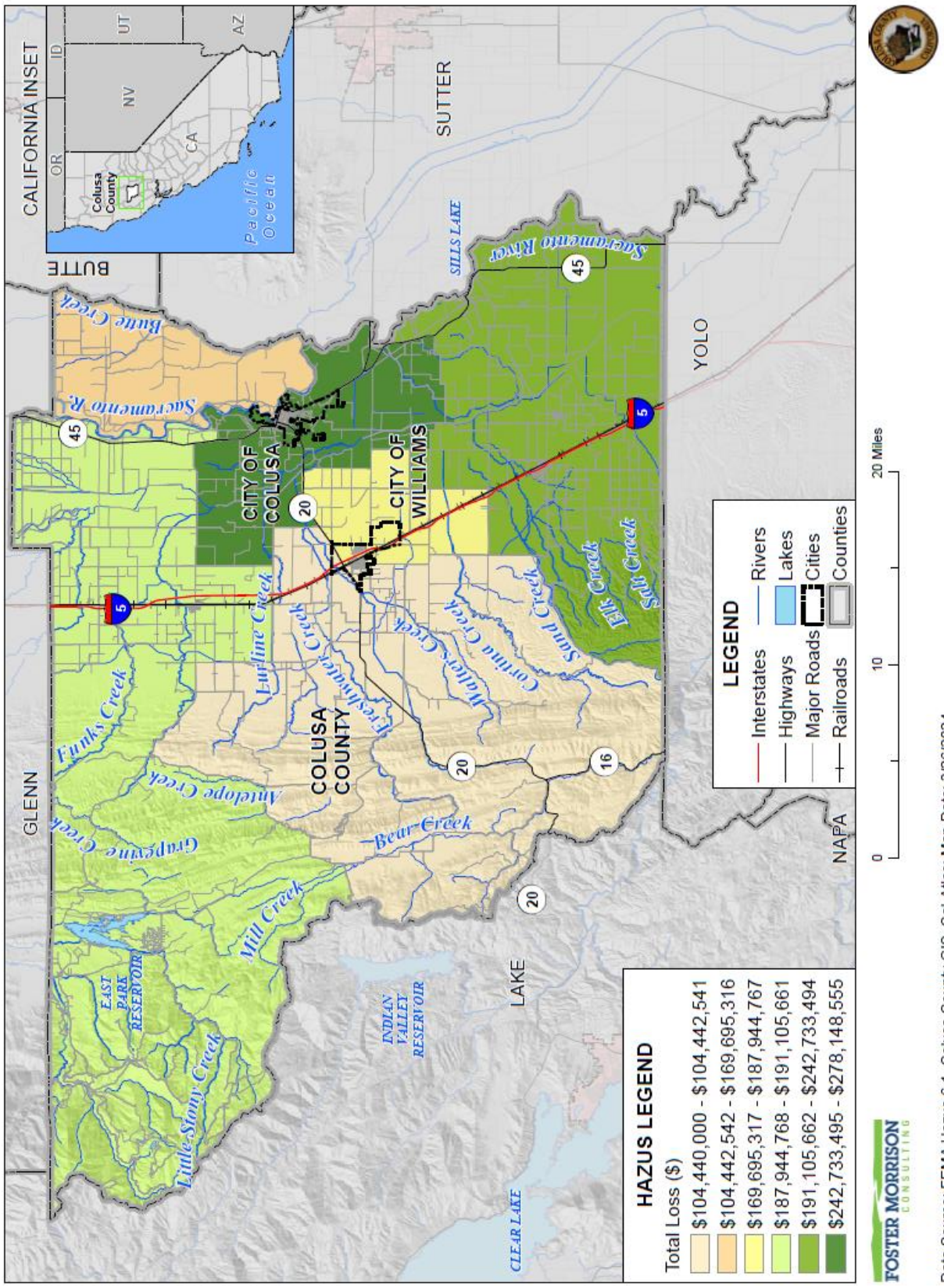
Type of Impact	7.0 Probabilistic Scenario
Total Buildings Damaged (based on 8,000 buildings)	Slight: 2,791 Moderate: 2,668 Extensive: 801 Complete: 310
Building and Income Related Losses	$1,174,080,000
Total Economic Losses (Includes building, income and lifeline losses)	$2,151,030,000
Casualties (Based on 2 a.m. time of occurrence)	Without requiring hospitalization: 87 Requiring hospitalization: 18 Life threatening: 2

Type of Impact	7.0 Probabilistic Scenario	
	Fatalities: 3	
Casualties (Based on 2 p.m. time of occurrence)	Without requiring hospitalization: 210 Requiring hospitalization: 58 Life threatening: 9 Fatalities: 17	
Casualties (Based on 5 p.m. time of occurrence)	Without requiring hospitalization: 136 Requiring hospitalization: 40 Life threatening: 13 Fatalities: 12	
Damage to Transportation Systems	16 road bridges and one airport facility with at least moderate damage	
Damage to Essential Facilities	1 hospital, 24 schools, 1 EOC, 4 police stations, and 9 fire stations with at least moderate damage. 0 facilities with complete damage.	
Damage to Utility Systems	3 wastewater facilities, 1 natural gas facility, 2 electrical power facilities, and 1 communication facility with at least moderate damage. 0 facilities with complete damage. 406 potable water line breaks, 204 wastewater line breaks, and 13 natural gas line breaks.	
Households without Power/Water Service (Based on 7,227 total households)	Power loss, Day 1: 6,098 Power loss, Day 3: 4,600 Power loss, Day 7: 2,389 Power loss, Day 30: 352 Power loss, Day 90: 7	Water loss, Day 1: 4,522 Water loss, Day 3: 4,058 Water loss, Day 7: 2,850 Water loss, Day 30: 0 Water loss, Day 90: 0
Displaced Households	529 displaced households	
Shelter Requirements	333 persons	
Debris Generation	216,000 tons	

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 4-71 Colusa County Planning Area – Probabilistic 7.0 Magnitude Hazus Total Loss



Hazus Scenario Comparisons

A comparison of the results of the deterministic 7.03 Great Valley Fault and 7.0 probabilistic scenarios is shown on Table 4-77.

Table 4-77 Colusa County – Comparison of Hazus Scenarios

Type of Impact	7.03 Great Valley Fault Deterministic		7.0 Probabilistic	
Total Buildings Damaged (based on 8,000 buildings)	Slight: 2,125 Moderate: 799 Extensive: 120 Complete: 23		Slight: 2,791 Moderate: 2,668 Extensive: 801 Complete: 310	
Building and Income Related Losses	$257,320,000		$1,174,080,000	
Total Economic Losses (Includes building, income and lifeline losses)	$624,160,000		$2,151,030,000	
Casualties (Based on 2 a.m. time of occurrence)	Without requiring hospitalization: 15 Requiring hospitalization: 2 Life threatening: 0 Fatalities: 0		Without requiring hospitalization: 87 Requiring hospitalization: 18 Life threatening: 2 Fatalities: 3	
Casualties (Based on 2 p.m. time of occurrence)	Without requiring hospitalization: 27 Requiring hospitalization: 5 Life threatening: 1 Fatalities: 1		Without requiring hospitalization: 210 Requiring hospitalization: 58 Life threatening: 9 Fatalities: 17	
Casualties (Based on 5 p.m. time of occurrence)	Without requiring hospitalization: 19 Requiring hospitalization: 4 Life threatening: 1 Fatalities: 1		Without requiring hospitalization: 136 Requiring hospitalization: 40 Life threatening: 13 Fatalities: 12	
Damage to Transportation Systems	None with at least moderate damage		16 road bridges and one airport facility with at least moderate damage	
Damage to Essential Facilities	None with at least moderate damage		1 hospital, 24 schools, 1 EOC, 4 police stations, and 9 fire stations with at least moderate damage. 0 facilities with complete damage.	
Damage to Utility Systems	1 electrical power facility with at least moderate damage. 101 potable water line breaks, 51 wastewater line breaks, and 3 natural gas line breaks.		3 wastewater facilities, 1 natural gas facility, 2 electrical power facilities, and 1 communication facility with at least moderate damage. 0 facilities with complete damage. 406 potable water line breaks, 204 wastewater line breaks, and 13 natural gas line breaks.	
Households without Power/Water Service (Based on 7,227 total households)	Power loss, Day 1: 1,427 Power loss, Day 3: 802 Power loss, Day 7: 272 Power loss, Day 30: 16	Water loss, Day 1: 411 Water loss, Day 3: 16 Water loss, Day 7: 0 Water loss, Day 30: 0	Power loss, Day 1: 6,098 Power loss, Day 3: 4,600 Power loss, Day 7: 2,389 Power loss, Day 30: 352 Power loss, Day 90: 7	Water loss, Day 1: 4,522 Water loss, Day 3: 4,058 Water loss, Day 7: 2,850 Water loss, Day 30: 0

Type of Impact	7.03 Great Valley Fault Deterministic		7.0 Probabilistic	
	Power loss, Day 90: 2	Water loss, Day 90: 0		Water loss, Day 90: 0
Displaced Households	55 displaced households		529 displaced households	
Shelter Requirements	35 persons		333 persons	
Debris Generation	38,000 tons		216,000 tons	

Source: Hazus 6.1

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 Colusa County residents and visitors. Other impacts to the Colusa 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; 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 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 Colusa 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 Colusa County has recently slowed. 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. 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

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Colusa 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

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 Colusa 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 and lake flooding** is the most common type of flood event and occurs when a watercourse exceeds its "bank-full" capacity. Riverine flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with already saturated soils from previous rain events. The 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. 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.

The Colusa County Planning Area is also at risk to flooding resulting from dam and levee failures. Dam failure flooding is discussed separately in Section 4.3.8 of this document, while levee failures are discussed in Section 4.3.14. 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 reach.

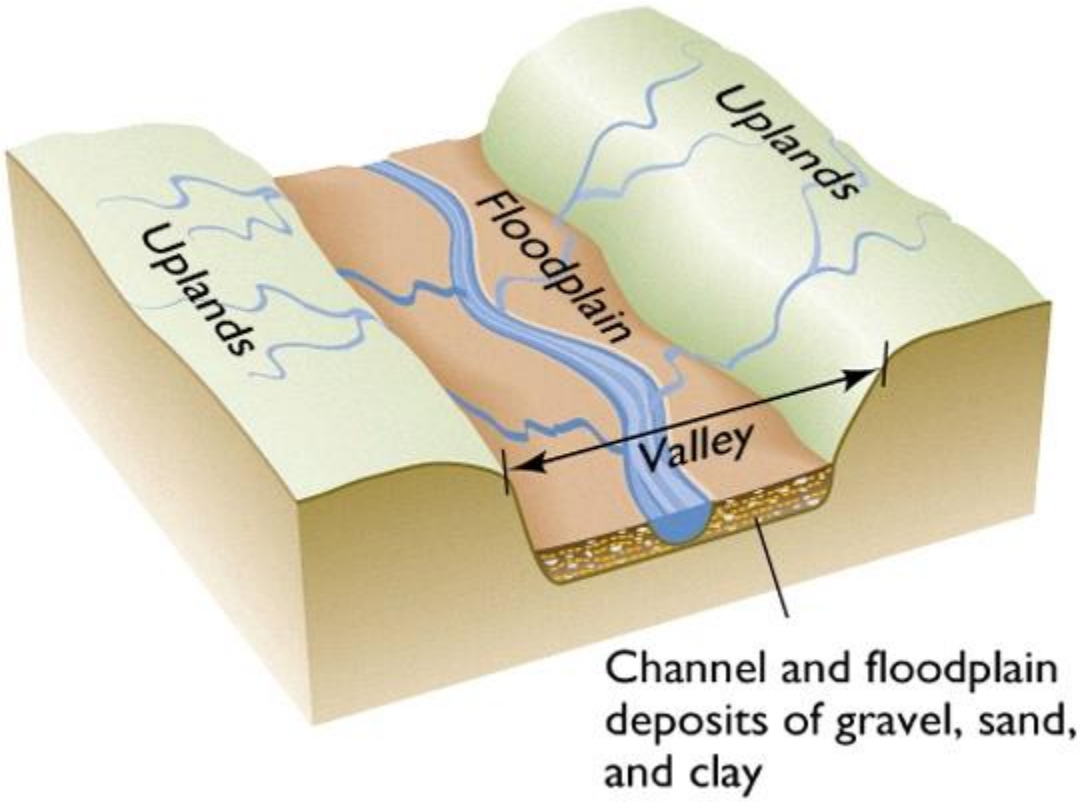
The potential for flooding can change and increase through various land use changes and changes to land surface, resulting in a change to the floodplain. Environmental changes can create localized flooding problems in and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

Location and Extent

Floodplains

The area adjacent to a channel is the floodplain (see Figure 4-72). 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. The 200-year flood is one that has 0.5% chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

Figure 4-72 Floodplain Schematic



Source: FEMA

Hydrologic Regions

According to Cal DWR, California is divided into 10 hydrologic regions. The Colusa County Planning Area is traversed by one hydrologic region – the Sacramento Hydrologic Region:

- The Sacramento River hydrologic region covers approximately 17.4 million acres (27,200 square miles). The region includes all or large portions of Modoc, Siskiyou, Lassen, Shasta, Tehama, Glenn, Plumas, Butte, Colusa, Sutter, Yuba, Sierra, Nevada, Placer, Sacramento, El Dorado, Yolo, Solano, Lake, and Napa counties. Small areas of Alpine and Amador counties are also within the region. Geographically, the region extends south from the Modoc Plateau and Cascade Range at the Oregon border, to the Sacramento-San Joaquin Delta. The Sacramento Valley, which forms the core of the region, is bounded to the east by the crest of the Sierra Nevada and southern Cascades and to the west by the crest of the Coast Range and Klamath Mountains. The Sacramento metropolitan area and surrounding communities form the major population center of the region. With the exception of Redding, cities and towns to the north, while steadily increasing in size, are more rural than urban in nature, being based in major agricultural areas.

A map of the California's hydrological regions is provided in Figure 4-73.

Figure 4-73 California Hydrologic Regions

Source: California Department of Water Resources

The Colusa County Waterway System

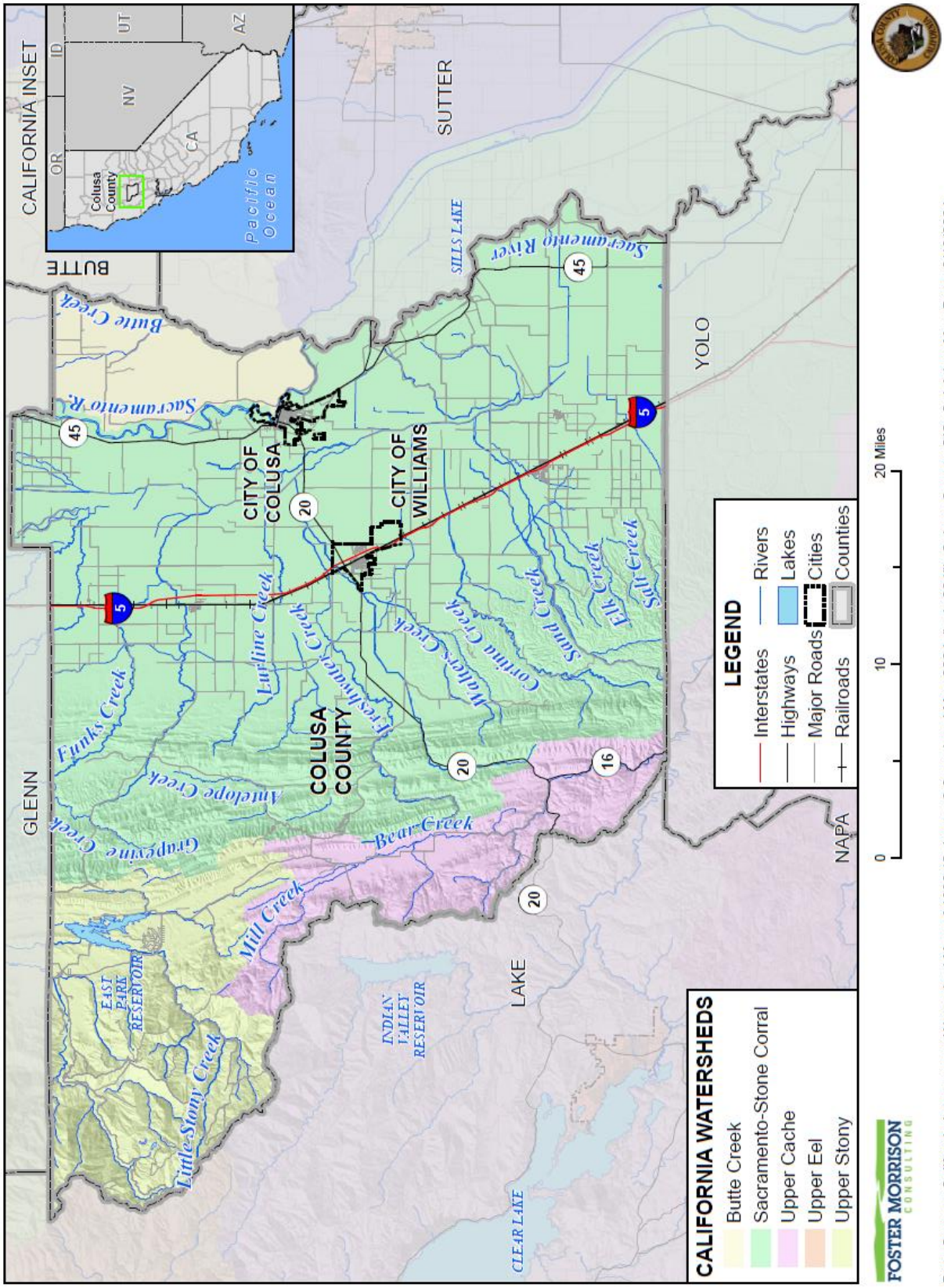
Colusa County encompasses multiple rivers, streams, creeks, and associated watersheds. Colusa County crosses five watersheds. These include the following watersheds:

- Butte Creek
- Cache Watershed
- Eel Watershed
- Sacramento-Stone Watershed

- Stony Watershed

Figure 4-74 illustrates the primary watersheds of Colusa County, as well as the primary waterways in the County.

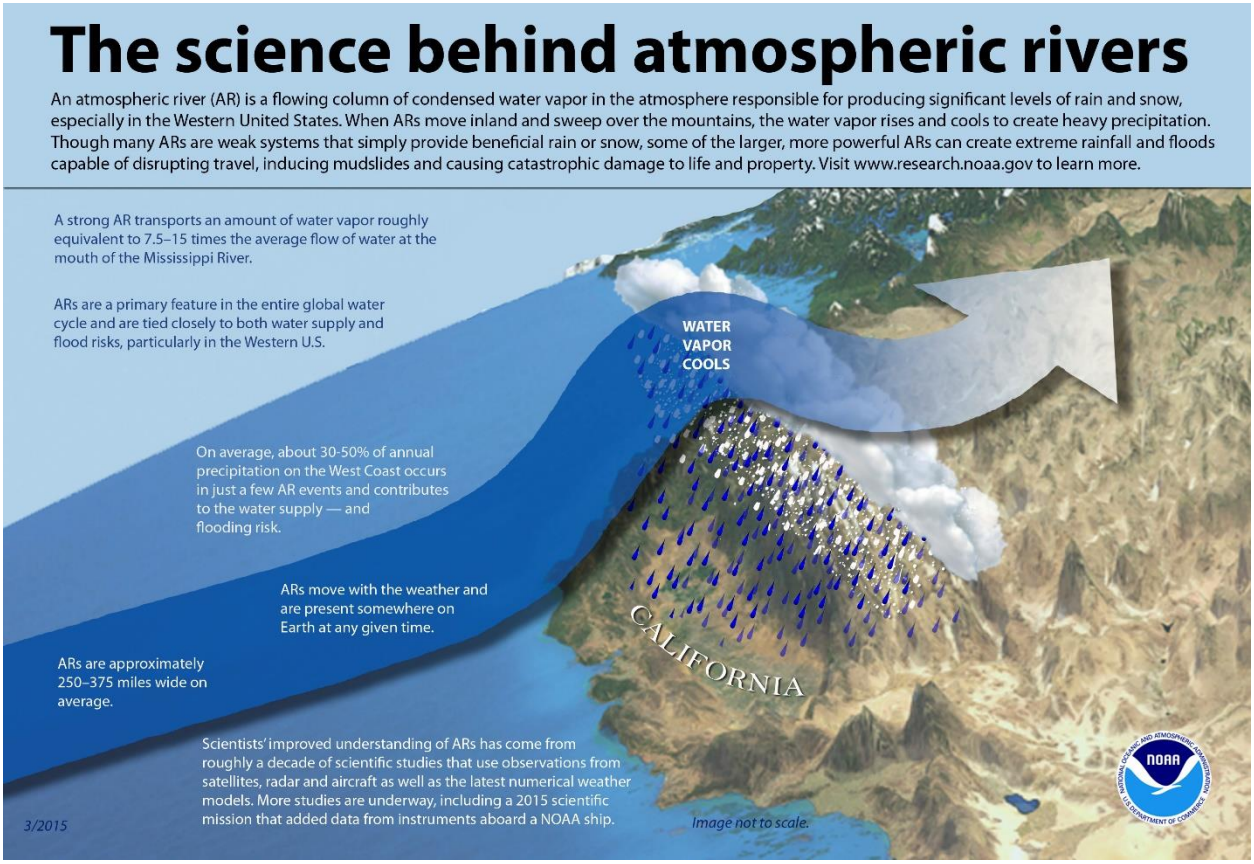
Figure 4-74 Primary Watersheds and Waterways of Colusa County



Other Sources of Flooding

Colusa County and much of California can be affected by a phenomenon known as an atmospheric river. These types of storms occurred frequently in the winter of 2022/2023. 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 4-75.

Figure 4-75 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 can bring 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. This also occurred in and around the County in the winter of 2022/2023. In 2023, it resulted in two federal disaster declarations.

Colusa County Flood Mapping

As part of the County's ongoing efforts to identify and manage their flood prone areas, Colusa County relies on a variety of different mapping efforts. What follows is a brief description of FEMA and DWR mapping efforts covering the Colusa 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 shown 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 Colusa County FIS is dated March 27, 2024. 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 Colusa 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. Levees in the County are discussed in Section 4.3.14 of this Plan Update.

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.

New DFIRMs for Colusa County have been developed and are dated March 27, 2024, and are being used for the flood analysis for this LHMP Update. The DFIRM is shown in Figure 4-76, and DFIRM flood zones are shown on Table 4-78. These new DFIRM flood maps reflect the decertification of all the levees in the County. A comparison of how the DFIRM has changed since the 2018 Plan is shown on Figure 4-77 and Table 4-79.

Figure 4-76 Colusa County - DFIRM

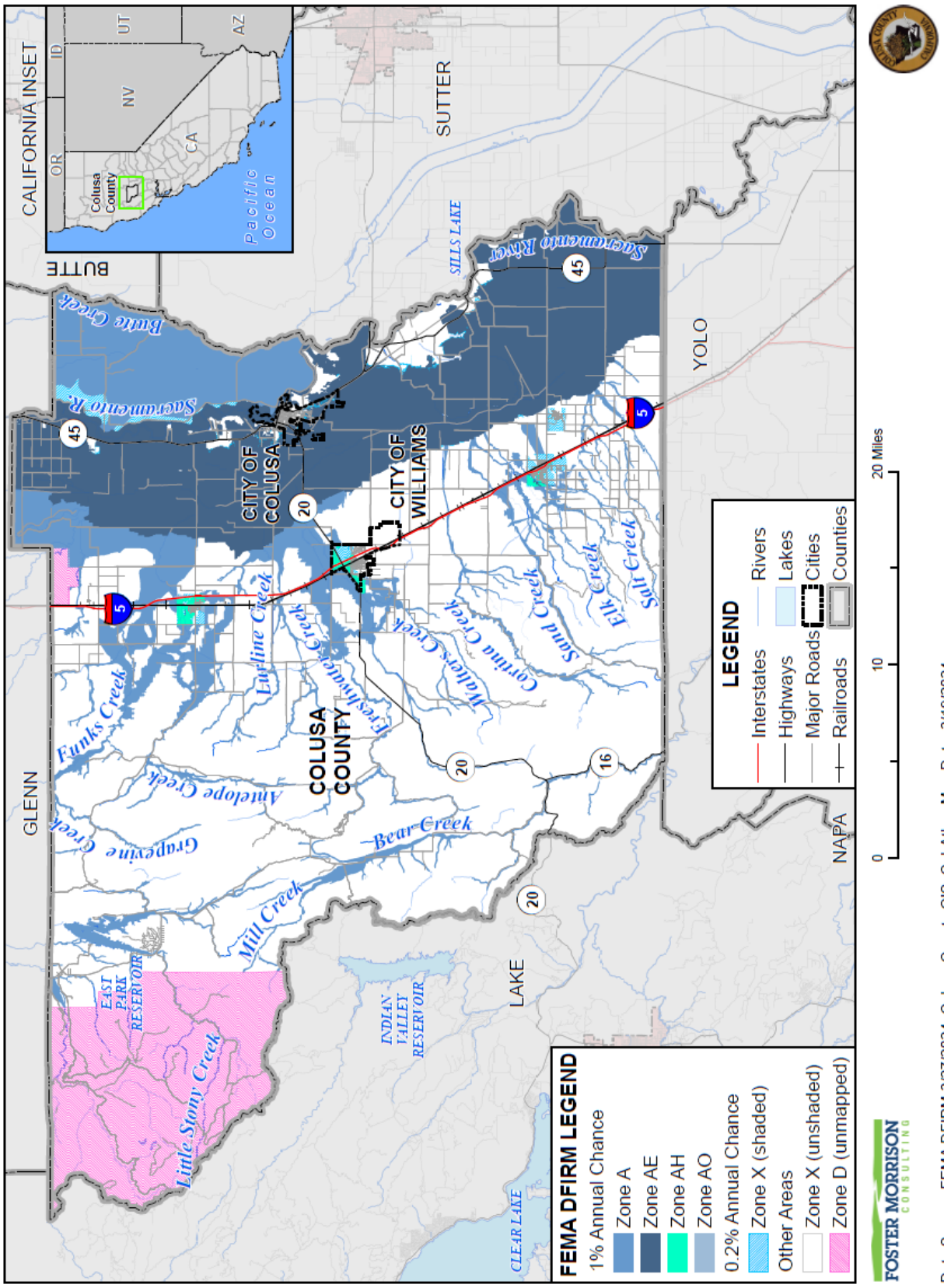


Table 4-78 Colusa County – FEMA DFIRM Flood Zones by Jurisdiction

Flood Zone	Description	Flood Zone Present in City of Colusa	Flood Zone Present in City of Williams	Flood Zone Present in unincorporated County
A	1% annual chance flooding: No base flood elevations provided		X	X
AE	1% annual chance flooding: Base flood elevations provided	X		X
AH	1% annual chance flood areas of shallow flooding between one to three feet deep. Regulatory floodway; Base flood elevations provided		X	X
AO	1% annual chance flooding: sheet flow areas. BFEs derived from detailed hydraulic analyses are shown in this zone.		X	X
Shaded X	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	X
X (unshaded)	No flood hazard	X	X	X
D	Areas with a potentially moderate to high risk of flooding, but the probability has not been determined.			X

Source: FEMA DFIRM 03/24

Figure 4-77 Colusa County Planning Area – Comparison of DFIRM from 2018 Plan to 2024 Plan

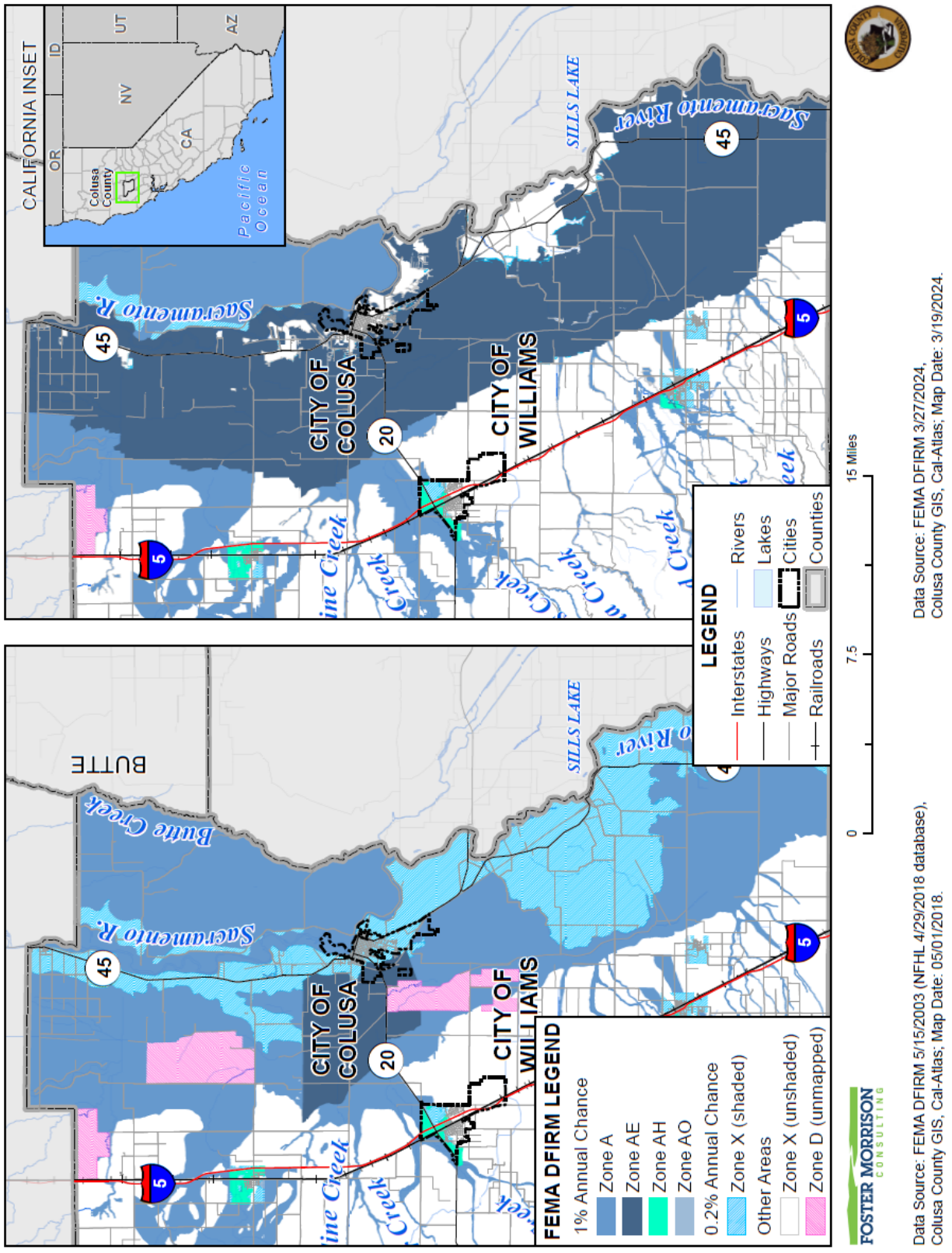


Table 4-79 Colusa County Planning Area – Comparison of DFIRM from 2018 Plan to 2024 Plan

Jurisdiction / Flood Zone	2018 Total Flooded Acres	2024 Total Flooded Acres	Change in Total Flooded Acres
City of Colusa			
1% Annual Chance Flood Hazard			
Zone A	6.33	-	-6.33
Zone AE	432.13	1,682.17	1,250.04
Zone AH	-	-	0.00
Zone AO	-	-	0.00
1% Annual Chance Flood Hazard Total	**438.46**	**1,682.17**	**1,243.71**
0.2% Annual Chance Flood Hazard			
Zone X (shaded)	1,091.25	33.58	-1,057.67
0.2% Annual Chance Flood Hazard Total	**1,091.25**	**33.58**	**-1,057.67**
Other Areas			
Zone X (unshaded)	-	695.99	695.99
Zone D (unmapped)	-	-	0.00
Other Areas Total	**-**	**695.99**	**695.99**
City of Colusa Total	**1,529.70**	**2,411.73**	**882.03**
City of Williams			
1% Annual Chance Flood Hazard			
Zone A	0.14	44.56	44.42
Zone AE	5.55	5.67	0.12
Zone AH	537.00	577.62	40.62
Zone AO	21.98	23.10	1.12
1% Annual Chance Flood Hazard Total	**564.67**	**650.95**	**86.28**
0.2% Annual Chance Flood Hazard			
Zone X (shaded)	367.82	369.72	1.89
0.2% Annual Chance Flood Hazard Total	**367.82**	**369.72**	**1.89**
Other Areas			
Zone X (unshaded)	1,843.47	1,879.81	36.34
Zone D (unmapped)	-	-	0.00
Other Areas Total	**1,843.47**	**1,879.81**	**36.34**
City of Williams Total	**2,775.96**	**2,900.47**	**124.52**

Jurisdiction / Flood Zone	2018 Total Flooded Acres	2024 Total Flooded Acres	Change in Total Flooded Acres
Unincorporated Colusa County			
1% Annual Chance Flood Hazard			
Zone A	158,300.10	92,843.63	-65,456.46
Zone AE	12,210.60	134,240.57	122,029.97
Zone AH	1,177.57	1,148.63	-28.93
Zone AO	150.87	150.78	-0.08
1% Annual Chance Flood Hazard Total	**171,839.13**	**228,383.62**	**56,544.50**
0.2% Annual Chance Flood Hazard			
Zone X (shaded)	55,011.10	5,125.47	-49,885.63
0.2% Annual Chance Flood Hazard Total	**55,011.10**	**5,125.47**	**-49,885.63**
Other Areas			
Zone X (unshaded)	412,329.34	414,367.59	2,038.25
Zone D (unmapped)	84,985.46	76,122.61	-8,862.86
Other Areas Total	**497,314.80**	**490,490.19**	**-6,824.61**
Unincorporated Colusa County Total	**724,165.03**	**723,999.29**	**-165.74**
Grand Total	**728,470.69**	**729,311.50**	**840.81**

Source: FEMA

California Floodplain Mapping

Also to be considered when evaluating the flood risks in Colusa County are various floodplain maps and measures implemented by Cal DWR for various areas throughout California, and in the Sacramento-San Joaquin Valley cities and counties.

State Flood Protection Measures (Urban Level of Flood Protection – 200-year)

In 2007, Senate Bill 5 (SB 5), and additional clarifying legislation, were signed into law in order to strengthen the alignment between flood risk reduction investments, land-use decisions, and statewide flood planning objectives. These bills collectively require cities and counties within California's Central Valley Watershed to make findings related to an urban level of flood protection before making certain land-use decisions. California Government Code Section 65007(n) state: "Urban level of flood protection" means the level of protection that is necessary to withstand flooding that has a 1-in-200 chance of occurring in any given year using criteria consistent with, or developed by, the Department of Water Resources. The legislation also provided that the Urban Level of Flood Protection does not mean shallow flooding and local drainage.

The applicability of SB 5 to cities and counties and the requirement to consider the 0.5% or 200-year annual chance flood was further defined to cover properties located within: 1) the Sacramento-San Joaquin Valley

watershed, 2) an urban area of 10,000 residents, or within an urbanizing area that will have 10,000 people within 10-year, 3) a flood hazard zone that is mapped as either a special flood hazard area or an area of moderate hazard on FEMA's FIRM, 4) a watershed of more than 10 square miles, and 5) an area with a potential flood depth above 3.0 feet.

While, Colusa County and its cities fall within the Sacramento-San Joaquin Valley watershed area, the urban and urbanizing areas of Colusa County remain well below the 10,000 residents threshold for applicability of SB5. Thus, this LHMP Update focuses on the 1% (100-year) and 0.2% (500-year) floodplains within the Planning Area.

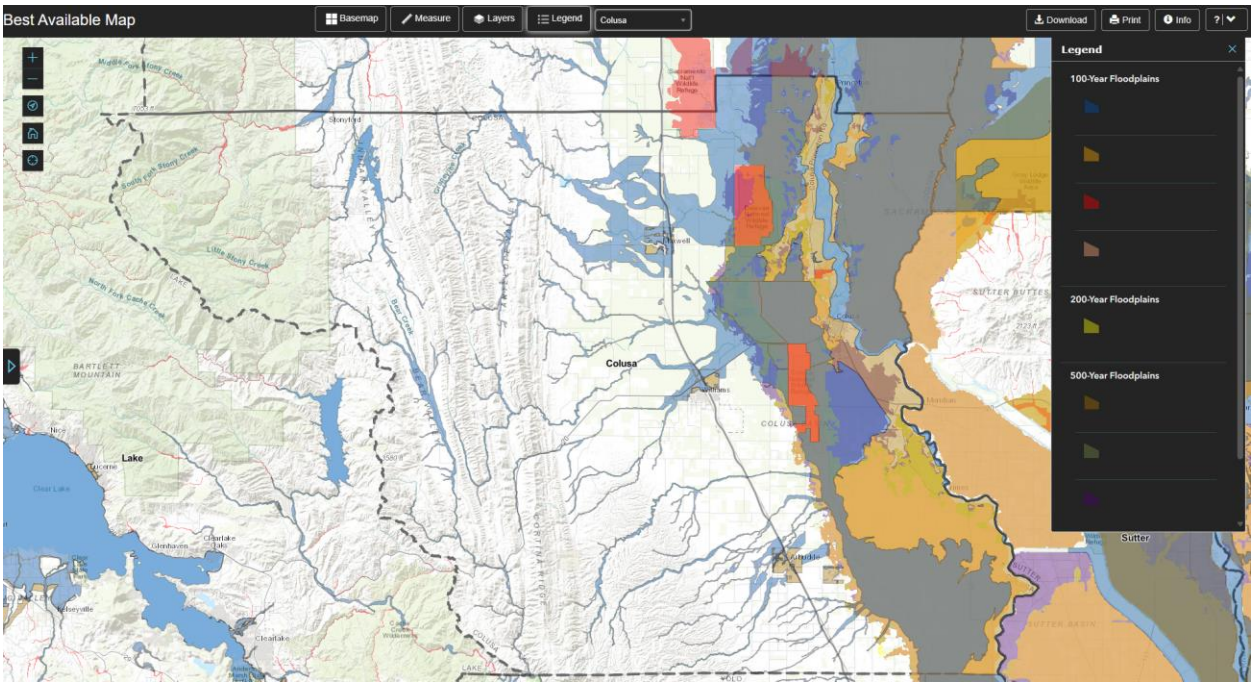
California Department of Water Resources Best Available Maps (BAM)

Also to be considered when evaluating the flood risks in Colusa 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 Colusa 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 4-78 shows the BAM for the Colusa County Planning Area.

Figure 4-78 Colusa County– Flood Awareness (Best Available) Map



Source: California DWR. Retrieved 3/3/2024

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 extents are usually measured in depths of flooding and area flooded. Expected flood depths in the Colusa 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 Colusa County Planning Area are detailed in Table 4-80.

Table 4-80 Colusa 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 Colusa						
1% Annual Chance Flood Hazard	2,857	26.82%	1,175	21.95%	1,682	31.74%
0.2% Annual Chance Flood Hazard	2,935	27.56%	1,618	30.23%	1,318	24.86%
Other Areas	4,858	45.62%	2,558	47.82%	2,300	43.40%
City of Colusa Total	**10,651**	**100.00%**	**5,350**	**100.00%**	**5,300**	**100.00%**

Jurisdiction / Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Williams						
1% Annual Chance Flood Hazard	1,866	27.72%	226	12.13%	1,640	33.67%
0.2% Annual Chance Flood Hazard	855	12.70%	245	13.19%	610	12.52%
Other Areas	4,010	59.57%	1,388	74.67%	2,621	53.81%
City of Williams Total	**6,731**	**100.00%**	**1,859**	**100.00%**	**4,871**	**100.00%**
Unincorporated Colusa County						
1% Annual Chance Flood Hazard	642,665	41.09%	287,197	43.37%	355,468	39.41%
0.2% Annual Chance Flood Hazard	69,452	4.44%	54,577	8.24%	14,875	1.65%
Other Areas	852,035	54.47%	320,451	48.39%	531,584	58.94%
Unincorporated Colusa County Total	**1,564,152**	**100.00%**	**662,225**	**100.00%**	**901,926**	**100.00%**
Grand Total	**1,581,533**	**100.00%**	**669,435**	**100.00%**	**912,098**	**100.00%**

Source: FEMA DFIRM 3/27/2024

Past Occurrences

Disaster Declaration History

A list of federal and state disaster declarations for Colusa County from flooding, (including heavy rains and storms) is shown on Table 4-81.

Table 4-81 Colusa County – Federal and State Disaster Declaration from Flood 1950-2023

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Table 4-82 shows events in Colusa County since 1993.

*Table 4-82 NCDC Flood Events in Colusa County 1993 to 8/31/2023**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Flash Flood	1	0	0	0	0	$0	$0
Flood	13	0	0	0	0	$32,900,000	$0
Total	**14**	**0**	**0**	**0**	**0**	**$32,900,000**	**$0**

Source: NCDC

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

FIS Events

The 2024 FIS noted that as a result of limited channel capacities, agricultural lands along the Colusa Basin Drain have experienced relatively frequent flooding. According to studies by the Cal DWR, crop damages were incurred as the result of historic floods during 1958, 1970, 1973, 1980, 1983, and 1986. Because of the predominantly rural nature of the study area, the reported damages to structures were relatively limited. However, approximately 20 homes and agricultural buildings experienced damages as a result of the 1983 flood event. Major flood events, such as those in 1983 and January 1995, resulted in overtopping and closure of State Highway 20. No significant structural damage was reported for the January 1995 flood event.

The City of Williams was inundated by a flood in 1973 caused by a heavy rainstorm in the western mountains. Severe floods also occurred in 1983 and 1984.

EOC Activations

The County maintains a list of EOC activations by hazard. EOC activations from flood and storms and from winter weather (which includes snow in the upper elevations of the County and flood in the lower elevations) from 2008 to 2024 are shown in Table 4-83.

Table 4-83 Colusa County – EOC Activations for Flood and Storms 2008-2024

Disaster Type	EOC Activations	
	Count	Date
Flood and Storms	6	1/2008; 1/2010, 3/2011; 11/2012; 2/2017
Winter Storm	2	1/2021, 1/2023

Source: Colusa County OES

Hazard Mitigation Planning Committee Events

The HMPC provided additional information on the following historical flood events in the County.

- **2023 Floods** - A major winter storm brought strong winds with moderate to heavy rain bringing renewed flooding of already elevated waterways. There was flooding of roadways, urban areas, rivers, streams and creeks, with rockslides and mudslides also reported. Winds gusted up to 60-70 mph in the Central Valley. In the mountains there were gusts up to 80 to 115 mph, which coupled with heavy snow, brought whiteout conditions. There were widespread trees down across the area, blocking roads and causing numerous power outages. Atmospheric river storms affected Colusa County and much of California beginning January 4 and continued well into late February. Colusa County received at least 9 in of rain. There was little to no break between storms, this caused over saturation of soil and flooding in the area. There was minor rockslides up in the hills and debris flows at various county roads. Wing Wall erosion causing over flow of debris onto Old Hwy 99 @ Funks Creek and Walnut Dr @ Salt Creek, causing road closures in these areas. Many culverts damaged due to the storms causing flooding in these areas. Monitoring river levels and notified Grimes Boat landing, Colusa Landing and residents along the river that potentially be affected by increasing river levels that were projected to reach flood stage in those areas. From January 4 – January 30 the river level reached up to 67 feet. Colusa County completed a preliminary estimate of damage to roads, road closures, debris removal, and high river levels of about $800,000 in damage. According to After Action Reports and FEMA project worksheets, multiple areas in the County had debris deposited from flooding. The Colusa Boat Landing had some damages to the private levee, with an estimate of about $200,000.
- **2019 Floods** - A strong atmospheric river brought heavy precipitation with widespread impacts across interior Northern California. These impacts included heavy high elevation snow, flooding, debris flows, strong mountain winds, and periods of whiteout conditions. Heavy snow fell over the mountains and extended down into lower elevations, causing widespread travel problems and road closures. Thunderstorms brought heavy rain and small hail with widespread road flooding. Gusty winds brought down trees and caused power outages. Caltrans reported that multiple vehicles were stuck in water on I-5. Local roadways in Colusa County also had flooding. Colusa County damage inventories showed that gravel roads were inundated with floodwaters. The County removed silt and other deleterious materials from the roadways and then repaired the surface course. County conducted emergency pumping as water management and flood fighting. Police conducted access management utilizing barricades and deployed sheriff officers and their vehicles to manage county wide access controls. In total, just over $725,000 in damages were reported.
- **2017 Floods** – The HMPC noted a flood in February of 2017. A Pacific storm parked itself over Southern California and unloaded, opening sinkholes and leading to the deaths of at least two people. The storm also affected areas farther north that have been lashed by rain for days. The Colusa County Sheriff's Office called for voluntary evacuations in Maxwell because of reports that rising water levels were threatening homes Saturday morning. The HMPC noted that roads turned into streams of brown water that lapped at doorsteps but no injuries were reported. The Red Cross of Northern California has opened evacuation centers for Colusa County residents after the Colusa County Sheriff issued an evacuation warning. The Sheriff's office said it began receiving calls that rising waters were threatening homes in the town of Maxwell. In addition, water rescues were carried out for several residences in Maxwell and at two residences in Williams. Many other rescues were carried out for persons who disregarded road closures and found their vehicle stalled out in flood water on roadways. The majority of the residences in Maxwell received up to three feet of water in them. The floodwater did not recede immediately: efforts to return residents to their homes were hindered. And, while the Small Business Administration set up a registration desk for assistance grants, few homeowners took advantage. A recovery team consisting of a representative from FEMA, Cal OES and the local OES with an interpreter (the majority of the residences in Maxwell are owned by Mexican families) conducted door

to door notification of services available for recovery assistance. Few of those homeowners were interested: if they weren't receiving free cash, they were determined to perform the clean-up and repairs themselves. The schools and businesses experienced insured losses. A large flood fight effort took place in the town of Princeton, which was experiencing water on the town's streets reaching unprecedented levels. Flood fight to protect residences and businesses was active for days on end. Local supplies and resources were depleted and additional supplies were purchased by the county. Mutual aid was requested for fire personnel to assist with the ongoing flood fight. The county's losses consisted mostly of road damages and flood fight expenses. Overtime expenses for first responders and public works were high as well. Public Assistance was granted totaling an amount reaching $735,000. Highway 99 was closed from the Glenn County Line to Williams, Maxwell Road was closed just west of the I-5 southbound on and off ramps, and many roads in the town of Maxwell are flooded. Damages to these roads was reported. Pictures of damages can be found in the past occurrences in Section 4.3.15. Photos of flooding can be seen in Figure 4-79.

Figure 4-79 Colusa County – 2017 Flooding

- **May 1998** Floods – On May 31, 1998, heavy rains and storms affected the County. Overland flooding can be seen on Figure 4-80.

Figure 4-80 Colusa County – May 31, 1998, Flooding

Source: Colusa County OES

- **1978 Floods** – The HMPC noted that the County experienced flooding in January of 1978. The Moulton Weir was overflowing, and the river overtopped the secondary levee of River Road. This can be seen in Figure 4-81.

Figure 4-81 Colusa County - January 1978 Flooding

Source: Colusa County OES

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.

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 is discussed using three sources:

- 2021 CAS
- Cal-Adapt
- National Center for Atmospheric Research

California Climate Adaptation Strategy

According to the 2021 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 4-42 in Section 4.3.4. These could affect flooding in the Colusa 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 Colusa County Planning Area has always been at risk to flooding during the rainy season from November through April. The Colusa 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 Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

The 2010 General Plan Background Report noted the flood issues and areas at risk. In the northwestern area of the County, 1% annual chance flood zones are delineated along Stony Creek northwest of Stonyford and around the East Park Reservoir, Little Stony Creek and Little Indian Creek near Lodoga. Near Delevan and Maxwell, delineated floodplains are identified along several streams, such as Hunters Creek, Funks Creek, Stone Coral Creek and the Glenn-Colusa Canal. Moving south, delineated floodplains coincide with several drainages, such as Lurline Creek, Freshwater Creek and Salt Creek, while floodplains near Arbuckle have been delineated along Cortina Creek, Sand Creek, Whiskey Creek and Elk Creek.

The lands to the east of Interstate 5 are crisscrossed with levees, canals and natural drainages. In addition, the Colusa Basin and Butte Sink frame the Sacramento River near the northeastern corner of the County. The flood control and water delivery facilities within the County are the product of a complex history of agencies, districts, plans, programs, and regulations.

The HMPC also noted that with the decertification of levees, additional homes have been placed into the 1% annual chance floodplain. In order to secure a federally backed mortgage, flood insurance would also be required on the homes recently put into the floodplain by the levee decertification

Assets at Risk

Assets at risk from 1% and 0.2% annual chance floods include people and populations; structures; critical facilities and infrastructure and community lifelines; natural, historic, and cultural resources, economic assets, and community activities of value). These are discussed in the following sections for the Colusa County Planning Area and unincorporated Colusa County.

The Planning Area has mapped FEMA flood hazard areas. GIS was used to determine the possible impacts of flooding within the Planning Area and how the risk varies across the Colusa 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)

2023 Colusa County Parcel/Assessor Data was used as the basis for the Colusa County inventory of parcels, values, and acres. Colusa County has a FEMA effective DFIRM dated 3/27/2024, which was obtained from FEMA's National Flood Hazard Layer to perform the flood analysis. In some cases, there are parcels in multiple flood zones, such as Zone A, Zone X, or Shaded X. GIS was used to create a centroid, or point representing the center of the parcel polygon. DFIRM flood data was then overlaid on the parcel layer. For the purposes of this analysis, the flood zone that intersected a parcel centroid was assigned the flood zone for the entire parcel.

Once the DFIRM flood zones were intersected, land and improved (structure) 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 Colusa County Assessor's database. The property use categories for the Colusa County Planning Area (derived from general plan property use descriptions) were used to develop estimated content replacement values (CRV) that are potentially at loss from hazards, using FEMA Hazus methodologies as previously described in Section 4.2. The CRVs were added to the land and improved parcel values.

The parcels and associated values were segregated and analyzed in this fashion to determine parcels and values at risk to the flood hazard for the Colusa County Planning Area.

Methodology (Loss Estimate)

The loss estimate for flood is based on the total of improved and contents value. Only improved parcels and the value of their structure improvements 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 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 the flood hazard 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.

Colusa 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 Assessor Data. Those residential parcel centroids that intersect the flood zones were counted and multiplied by the 2020 Census Bureau average household factors for each jurisdiction. This is shown in Table 4-84.

Table 4-84 Colusa County Planning Area – Improved Residential Parcels and Population by FEMA DFIRM Flood Zone by Jurisdiction

Jurisdiction	1% Annual Chance		0.2% Annual Chance	
	Improved Residential Parcels	Population at Risk	Improved Residential Parcels	Population at Risk
City of Colusa	300	870	13	38
City of Williams	19	48	168	428
Unincorporated Colusa County	492	1,761	953	3,412

Source: FEMA DFIRM 3/27/2024, 2023 Colusa County Parcel/Assessor Data, 2020 US Census Bureau Average Household Size– City of Colusa (2.90); City of Williams (2.55); Unincorporated Colusa County (3.58)

These numbers reflect low end estimates as the property use categories based on the Assessor data utilized for this LHMP Update assumes all residential properties are single family residences. However, some of the residential parcels actually include multi-family units, including apartments, condominiums, as well as duplexes and triplexes. These variations in residential property use were not accounted for in the analysis, which skews populations results to be lower.

Structures

Results are presented here first for the Colusa County Planning Area and secondly for unincorporated County.

Colusa County Planning Area

Certain structures in the Colusa 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. Table 4-85 shows parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), 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 4-85 Colusa 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	Improved Structure Value	Other Value	Total Value
City of Colusa						
1% Annual Chance Flood Hazard	476	355	$41,614,561	$118,703,421	$12,800,623	$173,118,605
0.2% Annual Chance Flood Hazard	18	15	$796,791	$3,866,267	$0	$4,663,058
Other Areas	1,840	1,707	$101,892,192	$321,198,099	$36,427,920	$459,518,211
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$637,299,874**
City of Williams						
1% Annual Chance Flood Hazard	115	53	$9,814,990	$22,835,847	$3,087,632	$35,738,469
0.2% Annual Chance Flood Hazard	204	183	$17,819,160	$61,549,910	$26,998,809	$106,367,879
Other Areas	1,436	1,241	$82,539,836	$265,076,793	$96,815,520	$444,432,149
City of Williams Total	**1,755**	**1,477**	**$110,173,986**	**$349,462,550**	**$126,901,961**	**$586,538,497**
Unincorporated Colusa County						
1% Annual Chance Flood Hazard	3,193	1,468	$751,354,019	$220,816,491	$53,782,824	$1,025,953,334
0.2% Annual Chance Flood Hazard	1,189	1,059	$72,344,377	$182,185,719	$5,850,126	$260,380,222
Other Areas	6,500	3,071	$741,971,756	$515,571,053	$139,714,432	$1,397,257,241

Jurisdiction / Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Total Value
Unincorporated Colusa County Total	**10,882**	**5,598**	**$1,565,670,152**	**$918,573,263**	**$199,347,382**	**$2,683,590,797**
Grand Total	**14,971**	**9,152**	**$1,820,147,682**	**$1,711,803,600**	**$375,477,886**	**$3,907,429,168**

Source: FEMA DFIRM 3/27/2024, 2023 Colusa 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 4-86 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 4-86 Colusa County Planning Area – FEMA DFIRM Flood Loss Estimates

Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance	3,784	1,876	$802,783,570	$362,355,759	$69,671,079	$311,463,844	$743,490,682	$148,698,136.00	0.05%
0.2% Annual Chance	1,411	1,257	$90,960,328	$247,601,896	$32,848,935	$157,188,784	$437,639,615	$87,527,924	0.03%
Total	**5,195**	**3,133**	**$893,743,898**	**$609,957,655**	**$102,520,014**	**$468,652,628**	**$1,181,130,297**	**$236,226,060**	**0.08%**

Source: FEMA DFIRM 3/27/2024, 2023 Colusa 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 4-85 and Table 4-86, the Colusa County Planning Area has 1,876 improved parcels and roughly $743.5 million of structure and contents value in the 1% annual chance floodplain. There are an additional 1,257 improved parcels and roughly $437.6 million of structure and contents value in the 0.2% annual chance flood event. A loss ratio of 0.05% and 0.02% indicates that while the Colusa 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 Colusa County

Numerous structures in unincorporated Colusa 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 4-87 shows parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), other

values, estimated content replacement values, and total values in the unincorporated County. This is shown 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 4-87 Unincorporated Colusa 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	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard							
Zone A							
Agricultural	754	315	$234,743,845	$43,627,424	$13,129,505	$43,627,424	$335,128,198
Commercial	13	8	$1,125,315	$5,666,198	$8,644,193	$5,666,198	$21,101,904
Government	54	2	$1,241,498	$139,339	$0	$139,339	$1,520,176
Industrial	3	3	$778,474	$6,384,279	$857,571	$9,576,418	$17,596,742
Institutional	7	0	$543,932	$0	$0	$0	$543,932
Miscellaneous	97	2	$16,460,628	$299,790	$1,579,253	$299,790	$18,639,461
Residential	91	73	$4,729,043	$12,512,049	$497,943	$6,256,026	$23,995,061
Zone A Total	**1,019**	**403**	**$259,622,735**	**$68,629,079**	**$24,708,465**	**$65,565,195**	**$418,525,474**
Zone AE							
Agricultural	1,327	531	$422,276,166	$60,273,876	$9,366,080	$60,273,876	$552,189,998
Commercial	60	44	$3,768,368	$13,036,277	$3,285,446	$13,036,277	$33,126,368
Government	99	11	$20,159,971	$793,399	$3,485	$793,399	$21,750,254
Industrial	9	5	$1,188,962	$1,750,252	$118,954	$2,625,378	$5,683,546
Institutional	13	3	$401,239	$293,916	$424,813	$293,916	$1,413,884
Miscellaneous	58	15	$11,002,308	$675,151	$90,670	$675,151	$12,443,280
Residential	304	246	$16,470,218	$39,577,850	$1,299,564	$19,788,928	$77,136,560
Zone AE Total	**1,870**	**855**	**$475,267,232**	**$116,400,721**	**$14,589,012**	**$97,486,925**	**$703,743,890**
Zone AH							
Agricultural	38	16	$6,308,885	$678,688	$5,533	$678,688	$7,671,794
Commercial	27	13	$2,106,718	$4,794,417	$3,270,868	$4,794,417	$14,966,420
Government	5	2	$291,276	$851,096	$24,100	$851,096	$2,017,568
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	3	1	$42,613	$1,919,497	$0	$1,919,497	$3,881,607
Miscellaneous	6	0	$1,059	$0	$0	$0	$1,059
Residential	178	138	$6,122,831	$18,284,397	$259,353	$9,142,199	$33,808,780
Zone AH Total	**257**	**170**	**$14,873,382**	**$26,528,095**	**$3,559,854**	**$17,385,897**	**$62,347,228**
Zone AO							
Agricultural	6	3	$212,189	$64,958	$0	$64,958	$342,105
Commercial	1	1	$5,237	$959	$0	$959	$7,155

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Government	0	0	$0	$0	$0	$0	$0
Industrial	2	1	$303,140	$6,100,489	$10,764,410	$9,150,734	$26,318,773
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	38	35	$1,070,104	$3,092,190	$161,083	$1,546,094	$5,869,471
Zone AO Total	**47**	**40**	**$1,590,670**	**$9,258,596**	**$10,925,493**	**$10,762,745**	**$32,537,504**
1% Annual Chance Flood Hazard Total	**3,193**	**1,468**	**$751,354,019**	**$220,816,491**	**$53,782,824**	**$191,200,762**	**$1,217,154,096**
0.2% Annual Chance Flood Hazard							
Zone X (shaded)							
Agricultural	90	70	$23,389,838	$11,859,628	$3,165,643	$11,859,628	$50,274,737
Commercial	27	21	$2,668,506	$5,500,237	$1,450,719	$5,500,237	$15,119,699
Government	21	7	$256,413	$710,194	$6,118	$710,194	$1,682,919
Industrial	1	1	$181,086	$1,146,913		$1,720,370	$3,048,369
Institutional	5	4	$114,466	$3,049,234	$369,211	$3,049,234	$6,582,145
Miscellaneous	24	3	$1,526,605	$3,178,676		$3,178,676	$7,883,957
Residential	1,021	953	$44,207,463	$156,740,837	$858,435	$78,370,409	$280,177,144
Zone X (shaded) Total	**1,189**	**1,059**	**$72,344,377**	**$182,185,719**	**$5,850,126**	**$104,388,748**	**$364,768,970**
0.2% Annual Chance Flood Hazard Total	**1,189**	**1,059**	**$72,344,377**	**$182,185,719**	**$5,850,126**	**$104,388,748**	**$364,768,970**
Other Areas							
Zone X (unshaded)							
Agricultural	3,201	1,709	$628,384,629	$243,574,227	$87,660,998	$243,574,227	$1,203,194,081
Commercial	132	92	$11,295,115	$42,538,977	$15,372,418	$42,538,977	$111,745,487
Government	232	16	$7,613,406	$1,583,898	$3,746	$1,583,898	$10,784,948
Industrial	36	20	$7,536,728	$56,124,516	$29,943,644	$84,186,776	$177,791,664
Institutional	27	18	$204,718	$2,664,515	$2,655,728	$2,664,515	$8,189,476
Miscellaneous	222	9	$2,955,560	$943,952	$181,750	$943,952	$5,025,214
Residential	2,398	1,152	$66,446,067	$160,209,004	$3,666,602	$80,104,503	$310,426,176
Zone X (unshaded) Total	**6,248**	**3,016**	**$724,436,223**	**$507,639,089**	**$139,484,886**	**$455,596,848**	**$1,827,157,046**
Zone D (unmapped)							
Agricultural	74	34	$9,641,023	$3,172,324	$229,546	$3,172,324	$16,215,217
Commercial	0	0	$0	$0	$0	$0	$0
Government	15	1	$2,395,245	$3,451,260	$0	$3,451,260	$9,297,765

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	125	0	$4,965,902	$0	$0	$0	$4,965,902
Residential	38	20	$533,363	$1,308,380	$0	$654,189	$2,495,932
Zone D (unmapped) Total	**252**	**55**	**$17,535,533**	**$7,931,964**	**$229,546**	**$7,277,773**	**$32,974,816**
Other Areas Total	**6,500**	**3,071**	**$741,971,756**	**$515,571,053**	**$139,714,432**	**$462,874,621**	**$1,860,131,862**
Unincorporated Colusa County Total	**10,882**	**5,598**	**$1,565,670,152**	**$918,573,263**	**$199,347,382**	**$758,464,131**	**$3,442,054,928**

Source: FEMA DFIRM 3/27/2024, Colusa 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 4-88 shows unincorporated Colusa County loss estimates and improved values at risk by FEMA 1% and 0.2% annual chance flood zones.

Table 4-88 Unincorporated Colusa County – FEMA DFIRM Flood Loss Estimates

Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance	3,193	1,468	$751,354,019	$220,816,491	$53,782,824	$191,200,762	$465,800,077	$93,160,015	0.03%
0.2% Annual Chance	1,189	1,059	$72,344,377	$182,185,719	$5,850,126	$104,388,748	$292,424,593	$58,484,919	0.02%
Total	**4,382**	**2,527**	**$823,698,396**	**$403,002,210**	**$59,632,950**	**$295,589,510**	**$758,224,670**	**$151,644,934**	**0.05%**

Source: FEMA DFIRM 3/27/2024, Colusa 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 4-87 and Table 4-88, the unincorporated Colusa County has 1,468 improved parcels and roughly $465.8 million of structure and contents value in the 1% annual chance floodplain. There are an additional 1,059 improved parcels and roughly $292.4 million of structure and contents value in the 0.2% annual chance flood event. A loss ratio of 0.03% and 0.02% 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 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 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. However, with the release of the new DFIRMs as detailed above, all levees within the Colusa County Planning Area have been deaccredited placing all structures previously protected by levees into the 1% annual chance flood. Flood insurance promotion and outreach will be important moving forward to ensure these vulnerable structures are adequately insured and protected.

Unincorporated Colusa County joined the NFIP on September 18, 1985. The County does not participate in the CRS program. NFIP insurance data indicates that as of February 2, 2024, there were 243 policies in force in the unincorporated County, resulting in $65,642,000 of insurance in force and $153,363 in annual premiums paid. Of these, 202 are for residential properties and 41 are nonresidential. 110 of these are in A zones; and 113 policies are for parcels in the B, C, & X zones.

There have been 142 closed paid losses totaling $3,120,729.86. 106 of these were for residential properties and 36 were for nonresidential. Of these 142 paid losses, 32 were parcels in A zones, 83 parcels were in B, C, & X zones, and 27 had no zone data attached to them. Of the 142 claims, 91 claims were associated with pre-FIRM structures and 23 with post-FIRM structures, with 28 had no data attached to them. There have been 7 substantial damage claims since 1978. There has been 1 Increased Cost of Compliance (ICC) loss totaling $30,000. According to FEMA's Community Information System data, there are 25 repetitive loss (RL) and 0 Post-FIRM Severe Repetitive Loss (SRL) buildings.

FEMA also supplied data from their PIVOT database, which looks at RL and SRL properties differently than the CIS data above. PIVOT data consider whether a structure has been mitigated or not, and also includes pre-FIRM SRL buildings. According to this database, there are 19 RL properties and 4 SRL properties in the unincorporated County. This can be seen on Table 4-89.

Table 4-89 Colusa County Planning Area – SRL and RL Properties and their Status

Community ID	Jurisdiction	RL Properties	SRL Properties	Mitigated	Single Family	Two-Four Family	Other Non-Residential	Non-Residential - Business
060023	City of Colusa	0	0	0	0	0	0	0
060024	City of Williams	0	0	0	0	0	0	0
060022	Unincorporated Colusa County	19	4	0	18	3	1	1

Source: FEMA, PIVOT, 5/8/2024

Based on this analysis of insurance coverage, unincorporated Colusa County has significant values at risk to the 1% and 0.2% annual chance and greater floods. Of the 1,468 improved parcels within the 1% annual

chance flood zone, only 110 (or 7.5 percent) of those parcels maintain flood insurance. This can be seen on Table 4-90, along with insurance information from the 2 incorporated communities in the County.

Table 4-90 Colusa County Planning Area– 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 Colusa	355	0	0.0%
City of Williams	53	3	5.7%
Unincorporated County	1,468	110	7.5

Source: FEMA DFIRM 3/27/2024, FEMA CIS 2024, 2023 Colusa County Parcel/Assessor's Data

As the levees are de-accredited, an increased number of Colusa County residents are placed in the floodplain. Table 4-91 illustrates the changes in the number of insured structures in the 1% annual chance floodplain. As seen in the table, the overall percentage of policy holders dropped from 22.2% in 2018 to 6.0% in 2024.

Table 4-91 Colusa County Planning Area– Comparison of 2024 and 2018 Percentage of Policy Holders to Improved Parcels in the 1% Annual Chance Floodplain

	2024 LHMP			2018 LHMP		
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	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 Colusa	355	0	0.0%	7	0	0.0%
City of Williams	53	3	5.7%	53	11	20.8%
Unincorporated County	1,468	110	7.5%	879	206	23.4%
Total	**1,876**	**113**	**6.0%**	**939**	**217**	**22.2%**

Source: FEMA DFIRM 3/27/2024, FEMA CIS 2024, 2023 Colusa County Parcel/Assessor's Data, 2018 Colusa County LHMP Update

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 water infrastructure for drinking water, wastewater service, and draining streets of rainwater. 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 Colusa 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 4-82 shows critical facilities and the detailed DFIRM flood zones. Table 4-92 details critical facilities in detailed DFIRM flood zones by facility type and count for the Colusa 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 4-82 Colusa County Planning Area – Critical Facilities in DFIRM Flood Zones

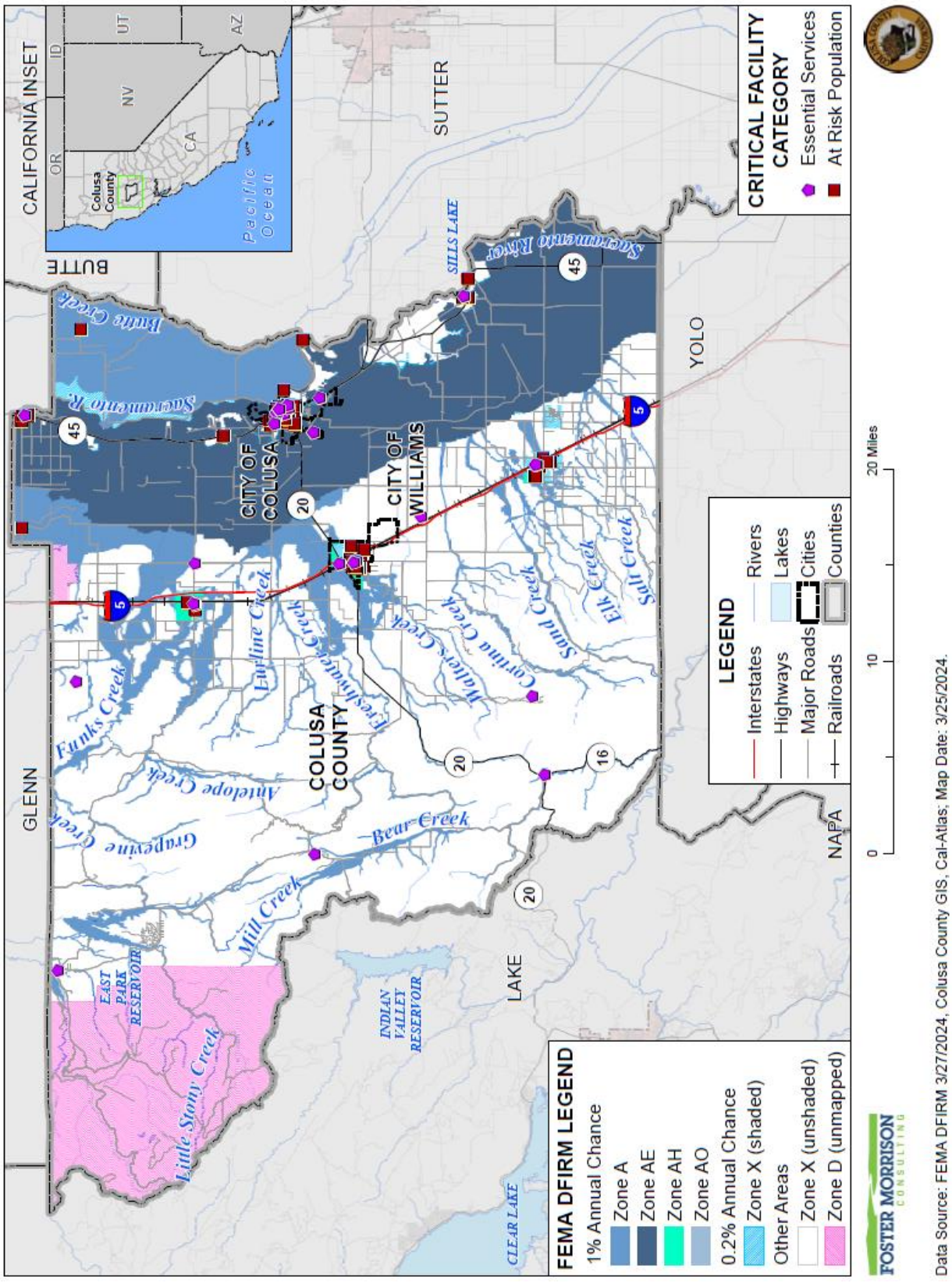


Table 4-92 Colusa County Planning Area – Critical Facilities in Detailed DFIRM Flood Zones by Category, Type, and Jurisdiction

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
City of Colusa		
1% Annual Chance Flood Hazard		
Zone AE		
Essential Services Facilities	Emergency Response	1
	Public Services	2
	Total	***3***
At Risk Population Facilities	Apartment Complex	3
	Mobile Home Park	4
	Total	***7***
Zone AE Total		**10**
1% Annual Chance Flood Hazard Total		**10**
Other Areas		
Zone X (unshaded)		
Essential Services Facilities	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	1
	Utility Facility	2
	Total	***7***
At Risk Population Facilities	Apartment Complex	19
	Assisted-Living	1
	Hotel or Motel	2
	Jail	1
	Mobile Home Park	1
	School	8
	Senior Living Facility	1
	Total	***33***
Zone X (unshaded) Total		***40***
Other Areas Total		**40**
City of Colusa Total		**50**
City of Williams		
1% Annual Chance Flood Hazard		
Zone AH		
Essential Services Facilities	Utility Facility	1

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
	Total	***1***
At Risk Population Facilities	Hotel or Motel	2
	Mobile Home Park	1
	Total	***3***
Zone AH Total		***4***
1% Annual Chance Flood Hazard Total		**4**
0.2% Annual Chance Flood Hazard		
Zone X (shaded)		
At Risk Population Facilities	Hotel or Motel	3
	Total	**3**
Zone X (shaded) Total		***3***
0.2% Annual Chance Flood Hazard Total		**3**
Other Areas		
Zone X (unshaded)		
Essential Services Facilities	Emergency Response	2
	Fire Station	1
	Public Services	1
	Total	***4***
At Risk Population Facilities	Apartment Complex	4
	Hotel or Motel	3
	Migrant Housing	1
	Mobile Home Park	1
	School	4
	Senior Living Facility	3
	Total	***16***
Zone X (unshaded) Total		***20***
Other Areas Total		**20**
City of Williams Total		**27**
Unincorporated Colusa County		
1% Annual Chance Flood Hazard		
Zone A		
At Risk Population Facilities	Mobile Home Park	2
	Total	***2***
Zone A Total		***2***
Zone AE		
Essential Services Facilities	Fire Station	1

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
	Total	***1***
At Risk Population Facilities	Apartment Complex	1
	Mobile Home Park	4
	School	2
	Total	***7***
Zone AE Total		***8***
Zone AH		
At Risk Population Facilities	Apartment Complex	1
	Mobile Home Park	1
	School	1
	Total	***3***
Zone AH Total		***3***
1% Annual Chance Flood Hazard Total		**13**
0.2% Annual Chance Flood Hazard		
Zone X (shaded)		
Essential Services Facilities	Utility Facility	1
	Total	***1***
At Risk Population Facilities	Apartment Complex	1
	Mobile Home Park	1
	School	4
	Total	***6***
Zone X (shaded) Total		***7***
0.2% Annual Chance Flood Hazard Total		**7**
Other Areas		
Zone D (unmapped)		
Essential Services Facilities	Native American Reservation	1
	Total	***1***
At Risk Population Facilities	Casino	1
	Hotel or Motel	1
	Total	***2***
Zone D (unmapped) Total		***3***
Zone X (unshaded)		
Essential Services Facilities	Fire Station	6
	Utility Facility	4
	Total	***10***
At Risk Population Facilities	Apartment Complex	2

Jurisdiction/Critical Facility Category	Facility Type	Facility Count
	Mobile Home Park	1
	School	2
	Total	**5**
Zone X (unshaded) Total		***15***
Other Areas Total		**18**
Unincorporated Colusa County Total		**38**
Grand Total		**115**

Source: FEMA 3/27/2024 DFIRM, Colusa County GIS

Community Lifelines

1% and 0.2% annual chance flooding presents a threat to life and property, including community lifelines in the Planning Area. Community lifelines that would be vulnerable to flooding include:

- **Safety and Security** – Search and rescue and swiftwater teams may be called on to perform riskier duties during times of flooding. Police, Fire, EMS, and Public Works personnel are often called on to respond during flood emergencies. During large events, these services may become stretched.
- **Food, Hydration, and Shelter -** Public health can also be at risk from flooding. Floodwater is often contaminated with sewage, which can lead to illness and affect clean drinking water.
- **Health and Medical** – Loss of life and injuries can occur during significant flood events, Flooding may complicate the ability to transport the injured possibly requiring rerouting of injured to other facilities.
- **Energy** – Floods can cause power grid issues and lead to power outages. During extreme flood events gas lines may break or otherwise be damaged from erosion and debris in floodwaters.
- **Communications** – Communication infrastructure can be inundated by a flood event causing damage and disruption in service. As well an influx of service calls to dispatch centers for reporting of flooding, power outages, or other issues can occur. Messaging systems need to be deployed during these times to let the public know about lane and road closures, washouts, debris on roads, and requirements for evacuations or sheltering.
- **Transportation** – Transport networks can be affected, such as flood damage to bridges, railways and roads. This can cause lane and road closures. These closures can affect response personnel (EMS, Fire, Police) as well as cause additional traffic issues for residents and impact evacuation routes. Life safety can also be an issue on flooded roads.
- **Hazardous Material** – Hazardous material facilities can be affected by flooding. Releases during these times can be comingles with flood waters, contaminate drinking water, as well as create additional exposures to the environment.
- **Water Systems** – Floods can affect the ability for water and wastewater systems to operate, since many are located near flood zones.

Generally, even major flood events are temporary events with flood waters receding back to pre-storm levels at the conclusion of the storm. However, depending on the location, duration, and magnitude and severity of any given flood event, some of these community lifelines may be overwhelmed in the short term.

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.

Economic Assets and Community Activities of Value

Major flood events could affect any economic asset that lies in the floodplain and can have long lasting effects. This could cause those businesses and economic assets within these areas to close or relocate. This could cause temporary or permanent loss of sales tax revenue. This is also true if agricultural areas are flooded in the County (discussed in greater detail in Section 4.3.6) resulting in losses. These events can also affect those economic assets outside of the floodplain, at least in the short term until the Planning Area has sufficiently recovered. Community activities of value can also be disrupted by floods, though many of these events take place in the summer months, when flooding is less likely to occur. This includes the County Fair, Farm Show, rodeos, craft fairs, the Lantern Festival, and hunting and fishing seasons.

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

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.

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.

Mercury in Waterways in Colusa County

As a result of historical releases of mercury associated with mining in Colusa County and the surrounding region, mercury contamination is a significant hazard to County residents and visitors, as well as wildlife. This Mercury contamination can become a greater concern during flood events. The State Resources Agency, as well as Cal EPA and US EPA, have recognized this contamination. The presence of mercury in the groundwater under the Colusa National Wildlife Refuge. The Colusa National Wildlife Water Management Plan dated March 3, 2011, details the contamination. This contamination is a potential hazard for local wildlife at the Refuge but also the food web for aquatic life in the lower Sacramento River and Delta due to the reduction of the mercury contamination into methylmercury by biotic microorganisms. The contamination from one of the sites identified on the State Water Resources Board 303(d) list to be submitted to the US EPA. These sites include Bear Creek, East Park Reservoir, Freshwater Creek to Salt Creek, Powell Slough, Sand Creek, Spring Creek, Stone Corral Creek, and Sulfur Creek in Colusa County.

Various factors in the region can affect the amount of mercury that enters the food chain and poses a hazard to human health and the environment. Some of these factors may be subject to some level of influence by human activity. Factors that affect the hazard caused by mercury include but are not limited nutrient levels, sediment transport, streambed modification, food chain and ecological effects, fish consumption practices, management of water levels, water exports and diversions, irrigation practices, salinity, oxygen concentrations, wetland restoration and management practices, flooding of affected areas, dredging, reservoir management, stormwater and wastewater discharges and treatment processes, source control and pollution prevention activities, and levels of mercury in sediments, water bodies, and discharges.

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 Colusa County 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 County. Population growth in Colusa County
- 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 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 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.

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: 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. Colusa 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 Colusa County. With the release of the new DFIRMs it is anticipated that the flood ordinance will be updated. Future development areas and their vulnerability to DFIRM flooding is discussed further in the below GIS analysis.

Future Development: GIS Analysis

Colusa County provided 53 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 assigned are based on the centroid

of the polygon. Figure 4-83 show the locations of the future development areas and FEMA DFIRM flood zones. Table 4-93 shows the details of the future development areas that are located in each FEMA DFIRM flood zone.

Figure 4-83 Unincorporated Colusa County – Future Development in FEMA DFIRM Flood Zones

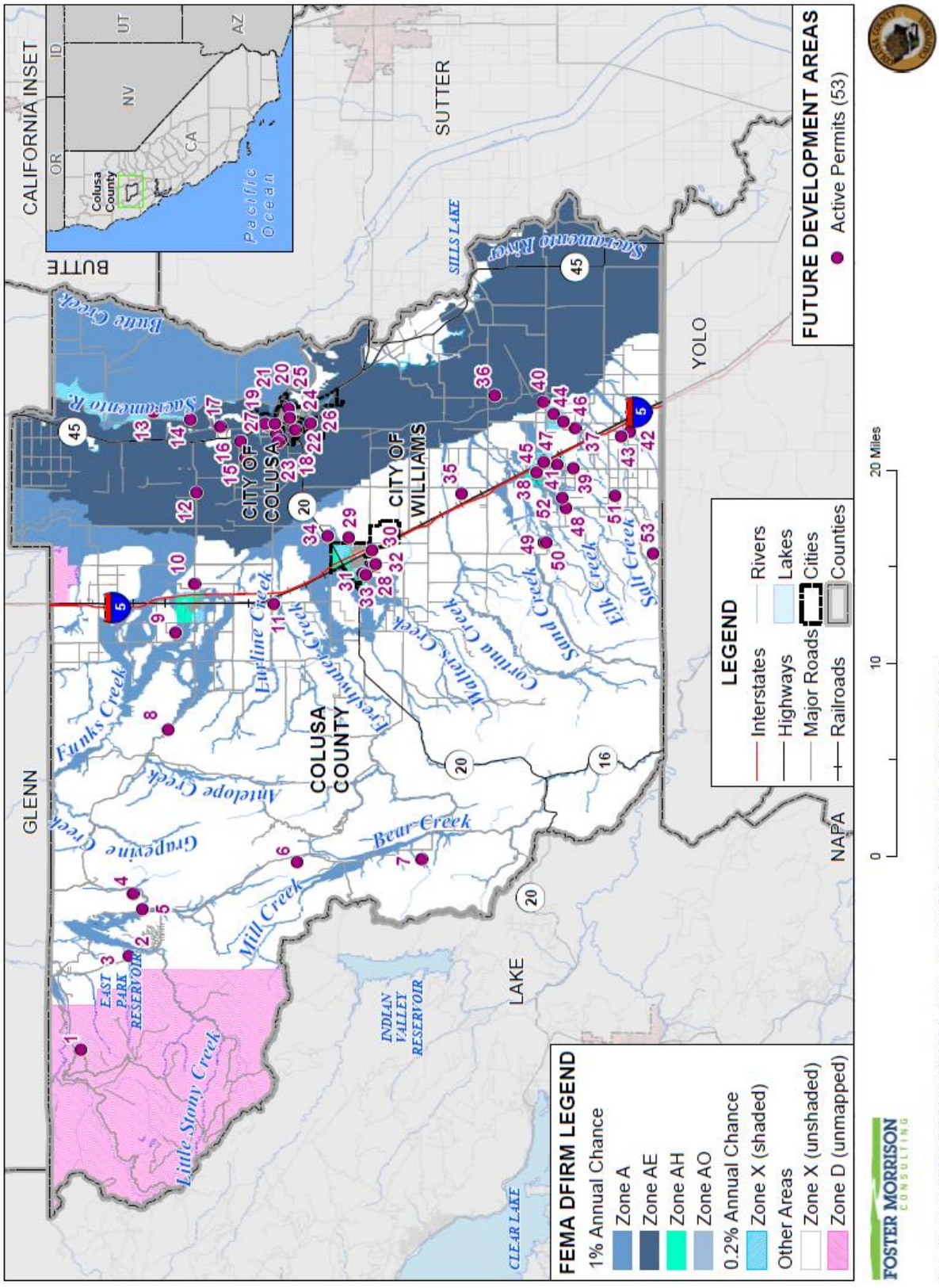


Table 4-93 Unincorporated Colusa County – Future Development in FEMA DFIRM Flood Zones with Parcel Counts and Acreages

Flood Zone	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
1% Annual Chance Flood Hazard				
Zone A	9	4105 RIORDAN RD	1	76.26
	13	4374 RIVER RD	1	402.44
	48	821 WYER RD	1	10.79
	Zone A Total		**3**	**489.49**
Zone AE	12	6458 MAXWELL RD	1	319.89
	15	015-060-091-000	1	497.11
	16	6892 HARBISON RD	1	11.00
	17	015-030-094-000	1	17.03
	18	3258 MCCOY RD	1	6.01
	20	022-200-066-000	1	0.45
	21	022-200-066-000	1	0.45
	22	3145 WILL S GREEN RD	1	7.48
	23	3286 RANCH RD	1	1.85
	26	015-380-019-000	1	1.00
	36	019-090-058-000	1	10.00
	40	7251 TULE RD	1	2.64
	Zone AE Total		**12**	**874.91**
Zone AH	47	720 FIFTH ST	1	0.55
	Zone AH Total		**1**	**0.55**
1% Annual Chance Flood Hazard Total			**16**	**1,364.94**
0.2% Annual Chance Flood Hazard				
Zone X (shaded)	14	4073 RIVER RD	1	10.32
	38	805 GAIL AVE	1	0.38
	44	507 MAIN ST	1	0.47
	45	707 FIRST ST	1	0.13
	Zone X (shaded) Total		**4**	**11.30**
0.2% Annual Chance Flood Hazard Total			**4**	**11.30**
Other Areas				
Zone X (unshaded)	2	4564 LODOGA STONYFORD RD	1	2.49

Flood Zone	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
	3	4564 LODOGA STONYFORD RD	1	2.49
	4	010-280-079-000	1	13.90
	5	4481 SITES LODOGA RD	1	86.68
	6	014-250-019-000	1	219.76
	7	2001 BEAR VALLEY RD	1	637.09
	8	011-200-012-000	1	282.12
	10	5603 MAXWELL RD	1	30.89
	11	5498 LURLINE AVE	1	12.18
	19	015-310-050-000	1	11.97
	24	1232 FIFTH ST	1	0.60
	25	002-101-004-000	1	4.48
	27	1773 LURLINE AVE	1	3.40
	28	016-230-101-000	1	2.49
	29	2668 HUSTED RD	1	10.00
	30	2461 OLD HIGHWAY 99W	1	8.53
	31	2533 VENICE AVE	1	2.06
	32	016-230-065-000	1	1.45
	33	016-220-099-000	1	1.37
	34	017-010-045-000	1	56.35
	35	1707 LONE STAR RD	1	121.30
	37	7020 FRIEL RD	1	9.92
	39	758 WILDWOOD RD	1	25.08
	41	887 WILDWOOD RD	1	1.89
	42	021-290-070-000	1	30.47
	43	6901 HARRINGTON AVE	1	15.16
	46	7072 PERKINS RD	1	9.29
	49	6031 HILLGATE RD	1	9.65

Flood Zone	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
	50	6011 HILLGATE RD	1	9.72
	51	6439 MARINE AVE	1	27.77
	52	853 JENSEN AVE	1	9.92
	53	5875 SILLS RD	1	618.41
	Zone X (unshaded) Total		**32**	**2,278.87**
Zone D (unmapped)	1	010-200-001-000	1	161.29
	Zone D (unmapped) Total		**1**	**161.29**
Other Areas Total			**33**	**2,440.16**
Grand Total			**53**	**3,816.40**

Source: FEMA 3/27/2024 DFRIM, Colusa County GIS

4.3.12. Flood: Localized Flooding

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Colusa 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

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 Colusa 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

In addition to flooding, damage to these areas during heavy storms can include pavement deterioration, washouts, landslides/mudslides, debris areas, and downed trees. 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 City this happens more often during the winter months, as was shown on Figure 4-35 above. Localized flooding often has a short duration. Specific locations in the County can be seen in the Local Concerns section below in Table 4-94.

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

2023 – Localized flooding occurred throughout the County. An area especially hit was Goat Mountain Road. Goat Mountain Road is a mountainous, rural gavel road, located in westerly Colusa County. The subject location is approximately 20 wide with a 24" corrugated galvanized culvert. The culvert failed during the event which was exasperated by the recurrence of natural spring in the toe of the roadway cutback up gradient of the culvert failure. The spring then began saturating the remaining road prism at the culvert failure, destabilizing the entire slope. In order to preserve the road way, a 'French Drain' was installed up gradient of the failed culvert to intercept the subsurface water from the spring. This water was then directed across the road and away from the failed 24' culvert by way of a new 18" culvert. The 24" cross culvert was replaced and both the new 18" and 24" culverts were backfilled with native material and class II road base.

2019 – Flooding was both local and along the RD 2048 canal and included erosion along roadways and the deposit of sediment on roadways which required clean up and also on unimproved roads, additional aggregate base needed to be imported and graded.

2017 – During the February storms, the HMPC noted that portions of the County suffered localized flooding. This can be seen in Figure 4-84.

Figure 4-84 Colusa County – February 2017 Localized Flooding

Source: Colusa County

The HMPC noted that Walnut Avenue east of Williams was flooded out, restricting access to Spring Valley Road and the Cortina Rancheria in 2017. Gridley Highway was closed for over a month in 2017 due to flooding.

Typically, localized flooding inundates roads and properties for a short period of time before receding. As Colusa County was fighting with torrential downpours, a need arose to combat runoff water from higher elevations encroaching on already saturated ground and storm drains. Unmaintained canals and ditches contributed to the excessive water in areas that had not historically experienced flooding such as the town of Maxwell. Roads and drains were damaged from the excessive water runoff, causing the need for repairs.

Once the river level receded, seepage water came up and areas adjacent to the river that had not experienced seepage in the past, did. East Clay Street in Colusa typically sees seepage each year. The road will close for a short period of time until the river level goes down, leaving only minor damage to the surface and shoulders of the road. In 2017, it saw that seepage, but at a depth of 3 feet and flowing across the road. One resident was unable to use their well or septic tank for a period of 38 days. The road's condition was greatly affected from the pressure of the water.

The Town of Grimes is also river-adjacent. There were areas of sloughing on the riverbank in the area, as well as seepage and boils. With the river maintained a higher than average depth for a longer than average period of time, the residents in Grimes were on high alert for weeks, concerned about the levee failing. The responsible agencies, Reclamation District 108 and the Sacramento River Westside Levee District, worked with the Department of Water Resources to monitor these areas. The SRWLD performed several repairs to the levee and sandbagged the boils to prevent further damages and protect the town of Grimes. After the

water receded and the river level stabilized, they carried out a large levee repair project, extending the wall of the levee's width in the area. More projects are planned as noted in the Project Worksheets located later in this Plan.

In the City of Williams excessive water caused two residences on Walnut Road to flood and water rescues had to be carried out to evacuate the tenants. Flood fight efforts built up an abandoned railroad right of way to control the water however it caused other flooding issues. Many businesses were affected by the water backing up.

Flooding on the roadway causes traffic safety concerns several times a year, as Highway 20 (also known as Bridge Street) in the City of Colusa experiences water encroaching up to the center line from the westside of the roadway between Jay Street to Webster Street. CalTrans places signage to warn drivers of flooding on this major east-east travel route. Fire, law enforcement and ambulance services are affected as the local hospital and county jail are located on the eastside of the roadway, obviously hindering emergency response.

Two weirs in Colusa County flow during high river levels, typically once every couple of years, with one closing the through-roadway completely when it flows. The Colusa Bridge gauge will need to read 64 feet in order for the Moulton Weir to flow, closing River Road twelve miles northeast of the town of Colusa. Runoff water or standing water typically do not affect this area. Several other roads on the eastside of Colusa will close when the weirs overflow, isolating some residents and duck club members on Laux Road when they are in-resident during hunting season. Should they need assistance, air or water response will be utilized to achieve rescues.

2004 – The LHMP noted that Colusa County has experienced localized flooding in repetitive damage areas, one tractor dealerships, agribusinesses, and a residential area west of the City of Colusa. Two tractor dealerships and one residential area with approximately 30 homes exist in this localized flooding area. Winter storms depositing large amounts of water in short periods of time are the catalyst for the flooding in those areas and on roadways, causing closures on major east-west transportation routes.

It was also noted in the 2004 LHMP that in an area of north Williams, there is a section of a low-income residential neighborhood that has seen repetitive damage due to stream bank overflows during periods of heavy rains. Approximately 15 homes are located here, with no businesses or industry. Irrigation water conveyance or runoff present in the streams contributes to the cause of the overflows.

1997 – Freshwater Creek topped its bank and caused a small breach at the top of the creek bank north of Williams. Eleven residents needed to be evacuated with the local Fire Department taking the lead on evacuation, flood fight and sheltering. They were able to handle the event with their own resources. The responsible private property owner repaired the creek bank to its original condition with no financial assistance requested.

Likelihood of Future Occurrence

Highly Likely—Natural drainage systems located throughout the Colusa 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 Colusa 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 Colusa 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 Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

The 2010 General Plan Background Report noted that while information on areas most affected by drainage issues and flooding is available for most of the County's incorporated cities, data on the severity of drainage problems in the unincorporated areas - which comprise much of the county - is more limited. Localized flooding can cause damage to roads, infrastructure and utilities, as well as to buildings in the County. Temporary road closures due to localized flooding can be a significant issue in the County.

The amount and type of damage or flooding that occurs varies from year to year, depending on the quantity of runoff. These primary areas of localized flooding and the types of damage are presented in Table 4-94.

Table 4-94 Colusa County Localized Flooding Areas

Road Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris	Downed Trees
Lonestar Road	X	X	X			X	
Lurline Avenue	X	X		X		X	
San Jose Road	X	X		X		X	
Brim Road	X	X			X	X	X
East Clay Street	X	X				X	
Goat Mountain Rd		X	X		X	X	X
Fouts Springs Rd	X	X	X	X		X	
Lodoga Stonyford	X	X		X		X	X
Cook Springs Rd	X	X	X	X	X	X	
Sites Lodoga Rd	X	X	X			X	X
Corbin Road	X	X	X	X		X	X
Walnut Ave	X	X	X	X		X	X
Gridley Highway	X	X	X	X		X	X

Source: Colusa County OES

Assets at Risk

Assets at risk from localized flood 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 Colusa County Planning Area and unincorporated Colusa County.

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.

Community Lifelines

Due to the relatively minor nature of localized flooding, community lifelines are unlikely to be overwhelmed. There may be minor vulnerabilities to the following:

- **Safety and Security** – Law Enforcement/Security, Fire Service, and Community Safety officials may be needed to close roads and redirect traffic during localized flood events. These agencies may also experience flooded roads when responding to emergencies.
- **Communications** – Unless directly affected by flooding, communication systems are not likely to be impacted. Warnings and Messaging may be required to reroute traffic away from localized flooding areas.
- **Transportation** – Highways, roads, and bridges may be temporarily blocked until localized floodwaters recede.
- **Water Systems** – Water and wastewater systems can be infiltrated during localized flooding events. Stormwater drainage systems are often undersized and inadequate to convey the volume of flood waters.

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.

Economic Assets and Community Activities of Value

Localized flooding occurs on an annual basis throughout the Colusa County Planning Area during storm events. Most of these events have limited impacts and include those associated with localized flooding due to undersized drainage systems, affecting nearby roads, structures, and other nearby assets. Unless directly affected by localized flooding, these events are unlikely to affect the Planning Area's key economic assets.

Community activities of value may have minor vulnerabilities if a localized flood event were to occur during the activity. Though unlikely, this may cause the activity to be relocated, cancelled, or rescheduled. This includes the County Fair, Farm Show, rodeos, craft fairs, and hunting and fishing seasons.

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. Localized flooding impacts may be exacerbated in the future due to the effects of climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development.

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 Colusa 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 Colusa County has recently slowed. 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. While limited, much of the growth in Colusa County is occurring through expansion of the more urban 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.

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 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.

4.3.13. Landslides, Mudslides, and Debris Flows

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Colusa 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

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 (as discussed in Section 4.3.13), 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 4.3.17)
- 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 rolling hills 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 4-85 shows the CGS areas at susceptible to deep seated landslides. The legend on Figure 4-85 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 Planning Area are shown on Table 4-95. 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 Planning Area and surrounding area are at high to very high susceptibility areas for landslides. 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 Colusa County, landslides generally occur where there is very little population or infrastructure.

Figure 4-85 Colusa County Planning Area – Susceptibility to Deep Seated Landslides

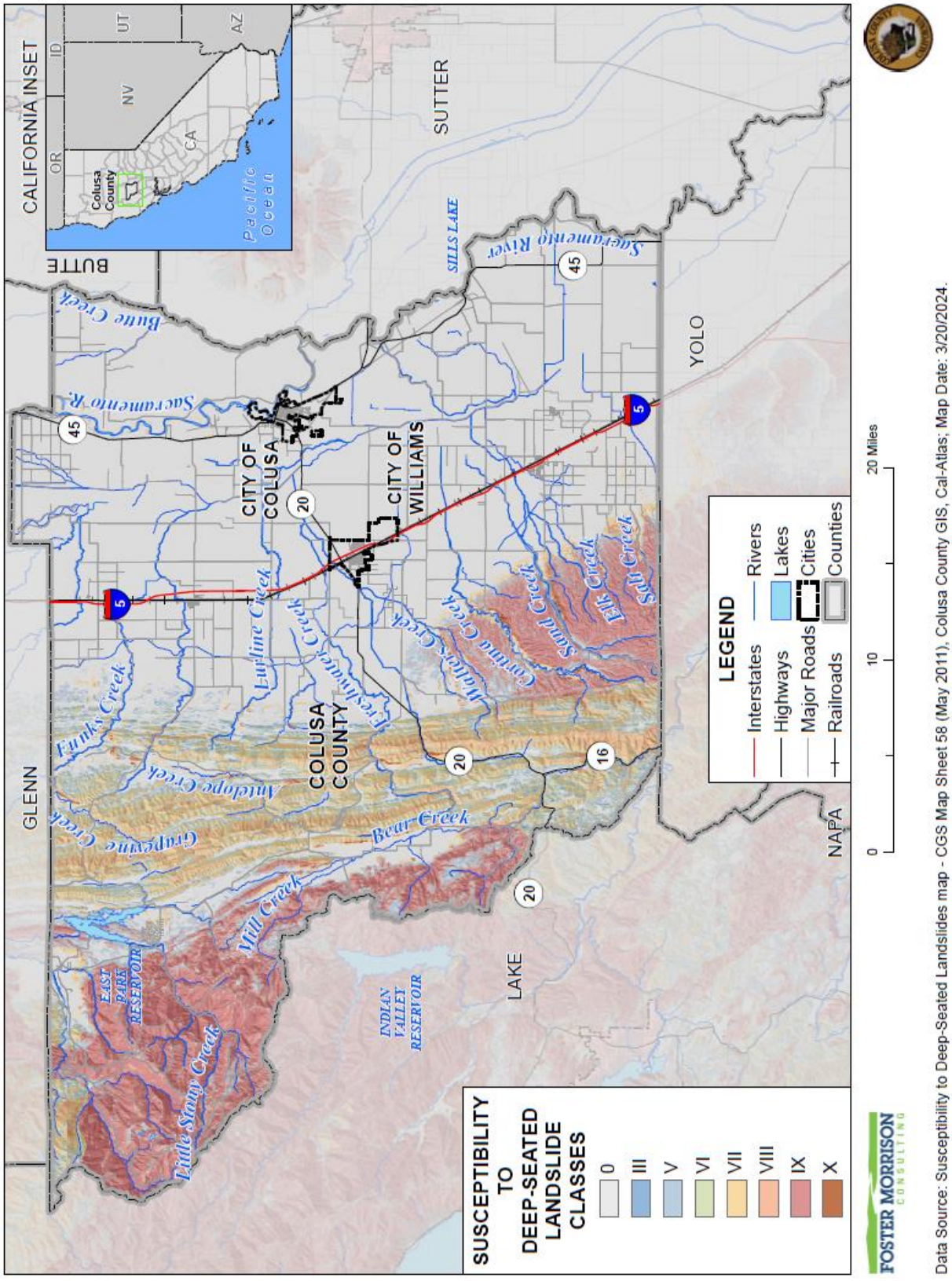


Table 4-95 Colusa County Planning Area – Susceptibility to Deep Seated Landslides Geographical Extents by Class and Jurisdiction

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 Colusa						
0	2,389	99.07%	1,387	99.88%	1,002	97.97%
III	0	0.00%	0	0.00%	0	0.00%
V	0	0.00%	0	0.00%	0	0.00%
VI	0	0.00%	0	0.00%	0	0.00%
VII	22	0.93%	2	0.12%	21	2.03%
VIII	0	0.00%	0	0.00%	0	0.00%
IX	0	0.00%	0	0.00%	0	0.00%
X	0	0.00%	0	0.00%	0	0.00%
City of Colusa Total	**2,412**	**100.00%**	**1,388**	**100.00%**	**1,023**	**100.00%**
City of Williams						
0	2,900	100.00%	1,062	99.99%	1,838	100.00%
III	0	0.00%	0	0.00%	0	0.00%
V	0	0.00%	0	0.00%	0	0.00%
VI	0	0.00%	0	0.00%	0	0.00%
VII	0	0.00%	0	0.01%	0	0.00%
VIII	0	0.00%	0	0.00%	0	0.00%
IX	0	0.00%	0	0.00%	0	0.00%
X	0	0.00%	0	0.00%	0	0.00%
City of Williams Total	**2,900**	**100.00%**	**1,062**	**100.00%**	**1,838**	**100.00%**
Unincorporated Colusa County						
0	446,915	61.71%	222,085	89.97%	224,831	47.10%
III	22,627	3.12%	3,277	1.33%	19,350	4.05%
V	27,683	3.82%	3,597	1.46%	24,086	5.05%
VI	27,146	3.75%	3,031	1.23%	24,116	5.05%
VII	61,866	8.54%	8,426	3.41%	53,440	11.19%
VIII	40,496	5.59%	2,455	0.99%	38,041	7.97%
IX	95,439	13.18%	3,556	1.44%	91,883	19.25%
X	2,039	0.28%	425	0.17%	1,614	0.34%
Unincorporated Colusa County Total	**724,212**	**100.00%**	**246,851**	**100.00%**	**477,360**	**100.00%**

Jurisdiction / Susceptibility to Deep-Seated Landslide Class	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Grand Total	**729,524**	**100.00%**	**249,302**	**100.00%**	**480,221**	**100.00%**

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 landslides in Colusa County, as shown in Table 4-4.

NCDC Events

The NCDC contains no records for landslides in Colusa County.

Hazard Mitigation Planning Committee Events

There have been no major landslides in Colusa County to note. Minor slides have caused rocks to tumble onto foothill roads such as Lodoga Stonyford Road. The Public Works Department works diligently to remove the hazards as soon as possible, 24-hours a day. As a result of the Mendocino Complex Fire (August 2018) and more recent 2022 August Complex and Hennessey fires, there may be various remote locations that would be susceptible to landslides in the burn scar areas. Given the remote area, few homes would likely be affected; however, roadways may become closed should debris encroach upon them.

The County noted that there have been landslides in the Leesville Road, Stonyford, and Ladoga areas. The HMPC noted that the landslides within this have typically been smaller. However, they are frequent and under all conditions rocks and debris slide onto the road and must be plowed off. The roads include Leesville Road, Sites Ladoga Road as well as all other roads within the mountainous western portion of Colusa County. One of the larger landslides recently occurred in 2023 on Goat Mountain and resulted in the County hiring a contractor to reconstruct the road and the storm water conveyance system.

Likelihood of Future Occurrence

Likely—Based on data provided by the HMPC, landslides are naturally occurring events that will inevitably happen as long as gravity itself is a controlling factor upon the landscape. Since Colusa County's mountainous terrain in the western portion of the County challenges gravity as it rapidly rises to upper elevations, much of the high-relief topography in the County can be identified as land with the potential for landslides. Much of that land though is in remote and undeveloped locales, which reduces the risk of this natural hazard. Given the nature of localized problems identified within the County, landslides will likely continue to impact the area when heavy precipitation occurs and in post wildfire burn areas, 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 2021 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 4.3.4. 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 Colusa County Planning Area. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

The 2010 General Plan Background Report noted that the landslide susceptibility in the eastern one-half of the county is generally low. A north-south band of moderate landslide potential stretches from East Park Reservoir south to the Bear Valley. Generally, this area of moderate potential frames the north-south trending valleys at the Coast Range/Central Valley boundary. Only the northwestern portion of the county is within a sub-region of high landslide susceptibility. This area of high susceptibility is almost entirely within the boundaries of the Mendocino National Forest.

The HMPC noted that many areas in western Colusa County are also rated high or very high in their susceptibility to landslide due to erosive soils, and from hydrophobic soils from past wildfire burn scars. There is very little population or improved parcels in this area. Currently there are no active landslides requiring repair in the County.

Assets at Risk

Assets at risk from landslide 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 Colusa County Planning Area and unincorporated Colusa County.

Methodology

The 2011 California Geologic Survey Deep Seated Landslide Susceptibility data was obtained for the Colusa County Planning Area. The 2023 Colusa County Parcel/Assessor Data was used as the basis for the inventory of all parcels within the Colusa County Planning Area. GIS was used to overlay the landslide hazard layer onto the parcel layer, and where the landslide susceptibility classes intersected a parcel centroid, it was assigned with that hazard class for the entire parcel.

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.

Colusa 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 4-96.

Table 4-96 Colusa 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 at Risk
Class VII		
City of Colusa	4	12
City of Williams	0	0

Deep Seated Landslide Class/Jurisdiction	Improved Residential Parcels	Population at Risk
Unincorporated County	52	186
Class VIII		
City of Colusa	0	0
City of Williams	0	0
Unincorporated County	7	25
Class IX		
City of Colusa	0	0
City of Williams	0	0
Unincorporated County	12	43
Class X		
City of Colusa	0	0
City of Williams	0	0
Unincorporated County	1	4

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011), 2023 Colusa County Parcel/Assessor Data, 2020 US Census Bureau Average Household Size– City of Colusa (2.90); City of Williams (2.55); Unincorporated Colusa County (3.58).

These numbers reflect low end estimates as the property use categories based on the Assessor data utilized for this LHMP Update assumes all residential properties are single family residences. However, some of the residential parcels actually include multi-family units, including apartments, condominiums and well as duplexes and triplexes. These variations in residential property use were not accounted for in the analysis, which skews populations results to be lower.

Structures

Landslides can affect the built environment of the Colusa 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 4-85. Table 4-97 summarizes parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), other values, estimated content replacement values, and total values in the Planning Area for deep seated landslide classes. Table 4-98 summarizes parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), other values, estimated content replacement values, and total values by property use for the unincorporated County for deep seated landslide classes. As shown, very few improved parcels fall in that Classes VII to X.

Table 4-97 Colusa 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	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa							
0	2,330	2,073	$144,046,221	$442,968,788	$49,228,543	$309,096,464	$945,340,016
VII	4	4	$257,323	$798,999	$0	$399,499	$1,455,821
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$946,795,837**
City of Williams							
0	1,755	1,477	$110,173,986	$349,462,550	$126,901,961	$254,199,840	$840,738,337
City of Williams Total	**1,755**	**1,477**	**$110,173,986**	**$349,462,550**	**$126,901,961**	**$254,199,840**	**$840,738,337**
Unincorporated Colusa County							
0	9,146	5,347	$1,490,489,633	$883,243,587	$197,157,808	$730,090,834	$3,300,981,862
III	104	14	$5,558,789	$928,874	$0	$876,363	$7,364,026
V	447	78	$16,418,201	$7,977,574	$122,839	$4,797,858	$29,316,472
VI	128	12	$6,936,430	$765,037	$3,400	$753,407	$8,458,274
VII	401	99	$20,182,733	$12,655,016	$1,994,611	$9,533,532	$44,365,892
VIII	268	21	$10,936,383	$3,651,556	$0	$3,321,520	$17,909,459
IX	376	25	$14,885,662	$7,970,216	$68,724	$7,719,011	$30,643,613
X	12	2	$262,321	$1,381,403	$0	$1,371,606	$3,015,330
Unincorporated Colusa County Total	**10,882**	**5,598**	**$1,565,670,152**	**$918,573,263**	**$199,347,382**	**$758,464,131**	**$3,442,054,928**
Grand Total	**14,971**	**9,152**	**$1,820,147,682**	**$1,711,803,600**	**$375,477,886**	**$1,322,159,934**	**$5,229,589,102**

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011), 2023 Colusa County Parcel/Assessor Data

Table 4-98 Unincorporated Colusa 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	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
0							
Agricultural	4,677	2,571	$1,267,327,821	$345,359,449	$111,441,407	$345,359,449	$2,069,488,126
Commercial	260	179	$20,969,259	$71,537,065	$32,023,644	$71,537,065	$196,067,033
Government	361	38	$28,276,807	$4,077,926	$37,449	$4,077,926	$36,470,108

Susceptibility to Deep-Seated Landslide Class / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Industrial	51	30	$9,988,390	$71,506,449	$41,684,579	$107,259,676	$230,439,094
Institutional	54	25	$1,291,943	$7,904,619	$3,449,752	$7,904,619	$20,550,933
Miscellaneous	324	28	$30,528,176	$5,046,122	$1,851,673	$5,046,122	$42,472,093
Residential	3,419	2,476	$132,107,237	$377,811,957	$6,669,304	$188,905,977	$705,494,475
0 Total	**9,146**	**5,347**	**$1,490,489,633**	**$883,243,587**	**$197,157,808**	**$730,090,834**	**$3,300,981,862**
III							
Agricultural	71	9	$4,183,538	$823,852		$823,852	$5,831,242
Commercial	0	0	$0	$0	$0	$0	$0
Government	14	0	$981,011	$0	$0	$0	$981,011
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	4	0	$197,717	$0	$0	$0	$197,717
Residential	15	5	$196,523	$105,022	$0	$52,511	$354,056
III Total	**104**	**14**	**$5,558,789**	**$928,874**	**$0**	**$876,363**	**$7,364,026**
V							
Agricultural	97	16	$12,441,400	$1,618,145	$55,077	$1,618,145	$15,732,767
Commercial	0	0	$0	$0	$0	$0	$0
Government	6	0	$86,257	$0	$0	$0	$86,257
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	16	0	$484,995	$0	$0	$0	$484,995
Residential	328	62	$3,405,549	$6,359,429	$67,762	$3,179,713	$13,012,453
V Total	**447**	**78**	**$16,418,201**	**$7,977,574**	**$122,839**	**$4,797,858**	**$29,316,472**
VI							
Agricultural	93	9	$5,246,699	$690,329	$3,400	$690,329	$6,630,757
Commercial	0	0	$0	$0	$0	$0	$0
Government	13	0	$1,367,762	$0	$0	$0	$1,367,762
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	16	1	$197,448	$51,447	$0	$51,447	$300,342
Residential	6	2	$124,521	$23,261	$0	$11,631	$159,413
VI Total	**128**	**12**	**$6,936,430**	**$765,037**	**$3,400**	**$753,407**	**$8,458,274**
VII							
Agricultural	233	46	$16,448,104	$6,389,510	$1,994,611	$6,389,510	$31,221,735
Commercial	0	0	$0	$0	$0	$0	$0

Susceptibility to Deep-Seated Landslide Class / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Government	15	0	$551,971	$0	$0	$0	$551,971
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	1	$15,025	$22,543	$0	$22,543	$60,111
Miscellaneous	19	0	$306,520	$0	$0	$0	$306,520
Residential	133	52	$2,861,113	$6,242,963	$0	$3,121,479	$12,225,555
VII Total	**401**	**99**	**$20,182,733**	**$12,655,016**	**$1,994,611**	**$9,533,532**	**$44,365,892**
VIII							
Agricultural	132	14	$8,877,286	$2,991,487	$0	$2,991,487	$14,860,260
Commercial	0	0	$0	$0	$0	$0	$0
Government	8	0	$335,484	$0	$0	$0	$335,484
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	44	0	$1,234,967	$0	$0	$0	$1,234,967
Residential	84	7	$488,646	$660,069	$0	$330,033	$1,478,748
VIII Total	**268**	**21**	**$10,936,383**	**$3,651,556**	**$0**	**$3,321,520**	**$17,909,459**
IX							
Agricultural	183	12	$10,211,057	$4,016,544	$62,810	$4,016,544	$18,306,955
Commercial	0	0	$0	$0	$0	$0	$0
Government	9	1	$358,517	$3,451,260	$0	$3,451,260	$7,261,037
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	109	0	$3,962,239	$0	$0	$0	$3,962,239
Residential	75	12	$353,849	$502,412	$5,914	$251,207	$1,113,382
IX Total	**376**	**25**	**$14,885,662**	**$7,970,216**	**$68,724**	**$7,719,011**	**$30,643,613**
X							
Agricultural	4	1	$220,670	$1,361,809	$0	$1,361,809	$2,944,288
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	0	0	$0	$0	$0	$0	$0
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	8	1	$41,651	$19,594	$0	$9,797	$71,042
X Total	**12**	**2**	**$262,321**	**$1,381,403**	**$0**	**$1,371,606**	**$3,015,330**

Susceptibility to Deep-Seated Landslide Class / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Unincorporated Colusa County Total	**10,882**	**5,598**	**$1,565,670,152**	**$918,573,263**	**$199,347,382**	**$758,464,131**	**$3,442,054,928**

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011), 2023 Colusa 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 Colusa 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 4-86 shows critical facilities, as well as the deep-seated landslide classes. Table 4-99 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, very few critical facilities fall in the Classes VII to X.

Figure 4-86 Colusa County Planning Area – Critical Facilities in Deep-Seated Landslide Class

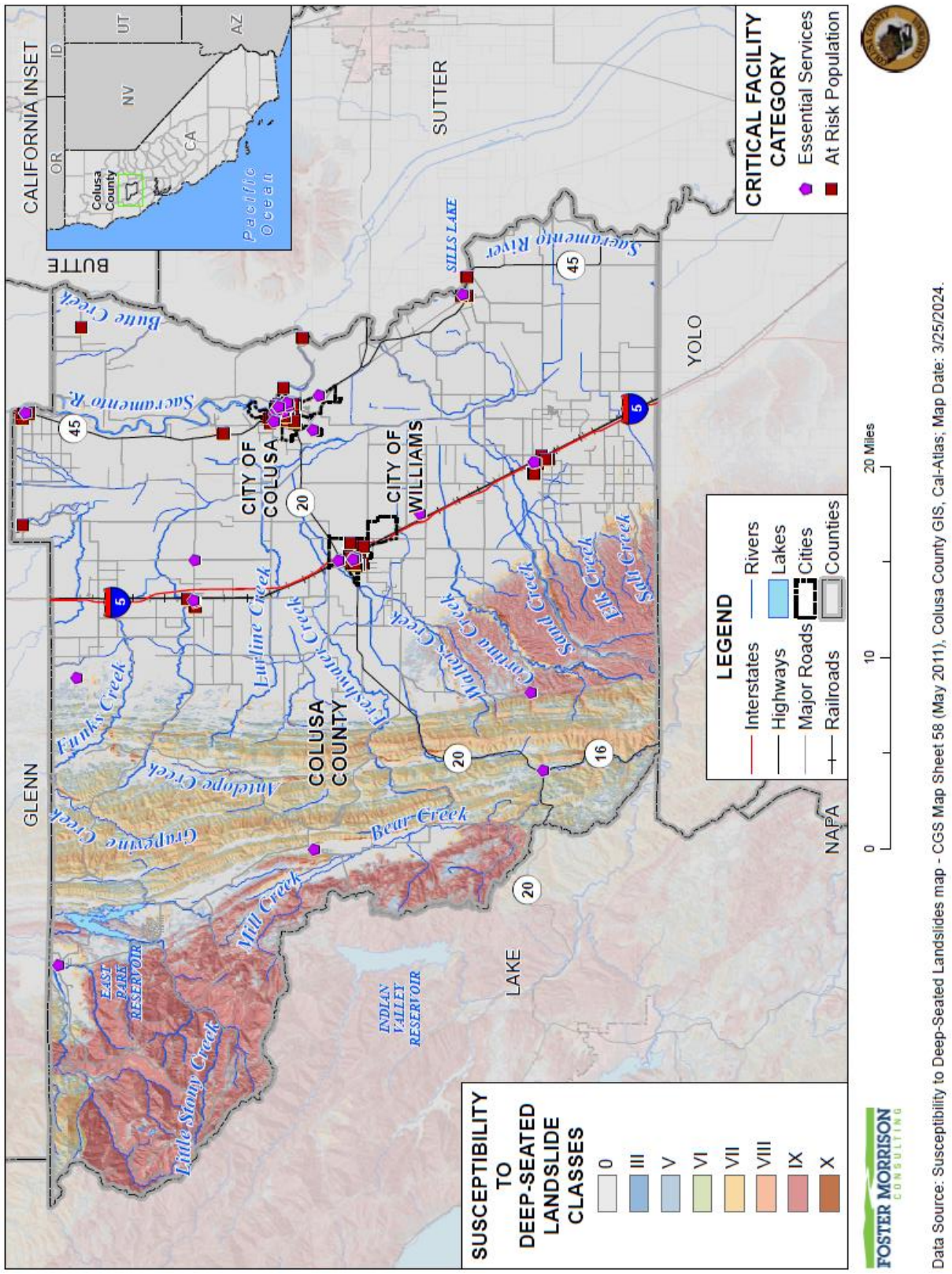


Table 4-99 Colusa County Planning Area – Critical Facilities in Deep-Seated Landslide Class by Category, Type, and Jurisdiction

Jurisdiction / Susceptibility to Deep-Seated Landslide Class	Critical Facility Category	Facility Type	Facility Count
City of Colusa			
0	Essential Services Facilities	Emergency Response	1
		Fire Station	2
		Medical	1
		Police Station	1
		Public Services	3
		Utility Facility	2
		Total	**10**
	At Risk Population Facilities	Apartment Complex	22
		Assisted-Living	1
		Hotel or Motel	2
		Jail	1
		Mobile Home Park	5
		School	8
		Senior Living Facility	1
		Total	**40**
0 Total			**50**
City of Colusa Total			**50**
City of Williams			
0	Essential Services Facilities	Emergency Response	2
		Fire Station	1
		Public Services	1
		Utility Facility	1
		Total	**5**
	At Risk Population Facilities	Apartment Complex	4
		Hotel or Motel	8
		Migrant Housing	1
		Mobile Home Park	2
		School	4
		Senior Living Facility	3
		Total	**22**
0 Total			**27**
City of Williams Total			**27**

Jurisdiction / Susceptibility to Deep-Seated Landslide Class	Critical Facility Category	Facility Type	Facility Count
Unincorporated Colusa County			
0	Essential Services Facilities	Fire Station	5
		Utility Facility	5
		Total	10
	At Risk Population Facilities	Apartment Complex	5
		Casino	1
		Hotel or Motel	1
		Mobile Home Park	9
		School	9
		Total	**25**
0 Total			**35**
III	Essential Services Facilities	Fire Station	1
		Total	1
III Total			**1**
V	Essential Services Facilities	Native American Reservation	1
		Total	**1**
V Total			**1**
VII	Essential Services Facilities	Fire Station	1
		Total	**1**
VII Total			**1**
Unincorporated Colusa County Total			**38**
Grand Total			115

Source: Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011), Colusa County GIS

Community Lifelines

Community lifelines at risk to a landslide event include:

- **Safety and Security** –Planning Area personnel would be involved in response and recovery efforts. This includes police, fire, EMS, public works, and other personnel.
- **Food, Hydration, and Shelter** – As homes are damaged, shelter needs would significantly increase. Temporary housing would need be to be established. Water supplies could be offline for an extended period. Residents, visitors and others caught in a large event would need to find sources of food and water until the Planning Area recovers.
- **Health and Medical** – Injuries and deaths can occur. This causes EMS calls and ER visits to spike. Transporting patients to medical facilities may be difficult. Depending on the extent of injuries and deaths the capacity of medical facilities could be strained and eventually overwhelmed.

- **Energy** – The power grid may be damaged from landslide. Fuel transportation may need to be delayed or rerouted, causing temporary shortages.
- **Communications** – Communications systems may be damaged during landslide events. Messaging boards and alerts need to be then put into place to ensure public safety and order.
- **Transportation** – Major damage can occur to roads and bridges in the Planning Area. Damage can also occur to rail lines and airports in and near the Planning Area. Roads may be closed due to damage, or to debris on the roads from earthquake events. These closures could be place for an extended period while debris clearing efforts are undertaken to allow repairs to be made.
- **Hazardous Material** – Hazardous materials facilities can be compromised during times of landslide events causing releases of contaminants into the environment. Natural gas pipelines can be affected by earthquakes. This can affect not only residents, but those who are charged with responding to or resolving the spill/rupture.
- **Water Systems** – Water, drainage, and wastewater systems can be damaged.

As shown on Figure 4-85, the Colusa County Planning Area has limited areas of landslide vulnerability, with most of these areas located in the upper elevations in the western portion of the County. These areas are more sparsely populated. As such, impacts to community lifelines from landslides in the Planning Area would be limited. Community lifelines are not likely to be overwhelmed by a landslide event.

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 4-85 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 in the Planning Area.

Economic Assets and Community Activities of Value

Landslides can affect economic assets and community activities of value if they fall into the higher landslide susceptibility areas, the landslide run out areas, or if economic assets are cut off from transportation routes in the Planning Area. Since most of the landslide risk is in the lightly populated western areas of the County, most economic assets in the Planning Area are unlikely to be affected. Very few community activities of value occur in areas threatened by landslide.

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 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. Most, but not all, of the historic landslides in the Colusa 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

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 Colusa 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 Colusa County has recently slowed. The areas of landslide risk in the County are areas that traditionally have been undeveloped or along those areas bordering transportation routes. 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. 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 wildfire 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 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.

GIS Analysis

Colusa County provided 53 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 assigned are based on the centroid of the polygon. Figure 4-87 show the locations of the future development areas and deep-seated landslide classes. Table 4-100 shows the details of the future development areas that are located in each deep-seated landslide class.

Figure 4-87 Unincorporated Colusa County – Future Development in Deep-Seated Landslide Classes

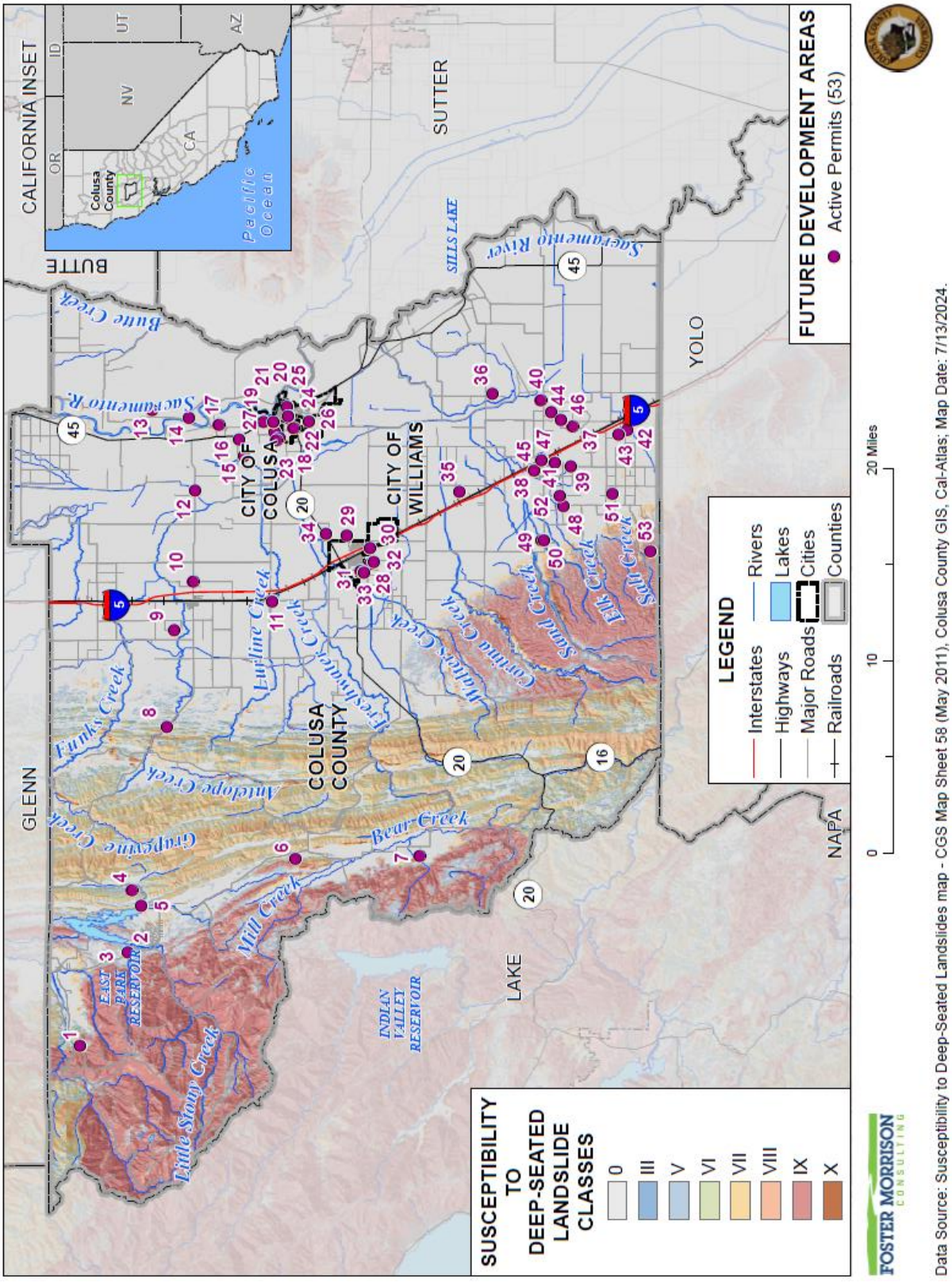


Table 4-100 Unincorporated Colusa County – Future development in Deep-Seated Landslide Classes with Parcel Counts and Acreages

Susceptibility to Deep-Seated Landslide Class	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
0	2	4564 LODOGA STONYFORD RD	1	2.49
	3	4564 LODOGA STONYFORD RD	1	2.49
	6	014-250-019-000	1	219.76
	7	2001 BEAR VALLEY RD	1	637.09
	9	4105 RIORDAN RD	1	76.26
	10	5603 MAXWELL RD	1	30.89
	11	5498 LURLINE AVE	1	12.18
	12	6458 MAXWELL RD	1	319.89
	13	4374 RIVER RD	1	402.44
	14	4073 RIVER RD	1	10.32
	15	015-060-091-000	1	497.11
	16	6892 HARBISON RD	1	11.00
	17	015-030-094-000	1	17.03
	18	3258 MCCOY RD	1	6.01
	19	015-310-050-000	1	11.97
	20	022-200-066-000	1	0.45
	21	022-200-066-000	1	0.45
	22	3145 WILL S GREEN RD	1	7.48
	23	3286 RANCH RD	1	1.85
	24	1232 FIFTH ST	1	0.60
	25	002-101-004-000	1	4.48
	26	015-380-019-000	1	1.00
	27	1773 LURLINE AVE	1	3.40
	28	016-230-101-000	1	2.49
	29	2668 HUSTED RD	1	10.00
	30	2461 OLD HIGHWAY 99W	1	8.53
	31	2533 VENICE AVE	1	2.06
	32	016-230-065-000	1	1.45
	33	016-220-099-000	1	1.37
	34	017-010-045-000	1	56.35
	35	1707 LONE STAR RD	1	121.30
	36	019-090-058-000	1	10.00
	37	7020 FRIEL RD	1	9.92
	38	805 GAIL AVE	1	0.38

Susceptibility to Deep-Seated Landslide Class	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
	39	758 WILDWOOD RD	1	25.08
	40	7251 TULE RD	1	2.64
	41	887 WILDWOOD RD	1	1.89
	42	021-290-070-000	1	30.47
	43	6901 HARRINGTON AVE	1	15.16
	44	507 MAIN ST	1	0.47
	45	707 FIRST ST	1	0.13
	46	7072 PERKINS RD	1	9.29
	47	720 FIFTH ST	1	0.55
	48	821 WYER RD	1	10.79
	49	6031 HILLGATE RD	1	9.65
	50	6011 HILLGATE RD	1	9.72
	51	6439 MARINE AVE	1	27.77
	52	853 JENSEN AVE	1	9.92
	0 Total		**48**	**2,654.01**
III	4	010-280-079-000	1	13.90
	5	4481 SITES LODOGA RD	1	86.68
	8	011-200-012-000	1	282.12
	III Total		**3**	**382.69**
V	1	010-200-001-000	1	161.29
	V Total		**1**	**161.29**
IX	53	5875 SILLS RD	1	618.41
	IX Total		**1**	**618.41**
Grand Total			**53**	**3,816.40**

Source: CGS, Colusa County GIS

4.3.14. Levee Failure

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Colusa 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

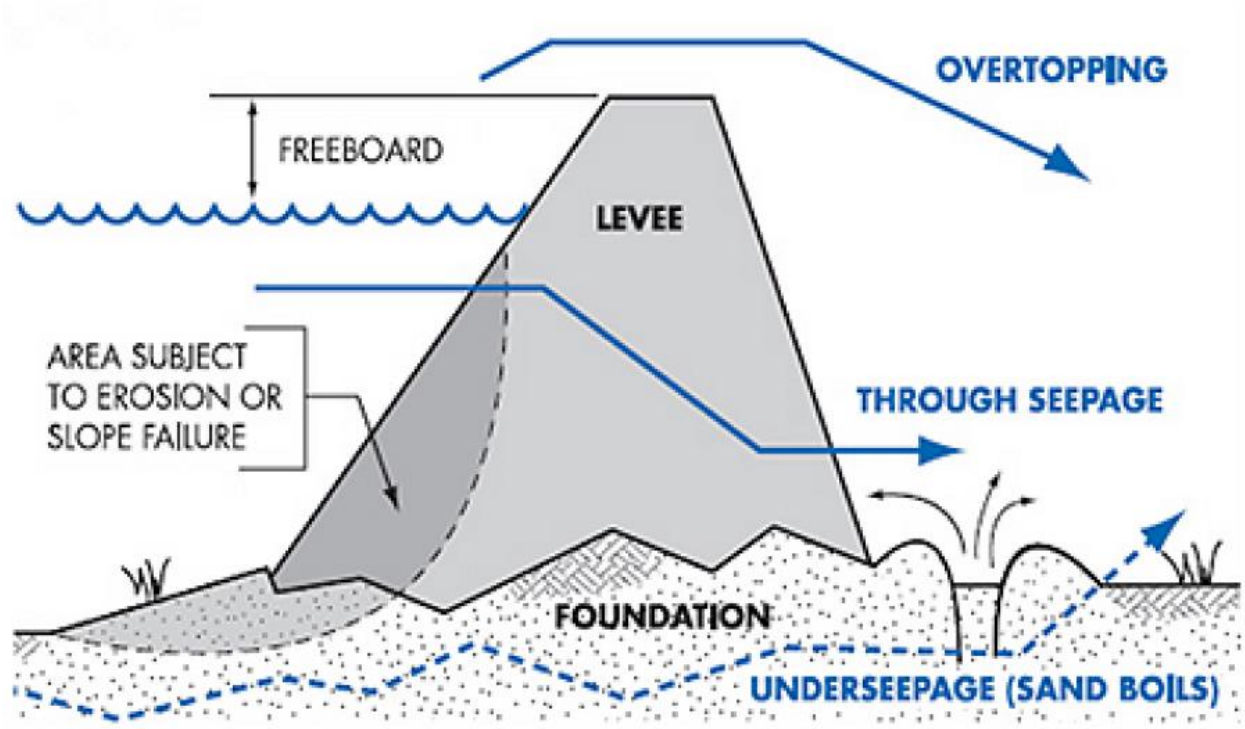
A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower steam channel, levees can also increase the speed of the water. Levees can be 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. Man-made levees are formed by the hauling of sediment and fill in order to protect the area behind the levee.

Levees can provide strong flood protection, but they are not failsafe. Levees are often designed to protect against a specific flood level and could be overtopped during severe weather events or a 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's important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

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 burrowing into and compromising the levee system can also contribute to a levee failure as can erosion of the leveed area. Levee failure can also be caused by high winds creating wave action and high tides, especially combined with storm events. Figure 4-88 depicts the causes of levee failure.

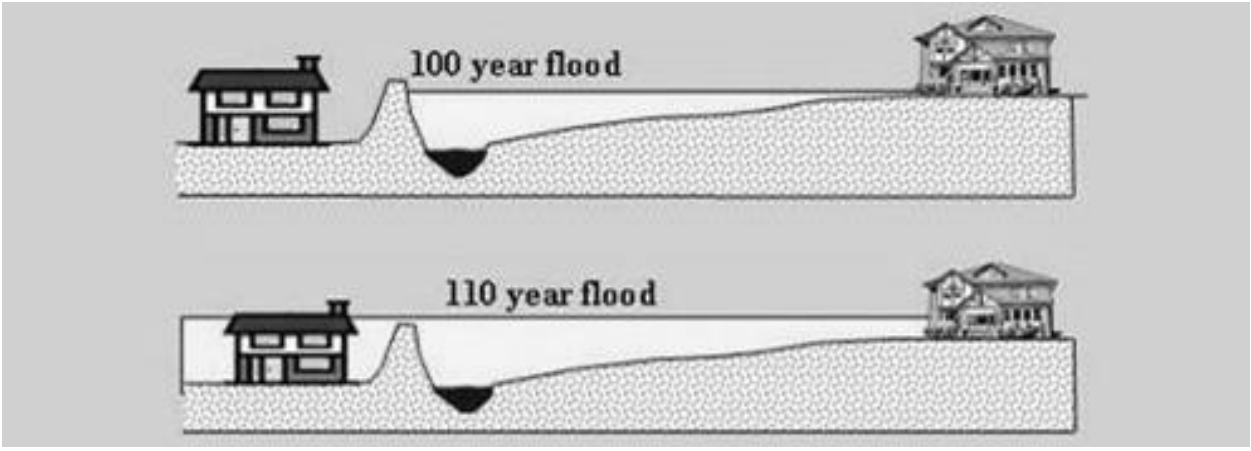
Figure 4-88 Potential Causes of Levee Failure



Source: USACE

Overtopping failure occurs when the flood water level rises above the crest of a levee. As shown in Figure 4-89, overtopping of levees can cause greater damage than a traditional flood due to the often lower topography behind the levee.

Figure 4-89 Flooding from Levee Overtopping



Source: Levees in History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR.

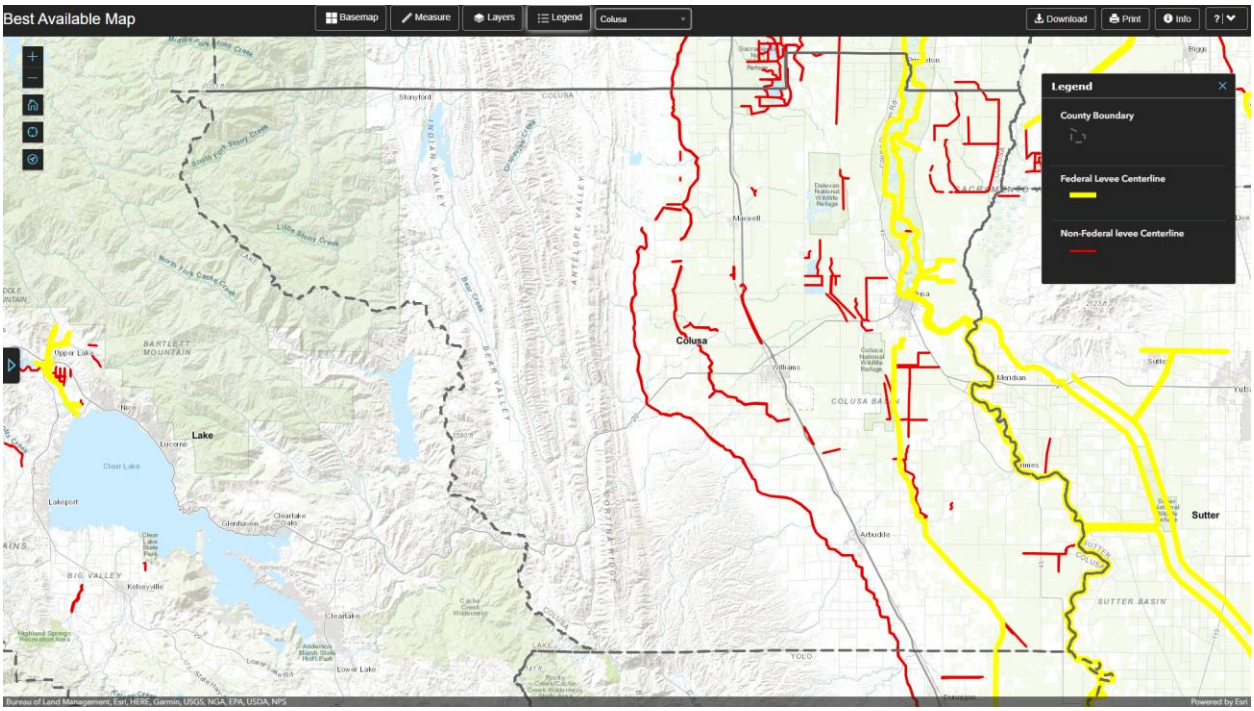
Location and Extent

Levees occur throughout Colusa County. They are primarily located in the eastern half of the County. Cal DWR has mapped these locations. There are two types of levees in their mapped database. The following is their definition:

- Federal levees are Flood Control Works (Levees/Flood Protection Projects) built and maintained by the United State Army Corps of Engineers (USACE) or are locally maintained. In addition, these projects are included in the USACE Inspection of Completed Works (ICW) program, and are automatically incorporated into the USACE Rehabilitation and Inspection Program (RIP). Within the Central Valley, certain Federal levees are considered State-Federal Project Levees as defined by the State Plan of Flood Control under the California Public Resources Code Section 5096.805
- Non-Federal levees are levees that are not part of the State Plan of Flood Control and are not constructed by the USACE. These facilities are any man-made facility that alters the direction of the natural flow path. The location of the facilities shown was developed from various sources of information that included digital orthophoto maps and United States Geological Service (USGS) 1:24,000 quadrangle maps.

A map of these levees is shown in Figure 4-90.

Figure 4-90 Colusa County – Levee Centerlines

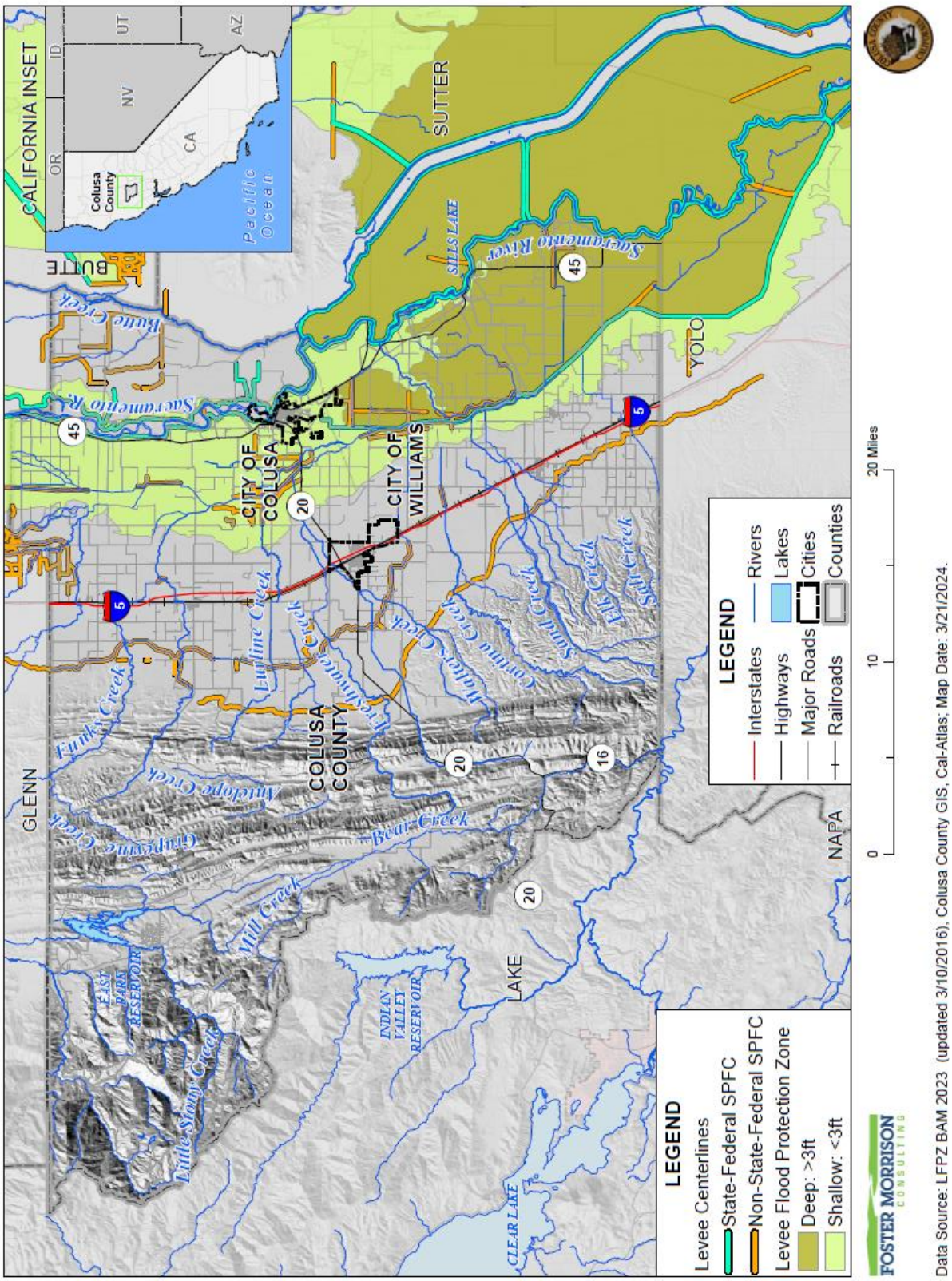


Source: CA DWR Best Available Maps

In addition to the map above, CA DWR has put together Levee Flood Protection Zone (LFPZ) maps. These LFPZ maps were developed by CA DWR as required by Water Code Section 9130 to increase awareness of flood risks associated with State-Federal levees. The maps should not be confused with Federal Emergency Management Agency's Flood Insurance Rate Maps used for the National Flood Insurance

Program. They are not showing the same type of flood hazard and they were prepared for different purposes. Levee Flood Protection Zone 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 Levee Flood Protection Zone 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 a Levee Flood Protection Zone may also be subject to flood. LFPZ zones in the County can be seen in Figure 4-91.

Figure 4-91 Colusa County – Levee Flood Protection Zones



There is not a scientific scale or measurement system in place for levee failure. It us usually measured in area covered and depth of flooding. Maps showing inundation depths due to a levee failure in the County do not exist. The speed of onset is slow as the river rises, but if a levee fails the warning times are short for those in the inundation area. The duration of levee failure risk times can be hours to weeks, depending on the river flows that the levee holds back. The 2004 LHMP noted that since dredging of the river bottom has been discontinued, the bottom of the river has become higher, thus the water levels reach higher on the banks of the levees. When northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees. The potential for levee breaches and erosion damage has increased. Geographical extents of the LFPZ flood sones are detailed in Table 4-101 .

Table 4-101 Colusa County Planning Area – LFPZ Geographical Extents by Depth and Jurisdiction

Jurisdiction / Levee Flood Protection Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Colusa						
Shallow: <3ft	2,062	85.504%	1,377	99.194%	685	66.927%
City of Colusa Total	**2,062**	**85.504%**	**1,377**	**99.194%**	**685**	**66.927%**
City of Williams						
Shallow: <3ft	0	0.000%	0	0.000%	0	0.000%
City of Williams Total	**0**	**0.000%**	**0**	**0.000%**	**0**	**0.000%**
Unincorporated Colusa County						
Shallow: <3ft	92,181	12.724%	49,075	19.879%	43,105	9.025%
Unincorporated Colusa County Total	**92,181**	**12.724%**	**49,075**	**19.879%**	**43,105**	**9.025%**
Grand Total	**94,243**	**12.913%**	**50,453**	**20.236%**	**43,790**	**9.114%**

Source: LFPZ BAM (2023)

It is important to note that all levees in the County were de-accredited by FEMA in the most recent 2024 DFIRMs and thus do not provide protection against the 1% annual chance flood. Although de-accredited, the levees are all in place and functional and provide some level of protection against future flood events. A discussion of the levees in the Colusa County Planning Area follows.

According to CA DWR, the Sacramento River Flood Control Project (SRFCP) is actually six, interrelated projects undertaken by the USACE, including reservoirs constructed on major rivers, which constitute the largest flood control system in the state. Project facilities extend from north of Colusa County southward to the Sacramento-San Joaquin Delta, about 230 miles along the Sacramento River corridor. Levees and

associated facilities of the SRFCP have been constructed along 5 rivers, 15 creeks and 13 sloughs. In addition, human-made or human-modified facilities include 6 bypasses and 11 channels.

The FIS noted that Colusa County has two of the Sacramento River by-pass weirs within its boundaries: the Colusa Weir just northeast of the City of Colusa and the Moulton Weir, 12 miles northeast of Colusa. When the Sacramento River level gauge reads 60 feet, the water flows at the Colusa Weir into a bypass area that is uninhabited and does not affect any major roadways. When the Colusa Bridge gauge reads 64 feet, the river overtops the bank at the Moulton Weir. During extended flow, the water crosses River Road and closes the roadway. There are alternate roads to travel from that area so that no residences become isolated. Along with the other bypasses, most designed in 1930, urban flooding is deterred and offers a high level of protection as the weirs are not gated: they do not need to be opened manually to properly function.

Levee failure inundation maps have not been developed locally. Any failure would be scenario-based depending on the river depth and surface water and creek/stream levels in the area of failure. Planning efforts rely on the Department of Water Resources inundation maps. Any assumption will be based on the land elevation of each town: the town of Princeton is 82 feet above sea level; the City of Colusa is 53 feet above sea level. Grimes is 46 feet. The warning levels at the Colusa Bridge gauge are determined by the DWR: 63' is Monitor Stage, 70' is Flood Stage and 71' is Danger Stage.

More information on levees specific to the Colusa County Planning Area can be found in the Reclamation District 108 and Sacramento River West Side Levee District Annexes to this Plan Update.

Past Occurrences

Disaster Declaration History

There have been no disasters declarations related to levee failure in Colusa County, as shown on Table 4-5.

NCDC Events

There have been no NCDC levee failure events in Colusa County.

Hazard Mitigation Planning Committee Events

The HMPC could provide no events of levee failure. However, the HMPC did note that:

- In **2017**, there were areas of sloughing on the riverbank in the area near Grimes, as well as seepage and boils. With the river maintained a higher than average depth for a longer than average period of time, the residents in Grimes were on high alert for weeks, concerned about the levee failing. The responsible agencies, Reclamation District 108 and the Sacramento River Westside Levee District, worked with the Department of Water Resources to monitor these areas. The SRWLD performed several repairs to the levee and sandbagged the boils to prevent further damages and protect the town of Grimes. After the water receded and the river level stabilized, they carried out a large levee repair project, extending the wall of the levee's width in the area. More projects are planned as noted in the Project Worksheets located later in this Plan.

- In **2015** the County observed a large cut through the levee, although not down to the surface elevation. This was not the Sacramento River levee, but a dry levee named the Powell Slough Levee that would protect a portion of the City of Colusa during a ground flood event, not a river event. The cut was located at the beginning of the levee by the east gate off Highway 20, just to the right as the levee rises, clearly visible from the road. In addition, the berm/old railroad right of way has a cut through it down to ground surface level as it runs parallel with Arnold's (north side) just off Highway 20. It appears there is a cut through it to access a dirt road leading to a side gate, and built the spoils up onto the berm in large piles which would restrict some vehicles from crossing it. These items were fixed before any damage could occur.
- **1978 Floods** – The HMPC noted that the County experienced flooding in January of 1978. The Moulton Weir was overflowing, and the river overtopped the secondary levee of River Road. This was shown on Figure 4-81 in Section 4.3.11.

Likelihood of Future Occurrence

Occasional – It is important to remember that no levee provides protection from events for which it was not designed: they are not fail-safe. As historically noted, changes to the bottom of the river have affected the protection the levee provides. Proper maintenance is necessary to reduce the probability of failure. Due to the number and age of levees in Colusa County, future levee failures are currently considered occasional.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and levee 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 Levee Failure

In general, increased flood frequency in California is a predicted consequence of climate change. Mechanisms whereby climate change leads to an elevated flood risk include more extreme precipitation events and shifts in the seasonal timing of river flows. This threat may be particularly significant because recent estimates indicate the additional force exerted upon the levees is equivalent to the square of the water level rise. These extremes are most likely to occur during storm events, leading to more severe damage from waves and floods.

Vulnerability Assessment

Vulnerability—Extremely High

The probability of levee failure is increasing over time due to increased storms and flooding potential from global climate change. Levee failure flooding can occur as the result of partial or complete collapse of an impoundment, and often results from prolonged rainfall and flooding. A levee failure can range from a small uncontrolled release to a catastrophic failure. The primary danger associated with levee failure is the high velocity flooding of those properties downstream of the breach. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the levee. In addition, levee failure can cause stream bank erosion, which can in some instances have effects worse than those of flooding itself.

Large portions of the Colusa County Planning Area are at some measure of vulnerability to levee failure. An assessment of a community's vulnerability to levee failure begins with an understanding of local exposure to levee failure. This is included in the discussion of the Planning Area's Assets at Risk to this hazard. The following sections provide an analysis of the Levee Flood Protection Zones.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

Levee failures that could inundate both urbanized areas and rural areas and cause flooding which could close roadways are of great concern. Life safety is of the highest concern followed by property damage and impacts to critical facilities and infrastructure. Specific locations of concern from levee failure would be the Sacramento River and the 2047 Canal.

Assets at Risk

Assets at risk from levee failure 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 Colusa County Planning Area and unincorporated Colusa County.

Methodology

2023 Colusa County Parcel/Assessor Data was used as the basis for the Colusa County inventory of parcels and values. The levee failure analysis is performed using the LFPZ data for expected flood extents and depths. These LFPZ maps showing deep and shallow flooding areas of flooding. GIS was used to create a centroid, or point representing the center of the parcel polygon. LFPZ flood data was then overlaid on the parcel layer. For the purposes of this analysis, the flood depth that intersected a parcel centroid was assigned the flood depth for the entire parcel. The parcels and associated values were segregated and analyzed in this fashion to determine parcels and values at risk based on the LFPZ maps for the Colusa County Planning Area.

People and Populations

Populations in the LFPZs are at risk to flooding. Certain vulnerable populations may be at greater risk to the effects of levee failure flooding. Certain vulnerable populations may be at a greater risk of a sudden levee failure, including the unsheltered, those with limited mobility and those that lack the resources to leave the area.

Planning Area residents that live in the LFPZs are vulnerable to levees failure flooding. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant levee failure events. To evaluate the population of residents of the Planning Area that live within LFPZs, these areas were overlayed on the parcel layer and linked to the Assessor data. Those residential parcel centroids that intersect each LFPZ flood depth were counted and multiplied by the 2020 Census Bureau average household factors for each jurisdiction. Results are shown in Table 4-102.

Table 4-102 Colusa County Planning Area – Improved Residential Parcels and Population by LFPZ Flood Depth and Jurisdiction

Jurisdiction	Deep: >3ft		Shallow: <3ft	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population
City of Colusa	0	0	1,778	5,156
City of Williams	0	0	0	0
Unincorporated County	6	21	540	1,933
Total	**6**	**21**	**2,318**	**7,089**

Source: LFPZ BAM 2023, 2023 Colusa County Parcel/Assessor Data, 2020 US Census Bureau Average Household Size– City of Colusa (2.90); City of Williams (2.55); Unincorporated Colusa County (3.58).

These numbers reflect low end estimates as the property use categories based on the Assessor data utilized for this LHMP Update assumes all residential properties are single family residences. However, some of the residential parcels actually include multi-family units, including apartments, condominiums and well as duplexes and triplexes. These variations in residential property use were not accounted for in the analysis, which skews populations results to be lower.

Structures

A levee failure can affect the built environment of the Colusa County Planning Area, with some structures in the Planning Area at risk to a levee failure event. GIS was used to determine the possible impacts of levee failure flooding from LFPZ areas within the Planning Area. Table 4-103 shows the parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), other values, estimated content replacement values, and total values by property use in the Planning Area that fall in LFPZ by flood depth. Table 4-104 breaks down Table 4-104 for the unincorporated County to show what property uses are in the LFPZ areas.

Table 4-103 Colusa County Planning Area – Count and Value of Parcels (and Structures) in LFPZs by Jurisdiction

Jurisdiction / Levee Flood Protection Zone Depths	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa							
Deep: >3ft	4	2	$105,143	$261,230	$309,690	$391,845	$1,067,908

Jurisdiction / Levee Flood Protection Zone Depths	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Shallow: <3ft	2,312	2,075	$143,023,106	$443,506,557	$48,918,853	$309,104,118	$944,552,634
City of Colusa Total	**2,316**	**2,077**	**$143,128,249**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$945,620,542**
City of Williams							
Deep: >3ft	0	0	$0	$0	$0	$0	$0
Shallow: <3ft	0	0	$0	$0	$0	$0	$0
City of Williams Total	**0**	**0**	**$0**	**$0**	**$0**	**$0**	**$0**
Unincorporated Colusa County							
Deep: >3ft	509	198	$198,182,119	$26,076,001	$4,112,753	$25,651,575	$254,022,448
Shallow: <3ft	2,045	1,205	$363,182,229	$189,921,002	$41,415,608	$159,484,028	$754,002,867
Unincorporated Colusa County Total	**2,554**	**1,403**	**$561,364,348**	**$215,997,003**	**$45,528,361**	**$185,135,603**	**$1,008,025,315**
Grand Total	**4,870**	**3,480**	**$704,492,597**	**$659,764,790**	**$94,756,904**	**$494,631,566**	**$1,953,645,857**

Source: LFPZ BAM 2023, 2023 Colusa County Parcel/Assessor Data

Table 4-104 Unincorporated Colusa County – Count and Value of Parcels (and Structures) in LFPZs by Property Use

Levee Flood Protection Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Deep: >3ft							
Agricultural	477	188	$197,214,771	$20,487,067	$2,982,193	$20,487,067	$241,171,098
Commercial	4	4	$380,841	$4,740,084	$1,130,560	$4,740,084	$10,991,569
Government	8	0	$25,232	$0	$0	$0	$25,232
Industrial	1	0	$237,402	$0	$0	$0	$237,402
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	12	0	$178,377	$0	$0	$0	$178,377
Residential	7	6	$145,496	$848,850	$0	$424,424	$1,418,770
Deep: >3ft Total	**509**	**198**	**$198,182,119**	**$26,076,001**	**$4,112,753**	**$25,651,575**	**$254,022,448**
Shallow: <3ft							
Agricultural	1,069	553	$289,290,968	$77,667,183	$21,692,157	$77,667,183	$466,317,491
Commercial	83	59	$5,018,483	$10,420,583	$2,808,064	$10,420,583	$28,667,713
Government	103	16	$19,080,139	$977,495	$4,375	$977,495	$21,039,504

Levee Flood Protection Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Industrial	30	15	$2,782,477	$18,761,813	$12,621,018	$28,142,721	$62,308,029
Institutional	17	6	$435,833	$1,723,486	$1,885,258	$1,723,486	$5,768,063
Miscellaneous	93	16	$14,799,567	$734,651	$90,670	$734,651	$16,359,539
Residential	650	540	$31,774,762	$79,635,791	$2,314,066	$39,817,909	$153,542,528
Shallow: <3ft Total	**2,045**	**1,205**	**$363,182,229**	**$189,921,002**	**$41,415,608**	**$159,484,028**	**$754,002,867**
Unincorporated Colusa County Total	**2,554**	**1,403**	**$561,364,348**	**$215,997,003**	**$45,528,361**	**$185,135,603**	**$1,008,025,315**

Source: LFPZ BAM 2023, 2023 Colusa County Parcel/Assessor Data

Critical Facilities and Infrastructure

Levee failure flooding presents a threat to critical facilities and infrastructure, and community lifelines. Critical infrastructure failures such as loss of power, impacts to potable and wastewater treatment systems, and road and bridge failures can all be caused by levee failure events, depending on the magnitude of the resulting flood. The following analysis discusses critical facilities and infrastructure at risk to levee failure flooding, followed by a discussion on vulnerability of community lifelines.

A separate analysis was performed on the critical facility inventory in the Colusa County Planning Area to determine critical facilities in LFPZs. Using GIS, the LFPZ areas were overlayed on the critical facility GIS layer. Figure 4-92 shows critical facilities, as well as the LFPZs. Table 4-105 details critical facilities by LFPZ by facility type and count for the Planning Area. Details of critical facility category, type, name and address by LFPZ are listed in Appendix F.

Figure 4-92 Colusa County Planning Area – Critical Facilities in LFPZs

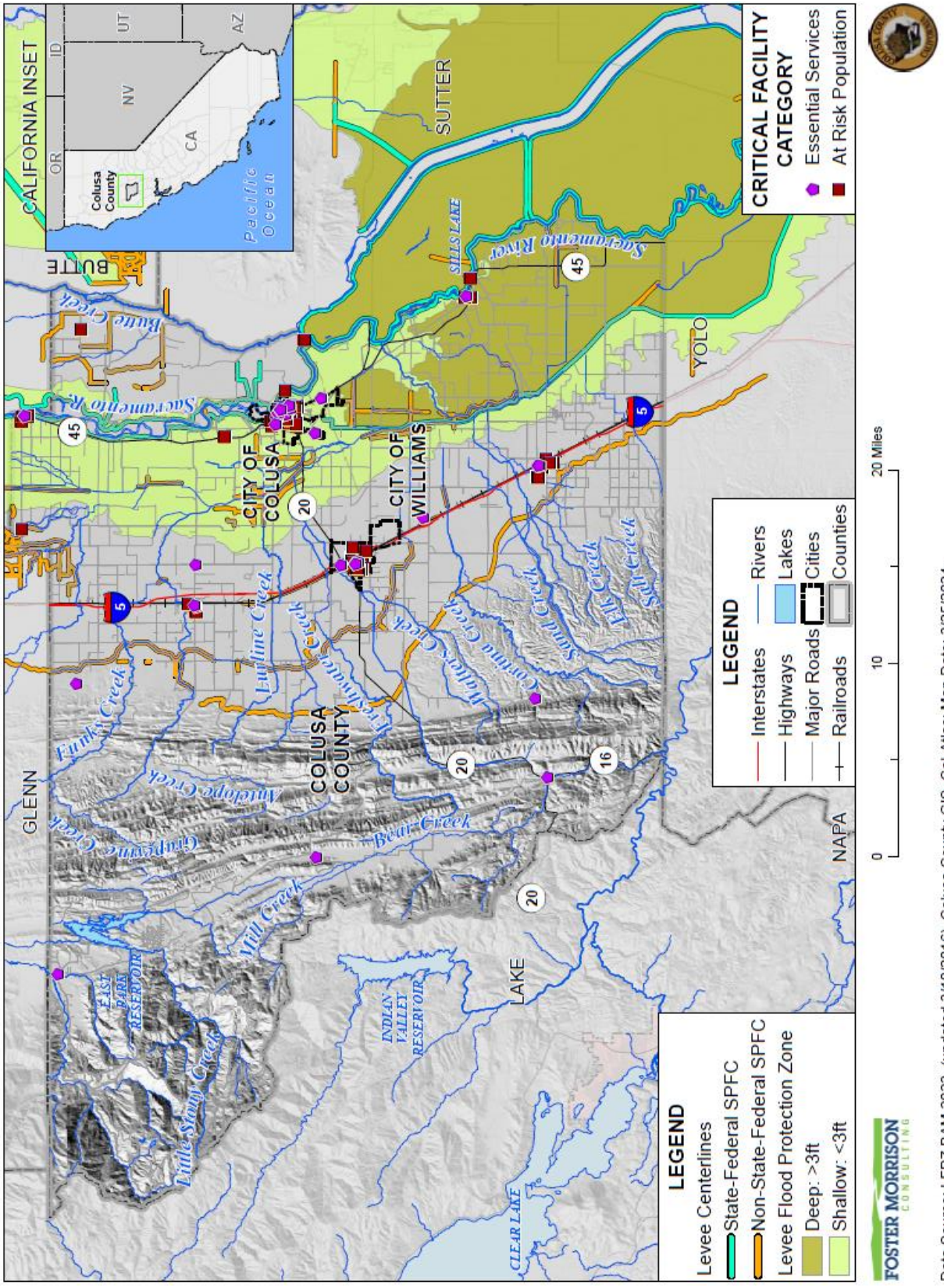


Table 4-105 Colusa County Planning Area – Critical Facilities in Levee Flood Protection Zones by Category, Type, and Jurisdiction

Levee Flood Protection Zone	Critical Facility Category	Facility Type	Facility Count
City of Colusa			
Shallow: <3ft	Essential Services Facilities	Emergency Response	1
		Fire Station	2
		Medical	1
		Police Station	1
		Public Services	3
		Utility Facility	2
		Total	**10**
	At Risk Population Facilities	Apartment Complex	22
		Assisted-Living	1
		Hotel or Motel	2
		Jail	1
		Mobile Home Park	4
		School	8
		Senior Living Facility	1
		Total	**39**
Shallow: <3ft Total			**49**
City of Colusa Total			**49**
Unincorporated Colusa County			
Shallow: <3ft	Essential Services Facilities	Fire Station	2
		Total	**2**
	At Risk Population Facilities	Apartment Complex	3
		Casino	1
		Hotel or Motel	1
		Mobile Home Park	2
		School	3
		Total	**10**
Shallow: <3ft Total			**12**
Unincorporated Colusa County Total			**12**
Grand Total			**61**

Source: LFPZ BAM (2023), Colusa County GIS

Community Lifelines

Levee failure flooding presents a threat to life and property, including community lifelines in the Colusa County Planning Area. Community lifelines that would be vulnerable to levee failure flooding include:

- **Safety and Security** – Search and rescue and swiftwater teams may be called on to perform riskier duties during times of levee failure and flooding. Police, Fire, EMS, and Public Works personnel are often called on to respond during flood emergencies which at times may stretch their capacity.
- **Food, Hydration, Shelter –** Floodwater is often contaminated with sewage and other contaminants, which can lead to illness and affect clean drinking water. These life safety and public health issues can tax the ability of the health and medical systems to provide necessary services, even if only temporarily.
- **Health, and Medical** – Loss of life and injuries can occur during significant levee failure events. Flooding may complicate the ability to transport the injured possibly requiring rerouting of injured to other facilities. Public health can also be at risk from flooding.
- **Energy** – Levee failure flooding could affect power distribution locations in the Planning Area. Power outages may occur. Fuel supplies may be temporarily cut off until levees are repaired (allowing for transport of fuel to resume).
- **Communications** – Communication infrastructure can be inundated by a levee failure event causing damage and an interruption in service. As well, an influx of service calls to dispatch centers for reporting of flooding, power outages, or other issues can occur. Messaging systems may need to be deployed during these times to let the public know about road and lane closures, washouts, and debris or flooding on roads.
- **Transportation** – Highways and local roads may experience levee failure flooding. This can cause lane or road closures, bridge closures and significantly limit mobility in the Planning Area. These closures can affect response personnel (EMS, Fire, Police) as well as cause additional traffic issues for residents and impact evacuation routes.
- **Hazardous Material** – Hazardous material facilities can be affected by levee failure flooding. Hazardous materials releases can occur if waters that overtop levees rupture storage tanks and other containment structures and cause them to spill into streams, rivers or drainage systems. Releases during these times can be comingled with flood waters, contaminate drinking water, as well as create additional exposures to the environment.
- **Water Systems** – Floods from levee failures can affect the ability for water and wastewater systems to operate, since many are located near leveed areas.

Given the high amount of area that falls in the leveed areas in the County (regardless of whether the levees are certified or not), these community lifelines could be overwhelmed during a levee failure event.

Natural, Historic, and Cultural Resources

Large levee failure events can affect natural, historic, and cultural resources. There are a number of ways levee failures and associated floodwaters can impact natural resources and the environment: Wildlife habitats can be destroyed. 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 areas protected by levees, but other cultural resources such as those associated with Native

Americans and old tribal areas can also be disturbed, damaged and lost during extreme levee failure events. Any of these that fall in the LFPZ flood zones would be vulnerable.

Economic Assets and Community Activities of Value

Major levee failure flooding events could affect any economic asset that lies in the areas protected by levees. These events can also affect those economic assets outside of the areas protected by levees, at least in the short term until floodwaters have receded and the Planning Area has sufficiently recovered. The Planning Area felt that a levee failure would have little bearing on community activities of value, unless a failure had a direct impact on the activity while it was occurring.

Impacts from Levee Failure

Floods and their impacts vary by location, including impacts associated with a levee failure flood event, and will only affect certain areas of the Colusa County Planning Area that are in areas protected by levees. Based on the areas of the Colusa County Planning Area surrounded by levees, including a large portion of developed areas of the County, it is evident that levee failure floods could potentially have significant impacts to the Colusa County Planning Area, depending on the severity of the event. Impacts that are not quantified, but could be anticipated in large levee failure event, include:

- Injury and loss of life.
- Commercial and residential structural and property damage.
- Crop damage.
- Disruption of and damage to public critical infrastructure and services.
- Health hazards associated with mold and mildew, contamination of drinking water, etc.
- Impacts to natural resource areas, including stream bank erosion.
- Damage to roads/bridges resulting in loss of mobility.

In addition to flood related levee failures, the levees in the Planning Area are at risk to failure during an earthquake event. Levee failure flooding could accompany an earthquake and could be compounded further if a dam or storage reservoir fails. Channels and water courses with earthen banks and levees are particularly vulnerable and could collapse in a major earthquake resulting in partial or complete blockage of channels causing flooding upstream of the impoundment. Levees are especially susceptible to rapid settlement due to liquefaction or horizontal spreading of underlying soils.

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 Colusa County include the following:

- Climate change is likely to exacerbate future heavy rain conditions and associated impacts and vulnerability of the County to levee failure 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 growth in Colusa County has recently slowed; however, additional growth within the recently decertified levee protected areas, including the LFPZs would place additional populations at risk to flood. 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 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. Locating new development, structures and critical facilities and infrastructure within or near areas at risk to levee failure 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 conditions. 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 considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes and the floodplain ordinance, 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.

Colusa County is also evaluating the feasibility of projects to bring some area levees up to a 0.1% and 0.5% annual chance or greater level of protection which would likely change future development standards in levee protected areas. These projects would bring a decreased vulnerability to all populations and development within the inundation area.

GIS Analysis

Colusa County provided 53 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 assigned are based on the centroid of the polygon. Figure 4-93 show the locations of the future development areas and LFPZs. Table 4-106 shows the details of the future development areas that are located in each LFPZ.

Figure 4-93 Unincorporated Colusa County – Future Development in LFPZs

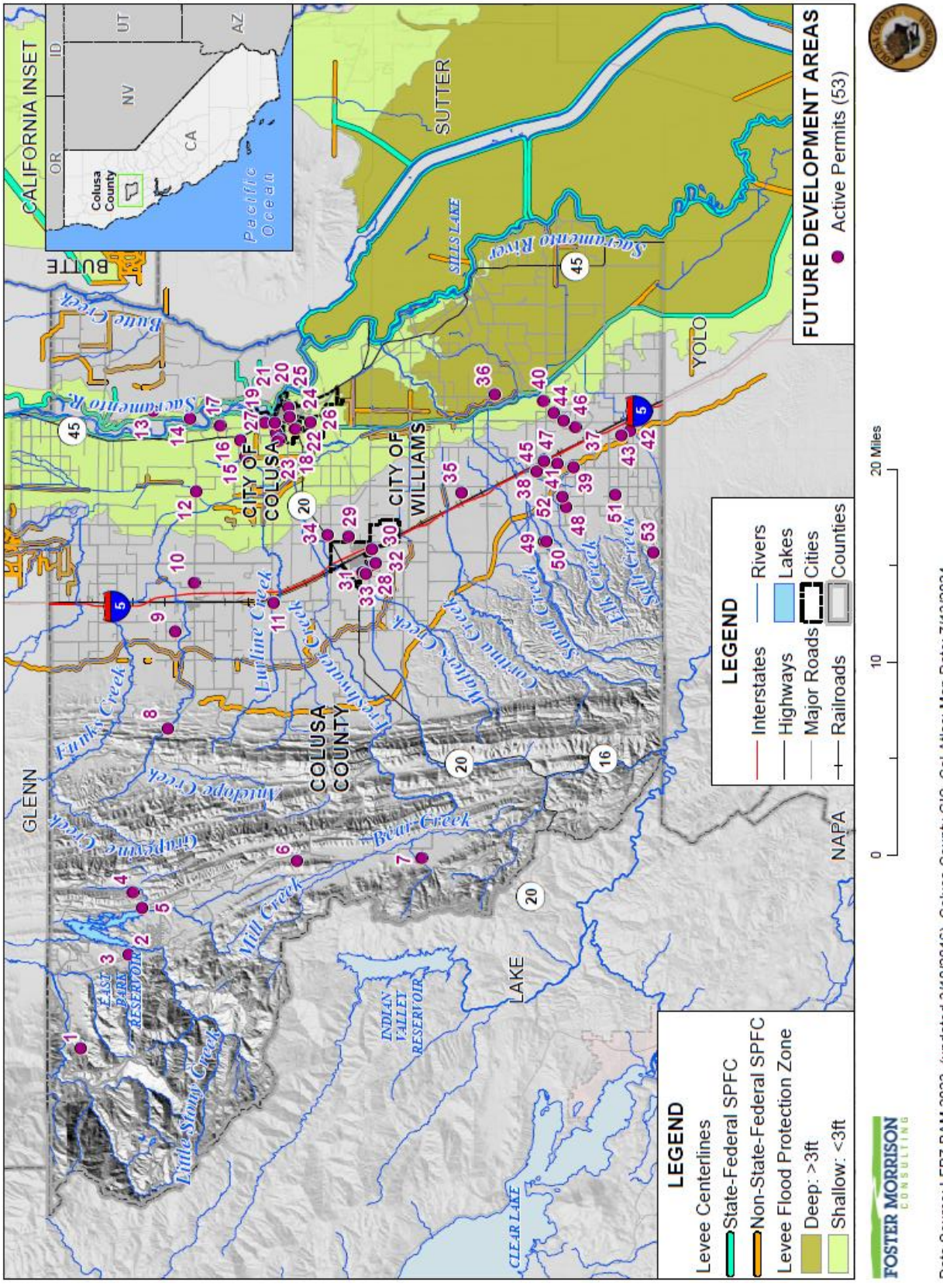


Table 4-106 Unincorporated Colusa County – Future Development in LFPZs with Parcel Counts and Acres

Levee Flood Protection Zone	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
Deep: >3ft	36	019-090-058-000	1	10.00
	Deep: >3ft Total		**1**	**10.00**
Shallow: <3ft	12	6458 MAXWELL RD	1	319.89
	14	4073 RIVER RD	1	10.32
	15	015-060-091-000	1	497.11
	16	6892 HARBISON RD	1	11.00
	17	015-030-094-000	1	17.03
	18	3258 MCCOY RD	1	6.01
	19	015-310-050-000	1	11.97
	20	022-200-066-000	1	0.45
	21	022-200-066-000	1	0.45
	22	3145 WILL S GREEN RD	1	7.48
	23	3286 RANCH RD	1	1.85
	24	1232 FIFTH ST	1	0.60
	25	002-101-004-000	1	4.48
	26	015-380-019-000	1	1.00
	27	1773 LURLINE AVE	1	3.40
	40	7251 TULE RD	1	2.64
	Shallow: <3ft Total		**16**	**895.68**
Grand Total			**17**	**905.67**

4.3.15. Stream Bank Erosion

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Colusa 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.

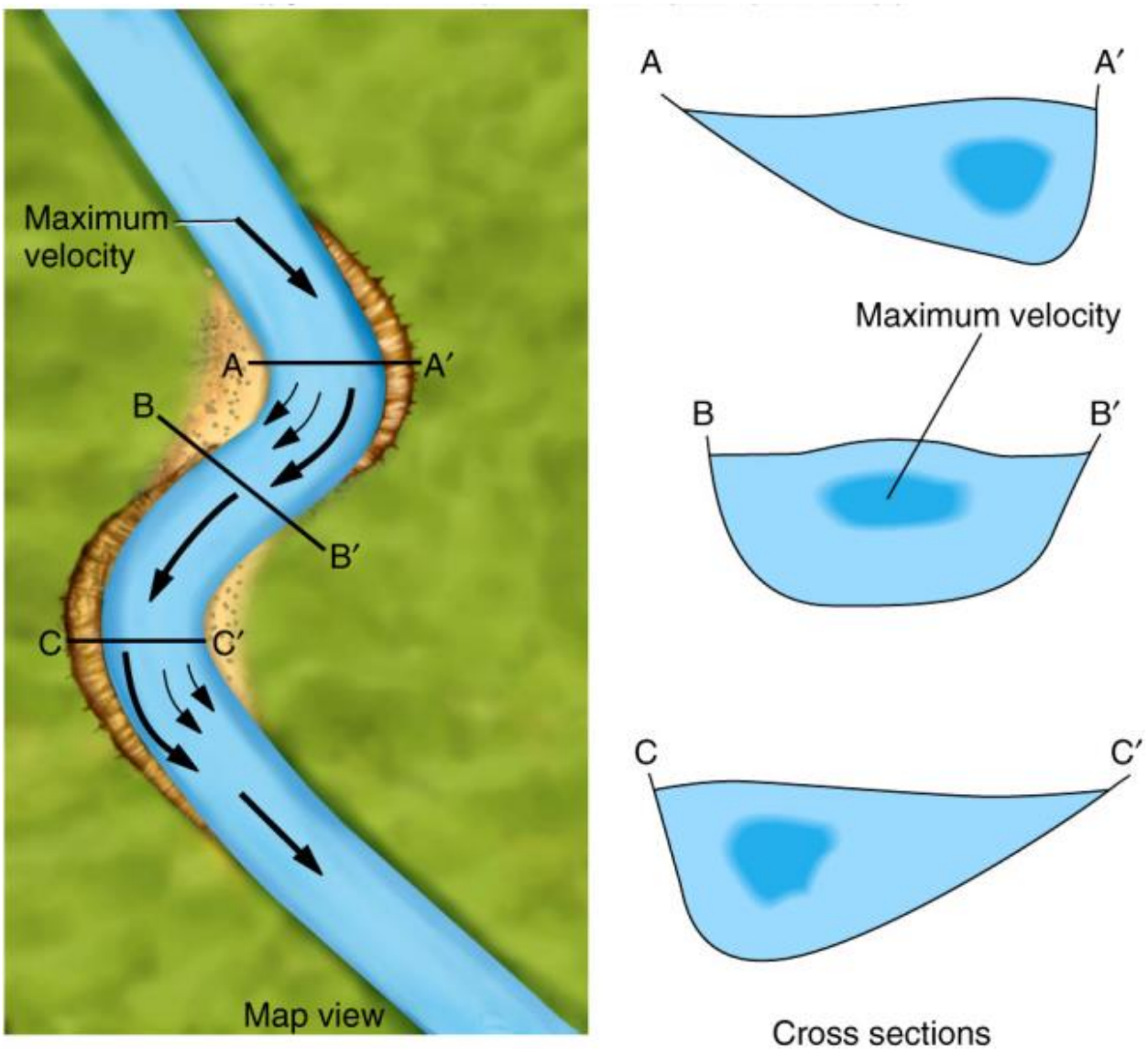
Hazard/Problem Description

Erosion is the general process whereby rocks and soils are broken down, removed by weathering, or fragmented and then deposited in other places by water or air. Water erosion poses problems for Colusa County. The rate of erosion depends on many variables, including the soil or rock texture and composition, soil permeability, slope, extent of vegetative cover, and precipitation amounts and patterns. Erosion increases with increasing slope and precipitation and with decreasing vegetative cover, which includes areas where protective vegetation has been removed by fire, construction, or cultivation. Colusa County is traversed by many waterways, including leveed areas. These locations are all subject to bank erosion. Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects.

According to the DWR, any flowing body of water (brook, creek, stream, river) is a stream. Stream flow is expressed as volume per unit time, usually cubic meters per second, cubic feet per second, sometimes cubic kilometers per second, or acre-feet per second or day. Stream flow varies tremendously with time. Short term effects of streambank erosion come from rainfall, snowmelt, and evaporation conditions. Long term effects of streambank erosion come from land use, soil, groundwater state, and rock type.

Stream bank erosion is a natural process (as shown on Figure 4-94), but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

Figure 4-94 Meanders and Stream Flows



Location and Extent

Stream bank erosion and deposition are occurring continually at varying rates over the Planning Area. Swiftly moving floodwaters cause rapid local erosion as the water carries away earth materials. This is especially problematic in leveed areas. Severe erosion removes the earth from beneath bridges, roads and foundations of structures adjacent to streams. By undercutting it can lead to increased rockfall and landslide hazard. The deposition of material can block culverts, aggravate flooding, destroy crops and lawns by burying them, and reduce the capacity of water reservoirs as the deposited materials displace water.

Stream bank erosion occurs on rivers, streams, and other moving waterways, including leveed areas, in the County. These leveed areas were shown on Figure 4-74. While this hazard addresses stream bank erosion, there are soil considerations in the greater County outside of these streambank areas that affect erosion.

Certain highly erodible areas of the County occur along streambanks in the County. The discussion below discusses the larger County, as well as the erodible areas of the County based on soil factors that pertain and are related to streambank erosion. These soil factors play a role in the erodibility of the levees.

The US Natural Resources Conservation Service (NRCS) delineates soil units and compiles soils data as part of the National Cooperative Soil Survey. The following description of erosion factors is provided by the NRCS Physical Properties Descriptions:

> ***Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.***

As mentioned above, the Kw factor for a given soil can range from 0.02 to 0.69, with 0.69 being the most "erodible." Soils data for Colusa County were obtained from the NRCS in order to identify the spatial distribution erosion factors. In the following table, erosion factor Kw represents erodibility of the whole soil, as the estimates are modified by the presence of rock fragments. Table 4-107 identifies approximate countywide acreages and percentages of total County area for low, moderate, high, and very high erosion factor soils. This includes the areas along stream banks. The westernmost portion of the County, primarily in the area of the Mendocino National Forest, has not been surveyed. Areas without soils data and surface water are represented in the "No Value" row in the table.

Table 4-107 Colusa County – Soil Erosion

Kw	Acres	Percent
≤0.17	9,345.7	1.30%
0.17-0.35	43,6347.1	59.00%
0.35-0.52	19,6851	26.70%
0.52-0.69	0	0.00%
No Value	97,782.5	13.30%
Total	**740,326**	**100%**

Source: NRCS

As identified in the table, very little of the surveyed portion of the County contains soils with a low erosion factor. This is also true for areas along stream banks. In addition, no soils with a very high erosion factor are identified within the County. Moderate erosion factors dominate the county's surveyed soils. High erosion factors are found primarily along the Sacramento River corridor (where streams may erode bank sides) and along the Coast Range/Central Valley boundary. This is where many of the levees sit.

The speed of onset of streambank erosion is typically slow, as the erosion takes place over periods of years. Duration of erosion is extended. However, during periods of high stream flow and during storm and wind events when wave action contributes to the extent and speed of streambank erosion, the speed of onset can be more sudden and the duration more compressed resulting in significant erosion along waterways

Past Occurrences

Disaster Declarations

There have been no federal or state disaster declarations related to erosion, as shown in Table 4-4.

NCDC Events

The NCDC does not track erosion events.

Hazard Mitigation Planning Committee Events

According to the HMPC, erosion from heavy rains occurs along the stream banks on an annual basis in the County.

2019 and 2023 – Streambank erosion has occurred on most creeks within the County within reason, but the streambeds which have had the most impacts are Sand Creek, Salt Creek, Stone Coral Creek.

2017 Floods – The HMPC noted flood conditions in February of 2017. A Pacific storm parked itself over Southern California and unloaded, opening sinkholes and leading to the deaths of at least two people. The storm also affected areas farther north that have been lashed by rain for days. The HMPC noted that roads turned into streams of brown water that lapped at doorsteps but no injuries were reported. Highway 99 was closed from the Glenn County Line to Williams, Maxwell Road was closed just west of the I-5 southbound on and off ramps, and many roads in the town of Maxwell were flooded and were eroded. Damages to these roads was reported. This can be seen in Figure 4-95.

Figure 4-95 Streambank Erosion from 2017 Floods

Source: Colusa County OES

Likelihood of Future Occurrence

Highly Likely – Due to the high number of linear feet of levees and stream and creek banks within the Colusa County Planning Area and the fact that erosion is constantly occurring, the likelihood of future occurrences of streambank erosion in Colusa County is highly likely.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on climate change and stream bank erosion 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 Stream Bank Erosion

According to the 2021 CAS, climate change may affect flooding and thereby erosion in Colusa County. 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. Future precipitation projections were shown in Figure 4-42 in Section 4.3.4. 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. All of the events above could exacerbate stream bank erosion in the County.

Vulnerability Assessment

Vulnerability—Medium

Many areas of the County are at risk to streambank erosion. An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

Certain developed areas that abut creeks and rivers in the County are at risk to continued bank erosion. Levees are at risk to erosion as well, due to the channelization of narrow river channels. Significant erosion can cause degradation and loss of levee and bank stability. This is the main concern regarding erosion in Colusa County. This is the case in many locations, but a few examples are included here:

- Lack of shoulder for road on Road 1 at Yolo County Border from Tehama Colusa Canal west to the intersection of Road 1 and Road 84. There has been substantial erosion on both sides of Road 1 which could result in a falling power pole or a car overturning in the steep ditch.
- Deterioration of the east side of the Levee on the Colusa Basin Drain east of the Colusa National Refuge at MA12 7.0 – this has been deteriorating for over a year. There are markers which might indicate the site will be repaired. This levee is under the control of CA DWR out of its Hwy 20 office.

Additionally, the County noted that streambank erosion increases the sediment that a stream must carry, results in the loss of fertile bottomland, and causes a decline in the quality of habitat on land and in the stream. High velocity flows can erode material from the outboard or waterside of the levee (see Section 4.3.14), which may lead to instability and failure. Erosion can occur at once or over time as a function of the storm cycle and the scale of the peak storms.

Furthermore, as noted in the levee discussion in Section 4.3.14, since dredging the river bottom has been discontinued, the bottom of the river has become higher, thus the water levels reach higher on the banks of the rivers and levees. When northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on levees. The potential for levee and stream bank erosion damage has increased.

Assets at Risk from Stream Bank Erosion

Assets at risk from stream bank erosion include people and populations; structures; critical facilities and infrastructure and community lifelines; natural, historic, and cultural resources, economic assets, and community activities of value). These are discussed in the following sections for the Colusa County Planning Area and unincorporated Colusa County.

People and Populations

Streambank erosion will have a minimal direct effect on people and populations in the County. Indirect effects on people and populations include damages to roads or bridges from streambank erosion, causing transportation issues. Streambank erosion can also cause high sediment loads. This can cause water quality impacts. Water quality can be impacted causing health problems, especially to vulnerable populations where access to clean water supplies can be more challenging. Water quality can have an effect on 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 clean drinking water. There may be higher costs borne by water companies to treat this water. Water companies may pass those costs onto those to whom they provide water services. Those who are economically disadvantaged may be unable to afford the increased costs of potable water.

Structures

Structures near rivers are at some risk from the effects of streambank erosion. Structures that are in areas protected by levees are at greater risk of streambank erosion. Should levees erode quickly, their risk of failure increases. Those structures behind the levees would be at risk. This is discussed in greater detail in Section 4.3.14.

Critical Facilities and Infrastructure

Flooding presents a threat to critical facilities and infrastructure, and community lifelines. Critical 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 water infrastructure for drinking water, wastewater service, and draining streets of rainwater. 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.

Community Lifelines

Typically, streambank erosion is an ongoing process and has limited impact to community lifelines. Streambank erosion that causes significant issues, including levee failures, presents a threat to life and property, including community lifelines in the Colusa County Planning Area. A catastrophic levee failure could challenge local response capabilities and require evacuations to save lives. Community lifelines that would be at risk to levee failure flooding include:

- **Safety and Security** – Police, Fire, EMS, and Public Works personnel are often called on to respond during flood emergencies. This would be especially true in a dam failure event. Search and rescue and swiftwater teams may be called on to perform riskier duties during times of heavy rains and flooding.
- **Food, Hydration, Shelter** – a dam failure would displace many residents in the Planning Area. Some would need shelter, as well as food and water.
- **Health and Medical** – There is the potential for multiple injuries and deaths from a catastrophic dam failure taxing health and medical facilities. Casualty and patient movement from the inundation areas and unrelated incidents by EMS may be significantly impacted and have to be rerouted. Public health facilities can also be at risk from flooding caused by dam failures.
- **Energy** – Dam failure could impact large areas of above ground electric infrastructure, causing widespread power outages. Dam failure could also affect fueling stations, as well as electric car charging stations.
- **Communications** – An influx of service calls to dispatch centers for reporting of flooding, power outages, and rescues or other issues can occur resulting in communication networks going down for extended periods of time. Messaging systems need to be deployed during these events to let the public know about road closures, washouts, debris on roads, or lane closures. Calls to and from family and friends during a hazard event can further overwhelm communication systems such as cell towers and other infrastructure. Demand may exceed the capacity of these systems to remain operational during response efforts.
- **Transportation** – Highways and local roads may see extensive flooding. Bridges can be damaged or destroyed. This can cause lane closures or road closures and limit available routes altogether. These closures can affect response personnel (EMS, Fire, Police) as well as cause additional traffic issues for residents. Evacuation efforts may be difficult and further put people at risk of death or injury.
- **Hazardous Material** – Hazardous material facilities can be affected by flooding. Releases during these events can contribute to the dangers of floodwaters and cause contamination of potable water sources, as well as additional exposure to the environment.
- **Water Systems** – Any water (or wastewater) system located in a dam inundation area may be affected by dam failure flooding. The Planning Area's stormwater drainage system and facilities may also be affected.

Streambank erosion leading to a large levee failure event could overwhelm many community lifelines in the Colusa County Planning Area. As shown on the maps and tables above, there are multiple levees that would affect large swaths of the Planning Area. A failure of many of these levees could, at least temporarily, overwhelm the community lifelines in place in affected areas of the Planning Area.

Natural, Historic, and Cultural Resources

Streambank erosion could have a minor effect on those resources that are near areas where streambank erosion occurs. The greater risk is from streambank erosion that could cause levee failure flooding. 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.

Economic Assets and Community Activities of Value

Streambank erosion could have a minor effect on those assets that are near areas where streambank erosion occurs. Activities of value are thought to be minimally affected. The greater risk is from streambank erosion that could cause levee failure flooding. Major flood events could affect any economic asset that lies in the floodplain and can have long lasting effects. This could cause those businesses and economic assets within these areas to close or relocate. This could cause temporary or permanent loss of sales tax revenue. This is also true if agricultural areas are flooded in the County (discussed in greater detail in Section 4.3.6). These events can also affect those economic assets outside of the floodplain, at least in the short term until the Planning Area has sufficiently recovered. Community activities of value can also be disrupted by floods, though many of these events take place in the summer months, which are less likely to flood. This includes the County Fair, Farm Show, rodeos, craft fairs, and hunting and fishing seasons.

Impacts from Streambank Erosion

The 2023 California State Hazard Mitigation Plan noted that riverine flooding causes bank erosion, especially in the upper courses of rivers with steep gradients, where floodwaters can pass quickly without much flooding but scour the banks, edging properties closer to the floodplain or causing them to fall in. Other impacts from stream bank erosion include greater levee maintenance and increased risk of levee failure. Should the levees fail, the area protected by the levees would be flooded.

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 Colusa County include the following:

- Climate change is likely to exacerbate future streambank erosion conditions and associated impacts and vulnerability of the County to levee failures.
- 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 Colusa County has recently slowed. Additional population growth would likely bring continued diversity to the County. Vulnerable population groups could face disproportionate effects from streambank erosion (and resultant levee failure) and should be planned for. Changes in population and population patterns will likely 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. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires land use planning, enforcing regulatory requirements, and an understanding of both stream dynamics and the management of streamside vegetation. 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. Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion.

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 make for a more resilient community. Planned developments should take erosion risk areas into account during the construction of new homes and commercial properties.

4.3.16. Subsidence

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Colusa 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

Land subsidence is defined as the sinking of the land over man-made or natural underground voids. Subsidence can result in serious structural damage to buildings, roads, irrigation ditches, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Weight, including surface developments such as roads, reservoirs, and buildings and manmade vibrations from such activities as blasting or heavy truck or train traffic can accelerate the natural processes of subsidence. In Colusa County, there are generally two types of subsidence of concern: subsidence from groundwater pumping and the settling of the ground over abandoned mine workings (i.e., the creation of sinkholes).

Groundwater Pumping

Severe groundwater overdraft may lead to subsidence, a permanent lowering of the ground surface due to consolidation of sediments. According to the HMPC, groundwater pumping is the primary contributor to subsidence; however, this pumping has only a small effect on the County. Water is a necessity for ranchers raising beef cattle, growing vineyards and orchard crops or farmers growing annual truck crops. Livestock must be supplied with water and crops must be irrigated.

Fluctuations in the level of underground water caused by pumping or by injecting fluids into the earth can initiate sinking to fill the empty space previously occupied by water or soluble minerals. The consequences of improper use of land subject to ground subsidence can be excessive economic losses, including the high costs of repair and maintenance for buildings, irrigation works, highways, utilities, and other structures. This results in direct economic losses to citizens as well as indirect economic losses through increased taxes and decreased property values.

Location and Extent

Subsidence has been documented in some areas of the Sacramento Valley. Minimal subsidence locations in the County have been reported. According to the HMPC, any groundwater pumping areas in the eastern portion of the County may be at risk to subsidence. The HMPC noted that the Arbuckle area of the County is an area subject to subsidence associated with the drawdown of the water table. This is also where 5 wells went dry during the most recent drought.

There is no scientific scale or measurement system of subsidence. Changing elevations and groundwater tables can be measured over time, if areas are suspected of being affected by subsidence. The speed of onset of subsidence is slow, making it hard to determine with certainty that subsidence has occurred.

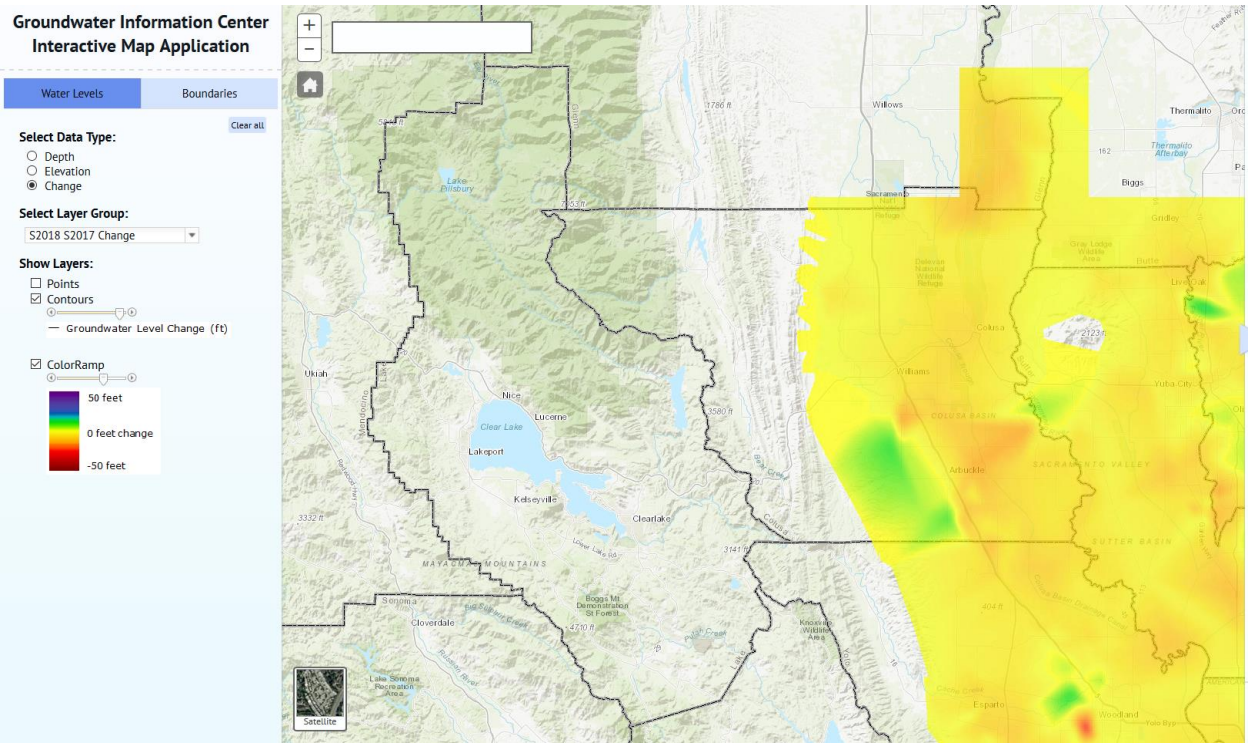
The California Department of Water Resources has created an interactive map that shows geospatially referenced groundwater levels, groundwater table elevation, and subsidence in California. The map includes:

- Groundwater depth below ground surface
- Groundwater elevation
- Groundwater change in elevation from year to year
- Subsidence trends as measured by extensometers and at GPS stations
- Cumulative subsidence at GPS stations

- Changes in groundwater levels from long-term monitoring wells
- Estimated potential for future subsidence in each groundwater basin

The groundwater subsidence map for Colusa County is shown in Figure 4-96.

Figure 4-96 Colusa County – Subsidence from Groundwater Pumping



Source: Cal DWR Groundwater Information Center. Verified on 3/22/2024.

Abandoned Mines

Given the mining history in Colusa County, subsidence due to past mining operations (i.e., the settling of ground over abandoned mine workings) is a concern in the Planning Area. Past mining activities have created surface subsidence in some areas and have created the potential for subsidence in other areas. Colusa County is home to many abandoned mines.

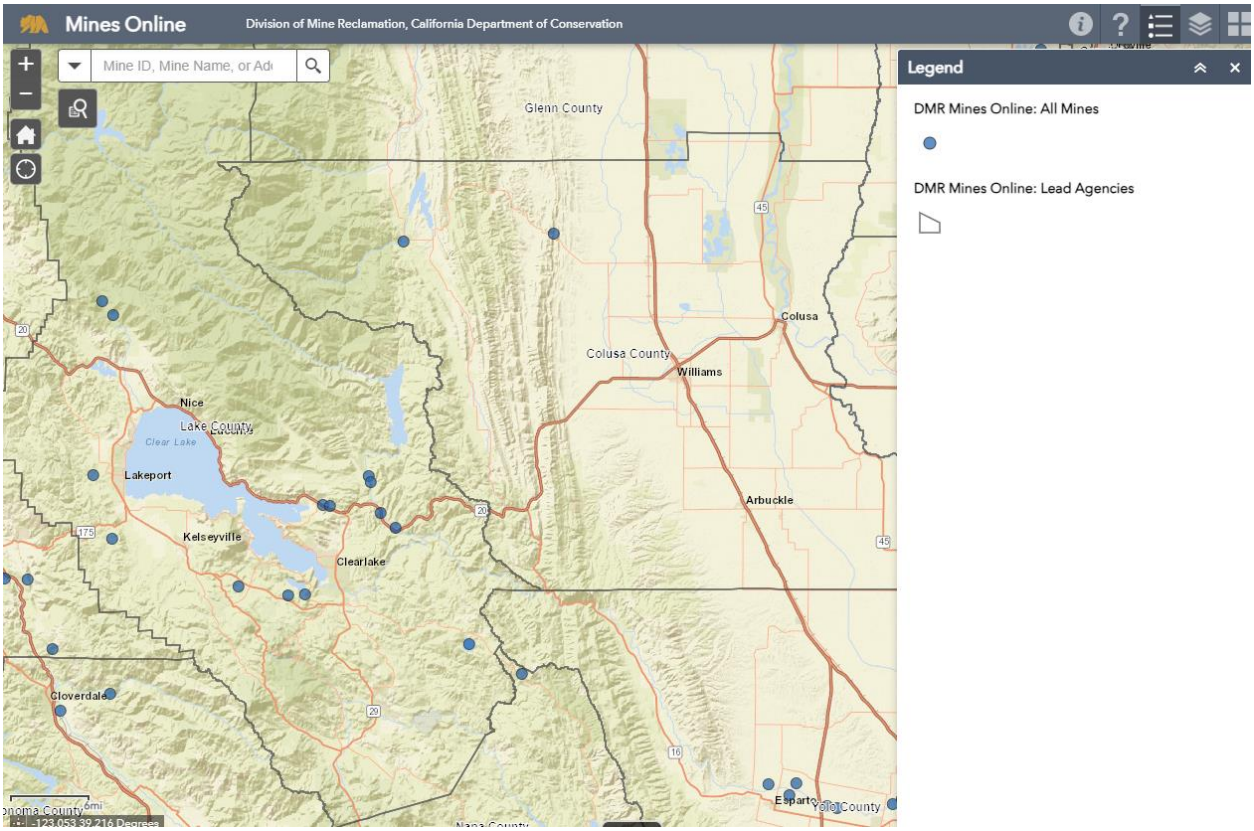
The susceptibility of mine shafts to subsidence or cave-ins depends on a number of factors, particularly water content of the soil above and the depth and physical condition of the shaft (often due to heavy rains). The Division of Mines and Geology believes that septic systems contribute to subsidence by keeping otherwise dry soil overburden wet and heavy, thus triggering collapses that might otherwise not occur.

The greatest problem regarding mine-related surface hazards is the absence of information about the locations and physical characteristics of abandoned tunnel entrances and shafts. Some are known, cataloged and marked, while others are not. Most are on privately owned property. Without current, comprehensive information, it is difficult to assess the magnitude of the problem or to devise remedial programs.

Location and Extent

Mines and mining, always dangerous while in operation, posed new dangers when abandoned. Airshafts were left exposed or covered by a few boards. They are typically holes of 4 to 10 feet in diameter on the surface, extending hundreds of feet down to the mine tunnels below. Access shafts were often covered hurriedly by closing off the mine mouth (entrance) with logs, then backfilling with rock and earth. In time, the forgotten but reclaimed site sprouted vegetation, hiding a large hole lurking perhaps as little as 8 to 10 feet below the surface. Abandoned mines in Colusa County are shown on Figure 4-97. It should be noted that this list of locations may be incomplete, as many mine areas have gone unreported.

Figure 4-97 Colusa County – Location of Abandoned Mines



Source: California Department of Conservation. Retrieved 3/22/2024.

There is no scientific scale or measurement system of subsidence from abandoned mines. Changing elevations or sinkholes can be measured over time, if areas are suspected of being affected by subsidence. The speed of onset of subsidence is variable and can be long (as slow settling occurs) or short (if a shaft collapses).

Past Occurrences

Disaster Declaration History

There have been no disaster declarations related to subsidence in Colusa County, as shown in Table 4-4.

NCDC Events

The NCDC database does not track past occurrences of subsidence.

EOC Activations

The County maintains a list of EOC activations by hazard. EOC activations from subsidence from 2008 to 2024 are shown in Table 4-108.

Table 4-108 Colusa County – EOC Activations from Subsidence 2008-2024

Disaster Type	EOC Activations	
	Count	Date
Subsidence	1	4/2014

Source: Colusa County OES

Hazard Mitigation Planning Committee Events

2014 - The HMPC noted that a sinkhole was reported to OES on the Victoria Farms property, a private drive off of Maxwell Colusa Road west of Highway 45. Located northeast of shop area near well pad adjacent to concrete ditch. Approximately 75' in diameter, it has deepened about 6" recently. The sinkhole is encroaching on ditch which will cause it to become unusable. Advised to keep marked for safety purposes and if filled, should use natural materials such as rip rap, rocks, and clayey soil.

Since 2014, subsidence has occurred to a large degree within the Arbuckle area. This affects County Roads and Interstate 5. It is believed that this is caused by the removal of groundwater. Groundwater recharge could help the issue to some degree, however a permanent solution has not been developed yet. The California Department of Water Resources has been working to determine the cause and to develop a solution.

While the HMPC knows that subsidence currently may occur in the County, few other specific events where damages were caused could be recalled. The HMPC further noted that subsidence of the groundwater table is a larger, regional and State of California issue.

Likelihood of Future Occurrence

Likely— California's land subsidence is tied to prolonged droughts and simultaneous record-breaking heat. When the state endures prolonged periods of drought, surface water stores are depleted, and the reliance on groundwater for water supply is increased. Groundwater pumping has historically occurred in the history of Colusa County, especially during times of drought. Given the likelihood of drought and the need for water for agricultural purposes, future occurrences are considered likely.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. 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 Subsidence

Climate change may cause additional subsidence in the County during times of drought and additional groundwater pumping. Data is showing that the groundwater table is lowering causing subsidence in California which can be compounded by the changes in precipitation and periods of drought.

Vulnerability Assessment

Vulnerability—Low

California's land subsidence is often tied to prolonged droughts and simultaneous record-breaking heat. When the state endures prolonged periods of drought, surface water stores are depleted, and the reliance on groundwater for water supply is increased.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

In Colusa County, there are generally two types of subsidence of concern: subsidence from groundwater pumping and the settling of the ground over abandoned mine workings (i.e., the creation of sinkholes). There are few mines in the County, though members of the HMPC noted old mine sites west of Cortina Rancheria may be causing water quality concerns due to the tailing. Karst may also happen in the County, but it is of lesser concern.

The 2010 General Plan Background report noted that a document titled *Ground Water Levels in the Sacramento Valley Groundwater Basin – Colusa County* (DWR, 1994) summarized hydrographs dating to the 1920s, from 114 groundwater wells in Colusa County. Water management and delivery practices appear to have rectified declining ground water levels that were documented into the 1960s. The application of surface water, which coincided with the abandonment of large-scale groundwater extraction, also appears to have stabilized annual fluctuations in groundwater levels that were experienced prior to the late 1960s.

Since 2014, subsidence has occurred to a large degree within the Arbuckle area. This affects County Roads and Interstate 5. It is believed that this is caused by the removal of groundwater. Groundwater recharge could help the issue to some degree, however a permanent solution has not been developed yet. The California Department of Water Resources has been working to determine the cause and to develop a solution.

The County noted that other issues with subsidence is the displacement of the roads with vertical shifting as well as how this vertical displacement affects all infrastructure and private property.

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 subsidence 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 Colusa County Planning Area and unincorporated Colusa County.

People and Populations

Since subsidence generally happens over a long period of time, there is only a minimal risk to people and populations, including vulnerable populations. Areas in the eastern portion of the Colusa County Planning Area have had groundwater levels lowered due to pumping; and subsidence has occurred. Since subsidence from groundwater pumping is a slowly occurring phenomenon, it is unlikely to affect populations in the short term. Given the lack of data on mines in the County, it is unknown whether people or populations will have any measurable risk to mine-related subsidence. Sinkholes happen more quickly than general subsidence and can affect people and populations, depending on where the sinkhole occurs.

Structures

Certain structures in the Colusa County Planning Area bear some measure of risk to subsidence. Subsidence could cause damages as building footings become unstable. However, as noted above, area groundwater levels have been lowered due to pumping, and no related subsidence has resulted. A sinkhole from an abandoned mine location could affect a structure.

Critical Facilities and Infrastructure and Community Lifelines

Critical facilities in the Colusa County Planning Area bear some measure of risk to subsidence. Gradual sinking could cause foundation damage. If a sinkhole were to open as a result of subsidence, there could be damages to infrastructure and lifelines. A sinkhole from an abandoned mine location could affect critical facilities, infrastructure, or community lifelines.

Natural, Historic, and Cultural Resources

All natural, historic, and cultural resources in the Colusa County Planning Area bear some measure of risk to subsidence. A sinkhole from an abandoned mine location could affect a historic structure. Historic structures built when building codes were less restrictive may be at greater risk should a sinkhole occur.

Economic Assets and Community Activities of Value

Economic assets bear some measure of risk to subsidence. Subsidence could cause damages as building footings become unstable. Community activities of value are thought to have little to no risk from subsidence.

Impacts from Subsidence

Effects of land subsidence in California include increased flood risk in low-lying areas, damage to buildings and infrastructure, loss of groundwater aquifers, and damage to aquatic ecosystems. As the land sinks, it can experience increased flooding and adverse impacts on sewer lines, stormwater drainage systems, and other impacts to critical facilities and infrastructure. As subsidence progresses, areas protected by levees can be impacted. Compaction of the aquifer system due to subsidence may permanently decrease its capacity to store water. Other impacts of subsidence is the displacement of the roads with vertical shifting as well as how this vertical displacement affects infrastructure and private property.

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 Colusa County include the following:

- Climate change is likely to exacerbate future subsidence conditions for subsidence from groundwater pumping and associated impacts and vulnerability of the County to subsidence. Climate change impacts on old mine areas is unknown, but unlikely.
- 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 Colusa County has recently slowed. Additional population growth would likely bring continued diversity to the County. Though unlikely, vulnerable population groups could face disproportionate effects from subsidence and should be planned for. Changes in population and population patterns will likely 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. Locating new development, structures and critical facilities and infrastructure within or near areas of subsidence may put additional development at risk. Additionally, County building codes are in effect to reduce this risk. 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 considerations should be ongoing and proactive. Many of the groundwater subsidence and mine areas in the County are known, but many still remain unknown and untracked. Knowing these

locations and choosing not to develop in those areas or mitigating against future issues will reduce future losses due to subsidence. 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 make for a more resilient community.

4.3.17. Wildfire

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the Colusa 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

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 Colusa County Planning Area. Generally, 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. During 2018 during the Camp Fire in Butte

County, Colusa County experienced 13 days of the worst air quality previously experienced in the region. 2019 and 2020 saw air quality impacts from smoke as well. Purple air sensors in the County showed periods of very poor air quality in Colusa County. This was a concern especially 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).

Location and Extent

This section is broken down into two parts: a discussion on the wildland urban interface, and the Colusa 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 wildland urban interface 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 Colusa County consists of communities at risk (shown in in Section 4.3.17) 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.

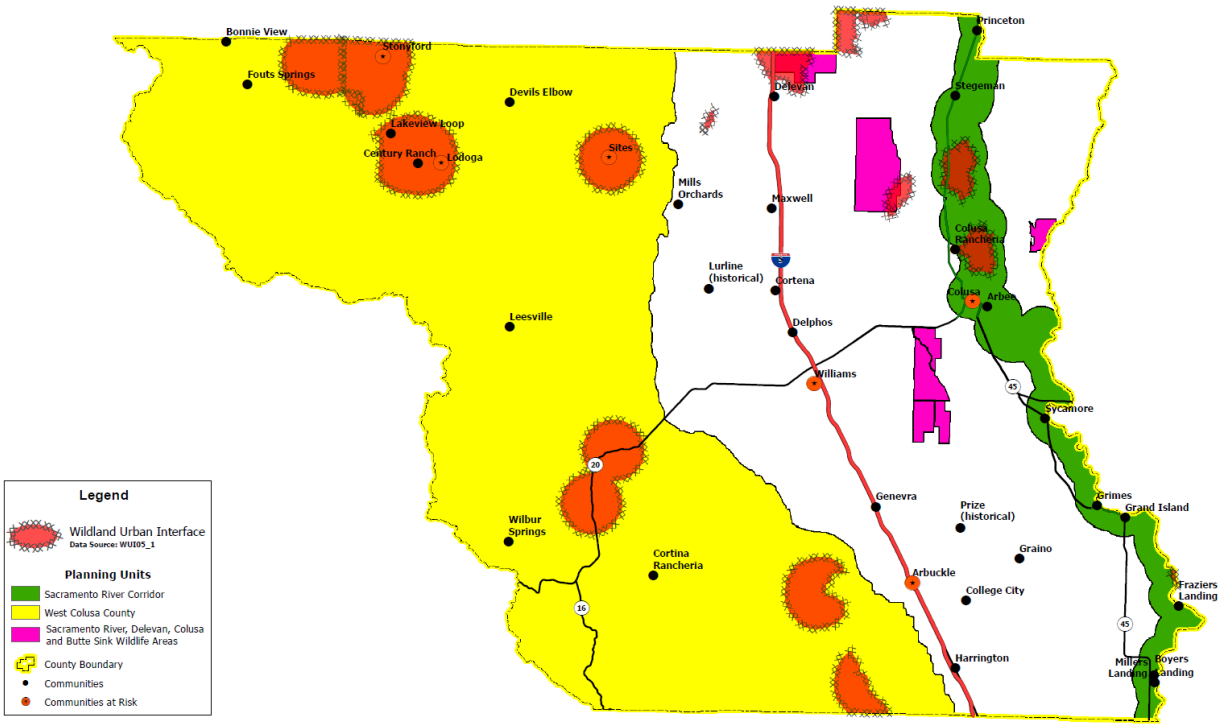
WUI fires are often the most damaging. WUI fires occur where the natural and urban development intersect. Even relatively small acreage fires may result in disastrous damages. WUI fires occur where the natural forested landscape and urban-built environment meet or intermix. The damages are primarily reported as damage to infrastructure, built environment, loss of socio-economic values and injuries to people.

The 2021 Colusa County Community Wildfire Protection Plan (CWPP) noted that within Colusa County, remote communities and residences at risk from fires originating within wildlands areas are primarily located within the County's grasslands and oak woodlands. These developed areas include Stonyford, Lodoga, the Cortina Rancheria, Century Ranch development and Sites developed area. Additional scattered development of individual homes and other domestic structures are found within or near the Mendocino National Forest such as Fouts Springs, Wilbur Springs and Leesville. In terms of wildfire threat, these areas

of rural development have been described as points where the fuel feeding a wildfire changes from natural (wildland) to manmade fuel, such as structures, crops, and urban debris.

Figure 4-98 shows these WUI areas in red with Colusa County in the center of the frame. This intermingling of wildland and manmade fuel has made the control of wildland fires more difficult and costly. It has also dramatically increased the danger and potential destruction caused by wildfire.

Figure 4-98 Colusa County – WUI Areas



Source: Colusa County 2021 CWPP

Colusa County Wildfire Setting

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 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. The 2023 Fire Plan for the Sonoma-Lake-Napa Unit (which includes Colusa County) noted that there is a wide range of fuels in the County. Fuels range from agricultural farmland (wheat, safflower, cut stubble), annual grasses, oak woodland, 15–50 year old chaparral, large stands of decadent brush and timber in the higher elevations. 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.

- **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 2023 Sonoma-Lake-Napa Fire Plan noted certain topographic elements in the County. Elevation within the East Division ranges from 250' to 3000' with slopes ranging from 0 – 80%. There is a dominant North/South orientated ridge running from Hwy 20 to central Colusa county. These main ridges keep the coastal influence weather from being a factor. Farmlands, ranches, rural and major roads along with other manmade features provide a network of barriers that will need to be connected to create an effective fire line.
- **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. 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 2023 Fire Plan noted that the weather in the County is generally warm and dry during the day with a slight relative humidity recovery at night. If a critical weather pattern exists such as a Foehn North Wind, or a cold front passage, the daily diurnal weather variation will be subdued. If these critical weather patterns align with the topography, expect extreme rates of spread, especially along exposed ridges and through constricted areas. Peak summer day temperatures are generally 95°-105°F, cooling to 50°-60°F at night, with relative humidity ranging between 20% – 35% or less. Gradient winds are generally out of the N/NW 5-10 mph, strengthening in the afternoon with a 10-15 mph wind in the late afternoon diminishing by dark.
- **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.

The 2021 Colusa County CWPP noted that a large portion of Colusa County, like much of Northern California, is at very high risk of experiencing catastrophic wildfire. The Colusa County's westside area is largely rural or in the wildland/urban interface between urban development and those lands managed for ranching, timber production, open space, and watershed resources. Landscapes within various U.S. Fish and Wildlife Service (USFWS) refuges located in the County as well as those along and immediately adjacent to the Sacramento River remain in a more natural condition with abundant native vegetation and related wildland fuels. Over the past 90 years, many of the landscapes within western Colusa County have developed high levels of fuel loading due to aggressive fire suppression on both public and private lands. Lands within federal wildlife refuges and wildland areas along the Sacramento River can develop unnatural amounts of live and dead fuels unless managed in order to reduce fire risk and the impact of wildfire on adjacent developed areas. These high fuel loads can without management, increased the potential for large wildfires that could destroy an array of natural resources and cause millions of dollars in damage to public and private property. The problem of hazardous fuel conditions continues to grow each year as more people move into and utilize the area's grasslands, oak woodlands, chaparral and forestlands. Greater recreational

use of Mendocino National Forest (MNF), U.S. Bureau of Reclamation (BOR), and Bureau of Land Management (BLM) parcels located within western Colusa County has also contributed to an increase in the threat of wildfire on these public lands and on adjacent private parcels.

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, 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, which range from Urban-Unzoned to Very High, can be found in the Vulnerability Assessment below. Geographic extents of wildfire can be seen on Figure 4-99 and is detailed by jurisdiction in Table 4-109.

Figure 4-99 Colusa County Planning Area – CAL FIRE Fire Hazard Severity Zones

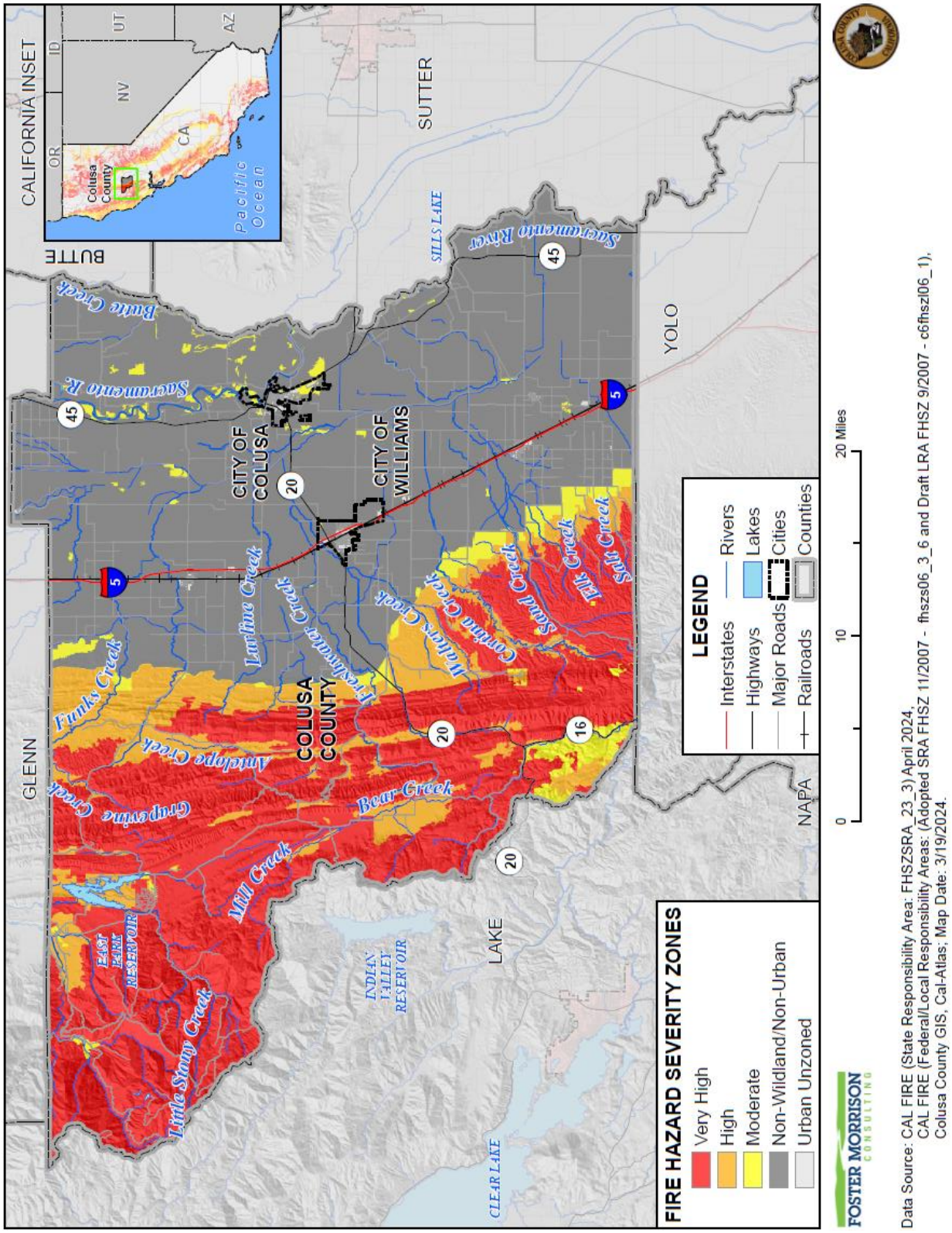


Table 4-109 Colusa County Planning Area – CAL FIRE Fire Hazard Severity Zones Geographical Extents by Jurisdiction

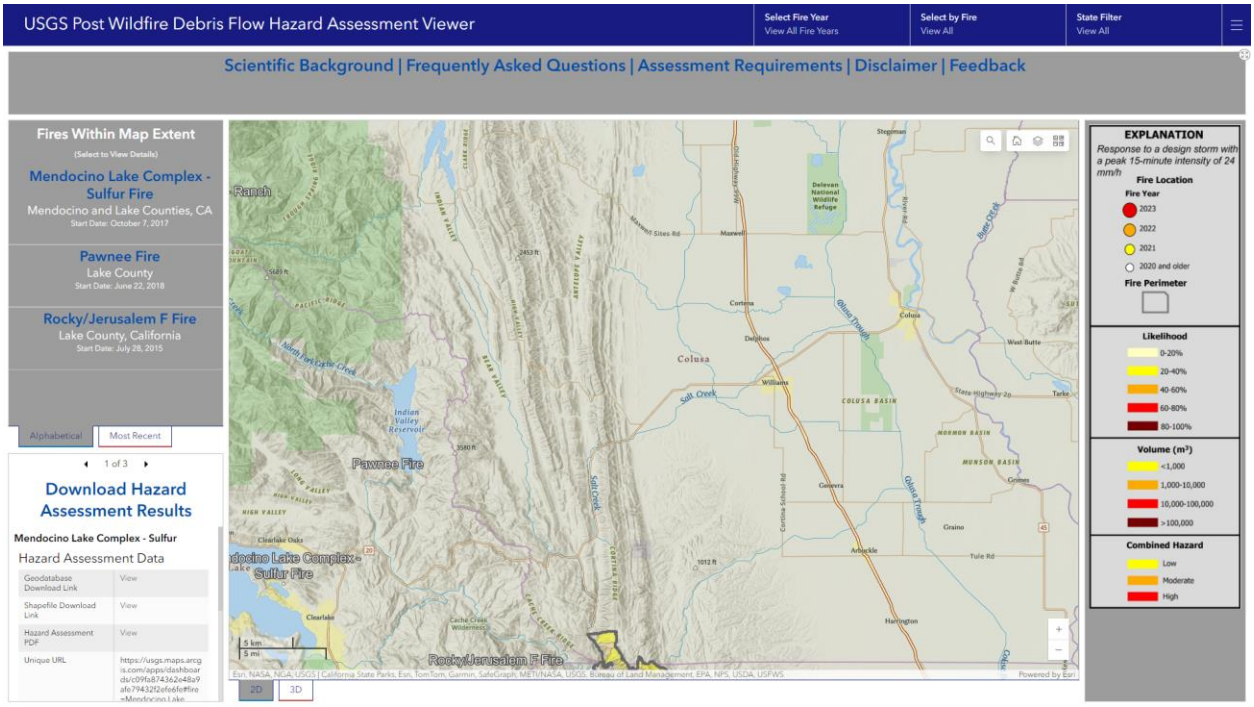
Jurisdiction / Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
City of Colusa						
Very High	0	0.00%	0	0.00%	0	0.00%
High	0	0.00%	0	0.00%	0	0.00%
Moderate	507	21.03%	168	12.13%	339	33.10%
Non-Wildland/Non-Urban	1,113	46.17%	544	39.18%	569	55.65%
Urban Unzoned	791	32.81%	676	48.69%	115	11.25%
City of Colusa Total	**2,412**	**100.00%**	**1,388**	**100.00%**	**1,023**	**100.00%**
City of Williams						
Very High	0	0.00%	0	0.00%	0	0.00%
High	0	0.00%	0	0.00%	0	0.00%
Moderate	96	3.30%	27	2.55%	69	3.74%
Non-Wildland/Non-Urban	2,047	70.59%	603	56.76%	1,444	78.59%
Urban Unzoned	757	26.11%	432	40.69%	325	17.67%
City of Williams Total	**2,900**	**100.00%**	**1,062**	**100.00%**	**1,838**	**100.00%**
Unincorporated Colusa County						
Very High	267,535	36.95%	21,986	8.91%	245,549	51.45%
High	77,030	10.64%	25,282	10.24%	51,747	10.84%
Moderate	25,855	3.57%	9,844	3.99%	16,010	3.35%
Non-Wildland/Non-Urban	352,204	48.64%	188,727	76.46%	163,476	34.26%
Urban Unzoned	1,418	0.20%	979	0.40%	440	0.09%
Unincorporated Colusa County Total	724,041	100.00%	246,818	100.00%	477,223	100.00%
Grand Total	**729,353**	**100.00%**	**249,269**	**100.00%**	**480,084**	**100.00%**

Source: CAL FIRE (FHSZ SRA 2024, FRA & LPA 2007)

Post-Wildfire Landslides and Debris Flows

Post-wildfire landslides and debris flows are a concern in Colusa County, though the fires usually burn in areas that are less populated. Fires that burn in hilly areas, which comprise the western portion of Colusa 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 only one event in Colusa County – a very small portion of the Rocky/Jerusalem Fire. This can be seen at the bottom center of Figure 4-100.

Figure 4-100 Colusa County – Post-Wildfire Debris Flow Areas



Source: USGS. Retrieved 3/22/2024.

Past Occurrences

Disaster Declaration History

A search of FEMA and Cal OES disaster declarations shows one federal and two state disaster declarations. These are shown in Table 4-110.

Table 4-110 Colusa County – Federal and State Disaster Declaration from Wildfire 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Fire	1	2018 (Ranch Fire)	2	1987 (Fouts Fire), 2018 (Ranch Fire)

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked wildfire events in the County dating back to 1993. The 13 events in Colusa County in the database are shown in Table 4-111.

*Table 4-111 NCDC Wildfire Events in Colusa County 1993 to 8/31/2023**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Wildfire	13	7	1	37	5	$0	$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 National Park Service (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 National Park Service, Bureau of Land Management, 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, National Park Service, 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 Colusa County were extracted and are listed in Table 4-112. There are 75 fires recorded in this database for Colusa County greater than 50 acres. Each of them was tracked by CAL FIRE. Many more small fires have occurred, but were not included in the analysis.

Figure 4-101 shows fire history for the Colusa County Planning Area, colored by the size of the acreage burned. This map contains fires from 1950 to 2023, while the detailed tables of wildfire shown in Table 4-112 contain fires from 1910 to 2023, though the first recorded wildfire in this database in Colusa County is from 1916.

Figure 4-101 Colusa County Wildfire History – CAL FIRE 1910 to 2023

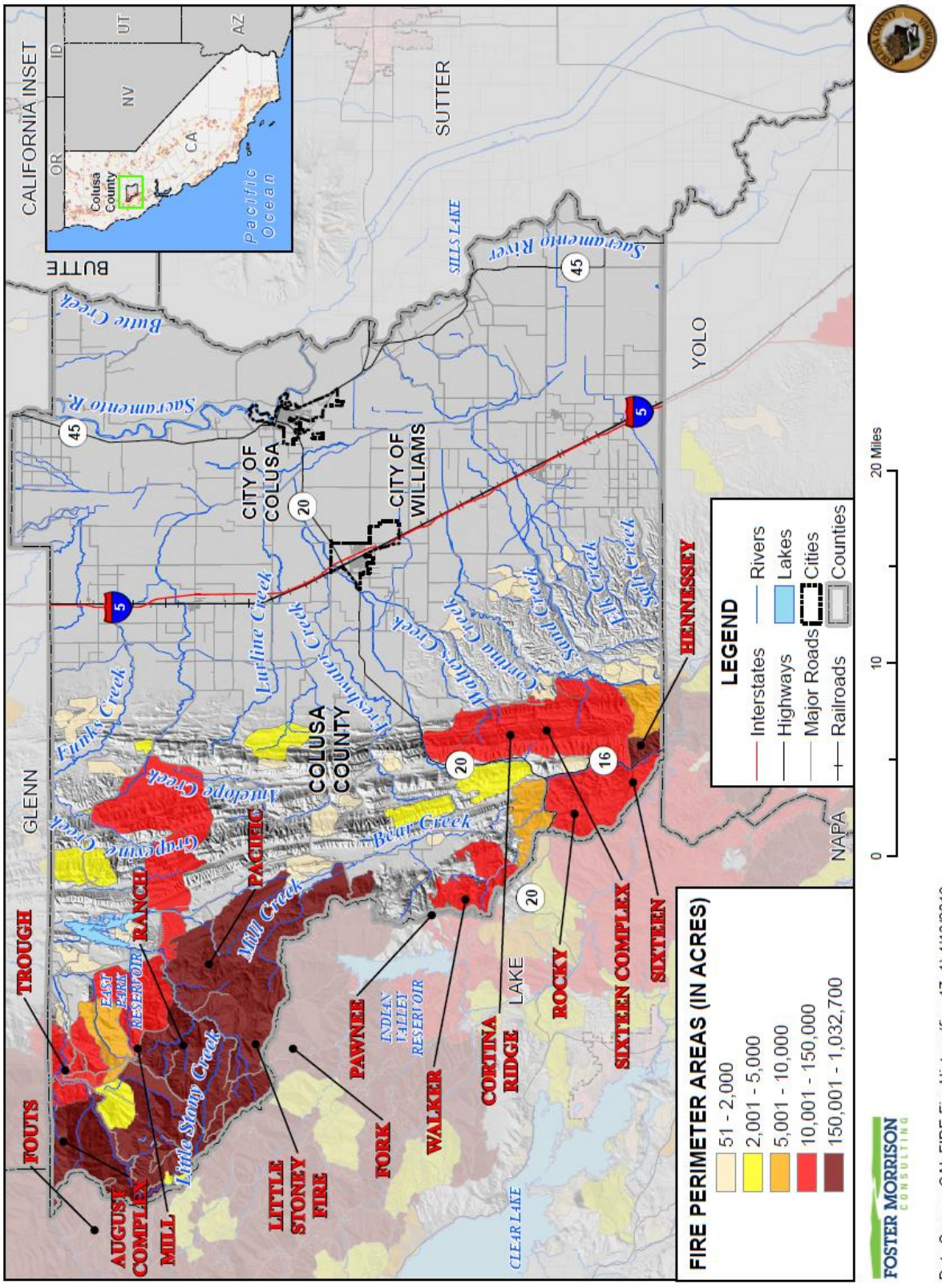


Table 4-112 Colusa County – CAL FIRE Wildfire History Summary 1910-2023

Wildfire Name	Year	Date	Cause Description	Total Wildfire Acres	Wildfire Acres Within County
40 FIRE	–	–	–	1,057	19
TROUGH SPRINGS	1916	–	Equipment Use	6,189	6,188
PACIFIC	1928	–	Equipment Use	15,610	15,607
SPANISH RANCH	1928	–	Miscellaneous	1,395	0
CRACKER BOX	1932	–	Unknown/Unidentified	1,853	1,853
DIGGER PINE CAMP	1939	–	Miscellaneous	3,982	1
FOUTS SPRING	1939	–	Miscellaneous	524	524
(blank)	1948	–	Unknown/Unidentified	12,222	12,220
(blank)	1949	–	Unknown/Unidentified	782	782
WALTER TINDELL	1950	–	Unknown/Unidentified	299	299
I.G. ZUMWALT	1950	8/6/1950	Unknown/Unidentified	345	345
LITTLE STONEY FIRE	1950	9/3/1950	Unknown/Unidentified	17,367	9,283
WENDELL PAYNE #3	1950	9/3/1950	Unknown/Unidentified	568	568
LANG	1951	8/9/1951	Unknown/Unidentified	1,202	1,202
LANG #3	1951	9/9/1951	Unknown/Unidentified	642	642
GABBERT	1952	19166	Unknown/Unidentified	1,390	1,390
JACKSON	1952	8/23/1952	Unknown/Unidentified	266	265
ZUMWALT	1952	8/5/1952	Unknown/Unidentified	1,252	1,252
W.H. JONES	1952	9/27/1952	Unknown/Unidentified	454	454
LEON ETCHEPARE	1953	–	Unknown/Unidentified	805	805
L.V. & J.D. MOSSMAN	1953	6/17/1953	Unknown/Unidentified	548	548
I. ZUMWALT	1954	7/22/1954	Unknown/Unidentified	1,643	1,149
LIGHTNING #5	1954	7/25/1954	Unknown/Unidentified	2,129	2,129
U.S. RECLAMATION	1954	8/7/1954	Unknown/Unidentified	516	516
ROADSIDE #2	1960	7/21/1960	Unknown/Unidentified	1,308	1,288
ROADSIDE #4	1961	–	Unknown/Unidentified	1,171	1,170
ROADSIDE #1	1961	6/14/1961	Unknown/Unidentified	3,621	3,620
A. W. WALDO	1961	7/24/1961	Unknown/Unidentified	470	470
ROADSIDE #3	1961	8/9/1961	Unknown/Unidentified	372	372
ROADSIDE #1	1962	–	Unknown/Unidentified	569	569
THREE SISTERS	1962	6/7/1962	Unknown/Unidentified	510	510
ROADSIDE #3	1962	9/8/1962	Unknown/Unidentified	446	446
CACHE CREEK	1964	7/11/1964	Unknown/Unidentified	375	375

Wildfire Name	Year	Date	Cause Description	Total Wildfire Acres	Wildfire Acres Within County
SOUTH JACKSON CANYON	1964	8/5/1964	Unknown/Unidentified	718	718
ZUMWALT	1966	24273	Unknown/Unidentified	544	544
DEBOLT	1966	6/11/1966	Unknown/Unidentified	812	812
CORTINA RIDGE FIRE	1966	6/12/1966	Unknown/Unidentified	16,323	16,320
DUMP #12	1966	6/26/1966	Unknown/Unidentified	78	78
PAULO	1967	7/6/1967	Unknown/Unidentified	437	437
BRUSH CREEK	1967	9/13/1967	Unknown/Unidentified	385	385
GRANT	1968	25097	Unknown/Unidentified	1,863	1,862
ELK CREEK	1968	7/18/1968	Unknown/Unidentified	724	724
JACKSON	1972	–	Unknown/Unidentified	1,958	1,958
ZUMWALT	1974	6/23/1974	Unknown/Unidentified	796	52
FOUTS	1975	–	Debris	2,546	2,546
KALFSBEER	1975	6/20/1975	Unknown/Unidentified	1,047	1,047
COOK FIRE	1976	–	Unknown/Unidentified	984	984
GRAVRLLY BUTTES	1976	6/23/1976	Unknown/Unidentified	1,199	1,198
(blank)	1977	–	Miscellaneous	98	79
SITES	1978	9/4/1978	Unknown/Unidentified	748	748
ROBINSON	1979	–	Unknown/Unidentified	731	731
FOUTS	1987	9/1/1987	Lightning	16,363	4,907
LETTS	1988	12/5/1988	Miscellaneous	3,312	606
COOK	1989	8/27/1989	Arson	973	973
TURKEY RUN	1991	–	Unknown/Unidentified	516	13
LIGHTENING FIRE	1992	–	Unknown/Unidentified	2,928	2,928
FORK	1996	8/11/1996	Arson	83,057	441
MIDDLE	1998	9/20/1998	Equipment Use	5,993	4,202
SIXTEEN	1999	10/16/1999	Arson	37,893	2,960
TROUGH	2001	8/8/2001	Miscellaneous	24,927	7,326
BEAR	2002	5/18/2002	Escaped Prescribed Burn	110	110
4-2	2003	9/3/2003	Equipment Use	304	55
SITES	2003	9/3/2003	Lightning	390	390
RUMSEY 2	2005	10/12/2005	Miscellaneous	392	1
SPRING	2006	7/8/2006	Vehicle	274	274
WALKER	2008	6/22/2008	Vehicle	11,173	6,314
RUMSEY	2009	6/29/2009	Equipment Use	677	262

Wildfire Name	Year	Date	Cause Description	Total Wildfire Acres	Wildfire Acres Within County
SUMMIT	2009	8/12/2009	Campfire	287	282
OASIS	2009	9/7/2009	Campfire	1,575	18
MILL	2012	–	Miscellaneous	29,526	29,521
SITES_COMPLEX	2012	7/8/2012	Arson	4,429	4,087
WALKER	2012	8/12/2012	Unknown/Unidentified	5,103	3,992
SIXTEEN_COMPLEX	2012	9/4/2012	Arson	17,942	17,688
ROCKY	2015	7/29/2015	Miscellaneous	69,438	10,453
SANDS	2017	7/17/2017	Unknown/Unidentified	53	53
PAWNEE	2018	6/23/2018	Miscellaneous	15,197	43
RANCH	2018	7/27/2018	Miscellaneous	410,202	73,721
AUGUST COMPLEX	2020	8/16/2020	Lightning	1,032,700	51
HENNESSEY	2020	8/17/2020	Lightning	305,352	1,465
Grand Total				**2,194,963**	**271,220**

Source: CAL FIRE Fire History (4/13/2018)

EOC Activations

The County maintains a list of EOC activations by hazard. EOC activations from wildfire from 2008 to 2024 are shown in Table 4-113.

Table 4-113 Colusa County – EOC Activations from Wildfire 2008-2024

Disaster Type	EOC Activations	
	Count	Date
Wildfire	3	8/2012, 7/2016, 8/2020, 6/2024

Source: Colusa County OES

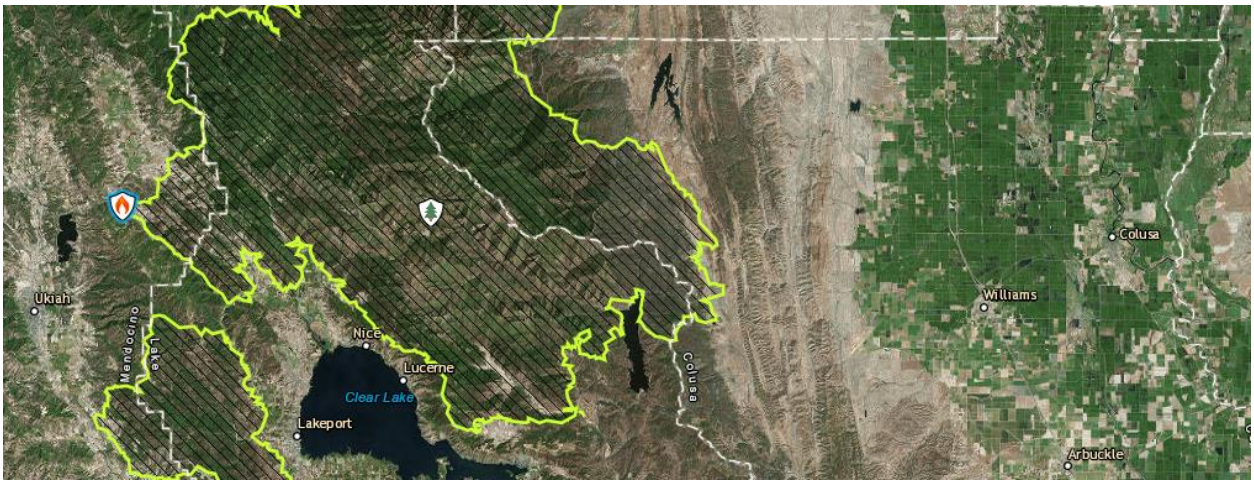
Hazard Mitigation Planning Committee Events

The HMPC noted that fire has played a significant historical role in Colusa County. The following includes some of the more significant named fires in Colusa County.

- **2018 Mendocino Complex Fire** – The Mendocino Complex Fire was the largest recorded fire complex in California history. It was a large complex of two wildfires, the River Fire and Ranch Fire, which burned in Mendocino, Lake, Colusa, and Glenn Counties in the U.S. State of California. First reported on July 27, 2018, both fires burned a combined total of 459,123 acres. Colusa County had burn areas in the unincorporated County. The entire western side of the County was on mandatory evacuations. The HMPC noted that a Red Cross shelter and a State Fire Camp and Federal Fire Camp was set up in the County. In the western part of the County in the communities of Stonyford, Lodoga and Fouts Sprints, many outbuilding and one residence was lost to the fire. Fortunately, no lives were lost. Many

acres of timberland were burned which will affect those who harvest the trees for woodcutting. No established businesses reported economic loss due to fire activity. The County experience damage to roads, and expended funds for many overtime activities during the firefight. A local emergency was proclaimed, and a USDA emergency was supportive for agricultural losses, however Colusa County was not named in the Gubernatorial or Federal Declaration. No public assistance support was received. Burn areas can be seen on Figure 4-102.

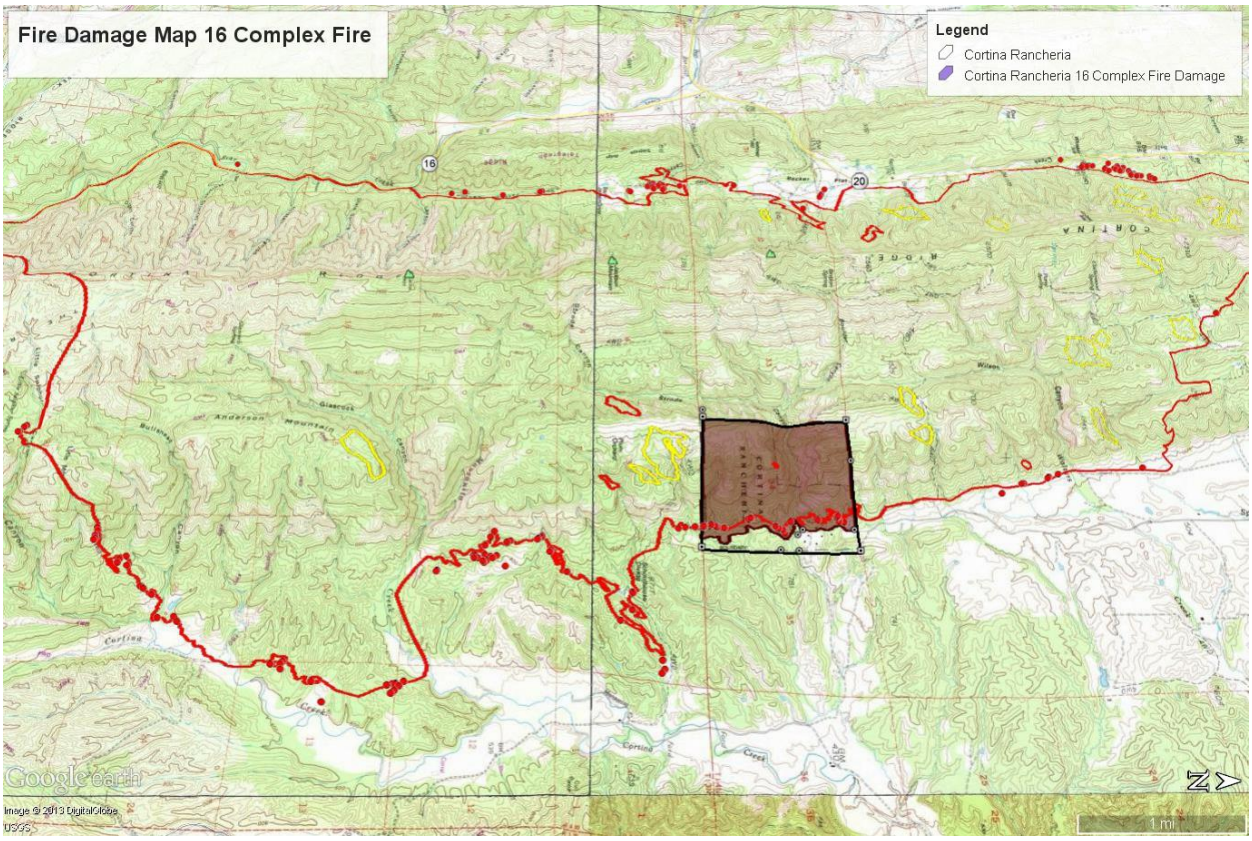
Figure 4-102 Mendocino Complex Burn Areas



Source: CAL FIRE

- **2012 Mill Fire** – The Mill Fire began sometime after midnight July 7, 2012, in the area near Mill Valley, Mill Creek and Letts Lake campgrounds. On July 7, the fire grew to one acre by 3 p.m. and expanded to about 150 acres by 8 p.m. according to the U.S. Forest Service. By July 8th the fire grew to 10,000 acres by 10 p.m. In total, the fire burned 29,502 acres.
- **2012 Wye Fire** – The Wye Fire burned 7,934 acres in Lake and Colusa counties. Challenging fire behavior, low reality humidity, very high temperatures, and erratic winds contributed to the spread of the fire. The fire burned an area around Highway 20 east of Highway 53 and in the Clearlake Oaks area. The smoke from the fires could be seen for miles. It could be seen from Napa County from the south and Butte County from the north. The fire destroyed two structures and one outbuilding. In addition, two other structures were damaged. 3 injuries were attributed to this fire. At its peak, more than 1,250 fire personnel from multiple agencies were involved in the fire fight. Multiple evacuation orders were put out. The Wye Fire resulted in a federal disaster declaration (FM-5004).
- **2012 Complex 16 Fire** – A wildfire burned in Colusa County, which caused damages to both the County and the Cortina Rancheria. Cultural items lost included multiple oak trees. The wildfire exacerbated future erosion in the burn scar areas, and has caused some recurring problems with hydrophobic soils. No homes were lost, but the fire occurred very close to site of 6 homes and cultural center. An acorn crop was lost due to the fire. Spring Valley Rd. was closed due to down power lines and residents were trapped due to no other road to use for ingress and egress. $75,000 in damages was reported on the Cortina Rancheria. Figure 4-103 shows the wildfire perimeter and the location of the Cortina Rancheria.

Figure 4-103 16 Complex Fire Burn Perimeter and Cortina Rancheria Area



Source: Cortina Rancheria

- **2001 Trough Fire** – The Trough Fire was one that challenged firefighter forces for over a week and required the combined forces of over 1,583 personnel. Fire suppression efforts were hampered by steep wilderness terrain, high temperatures, and access to areas of the Snow Mountain Wilderness area by air insertion only. The fire started on August 8, 2001, in an area just west of the community of Stonyford, California. By the time containment was achieved the fire had burned into three counties; Colusa County, Glenn County and Lake County respectively. Property losses included 10 residential structures, 20 outbuildings, 7 vehicles, and 2 other designated properties. Some damages can be seen on Figure 4-104. Property saved included 27 residential structures, 70 other miscellaneous outbuildings, and 1 commercial property. Notable saves include; the California Youth Authority's Fouts Springs Youth Facility which houses 162 youths on a compound of approx. 20 structures, the community of Stonyford with a population of 250, and many historical structures throughout the region.

Figure 4-104 Trough Fire – One of Three Vintage Outbuildings and Bus Destroyed on CYA Youth Compound

Source: Colusa County OES

Likelihood of Future Occurrence

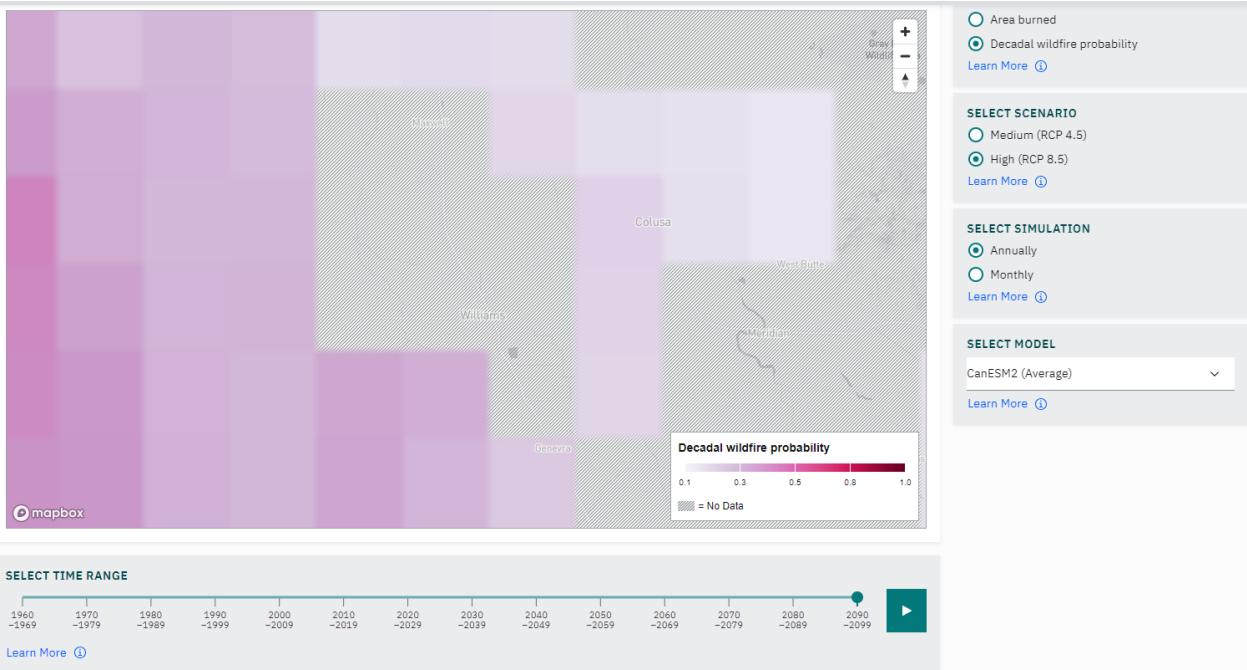
Highly Likely —Colusa County faces a serious wildland fire threat every year. While generally limited to the sparsely populated, forested areas in the western portion of the County, fires will continue to occur on an annual basis in the Colusa County Planning Area. The threat of wildfire and potential 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 Colusa County continue to be at risk from wildfire. However, most of the fires remain occur in more remote areas of the County with limited structures and people at risk.

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 recent (2010) conditions. This is shown in Figure 4-105. Based on this model, Cal-Adapt predicts that wildfire risk in Colusa 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 Colusa County Planning Area, precipitation patterns, high levels of heat, topography, and fuel load will determine the frequency and intensity of future wildfire.

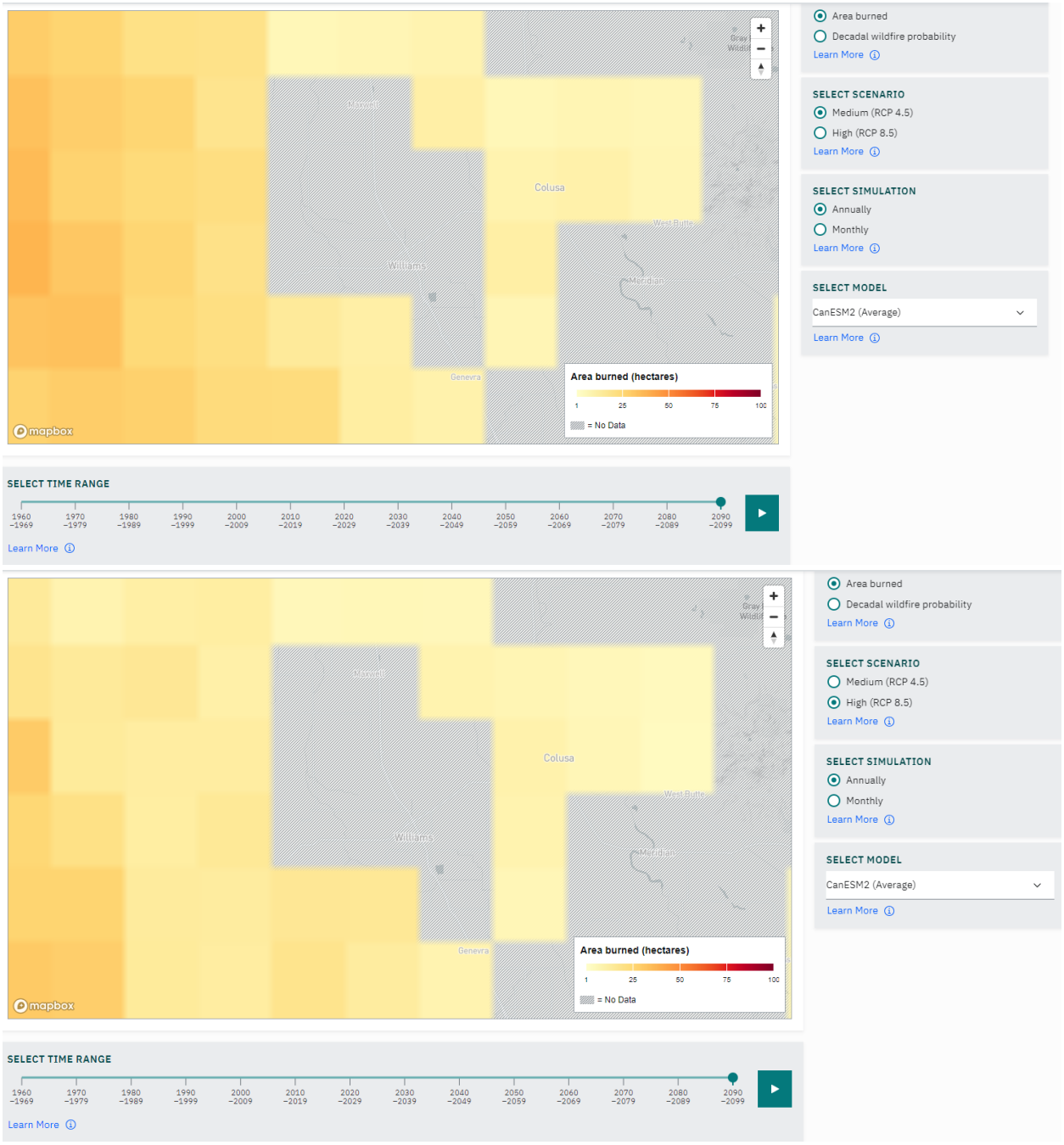
Figure 4-105 Colusa County Planning Area – Projected Increase in Wildfire Burn Areas



Source: Cal-Adapt. Retrieved 3/22/2024.

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 4-106. 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 4-106 Colusa County Planning area – Future Annual Averages of Acres Burned under RCP 4.5 and 8.5 Scenarios



Source: Cal-Adapt. Retrieved 3/22/2024.

Vulnerability Assessment

Vulnerability—High

Risk and vulnerability to the County from wildfire is of 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 wildfires will also increase.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to unincorporated Colusa 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 Colusa County Planning Area as well as the unincorporated portions of Colusa County. How the hazard affects the 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 Colusa 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.

A section of National Forest crosses through the western area of Colusa County. The United States Forest Service patrols the areas during wildfire season. Past planning processes have determined that wildfires are a minor threat to the Colusa County Planning Area, based on land use listed in the County General Plan and historical data of previous declarations, and input from area fire departments. This is changing in the County. Secondary homes within the forest boundaries which could place residents in jeopardy of death or injury during a rapidly moving wildfire. Adjacent to the National Forest are areas of rolling hills and brush areas. This land is part of the State Responsibility Area, which means that wildfire protection is under the jurisdiction of CAL FIRE. This area has limited population, but has moderate fire risk. Historically, wildfire has been of limited concern in the County as the WUI areas and other fire prone areas of the County are found in the western side of the County where limited population exists

The 2021 Colusa County CWPP noted, however, that throughout Colusa County and in California as a whole, communities adjacent to and within the state's wildlands have experienced growth and an increase in public access and use. Development in these areas has taken a number of forms. Remote residences and areas of development are often created without many of the infrastructure components and fire safety features that are integral to fire protection. Significant among these deficiencies are insufficient access on two lane roads for ingress and egress of firefighting equipment, roads that dead end reducing escape opportunities, inadequate water supply systems, and the presence of mobile homes as residences on small rural parcels. Considering that mobile homes are often installed with insufficient vegetation removal and control, this type of residence is at an increased risk from fast moving wildland fires.

In addition to the fire threats facing WUI areas within Colusa County, several other significant wildfire issues confront County residents. Among these are highly flammable invasive fuels (Arundo donax and Tamarisk) within a number of streams located on the valley floor. The potential for fire within this dense, often desiccated vegetation threatens developed sites, ranchlands and farms. In addition, high vegetative fuel levels are found along the Sacramento River corridor and within U.S. Fish and Wildlife Service National Wildlife Refuge lands located throughout portions of Colusa County on the valley floor.

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 wildfire 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 Colusa County Planning Area and unincorporated Colusa County.

Methodology

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 Fire Hazard Severity Zones (FHSZs), include 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 Fire Hazard Severity Zone (FHSZ) maps for the State Responsibility Area (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. The FHSZ mapping program is still ongoing with new mapping in Local Responsibility Areas (LRA) in process.

For the Colusa County Planning Area, the following datasets were utilized for the analysis and contained all FHSZ hazard classes from Very High to Urban Unzoned: CAL FIRE State Responsibility Area (FHSZSRA_23_3) April 2024 and CAL FIRE Federal/Local Responsibility Areas: (Adopted SRA FHSZ 11/2007 - fhszs06_3_6 and Draft LRA FHSZ 9/2007 - c6fhszl06_1). Since it is possible for any given parcel to intersect with multiple categories for purposes of this analysis, the parcel centroid was used to determine which FHSZ to assign to each parcel. Once completed, the parcel boundary layer was joined to the centroid layer and values were transferred based on the identification number in the Assessor's database and the parcel layer. Based on this approach, the FHSZs for the Planning Area were determined and further broken out by property use and included information on both land and improved values.

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
- Elderly (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

Colusa 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 wildfire hazard layers were overlayed on the parcel layer and linked to the Assessor data. Those residential parcel centroids that intersect the mapped layers were counted and multiplied by the 2020 Census Bureau average household factors for each jurisdiction. These are shown by jurisdiction in Table 4-114.

Table 4-114 Colusa County Planning Area – Improved Residential Parcels and Population by CAL FIRE 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 Colusa	0	0	0	0	175	508
City of Williams	0	0	0	0	3	8
Unincorporated County	232	673	82	209	72	258

Source: CAL FIRE, 2023 Colusa County Parcel/Assessor's Data, 2020 US Census Bureau Average Household Size– City of Colusa (2.90); City of Williams (2.55); Unincorporated Colusa County (3.58).

These numbers reflect low end estimates as the property use categories based on the Assessor data utilized for this LHMP Update assumes all residential properties are single family residences. However, some of the residential parcels actually include multi-family units, including apartments, condominiums and well as duplexes and triplexes. These variations in residential property use were not accounted for in the analysis, which skews populations results to be lower.

Structures

This section is presented in two sections: Fire Responsibility Area Analysis and Fire Hazard Severity Zone Analysis.

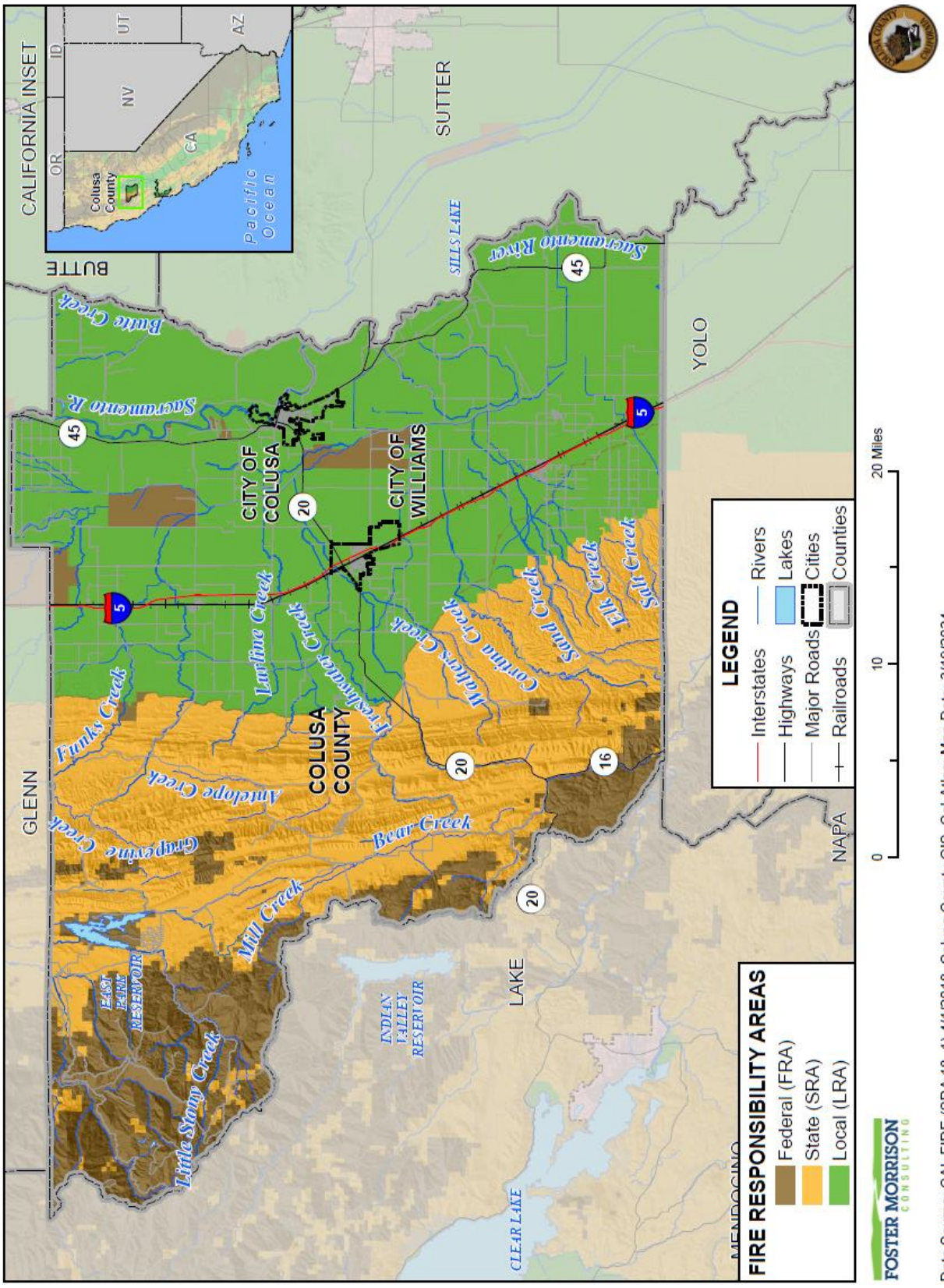
Fire Responsibility Area Analysis

There are various wildland fire protection agencies that have responsibility within the California Counties. There are also numerous fire departments and fire protection districts that serve local areas, many of whom have mutual aid agreements with each other as well as federal and state agencies for fire suppression and protection. Fire Responsibility areas are generally categorized by Federal Responsibility Areas (FRA), State Responsibility Areas (SRA) and Local Responsibility Areas (LRA).

The CAL FIRE data, detailing Fire Responsibility Areas within the County Planning Area, was utilized to determine the locations, numbers, types, and values of land and structures falling within each Fire Responsibility Area. CAL FIRE has a legal responsibility to provide fire protection on all SRA lands, which are defined based on land ownership, population density and land use. CAL FIRE's State Responsibility Area layer was used in this analysis to show Colusa County's parcel counts and values by FRA, SRA, and LRA.

The fire responsibility area layer was overlaid with the parcel data. Since it is possible for any given parcel to intersect with multiple fire responsibility areas, for purposes of this analysis, the parcel centroid was used to determine which fire responsibility area to assign to each parcel. Once completed, the parcel boundary layer was joined to the centroid layer and values were transferred based on the identification number in the Assessor's database and the FIS parcel layer. Based on this approach, the fire responsibility areas for the Colusa County Planning Area were determined and further broken out by property use and included information on both land and improved values. Locations of each responsibility area are shown in Figure 4-107.

Figure 4-107 Colusa County Planning Area – Fire Responsibility Areas in FRA, SRA, and LRA



Colusa County is relatively equally divided (in terms of land area) between the FRA, SRA, and LRA as shown in the figure above. However, most of the structures in the County fall in the LRA. 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. The County parcel inventory and associated values by fire responsibility area are provided in Table 4-115 for the entire Colusa County Planning Area.

Table 4-115 Colusa County Planning Area – Count and Value of Parcels by Local, State, and Federal Responsibility Areas by Jurisdiction

Jurisdiction / Fire Responsibility Area	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Total Value
City of Colusa						
LRA	2,334	2,077	$144,303,544	$443,767,787	$49,228,543	$637,299,874
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$637,299,874**
City of Williams						
LRA	1,755	1,477	$110,173,986	$349,462,550	$126,901,961	$586,538,497
City of Williams Total	**1,755**	**1,477**	**$110,173,986**	**$349,462,550**	**$126,901,961**	**$586,538,497**
Unincorporated Colusa County						
LRA	7,709	4,997	$1,431,126,141	$851,585,243	$195,516,311	$2,478,227,695
SRA	2,686	586	$95,150,150	$62,943,153	$3,831,071	$161,924,374
FRA	487	15	$39,393,861	$4,044,867		$43,438,728
Unincorporated Colusa County Total	**10,882**	**5,598**	**$1,565,670,152**	**$918,573,263**	**$199,347,382**	**$2,683,590,797**
Grand Total	**14,971**	**9,152**	**$1,820,147,682**	**$1,711,803,600**	**$375,477,886**	**$3,907,429,168**

Source: CAL FIRE (FHSZ SRA 2024, FRA & LPA 2007), 2023 Colusa County Parcel/Assessor's Data

Fire Hazard Severity Zone Analysis

All structures in the Colusa County Planning Area have some risk to wildfire. GIS was used to determine the possible impacts of wildfire within the Planning Area. Summary analysis results for each jurisdiction in the Planning Area are shown in Table 4-116, which summarizes total parcel counts, improved parcel counts and their structure values by fire hazard severity zone. Breakouts of this FHSZ analysis by property use for the unincorporated County is shown in Table 4-117. Details specific to property uses in the incorporated jurisdictions in the County are shown in their respective annexes to this Plan Update.

Table 4-116 Colusa County Planning Area – Count and Value of Parcels (and Structures) by CAL FIRE Fire Hazard Severity Zone by Jurisdiction

Jurisdiction / Fire Hazard Severity Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Colusa							
Moderate	271	205	$26,303,908	$100,956,400	$20,126,336	$78,616,901	$226,003,545
Non-Wildland/Non-Urban	109	66	$21,782,513	$18,275,854	$7,091,405	$15,337,734	$62,487,506
Urban Unzoned	1,954	1,806	$96,217,123	$324,535,533	$22,010,802	$215,541,328	$658,304,786
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$946,795,837**
City of Williams							
Moderate	14	7	$1,213,560	$1,877,618	$333,680	$1,624,053	$5,048,911
Non-Wildland/Non-Urban	624	533	$50,157,946	$156,354,180	$39,433,510	$99,958,385	$345,904,021
Urban Unzoned	1,117	937	$58,802,480	$191,230,752	$87,134,771	$152,617,402	$489,785,405
City of Williams Total	**1,755**	**1,477**	**$110,173,986**	**$349,462,550**	**$126,901,961**	**$254,199,840**	**$840,738,337**
Unincorporated Colusa County							
Very High	2,239	335	$61,918,918	$38,071,019	$1,119,547	$28,058,865	$129,168,349
High	557	206	$37,653,475	$20,687,067	$2,008,318	$16,512,900	$76,861,760
Moderate	556	264	$44,579,599	$36,709,787	$9,516,826	$31,522,348	$122,328,560
Non-Wildland/Non-Urban	5,583	3,199	$1,346,694,088	$606,061,874	$174,717,679	$542,099,435	$2,669,573,076
Urban Unzoned	1,947	1,594	$74,824,072	$217,043,516	$11,985,012	$140,270,583	$444,123,183
Unincorporated Colusa County Total	**10,882**	**5,598**	**$1,565,670,152**	**$918,573,263**	**$199,347,382**	**$758,464,131**	**$3,442,054,928**
Grand Total	**14,971**	**9,152**	**$1,820,147,682**	**$1,711,803,600**	**$375,477,886**	**$1,322,159,934**	**$5,229,589,102**

Source: CAL FIRE (FHSZ SRA 2024, FRA & LPA 2007), 2023 Colusa County Parcel/Assessor Data

Table 4-117 Unincorporated Colusa County– Count and Value of Parcels (and Structures) by CAL FIRE Fire Hazard Severity Zone and by Property Use

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Very High							
Agricultural	842	96	$43,888,662	$17,256,564	$517,385	$17,256,564	$78,919,175

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Commercial	4	4	$267,832	$404,735	$8,130	$404,735	$1,085,432
Government	30	1	$914,151	$39,764	$0	$39,764	$993,679
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	1	1	$27,716	$294,198	$321,914	$294,198	$938,026
Miscellaneous	209	1	$6,272,606	$51,447	$0	$51,447	$6,375,500
Residential	1,153	232	$10,547,951	$20,024,311	$272,118	$10,012,157	$40,856,537
Very High Total	**2,239**	**335**	**$61,918,918**	**$38,071,019**	**$1,119,547**	**$28,058,865**	**$129,168,349**
High							
Agricultural	329	118	$32,655,450	$11,825,999	$1,387,345	$11,825,999	$57,694,793
Commercial	2	2	$42,891	$300,496	$0	$300,496	$643,883
Government	12	1	$1,056,601	$40,537	$0	$40,537	$1,137,675
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	3	2	$4,282	$86,072	$90,354	$86,072	$266,780
Miscellaneous	14	1	$534,111	$85,631	$0	$85,631	$705,373
Residential	197	82	$3,360,140	$8,348,332	$530,619	$4,174,165	$16,413,256
High Total	**557**	**206**	**$37,653,475**	**$20,687,067**	**$2,008,318**	**$16,512,900**	**$76,861,760**
Moderate							
Agricultural	234	160	$30,954,976	$16,403,724	$3,816,001	$16,403,724	$67,578,425
Commercial	27	24	$1,460,372	$6,006,314	$3,388,815	$6,006,314	$16,861,815
Government	109	2	$4,011,954	$3,490,763	$0	$3,490,763	$10,993,480
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	6	4	$386,407	$260,512	$404,302	$260,512	$1,311,733
Miscellaneous	16	2	$2,282,512	$173,599	$1,761,003	$173,599	$4,390,713
Residential	164	72	$5,483,378	$10,374,875	$146,705	$5,187,436	$21,192,394
Moderate Total	**556**	**264**	**$44,579,599**	**$36,709,787**	**$9,516,826**	**$31,522,348**	**$122,328,560**
Non-Wildland/Non-Urban							
Agricultural	4,054	2,285	$1,216,344,410	$316,276,836	$107,606,265	$316,276,836	$1,956,504,347
Commercial	64	38	$8,055,110	$42,292,303	$24,041,083	$42,292,303	$116,680,799
Government	229	9	$25,203,187	$515,401	$0	$515,401	$26,233,989
Industrial	31	19	$6,057,680	$57,506,560	$38,488,991	$86,259,843	$188,313,074
Institutional	18	1	$593,137	$2,691,992	$0	$2,691,992	$5,977,121
Miscellaneous	241	19	$26,257,343	$1,347,357	$90,670	$1,347,357	$29,042,727
Residential	946	828	$64,183,221	$185,431,425	$4,490,670	$92,715,703	$346,821,019
Non-Wildland/Non-Urban Total	**5,583**	**3,199**	**$1,346,694,088**	**$606,061,874**	**$174,717,679**	**$542,099,435**	**$2,669,573,076**

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Urban Unzoned							
Agricultural	31	19	$1,113,077	$1,488,002	$230,309	$1,488,002	$4,319,390
Commercial	163	111	$11,143,054	$22,533,217	$4,585,616	$22,533,217	$60,795,104
Government	46	26	$771,916	$3,442,721	$37,449	$3,442,721	$7,694,807
Industrial	20	11	$3,930,710	$13,999,889	$3,195,588	$20,999,833	$42,126,020
Institutional	27	18	$295,426	$4,594,388	$2,633,182	$4,594,388	$12,117,384
Miscellaneous	52	6	$1,565,490	$3,439,535	$0	$3,439,535	$8,444,560
Residential	1,608	1,403	$56,004,399	$167,545,764	$1,302,868	$83,772,887	$308,625,918
Urban Unzoned Total	**1,947**	**1,594**	**$74,824,072**	**$217,043,516**	**$11,985,012**	**$140,270,583**	**$444,123,183**
Unincorporated Colusa County Total	**10,882**	**5,598**	**$1,565,670,152**	**$918,573,263**	**$199,347,382**	**$758,464,131**	**$3,442,054,928**

Source: CAL FIRE (FHSZ SRA 2024, FRA & LPA 2007), 2023 Colusa County Parcel/Assessor Data

Critical Facilities and Infrastructure

Wildfire presents a threat to critical facilities and infrastructure. The following analysis identifies critical facilities and infrastructure at risk to wildfire. A separate analysis was performed on the critical facility inventory in Colusa County and all jurisdictions to determine critical facilities in FHSZs. Using GIS, the FHSZ areas were overlayed on the critical facility GIS layer. Figure 4-92 shows critical facilities, as well as the FHSZs. Table 4-105 details critical facilities by FHSZ by facility type and count for the Planning Area. Details of critical facility definition, type, name and address by FHSZ are listed in Appendix F.

Figure 4-108 Colusa County Planning Area – Critical Facilities in CAL FIRE FHSZs

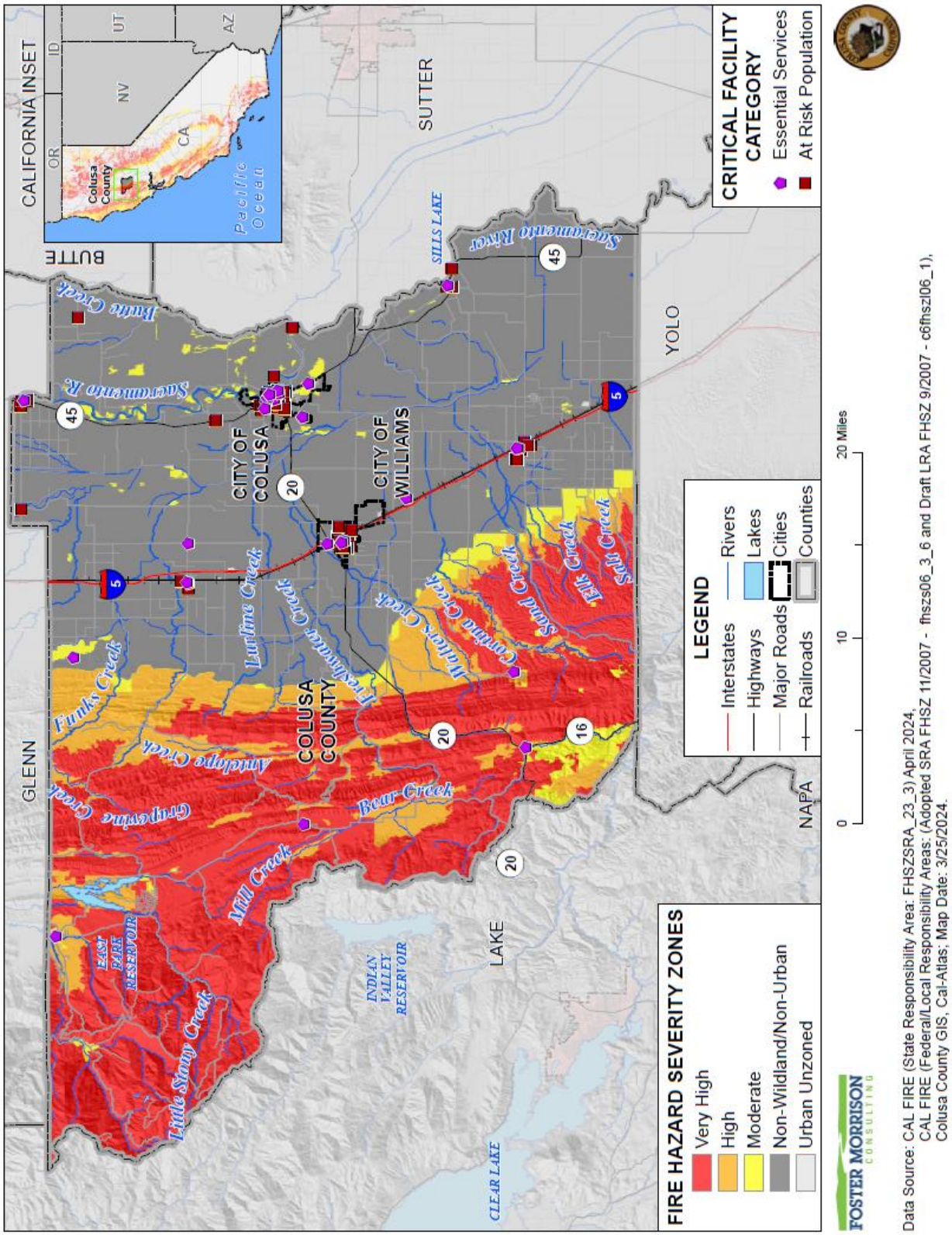


Table 4-118 Colusa County Planning Area – Critical Facilities in CAL FIRE FHSZs by Category, Type, and Jurisdiction

Jurisdiction/ Fire Hazard Severity Zone	Critical Facility Category	Facility Type	Facility Count
City of Colusa			
Moderate	Essential Services Facilities	Public Services	1
		Total	**1**
	At Risk Population Facilities	Apartment Complex	2
		Mobile Home Park	1
		Total	**3**
Moderate Total			**4**
Non-Wildland/Non-Urban	Essential Services Facilities	Utility Facility	1
		Total	**1**
	At Risk Population Facilities	Apartment Complex	1
		Mobile Home Park	1
		Total	**2**
Non-Wildland/Non-Urban Total			**3**
Urban Unzoned	Essential Services Facilities	Emergency Response	1
		Fire Station	2
		Medical	1
		Police Station	1
		Public Services	2
		Utility Facility	1
		Total	**8**
	At Risk Population Facilities	Apartment Complex	19
		Assisted-Living	1
		Hotel or Motel	2
		Jail	1
		Mobile Home Park	3
		School	8
		Senior Living Facility	1
		Total	**35**
Urban Unzoned Total			**43**
City of Colusa Total			**50**
City of Williams			
Non-Wildland/Non-Urban	At Risk Population Facilities	Mobile Home Park	1
		Senior Living Facility	1
		Total	**2**

Jurisdiction/ Fire Hazard Severity Zone	Critical Facility Category	Facility Type	Facility Count
Non-Wildland/Non-Urban Total			**2**
Urban Unzoned	Essential Services Facilities	Emergency Response	2
		Fire Station	1
		Public Services	1
		Utility Facility	1
		Total	**5**
	At Risk Population Facilities	Apartment Complex	4
		Hotel or Motel	8
		Migrant Housing	1
		Mobile Home Park	1
		School	4
		Senior Living Facility	2
		Total	**20**
Urban Unzoned Total			**25**
City of Williams Total			**27**
Unincorporated Colusa County			
Very High	Essential Services Facilities	Fire Station	2
		Total	**2**
Very High Total			**2**
High	Essential Services Facilities	Fire Station	1
		Total	1
High Total			**1**
Moderate	Essential Services Facilities	Native American Reservation	1
		Total	1
	At Risk Population Facilities	Mobile Home Park	1
		Total	1
Moderate Total			2
Non-Wildland/Non-Urban	Essential Services Facilities	Utility Facility	2
		Total	**2**
	At Risk Population Facilities	Apartment Complex	1
		Casino	1
		Hotel or Motel	1
		Mobile Home Park	4
		Total	**7**
Non-Wildland/Non-Urban Total			**9**
Urban Unzoned	Essential Services Facilities	Fire Station	4

Jurisdiction/ Fire Hazard Severity Zone	Critical Facility Category	Facility Type	Facility Count
		Utility Facility	3
		Total	**7**
	At Risk Population Facilities	Apartment Complex	4
		Mobile Home Park	4
		School	9
		Total	**17**
Urban Unzoned Total			**24**
Unincorporated Colusa County Total			**38**
Grand Total			**115**

Source: CAL FIRE (FHSZ SRA 2024, FRA & LPA 2007), Colusa County GIS

Community Lifelines

Wildfire presents a threat to life and property, including to community lifelines in the Colusa County Planning Area. Community lifelines that would be vulnerable to wildfire include:

- **Safety and Security** –Police, Fire, and EMS personnel are often called on to respond during fire emergencies. This would be especially true if a wildfire occurred in or near the Planning Area. Emergency resources may be stretched during a large event.
- **Food, Hydration, Shelter** – Shelters may need to be opened to handle those displaced by a wildfire. Food and water would need to be provided.
- **Health and Medical** – There may be injuries and deaths from wildfire. Patient movement from accident scenes by EMS may have to be rerouted due to fire or smoke issues. Hospitals could see an influx of injured. Public health can be at risk from air quality issues from smoke.
- **Energy** – Wildfires could impact large areas of above ground electric infrastructure, causing widespread power outages. Even the threat of wildfire can cause power outages when fire weather conditions lead to PSPS events. Fire may cause fuel transportation to be delayed, causing local shortages.
- **Communications** – Communication systems can be damaged during a wildfire. An influx of service calls to dispatch centers for reporting of wildfire, power outages, or other issues can occur. Calls to and from family and friends during a wildfire can further overwhelm communication systems such as cell towers and other infrastructure. Demand may exceed the capacity of these systems to remain operational during response efforts. Messaging systems need to be deployed during these times to let the public know about road closures or evacuation routes.
- **Transportation** – Highways and local roads may see closures. These closures can affect response personnel (EMS, Fire, Police) as well as cause additional traffic issues for residents. Evacuation routes may be affected and overwhelmed during a large event.
- **Hazardous Material** – hazardous material facilities can be affected by wildfire. A release during these times can cause additional risk to responders, as well as additional exposure to the environment.
- **Water Systems** – Water systems may be taxed during wildfires. Access to water for firefighting can also be a challenge if power outages occur in affected areas. Wastewater systems can also be affected by an increase in silt, debris ash, and other materials entering the systems.

A large wildfire event could temporarily overwhelm many facilities and community lifelines in the Colusa County Planning Area.

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 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.

Economic Assets and Community Activities of Value

Wildfires in the Colusa County Planning Area can cause direct damage to economic assets such as businesses and commercial centers located in affected areas. If a fire occurs during a dry period, agricultural crops may also be affected. During extreme events, the economy may slow while recovery efforts are prioritized. Business revenue may be reduced during extended events. Community activities and events in areas affected by wildfire (and smoke and air quality issues) may be cancelled or rescheduled. This includes the County Fair, Farm Show, rodeos, craft fairs, and hunting and fishing seasons.

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 Colusa 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. Smoke impacts may come from wildfires outside the Planning Area, as well as from within.

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.

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 Colusa 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 Colusa County has recently slowed. Additional growth within the WUI and other high fire hazard 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. 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 most 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 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

Colusa County provided 53 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 assigned are based on the centroid of the polygon. Figure 4-109 show the locations of the future development areas and FHSZs. Table 4-119 shows the details of the future development areas that are located in each FHSZ.

Figure 4-109 Unincorporated Colusa County – Future Development in FHSZs

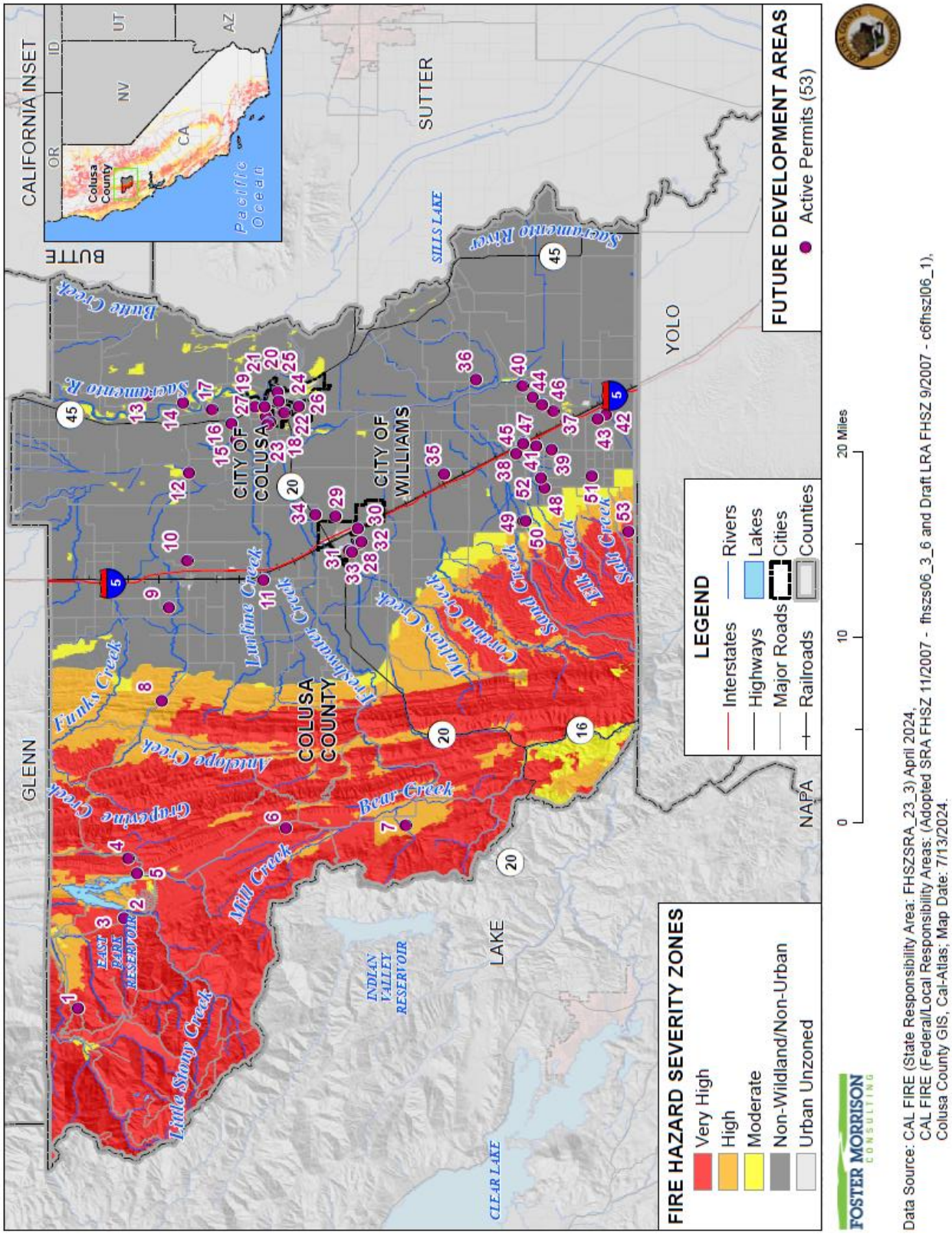


Table 4-119 Unincorporated Colusa County – Future Development in FHSZs with Parcel Counts and Acreages

Fire Hazard Severity Zone	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
Very High	1	010-200-001-000	1	161.29
	2	4564 LODOGA STONYFORD RD	1	2.49
	3	4564 LODOGA STONYFORD RD	1	2.49
	4	010-280-079-000	1	13.90
	5	4481 SITES LODOGA RD	1	86.68
	6	014-250-019-000	1	219.76
	53	5875 SILLS RD	1	618.41
	Very High Total		**7**	**1,105.00**
High	7	2001 BEAR VALLEY RD	1	637.09
	8	011-200-012-000	1	282.12
	High Total		**2**	**919.21**
Non-Wildland/Non-Urban	9	4105 RIORDAN RD	1	76.26
	10	5603 MAXWELL RD	1	30.89
	11	5498 LURLINE AVE	1	12.18
	12	6458 MAXWELL RD	1	319.89
	13	4374 RIVER RD	1	402.44
	14	4073 RIVER RD	1	10.32
	15	015-060-091-000	1	497.11
	16	6892 HARBISON RD	1	11.00
	17	015-030-094-000	1	17.03
	18	3258 MCCOY RD	1	6.01
	19	015-310-050-000	1	11.97
	23	3286 RANCH RD	1	1.85
	26	015-380-019-000	1	1.00
	27	1773 LURLINE AVE	1	3.40
	28	016-230-101-000	1	2.49
	29	2668 HUSTED RD	1	10.00

Fire Hazard Severity Zone	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
	30	2461 OLD HIGHWAY 99W	1	8.53
	32	016-230-065-000	1	1.45
	33	016-220-099-000	1	1.37
	34	017-010-045-000	1	56.35
	35	1707 LONE STAR RD	1	121.30
	36	019-090-058-000	1	10.00
	37	7020 FRIEL RD	1	9.92
	39	758 WILDWOOD RD	1	25.08
	40	7251 TULE RD	1	2.64
	41	887 WILDWOOD RD	1	1.89
	42	021-290-070-000	1	30.47
	43	6901 HARRINGTON AVE	1	15.16
	46	7072 PERKINS RD	1	9.29
	48	821 WYER RD	1	10.79
	49	6031 HILLGATE RD	1	9.65
	50	6011 HILLGATE RD	1	9.72
	51	6439 MARINE AVE	1	27.77
	52	853 JENSEN AVE	1	9.92
	Non-Wildland/Non-Urban Total		**34**	**1,775.14**
Urban Unzoned	20	022-200-066-000	1	0.45
	21	022-200-066-000	1	0.45
	22	3145 WILL S GREEN RD	1	7.48
	24	1232 FIFTH ST	1	0.60
	25	002-101-004-000	1	4.48
	31	2533 VENICE AVE	1	2.06
	38	805 GAIL AVE	1	0.38
	44	507 MAIN ST	1	0.47
	45	707 FIRST ST	1	0.13
	47	720 FIFTH ST	1	0.55
	Urban Unzoned Total		**10**	**17.05**

Fire Hazard Severity Zone	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
Grand Total			**53**	**3,816.40**

Source: CAL FIRE, Colusa County

4.4 Capability Assessment

Thus far, the planning process has identified the natural hazards posing a threat to the Colusa 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 4.4.3; and mitigation education, outreach, and partnerships are discussed in Section 4.4.4.

4.4.1. Colusa County's Regulatory Mitigation Capabilities

Table 4-120 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 Colusa County. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 4-120 Colusa 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	2012	
Climate Change Adaptation Plan		

Community Wildfire Protection Plan	Y	Plan addresses wildfire hazard and has mitigation actions. It was updated in 2021.
Comprehensive/Master Plan	2012/2014	County 2030 General Plan. Yes the General Plan primarily through its Safety Element implements mitigation policies and actions.
Continuity of Operations Plan	2017	
Economic Development Plan	2012	
Land Use Plan	Y	As part of General Plan.
Local Emergency Operations Plan	2016	
Stormwater Management Plan		
Transportation Plan		
Other (describe)		
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	N	N/A
Building code	Y	Y
Flood insurance rate maps	Y	Y
Floodplain ordinance	Y	Y
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	N/A
Subdivision ordinance	Y	Y
Zoning ordinance	Y	Y
Other	Y	Erosion program through building code.
How can these capabilities be expanded and improved to reduce risk?		
Erosion control measures could be enhanced through the adoption of County specific performance standards. The EOP will be updated soon, which would also help reduce risk. An update of the Safety Element is needed. This is especially poignant as the levee decertifications have put more of the County in the 1% annual floodplain.		

As indicated in the tables above, Colusa County has several plans and programs that guide the County's mitigation of development of hazard-prone areas. Starting with the Colusa 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.

Colusa County General Plan (2012)

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 hazards and hazard mitigation from the General Plan include the following:

Circulation Element

Goal CIRC-3	Provide a Circulation System that Supports Public Safety
Objective CIRC-3A:	Minimize Inconveniences and Safety Hazards Caused by Road Flooding, Washouts, and Emergency Conditions

Conservation Element

Goal CON-1	Conserve and protect Colusa County's ecosystem.
Policy CON 1-11:	Protect wetlands and riparian habitat areas from encroachment by development to the greatest extent feasible.
Policy CON 1-15:	Require that impacts to wetlands and riparian habitat protected by State or Federal regulations be avoided to the greatest extent feasible. If avoidance is not possible, fully mitigate impacts consistent with applicable local, state, and federal requirements.
Policy CON 1-16	Require new development projects to incorporate measures that eliminate or avoid direct impacts to lakes, reservoirs, rivers, creeks, streams, wetlands, and other waterways to the greatest extent feasible. Measures may include, but are not limited to, appropriate setbacks or the implementation of best management practices approved by the Department of Planning and Building.
Policy CON 1-29:	Support water development, treatment, and storage projects that are needed to meet existing and future local and regional demand.
Policy CON 1-30	Ensure that regional, state, and federal water projects, including proposed Sites Reservoir, protect local water rights and areas of origin.
Policy CON 1-31	Encourage municipal water purveyors to install water meters and abandon flat---fee water use rate structures where feasible.
Policy CON 1-32	Demonstrate leadership in water conservation by including water---efficient plumbing and landscaping at all new County facilities, and by reducing the County's own water use to the extent possible.
Policy CON 1-33	Require new development and expansion of existing uses to incorporate best management practices for water use and include water conservation measures.
Policy CON 1-34	Encourage the use of water conservation measures for agriculture and in existing residences and businesses.
Policy CON 1-35	Encourage the use of water conservation measures, including low flow plumbing; reclaimed wastewater for non---potable uses; dual plumbing that allows grey water from showers, sinks, and washers to be reused for landscape irrigation in new developments; and native and drought---tolerant landscaping.

Land Use Element

GOAL LU-1	Maintain the efficient and harmonious use of land in the county, promoting a well organized and orderly development pattern, avoiding random, haphazard growth, protecting public health and safety, and accommodating the orderly and sustainable growth of employment and population.
Policy LU 1-4	Locate lands designated for future development based on constraints associated with natural features, such as soil, slope, and drainage, preservation of the County's resources, including agriculture, open space, and scenic views, and by public service availability, such as sewer and water capability; policies and actions related to these requirements are set forth in more detail in the Safety, Conservation, and Public Facilities and Services Elements.

Open Space and Recreation Element

Goal OSR-1:	Preserve and Protect the Natural Resources and Scenic Beauty of the County
Policy OSR 1-5	New development should be designed and constructed to preserve open space features such as scenic corridors, wetlands, riparian vegetation, native vegetation, trees and natural resource areas where feasible and appropriate.
Policy OSR 1-9:	Maintain open space for future water and drainage projects.

Goal PSF-1	Ensure that adequate water and wastewater services are available to serve existing land uses and areas of planned growth, as identified in the General Plan Land Use Map.
Policy PSF 1-1	Encourage and support the expansion of municipal water systems to areas identified for current or future development and growth on the General Plan land use map.
Policy PSF 12	Prior to the approval of development, infrastructure, Specific Plans, or other projects that would result in increased demand for public water conveyance and treatment, projects must demonstrate proof of adequate water supply (e.g., that existing services are adequate to accommodate the increased demand, or improvements to the capacity of the system to meet increased demand will be made prior to project implementation), and that potential cumulative impacts to water users and the environment will be addressed.
Policy PSF 1-3	Coordinate with water providers throughout the County to manage water supplies in a way that ensures adequate supplies for existing residents, agricultural uses, and businesses, and for projected growth, and avoids groundwater overdraft, water quality degradation and other adverse environmental impacts.

Safety Element

Goal SA-1	Ensure the safety of County residents, businesses, and visitors from hazardous conditions, including natural catastrophes and human-caused emergencies.
Objective SA 1-A	Ensure that Colusa County is Prepared to Provide an Organized Response to Natural and Human-Caused Emergencies.

Goal SA-1	Ensure the safety of County residents, businesses, and visitors from hazardous conditions, including natural catastrophes and human-caused emergencies.
Objective SA 1-B	Ensure that Planning and Development Procedures Identify and Mitigate Potential Hazards
Objective SA 1-C	Reduce Risks to Human Life and Property from Seismic and Geological Hazards
Objective SA 1-D	Take Appropriate Steps to Reduce the Risks to Life, Property, and Public Services Associated with Flooding.
Objective SA 1-E	Strive to Maintain an Adequate System of Levees that Provide Flood Protection to Areas Throughout the County.
Objective SA 1-F	Reduce Risks to Life and Property from Dam Inundation
Objective SA 1-G	Minimize Risks to Human Life and Property from Fire in both Developed and Undeveloped Areas of the County
Objective SA 1-H	Minimize Risks to Residents and the Environment from Hazardous Materials and Waste

Other Colusa County Plans/Studies/Programs

Colusa County Emergency Operations Plan (2016)

The County of Colusa Emergency Operations Plan (EOP) addresses the County's planned response to extraordinary emergency situations associated with natural disasters, technological incidents and national security emergencies in or affecting the County of Colusa. This plan does not apply to normal day-to-day emergencies or the established departmental procedures used to cope with such emergencies. Rather, this plan focuses on operational concepts and would be implemented relative to large-scale disasters, which can pose major threats to life, property and the environment requiring unusual emergency responses.

This plan accomplishes the following:

- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting the County of Colusa.
- Identifies the roles and responsibilities required to protect the health and safety of Colusa residents, public and private property and the environmental effects of natural and technological emergencies and disasters.
- Establishes the operational concepts associated with a field response to emergencies, the County of Colusa Emergency Operations Center (EOC) activities and the recovery process.

Colusa County Threat and Hazard Risk Assessment (2014)

The Colusa Operational Area has compiled this Threat and Hazard Identification and Risk Assessment (THIRA) as a standard process for identifying community-specific threats and hazards and setting capability targets for each core capability identified in the National Preparedness Goal as required in Presidential Policy Directive (PPD) 8, and follows guidance from the Comprehensive Preparedness Guide (CPG) 201. New guidance for 2013 expands the THIRA process to include estimation of resources needed to meet the capability targets.

This THIRA will be reviewed on an annual basis and updated as necessary to acknowledge changing threats within the Operational Area to ensure planning processes include any changes or new threats.

Colusa County Wildfire Protection Plan (2021)

The Colusa County Community Wildfire Protection Plan was developed as a means of describing current fire and fuels conditions within various portions of Colusa County, identifying public and private assets at risk from wildfire, assessing currently in-place infrastructure that have been developed in order to protect these assets and to design efforts that improve current conditions. The planning document also provides background information necessary for local organizations to obtain grants and secure funding for future fuel reduction projects and other mitigation measures.

Throughout Colusa County and in California as a whole, communities adjacent to and within the state's wildlands have experienced growth and an increase in public access and use. Development in these areas has taken a number of forms. Remote residences and areas of development are often created without many of the infrastructure components and fire safety features that are integral to fire protection. Significant among these deficiencies are insufficient access on two lane roads for ingress and egress of firefighting equipment, roads that dead end reducing escape opportunities, inadequate water supply systems, and the presence of mobile homes as residences on small rural parcels. Considering that mobile homes are often installed with insufficient vegetation removal and control, this type of residence is at an increased risk from fast moving wildland fires.

Strategic Fire Plan Sonoma-Lake-Napa Unit (2023)

The California Department of Forestry and Fire Protection (CAL FIRE), Sonoma-Lake-Napa Unit (LNU) serves the counties of Sonoma, Lake, Napa, Solano, Yolo, and Colusa.

The LNU Fire Management Plan is a product of the implementation of the State Fire Plan. The State Fire Plan provides an analysis procedure to assess fire fuel hazards and risks in order to design and implement mitigating activities. The LNU Fire Management Plan provides background information, fuels and fire data, proposed projects, and individual Battalion reports outlining mitigating activities commonly carried out each year. This Plan is a local road map for the fire service and the public to create and maintain defensible landscapes to protect those assets vital to the state and its citizens.

The LNU Fire Plan outlines a comprehensive program designed to reduce total government costs and citizen losses from wildland fire in the Unit. It also strives to assist the public with assistance and education to create fire adapted communities that can more safely withstand a wildland fire.

Colusa County Climate Change and Health Profile Report (2017)

The Climate Change and Health Profile Report 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.

The content of this report was guided by a cooperative agreement between CDPH and the CDC Climate-Ready States and Cities Initiative's program Building Resilience Against Climate Effects (BRACE). The goals of BRACE are to assist state health departments to build capacity for climate and health adaptation planning. This includes using the best available climate science to project likely climate impacts, identifying climate-related health risks and populations vulnerable to these impacts, assessing the added burden of disease and injury that climate change may cause, identifying appropriate interventions, planning more resilient communities, and evaluating to improve the planning effort. Communities with economic, environmental, and social disadvantages are likely to bear disproportionate health impacts of climate change.

This Climate Change and Health Profile Report 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.

Covid-19 Continuity of Operations Plan (2020)

The Colusa County Department of Health and Human Services put together a Continuity of Operations Plan (COOP) to deal with the Covid-19 pandemic. The goal of this plan was to continue all Colusa County services, as well as to mitigate the impact of staffing shortages. As the CDC guidance came out regarding social distancing and reducing face to face contact, the Colusa County Department of Health and Human Services made efforts to adapt to changes in how to deliver services. This included the following:

- To enforce the social distancing requirements set by CDC, and temporarily alleviate some of the workload due to staffing shortages, all non-emergency contact will be conducted by telephone or mail.
- All interviews can be conducted by telephone. Documents will be mailed to applicants where a signature is required.
- Workers are available by telephone Monday – Friday, 8:00 AM – 4:30 PM at (530) 458-0250 locally. Workers will be making extra effort to answer all incoming calls immediately, and return missed calls within one business day, as we anticipated increased phone traffic and prompt response times will reduce attempted in-office visits.
- EBT cards will be mailed, with the exception of qualified emergency applications or emergency replacements where the customer desires pick-up.
- The lobby will be open Monday – Friday, 8:00 AM – 4:30 PM for emergency services only. Emergency services available in lobby include accepting emergency applications, printing Passport-to-Services, printing emergency Beneficiary Identification Cards (BIC) and issuing emergency EBT cards. Applications for emergency services do not need to be filed in person, and can be made by any of the methods listed above.
- The public who choose to visit our lobby will be advised to maintain 6 feet or more social distancing during all face-to-face contact. Frequently touched surfaces in our lobby will be disinfected often. Our waiting area will have chairs placed 6 feet apart.

Colusa Basin Watershed Management Plan (2012)

The Colusa Basin Watershed is located in Northern California and lies mainly in Colusa County, with portions of the watershed spanning areas of Glenn and Yolo Counties. The watershed extends from the Stony Creek Watershed in the north to the Cache Creek Watershed in the south and from the Sacramento River westward to the ridge crest of the Inner Coast Range foothills. The watershed covers approximately 1,045,445 acres (1,634 square miles) and drains into the Sacramento River at Knights Landing via the Colusa Basin Drain. The landscape is dominated by agricultural and rangeland activities, with less than 1% of the land being urbanized.

The Colusa County Resource Conservation District's (CCRCD) Watershed Coordinator, working under a Watershed Coordinator grant from the California Department of Conservation, has prepared this Colusa Basin Watershed Management Plan (Plan) as part of an ongoing effort by the CCRCD to address natural resource concerns in the Colusa Basin Watershed. This Plan is a non-regulatory, community-driven guide which addresses the concerns of a variety of stakeholders. This Plan is meant to be a user-friendly, living document with a clear set of management goals, objectives and achievable programs and projects to sustain and enhance watershed functions.

Groundwater Sustainability Plan (2021)

Sustainable management of groundwater is defined under SGMA as the "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results" (California Water Code [CWC] Section 10721(v)). Undesirable results are associated with each of six sustainability indicators, including chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, degraded water quality, land subsidence, and depletions of interconnected surface water. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the subbasin. Sea water intrusion, while a SGMA-defined sustainability indicator, was determined to be inapplicable to the Subbasin due to the distances between the Subbasin and the Pacific Ocean, bays, deltas, or inlets ranging from about 30 to 60 miles.

The purpose of this GSP is to characterize groundwater conditions in the Subbasin, evaluate and report on existing conditions relating to the six sustainability indicators, describe existing monitoring, management programs and policies relating to groundwater resource use, document public outreach and communication, establish sustainability goals, and describe projects and management actions (PMAs) the GSAs will implement to achieve sustainable groundwater management within 20 years of implementing the GSP (CCRs Title 23, Section 350.4 (f)).

Integrated Water Management Plan (2014)

The purpose of this Integrated Regional Water Management Plan (IRWMP) is to document the regional water resource management conditions, needs and strategies; to describe the process and projects that will improve regional water resources management in the IRWM region; and, to comply with the Final California Department of Water Resources (DWR) Integrated Regional Water Management (IRWM) Grant Program Guidelines.

The IRWMP was developed in three phases: Phase 1 centered on developing the goals and objectives for the region; Phase 2 focused on developing and prioritizing projects; and Phase 3 focused on drafting, and public review of, the IRWMP.

Colusa County Ordinances

Building Code (Chapter 5)

This chapter shall be known and may be referred to in all proceedings as the "Colusa County Building Code." The purpose of this chapter is to enact regulations relating to buildings and structures, imposing restrictions thereon and to provide for their enforcement. The provisions of this chapter shall apply to all of the unincorporated territory of Colusa County. (Ord. No. 744, § 2 (part); Ord. No. 763 § 1 (part): Ord. No. 781 § 1 (part): Ord. No. 805, § 1.) The following codes are adopted:

- The 2016 Edition of the California Building Code, including all its appendices, as adopted by the state of California and incorporated in Title 24, Part 2, of the California Code of Regulations, is adopted with the same force and effect as if fully set forth herein.
- The 2016 Edition of the California Mechanical Code, including all its appendices, as adopted by the state of California and incorporated in Title 24, Part 4, of the California Code of Regulations, is adopted by Colusa County with the same force and effect as if fully set forth herein.
- The 2016 Edition of the California Electrical Code, including all its appendices, as adopted by the state of California and incorporated in Title 24, Part 3, of the California Code of Regulations, is adopted with the same force and effect as if fully set forth herein.
- The 2016 Edition of the California Plumbing Code, including all its appendices, as adopted by the state of California and incorporated in Title 24, Part 5, of the California Code of Regulations, is adopted with the same force and effect as if fully set forth herein.
- The 2016 Edition of the California Fire Code, including all its appendices, as adopted by the state of California and incorporated in Title 24, Part 9, of the California Code of Regulations, is adopted with the same force and effect as if fully set forth herein.
- The 2016 Edition of the California Residential Code, including all its appendices, as adopted by the state of California and incorporated in Title 24, Part 2.5, of the California Code of Regulations, is adopted with the same force and effect as if fully set forth herein.
- The 2016 Edition of the California Energy Code, including all its appendices, as adopted by the state of California and incorporated in Title 24, Part 6, of the California Code of Regulations, is adopted with the same force and effect as if fully set forth herein.
- The 2016 California Green Building Standards Code, including all its appendices, as adopted by the state of California and incorporated in Title 24, Part 11, of the California Code of Regulations, is adopted with the same force and effect as if fully set forth herein.
- The 2016 California Referenced Standards Code, including all its appendices, as adopted by the state of California and incorporated in Title 24, Part 12, of the California Code of Regulations, is adopted with the same force and effect as if fully set forth herein.

Emergency Services (Chapter 6)

The declared purposes of this chapter are to provide for the preparation and carrying out of plans for the protection of persons and property within this county in the event of an emergency; the direction of the emergency organization; and the coordination of the emergency functions of this county with all other public agencies, corporations, organizations, and affected private persons. (Ord. No. 450, § 2 (part).)

t shall be the duty of the county disaster council, and it is hereby empowered, to develop and recommend for adoption by the board of supervisors, emergency and mutual aid plans and agreements and such ordinances and resolutions and rules and regulations as are necessary to implement such plans and agreements. The disaster council shall meet upon call of the chairman or, in his absence from the county or inability to call such meeting, upon call of the vice-chairman.

All officers and employees of this county, together with those volunteer forces enrolled to aid them during an emergency, and all groups, organizations, and persons who may by agreement or operation of law, including persons impressed into service under the provisions of section 6-6(a)(6)(c) of this chapter, be charged with duties incident to the protection of life and property in this county during such emergency, shall constitute the emergency organization of the county of Colusa. (Ord. No. 450, § 2 (part).)

The Colusa County disaster council shall be responsible for the development of the county of Colusa emergency plan, which plan shall provide for the effective mobilization of all of the resources of this county, both public and private, to meet any condition constituting a local emergency, state of emergency, or state of war emergency; and shall provide for the organization, powers and duties, services, and staff of the emergency organization. Such plan shall take effect upon adoption by resolution of the board of supervisors.

Fire Prevention (Chapter 7)

There is hereby adopted by the board of supervisors, county of Colusa, for the purpose of prescribing regulations governing conditions hazardous to life and property from fire or explosion, that certain code known as the Uniform Fire Code, recommended by the Western Fire Chiefs Association and the International Conference of Building Officials, being particularly the 1982 edition thereof and the whole thereof, save and except such portions as are hereinafter deleted, modified or amended by Sections 7-3 through 7-3.17 of this chapter, of which code not less than three copies have been and are now filed in the office of the clerk of the county of Colusa, and the ex officio clerk to the board of supervisors, and the same are hereby adopted and incorporated as fully as if set out at length herein and from the date on which this article shall take effect, the provisions thereof shall be controlling within the limits of the unincorporated areas of the county of Colusa. (Ord. No. 397, § 1; Ord. No. 432, § 1.)

Weed Abatement (Chapter 7A)

The purpose of this chapter is to provide for the removal of weeds from around the exterior of improvements situated in the unincorporated areas of the county so as to reduce the potential for fire, exposure to potential for fire, exposure to poisons and noxious substances and to promote the public health, safety and welfare of the community.

The board of supervisors finds that on many lots or parcels of land located in the unincorporated areas of the county, the growth and accumulation of weeds during the summer and fall months of the year poses a severe fire and safety hazard, both to persons and property; that the growth and accumulation of weeds presents difficult conditions for fire suppression efforts; that the growth and accumulation of weeds is allowed to occur by significant numbers of property owners, many of whom live out of the county and/or the state.

Based upon these findings, the board of supervisors declares that the existence of weeds in the unincorporated areas of the county constitutes a nuisance of a seasonal and recurring nature and that the weeds in these areas should be removed by the owners of the respective lots or parcels and, in the absence of such voluntary removal, that the weeds may be abated and removed by the county fire districts as set forth in this chapter. (Ord. No. 437, § 2 (part).)

Land Grading and Leveling (Chapter 9)

The board of supervisors finds that the regulations contained in this chapter governing the grading and levelling of land, the obstruction of or change in the natural drainage, and the control of irrigation and drainage water resulting therefrom are necessary for the protection of roads, highways, and other public properties and improvements pertaining to public health, safety, convenience and general welfare. (Ord. No. 414, § 2 (part).)

No person shall grade or level, cause to be graded or levelled, or commence grading or levelling operations upon any land area of five or more acres, or move, excavate, remove, dredge, pile or stockpile earth or other material so as to change, or cause to be changed, the natural course of any channel or waterway without first having complied with the provisions of this chapter.

Flood Damage Prevention (Chapter 33)

The flood hazard areas of Colusa 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 contribute to the flood loss. (Ord. No. 822, Exh. A.)

It is the purpose of this chapter to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone and sewer lines; and streets and bridges located in areas of special flood hazard;
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage;
- Ensure that potential buyers are notified that property is in an area of special flood hazard; and
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

In order to accomplish its purposes, this chapter includes methods and provisions to:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities;
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters;
- Control filling, grading, dredging, and other development 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.

This chapter shall apply to all areas of special flood hazards within the jurisdiction of Colusa County, commonly designated as zone(s) A or AE.

A development permit shall be obtained before any construction or other development begins within any area of special flood hazard established in section 33-3.2. Application for a development permit shall be made on forms furnished by the floodplain administrator and may include, but not be limited to: plans in duplicate drawn to scale showing the nature, location, dimensions, and elevation of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing.

Groundwater Management (Chapter 43)

It is the long-standing policy of the county of Colusa to conserve and encourage agricultural operations within the county. The county general plan establishes the preservation and promotion of agriculture in its various forms as being the highest priority goal in the county planning process. Other legislative acts of the county board of supervisors, including but not limited to the adoption of the "right to farm" ordinance, are further evidence of the existing policy.

It is essential for the protection of the health, welfare, and safety of the residents of the county and the public benefit of the state, that county groundwater resources be protected from harm resulting from the extraction of groundwater for use on lands outside the county and its groundwater basins unless and until such time as needed additional surface water supplies are obtained for use on county lands and over-development of groundwater resources is addressed to the satisfaction of the board. (Ord. No. 615, (part): Ord. No. 770, § 1 (Exh. A) (part).)

Zoning Code (Chapter 44)

The zoning code carries out the policies of the Colusa County General Plan by classifying and regulating the uses of land and structures, consistent with the General Plan. This zoning code is adopted to protect and promote the public health, safety, comfort, convenience, prosperity, and general welfare of residents, and businesses in the unincorporated County. More specifically, the purpose of this zoning code is to:

- Provide standards and guidelines for the continuing orderly growth and development that will assist in encouraging economic growth, protecting the rural and agricultural character, and providing property owners the ability to develop and optimize the use of their land;
- Promote the County's agricultural character and open spaces, including view sheds, cultural and historic resources, forests, hills, and waterways;

- Promote proposed development and new land uses that conserve energy and natural resources;
- Create a comprehensive and stable pattern of land uses upon which to plan transportation, water supply, waste water, energy, and other public facilities and utilities;
- Promote proposed development within established communities that is designed to contribute to the character of the community, through compatible building types and appearance, attractive streetscapes, and appealing pedestrian spaces; and
- Promote compatibility between different types of development and land uses.

It is unlawful and a violation of this zoning code for any person to establish, construct, reconstruct, alter, or replace any use of land or structure, except in compliance with the requirements of this zoning code. No planning permit, building permit, or grading permit shall be issued by the County unless the proposed development complies with all applicable provisions of this zoning code. (Ord. No. 765 § 2 (Exh. A) (part))

Any subdivision of land proposed after the effective date of this zoning code shall be consistent with the minimum lot size requirements of Article 44-2 (Zoning Classifications, Allowed Uses, and Development Standards) and Colusa County Code Appendix IV (Subdivisions), and all applicable requirements of this zoning code. (Ord. No. 765 § 2 (Exh. A) (part))

The provisions of this zoning code shall be minimum requirements for the promotion of the public health, safety, and general welfare. When this zoning code provides for discretion or common sense interpretation on the part of a County official or body, that discretion or interpretation may be exercised to require more stringent measures than set forth in this zoning code, in order to promote orderly land use and development, agricultural resource protection, and the other purposes of this zoning code.

4.4.2. Colusa County's Administrative/Technical Mitigation Capabilities

Table 4-121 identifies the County personnel responsible for activities related to mitigation and loss prevention in the County.

Table 4-121 Colusa 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/FT	Y
Civil Engineer, including dam and levee safety	N	
Community Planner	Y/FT	Limited training on hazards and mitigation of such hazards
Emergency Manager	Y/FT	Does not have a designation to enforce any codes
Floodplain Administrator	Y/FT	As part of the FT department head's duties and not a separate position
GIS Coordinator	N	

Planning Commission	Y	Reviewing entity for changes to local ordinances including ordinances designed to address hazards
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	N	
Hazard data and information	Y	FT staff in various departments uses analysis to do so
GIS analysis	N	
Mutual aid agreements	N	
Other	Y	Local capability to perform mitigation duties like tree trimming and drain maintenance is effective, however some drains are privately owned and some do not take responsibility for maintenance.
How can these capabilities be expanded and improved to reduce risk?		
Only if more positions are added to various departments. Many County staff currently fill more than one role, making expansion difficult with current staffing levels. Increased grant funding could allow additional staff to be hired.		

4.4.3. Colusa County's Fiscal Mitigation Capabilities

Table 4-122 identifies financial tools or resources that the County could potentially use to help fund mitigation activities.

Table 4-122 Colusa 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		
Community Development Block Grant	Y	The County does have access to CDBG funding
Federal funding programs (non-FEMA)		
Fees for water, sewer, gas, or electric services		
Impact fees for new development	Y	Development Impact Fees have been utilized for specific improvements
State funding programs	Y	CA DWR Grants and Cal OES grants. Other grant sources have been used.
Stormwater utility fee	N	
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?		
Look for grant or other funding opportunities, both from stated and federal grants. Increased staff would be needed to both apply for and manage any future grant opportunities. Many County staff currently fill more than one role, making expansion difficult with current staffing levels.		

4.4.4. Colusa County Mitigation Education, Outreach, and Partnerships

Table 4-123 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 4-123 Colusa County Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	Limited for hazard information
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	Y	OES provides some public outreach and education. Education always helps mitigation activities.
Local news		
Organizations that interact with underserved and vulnerable communities	Y	This has recently been expanded.
Social media	Y	Instagram and Facebook
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional hazard info can be placed in community newsletters. The County has recently done increased outreach to underserved communities. That will be continued, and the County will seek to increase this. Seek to increase public/private partnerships. Current County funding makes this difficult.		

4.5 Natural Hazards Summary

As detailed in the hazard identification section, those hazards identified as a high or medium significance in Table 4-124 are considered priority hazards for mitigation planning. Those hazards that occur infrequently or have little or no impact on each jurisdiction in the Colusa 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 by the Planning Committee to

prioritize those hazards of greatest significance to each jurisdiction in the Colusa County Planning Area, enabling the jurisdictions to focus resources where they are most needed. ***Note***: originally landslide and subsidence were priority hazards for Colusa County. After review of the hazards, possible mitigation actions, and the County's current capabilities, these hazards were moved to low priority hazards for mitigation planning for this LHMP Update.

Table 4-124 Hazard Identification and Initial Determination of Priority Hazards

Hazard	Likelihood of Future Occurrence	Priority Hazard
Ag Hazards: Severe Weather/Invasive Species	Highly Likely	Y
Climate Change	Highly Likely	Y
Dam Failure	Occasional	Y
Drought & Water shortage	Likely	Y
Earthquake	Likely /Unlikely	Y
Floods: 1%/0.5%/0.2% annual chance	Occasional / Unlikely	Y
Floods: Localized Stormwater	Highly Likely	Y
Landslide, Mudslide, and Debris Flow	Likely	N
Levee Failure	Occasional	Y
Severe Weather: Extreme Cold and Freeze	Highly Likely	Y
Severe Weather: Extreme Heat	Highly Likely	Y
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Highly Likely	Y
Severe Weather: High Winds and Tornados	Highly Likely / Occasional	Y
Stream Bank Erosion	Highly Likely	Y
Subsidence	Likely	N
Wildfire	Highly Likely	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 2024 Colusa 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 Colusa 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 2024 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 Colusa 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 2024 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 Colusa 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. While Tribal governments are eligible for participation in the NFIP, very few actually participate. The Kletsel Dehe Winton Nation, as a Tribal government participating in this LHMP Update, does not have any identified flood-prone areas, and thus does not participate in the NFIP. Although the participating districts to this LHMP Update are not eligible NFIP communities, many of their mitigation actions and projects contain measures to promote effective floodplain management throughout the Colusa County Planning Area.

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.

Colusa County's Flood Management Program

Colusa County has participated in the Regular Phase of the NFIP since September 18, 1985. 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 Colusa 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)?	The director of public works is designated the floodplain administrator. The floodplain administrator shall have the authority to delegate performance of certain duties to other employees. The director of public works has other roles.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	No, Not required per County Code (Chapter 33)
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)	Permit review, Elevation Certificates education, and outreach
What are the barriers to running an effective NFIP program in the community, if any?	Existing budgets and hydraulic modeling deficiencies.
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	243 policies $153,363 in annual premiums $65,642,000 of insurance in force
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?	142 paid losses $3,120,730 in paid claims. 7 substantial damage claims
How many structures (residential and non-residential) are exposed to flood risk within the community?	1,468 in 1% annual chance flood zone 1,059 in 0.2% annual chance flood zone
Are there Repetitive Loss (RL) and Severe Repetitive Loss Properties (SRL) structures in the community? (from CIS*)	25 RL 0 SRL
Are there Repetitive Loss (RL) and Severe Repetitive Loss Properties (SRL) structures in the community? (from PIVOT*)	19 RL 4 SRL
Describe any areas of flood risk with limited NFIP policy coverage	Flood insurance coverage within 1% annual chance floodplain is only 11.5% now that the remapping exercise has been completed and new flood maps are in effect as of March 27, 2024
How does the community teach property owners or other stakeholders about the importance flood insurance?	Flyers, social media outreach, and other efforts are used. City website is also used.
What digital sources (like the FEMA Map Service Center, National Flood Hazard Layer) or non-regulatory tools does the community use?	DFIRMs are used.
Compliance History	
Is the community in good standing with the NFIP?	Y
Are there any outstanding compliance issues (i.e., current violations)?	N

NFIP Topic	Comments
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?	For applications for building permits to improve buildings and structures, including alterations, movement, repair, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the floodplain administrator, in coordination with the building official, shall: (a) Estimate the market value, or require the applicant to obtain a professional appraisal prepared by a qualified independent appraiser of the market value, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made. (b) Compare the cost to perform the improvement, the cost to repair the damaged building to its predamaged condition, or the combined costs of improvements and repairs, where applicable, to the market value of the building or structure. (c) Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage. (d) Notify the applicant when it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the building code is required and notify the applicant when it is determined that work does not constitute substantial improvement or repair of substantial damage.
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	CAV – 6/18/2020
Is a CAV or CAC scheduled or needed?	No
Regulation	
When did the community enter the NFIP?	9/18/1985
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?	NFIP minimum regulations have been adopted. Most recently in 2020.
Has the community adopted the latest effective FIRM? Date adopted?	Yes. Most recently in 2020.

NFIP Topic	Comments
How does the community enforce local floodplain regulations and monitor compliance?	The floodplain administrator shall coordinate with and provide comments to the building official to administer and enforce the flood provisions of the building code and to ensure compliance with the applicable provisions of these regulations. The floodplain administrator and the building official have the authority to establish written procedures for reviewing applications and conducting inspections for buildings and for administering and documenting determinations of substantial improvement and substantial damage made.
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Meets.
How are Letters of Map Change (LOMCs) tracked and compiled?	New DFIRMs are downloaded regularly which include the latest LOMCs, LOMRs, and CLOMRs.
Provide an explanation of the permitting process.	If a property is to be developed in a floodplain, the building department coordinates flood zone development/elevation certificate requirements with the Flood Zone Administrator to ensure that the development is built to conform to the County floodplain ordinance.
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, Colusa County

*FEMA CIS and PIVOT databases record this data differently. CIS does not differentiate between RLs that have been mitigated, while PIVOT removes mitigated properties from the RL list. CIS contains only Post-FIRM SRL properties, while PIVOT contains both Pre- and Post-FIRM SRL properties.

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 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 Colusa 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 2024 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 Colusa County Planning Area.

Goal 1: Minimize risk and vulnerability of Colusa County to natural hazards (including climate change considerations) and protect lives and prevent losses to property, public health, economy, and the environment

- Provide protection for existing and future development
- Provide protection for critical facilities, infrastructure, and services and minimize disruptions
- Provide protection for natural resources
- Reduce the number of emergency incidents
- Consider future impacts of climate change in natural hazard mitigation
- Foster an economy that promotes and values a proactive approach to mitigation
- Preserve the functionality of property, economy, and commerce, that may be affected by infrastructure vulnerability

Goal 2: Increase community/public outreach, education, and awareness for all hazards to minimize hazard-related losses

- Increase public awareness of hazard risk, vulnerability, and mitigation
- Enhance outreach and education of community members to promote a hazard resilient community
- Educate citizens and farmers on water conservation methods to provide protection from future hazard events and build support for water storage projects
- Educate and increase awareness and understanding of migrant and other transient residents on hazards and natural hazard mitigation
- Increase education and awareness and ensure adequate resources among historically underserved populations, individual with access and functional needs, and populations impacted by natural hazards and disasters

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

- Increase communities' capabilities to respond to increased climate impacts, (e.g., legislation, education, projects)
- Make better use of technology to predict and mitigate damage
- Increase the use of shared resources and multi-agency efforts
- Continued improvements to emergency services and public safety capabilities

- Increase participation by all County entities and agencies operating in Colusa County in disaster planning activities to improve hazard awareness, intra-and inter-agency communications, mitigation action implementation, and coordinated response and recovery efforts
- Enhance Tribal coordination for disasters
- Maintain Colusa County communities' eligibility for FEMA grant funding and other FEMA programs

Goal 4: 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

- Increase education, outreach, and awareness of natural hazards and disasters and ensure adequate resources with a focus on the whole community
- Reduce hazard risk and vulnerability and increase disaster resilience through the equitable and accessible planning and implementation of hazard mitigation actions and priorities
- Enhance natural hazard mitigation strategies to protect the most rural, vulnerable areas

Goal 5: Improve community resiliency to flooding in Colusa County

- Reduce the flood risk and vulnerability in Colusa County
- Reduce life safety issues, property loss, and damages associated with flooding
- Reduce flooding adjacent to streams, residential areas, and areas with critical infrastructure
- Improve stream flow to reduce bank erosion
- Maintain/improve flood protection and control measures, including maintenance and improvements to the levee systems, to minimize future flood related impacts and damages

Goal 6: Continue to protect and promote Colusa County agriculture by ensuring safe and effective farming practices that protect the citizens and environment and that minimize future hazard related losses

- Reduce the impacts to and loss of agricultural resources from natural hazards and disasters
- Support and implement water projects that replenish the aquifer, increase available agricultural water during critical times of need for local crops, and ensure a consistent water supply and distribution to County residents.
- Educate County citizens as to how they can help protect Colusa's agriculture from noxious weeds and pests
- Work with local farmers to keep canals, ditches, and streambeds clear of debris reducing downstream flooding and other impacts

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 and Table 5-3 provide a listing of priority hazards by jurisdiction to be addressed in the mitigation strategy portion of this Plan.

Note: originally landslide and subsidence were priority hazards for Colusa County. After review of the hazards, possible mitigation actions, and the County's current capabilities, these hazards were moved to low priority hazards for mitigation planning.

Table 5-2 Colusa County Planning Area: Mitigation Action Priority Hazards by Jurisdiction

Hazard	Colusa County	City of Colusa	City of Williams	Colusa County RCD	Cortina CSD
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	X			X	
Climate Change	X		X	X	
Dam Failure	X	X			
Drought & Water shortage	X	X	X	X	
Earthquake	X	X	X		
Floods: 1%/0.2% annual chance	X	X	X		X
Floods: Localized Stormwater	X	X	X	X	X
Landslide, Mudslide, and Debris Flow					
Levee Failure	X	X			
Severe Weather: Extreme Cold and Freeze	X				
Severe Weather: Extreme Heat	X				
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	X	X	X		
Severe Weather: High Winds and Tornados	X				
Stream Bank Erosion	X		X	X	X
Subsidence				X	
Wildfire	X		X	X	

Table 5-3 Colusa County Planning Area: Mitigation Action Priority Hazards by Jurisdiction

Hazard	Kletsel Dehe Wintun Nation	RD 108	RD 479	Sacramento Westside Levee District
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)				
Climate Change	X		X	
Dam Failure				
Drought & Water shortage	X			
Earthquake				
Floods: 1%/0.2% annual chance		X	X	X
Floods: Localized Stormwater		X	X	X
Landslide, Mudslide, and Debris Flow	X			
Levee Failure		X	X	X
Severe Weather: Extreme Cold and Freeze				
Severe Weather: Extreme Heat	X			
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)				
Severe Weather: High Winds and Tornados				
Stream Bank Erosion	X		X	
Subsidence				
Wildfire	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 2024 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 Planning Committee 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 from the 2018 LHMPs 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 18 colored dots, six 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 2024 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 Colusa 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 Colusa 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 future and existing 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 5-4 identifies all mitigation actions for participating jurisdictions to this LHMP Update. For each mitigation action item included in Table 5-4, a detailed mitigation implementation strategy has been developed. The detailed descriptions for each mitigation action are included in each respective jurisdictional annex to this LHMP.

The mitigation action plan summarized below contains both new action items developed for this 2024 LHMP Update as well as old actions that were yet to be completed from the 2018 LHMP. Table 5-4 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 2024 LHMP Update, the Colusa 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 2024 Update. Thus, only a portion of the actions identified in Appendix C have been carried forward into the mitigation strategy presented in Table 5-4. 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 5-4 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 2024 LHMP Update.

Table 5-4 Colusa County Planning Area Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Colusa County					
Multi-Hazard Actions					
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 2. Public Education and Community Outreach Countywide	Previous Action	X	X	X	Public Education
Action 3. Alert and Warning System for Sheriff's Office and Public Health	New Action	X	X		Emergency Services
Action 4. Technology Enhancements to Support Hazard Mitigation Planning and Project Implementation and for use in Disaster Preparedness, Response, and Recovery Efforts (e.g., GIS Application Enhancements)	New Action	X	X	X	Prevention Public Information Emergency Services Property Protection
Action 5. Vulnerable Population Planning	New Action	X	X		Prevention Public Information Emergency Services
Action 6. Update 211 system	New Action	X	X		Emergency Services
Action 7. Coordinate with the American Red Cross (ARC) for Mass Care Planning	New Action	X	X		Prevention Public Information Emergency Services
Action 8. Vulnerable Population Planning (with a focus on Access and Functional Needs)	New Action	X	X		Prevention Public Information Emergency Services
Action 9. Coordination with Community Based Organizations	New Action	X	X		Prevention Public Information Emergency Services
Action 10. Enhance Tribal Coordination for Disasters	New Action	X	X		Prevention Emergency Services
Action 11. Generator Purchases to Enhance Project Power for Colusa County	New Action	X	X	X	Emergency Services Property Protection
Action 12. EOP Update & Implementation	New Action	X	X		Prevention Emergency Services
Action 13. Evacuation Planning Countywide	Previous Action	X	X		Emergency Services
Action 14. Migrant Center Improvements/House Vulnerable Populations During Disaster	New Action	X	X		Emergency Services
Action 15. Install Road Closure Infrastructure	New Action	X	X		Emergency Services

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Agricultural Hazards: Severe Weather/Invasive Species (Pests and Weeds)					
Action 16. Pest and Rodent Prevention Project for Infrastructure Protection	New Action	X	X		Prevention Property Protection
Action 17. Development of Ordinance and Zoning to Limit/Manage Pest Introduction into Colusa County	New Action	X	X		Prevention
Action 18. Abandoned Agricultural Lands Pest Management (joint with RCD)	New Action	X	X		Property Protection Natural Resource Protection
Climate Change Actions					
Action 19. Climate Change Mitigation Adaptation Action Plan	New Action	X	X	X	Prevention
Action 20. Climate-smart Agricultural Planning (joint with RCD)	New Action	X	X		Property Protection Natural Resource Protection
Dam Failure Actions					
Action 21. Continue Communication about Dam Safety and Awareness County-wide	New Action	X	X	X	Prevention Public Information Emergency Services
Action 22. Dam Failure Mitigation, Education, and Awareness	Previous Action	X	X	X	Prevention Public Information Emergency Services
Drought and Water Shortage Actions					
Action 23. Groundwater Recharge (joint with RCD)	New Action	X	X		Property Protection Structural Projects Natural Resource Protection
Action 24. Invasive Species Removal from Waterways (joint with RCD)	New Action	X	X	X	Property Protection Natural Resource Protection
Action 25. Irrigation Efficiency Technical Assistance (joint with RCD)	New Action	X	X		Property Protection Natural Resource Protection
Action 26. On-farm Water Storage Projects (joint with RCD)	New Action	X	X		Property Protection Structural Projects Natural Resource Protection
Earthquake Actions					
Action 27. Earthquake Vulnerability Study and Retrofitting of County Structural Assets	Previous Action	X	X		Prevention Structural

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Flood, Localized Flood, Levee Failure, and Heavy Rains and Storm Actions					
Action 28. Flood ordinance updates		X	X	X	Prevention
Action 29. Localized Stormwater Management and Streambank Erosion Mitigation (joint with RCD)	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 30. Princeton Storm Water Drainage Assessment	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 31. Roadway Flood Prevention	New Action	X	X	X	Prevention Property Protection Structural Projects Natural Resource Protection
Severe Weather Actions					
Action 32. Sheltering for Unhoused (winter weather)	New Action	X	X		Prevention Emergency Services
Action 33. Sheltering for Unhoused (Extreme Heat)	New Action	X	X		Prevention Emergency Services
Action 34. Severe Weather Plan Update	New Action	X	X	X	Prevention Emergency Services
Wildfire Actions					
Action 35. Beetle-killed Tree Removal (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 36. Update and Implement Community Wildfire Protection Plan (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 37. Colusa County Fire Mitigation Plan of 2024 Implementation (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 38. Colusa County Fire Safe Council (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
City of Colusa					
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	New Action	X	X	X	Public Education
Action 3. Evacuation Training for the Community of Colusa	New Action				Emergency Services
Action 4. Fire and sanitation water is needed in case of emergency in the City of Colusa during a drought	New Action	X	X		Prevention Emergency Servies Property Protection
Action 5. URM Mapping and Identification	Previous Action	X	X		Prevention Property Protection
Action 6. Project improvements to Decrease Flooding	New Action	X	X	X	Property Protection Structural Projects
Action 7. Levee Mitigation	New Action	X	X	X	Property Protection Structural Projects
Action 8. Colusa Basin Drain	New Action	X	X	X	Property Protection Structural Projects
City of Williams					
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	Public Information
Action 3. Aquifer Recharge Project	New Action	X	X		Property Protection Natural Resource Protection
Action 4. Storm Drain Master Plan	Previous Action	X	X	X	Property Protection Structural Projects Natural Resource Protection
Action 5. Salt Creek Erosion Control	New Action	X	X	X	Property Protection Natural Resource Protection
Action 6. Underground Powerlines	New Action	X	X		Property Protection Structural Projects
Action 7. Healthy Trees Program	New Action	X	X		Property Protection Natural Resource Protection
Action 8. EQ Vulnerability Study and Retrofit of City Assets	Previous Action	X	X		Property Protection
Action 9. Detention Basin Construction (continuing from the 2018 LHMP)	Previous Action	X	X	X	Natural Resource Protection

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Colusa County RCD					
Action 1. Abandoned Agricultural Lands Pest Management	New Action	X	X		Property Protection Natural Resource Protection
Action 2. Beetle-killed Tree Removal	New Action	X	X		Property Protection Natural Resource Protection
Action 3. Climate Action Plan	New Action	X	X	X	Prevention
Action 4. Climate-smart Agricultural Planning	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 5. Update and Implement Community Wildfire Protection Plan	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 6. Colusa County Fire Mitigation Plan of 2024 Implementation	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 7. Colusa County Fire Safe Council	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 8. Groundwater Recharge	New Action	X	X		Property Protection Natural Resource Protection
Action 9. Invasive Species Removal from Waterways	New Action	X	X	X	Property Protection Natural Resource Protection
Action 10. Irrigation Efficiency Technical Assistance	New Action	X	X		Property Protection Natural Resource Protection
Action 11. Localized Stormwater Management and Streambank Erosion Mitigation	New Action	X	X	X	Property Protection Natural Resource Protection
Action 12. On-farm Water Storage Projects	New Action	X	X		Property Protection Natural Resource Protection
Cortina Community Services District					
Action 1. Armor the Salt Creek Bank	New Action	X	X	X	Property Protection Natural Resource Protection
Kletsel Dehe Wintun Nation					
Action 1. Update Cortina Rancheria Climate Change Adaptation Plan (2017)	New Action	X	X	X	Prevention

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 2. Water Tank	New Action	X	X		Property Protection Structural Project
Action 3. Emergency Generator	New Action	X	X		Emergency Services Property Protection
Action 4. Improve Erosion Control Management Practices	New Action	X	X	X	Property Protection Natural Resource Protection
Action 5. Secondary Evacuation Route	New Action	X	X		Emergency Services
Action 6. Fuel Reduction and Defensible Space Projects	New Action	X	X		Property Protection Natural Resource Protection
Action 7. Enhanced Mapping and Assessing Rancheria Vulnerability to Hazards	New Action	X	X		Prevention Emergency Services Property Protection
Action 8. Public Education and Outreach	New Action	X	X	X	Public Information
RD 108					
Action 1. Emergency Generator Maintenance and Upkeep - District Office	Previous Action	X	X	X	Emergency Services Property Protection
Action 2. Emergency Generator - Pump Stations	Previous Action	X	X	X	Emergency Services Property Protection
Action 3. Stabilization of Colusa Basin Drain Levee	Previous Action	X	X	X	Property Protection Structural Projects
RD 479					
Action 1. RD 479 Integrity Preservation	New Action	X	X	X	Property Protection Structural Projects
Sacramento Westside Levee District					
Action 1. Seepage Mitigation of Sacramento River Levee	Previous Action	X	X	X	Property Protection Structural Projects
Action 2. Hardening of Sacramento River Levee	Previous Action	X	X	X	Property Protection Structural Projects
Action 3. BRIC Project EMF-2021-BR-089-0008: Grimes Floodplain Restoration and Levee Resiliency Project	New Action	X	X	X	Property Protection Structural Projects

Colusa County Mitigation Actions

Multi-Hazard Actions

Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: 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: Colusa County Planning Department

Cost Estimate: Jurisdictional board/staff time

Benefits (avoided Losses): 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

Timeline: As soon as possible.

Project Priority: High

Action 2. Public Education and Community Outreach Countywide

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: Families unprepared in an event of a disaster

Project Description: Provide educational materials in multi-languages; participate in public events throughout the county, engage in conversation explaining the importance of emergency preparedness for all hazards. Place materials at various locations in the county example libraries, community bulletin boards and schools.

Other Alternatives: Use social media platforms

Existing Planning Mechanism(s) through which Action Will Be Implemented: Through the OES, Schools, Public Health and Cities

Responsible Office/Partners: County OES

Benefits (Losses Avoided): If people can be prepared for all-hazard events, the losses are numerous and not limited to financial assistance.

Potential Funding: General Fund, Grants to be identified

Timeline: 2027

Project Priority (H, M, L): High

Action 3. Alert and Warning System for Sheriff's Office and Public Health

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 2, 3, 4,5

Issue/Background: Residents currently receive alerts in similar formats. Access to several Alerting and Warning Systems is available. The system requires residents to register to receive notifications.

Project Description: Receive approval from FEMA to use IPAWS. Will allow for anyone with a smart phone to receive notification in the event of a Multi-Hazard.

Other Alternatives: Continue to use RAVE system

Existing Planning Mechanism(s) through which Action Will Be Implemented: OES will coordinate implementation through the EAP, work alongside Public Health using RAVE system to send out notifications. Community outreach to register more residents.

Responsible Office/Partners: County OES & Public Health

Benefits (Losses Avoided): Life and property preservation

Potential Funding: Public Health will continue to fund RAVE system, no charge for IPAWS

Timeline: 2025

Project Priority (H, M, L): Medium

Action 4. Technology Enhancements to Support Hazard Mitigation Planning and Project Implementation and for use in Disaster Preparedness, Response, and Recovery Efforts (e.g., GIS Application Enhancements)

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: Colusa County requires a high-impact response and recovery plan with the right resources in the right place at the right time due to its geography. Cities within the county are separated by miles with limited to no infrastructure in between. GIS can forecast surge and optimize resource allocation so that we can place resources precisely where they are most needed. Mapping and analysis can expose gaps in capacity, show at-risk populations' needs, aid in effectively distributing supplies, and inform personnel allocation. Location intelligence supports the distribution of resources where people and need intersect.

Project Description: Geographic information Software will serve as the common denominator for Colusa County DHHS preparedness solution because location data is essential to every phase of planning, response, and recovery. GIS scales to events ranging from inclement weather conditions to pandemics. It helps state and local governments scope out the extent of a public health crisis and predict the path forward for allocating resources and monitoring processes and outcomes. Maps and apps enable public health officials to coordinate efforts with other agencies and external stakeholders. The public health preparedness community can make major inroads by embracing GIS data, models, communication and engagement hubs, and location-centric applications.

Other Alternatives: There are no **Other Alternatives**

Existing Planning Mechanism(s) through which Action Will Be Implemented: This plan will be implemented through our ArcGIS Organizational Account.

Responsible Office/Partners: Department of Health and Human Services

Benefits (Losses Avoided): Using Esri Software for Health and Human services professionals to provide insights, Spatial data and geographic information system (GIS) technology to underscore coverage gaps in the populations we hope to reach, to create opportunities to improve workflows, and the ability to plan for and mitigate against unforeseen events.

Potential Funding: Behavioral Health Bridge Housing Program Round 3

Timeline: November 2024- March 2025

Project Priority (H, M, L): H

Action 5. Vulnerable Population Planning

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5,

Issue/Background: During disasters, people with higher needs for care require specialized sheltering options. This may include shelter similar to skilled nursing or psychiatric care hospitals, identifying the County's need and resources. During the 2018 Camp Fire Colusa assisted Butte county by providing sheltering for vulnerable populations in the Williams Migrant Center.

Project Description: Development of a shelter plan focused on vulnerable populations, this may include the use of Williams Migrant Center, Local Motels and Hotels or an MOU with a neighboring county to assist in sheltering vulnerable populations.

Other Alternatives: Formalize MOUS with neighboring County to provide care for our vulnerable populations.

Existing Planning Mechanism(s) through which Action Will Be Implemented: There is an existing reoccurring multidisciplinary meeting in which partner organizations meet to discuss the safety and well-being of vulnerable county residents as well as high intensity users of services.

Responsible Office/Partners: Public Health, Fire, Police, Sheriff, Behavioral Health, Red Cross, APS/CPS Units

Benefits (Losses Avoided): Avoid exacerbation of existing conditions due to complications related to vulnerable populations. The mitigation of specialized need reduces the strain placed on EMS services and first responders that are responding to primary incidents.

Potential Funding: FEMA disaster funding: HMGP, HHAP Funds,

Timeline: Within 5 years

Project Priority (H, M, L): M

Action 6. Update 211 system

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire).

Goals Addressed: 1, 3, 4, 5

Issue/Background: During disaster, emergency lines such as 911 becomes inundated with non-emergent calls. Having a resource center that can receive all non-emergent calls and coordinate with local response team will allow public to have access to information in real time without interfering with other operations.

Project Description: Work to develop a contract with a 211-call center to provide services within Colusa County. By establishing, a year round 211 program and outlining the level of response during emergencies this would establish the infrastructure to assist in any future disaster.

Other Alternatives: OES call center for non-emergent issues during disasters.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Colusa 211 was one of the Counties the received Disaster 211 through SB1212, that program is no longer actives, however much of the infrastructure work necessary to launching 211 has already been conducted in the County. Colusa 211 meetings have been ongoing over the last 6 months between identified partners.

Responsible Office/Partners: OES, Sheriff, DHHS, County CAO, 211 Call Center, CPUC

Benefits (Losses Avoided): Reducing the strain placed on first responders that are dealing with primary incidents, centralized information database for public to access. Uniform message developed by OES and shared county wide during disaster response

Potential Funding: Jobs First Colusa, Northern Valley Community Foundation,

Timeline: 6-12 months

Project Priority (H, M, L): M

Action 7. Coordinate with the American Red Cross (ARC) for Mass Care Planning

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5

Issue/Background: Any time there is an evacuation of the local population, mass care and sheltering will be a responsibility of the County. This is Emergency Support Function 6, which is a responsibility of Human Services, along with medical care of sheltered populations, which is the responsibility of Public Health, Emergency Support Function 8. Current plans are in need of updates, the trailer that houses ARC shelter supplies has extensive water damage, and staff need to be exercised on shelter operations with ARC.

Project Description: This mitigation project will coordinate meetings between DHHS, OES and ARC. Shelter plans will be updated, a new trailer will be purchased, and an exercise will be held to test the capabilities of staff.

Other Alternatives: Online training

Existing Planning Mechanism(s) through which Action Will Be Implemented: American Red Cross participates in emergency preparedness and planning meetings already occurring within Colusa County. ARC has provided training to DHHS staff in FY 23-24.

Responsible Office/Partners: DHHS, ARC

Benefits (Losses Avoided): Improved mass care services will lead to improved outcomes for community members evacuated due to an emergency or disaster.

Potential Funding: General Fund, Staff Time

Timeline: July 1, 2026

Project Priority (H, M, L): M

Action 8. Vulnerable Population Planning (with a focus on Access and Functional Needs)

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5

Issue/Background: Vulnerable populations are disproportionately affected by emergencies and disasters than the rest of the population. This occurs for various reasons depending on the hazard and the individual. Colusa County has a history of being underserved in regards to services available and community based organizations.

Project Description: This project will coordinate with various AFN services providers and independent living center organizations to increase capacity and subject matter expertise. It will also facilitate an AFN

disaster work group. This work group would support county efforts to support vulnerable populations during disasters.

Other Alternatives: Set-up subcommittee from an already active work group in the county.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Utilize Colusa County Partners for Heath, Healthcare Coalition and Emergency Medical Care Committee to make connections with service providers.

Responsible Office/Partners: DHHS

Benefits (Losses Avoided): Improved community resilience to disasters. Enhanced County coordination and response specific to vulnerable populations during an emergency or disaster.

Potential Funding: CASPHI

Timeline: July 1, 2026

Project Priority (H, M, L): M

Action 9. Coordination with Community Based Organizations

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5

Issue/Background: In efforts to provide assistants to community during a disaster there should be a strong relationship with the public as a government agency.

Project Description: Build relationship with Community Based Organizations (CBO's) in the county. Create a list of CBO's POC information, organization's focus areas, geographic location, resources available. Engage in communication during major events.

Other Alternatives: Continue to reach out to DHHS

Existing Planning Mechanism(s) through which Action Will Be Implemented: OES will coordinate implementation through the EAP

Responsible Office/Partners: OES; DHHS

Benefits (Losses Avoided): Provide community in a time devastation with assistance

Potential Funding: Staff Time

Timeline: 2025

Project Priority (H, M, L): Medium

Action 10. Enhance Tribal Coordination for Disasters

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5

Issue/Background: Currently unaware of any communication between county and tribes in the event of a disaster. Tribes may have their own plan for evacuations.

Project Description: Coordination with Tribes during events and/or pre-season fire & winter. There may be major damages within Tribes' jurisdiction during a disaster, which county may be unaware of such. Share with tribes updates and invite input throughout planning processes for Multi-Hazard events.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Responsible Office/Partners: OES

Benefits (Losses Avoided): Life preservation

Potential Funding: Staff Time

Timeline: 2026

Project Priority (H, M, L): Low

Action 11. Generator Purchases to Enhance Project Power for Colusa County

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: Colusa County's Project Power comprises a reserve of generators that can be utilized throughout the entire county during power outages as part of emergency response measures.

Project Description: Acquire and uphold generators to enhance the current Project Power. Generators can be utilized for individuals relying on life-support systems or to guarantee the uninterrupted operation of businesses or government entities

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: OES will coordinate implementation through EAP

Responsible Office/Partners: County OES

Benefits (Losses Avoided): Life and property preservation

Potential Funding: Homeland Security Grant Funds

Timeline: 2027

Project Priority (H, M, L): Low

Action 12. EOP Update & Implementation

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: EOP is out dated; new implementations from Cal-OES have been establish

Project Description: Review and identify sections, which need be update in County EOP. Expect to work with consultant in updating EOP.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Responsible Office/Partners: County OES

Benefits (Losses Avoided): Life preservation

Potential Funding: Emergency Management Program Grant

Timeline: 2026

Project Priority (H, M, L): Low

Action 13. Evacuation Planning Countywide

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: Clear travel routes are available, yet numerous individuals struggle with understanding how to evacuate from their present location and locate suitable travel routes.

Project Description: Each town in the county will have detailed plans outlining evacuation procedures and travel routes.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: OES will coordinate implementation through the EAP

Responsible Office/Partners: OES; County Public Works; CalTrans; CHP

Benefits (Losses Avoided): Life preservation

Potential Funding: Emergency Management Program Grant; FEMA HMGP

Timeline: 2026

Project Priority (H, M, L): Low

Action 14. Migrant Center Improvements/House Vulnerable Populations During Disaster

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: The County operates a 100-unit Migrant Farm Housing. These units were intended to be used during the summer months by migrant farm workers. Due to their seasonal use, the units were not built with heating. They only had evaporative cooling to each unit. This prevented them from being used for habitation in the winter months.

Project Description: In 2022, the BOS entered into an agreement with HCD-OMS to provide improvements to the aging Migrant Center. These improvements included Central Heating and Air to all 100 units. This allowed them to be used in the winter months for emergency housing situations. They need to be maintained year-round.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: HCD-OMS agreement.

Responsible Office/Partners: Agreement between property owner and operator (Colusa County) and the CA HCD-OMS building owner and funding authority for the Migrant Center Program.

Benefits (Losses Avoided): Provides housing for vulnerable populations during emergency situations.

Potential Funding: HCD-OMS funding for capital improvement and infrastructure to their buildings.

Timeline: Continual maintenance

Project Priority (H, M, L): Low

Action 15. Install Road Closure Infrastructure

Hazards Addressed: Multi-Hazard

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: During winter time flooding conditions, wildfire events or other hazardous events, closing roads provides a way to prevent drivers from going through impassable standing water or other hazards. Currently the County uses portable barricades to close these roads which are labor intensive to place county wide and people drive around them.

Project Description: This project would install permanent signage that can easily be turned in the direction of traffic during hazard events.

Other Alternatives: More expensive, permanent Changeable message boards.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Determine all routes which will need the installation of these, develop cost estimates, find funding, perform environmental work, bid project, award and construct.

Responsible Office/Partners: Colusa County Public Works

Benefits (Losses Avoided): The use of these will potentially save lives and avoid costs and risks to emergency personnel who perform rescues of people who drive around barricades or otherwise drive into hazardous situations.

Potential Funding: Hazard Elimination grants.

Timeline: Within 5 years (if funding is available)

Project Priority (H, M, L): M

Agricultural Hazards: Severe Weather/Invasive Species (Pests and Weeds)

Action 16. Pest and Rodent Prevention Project for Infrastructure Protection

Hazards Addressed: Agricultural hazards.

Goals Addressed: 1, 3, 6

Issue/Background: The County has critical infrastructure such as interstates, railways, and public roads. Colusa County also has an extensive production agriculture industry. Pests, if not properly managed, can cause not only economic crop damage, but extensive infrastructure damage from burrowing rodents and other such pests.

Project Description: Develop a program to ensure best management practices are used in maintaining the pest populations throughout the County. In addition, find ways to assist the industry in maintaining the pest populations.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: No program exists. This project would create the planning mechanism.

Responsible Office/Partners: Colusa Agricultural Commissioner Office, CCRCD

Benefits (Losses Avoided): Protection of critical infrastructure.

Potential Funding: Existing budgets. Cal Trans grants.

Timeline: Currently in progress

Project Priority (H, M, L): Medium

Action 17. Development of Ordinance and Zoning to Limit/Manage Pest Introduction into Colusa County

Hazards Addressed: Agricultural hazards

Goals Addressed: 1, 3, 6

Issue/Background: Colusa County has an extensive production agriculture industry. Pests are a significant threat to this multi-million-dollar industry. The County must take proactive all proactive steps to protect that industry from pest introduction.

Project Description: Develop rules, policies, and ordinances that will protect Colusa County's Agricultural Industry. Implement programs to ensure their success.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: No program exists. This project would create the planning mechanism.

Responsible Office/Partners: Colusa Agricultural Commissioner Office, CCRCD

Benefits (Losses Avoided): Reduction in greenhouse gasses has a cumulative effect in reducing the effects of climate change worldwide

Potential Funding: Existing budgets.

Timeline: Within 5 years.

Project Priority (H, M, L): Medium

Action 18. Abandoned Agricultural Lands Pest Management (joint with RCD)

Hazards Addressed: Agriculture Hazards

Goals Addressed: 1, 3, 4, 6

Issue/Background: Colusa County has abandoned croplands that pose a threat to nearby productive land. A high number of invertebrate and vertebrate pests that live on unmanaged, abandoned land can cause crop damage to adjacent fields.

Project Description: Orchard removal, mulching to improve soil health, and reestablishing beneficial insect habitat.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Wildlife Conservation Board (WCB), CDFA, Colusa County Wildfire Mitigation Action Plan (2024)

Responsible Office/Partners: CCRCD, Colusa Agricultural Commissioner Office

Benefits (Losses Avoided): Pest management, crop damage mitigation

Potential Funding: CDFA, WCB

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Climate Change Actions

Action 19. Climate Change Mitigation Adaptation Action Plan

Hazards Addressed: Climate Change

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: Anthropogenic and other greenhouse gasses will continue to cause more extreme climate change conditions unless steps taken to minimize greenhouse gases and carbon footprints. The County's roadways, infrastructure in flood zones, disadvantaged communities, agriculture sector and sensitives species habitat are among the most vulnerable to climate change impacts.

Project Description: Colusa County will be proposing to hire a consultant to coordinate efforts in implementing the Climate Action Plan. Along with conducting Vulnerability Assessments

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: OES to implement through the LHMP

Responsible Office/Partners: OES; County Safety Officer, Cities of Colusa and Williams

Benefits (Losses Avoided): Reduction in greenhouse gasses has a cumulative effect in reducing the effects of climate change worldwide

Potential Funding: FEMA Hazard Mitigation Grant

Timeline: 2027

Project Priority (H, M, L): High

Action 20. Climate-smart Agricultural Planning (joint with RCD)

Hazards Addressed: Climate change, air quality

Goals Addressed: 1, 3, 4, 6

Issue/Background: Climate change threatens the food security and economic viability of agriculture in Colusa 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 our region.

Project Description: CCRCD will incorporate conservation agriculture practices to conserve resources and limit the exacerbation of climate change, while also reaching farmers to aid in climate change adaptation and resiliency on farms.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Regional Climate and Agriculture Hub, CDFA programming

Responsible Office/Partners: CCRCD, USDA-NRCS

Benefits (Losses Avoided): Climate change adaptation and resiliency, carbon sequestration, mitigation of greenhouse gas emissions

Potential Funding: State ag grants, USDA grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Dam Failure Actions

Action 21. Continue Communication about Dam Safety and Awareness County-wide

Hazards Addressed: Dam failure

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: The County OES attends yearly dam training, receives and maintains copies of all dams that would affect Colusa County. While verbalizing this to our counterparts in the county and city is done, it would be beneficial for all to have an in-person awareness meeting.

Project Description: Call meeting of county and city administration and first responders

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: OES will coordinate meetings

Responsible Office/Partners: County OES

Benefits (Losses Avoided): Life and property preservation

Potential Funding: Staff Time

Timeline: 2027

Project Priority (H, M, L): High-easily achievable

Action 22. Dam Failure Mitigation, Education, and Awareness

Hazards Addressed: Dam Failure

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: Sites Reservoir dam construction anticipated late 2026, currently have no plan is in place for dam failure. There are other dams near the county and residents are not fully educated or aware of imminent threat of a dam failure

Project Description: The plan will address the potential threat of a dam failure, not only for the Sites Reservoir, but also for any dams surrounding the area.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: OES will coordinate implementation through the EAP

Responsible Office/Partners: OES, Public Works

Benefits (Losses Avoided): Life preservation

Potential Funding: Emergency Management Program Grant, FEMA HMGP

Timeline: 2028

Project Priority (H, M, L): Medium

Drought and Water Shortage Actions

Action 23. Groundwater Recharge (joint with RCD)

Hazards Addressed: Drought and water shortage, agriculture, subsidence

Goals Addressed: 1, 3, 4, 6

Issue/Background: Climate instability has led to increased extreme precipitation events. Due to the prevalence of extreme precipitation events and drought, it may prove beneficial to harness the surface runoff in wet years by recharging the aquifer.

Project Description: CCRCD will support farmers and landowners interested in installing groundwater recharge projects on their land.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: DWR Programming, USDA-NRCS Conservation Innovation, CDFA

Responsible Office/Partners: Colusa County, CCRCD, DWR, USDA-NRCS Conservation Innovation, CDFA, various NGOs

Benefits (Losses Avoided): Food security, long-term water storage for dry years, aquifer recharge/maintenance

Potential Funding: CA DWR, CDFA, USDA grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 24. Invasive Species Removal from Waterways (joint with RCD)

Hazards Addressed: Drought and water storage, agriculture

Goals Addressed: 1, 3, 4, 6

Issue/Background: California Invasive Plant Council (Cal IPC) mapped arundo and tamarisk throughout Colusa County watersheds and identified these species as an invasive species due to being high water demand plants, spreading vigorously, displacing native species and a fire hazard.

Project Description: CCRCD will work with a neighboring RCD and the Colusa Agriculture Department to continue removing arundo in upper Stony Creek and other water ways throughout the county.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Cal IPC report, Glenn County and Colusa County Community Wildfire Protection Plans

Responsible Office/Partners: Colusa County Dept of Agriculture, CCRCD, Glenn County RCD

Benefits (Losses Avoided): Invasive plant control, water security, streambank stability, wildfire protection

Potential Funding: Cal Fire, CDFA

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 25. Irrigation Efficiency Technical Assistance (joint with RCD)

Hazards Addressed: Drought and water shortage, agriculture

Goals Addressed: 1, 3, 4, 6

Issue/Background: Drought has worsened in the Sacramento Valley and water prices have risen, making agriculture less feasible for farmers in Colusa County and destabilizing our local food system.

Project Description: CCRCD will provide planning and financial assistance to farms to increase water use efficiency on farms. CCRCD will help farmers upgrade water and pumping infrastructure, introduce farmers to climate-smart agriculture, irrigation management, increase uptake of soil health practices, land management technical assistance for water quantity and quality.

Other Alternatives: No action, which may keep water prices higher for longer.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CDFA SWEEP, Regional Mobile Irrigation Lab

Responsible Office/Partners: Colusa County Dept of Agriculture, CCRCD, USDA-NRCS, Yolo RCD, Glenn RCD

Benefits (Losses Avoided): Increased water use efficiency on farmland/farm adaptation to drought, food security, economic benefits for farmers

Potential Funding: CA DWR, CAL FIRE grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 26. On-farm Water Storage Projects (joint with RCD)

Hazards Addressed: Drought and water shortage, agriculture

Goals Addressed: 1, 3, 4, 6

Issue/Background: Drought has worsened in the Sacramento Valley and water prices have risen, making agriculture less feasible for farmers in Colusa County and destabilizing our local food system. Water storage provides a localized way to address this issue and improve the economic viability of farms and ranches.

Project Description: CCRCD will improve or install water storage on farms and ranches in Colusa County based on NRCS conservation practice recommendations. Rangeland planting for upper watershed management may also be included in this project.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CDFA SWEEP, DWR Programming

Responsible Office/Partners: Colusa County Dept of Agriculture, CCRCD, USDA-NRCS

Benefits (Losses Avoided): Farm adaptation to drought, food security, long-term water storage for dry years, economic benefit for farmers, habitat establishment in upper watershed

Potential Funding: CDFA, CA DWR grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Earthquake Actions

Action 27. Earthquake Vulnerability Study and Retrofitting of County Structural Assets

Hazards Addressed: Earthquake

Goals Addressed: 1, 2, 3

Issue/Background: Colusa County has older areas and historic buildings of Unreinforced Masonry (URM), multi-story, and older construction that may be vulnerable to a seismic event. Most of these buildings have not been evaluated for seismic safety or performance during an earthquake.

Project Description:

The County's building official will work with building owners to conduct seismic assessments of potential vulnerable buildings and will identify and prioritize those in need of seismic upgrades. This will involve site visits and coordination with seismic professionals to determine possible seismic retrofit options that also preserve the historic and architectural integrity of vulnerable buildings. Once seismic assessments and prioritizations are complete, the County will develop and implement a prioritized plan for structural upgrades of key buildings.

Location of Project: Countywide

Other Alternatives: Maintain and operate or abandon vulnerable structures

Existing Planning Mechanism(s) through which Action Will Be Implemented: Capital Improvement Program

Responsible Office/Partners: County Building Official

Project Priority: Low

Benefits (Losses Avoided): Life safety, property protection, and historic preservation

Potential Funding: Initial seismic assessment – Capital Improvement Program/County General Fund. Seismic Upgrades – CA Seismic Retrofit Grants under the California Earthquake Authority and FEMA HMGP grants

Timeline: 2025 - 2030

Flood, Localized Flood, Levee Failure, Heavy Rains and Storm, and Stream Bank Erosion Actions

Action 28. Flood ordinance updates

Hazards Addressed: Flood, Localized Flood, Heavy Rains and Storms, Levee Failure

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: Flood ordinance changes have increased the number of people in the community that are required to carry flood insurance. The financial cost of flood insurance can significantly affect low-income residents as well as those on fixed incomes, leading to an increase of under insured households. During a levee failure the impact to towns located along the Sacramento River (Colusa, Princeton)

Project Description: Develop a 3-tiered approach to flood response, including immediate funds to help cover cost of deductibles, collective bargaining on affordable flooding insurance providing under insured families short term housing post disaster. Offering multiple insurance options for people in Colusa to make sure they have appropriate coverage will help establish a response plan in the event of floods.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Application for funding is complete and pending submission, once funding is secured there will be a working group formed to help guide the project. Implementation of similar projects are currently underway; Colusa County will collaborate with entities currently performing similar work.

Responsible Office/Partners: Colusa Public Works, DHHS,

Benefits (Losses Avoided): Provides affordable insurance options for people located in flood zones. Increases communities ability to recover in the event in catastrophic flooding.

Potential Funding: State of California, Adaptation Planning Grant Program - Round 2

Timeline: 18 months

Project Priority (H, M, L): H

Action 29. Localized Stormwater Management and Streambank Erosion Mitigation (joint with RCD)

Hazards Addressed: Flooding, severe weather, stream bank erosion

Goals Addressed: 1, 3, 4, 5

Issue/Background: Climate instability has led to increased extreme precipitation events. Due to the prevalence of extreme precipitation events, Colusa County needs to adapt natural lands to be more resilient to flooding and waterway erosion.

Project Description: CCRCD will update our streambank erosion plan, update the Colusa Basin Watershed Assessment, restore floodplain/wetland habitat, do rangeland and upper watershed management to mitigate erosion, instream restoration of stream beds, implement conservation practices along streambanks and ditches (grassed waterways, low water crossings)

Other Alternatives: Allow erosion to occur and fix on a case by case basis.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Colusa Basin Watershed Assessment, Streambank Erosion Plan, SGMA Action Plan

Responsible Office/Partners: CCRCD, DWR

Benefits (Losses Avoided): Reduced runoff, reduced soil erosion/loss, increased water quality

Potential Funding: CA DWR grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 30. Princeton Storm Water Drainage Assessment

Hazards Addressed: Flooding

Goals Addressed: 1, 3, 4, 5

Issue/Background: During heavy or long duration rain events, standing and ponding water are experienced in residential areas within the town of Princeton.

Project Description: This project would assess drainage within the town and determine capacity necessary for improvements to the drainage system. In addition a pump could be purchased if funding were available to remove water from inundated areas.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: At this time, County Public Work staff will continue to try to alleviate the issues associated with these events by clearing drains, placing flooded signs and monitoring the situations to make sure the area is as safe and passable as possible.

Responsible Office/Partners: County Public Works, OES

Benefits (Losses Avoided): Life/Safety, Damage to roads due to saturated roadway section

Potential Funding: Transportation funds

Timeline: When Funding becomes available

Project Priority (H, M, L): M

Action 31. Roadway Flood Prevention

Hazards Addressed: Flooding

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: The County has many roads which flood during heavy rain events, due to large tributary areas contributing to local water sheds.

Project Description: This project would include many different improvements which could include increasing and adding drainage culverts, roadside grading and adding drainage facilities, elevating roadways where feasible in low spots as well as other innovative solutions not yet explored. These roads include, but are not limited to, Corbin Road, East Clay Street, Lonestar Road, San Jose Road, Wildwood Road, State Route 20 in working with Caltrans.

Other Alternatives: Full elevation of the roadway into a causeway fashion.

Existing Planning Mechanism(s) through which Action Will Be Implemented: OES would coordinate implementation with Public Works.

Responsible Office/Partners: Colusa County Public Works, Caltrans, DWR

Benefits (Losses Avoided): Preservation of Life and safety.

Potential Funding: State and Federal road and or flood funding.

Timeline: 2030

Project Priority (H, M, L): Low

Severe Weather (Extreme Cold, Extreme Heat, Heavy Rains and Storms, Wind and Tornado) Actions

Action 32. Sheltering for Unhoused (Winter Weather)

Hazards Addressed: Risk of weather related medical emergencies for people experiencing homelessness.

Goals Addressed: 1, 3, 4

Issue/Background: Colusa County has extreme heat in the summer and has experienced severe colds in the winter along with heavy rain. Colusa County does not have a year-round shelter for unhoused people.

Project Description: Wintertime Sheltering- Working in collaboration with Ag Dept. and Office of Migrant Services, DHHS will operate a wintertime shelter for families between the months of December and March. In doing so the risk of people in harsh winter climates will be reduced and the housing team will work to help secure permanent housing.

Other Alternatives: Temporary sheltering utilizing motel vouchers.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Colusa County DHHS successfully operated a pilot project of the Wintertime Shelter during 2023/2024.

Responsible Office/Partners: Colusa County Health and Human Services, Public Health, Ag. Dept. and Office of Migrant Services (OMS).

Benefits (Losses Avoided): Decrease the number of people accessing emergency medical services due to the winter weather.

Potential Funding: Homeless Housing, Assistance and Prevention (HHAP) Grant Program (Winter Shelter)

Timeline: November 2024- March 2025

Project Priority (H, M, L): H

Action 33. Sheltering for Unhoused (Extreme Heat)

Hazards Addressed: Risk of weather-related medical emergencies for people experiencing homelessness. (Extreme Heat)

Goals Addressed: 1, 3, 4

Issue/Background: Colusa County has extreme heat in the summer and has experienced sever colds in the winter along with heavy rain. Colusa County does not have a year round shelter for unhoused people.

Project Description: Housing case managers within the DHHS Housing unit will work with vulnerable populations to secure short term stays in hotel/motel when temperatures exceed 100 degrees.

Other Alternatives: Cooling Centers on days over 100 degrees.

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Colusa County Public Health has operated cooling shelters utilizing public library offices.

Responsible Office/Partners: Colusa County Health and Human Services, Public Health, Colusa Library, Local motels

Benefits (Losses Avoided): Decrease the number of people accessing emergency medical services due to the extreme heat.

Potential Funding: Rural Set Aside special NOFO

Timeline: Summer 2024

Project Priority (H, M, L): H

Action 34. Severe Weather Plan Update

Hazards Addressed: Severe Weather

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: Severe weather during Winter Storms and Extreme heat in the summer is becoming more prevalent and increasing risk to people and property.

Project Description: Heat Contingency Planning, PSPS Planning. Evaluate which resources are available to protect livestock and animals from extreme cold and/or heat. Educate the public on disaster preparedness

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: OES to continue community outreach providing printed information related to extreme weather

Responsible Office/Partners: OES, County Agency's

Benefits (Losses Avoided): Protection of life and property

Potential Funding: HMGP, EMPG

Timeline: 2026

Project Priority (H, M, L): Medium

Wildfire Actions

Action 35. Beetle-killed Tree Removal (joint with RCD)

Hazards Addressed: Wildfire, Drought and Water Shortage, Climate Change, Ag Hazards

Goals Addressed: 1, 3, 4, 6

Issue/Background: Colusa County has a high number of bark-beetle infested trees that are now dead and require removal to minimize fire risk. Beetle populations increase over time and threaten infestation of healthy nearby trees.

Project Description: CCRCD will work with US Forest Service and local landowners to remove beetle infested trees.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Colusa County Community Wildfire Protection Plans, Colusa County Fire Mitigation Project (2024)

Responsible Office/Partners: Colusa County, CCRCD, US Forest Service

Benefits (Losses Avoided): Pest management, wildfire protection

Potential Funding: Cal Fire

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 36. Update and Implement Community Wildfire Protection Plan (joint with RCD)

Hazards Addressed: Fire mitigation

Goals Addressed: 1, 3, 4, 6

Issue/Background: Wildfire threatens the hills of Western Colusa County and poses a risk to structures and valuable natural resources in the area. CCRCD has been forming a Community Wildfire Protection Plan to gain stakeholder input and develop a collective understanding of the risks and solutions associated with wildfire in the region.

Project Description: CCRCD will update the CWPP and work to implement project ideas in the county.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CWPP development, Fire Safe Council, Colusa County Coordinator Fire Mitigation Plan (2024)

Responsible Office/Partners: County of Colusa Community Development, CCRCD, Cal Fire, local fire authorities

Benefits (Losses Avoided): Decreased wildfire risk, high community input on climate solutions, conservation of natural resources (timber and natural lands)

Potential Funding: CAL FIRE grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 37. Colusa County Fire Mitigation Plan of 2024 Implementation (joint with RCD)

Hazards Addressed: Fire mitigation

Goals Addressed: 1, 3, 4,6

Issue/Background: Wildfire threatens the hills of Western Colusa County and poses a risk to structures and valuable natural resources in the area.

Project Description: CCRCD will implement projects outlined in the fire mitigation plan. This plan identifies new projects to be added to the community wildfire protection plan (CWPP) and reestablishes stakeholder engagement that began with the CWPP. New projects have been prioritized and identified through this effort between CCRCD and the County of Colusa Community Development Department. Projects include fuel breaks, prescribed burning on private lands, and community programs to increase defensible space in neighborhoods.

Other Alternatives: Deal with fires after the start.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CWPP, Fire Safe Council, Colusa County Coordinator Fire Mitigation Plan (2024)

Responsible Office/Partners: County of Colusa Community Development, CCRCD, Cal Fire, local fire authorities, US Forest Service

Benefits (Losses Avoided): Decreased wildfire risk, community input on climate solutions, conservation of natural resources

Potential Funding: CAL FIRE grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 38. Colusa County Fire Safe Council (joint with RCD)

Hazards Addressed: Fire mitigation

Goals Addressed: 1, 3, 4, 6

Issue/Background: Wildfire threatens the hills of Western Colusa County and poses a risk to structures and valuable natural resources in the area.

Project Description: CCRCD will support the development and oversight of a Fire Safe Council, which is a group of stakeholders that meet regularly to prioritize and implement projects outlined in wildfire mitigation plans.

Other Alternatives: Status quo.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CWPP, Fire Safe Council, Colusa County Coordinator Fire Mitigation Plan (2024)

Responsible Office/Partners: County of Colusa Community Development, CCRCD, Cal Fire, local fire authorities, US Forest Service

Benefits (Losses Avoided): Decreased wildfire risk, high community input on climate solutions, conservation of natural resources

Potential Funding: CAL FIRE grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): 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 2024 Colusa 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. Two resolutions were created – one for the County and incorporated communities and one for the special districts and Tribe.

The governing board for each jurisdiction has adopted this 2024 Colusa County LHMP Update by passing a resolution. A copy of the generic resolutions 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 2024 Colusa County LHMP Update is critical to the success of hazard mitigation in the Colusa 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 2024 Colusa County LHMP Update.

7.1 Implementation

Once adopted, this 2024 Colusa 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 2024 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 Colusa 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 2024 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 Colusa County, 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

Colusa 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. Colusa 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 2024 LHMP Update anticipated to be fully approved and adopted in late-2024, the next required written update of the Plan must be completed by late 2029. Colusa County OES will initiate the Plan update – which may include applying for grant funding to hire professional services to assist in preparing the 2029 LHMP Update. The 2029 LHMP Update development process should be initiated in 2026 to ensure the 2029 LHMP Update can be funded and completed by this 2024 Colusa 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 2024 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 mailed 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 Colusa 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 forwarded to the news media (public).
- A copy of the 2024 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 2024 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 2024 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 jurisdiction's 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
- Tribal Plans (for Kletsel Dehe Wintun Nation)
- 5-year plans (for levee districts)
- 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 2024 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 flood actions identified in this mitigation strategy with implementation priorities in existing Watershed, Flood, and Stormwater Drainage Plans. Key people responsible for development and implementation of Flood Plans and Stormwater Master and Drainage 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 flood and stormwater plans' processes through the efforts of each responsible jurisdiction and department.
3. 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.
4. Integration of many of the infrastructure, roads, and facility improvement projects with the jurisdictional Capital Improvement Programs.
5. 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	Safety Element / Master Plans/ Strategic Plans/ 5-Year Plans	EOP / Emergency Plans	CWPP / Fire Plans	CIP	Flood / Stormwater / Watershed Plans	Other Plans
Colusa County	X	X	X	X	X	SGMA Action Plan Streambank Erosion Plan Public Outreach

Jurisdiction	Safety Element / Master Plans/ Strategic Plans/ 5-Year Plans	EOP / Emergency Plans	CWPP / Fire Plans	CIP	Flood / Stormwater / Watershed Plans	Other Plans
City of Colusa	X	X	X	X	X	Public Outreach
City of Williams	X	X	X	X	X	Public Outreach
Colusa County RCD	X	X	X	X	X	SGMA Action Plan Streambank Erosion Plan
Cortina Community Services District	X					X
Kletsel Dehe Wintun Nation	X	X	X	X		Environmental Regulatory Plans and Programs Drought Plan Public Outreach
RD 108	X	X			X	X
RD 479	X				X	X
Sacramento River Westside Levee District	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 2024 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, 2029 Colusa County LHMP Update. As a starting point the underserved and vulnerable population groups identified for this 2024 LHMP Update will be contacted to invite them to the 2029 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 2024 Colusa 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 Colusa

A.1 Introduction

This Annex details the hazard mitigation planning elements specific to the City of Colusa, a previously participating jurisdiction to the 2018 Colusa 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 Colusa, 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 Colusa followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Colusa 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 Colusa – Planning Team

Name	Position/Title	How Participated
Bryan Stice	Previous City Planner	Attended workshops and provided details of the process the City of Colusa was going to take in relation to a mitigation strategy
Dave Swartz	City Engineer	Provided City input on hazard issues and mitigation strategies
Jesse Cain	City Manager	Oversaw the plan with the previous City Planner
Logan Conley	City Fire Chief	Attended HMPC meetings. Provided input on Hazard events and vulnerability concerns to the City

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 A-2.

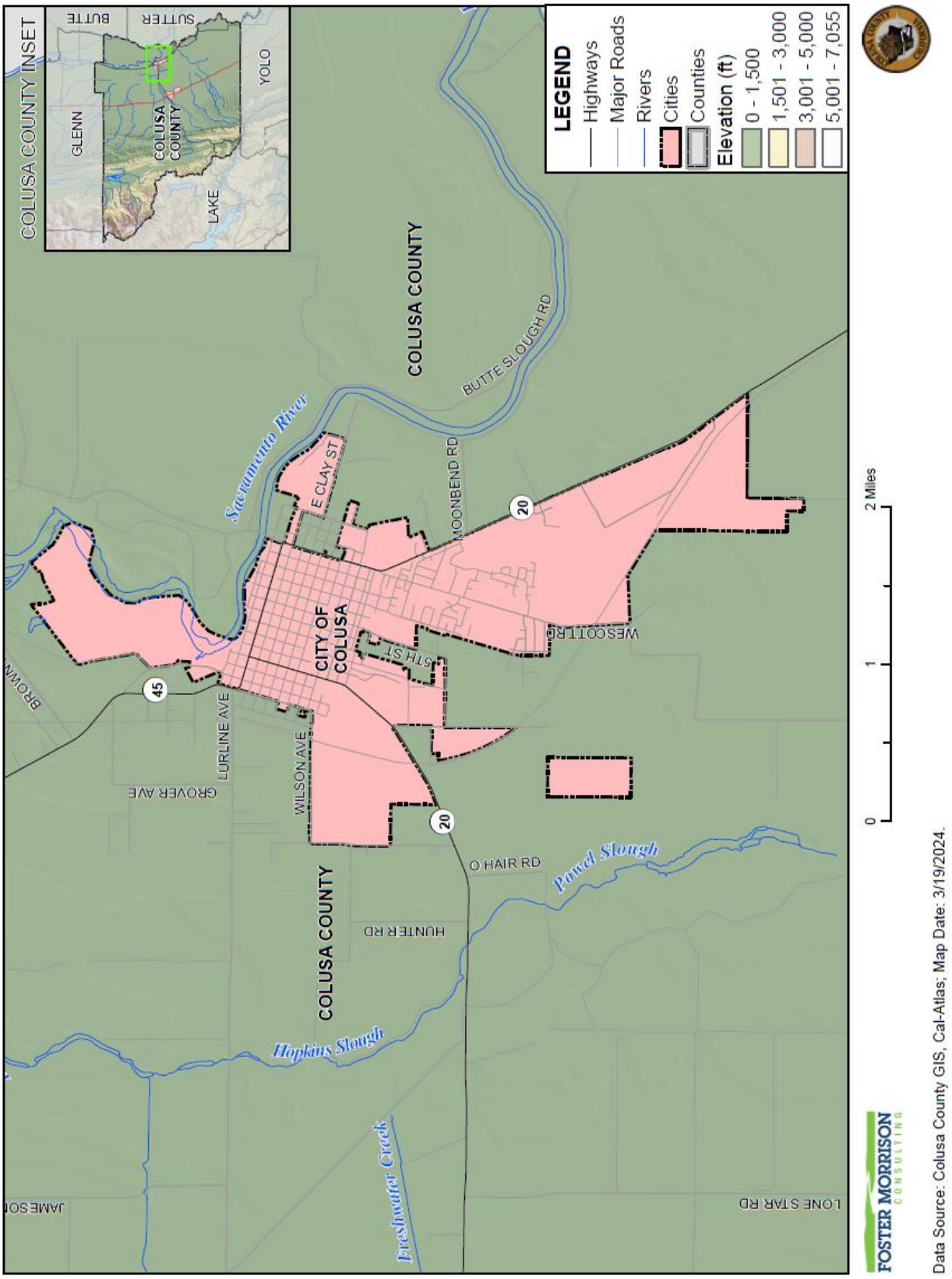
Table A-2 2018 LHMP Incorporation

Planning Mechanism 2018 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
–	Due to Covid-19, and the exit and absence of the city planner, it was difficult to implement any programs.

A.3 Community Profile

The community profile for the City of Colusa is detailed in the following sections. Figure A-1 displays a City map and the location of City of Colusa within Colusa County.

Figure A-1 City of Colusa



A.3.1. Geography and Climate

The City of Colusa is located near the geographic center of the Sacramento Valley. The nearest major metropolitan city is Sacramento, approximately 60 miles to the south. The City of Chico, located approximately 50 miles northeast of Colusa, and Yuba City, 22 miles east, are other nearby urban areas. Unique features of the Colusa community include its location next to the Sacramento River and historic character in the downtown core. The climate varies from low temperatures ranging from 24 to 44 degrees to high temperatures reaching temperatures of 80 to as high as 110 degrees at certain times of the year. The average annual rainfall is about 14.2 inches per year, with primary rain events occurring in the Fall (October) through the Spring (April). Colusa lies in the central valley of California, is relatively flat, and sits at 49' in elevation above mean sea level.

A.3.2. History

Founded in 1850, the City of Colusa was briefly known as Salmon Bend. Prior to its incorporation, the City was the site of an Indian village inhabited by a subgroup of the Wintun Indian Nation. One of the first Anglo-Saxon settlers was the Semple family. This group settled along the Sacramento River at present day Colusa and established a trading center for gold mining activities farther north in Trinity and Shasta Counties. River steamers could travel as far north as Red Bluff in the winter but could navigate only up to Colusa in the summer due to low water levels. Because Colusa was at the upper end of navigable waters during summer months, the town became a year-round center of commerce.

In the 1860s, the economy of Colusa County changed from primarily stock-raising to the farming of wheat, barley, and other crops. Wheat production eventually became the predominant land use and economic activity. However, the market for wheat eventually declined when Argentina and Canada became major exporters of the product in the 1890s. Following the decline of the wheat industry, rice was introduced to the area and became the dominant crop in the County. Rice required a large amount of water compared to other crops produced in the area. The need for additional water was addressed with the construction of the Glenn-Colusa Irrigation Canal.

Colusa was incorporated in 1868, during an expansion of farming and a growth in population in the region. The City grew to a population of 2,000 in the prosperous 1870s, distinguished by broad, level streets, numerous brick business buildings, and stately residences. As the county seat, Colusa counted among its residents an unusually large complement of judges, attorneys, assessors, and governing officials, many of whom also earned their livelihoods as farmers and merchants.

Vestiges of Colusa's 19th century traditional life continue to the present day. Stately Italianate and Queen Anne dwellings, intermingled with Craftsman bungalows and clusters of Tudor Revival homes, provide residences for a new generation of Colusans. Farm-supporting businesses continue to service agricultural production in the surrounding unincorporated lands.

A.3.3. Economy and Tax Base

Colusa's location, at the intersection of two state highways, provides an advantage for its retail economy. Colusa has three highway ingresses, all of which funnel traffic through downtown. The highway layouts,

combined with the historic small town commercial sites, provide a distinct advantage to the City's opportunity for economic development. Colusa's retail sector is the predominant influence on its economy, as well as the major generator of tax revenues to the City.

Colusa still relies in large part on the same economic base that has sustained it for more than a century – agriculture and its related businesses. Most of the residents in Colusa work in Colusa or the surrounding area, within a 30-minute commute or less from their homes. Unlike many other cities of equal distance from Sacramento, it has not become a "bedroom" community where most working residents face hours of daily commute to work.

US Census estimates show economic characteristics for the City of Colusa. These are shown in Table A-3 and Table A-4. Mean household income in the City was $75,073. Median household income in the City was $59,400.

Table A-3 City of Colusa – Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	439	16.2%
Construction	169	6.2%
Manufacturing	370	13.7%
Wholesale trade	38	1.4%
Retail trade	187	6.9%
Transportation and warehousing, and utilities	90	3.3%
Information	15	0.6%
Finance and insurance, and real estate and rental and leasing	74	2.7%
Professional, scientific, and management, and administrative and waste management services	71	2.6%
Educational services, and health care and social assistance	594	21.9%
Arts, entertainment, and recreation, and accommodation and food services	270	10.0%
Other services, except public administration	126	4.7%
Public administration	265	9.8%

Source: US Census Bureau American Community Survey 2022 Estimates

Table A-4 City of Colusa – Income and Benefits

Income Bracket	Percent
<$10,000	7.7%
$10,000 – $14,999	55.3%
$15,000 - $24,9999	7.9%
$25,000 – $34,999	13.0%
$35,000 – $49,999	10.3%
$50,000 – $74,999	17.0%

Income Bracket	Percent
$75,000 – $99,999	15.5%
$100,000 – $149,999	12.7%
$150,000 – $199,999	7.6%
$200,000 or more	3.0%

Source: US Census Bureau American Community Survey 2022 Estimates

Major employers of City residents in the area include the County of Colusa, City of Colusa, Colusa Casino Resort, Colusa Unified School District, Colusa Regional Medical Center, Colusa Industrial Properties, and Sunsweet Dryers. While many residents work locally, others commute to Yuba City, Williams, and the Yolo-Sacramento area for work.

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 Colusa 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 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. 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 Colusa'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 Colusa'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 socially 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 Colusa has 6,447 residents, as of January 1, 2024. The City of Colusa has seen growth rates as shown in Table A-5. As shown, the City has grown consistently since 1950, with growth slowing recently.

Table A-5 City of Colusa– Population Changes Since 1950

Year	Population	% Change
1950	3,031	–
1960	3.518	16.1%
1970	3.842	9.2%
1980	4,075	6.1%
1990	4,934	21.1%
2000	5,402	9.5%
2010	5,971	10.5%
2020	6,411	7.4%
2023	6,447	0.3%

Source: US Census Bureau, California Department of Finance (2024)

Special Populations and Disadvantaged Communities

The City is a very 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

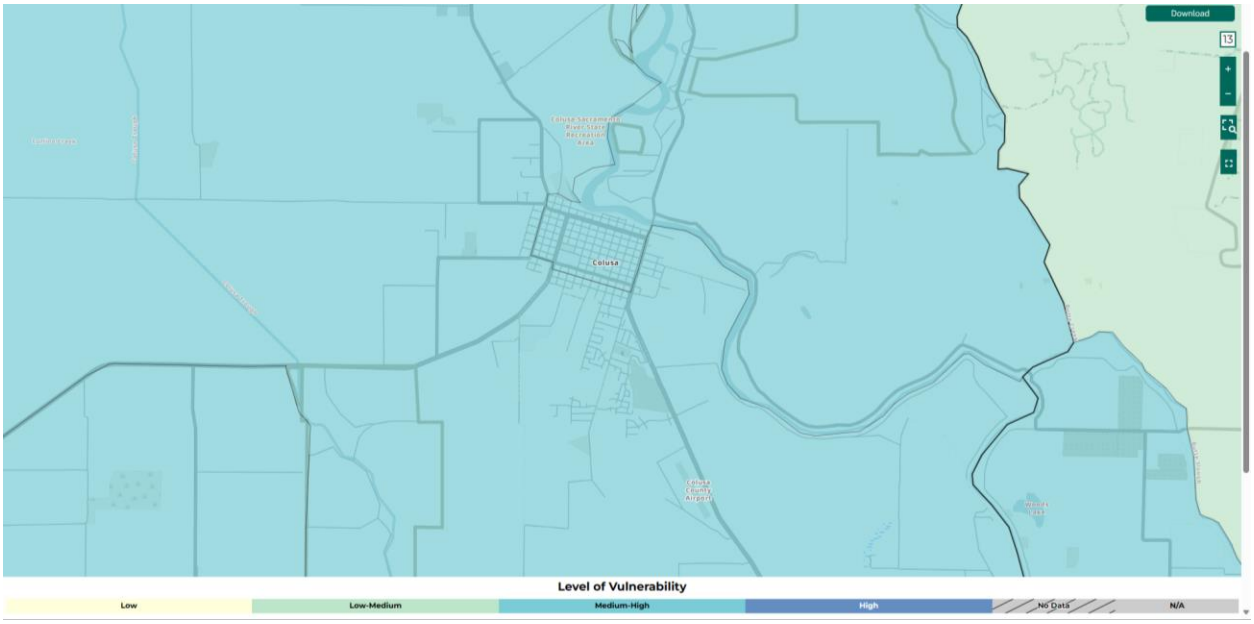
Every community must prepare for and respond to a hazard event, including the range of natural hazards addressed in this Plan, from severe weather extremes to large potentially catastrophic events such as wildfires or earthquakes. A number of factors, including poverty, lack of access to transportation, 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.

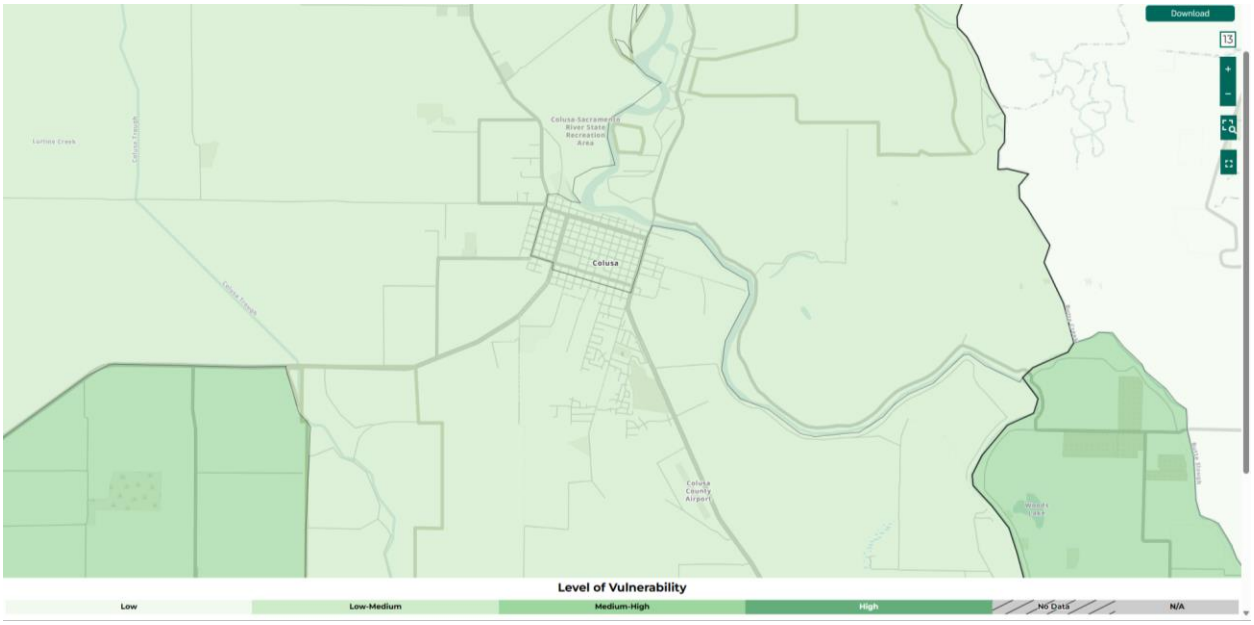
The overall SVI map is shown in Figure A-2; the socioeconomic SVI for the census tracts in and around the City are shown in Figure A-3; the household composition SVI is shown in Figure A-4; the minority and language SVI is shown in Figure A-5; and the housing and transportation SVI is shown in Figure A-6. Overall, the maps indicate that, in general, the City sees little change in social vulnerability regardless of location. As shown, there is very minimal change in each SVI across the City.

Figure A-2 City of Colusa – Overall Social Vulnerability



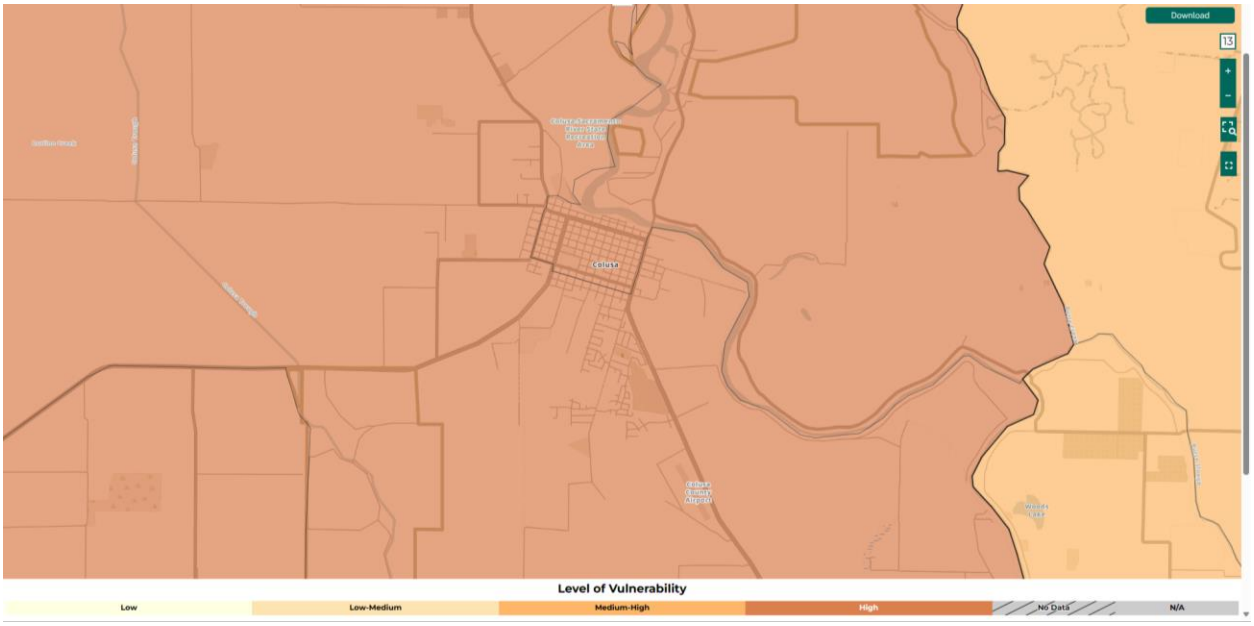
Source: CDC Social Vulnerability Index – map retrieved 3/20/2024
Level of Vulnerability Rating: **Yellow** – Low; **Green** – Low/Medium; **Aqua** – Medium/High; **Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure A-3 City of Colusa – Socioeconomic Status Vulnerability



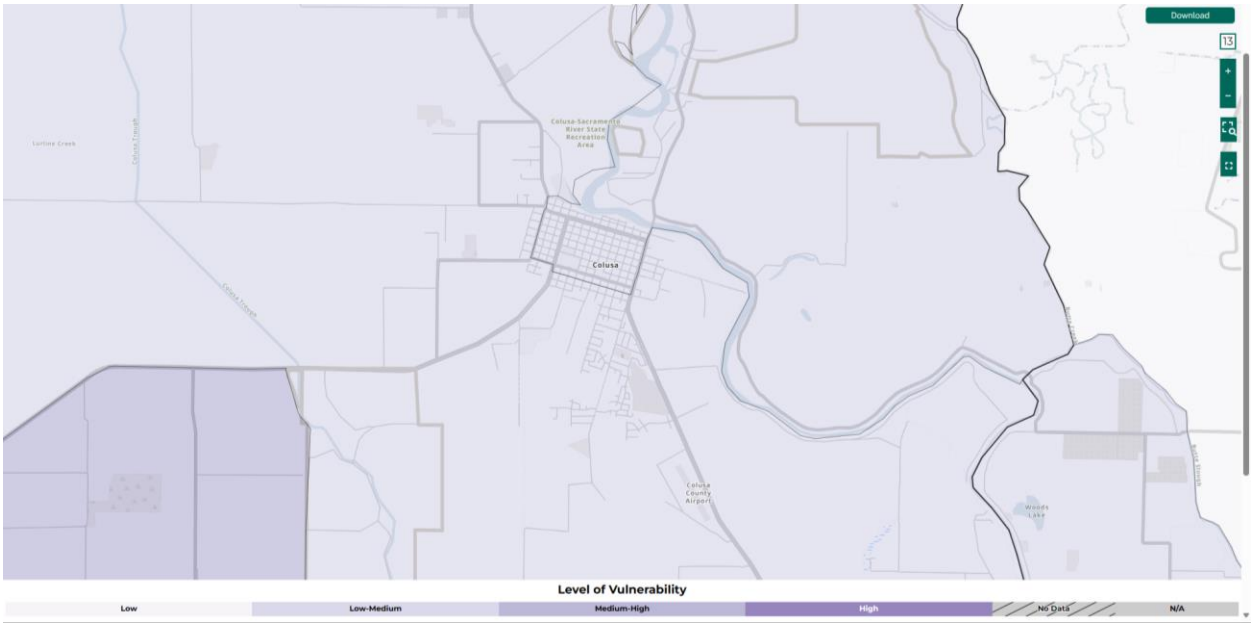
Source: CDC Social Vulnerability Index – map retrieved 3/20/2024
Level of Vulnerability Rating: **Faint Green** – Low; **Light Green** – Low/Medium; **Green** – Medium/High; **Dark Green** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure A-4 City of Colusa – Household Characteristics



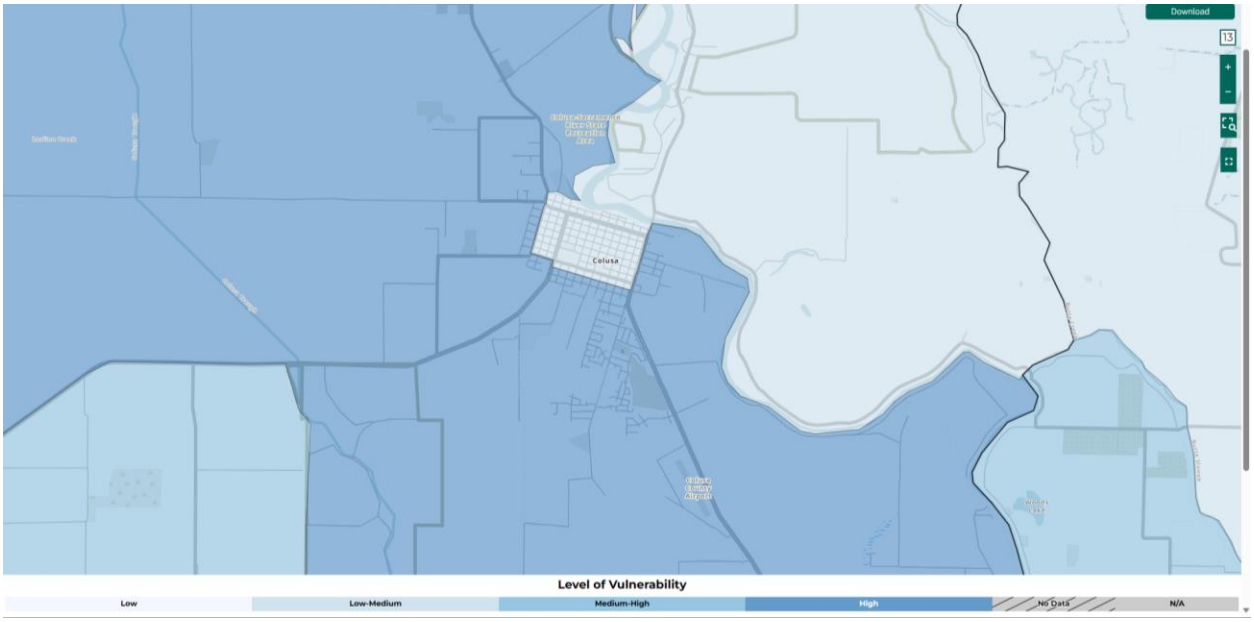
Source: CDC Social Vulnerability Index – map retrieved 3/20/2024
Level of Vulnerability Rating: **Faint Orange** – Low; **Light Orange**– Low/Medium; **Orange** – Medium/High; **Dark Orange** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure A-5 City of Colusa – Racial and Ethnic Minority Status



Source: CDC Social Vulnerability Index – map retrieved 3/20/2024
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 Colusa – Housing Type and Transportation

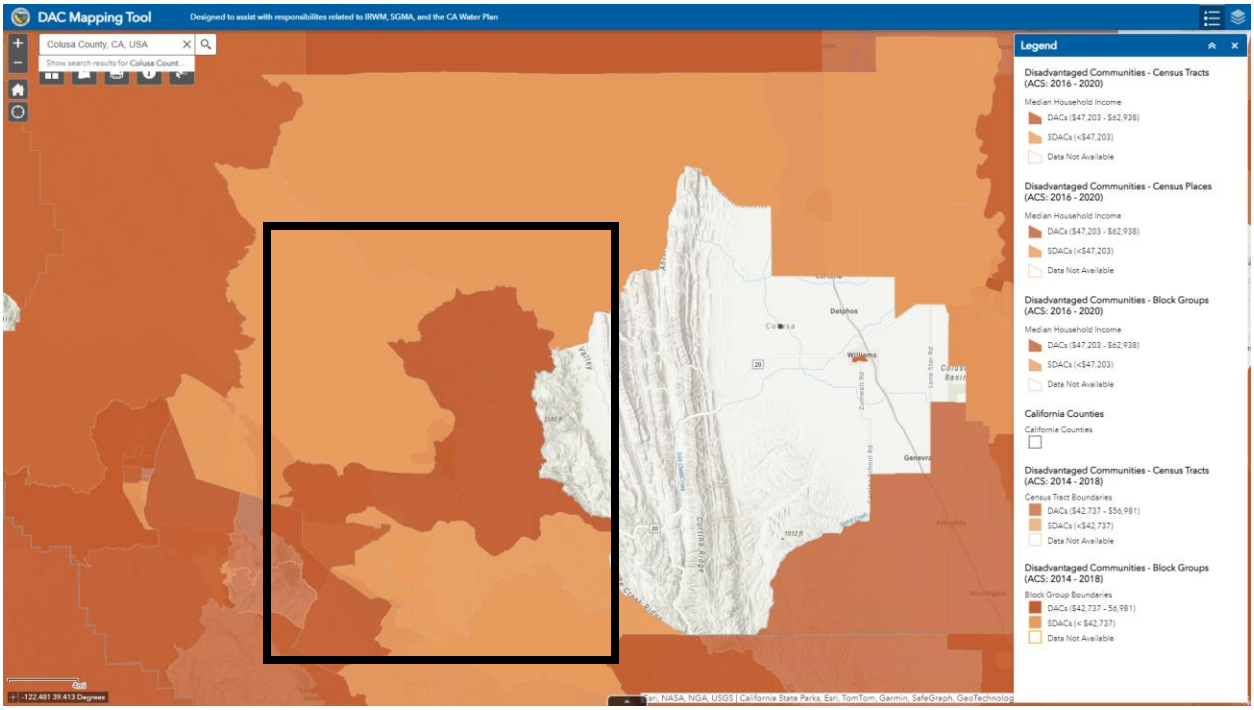


Source: CDC Social Vulnerability Index – map retrieved 3/20/2024
Level of Vulnerability Rating: **Faint Blue** – Low; **Light Blue** – Low/Medium; **Blue** – Medium/High; **Dark Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

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 Colusa County Planning Area – Disadvantaged Areas

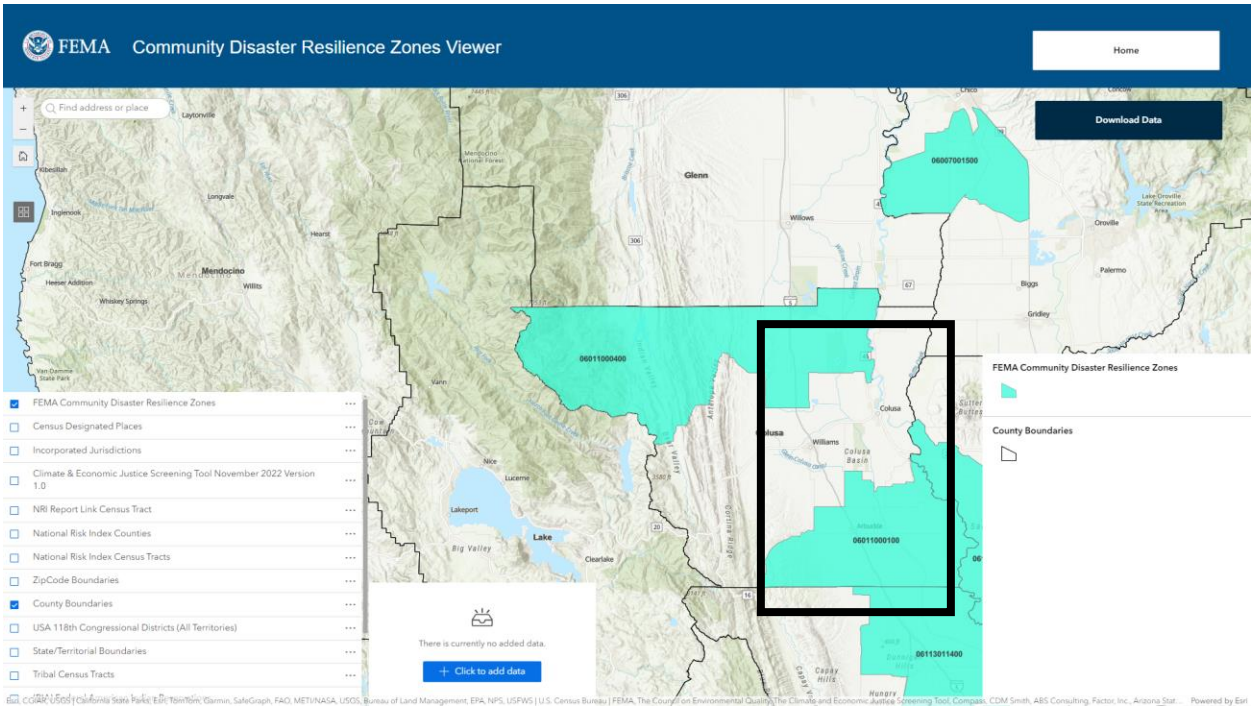


Source: Cal DWR DAC Mapping Tool – retrieved 3/14/2023

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, these areas lie adjacent to the City, but outside of the City limits.

Figure A-8 Colusa County Planning Area – FEMA Community Disaster Resilience Zones



Source: FEMA. Map retrieved 3/15/2024.

City Planning Team Input

The City noted that the Critical Facilities and Infrastructure section below includes the facilities used by At-Risk populations. 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.

The City Planning Team noted that the City of Colusa has limited facilities/housing for special needs populations. The City also noted that elderly residents are primarily congregated in the Jaconetti Center near the NW corner of Carson and D Streets. The Eskaton Frank Jaconetti Center is one of the largest non-profit providers of aging services in Northern California and has been serving older adults in the region for over 55 years. The organization offers stand-alone independent living, assisted living, and memory care communities, Life Plan Communities (CCRC, Continuing Care Retirement Community), affordable housing communities, home and community-based services, along with an array of education, social programs and resources to empower older adults to live well.

In addition, the City provides services through the local Veterans Hall. The Veterans of Foreign Wars of the United States is a nonprofit veterans service organization comprised of eligible veterans and military service members.

City of Colusa General Plan 2020-2028 Housing Element

The City of Colusa 2020-2028 Housing Element also discusses special populations in the City. Discussions for seniors, those with disabilities, people experiencing homelessness, large households, female headed

households, extremely low-income households, and farmworkers were included. These are discussed below.

Seniors

Seniors have special housing needs primarily resulting from physical disabilities and limitations, fixed or limited income and health care costs. Additionally, senior households also have other needs to preserve their independence, including supportive services to maintain their health and safety, in-home support services to perform activities of daily living, conservators to assist with personal care and financial affairs, public administration assistance to manage and resolve estate issues, and networks of care to provide a wide variety of services and daily assistance.

According to the U.S. Census Bureau, approximately 683 persons in Colusa were 65 years and older in 2016 as compared to 868 in 2011. This resulted in an overall 3.1% decrease in seniors of the City's overall population. There are three skilled care senior facilities in the Colusa area: Colusa Regional Medical Center (Colusa), Valley West Care Center (Williams) and the Sunbridge Care Center (Willows) to help care for this population.

Persons with Disabilities

A disability includes, but is not limited to, any physical or mental disability that limits a major life activity by making the achievement of major life activities difficult, including physical, mental and social activities and working. disabled persons often require special housing needs related to potential limited earning capacity, the lack of accessible and affordable housing, and higher health costs associated with disabilities. Additionally, various disabilities require a wide range of different housing options depending on the type and severity of the disability. According to the US Census Bureau, there are 1,200 persons with a disability living in the City. 6.6% of this number are employed, typically in low wage-earning positions indicating that this population needs access to affordable housing options.

Persons with a Developmental Disability

This term "developmental disability" includes mental retardation, cerebral palsy, epilepsy, autism and disabling conditions found to be closely related to mental retardation or to require treatment similar to that required for individuals with mental retardation. The California Department of Development Services (DDS) reports that approximately 54 developmentally disabled persons reside in the City, with almost all persons living with a parent or guardian.

Large Households

Large households are defined as those households containing 5 or more people. These families are typically limited in their income which causes housing issues due to larger units are more expensive and most units with over 3 bedrooms are typically single-family homes, instead of multi-family rental units. Large family households are considered a special needs group because there is a limited supply of adequately sized housing to accommodate their needs. Between 2011 and 2016, the number of owner-occupied large households in Colusa decreased from 148 to 121. However, renter-occupied households increased by more than 69% from 62 to 201 units, an increase of 139 households.

Overcrowded Households

Overcrowded households are usually a reflection of the lack of affordable housing available. Households that cannot afford housing units suitably sized for their families are often forced to live in housing that is too small for their needs, which may result in poor physical condition of the dwelling unit. Although there is more than one way of defining overcrowded housing units, the definition used in the Housing Element is 1.01 or more persons per room, the same definition used in the 2000 and 2010 Censuses. Overcrowding increases health and safety concerns and stresses the condition of the housing stock and infrastructure.

According to the U.S. Census Bureau in 2016, 180 households were living in crowded conditions. The majority of these households were living in overcrowded conditions with 1.01 to 1.50 person per room. The level of overcrowding is somewhat higher among renter occupied households at 8.9% compared to 8.6% for owner-occupied households, for a total average of 8.3% for all housing types. However, over all this is lower than the County average of 12.5% of households experiencing overcrowded conditions.

Female Head of Households

There are about 304 female headed households (single without husbands) residing in the City, which consists of about 20.3% of all households in Colusa. There has been very little shift in this number since 2010. Just under half of this population lives below the poverty rate, indicating that more housing support is needed for this vulnerable group that typically struggles with earning income opportunities and other specific needs like daycare availability.

Extremely Low Income

Households in the extremely low-income category have special housing needs because they are unlikely to find market-rate housing that is affordable at any price. Extremely low-income households may be homeless or in danger of being homeless because of their inability to find appropriately priced housing. Over 100 people in Colusa with annual incomes of less than $20,000 were paying more than 30% of their income for shelter. That constitutes over 26% of this extremely low-income category. Because of these cost burdens, extremely low-income households may require specific housing solutions, including subsidies, housing with supportive services, shared housing and/or single-room occupancy units.

Homeless Population

Homeless individuals, generally in the extremely low-income category, include, but are not limited to victims of domestic violence, persons with mental illness, persons suffering from addiction, families with single heads-of-household and unaccompanied minors. This term also includes individuals who have purchased parcels of land but are unable to afford site improvements for a home. Though there appears to be no significant homeless population in the City, some extremely low-income households are most at-risk of becoming homeless. In any case, it is clear that there is a need for a regional emergency shelter to serve the homeless' needs.

Periodically, there are a few individuals who are homeless in the City who call Colusa the location of their last permanent residence. There are no homeless encampments in the City. Many of the homeless individuals are permanently homeless who often live outside the City, but who need periodic emergency

shelter during in-climate weather, such as during the winter when the temperature can reach below freezing and during the summer when it can reach above 100 degrees.

Agricultural Workers

Agriculture workers can be characterized as having extremely low incomes that need special housing needs. They play a critical role in contributing to Colusa County's major producing industry since the largest portion of Colusa's workforce was employed in agriculture, forestry, fishing/hunting and mining in 2018. This does not account for how many of these individuals are employed separately in farm industries or whether they are seasonally or permanently employed. The housing needs of permanent farm workers are no different from those of other employment groups. Such needs consist of housing that is affordable in relation to income, meets acceptable housing standards and is reasonably accessible to the site of employment.

Seasonal or part-time farm workers who do not leave the area and seek year-round residency in the area, have similar needs, but their income is likely to be considerably less than year-round employees and these individuals may require subsidized housing or employer-based housing. As a result, migrant farm workers may seek housing in a labor camp or may rent an available and inexpensive unit (which may be shared among several workers). If such housing is not available, migrant farm workers may resort to substandard shelters, ranging from vehicles to tents or other forms of temporary shelter. Because migrant farm workers desire to reside near the work sites, most farm worker housing should be provided in these unincorporated areas; farm workers with reliable transportation could reside within the City limits.

Structures

This section looks at the parcels (and associated structures) that make up the built environment of the City. The following data from the Colusa County Assessor's Office is based on the 2023 Assessor's data, and the associated parcel layer. 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) and other values is the same as 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 generally the value of the infrastructure or improvements to the land that is of concern or at risk. Generally, the land itself is not a loss. 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 Colusa County Parcel/Assessor Data values and content replacement values (e.g., the values at risk) broken down by property use for the City.

Table A-6 City of Colusa – Total Parcels (and Structures) by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	23	11	$13,938,078	$552,430	$495,940	$552,430	$15,538,878
Commercial	249	190	$20,544,713	$57,204,144	$6,312,332	$57,204,144	$141,265,333
Government	107	51	$5,985,502	$33,560,789	$18,519,832	$33,560,789	$91,626,912
Industrial	65	22	$12,418,971	$34,637,423	$15,447,206	$51,956,134	$114,459,734
Institutional	34	20	$2,286,791	$6,200,820	$6,039,649	$6,200,820	$20,728,080
Miscellaneous	12	5	$615,343	$8,431,121	$0	$8,431,121	$17,477,585
Residential	1,844	1,778	$88,514,146	$303,181,060	$2,413,584	$151,590,525	$545,699,315
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$946,795,837**

Source: 2023 Colusa 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 Colusa 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 and (2) At-Risk Populations Facilities:

- **Essential Service Facility**: A facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions.
- **At-Risk Populations**: Pre-schools, public and private primary and secondary schools, before and after school care centers, daycare centers, group homes, and assisted living residential or congregate care facilities with multiple residents.

Critical facilities in the City are shown on Figure A-9. A summary of all critical facilities in the Colusa County Planning Area is shown in Table A-7 and detailed in Table A-8. Additional details of individual critical facilities can be found in Appendix F of this Plan Update.

Figure A-9 City of Colusa – Critical Facilities

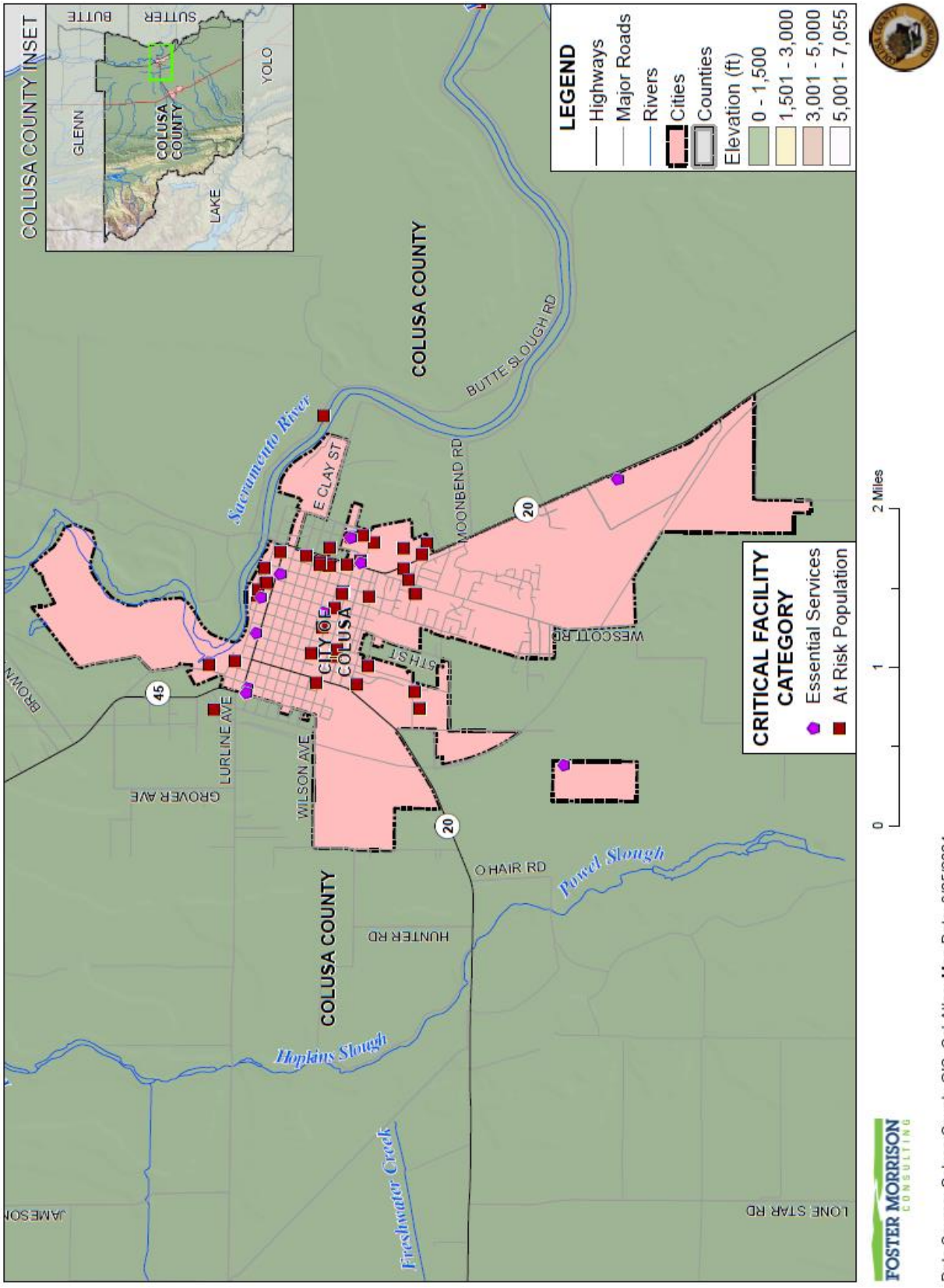


Table A-7 City of Colusa – Critical Facilities by Category

Critical Facility Category	Facility Count
Essential Services Facilities	10
At Risk Population Facilities	40
City of Colusa Total	**50**

Source: Colusa County GIS

Table A-8 City of Colusa – Critical Facilities by Category and Type

Critical Facility Category	Facility Type	Facility Count
Essential Services Facilities	Emergency Response	1
	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	3
	Utility Facility	2
	Essential Services Facilities Total	**10**
At Risk Population Facilities	Apartment Complex	22
	Assisted-Living	1
	Hotel or Motel	2
	Jail	1
	Mobile Home Park	5
	School	8
	Senior Living Facility	1
	At Risk Population Facilities Total	**40**
City of Colusa Total		**50**

Source: Colusa County GIS

Community Lifelines

Assessing the vulnerability of the City of Colusa 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 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.

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 County as a partnership between the City, local special districts, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the City's community lifelines overlap the County's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the City and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the City of Colusa 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 and are difficult to replace. Should a natural disaster occur, these species, resources, and locations are at risk.

The City of Colusa has a variety of natural resources of value to the community. Surrounding the City are many natural resources in preserves and open space, including the Colusa National Wildlife Refuge, one-half mile west of the City, and the Colusa-Sacramento River State Recreation Area to the north. In the future, the City of Colusa intends to promote these natural resources through increased awareness and improved public access.

The 2007 City of Colusa General Plan noted that Colusa is located next to the Sacramento River, in an area with high levels of waterfowl activity and raptor nesting. The River Basin contains a number of species, subspecies, and genetically distinct populations of fish that are presently listed as federally- or state-threatened/endangered species or species that appear to be approaching that status. However, the urbanized areas both in and just outside of the City limits are generally less likely to contain significant wildlife resources or habitat, and the California Department of Fish and Game has indicated there are no endangered animal species within the City of Colusa.

Just south of the City of Colusa, the federal government maintains the Colusa National Wildlife Refuge, part of the Pacific Flyway, which provides winter refuge for migrating waterfowl, such as ducks and geese. The 10,783-acre refuge consists of about 7,600 acres of managed wetlands, uplands, riparian habitat, and vernal pools. The refuge supports several endangered plants and animals, including transplanted colonies of palmate-braced bird's-beak, species of fairy shrimp, vernal pool tadpole shrimp, giant garter snake, wintering peregrine falcon, bald eagle, and breeding tri-colored blackbird. Resident wildlife includes grebe, heron, blackbird, golden eagle, beaver, muskrat, black-tailed deer, and other species typical of upland and wetland habitats. Approximately 9,000 people hunt on the refuge each year, and 73,000 people use the visitor center, auto tour route, and walking trail.

Although the urbanized area of the City of Colusa and outlying areas do not have species or vegetation which fall into the rare, threatened, or endangered categories, the City does consider its large variety of mature trees lining its streets a significant resource.

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.

Wetlands in the City are shown in Section 4.2.1 and detailed in Table A-9.

Table A-9 City of Colusa – Wetland Types and Acreages

Wetlands Area Type	Wetlands Count	Wetlands Area (in Acres)
Freshwater Emergent Wetland	27	56
Freshwater Forested/Shrub Wetland	12	87
Freshwater Pond	29	67
Lake	0	0
Riverine	52	11
Estuarine and Marine Wetland	0	0
City of Colusa Total	**120**	**221**

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 Colusa 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 6 historic buildings in the City in the OHP Database.

Table A-10 City of Colusa – Historic Resources

Resource Name (Plaque Number)	National Register	State Landmark	Point of Interest	Date Listed	City/ Community
Colusa Carnegie Library (N1657)	X			12/10/1990	Colusa
Colusa County Courthouse (890)		X		12/29/1975	Colusa
Colusa Grammar School (N632)	X			6/13/1978	Colusa
Colusa High School and Grounds (N434)	X			8/13/1976	Colusa
Colusa IOOF Hall / Odd Fellows Building (P505)			X	7/28/1977	Colusa
Grand Island Shrine (P329)	X		X	5/15/1974	Colusa

Source: California Department of Parks and Recreation Office of Historic Preservation, http://ohp.parks.ca.gov/. Retrieved March 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 Colusa 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 Colusa, this includes the following:

- Colusa's retail sector is the predominant influence on its economy, as well as the major generator of tax revenues to the City.
- The Countywide agricultural industry is an economic driver benefitting the City

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 Pool
- Local Splash Pool

The City noted the following community activities of value:

- Christmas time in Colusa
- 4th of July
- Founders Day
- Concerts in the Park
- Non-Profit events
- Farmers Market

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

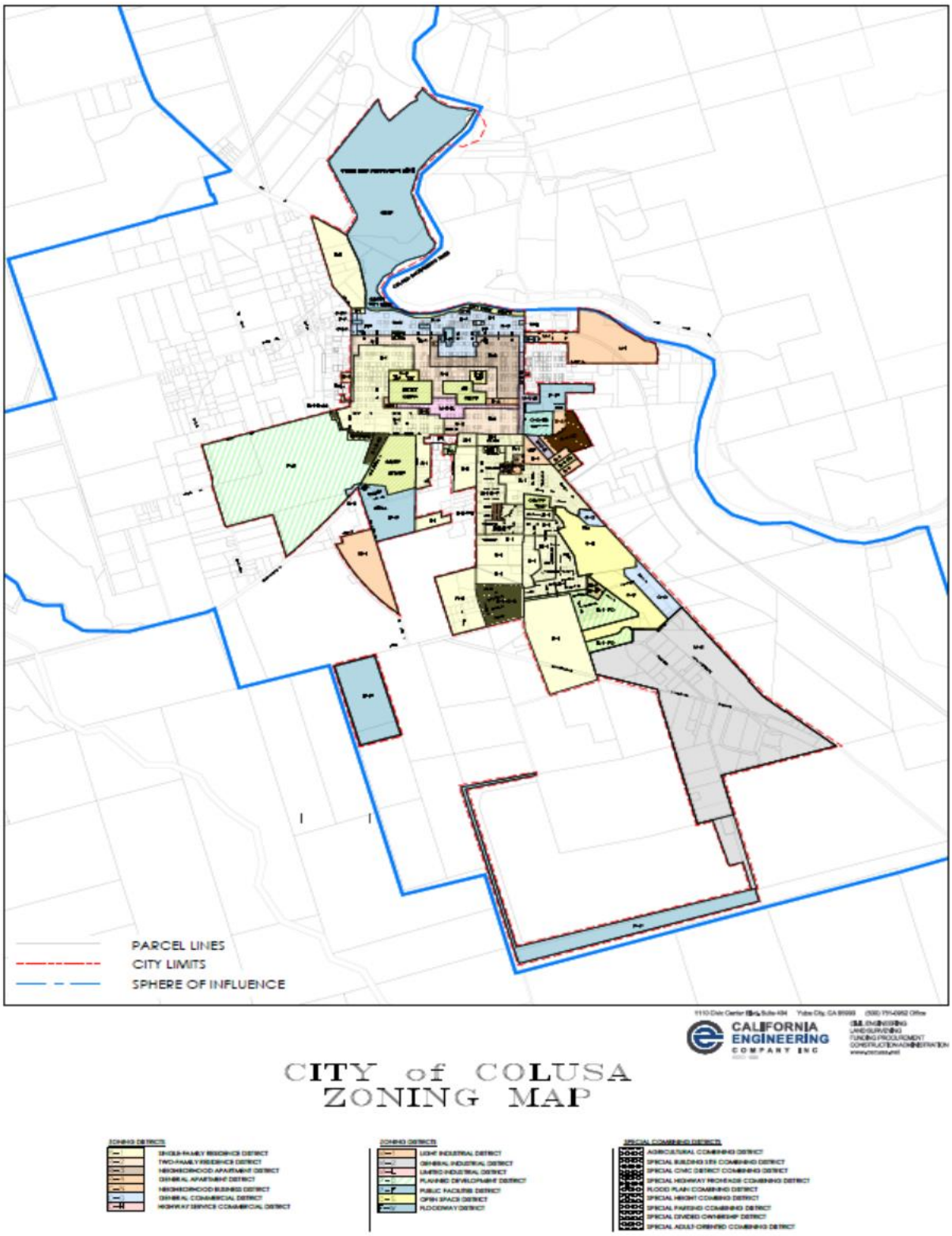
State planning law requires that a land use element of a general plan include a statement of the standard population density, building intensity, and allowed uses for the various land use designations in the plan (Government Code Section 65302(a)). The City's land use designations are generally described below and mapped on the Land Use Diagram (Figure A-10). The City of Colusa 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 Colusa. 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 Colusa residents.

Future land use for the City of Colusa from the 2007 City of Colusa General Plan Land Use Element is shown on Figure A-10.

Figure A-10 City of Colusa – Land Use Diagram



Source: City of Colusa website (https://cityofcolusa.com/planning-and-building/). Retrieved 7/1/2024

Population Trends and Projections

The City is expected to continue to increase in population. The 2020-2028 City of Colusa Housing Element contained population projections for the City from 2020 to 2028. These are shown on Table A-11.

Table A-11 City of Colusa – Future Population Projections

Forecast Factor	2020	2025	2028
Population	6,196	6,406	6,624

Source: 2020-2028 City of Colusa Housing Element

Development since 2018 Plan

The City noted that the Wildwood Estates (identified in the 2019 LHMP) has been completed. The Sunrise Landing Phase 1 and 2 was also developed since the last plan. Phase 1 and 2 included 90 units of single family residential housing. Also developed since last plan: it the Little Ceasars Pizza completed in 2023 on one parcel

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 2019 for the City. These are tracked by total development, property use type, and hazard risk area. These are shown in Table A-12 and Table A-13.

Table A-12 City of Colusa – Total Development Since 2019

Property Use	2019	2020	2021	2022	2023
Residential	36		42	21	21
Commercial	3	1		2	2
Industrial					
Other					
Total	**39**	**1**	**42**	**23**	**23**

Source: City of Colusa Planning Department

Table A-13 City of Colusa – Development in Hazard Areas since 2018

Property Use	1% Annual Chance Flood	Levee Protected Area	Wildfire Risk Area[1]	Other
Total	**110**	**18**	**0**	**0**

Source: City of Colusa Planning Department

[1]Moderate or higher wildfire risk area

Development has occurred in the identified hazard areas, including the 1% annual chance floodplains and high wildfire risk areas. It was completed in accordance with all current and applicable development codes, floodplain ordinances, and 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 provided 7 future development areas which were used as the basis for the inventory of future development for the City. These were mapped in GIS. Where multiple parcels are listed, the parcels are merged to form one polygon, and the hazards assigned are based on the centroid of the polygon. Figure A-11 show the locations of the future development areas in the City, while Table A-14 shows the details of the future development areas by acres and parcels.

Figure A-11 City of Colusa – Future Development Areas

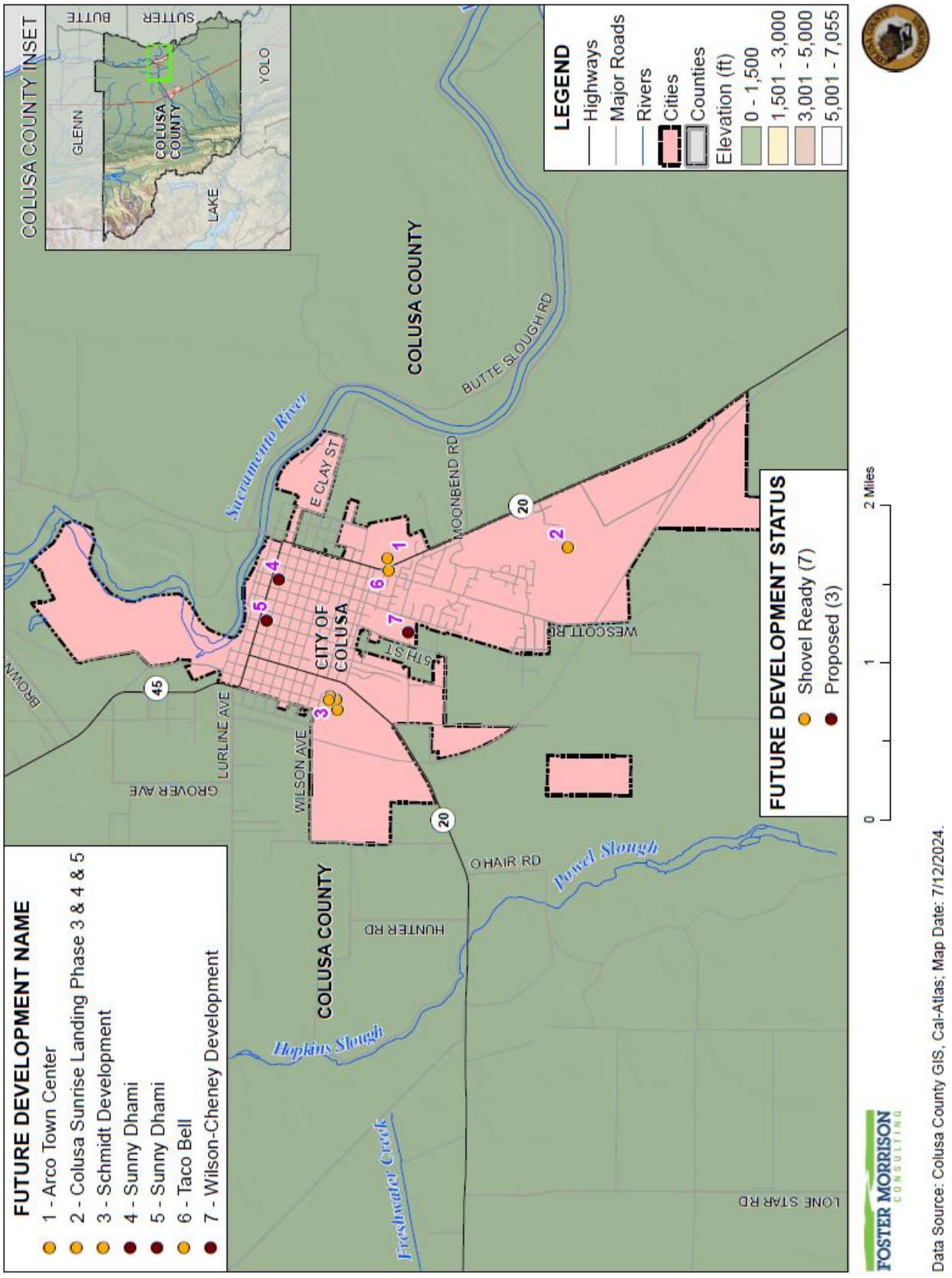


Table A-14 City of Colusa – Future Development by Status

Future Development Status	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
Proposed	4	Sunny Dhami	1	1
	5	Sunny Dhami	1	0.25
	7	Wilson-Cheney Development (temporary name)	1	9.36
	Proposed Total		**3**	**10.61**
Shovel Ready	1	Arco Town Center	1	4.58
	2	Colusa Sunrise Landing Phase 3 & 4 & 5	1	19
	3	Schmidt Development	4	8.4
	6	Taco Bell	1	1.26
	Shovel Ready Total		**7**	**33.24**
Grand Total			**10**	**43.85**

Source: City of Colusa

A.4.2. Hazard Identification

The City of Colusa 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-15).

Table A-15 City of Colusa—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Limited	Occasional / Unlikely	Limited	Low	Medium
Climate Change	Extensive	Highly Likely	Limited	Low	–
Dam Failure	Extensive	Occasional	Catastrophic	High	Medium
Drought & Water shortage	Extensive	Likely	Catastrophic	High	High
Earthquake	Extensive	Occasional	Critical	Medium	Low
Floods: 1%/0.2% annual chance	Extensive	Occasional / Unlikely	Catastrophic	High	Medium
Floods: Localized Stormwater	Significant	Likely	Critical	Medium	Medium
Landslide, Mudslide, and Debris Flow	Likely	Unlikely	Negligible	Low	Medium
Levee Failure	Likely	Unlikely	Negligible	High	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Highly Likely	Critical	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	Low	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: High Winds and Tornados	Extensive	Highly Likely	Critical	Low	Low
Stream Bank Erosion	Extensive	Likely	Catastrophic	Low	Medium
Subsidence	Significant	Occasional	Critical	Low	Low
Wildfire	Significant	Highly Likely	Critical	Low	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 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 Colusa (as identified in the Significance column of Table A-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 Colusa 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 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 that follow. 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 format as in Section A.4.1 above. This includes sections on: People and Populations; Structures; Critical Facilities and Infrastructure, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **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. Impacts are also affected by the community's ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by 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)

A new intentional disruption type of power shortage/failure event has been recently occurring 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), are coordinating to prepare 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 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

The City noted that there have been no PSPS events that have affected them.

Dam Failure

Likelihood of Future Occurrence–Occasional
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 Colusa County was shown in Section 4.3.8 in the Base Plan. Dams with an inundation area within the City of Colusa are shown on Figure A-12. This includes two extremely high hazard dams – Lake Almanor and Lake Oroville. It also includes three high hazard dams – Black Butte, Shasta, and Whiskeytown. It should be noted that no mapped significant hazard dam inundation areas affect the City.

There is no scale with which to measure dam failure. However, FEMA and CA DWR Division of Safety of Dams (DSOD) assigns 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 and Cal OES dam inundation areas is shown on Figure A-12 and Figure A-13, as well as in Table A-16.

Figure A-12 City of Colusa – Extremely High Hazard Dam Inundation Areas

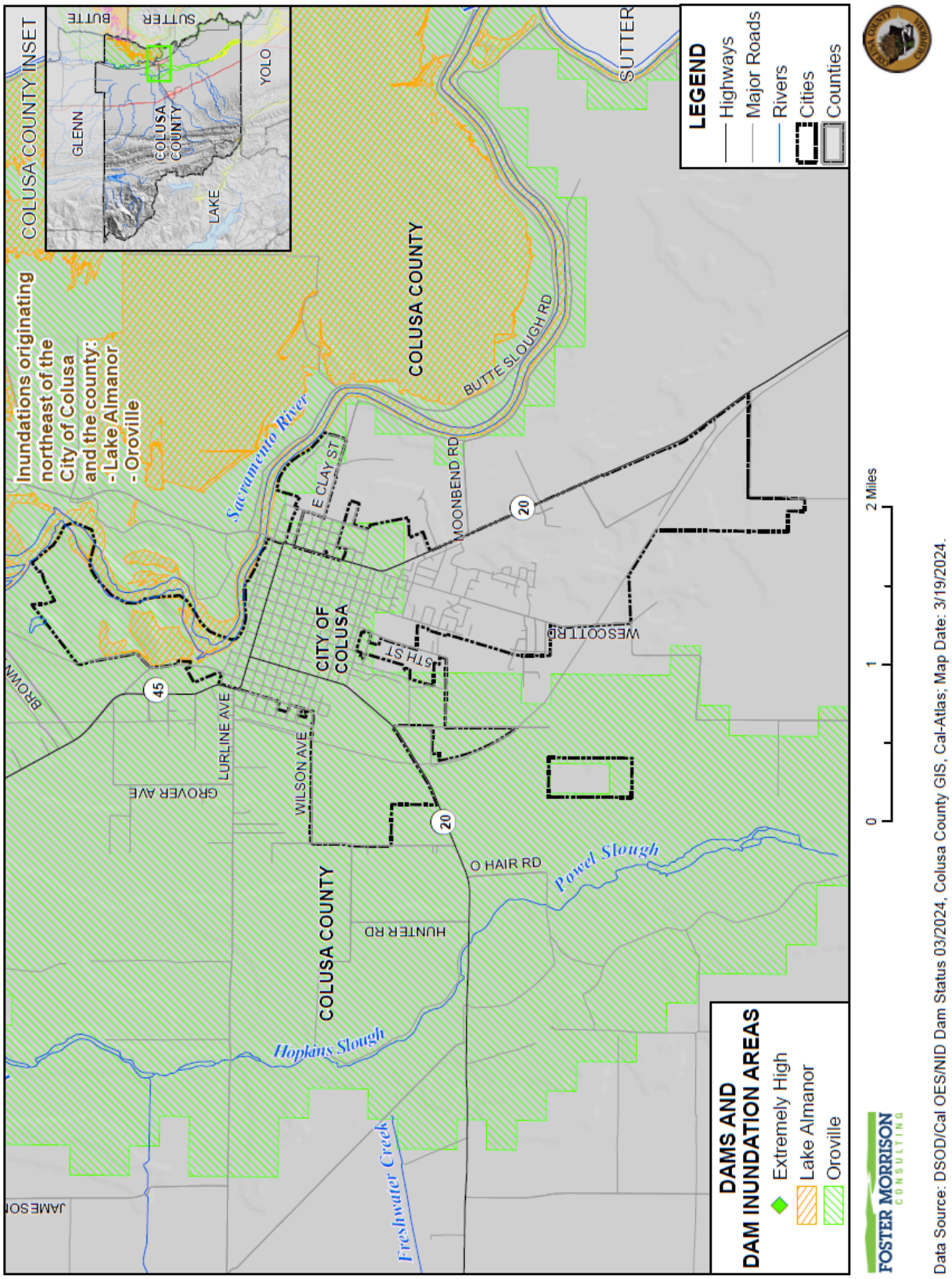


Figure A-13 City of Colusa – High Hazard Dam Inundation Areas

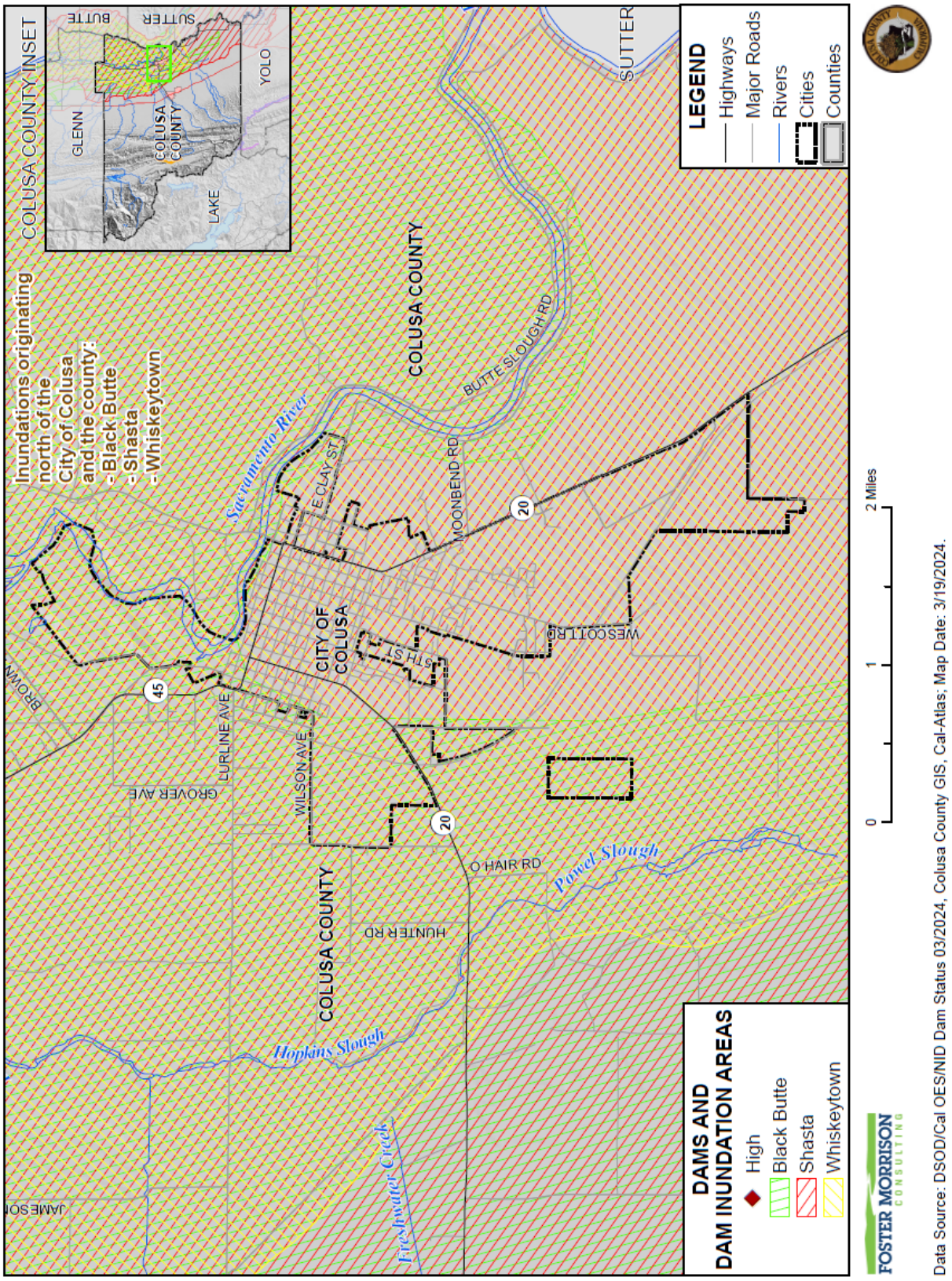


Table A-16 City of Colusa – Dam Inundation Areas Geographical Extents

Dam Inundation Area	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Lake Almanor	81	3.349%	0	0.005%	81	7.887%
Oroville	1,283	53.180%	811	58.430%	471	46.057%
Shasta	2,412	100.000%	1,388	100.000%	1,023	100.000%
Thermalito Afterbay	0	0.000%	0	0.000%	0	0.000%

Source: Cal OES, DSOD, Colusa County GIS

Past Occurrences

Disaster Declaration History

There have been no state or federal disaster declarations for dam failure in Colusa County.

NCDC Events

The NCDC does not contain any dam failure events for Colusa County.

City of Colusa Events

The City of Colusa noted that it was affected by dam incidents such as the 2017 Oroville dam failure. The City is indirectly affected due to the rise in river levels when there are dam failures. Similar to Colusa County, the City was also affected during the 2017 Oroville dam failure as a result of evacuees looking for shelter and other needs within the City of Colusa. The City noted that there have been no new dams or threats since the last LHMP.

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 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 Colusa County and the City.

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 vulnerabilities to this hazard.

The 2010 General Plan Background Report for the Colusa County noted that Lake Oroville, which is located in Butte County, would represent the most immediate threat to Colusa County (and the City) in the event of a dam failure, as flood waters could reach the County within eight hours. Lake Shasta, in Shasta County, could cause the most extensive inundation, reaching as far west as Maxwell and College City in a period of 42 hours. Inundation from Whiskeytown Lake, located in Trinity County, would take over three days to reach Colusa County. Failure of the dam of Black Butte Lake, which is on the border of Glenn and Tehama Counties, could result in some inundation within a period of about 35 hours. The inundation from a failure of this dam would be less extensive than if the other above referenced dams were to fail.

Failure of the dam at East Park Reservoir could cause minor inundation at the reservoir's outlet. The flood waters would flow into Glenn County; thus, its failure would not likely impact areas of Colusa County. In Glenn County, the flooding could extend up to one-quarter mile on either side of Stony Creek at its widest point. The water could cause an overflow of Stony Gorge Reservoir, which is located on Stony Creek. Black Butte Reservoir would retain the excess inundation.

Assets at Risk

Assets at risk from dam failure include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. 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 future evaluate the impact to the City of Colusa'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 Cal OES dam inundation areas were overlayed on the parcel layer.

Those residential parcel centroids that intersect the dam inundation areas were counted and multiplied by the Census Bureau average household factors for the City of Colusa – 2.55. This is shown in Table A-17.

Table A-17 City of Colusa – Improved Residential Parcels and Population by Dam Inundation Area

Dam Classification /Dams	City of Colusa	
	Improved Residential Parcels	Population
Extremely High Hazard Dams		
Oroville	982	2,848
High Hazard Dams		
Black Butte	76	194
Shasta	1,778	5,156
Whiskeytown	1,778	5,156

Source: Cal OES, DSOD, Colusa County 2023 Parcel/Assessor Data, US Census Bureau American Community Survey 2022 Household Size Estimates.

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 Colusa. 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), 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 tables below for the dams that affect the City. This starts with the extremely high hazard dam inundation areas – the Lake Oroville Dam (Table A-18). It continues with the high hazard dam inundation areas – the Black Butte Dam (Table A-19), the Shasta Dam (Table A-20), and the Whiskeytown Dam (Table A-21).

Table A-18 City of Colusa – Count and Value of Parcels (and Structures) in Lake Oroville Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	11	6	$7,643,184	$345,000	$0	$345,000	$8,333,184
Commercial	221	174	$18,937,630	$43,421,758	$4,378,626	$43,421,758	$110,159,772

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Government	88	44	$5,089,700	$26,665,866	$13,472,001	$26,665,866	$71,893,433
Industrial	2	2	$510,358	$1,791,452	$0	$2,687,178	$4,988,988
Institutional	28	15	$1,740,632	$3,228,069	$2,616,683	$3,228,069	$10,813,453
Miscellaneous	8	4	$510,307	$7,426,379	$0	$7,426,379	$15,363,065
Residential	1,022	982	$45,077,411	$140,127,506	$949,458	$70,063,756	$256,218,131
City of Colusa Total	**1,380**	**1,227**	**$79,509,222**	**$223,006,030**	**$21,416,768**	**$153,838,006**	**$477,770,026**

Source: DSOD, Cal OES, Colusa County 2023 Parcel/Assessor Data,

Table A-19 City of Colusa – Count and Value of Parcels (and Structures) in Black Butte Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	6	5	$7,138,911	$340,140	$0	$340,140	$7,819,191
Commercial	19	15	$1,191,676	$2,038,772	$0	$2,038,772	$5,269,220
Government	22	4	$1,499,162	$299,002	$0	$299,002	$2,097,166
Industrial	2	2	$510,358	$1,791,452	$0	$2,687,178	$4,988,988
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	1	1	$12,294	$582,611	$0	$582,611	$1,177,516
Residential	82	76	$3,610,457	$9,474,280	$161,962	$4,737,140	$17,983,839
City of Colusa Total	**132**	**103**	**$13,962,858**	**$14,526,257**	**$161,962**	**$10,684,843**	**$39,335,920**

Source: DSOD, Cal OES, 2023 Colusa County Parcel/Assessor Data

Table A-20 City of Colusa – Count and Value of Parcels (and Structures) in Shasta Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	23	11	$13,938,078	$552,430	$495,940	$552,430	$15,538,878
Commercial	249	190	$20,544,713	$57,204,144	$6,312,332	$57,204,144	$141,265,333
Government	107	51	$5,985,502	$33,560,789	$18,519,832	$33,560,789	$91,626,912
Industrial	65	22	$12,418,971	$34,637,423	$15,447,206	$51,956,134	$114,459,734
Institutional	34	20	$2,286,791	$6,200,820	$6,039,649	$6,200,820	$20,728,080
Miscellaneous	12	5	$615,343	$8,431,121	$0	$8,431,121	$17,477,585
Residential	1,844	1,778	$88,514,146	$303,181,060	$2,413,584	$151,590,525	$545,699,315
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$946,795,837**

Source: DSOD, Cal OES, 2023 Colusa County Parcel/Assessor Data

Table A-21 City of Colusa – Count and Value of Parcels (and Structures) in Whiskeytown Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	23	11	$13,938,078	$552,430	$495,940	$552,430	$15,538,878
Commercial	249	190	$20,544,713	$57,204,144	$6,312,332	$57,204,144	$141,265,333
Government	107	51	$5,985,502	$33,560,789	$18,519,832	$33,560,789	$91,626,912
Industrial	65	22	$12,418,971	$34,637,423	$15,447,206	$51,956,134	$114,459,734
Institutional	34	20	$2,286,791	$6,200,820	$6,039,649	$6,200,820	$20,728,080
Miscellaneous	12	5	$615,343	$8,431,121	$0	$8,431,121	$17,477,585
Residential	1,844	1,778	$88,514,146	$303,181,060	$2,413,584	$151,590,525	$545,699,315
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$946,795,837**

Source: DSOD, Cal OES, 2023 Colusa County Parcel/Assessor Data

Critical Facilities and Infrastructure

Dam failure presents a threat to both critical facilities and infrastructure. A separate analysis was performed on the critical facility inventory in the City to determine critical facilities that fall into dam inundation areas. Using GIS, the DFIRM flood zones were overlayed on the critical facility GIS layer. This is shown on Figure A-14 for extremely high hazard dam inundation areas in the City, and on Figure A-15 for high hazard dam inundation areas in the City. Table A-22 details which critical facilities fall in which dam inundation area. Details of critical facility categories, type, name, and address by detailed flood zone are listed in Appendix F.

Figure A-14 City of Colusa – Critical Facilities in Extremely High Hazard Dam Inundation Areas

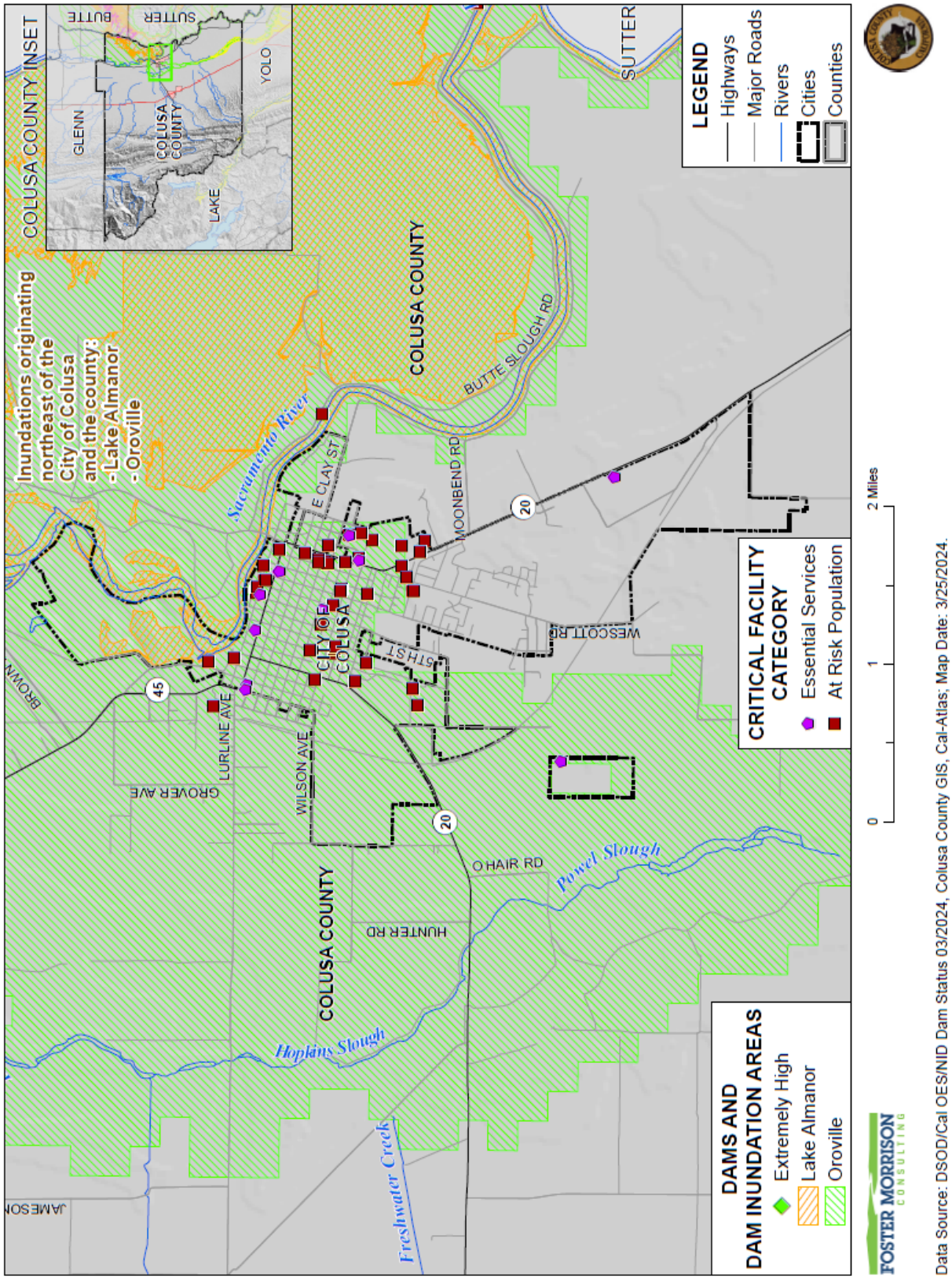


Figure A-15 City of Colusa – Critical Facilities in High Hazard Dam Inundation Areas

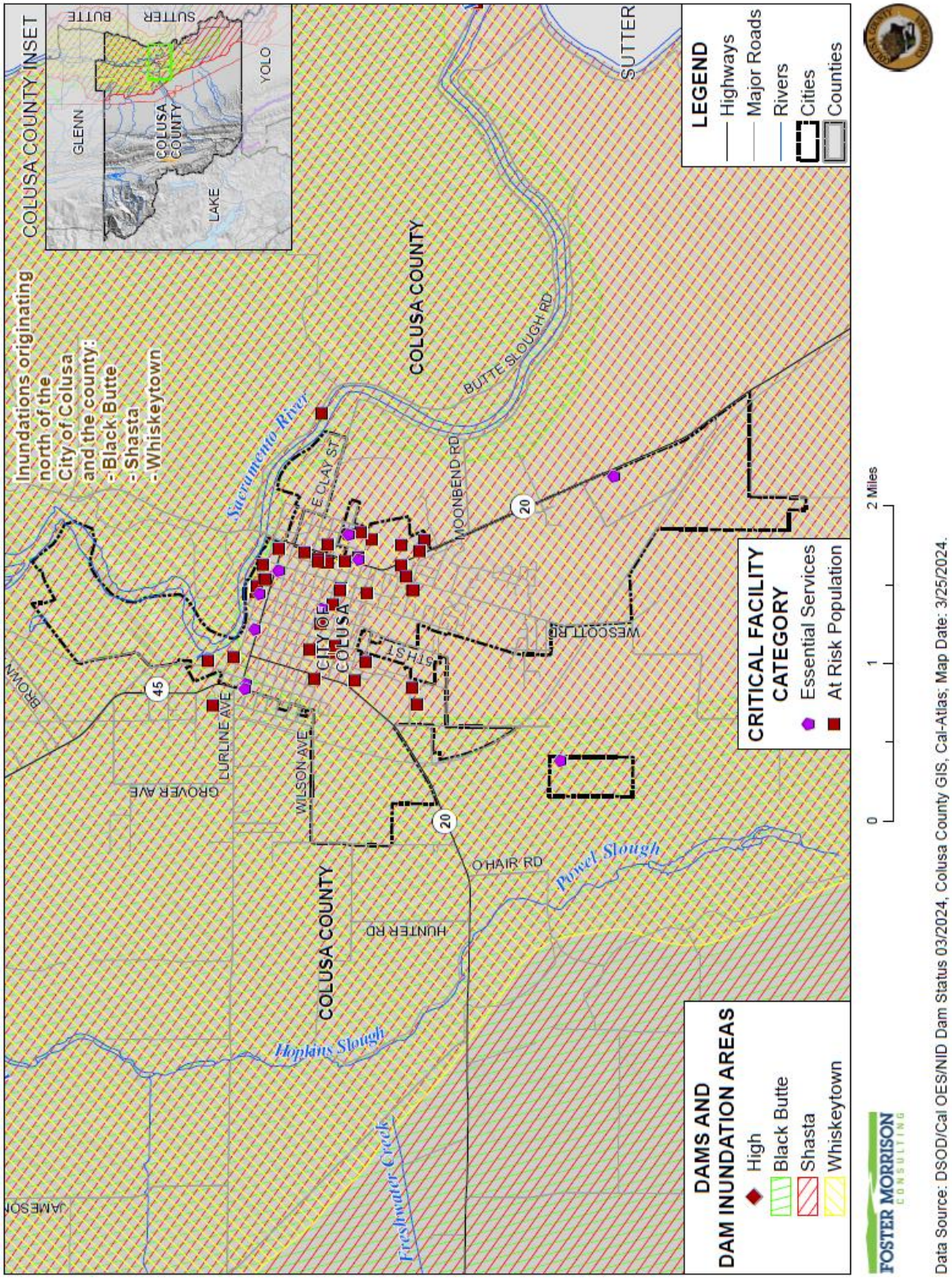


Table A-22 City of Colusa – Critical Facilities in Extremely High and High Hazard Dam Inundation Areas by Category and Type

Dam / Dam Classification/ Critical Facility Category	Facility Type	Facility Count
Extremely High Hazard Dam Inundation Area – Oroville Dam		
Essential Services Facilities	Emergency Response	1
	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	2
	Utility Facility	2
	Total	**9**
At Risk Population Facilities	Apartment Complex	19
	Assisted-Living	1
	Hotel or Motel	2
	Jail	1
	Mobile Home Park	4
	School	8
	Senior Living Facility	1
	Total	**36**
City of Colusa Oroville Dam Total		**45**
High Hazard Dam Inundation Area – Black Butte Dam		
Essential Services Facilities	Emergency Response	1
	Public Services	1
	Utility Facility	1
	Total	**3**
At Risk Population Facilities	Mobile Home Park	2
	Total	**2**
City of Colusa Black Butte Dam Total		**5**
High Hazard Dam Inundation Area – Shasta Dam		
Essential Services Facilities	Emergency Response	1
	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	3
	Utility Facility	2
	Total	**10**
At Risk Population Facilities	Apartment Complex	22

Dam / Dam Classification/ Critical Facility Category	Facility Type	Facility Count
	Assisted-Living	1
	Hotel or Motel	2
	Jail	1
	Mobile Home Park	5
	School	8
	Senior Living Facility	1
	Total	**40**
City of Colusa Shasta Dam Total		**50**
Hich Hazard Dam Inundation Area – Whiskeytown Dam		
Essential Services Facilities	Emergency Response	1
	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	3
	Utility Facility	2
	Total	**10**
At Risk Population Facilities	Apartment Complex	22
	Assisted-Living	1
	Hotel or Motel	2
	Jail	1
	Mobile Home Park	5
	School	8
	Senior Living Facility	1
	Total	**40**
City of Colusa Whiskeytown Dam Total		**50**

Source: Cal OES, DSOD, Colusa County GIS

Community Lifelines

Dam failure flooding presents a threat to life and property, including community lifelines in the City. They are likely to be overwhelmed in a dam failure event. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Many of the City's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.8 of the Base Plan.

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.

Economic Assets and Community Activities of Value

As shown on the maps and tables above, there are multiple dams that would affect large swaths of the City should they fail. Most economic assets of the City would be at least temporarily disrupted. Many of these may come back online relatively quickly after a dam failure flood event, but some would take longer to re-engage in business. Some economic assets may be damaged to the point where the business or area would no longer be economically viable to continue to operate.

Depending on the dam, and the nature and extent of the failure, most community activities of value would be affected if they occurred during a dam failure event.

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. Levees within the City and surrounding areas may also be damaged or destroyed contributing to the flood waters. Additionally, mass evacuations may be necessary and compounded by impacts to transportation systems and infrastructure. Economic losses to the City and Colusa County Planning Area 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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for Colusa 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.
- Population growth in the City has recently slowed; however, additional growth within the dam inundation areas of the City would place additional populations at risk to dam failure. 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 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. Locating new development, structures, and critical facilities and infrastructure within or near areas of dam failure risk may put additional development at risk. However, 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. 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 City to this hazard.

Future dam failure events may occur in the City. Given the high number of affected parcels and structures, future development in the City, could be affected by dam failures and associated flooding. Siting of future development areas should take dam failure flooding into account. As the City continues to grow and develop, the population will continue to grow and become more diverse. Changing migration patterns will fluctuate the vulnerability of the City and the vulnerable populations such as AFN, unhoused, the elderly, and very young may feel the effects of this disaster disproportionately.

Future development areas and their vulnerability to dam failure are discussed further in the below GIS analysis.

GIS Analysis

The City provided 7 future development areas which were used as the basis for the inventory of future development for the City. These were mapped in GIS. Utilizing the future development area spatial layer, the parcel centroid data was intersected to determine the future development areas within each mapped dam inundation area. Figure A-16 show the locations of the future development areas overlayed on the extremely high hazard dam inundation areas, while Figure A-17 show the locations of the future development areas overlayed on the extremely high hazard dam inundation areas. Table A-23 shows each future development area in the City in these areas.

Figure A-16 City of Colusa – Future Developments in Extremely High Hazard Dam Inundation Areas

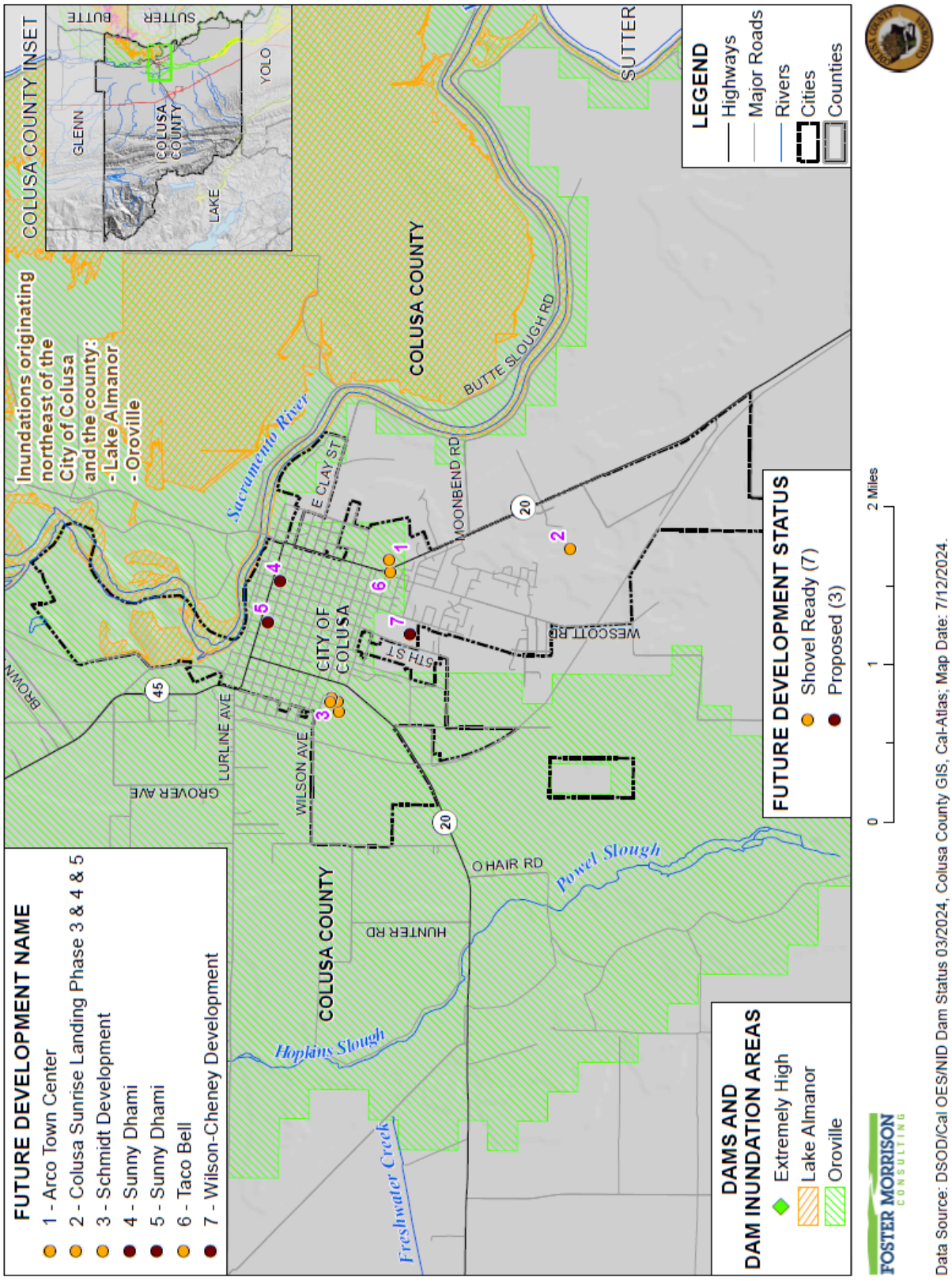


Figure A-17 City of Colusa – Future Developments in High Hazard Dam Inundation Areas

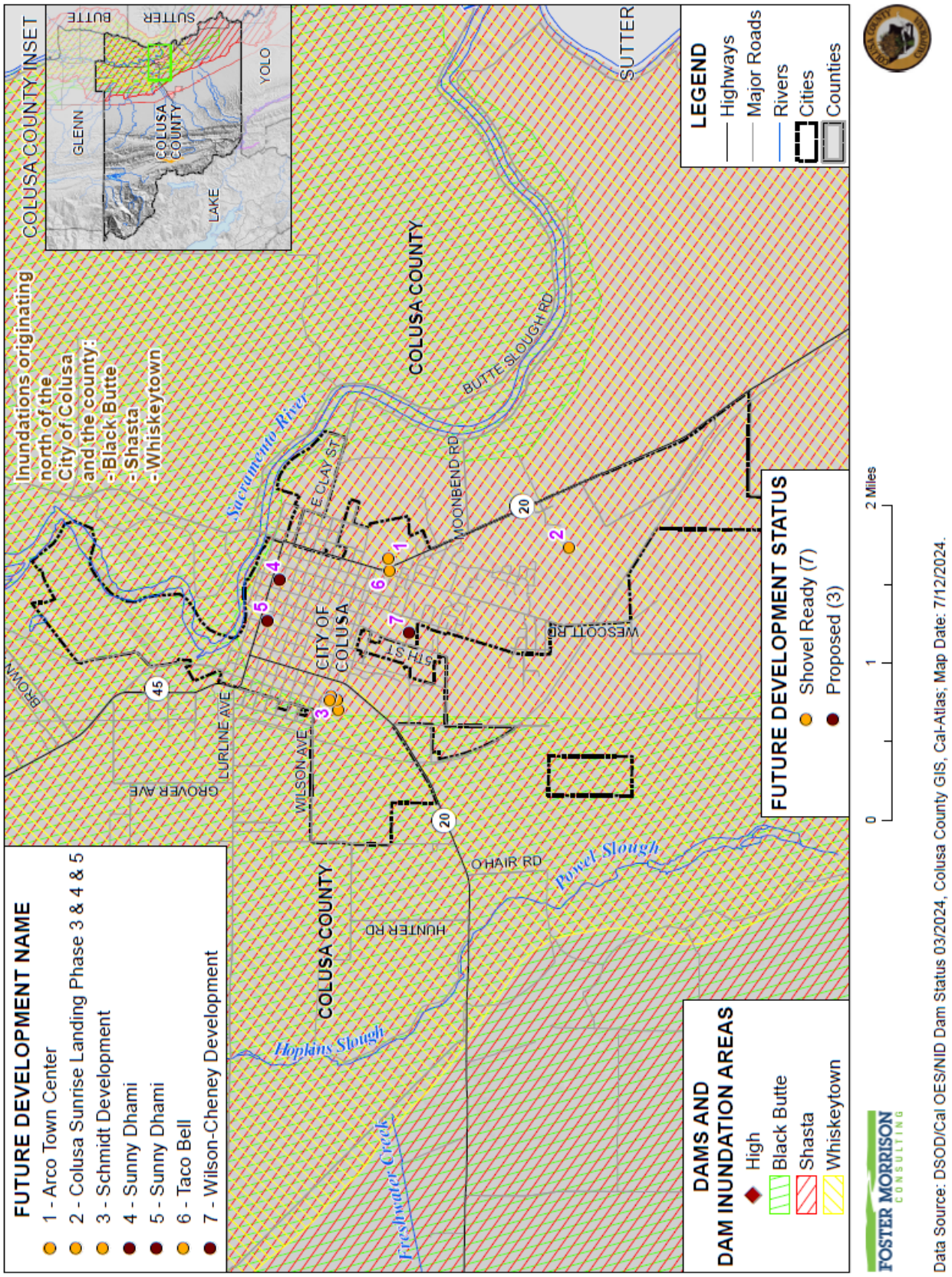


Table A-23 City of Colusa – Future Development in Extremely High and High Hazard Dam Inundation Areas

Dam Inundation Area	Future Development Status	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
Extremely High Dam Inundation Area					
Oroville	Proposed	4	Sunny Dhami	1	1
		5	Sunny Dhami	1	0.25
		Proposed Total		**2**	**1.25**
	Shovel Ready	1	Arco Town Center	1	4.58
		3	Schmidt Development	4	8.4
		6	Taco Bell	1	1.26
		Shovel Ready Total		**6**	**14.24**
	Oroville Total			**8**	**15.49**
High Dam Inundation Area					
Shasta	Proposed	4	Sunny Dhami	1	1
		5	Sunny Dhami	1	0.25
		7	Wilson-Cheney Development (temporary name)	1	9.36
		Proposed Total		**3**	**10.61**
	Shovel Ready	1	Arco Town Center	1	4.58
		2	Colusa Sunrise Landing Phase 3 & 4 & 5	1	19
		3	Schmidt Development	4	8.4
		6	Taco Bell	1	1.26
		Shovel Ready Total		**7**	**33.24**
	Shasta Total			**10**	**43.85**
Whiskeytown	Proposed	4	Sunny Dhami	1	1
		5	Sunny Dhami	1	0.25
		7	Wilson-Cheney Development (temporary name)	1	9.36
		Proposed Total		**3**	**10.61**
	Shovel Ready	1	Arco Town Center	1	4.58

Dam Inundation Area	Future Development Status	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
		2	Colusa Sunrise Landing Phase 3 & 4 & 5	1	19
		3	Schmidt Development	4	8.4
		6	Taco Bell	1	1.26
		Shovel Ready Total		**7**	**33.24**
	Whiskeytown Total			**10**	**43.85**

Source: DSOD/Cal OES, City of Colusa

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.

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

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. Current drought conditions in the City are shown in Section 4.3.9 of the Base Plan.

Past Occurrences

Disaster Declaration History

There have been one federal and three state disaster declarations from drought. This can be seen in Table A-24.

Table A-24 Colusa County – Federal and State Drought Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Drought	1	1977	3	1976, 2014, 2021

Source: Cal OES, FEMA

NCDC Events

There have been 58 NCDC drought events in Colusa County. These most likely had some impact on the City.

City of Colusa Events

Based on historical information, the occurrence of drought in California, including the City of Colusa, 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. 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 2021 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 Colusa 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.

Tree Mortality and Drought

One of the specific impacts of drought in the City of Colusa and the Colusa 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.

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 vulnerabilities to this hazard.

The City of Colusa obtains its drinking water from underground natural wells. Five municipal wells plus two additional wells are on an inter-tie agreement with CIP. The inter-tied wells are planned to be purchased by the City of Colusa at a later date. Two of the five City-owned wells will be shut down in the coming year and replaced with one new well. The City also has three untapped agricultural wells and no agricultural irrigation sites within its limits.

Assets at Risk

Assets at risk from drought and water shortage include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. 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.

Community Lifelines

While limited, community lifelines can have a vulnerability to drought and water shortage. Many of the City's community lifelines are the same as or similar to Colusa County's. Drought will most likely not overwhelm these community lifelines. This was discussed in greater detail in Section 4.3.9 of the Base Plan.

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.

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.

Economic Assets and Community Activities of Value

Economic assets and community activities in the City of Colusa generally have a limited vulnerability to drought and water shortage. Drought affects rural small business owners such as farmers and agricultural contractors who rely on water for their crops. Given that agriculture is very important in the County, this could have economic impacts in the City. Water supply issues can also affect businesses such as cafes and restaurants in more developed areas. Drought impacts to the agricultural industry can affect the supply chain and increase the cost of food and water, and adversely impact businesses tied to these industries. Reduction in or interruption of the water supply could also lead to lower productivity or closure of manufacturing facilities. Other economic sectors with a heavy reliance on water may also be affected. Depending upon how severe the conditions get and how long they last, drought and water shortage can restrict recreational and community activities, all of which can stress businesses and local economies over time.

The City noted that most of the community activities that the City provides could be affected by significant drought conditions. This includes the County Fair, 4th of July Firework Celebration, Splash Pad, and Community Pool.

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 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 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 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. Changes in population patterns and land use, and

the extent to which they affect this hazard, 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 this for the City of Colusa 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 has recently slowed. According to the HMPC, the City and Colusa 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 County from this hazard.
- Land use planning should be proactive to address future hazard conditions. As the City continues to grow, more cropland will be taken out of production to provide housing to accommodate for population growth. As Colusa'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.

As the community develops, an additional ground storage tank and booster pumps will be necessary. The City is working towards increasing efforts to reduce the demand for water, and to move toward more sustainable water use. The 2007 City of Colusa General Plan noted that it is anticipated that the City's wells will continue to produce approximately 3.17 million gallons per day, which currently serves a population of approximately 5,600 people. Currently, the City's groundwater wells produce an adequate supply of potable water for Colusa residents. While peak demand is currently less than peak supply, demand will grow as the City's population grows with new residential development. In order to serve future growth and buildout of the General Plan, new water distribution conveyance and pumping facilities will need to be constructed.

Earthquake

Likelihood of Future Occurrence–Occasional (minor)/ Unlikely (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, 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 Colusa, Colusa 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. These include the Great Valley and Sutter Buttes faults. A significant seismic event on any of these major faults could cause serious damage in the City of Colusa.

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 4.3.10 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 significant magnitude occur, so both magnitude and intensity of earthquakes are expected to remain moderate. Seismic shaking maps for the area in Section 4.3.10 of the Base Plan show Colusa 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 Colusa County from earthquake.

NCDC Events

The NCDC does not track earthquake events.

City of Colusa Events

As shown in the Base Plan, no disaster declarations have occurred in the County due to earthquake. The HMPC noted no past occurrences of earthquakes that affected the City in any meaningful way.

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 Colusa County Planning Area, seismic hazard mapping indicates that the City has low to moderate seismic hazard potential. There is the potential for the City and Colusa 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.

Earthquake shaking can also cause liquefaction to occur. Areas with loose soil and high water tables are at risk from liquefaction. There are limited areas in and near the City prone to liquefaction.

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 vulnerabilities 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 Colusa is within Zone 3.

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. There is a

minimal amount of URM buildings within the City of Colusa. No survey of URM buildings has taken place. The City's historic "Chinatown" district (APNs: 001-035-001 through -009) is constructed of URM and located approximately 100 feet from the toe of the Sacramento River levee. There are underground tunnels (which fill with periodic seasonal high groundwater fluctuations) constructed by the original inhabitants. The Chinatown area is shown on Figure A-18, while a URM example in the City is shown on Figure A-19.

Figure A-18 City of Colusa – Chinatown District and Levee

Source: City of Colusa

Figure A-19 City of Colusa – URM Building Example

Source: City of Colusa

The City is also concerned with aging underground infrastructure pertaining to water and sewer utilities.

Assets at Risk

Many assets in the City are at risk to ground shaking. Assets at risk from earthquake include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations

All people and populations are at risk from earthquake shaking and surface fault. Those at heightened risk include:

- The unsheltered
- Infants and children under age five and their caregivers
- Elderly (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 below specific to the City of Colusa. 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. Though not specific to the City, the Hazus scenarios in the Base Plan show how the larger Colusa County Planning Area 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. The critical facilities at risk to earthquake for the Colusa County Planning Area, including the City of Colusa, are presented in the Hazus analysis in Section 4.3.10 of the Base Plan.

Community Lifelines

All community lifelines in the City are vulnerable to earthquakes, depending on the severity and location of the shake. A major earthquake event could cause these lifelines to be overwhelmed. Some of these would be able to be restored to service quickly, while others would take more time having a prolonged impact on the people and structures within the City. More information on lifelines at risk can be seen in the Hazus scenarios in Section 4.3.10 of the Base Plan.

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. 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.

Economic Assets and Community Activities of Value

All economic assets in the City are vulnerable to earthquakes, depending on the severity and location of the shake and associated cascading hazards and impacts. Should an earthquake occur causing significant damages, the local economy can be affected for an extended period until recovery occurs and businesses and other economic drivers are operational. More information on economic assets at risk can be seen in

the Hazus scenarios in Section 4.3.10 of the Base Plan. All community activities of value would be affected by an earthquake if they were underway during an earthquake event and may be postponed or cancelled until the City has sufficiently recovered.

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 Colusa residents and visitors. Other impacts to the City 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; 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 or behind levees 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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City of Colusa 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 of Colusa has recently slowed. 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.

- Land use planning should be proactive to address future hazard conditions. However, 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 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. Migration patterns may impact the number of residents within the City, possibly affecting overall vulnerability. Future development in the City is subject to these building codes and land use planning.

Flood: 1%/0.2% Annual Chance

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. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures including the numerous levee systems located throughout the Colusa County Planning Area and the City of Colusa. 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.

Location and Extent

The City of Colusa has areas located in the 1% and 0.2% annual chance flood zones. This is seen in Figure A-20.

Figure A-20 City of Colusa – FEMA DFIRM Flood Zones

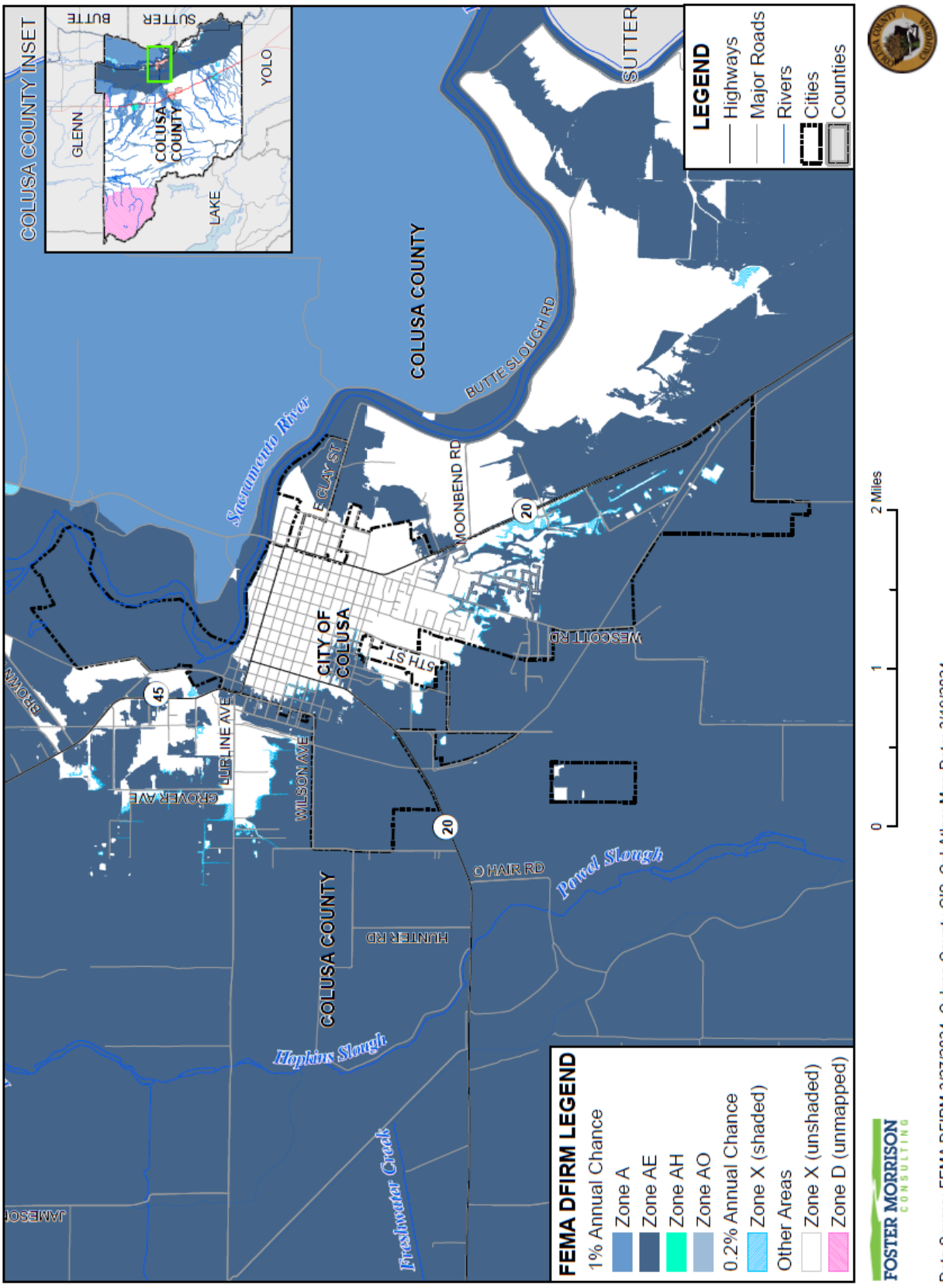


Table A-25 details the DFIRM mapped flood zones located within the City.

Table A-25 City of Colusa– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone Present in City of Colusa
A	1% annual chance flooding: No base flood elevations provided	
AE	1% annual chance flooding: Base flood elevations provided	X
AH	1% annual chance flood areas of shallow flooding between one to three feet deep. Regulatory floodway; Base flood elevations provided	
AO	1% annual chance flooding: sheet flow areas. BFEs derived from detailed hydraulic analyses are shown in this zone.	
Shaded X	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 (unshaded)	No flood hazard	X
D	Areas with a potentially moderate to high risk of flooding, but the probability has not been determined.	

Source: FEMA DFIRM 3/27/2024

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-26.

Table A-26 City of Colusa – 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	2,857	26.82%	1,175	21.95%	1,682	31.74%
0.2% Annual Chance Flood Hazard	2,935	27.56%	1,618	30.23%	1,318	24.86%
Other Areas	4,858	45.62%	2,558	47.82%	2,300	43.40%
City of Colusa Total	**10,651**	**100.00%**	**5,350**	**100.00%**	**5,300**	**100.00%**

Source: FEMA DFIRM 3/27/2024

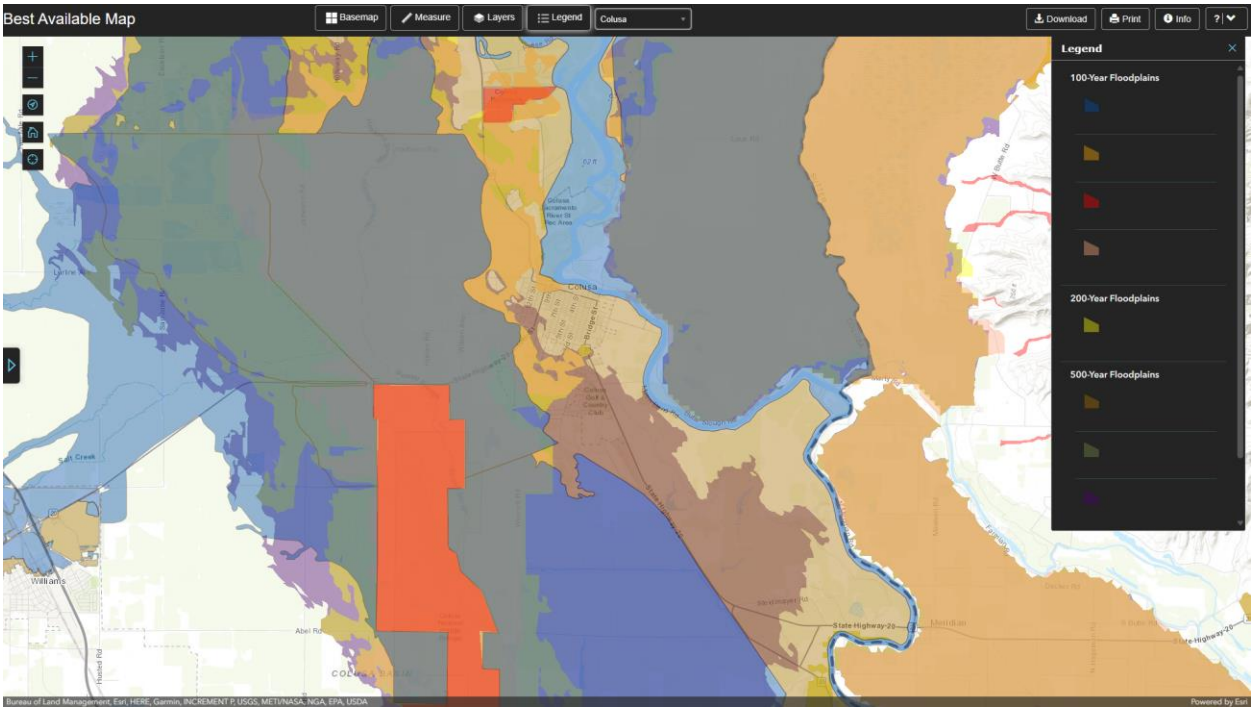
California Department of Water Resources Best Available Maps (BAM)

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 of Colusa is shown in Figure A-21.

Figure A-21 City of Colusa – 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 Colusa County from flooding is shown on Table A-27. These events also likely affected the City to some degree.

Table A-27 Colusa County – Federal and State Disaster Declarations from Flood 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Colusa County has seen 14 events. These events most likely had some impact on the City.

City of Colusa Events

The City noted that the following events had affects and damages to the City:

- During **December 1996 - January 1997**, the nearby Colusa Weir Gage reached flood stage. This historic flooding event devastated the region by destroying thousands of crop acres (rice, tomatoes, alfalfa) and property. The Colusa Weir Gage reached flood stage 68.67 feet on 1/3/1997.
- During **1995** the entire state experienced severe flooding, and the nearby Colusa Weir along with nearly all local main drainages including Powell Slough, and the 2047 canal reached flood stage, flooding nearly every piece of ground surrounding the south and west of the City of Colusa. Enormous damage occurred to the City and surrounding areas and the City and County were declared disaster areas by the state and federal government.
- **1998, 2006, and 2017** – the areas in and surrounding the City of Colusa experiences severe flooding, to the point where many roads leading into and from the City were closed, pavement was damaged, and the wastewater treatment plant and sewer collection facilities were inundated causing sanitary sewer overflows into the public streets.

Since 2019, the City has only experienced localized flooding, which has caused no significant property damage or loss. The localized flooding has been in the City streets and some alleyways.

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 CAS, climate change may affect flooding in California, the Colusa County Planning Area, and the City of Colusa. 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 vulnerabilities to this hazard.

As previously described in Section 4.3.11 of the Base Plan, the Colusa County Planning Area and the City of Colusa have been subject to historical flooding. The 2007 City of Colusa General Plan noted that Colusa is situated on the southern bank of a bend in the Sacramento River, which drains the northern half of the Central Valley. No other major bodies of water are located near the City. The river levee that protects the City from catastrophic flooding falls under the jurisdiction of Reclamation District No. 108 and is maintained by the Sacramento West Side Levee District.

The 2007 General Plan also noted that flooding within the City occurs during heavy rains and to some extent, even during mild storms. Periods of flooding can cause significant circulation problems and has resulted in some property damage in flood-prone areas. Flooding events cause inconveniences and potential safety hazards to motorists traveling through the flooded streets and property owners attempting to access parked cars. Minor flooding events can appear as quickly as one hour after significant rainstorms. While flooding may occur as quickly as one hour after the initiation of a storm event, generally speaking, the flooded areas drain within two or three hours after the end of the storm event.

Assets at Risk

Assets at risk from flood include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. 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. With the recent remapping of the City's floodplains, all former levee protected areas now fall in the DFIRM floodplains. 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 Colusa's residential population residing within these hazard areas, the DFIRM flood zones were overlayed on the parcel layer. Those residential parcel centroids that intersect the flood zones were counted and multiplied by the 2022 Census Bureau average household factors for the City of Colusa – 2.55. According to this analysis, there is a total population of 870 and 38 residents of the City at risk to flooding in the 1% and 0.2% annual chance floodplains, respectively. This is shown in Table A-28.

Table A-28 City of Colusa – 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 Colusa	300	870	13	38

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 Parcel/Assessor Data, US Census Bureau American Community Survey 2022 Household Size Estimates.

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 Colusa. 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-29 is a summary table for the City of Colusa. Parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), other 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-30 breaks down Table A-29 and shows the same analysis further broken out by detailed FEMA flood zone and property use.

Table A-29 City of Colusa – Count and Value of Parcels (and Structures) at Risk in Summary DFIRM Flood Zone

Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Total Value
1% Annual Chance Flood Hazard	476	355	$41,614,561	$118,703,421	$12,800,623	$173,118,605
0.2% Annual Chance Flood Hazard	18	15	$796,791	$3,866,267	$0	$4,663,058
Other Areas	1,840	1,707	$101,892,192	$321,198,099	$36,427,920	$459,518,211
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$637,299,874**

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 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-30 City of Colusa – Count and Values of Parcels (and Structures) at Risk by Detailed DFIRM Flood Zone and Property Use

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard							
Zone AE							
Agricultural	12	6	$7,527,941	$337,204	$0	$337,204	$8,202,349
Commercial	34	20	$1,916,839	$12,429,596	$1,916,816	$12,429,596	$28,692,847
Government	39	9	$2,018,999	$2,650,628	$22,874	$2,650,628	$7,343,129
Industrial	57	15	$10,691,358	$25,993,102	$9,522,346	$38,989,652	$85,196,458
Institutional	2	2	$286,062	$485,498	$771,560	$485,498	$2,028,618
Miscellaneous	5	3	$492,767	$7,399,098	$0	$7,399,098	$15,290,963
Residential	327	300	$18,680,595	$69,408,295	$567,027	$34,704,148	$123,360,065
Zone AE Total	**476**	**355**	**$41,614,561**	**$118,703,421**	**$12,800,623**	**$96,995,824**	**$270,114,429**
1% Annual Chance Flood Hazard Total	**476**	**355**	**$41,614,561**	**$118,703,421**	**$12,800,623**	**$96,995,824**	**$270,114,429**
0.2% Annual Chance Flood Hazard							
Zone X (shaded)							

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	0	0	$0	$0	$0	$0	
Commercial	2	0	$76,256	$0	$0	$0	$76,256
Government	1	0	$23,286	$0	$0	$0	$23,286
Industrial	2	2	$17,815	$1,017,083	$0	$1,525,625	$2,560,523
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	13	13	$679,434	$2,849,184	$0	$1,424,591	$4,953,209
Zone X (shaded) Total	**18**	**15**	**$796,791**	**$3,866,267**	**$0**	**$2,950,216**	**$7,613,274**
0.2% Annual Chance Flood Hazard Total	**18**	**15**	**$796,791**	**$3,866,267**	**$0**	**$2,950,216**	**$7,613,274**
Other Areas							
Zone X (unshaded)							
Agricultural	11	5	$6,410,137	$215,226	$495,940	$215,226	$7,336,529
Commercial	213	170	$18,551,618	$44,774,548	$4,395,516	$44,774,548	$112,496,230
Government	67	42	$3,943,217	$30,910,161	$18,496,958	$30,910,161	$84,260,497
Industrial	6	5	$1,709,798	$7,627,238	$5,924,860	$11,440,857	$26,702,753
Institutional	32	18	$2,000,729	$5,715,322	$5,268,089	$5,715,322	$18,699,462
Miscellaneous	7	2	$122,576	$1,032,023	$0	$1,032,023	$2,186,622
Residential	1,504	1,465	$69,154,117	$230,923,581	$1,846,557	$115,461,786	$417,386,041
Zone X (unshaded) Total	**1,840**	**1,707**	**$101,892,192**	**$321,198,099**	**$36,427,920**	**$209,549,923**	**$669,068,134**
Other Areas Total	**1,840**	**1,707**	**$101,892,192**	**$321,198,099**	**$36,427,920**	**$209,549,923**	**$669,068,134**
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$946,795,837**

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 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-31 summarizes Table A-30 and shows City of Colusa loss estimates and improved values at risk by FEMA 1% and 0.2% annual chance flood zones. According to Table A-30 and Table A-31, the City of Colusa has 355 parcels and $228.5 million of structure and contents values or values in the 1% annual chance flood zone, and 15 improved parcels and $6.8 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 $45 million in damage and a 0.2% chance in any given year of a flood event causing $1.4 million in damage in the City of Colusa. The loss ratio of 4.83% indicates that flood losses for 1% annual chance flooding would be relatively moderate, but the City would be able recover. The loss ratio of 0.14% indicates that flood losses for 0.2% annual chance flooding would be relatively major and the City would have some difficulty in recovering.

Table A-31 City of Colusa – Flood Loss Estimates

Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance	476	355	$41,614,561	$118,703,421	$12,800,623	$96,995,824	$228,499,868	$45,699,974	4..83%
0.2% Annual Chance	18	15	$796,791	$3,866,267	$0	$2,950,216	$6,816,483	$1,363,297	0.14%
Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$802,492,293**	**$160,498,459**	**0.05%**

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 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

Flooding presents a threat to threat to both critical facilities and infrastructure. Critical infrastructure plays an immensely important role in our communities. As previously noted, communities rely on roads and related biking and pedestrian routes for transportation, and on water infrastructure for drinking water, wastewater service, and draining streets of rainwater. 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 the Colusa County Planning Area.

A separate analysis was performed on the critical facility inventory in the City to determine critical facilities that fall into DFIRM flood zones. Using GIS, the DFIRM flood zones were overlayed on the critical facility GIS layer. This is shown on Figure A-22. Table A-32 details which critical facilities fall in which flood zone. Details of critical facility categories, type, name, and address by detailed flood zone for the entire Colusa County Planning Area including the City of Colusa are listed in Appendix F.

Figure A-22 City of Colusa – Critical Facilities in DFIRM Flood Zones

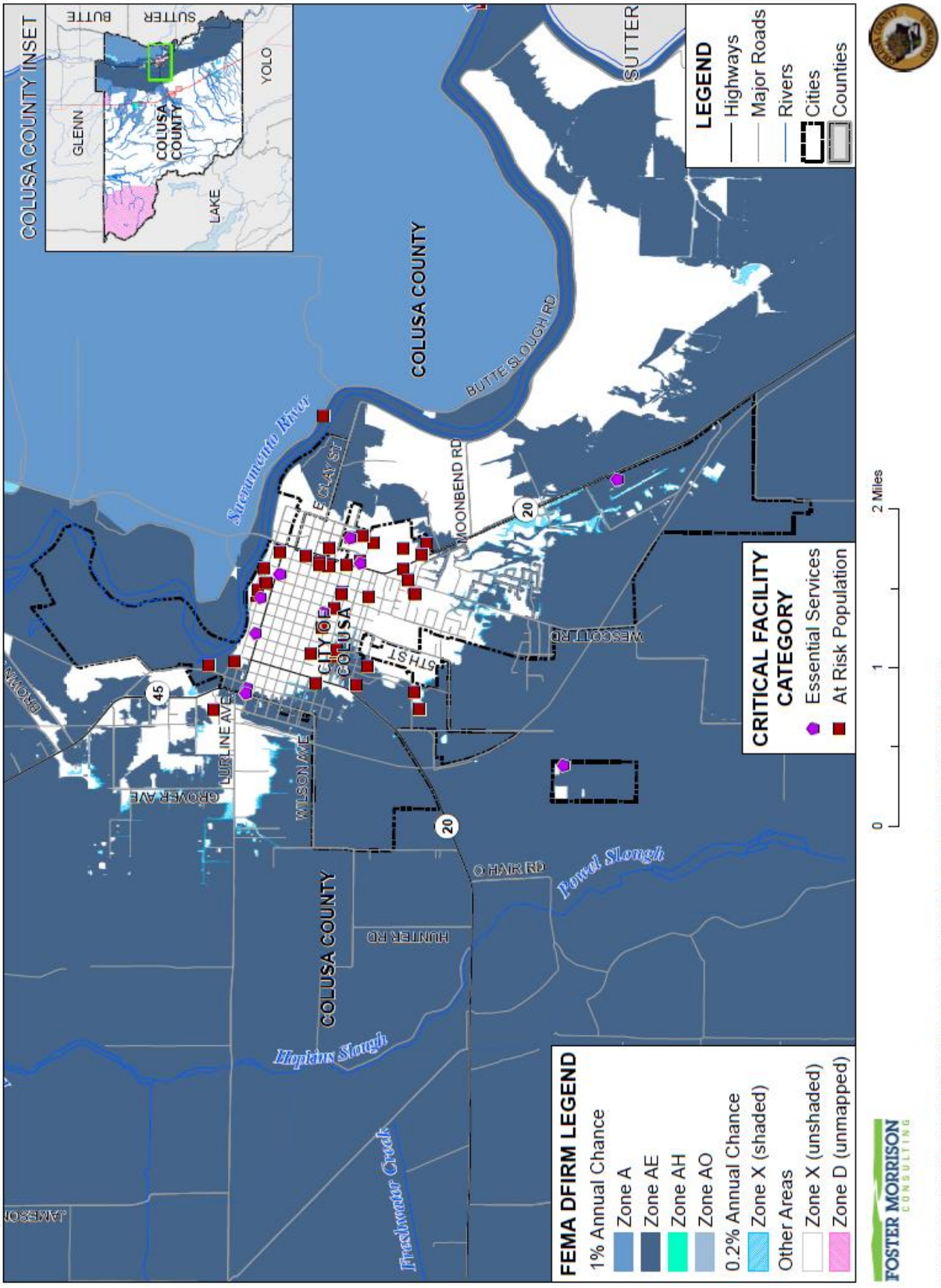


Table A-32 City of Colusa – Critical Facilities in DFIRM Flood Zones

Critical Facility Category	Facility Type	Facility Count
1% Annual Chance Flood Hazard		
Zone AE		
Essential Services Facilities	Emergency Response	1
	Public Services	2
	Total	***3***
At Risk Population Facilities	Apartment Complex	3
	Mobile Home Park	4
	Total	***7***
Zone AE Total		**10**
1% Annual Chance Flood Hazard Total		**10**
Other Areas		
Zone X (unshaded)		
Essential Services Facilities	Fire Station	2
	Medical	1
	Police Station	1
	Public Services	1
	Utility Facility	2
	Total	***7***
At Risk Population Facilities	Apartment Complex	19
	Assisted-Living	1
	Hotel or Motel	2
	Jail	1
	Mobile Home Park	1
	School	8
	Senior Living Facility	1
	Total	***33***
Zone X (unshaded) Total		***40***
Other Areas Total		**40**
City of Colusa Total		**50**

Source: FEMA DFIRM 3/27/2024, City of Colusa GIS

Community Lifelines

1% and 0.2% annual chance flooding presents a threat to life and property, including community lifelines in the City. Many of the City's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.11 of the Base Plan. Generally, even major flood events are temporary events with flood waters receding back to pre-storm levels at the conclusion of the storm.

However, depending on the location, duration, and magnitude and severity of any given flood event, some of these community lifelines may be overwhelmed in the short term.

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 that fall in the flood zones shown on Figure A-20 would be vulnerable.

Economic Assets and Community Activities of Value

Since the City lies entirely in the floodplain, major flood events could affect any economic asset that lies in the floodplain and can have long lasting effects. This could cause those businesses and economic assets within these areas to close or relocate. This could cause temporary or permanent loss of sales tax revenue. These events can also affect those economic assets outside of the floodplain, at least in the short term until the City has sufficiently recovered.

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 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Health Hazards from Flooding

According to FEMA, certain health hazards are also common to flood events. 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 other livestock 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 problem arises 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, the elderly, and those that are medically vulnerable.

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 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 structure 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.

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 Colusa joined the National Flood Insurance Program (NFIP) on June 30, 1976. The City does not participate in CRS program. NFIP data indicates that as of February 2, 2024, there were 75 flood insurance policies in force in the City with $25,650,000 of coverage. Of the 75 policies: 72 were for single family homes were residential (single-family homes), 2 were for a multi-family home, and 1 was for non-residential properties. Of the 75 policies in force, all were in B, C, and X zones. It should be noted that this data was provided before the new FEMA DFIRM flood mapping came into effect. The GIS parcel analysis detailed above identified 355 improved parcels in the 1% annual chance flood zone. There have been 13 historical claims for flood losses totaling $101,045.82.00. NFIP data further indicates that there are 2 repetitive loss (RL) and no severe repetitive loss (SRL) buildings in the City of Colusa. Data for FEMA's PIVOT database indicates that these repetitive loss parcels have been mitigated. There have been no substantial damage claims since 1978 in the City.

Based on this analysis of insurance coverage, the City has values at risk to the 1% annual chance and greater floods. Of the 355 improved parcels within the 1% annual chance flood zone, none of those parcels maintain flood insurance. This can be seen on Table A-33.

Table A-33 City of Colusa – 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 Colusa	355	0	0.0%

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 Parcel/Assessor Data, NFIP CIS data.

As the levees are decertified, an increased number of Colusa County residents are placed in the floodplain. Table A-34 illustrates the changes in the number of insured structures in the 1% annual chance floodplain. As seen in the table, the overall percentage of policy holders remains unchanged. Thus, flood insurance education and promotion will be an important focus moving forward with the recent DFIRM update putting more people and structures within the 1% annual chance floodplain.

Table A-34 City of Colusa – Comparison of 2024 and 2018 Percentage of Policy Holders to Improved Parcels in the 1% Annual Chance Floodplain

Jurisdiction	2018 LHMP			2024 LHMP		
	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	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 Colusa	7	0	0.0%	355	0	0.0%

Source: FEMA DFIRM 3/27/2024, 2023 Colusa County Parcel/Assessor's Data, 2018 Colusa County LHMP Update

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 Colusa 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. Population growth in the City of Colusa has recently slowed; however, additional growth within the recently decertified levee protected areas of the County and other 1% and 0.2% annual chance floodplains would place additional populations at risk to flood. 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.
- 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 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. Depending on the location of new development and adherence to protective building codes has recently slowed; however, additional growth within the recently decertified levee protected areas of the City and County and other 1% and 0.2% annual chance floodplains would place land at risk to flood.

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. As levees

are decertified, vulnerability increases, and certain populations may experience a disproportionate impact due to lack of access to resources.

The City enforces its floodplain management ordinance. More detail on the specifics of the floodplain ordinance can be found in the Capability section below. With the new effective 2024 DFIRMs, the City's floodplain ordinance should be updated to ensure new development within floodplains is adequately protected. A discussion of general considerations follows.

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. The City of Colusa's floodplain management ordinance provides standards for development, subdivision of land, construction of buildings, and improvements and repairs to buildings that meet the minimum requirements of the NFIP and also the requirements of the City's current adopted version of the California Building Code (and International Building Code), which in some areas exceed the base requirements of the NFIP.

The International Residential Code and International Building Code, 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 are 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 City may be built in the floodplain, in conformance to the standards of the floodplain ordinance. The City enforces the floodplain ordinance on new development in the City of Colusa. With the new FEMA DFIRMs in place, the City should consider additional flood protection standards with their flood ordinance update.

Future development areas and their vulnerability to DFIRM flooding is discussed further in the below GIS analysis.

GIS Analysis

The City provided 7 future development areas which were used as the basis for the inventory of future development for the City. These were mapped in GIS. Utilizing the future development area spatial layer, the parcel centroid data was intersected to determine the future development areas within each FEMA DFIRM flood zone. Figure A-23 show the locations of the future development areas overlayed on the FEMA DFIRM flood zones. Table A-35 shows each future development area in the City in these zones.

Figure A-23 City of Colusa – Future Development in DFIRM Flood Zones

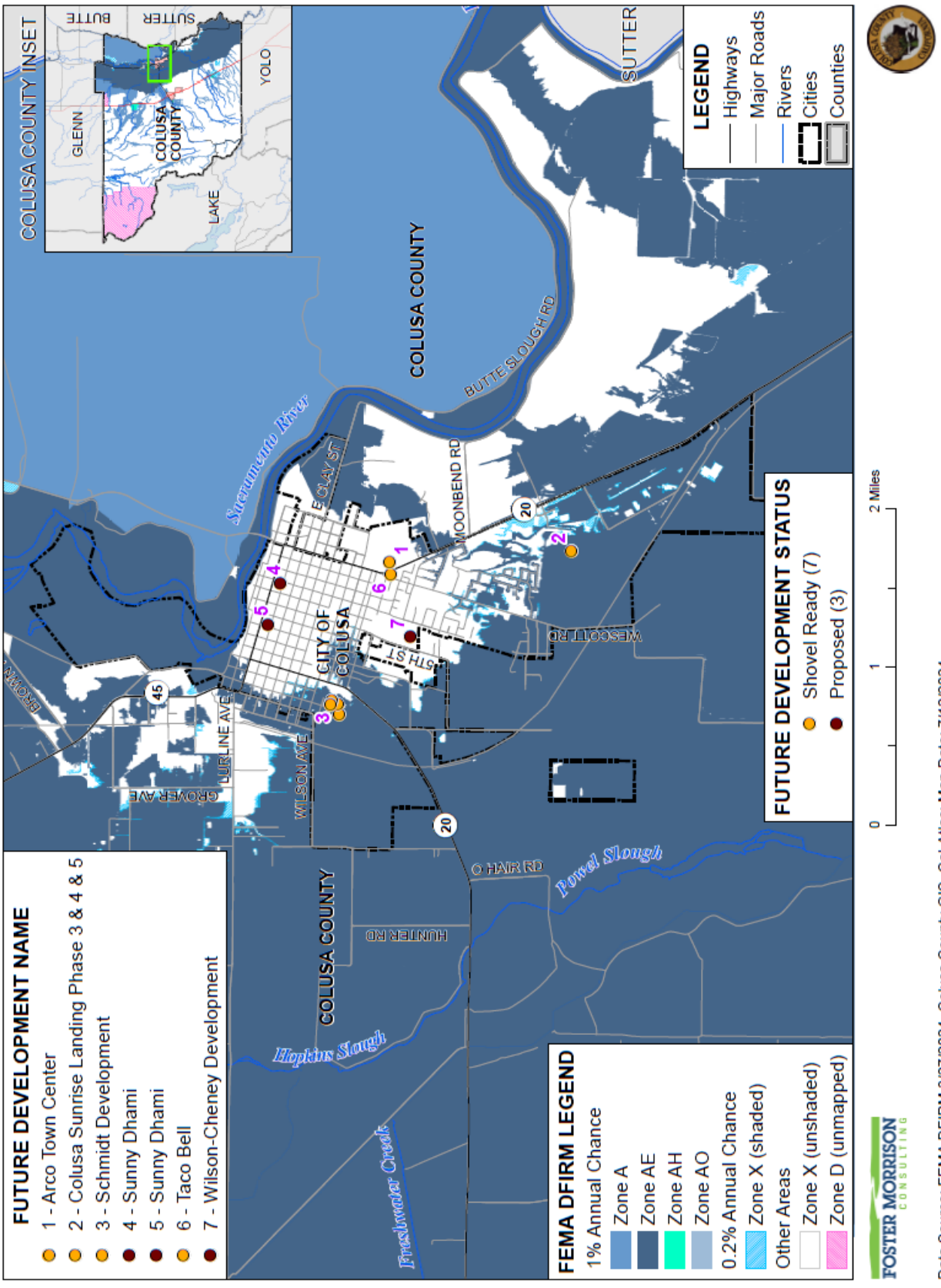


Table A-35 City of Colusa – Future Development Areas in FEMA DFIRM Flood Zones

Flood Zone	Future Development Status	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
1% Annual Chance Flood Hazard					
Zone AE	Shovel Ready	2	Colusa Sunrise Landing Phase 3 & 4 & 5	1	19
		3	Schmidt Development	3	3.27
		Shovel Ready Total		**4**	**22.27**
	Zone AE Total			**4**	**22.27**
1% Annual Chance Flood Hazard Total				**4**	**22.27**
Other Areas					
Zone X (unshaded)	Proposed	4	Sunny Dhami	1	1
		5	Sunny Dhami	1	0.25
		7	Wilson-Cheney Development (temporary name)	1	9.36
		Proposed Total		**3**	**10.61**
	Shovel Ready	1	Arco Town Center	1	4.58
		3	Schmidt Development	1	5.13
		6	Taco Bell	1	1.26
		Shovel Ready Total		**3**	**10.97**
	Zone X (unshaded) Total			**6**	**21.58**
Other Areas Total				**6**	**21.58**
Grand Total				**10**	**43.85**

Source: FEMA 3/27/2024 DFIRM, City of Colusa

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 contributes to a large volume of runoff resulting in high peak flows of moderate duration.

Location and Extent

The City of Colusa is subject to localized flooding throughout the City. This is discussed in Table A-36 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.

City of Colusa Events

The City noted the following past occurrences of localized flooding:

- Bridge Street between Main and south to Sioc Street experiences chronic flooding several times each year. Sioc Street on many of the same types of storm events experiences flooding west of the Bridge Street intersection and has to be closed. The central portion of the City covering a 10-12 block area bounded by Main street on the north, 4th street on the East, Fremont Street on the South and 9th Street on the north experiences chronic flooding. This area of town contains no underground storm drains. The Powell Slough leading out of town as an escape route at the Highway 20 crossing experiences severe flooding which overtops the Highway, which can then not be crossed by vehicular traffic. East Clay Street, east of Bridge Street experiences chronic flooding due to river seepage when the Sacramento River is at or around flood stage for extended time periods, and due to the lack of maintained storm drainage facilities and facilities that have been changed or removed downstream. Wilson road serving some commercial areas, and leading to the WWTP, experiences frequent flooding and must be closed.

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 vulnerabilities to this hazard.

Localized flooding in the City is caused by heavy downpours, which overwhelm the city's drainage capacity for a short time. The City's drainage quickly drains the access water held in the streets. When these events occur, the City streets can carry the excess water. Very few properties are in danger of flooding because the City streets, curb, and gutter systems were designed to hold additional water during intermittent downpours. There has been degraded drainage in some areas due to damaged drainpipes at alley access points, i.e., 13th Street ditch.

The City storm drains were originally not designed for the new atmospheric river storms and the rain now experienced during the downpours.

Historically, the City has been affected by flooding of streams and creeks occurring during heavy rain and storm 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 Colusa are summarized in Table A-36.

Table A-36 City of Colusa – List of Localized Flooding Problem Areas

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris	Downed Trees
5th street and Fremont	X	X					X
13th Street, Fremont St. to Market St.	X	X					X
North side of Main street	X						X
8th and 9th and SIOC	X	X					X
1st Parkhill	X						X
1st Clay							
1st Webster							X

Source: City of Colusa

Assets at Risk

Assets at risk from localized flood include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. 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.

Community Lifelines

Due to the relatively minor nature of localized flooding, community lifelines are unlikely to be overwhelmed. Many of the City's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.12 of the Base Plan.

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 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.

Economic Assets and Community Activities of Value

Localized flooding occurs on an annual basis throughout the City during storm events. Most of these events have limited impacts and include those associated with localized flooding due to undersized drainage systems, affecting nearby roads, structures, and other nearby assets. Unless directly affected by localized flooding, these events are unlikely to affect the City's key economic assets.

Community activities of value may have minor vulnerabilities if a localized flood event were to occur during the activity. This may cause the activity to be relocated, cancelled, or rescheduled.

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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City of Colusa 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 Colusa has recently slowed. 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 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 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. Creating 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.

Future development in the City mainly east of Bridge Street and State Route (SR) 20 must adequately address and mitigate impacts upon storm water drainage systems which will add more impervious surfaces and need to drain those waters. The City will need to be proactive to ensure that increased development has proper siting and drainage for stormwaters. These considerations will also aid the vulnerable populations within the city, since these groups face a disproportionate impact from hazards. 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.

Levee Failure

Likelihood of Future Occurrence–Unlikely
Vulnerability–Extremely High

Hazard Profile

A levee is a raised area that runs along the banks of a river, stream, or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main channel of a stream. 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.

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. For example, levees can be certified to provide protection against the 1% annual chance flood. 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. Levee failure can occur through overtopping or from seepage issues resulting from burrowing rodents, general erosion, excessive vegetation and root systems, and other factors that compromise the integrity of the levee. 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 the City of Colusa, levee failure poses a great risk to life and property in areas where levees protect surrounding property from flooding associated with stream and riverine flooding as well as areas where levees protect areas subject to events.

Location and Extent

Numerous levees are located throughout the City (as shown in Section 4.3.14 of the Base Plan. Figure A-24 shows the Levee Flood Protection Zones (LFPZs) in the City. Since the decertification of the levees, there is no FEMA DFIRM X Protected by Levee Flood Zone. However, analysis is performed using the LFPZ data of expected flood depths.

There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the City are not fully known, but the LFPZ maps provide a rough estimation. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of a levee failure can be hours to weeks, depending on the water flows that the levee holds back. The City noted that when northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on City levees. Geographical levee failure flood extent for the City developed from the LFPZs is shown in Table A-37.

Figure A-24 City of Colusa – LFPZ

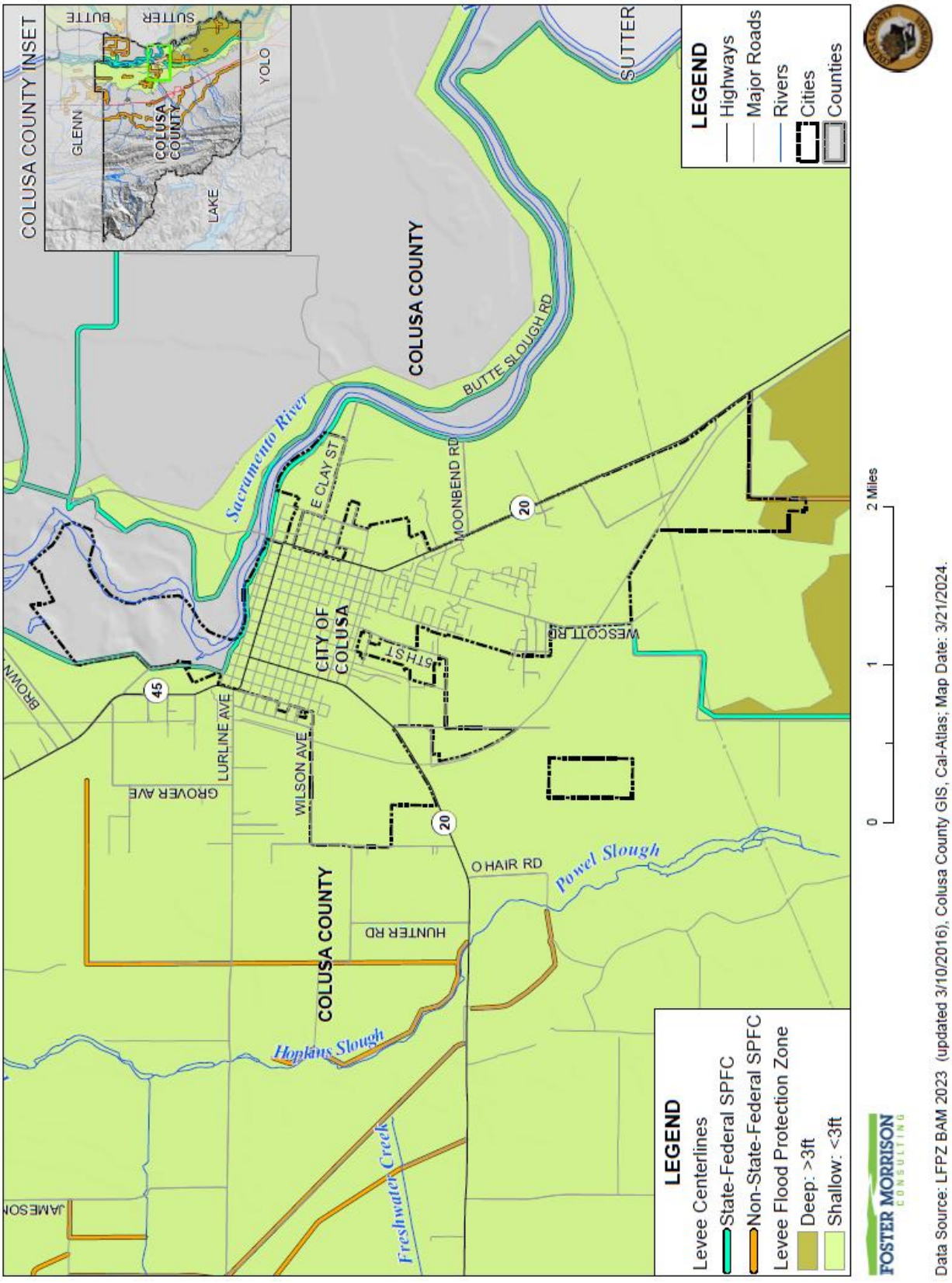


Table A-37 City of Colusa –Geographical LFPZ Extents

Levee Flood Protection Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Shallow: <3ft	2,062	85.504%	1,377	99.194%	685	66.927%
City of Colusa Total	**2,062**	**85.504%**	**1,377**	**99.194%**	**685**	**66.927%**

Source: CA DWR

Past Occurrences

Disaster Declarations

There have been no state or federal disaster declarations from levee failure.

NCDC Events

There have been no NCDC levee failure events in Colusa County.

City of Colusa Events

The City has not experienced significant changes in its levee system since 2019. The seepage locations have remained the same as in prior years and are accurately identified in the 2018 plan. More recently, the City levee system did experience potential damage from encampments set up on the river side of the levee near the 3rd Street access. DWR inspected the levee where the people living in the camp had dug into the base of the levee near the river's edge. DWR was confident that it did not pose a serious risk to the levee because of the location of the dug-in. It was located at one of the most comprehensive portions of the levee and did not pose any immediate threat.

Climate Change and Levee Failure

It is likely that climate change will increase the chance of future occurrence as well as future impacts from levee failure. More information on future impacts to the City can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

In general, increased flood frequency in California is a predicted consequence of climate change. Mechanisms whereby climate change leads to an elevated flood risk include more extreme precipitation events and shifts in the seasonal timing of river flows. This threat may be particularly significant because recent estimates indicate the additional force exerted upon the levees is equivalent to the square of the water level rise. These extremes are most likely to occur during storm events, leading to more severe damage to levees from waves and floods.

Vulnerability to Levee Failure

The probability of levee failure is increasing over time due to increased storms and flooding potential from global climate change. Levee failure flooding can occur as the result of partial or complete collapse of an

impoundment, and often results from prolonged rainfall and flooding. A levee failure can range from a small uncontrolled release to a catastrophic failure. The primary danger associated with levee failure is the high velocity flooding of those properties downstream of the breach. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the levee. In addition, levee failure can cause stream bank erosion, which can in some instances have effects worse than those of flooding itself.

Large portions of the City are at some measure of vulnerability to levee failure as shown by the number of levees located within the City and the LFPZs. An assessment of a community's vulnerability to levee failure begins with an understanding of local exposure to levee 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 vulnerabilities to this hazard.

The 2004 LHMP noted that since dredging the river bottom has been discontinued, the bottom of the river has become higher, thus the water levels reach higher on the banks of the levees. When northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees. The potential for levee breaches and erosion damage has increased. Also, since the levees have been decertified in the County, many areas that were once outside the floodplain have now been placed inside the Special Flood Hazard Area. This has put many citizen's homes or businesses into the floodplain, which requires them to have flood insurance. The seepage locations have remained the same as in prior years and are accurately identified in the 2018 plan.

At this time, the City has no plans to certify the levees. The City will continue to work with the reclamation districts to evaluate levee improvement options, including possible levee certification in the future?

Assets at Risk

Assets at risk from levee failure include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations

Populations in the floodplains are at risk to flooding, including populations located in in leveed areas. The LFPZ areas provide some indication of the potential risk to populations located within areas protected by levees. Certain vulnerable populations may be at a greater risk of a sudden levee failure, including the unsheltered, those with limited mobility and those that lack the resources to leave the area.

City residents that live in areas protected by levees 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 evaluate the population of residents of the City that live within areas protected by levees, the LFPZ was used to determine the potential risk of populations located within these leveed areas. The

LFPZs were overlayed on the parcel layer and linked to the Assessor data. Those residential parcel centroids that intersect the LFPZ were counted and multiplied by the 2022 Census Bureau average household factors for the City of Colusa – 2.55. According to this analysis, there is a total population of 5,156 residents of the City that reside in the LFPZs; although, all of these residents fall within the shallow, <3ft LFPZs. However, it should be noted that all populations located within areas protected by levees may be a risk to levee failure flooding. Residential populations within LFPZs are shown in Table A-28.

Table A-38 City of Colusa – Improved Residential Parcels and Population in LFPZs

Jurisdiction	Deep: >3ft		Shallow: <3ft	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population
City of Colusa	0	0	1,778	5,156

Source: CA DWR, Colusa County 2023 Parcel/Assessor Data, US Census Bureau American Community Survey 2022 Household Size Estimates.

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

A levee failure can affect the built environment of the City, with multiple structures in the City at risk to a levee failure event. While all structures located within leveed areas are potentially at risk to a levee failure event, the LFPZ data was used to help quantify this risk. GIS was used to determine the possible impacts of levee failure flooding from LFPZs within the City of Colusa. The methodology described in Section 4.3.14 of the Base Plan was followed in determining structures and values at risk to levee failure flooding based on the LFPZ data. Table A-39 shows the parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), estimated content replacement values, and total values by property use in the City that fall in LFPZs.

Table A-39 City of Colusa – Count and Value of Parcels (and Structures) in LFPZs by Property Use

Levee Flood Protection Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Deep: >3ft							
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	0	0	$0	$0	$0	$0	$0
Government	0	0	$0	$0	$0	$0	$0
Industrial	4	2	$105,143	$261,230	$309,690	$391,845	$1,067,908
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0	$0

Levee Flood Protection Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Deep: >3ft Total	**4**	**2**	**$105,143**	**$261,230**	**$309,690**	**$391,845**	**$1,067,908**
Shallow: <3ft							
Agricultural	23	11	$13,938,078	$552,430	$495,940	$552,430	$15,538,878
Commercial	246	190	$20,522,317	$57,204,144	$6,312,332	$57,204,144	$141,242,937
Government	93	51	$4,841,496	$33,560,789	$18,519,832	$33,560,789	$90,482,906
Industrial	61	20	$12,313,828	$34,376,193	$15,137,516	$51,564,289	$113,391,826
Institutional	34	20	$2,286,791	$6,200,820	$6,039,649	$6,200,820	$20,728,080
Miscellaneous	12	5	$615,343	$8,431,121	$0	$8,431,121	$17,477,585
Residential	1,843	1,778	$88,505,253	$303,181,060	$2,413,584	$151,590,525	$545,690,422
Shallow: <3ft Total	**2,312**	**2,075**	**$143,023,106**	**$443,506,557**	**$48,918,853**	**$309,104,118**	**$944,552,634**
City of Colusa Total	**2,316**	**2,077**	**$143,128,249**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$945,620,542**

Source: CA DWR, Colusa County 2023 Parcel/Assessor

Structures protected by levees that fail, including those with mapped LFPZs, are often total losses. The analysis above assumes all levees in the City break at one time, which is unlikely. The extent and depth of actual flooding and associated damage will vary depending on the location, nature, depth, and extent of any levee break.

Critical Facilities and Infrastructure

Levee failure flooding presents a threat to both critical facilities and infrastructure. Critical infrastructure failures such as loss of power, impacts to potable and wastewater treatment systems, and road and bridge failures can all be caused by levee failure events, depending on the magnitude of the resulting flood. While all critical facilities that are located behind leveed areas are potentially at risk to a levee failure event, a separate analysis was performed on the critical facility inventory in the City to determine critical facilities that fall within the LFPZs. Using GIS, the LFPZs were overlayed on the critical facility GIS layer. This is shown on Figure A-25 and detailed in Table A-40 for the LFPZ areas in the City. As shown, facilities lie in the Shallow: <3ft LFPZ.

Figure A-25 City of Colusa – Critical Facilities in LFPZs

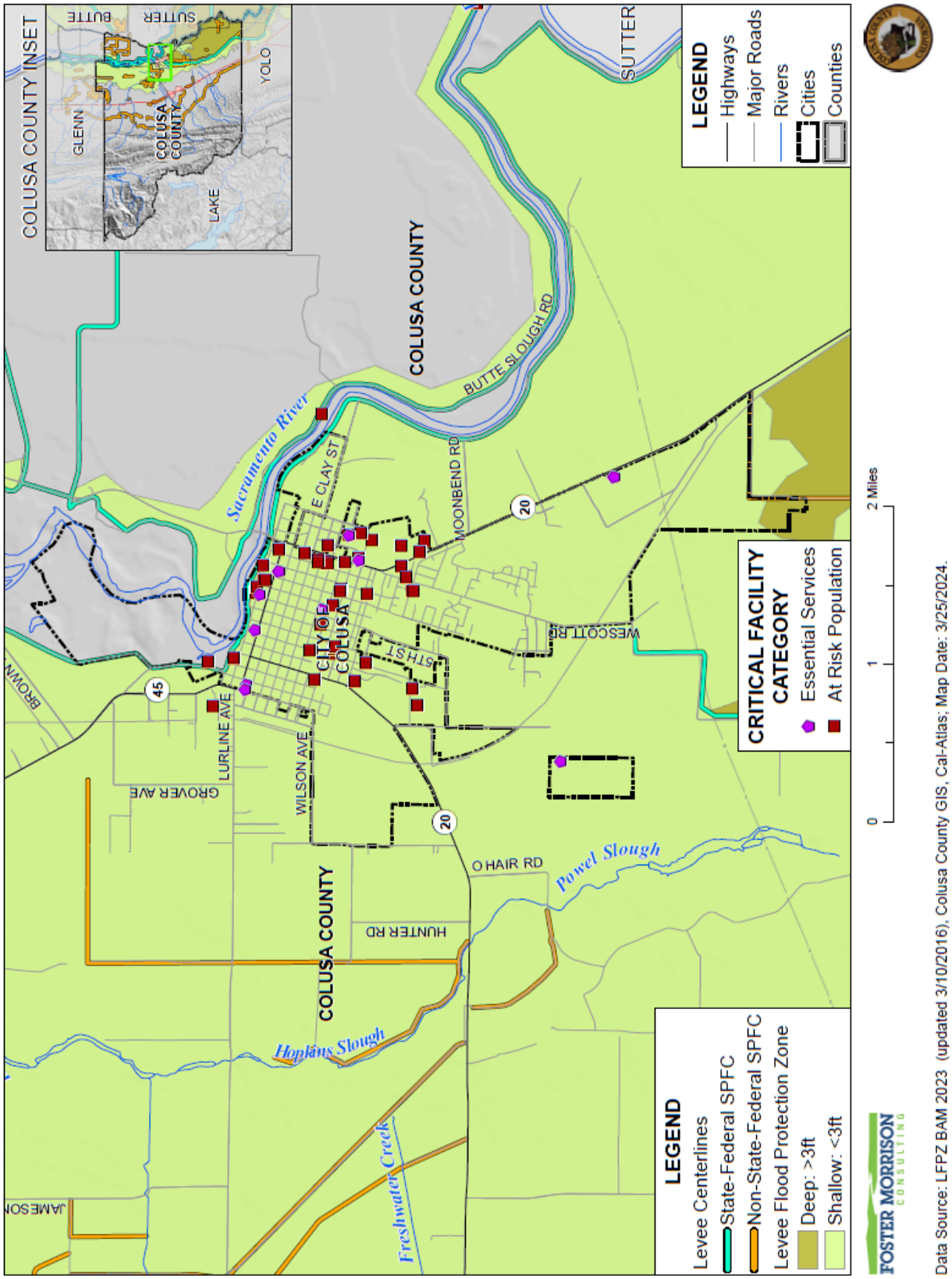


Table A-40 City of Colusa – Critical Facilities in LFPZ

Levee Flood Protection Zone	Critical Facility Category	Facility Type	Facility Count
Shallow: <3ft	Essential Services Facilities	Emergency Response	1
		Fire Station	2
		Medical	1
		Police Station	1
		Public Services	3
		Utility Facility	2
		Total	**10**
	At Risk Population Facilities	Apartment Complex	22
		Assisted-Living	1
		Hotel or Motel	2
		Jail	1
		Mobile Home Park	4
		School	8
		Senior Living Facility	1
		Total	**39**
Shallow: <3ft Total			**49**
City of Colusa Total			**49**

Source: CAL FIRE, City of Colusa GIS

Community Lifelines

Levee failure flooding presents a threat to life and property, including community lifelines in the City. Many of the City's community lifelines are the same as or similar to Colusa County's. These were discussed in greater detail in Section 4.3.14 of the Base Plan. A levee failure could overwhelm these community lifelines in the short term.

Natural, Historic, and Cultural Resources

Large levee failure events can affect natural, historic, and cultural resources. There are a number of ways levee failures and associated floodwaters can impact natural resources and the environment: Wildlife habitats can be destroyed. 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 areas protected by levees, but other cultural resources such as those associated with Native Americans and tribal cultural areas can also be disturbed, damaged and lost during extreme levee failure events. Any of these that fall in areas protected by levees and within the LFPZ flood zones would be vulnerable.

Economic Assets and Community Activities of Value

Major levee failure flooding events could affect any economic asset that lies in the areas protected by levees. These events can also affect those economic assets outside of the areas protected by levees, at least in the short term until floodwaters have receded and the City has sufficiently recovered. The City felt that a levee failure would have bearing on community activities of value, if a failure had a direct impact on the activity.

Impacts from Levee Failure

Floods and their impacts vary by location, including the added impacts associated with a levee failure flood event, and will only affect certain areas of the City that are in areas protected by levees. Based on the number of levees within the City and the LFPZ analysis, it is evident that levee failure floods could potentially have significant impacts to areas of the City protected by levees, depending on the severity of the event. Impacts that are not quantified, but could be anticipated in large future levee failure events, include:

- Injury and loss of life.
- Commercial and residential structural and property damage.
- Disruption of and damage to public critical infrastructure and services.
- Health hazards associated with mold and mildew, contamination of drinking water, etc.
- Impacts to natural resource areas, including stream bank erosion and loss of habitat areas.
- Damage to roads/bridges resulting in loss of mobility.

In addition to flood related levee failures, the levees in the City are at risk to failure during earthquake. Levee failure flooding could accompany an earthquake, especially if a dam or storage reservoir or tank fails. Severe ground shaking from an earthquake event can cause a dam to fail or overflow to the surrounding area. Levees are especially susceptible to rapid settlement due to liquefaction or horizontal spreading of underlying soils.

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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City of Colusa include the following:

- Climate change is likely to exacerbate future heavy rain conditions and associated impacts and vulnerability of the County to levee failure flooding.
- Population growth in the City of Colusa has recently slowed; however, additional growth within the recently decertified levee protected areas, including the LFPZs would place additional populations at

risk to flood. 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

- 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 levee failure risk may put additional development at risk. Future development built behind levees are subject to being built to the standards in the City of Colusa Floodplain Ordinance. However, City building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions. 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 City to this hazard.

Future development will be affected by this hazard as most of the Colusa area relies upon the protection of levees, not only directly adjacent to the City but also with the potential for levee failures upstream as far north as the Colusa Casino. Thus, it will always be some level of concern. Some areas of the City of Colusa, namely, west where future development is planned, are protected by a current levee, the Shattenger Levee, which, once certified will mitigate the flood risk, and the County is planning to install a new levee called the Powell Slough Levee that will protect against back water flooding the entire southwest quadrant of town.

Future development areas and their vulnerability to levee failure are discussed further in the below GIS analysis.

GIS Analysis

The City provided 7 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-26 show the locations of the future development areas overlayed on the LFPZs. Table A-41 shows each future development area in the City in these zones.

Figure A-26 City of Colusa – Future Development in LFPZs

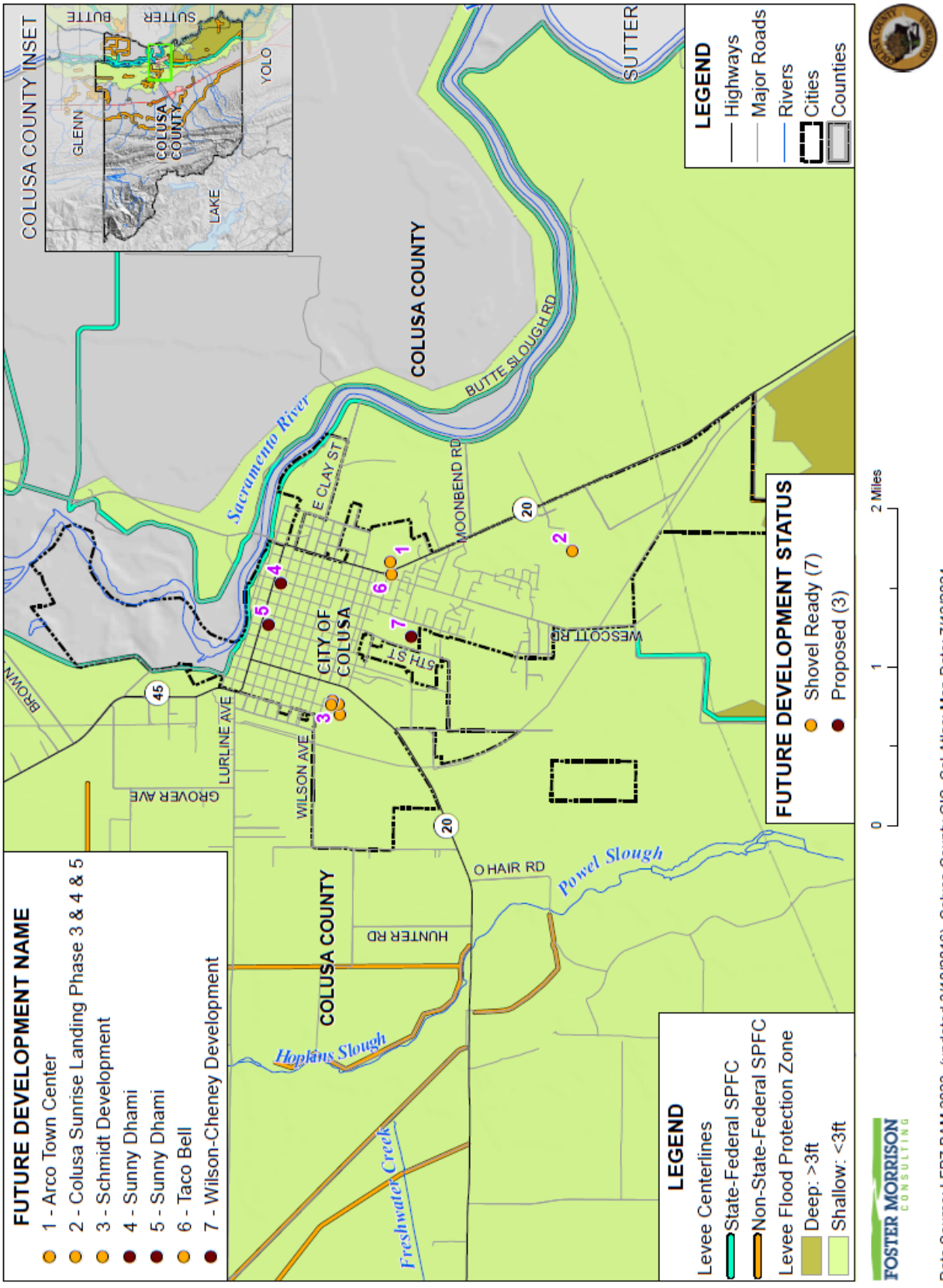


Table A-41 City of Colusa – Future Development in LFPZs

Levee Flood Protection Zone	Future Development Status	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
Shallow: <3ft	Proposed	4	Sunny Dhami	1	1
		5	Sunny Dhami	1	0.25
		7	Wilson-Cheney Development (temporary name)	1	9.36
		Proposed Total		3	10.61
	Shovel Ready	1	Arco Town Center	1	4.58
		2	Colusa Sunrise Landing Phase 3 & 4 & 5	1	19
		3	Schmidt Development	4	8.4
		6	Taco Bell	1	1.26
		Shovel Ready Total		**7**	**33.24**
	Shallow: <3ft Total			**10**	**43.85**
Grand Total				**10**	**43.85**

Source: LFPZ BAM 2023, City of Colusa

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.

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-36 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 Colusa 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-42.

Table A-42 Colusa County – Federal and State Disaster Declarations from Flood (Heavy Rain and Storms) 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC data recorded 30 hail, heavy rain, and winter weather incidents for Colusa County since 1950.

City of Colusa Events

The City noted that heavy rains and storms are an annual occurrence. 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 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 Colusa County and the City of Colusa. 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 vulnerabilities to this hazard.

The primary concern of the City from heavy rains and storms is the flooding that occurs during storm events. These heavy rains and storms can cause damages from localized flooding. This was discussed in the Flood: Localized Stormwater Flooding section above.

The City also experiences short power outages annually when severe weather occurs. In the past, these outages did not last long and did not cause an interruption in critical services. Most city facilities have standby generators and were able to operate without issue.

The City also noted that heavy rains and storms cause localized flooding in the City. The problem areas area shown on Table A-36 above.

Assets at Risk

Assets at risk from heavy rain and storms include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. 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 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 affected 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.

Community Lifelines

Community lifelines are likely to have some vulnerability to heavy rains and storms. Many of the City's community lifelines are the same as or similar to Colusa County's. These were discussed in greater detail in Section 4.3.4 of the Base Plan.

Short-term, heavy rains and storms can cause both widespread flooding as well as extensive localized drainage issues throughout the City. As storms continue to increase in intensity, existing drainage and stormwater systems may be overwhelmed at least temporarily contributing to an increase in flooding related impacts. While components of these lifelines may be damaged or otherwise impacted, it is unlikely that large storm events would overwhelm and take out any of these lifelines in the City as a whole.

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.

Economic Assets and Community Activities of Value

Heavy rain and storm events can cause direct damage to economic assets such as businesses and commercial centers. During extreme events, the economy may slow as people stay home or inside. Business revenue

may be reduced during extended storm events. Community activities of value may see a reduction in attendance, impacting revenues associated with these events, especially those that occur outdoors. Events may be cancelled or rescheduled. Along with this, a heavy rain and storm event could shut down schools and businesses, causing interruptions to education and economic areas of the City.

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 and erosion that would likely have the greatest impact.

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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City Colusa 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 is expected to decrease for the City of Colusa; however, the vulnerability may change depending on changes to the makeup of more vulnerable populations. Certain vulnerable populations, such as the unhoused, 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 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. 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. 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. With adherence to development standards, future losses to new development should be minimal.

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 population could increase the number of people impacted by heavy rains and storms, including an increase in vulnerable populations such as AFN, low-income families, the elderly, children, and the unhoused. 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.

Wildfire

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Low

Note: Though a low priority hazard for the City, due to its importance in the County and State of California, wildfire is profiled here. It is a low priority hazard for mitigation planning purposes.

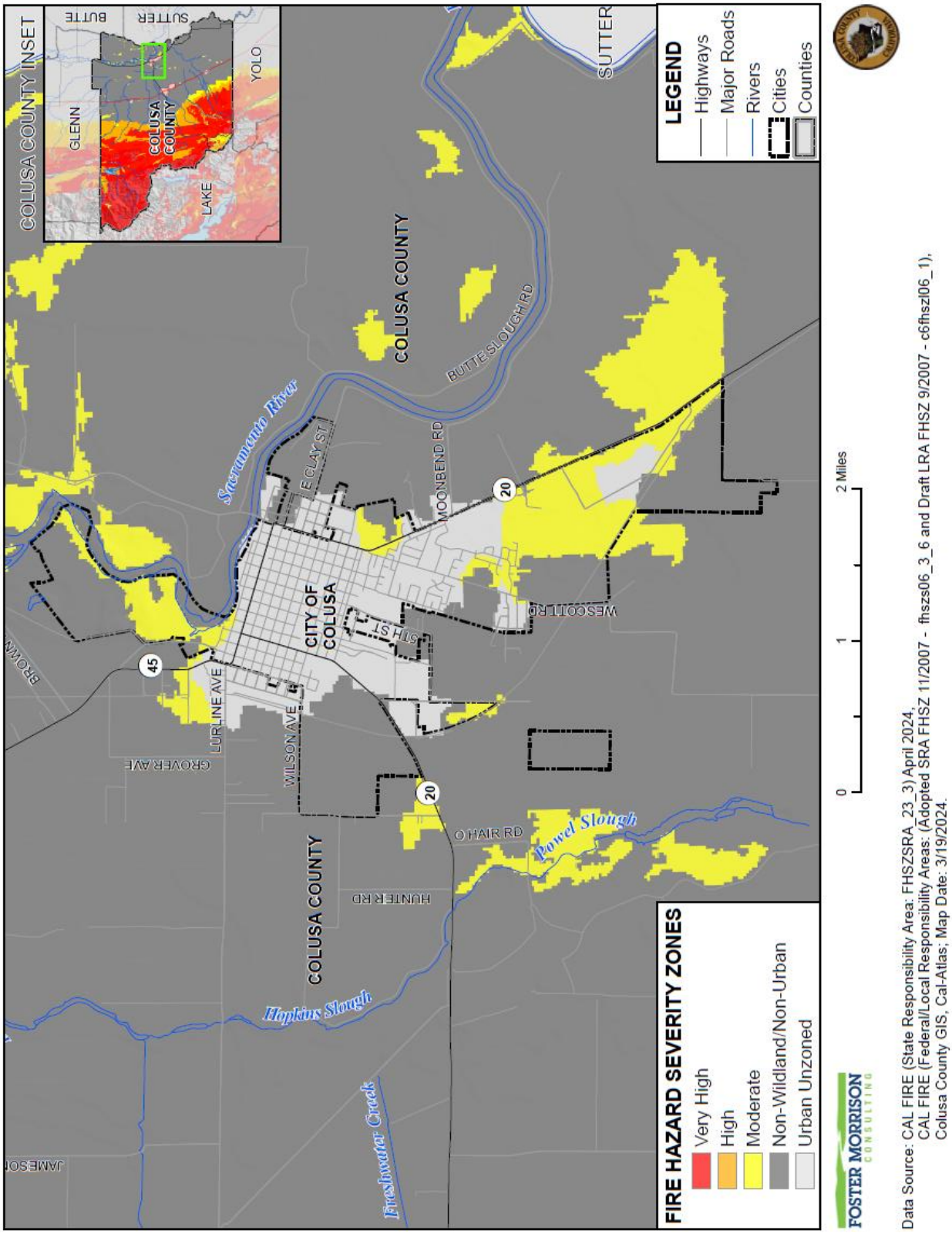
Hazard Profile

Wildland fire and the risk of a conflagration is an ongoing concern for the City of Colusa. 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/ESPS 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, urban 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 Colusa County Planning Area and the City.

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 maps showing risk variance. Following the methodology described in Section 4.3.17 of the Base Plan, wildfire maps for the City of Colusa were created. Figure A-27 shows the CAL FIRE Fire Hazard Severity Zone (FHSZ) in the City. As shown on the maps, FHSZs within the City range from Urban Unzoned to Moderate.

Figure A-27 City of Colusa – CAL FIRE Fire Hazard Severity Zones



Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on 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 extent from CAL FIRE is shown in Table A-43.

Table A-43 City of Colusa – CAL FIRE 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
Very High	0	0.00%	0	0.00%	0	0.00%
High	0	0.00%	0	0.00%	0	0.00%
Moderate	507	21.03%	168	12.13%	339	33.10%
Non-Wildland/Non-Urban	1,113	46.17%	544	39.18%	569	55.65%
Urban Unzoned	791	32.81%	676	48.69%	115	11.25%
City of Colusa Total	**2,412**	**100.00%**	**1,388**	**100.00%**	**1,023**	**100.00%**

Source: CAL FIRE

Past Occurrences

Disaster Declaration History

There has been one federal and two state disaster declaration due to fire, as shown in Table A-44.

Table A-44 Colusa County – Federal and State Wildfire Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Wildfire	1	2018	2	1987, 2018

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked 13 wildfire events in the County dating back to 1993.

City of Colusa Events

The City noted that 2021 and 2022 experienced unprecedented fires in the riparian areas of the State Park and properties that border the Sacramento River and the City of Colusa.

- **2021** - The "Jungle Fire" happened on the night of the 4th of July during the City's fireworks show. The cause was undetermined. The fire was primarily contained in the riparian area of the state park with minimal slope over to private property near Roberts Road. The estimated acreage affected was approximately 30 acres.

- **2022** – A fire started west of Roberts Road on private property. The fire was caused by a pan-head mower operated in and around dry brush. The fire started in the Sacramento River Fire Protection District service area and passed through the City's jurisdictional area. This fire was much more active than previous years and experienced ember-cast 1-2 miles from the fire edge.
  - ✓ In the City residential area, there was one related 911 call for gutters on fire at a single-family home near 1st Street and Clay Street.
  - ✓ The CIP area had a spot fire related to the fire.
  - ✓ Due to smoke, it was difficult to carry out normal activities, especially for the more vulnerable residents.

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 4.3.17 of the Base Plan. Based on this model, Cal-Adapt predicts that wildfire risk in Colusa 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 Colusa 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 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 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 vulnerabilities to this hazard.

As discussed in the Past Occurrences section above, dry conditions can cause fires to start in or near the City. The City has areas of moderate wildfire hazard, as defined by CAL FIRE.

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 Colusa 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 North Complex Fire, as well as others that affected the nearby areas.

Assets at Risk

Assets at risk from wildfire include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

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
- Elderly (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 parcel centroids that intersect the FHSZs were counted and multiplied by the 2022 Census Bureau average household factors for the City of Colusa – 2.55. According to this analysis, there is a total population of 508 residents of the City of Colusa at risk to moderate or higher FHSZs. This is shown in Table A-45.

Table A-45 City of Colusa – Improved Residential Parcels and Population by CAL FIRE 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 Colusa	0	0	0	0	175	508

Source: CAL FIRE, Colusa County 2023 Parcel/Assessor Data, US Census Bureau American Community Survey 2022 Household Size Estimates.

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

All structures in the City have some risk to wildfire. GIS was used to determine the possible impacts of wildfire within the City of Colusa. The methodology described in Section 4.3.17 of the Base Plan was followed in determining structures and values at risk in CAL FIRE's Fire Hazard Severity Zone layer. Summary analysis results for the City of Colusa are shown in Table A-46, which summarizes total parcel counts, improved parcel counts and their structure values by fire hazard severity zone. Table A-47 breaks out the Table A-46 by adding the property use details by fire hazard severity zone for the City.

Table A-46 City of Colusa – Count and Value of Parcels (and Structures) by CAL FIRE Fire Hazard Severity Zone

Fire Hazard Severity Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Moderate	271	205	$26,303,908	$100,956,400	$20,126,336	$78,616,901	$226,003,545
Non-Wildland/Non-Urban	109	66	$21,782,513	$18,275,854	$7,091,405	$15,337,734	$62,487,506
Urban Unzoned	1,954	1,806	$96,217,123	$324,535,533	$22,010,802	$215,541,328	$658,304,786
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$946,795,837**

Source: CAL FIRE, Colusa County 2023 Parcel/Assessor Data

Table A-47 City of Colusa – Count and Value of Parcels (and Structures) by CAL FIRE Fire Hazard Severity Zone and Property Use

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Moderate							
Agricultural	2	0	$106,121	$0	$0	$0	$106,121

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Commercial	26	16	$4,655,038	$16,536,493	$2,454,172	$16,536,493	$40,182,196
Government	17	3	$1,598,240	$12,603,396	$13,416,418	$12,603,396	$40,221,450
Industrial	30	10	$5,703,369	$13,066,387	$3,853,036	$19,599,581	$42,222,373
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	1	1	$57,740	$1,004,742	$0	$1,004,742	$2,067,224
Residential	195	175	$14,183,400	$57,745,382	$402,710	$28,872,689	$101,204,181
Moderate Total	**271**	**205**	**$26,303,908**	**$100,956,400**	**$20,126,336**	**$78,616,901**	**$226,003,545**
Non-Wildland/Non-Urban							
Agricultural	17	8	$13,575,300	$371,644		$371,644	$14,318,588
Commercial	8	3	$928,464	$1,005,421	$151,733	$1,005,421	$3,091,039
Government	5	0	$1,253,620				$1,253,620
Industrial	26	4	$3,301,172	$4,914,780	$6,138,700	$7,372,170	$21,726,822
Institutional	1	1	$188,346	$610,371	$798,717	$610,371	$2,207,805
Miscellaneous	1	1	$12,294	$582,611	$0	$582,611	$1,177,516
Residential	51	49	$2,523,317	$10,791,027	$2,255	$5,395,517	$18,712,116
Non-Wildland/Non-Urban Total	**109**	**66**	**$21,782,513**	**$18,275,854**	**$7,091,405**	**$15,337,734**	**$62,487,506**
Urban Unzoned							
Agricultural	4	3	$256,657	$180,786	$495,940	$180,786	$1,114,169
Commercial	215	171	$14,961,211	$39,662,230	$3,706,427	$39,662,230	$97,992,098
Government	85	48	$3,133,642	$20,957,393	$5,103,414	$20,957,393	$50,151,842
Industrial	9	8	$3,414,430	$16,656,256	$5,455,470	$24,984,383	$50,510,539
Institutional	33	19	$2,098,445	$5,590,449	$5,240,932	$5,590,449	$18,520,275
Miscellaneous	10	3	$545,309	$6,843,768	$0	$6,843,768	$14,232,845
Residential	1,598	1,554	$71,807,429	$234,644,651	$2,008,619	$117,322,319	$425,783,018
Urban Unzoned Total	**1,954**	**1,806**	**$96,217,123**	**$324,535,533**	**$22,010,802**	**$215,541,328**	**$658,304,786**
City of Colusa Total	**2,334**	**2,077**	**$144,303,544**	**$443,767,787**	**$49,228,543**	**$309,495,963**	**$946,795,837**

Source: CAL FIRE, Colusa County 2023 Parcel/Assessor Data

Critical Facilities and Infrastructure

Wildfire presents a threat to critical facilities and infrastructure. The following analysis identifies critical facilities and infrastructure at risk to wildfire.

An analysis was performed on the critical facility inventory in the City of Colusa in identified Cal Fire's FHSZ mapping. Critical facilities in CAL FIRE FHSZs in the City of Colusa are shown in Figure A-28 and detailed in Table A-48. Details of critical facility definition, type, name and address and jurisdiction by fire hazard severity zone are listed in Appendix F.

Figure A-28 City of Colusa – Critical Facilities in Fire Hazard Severity Zones

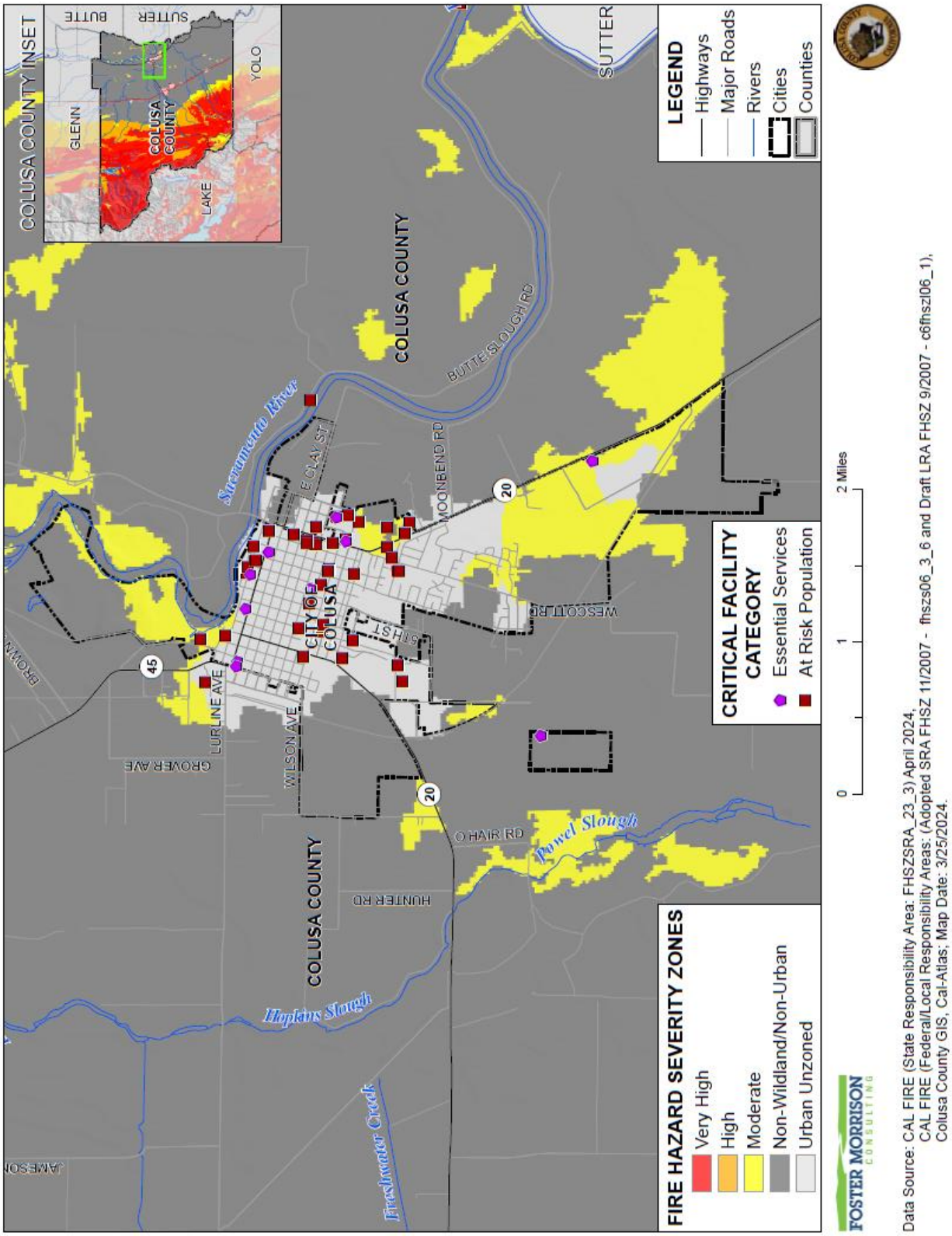


Table A-48 City of Colusa – Critical Facilities by Fire Hazard Severity Zone

Fire Hazard Severity Zone	Critical Facility Category	Facility Type	Facility Count
Moderate	Essential Services Facilities	Public Services	1
		Total	**1**
	At Risk Population Facilities	Apartment Complex	2
		Mobile Home Park	1
		Total	**3**
Moderate Total			**4**
Non-Wildland/Non-Urban	Essential Services Facilities	Utility Facility	1
		Total	**1**
	At Risk Population Facilities	Apartment Complex	1
		Mobile Home Park	1
		Total	**2**
Non-Wildland/Non-Urban Total			**3**
Urban Unzoned	Essential Services Facilities	Emergency Response	1
		Fire Station	2
		Medical	1
		Police Station	1
		Public Services	2
		Utility Facility	1
		Total	**8**
	At Risk Population Facilities	Apartment Complex	19
		Assisted-Living	1
		Hotel or Motel	2
		Jail	1
		Mobile Home Park	3
		School	8
		Senior Living Facility	1
		Total	**35**
Urban Unzoned Total			**43**
City of Colusa Total			**50**

Source: CAL FIRE, City of Colusa GIS

Community Lifelines

Wildfire presents a threat to life and property, including to community lifelines in the City. Many of the City's community lifelines are the same as or similar to Colusa County's. These were discussed in greater detail in Section 4.3.17 of the Base Plan. A large wildfire near the City could overwhelm community lifelines.

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 affected and are often more vulnerable due to their older age, construction type, and lack of fire prevention infrastructure such as sprinklers.

Economic Assets and Community Activities of Value

Wildfires in the City can cause direct damage to economic assets such as businesses and commercial centers located in affected areas. During extreme events, the economy may slow while recovery efforts are prioritized. Business revenue may be reduced during extended events. Community activities and events in areas affected by wildfire (and smoke and air quality issues) may be cancelled or rescheduled. As shown on the maps, the areas of moderate FHSZ in the City are in areas that have minimal development. There are few economic assets or community activities of value in these areas.

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 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 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 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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City of Colusa 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 of Colusa has recently slowed. 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.
- 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. However, City 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 most of the growth in the City 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 City to this hazard.

Additional growth and development within moderate or higher fire hazard severity zones in the City would place additional values at risk to wildfire. More vulnerable populations may experience a disproportionate impact from wildfire, and this should be considered as development continues. However, City building codes are in effect and should continue to be updated as appropriate to reduce this risk.

Future development areas and their vulnerability to wildfire are discussed further in the below GIS analysis.

GIS Analysis

The City provided 7 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-29 show the locations of the future development areas overlayed on the CAL FIRE FHSZs. Table A-49 shows each future development area in the City in these zones.

Figure A-29 City of Colusa – Future Development in FHSZs

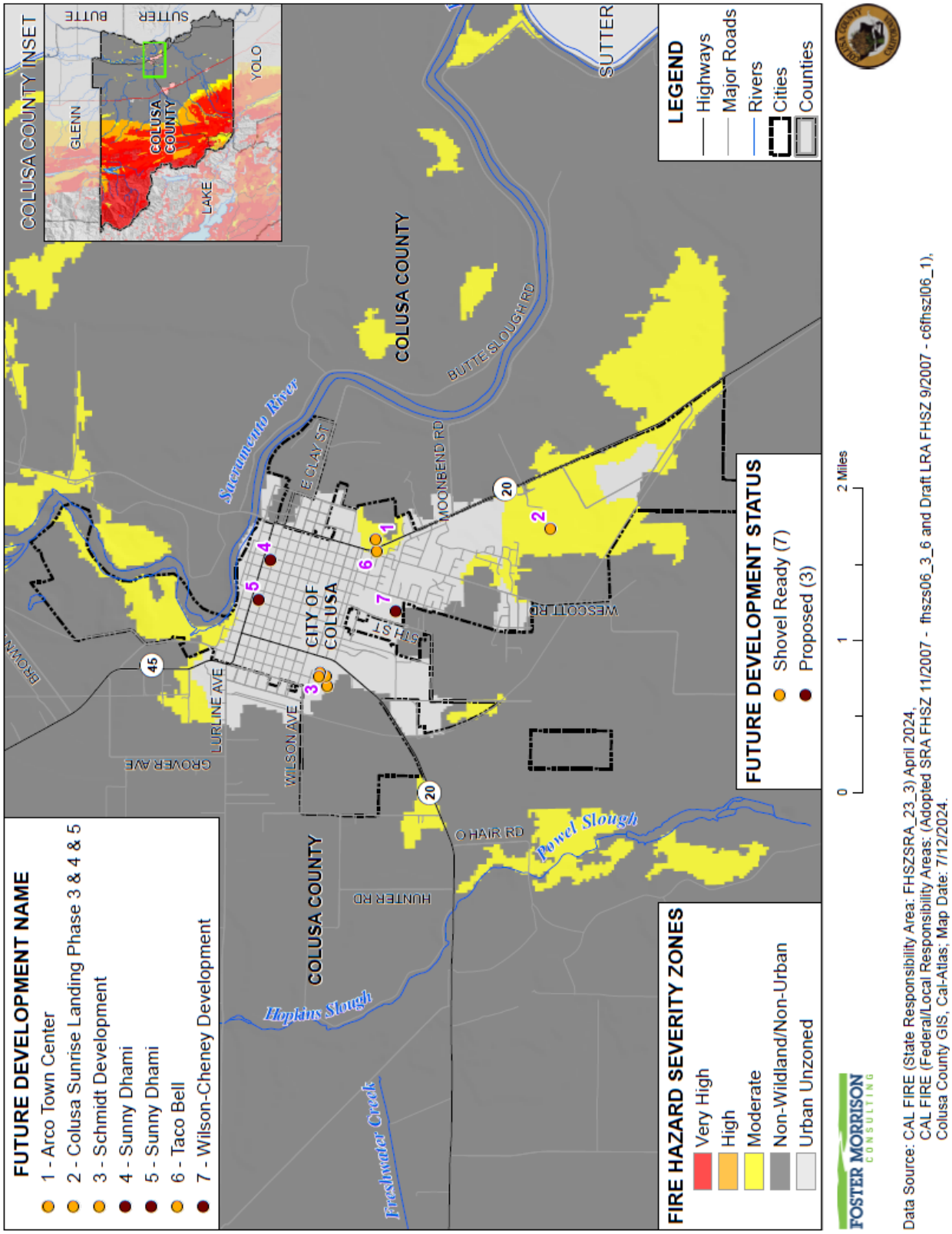


Table A-49 City of Colusa – Future Development in FHSZs

Fire Hazard Severity Zone	Future Development Status	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
Moderate	Shovel Ready	1	Arco Town Center	1	4.58
		2	Colusa Sunrise Landing Phase 3 & 4 & 5	1	19
		6	Taco Bell	1	1.26
		Shovel Ready Total		**3**	**24.84**
	Moderate Total			**3**	**24.84**
Urban Unzoned	Proposed	4	Sunny Dhami	1	1
		5	Sunny Dhami	1	0.25
		7	Wilson-Cheney Development (temporary name)	1	9.36
		Proposed Total		**3**	**10.61**
	Shovel Ready	3	Schmidt Development	4	8.4
		Shovel Ready Total		**4**	**8.4**
	Urban Unzoned Total			**7**	**19.01**
Grand Total				**10**	**43.85**

Source: FEMA 3/27/2024 DFIRM, City of Colusa

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-50 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 Colusa.

Table A-50 City of Colusa'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	N	

Climate Change Adaptation Plan		
Community Wildfire Protection Plan	N	
Comprehensive/Master Plan	Y	The General Plan addresses various hazards but does not identify any mitigation projects. The General Plan does not implement mitigation. 2007
Continuity of Operations Plan		
Economic Development Plan	N	
Land Use Plan		
Local Emergency Operations Plan		
Stormwater Management Plan		
Transportation Plan	Y	
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		
Building code	Y	
Flood insurance rate maps	Y	Yes and n/a
Floodplain ordinance	Y	Yes and Yes
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	Y	Yes and Yes
Zoning ordinance	Y	Yes and Yes
Other		
How can these capabilities be expanded and improved to reduce risk?		
Increase capacity through enhanced education and training. Along with this, seeking after funding opportunities like grants, building our social media presence, and making the community more aware of the training, education, and emergencies. The 2028 General Plan that is currently being produced will feature future mitigation.		

Source: City of Colusa

The City of Colusa General Plan Program, 2007

The City of Colusa General Plan Program serves as the blueprint for future growth and development and provides comprehensive planning for the future. It encompasses what the City is now, and what it intends to be, and provides the overall framework of how to achieve this future condition (see the discussion in Section 4.3.1 Growth and Development Trends).

The General Plan includes a Safety Element that focuses on safety issues to be considered in planning for the present and future development of the Colusa Planning Area. Identified hazards include wildfire,

geologic/seismic, flooding, and other natural and man-made hazards (such as hazardous materials). Mitigation-related actions and objective summaries are as follows:

- Flooding – 3 policies and 9 actions
- Seismic and Geologic Hazards – 2 policies and 4 actions

City of Colusa Drainage Master Plan (2009)

In order to reduce flooding in the City from localized flooding, a drainage master plan was put in place in 2009. The City continues to work through the actions put together in this plan to mitigate localized flooding.

Mitigation Related Ordinances

Building Regulations (Chapter 6)

or the purpose of decreasing the hazard from fire and for the protection of property therefrom the entire city is hereby declared to be, and is hereby established as, a fire district, and such fire district is divided into zones designated fire zones one, two and three.

- Fire Zone One. Fire zone one shall include all areas in the city designated C-2 central business district and C-3 general commercial district as such districts are defined and specified in the zoning regulations of the city.
- Fire Zone Two. Fire zone two shall include all areas in the city designated R-3 neighborhood apartment district, R-4 general apartment district, C-1 neighborhood business district, C-2-F central business district (special highway frontage district), C-3-F general commercial district (special highway frontage district), and M-1 light industrial district, as such districts are defined and specified in the zoning regulations of the city.
- Fire Zone Three. Fire zone three shall include all areas in the city designated as R-1 single-family residence district and R-2 two-family residence district, as such districts are defined and specified in the zoning regulations of the city.

Buildings or structures hereafter erected, constructed, moved within or into any of such fire zones shall be subject to the provisions and restrictions set forth in Chapter 16 of Part IV of the Uniform Building Code, as adopted by this chapter/

This Chapter adopts the following codes:

- 2013 California Building Standards Code, Title 24 - Part 1 - Administrative Code, Part 2.5 Residential Code, Part 6 - Energy Code, Part 8, Historical Code, Part 10 Existing Building Code, Part 11 - Green Building Standards Code, and Part 12 - Referenced Standards Code, as adopted by the California Building Standards Commission.
- The 2013 California Building Code
- The 2013 California Mechanical Code
- The 2013 California Electrical Code
- The California Plumbing Code, 2013

Civil Emergencies (Chapter 7)

The declared purposes of this chapter are to provide for the preparation and carrying out of plans for the protection of persons and property within this city in the event of an emergency; the direction of the emergency organization; and the coordination of the emergency functions of this city with all other public agencies, corporations, organizations and affected private persons.

It shall be the duty of the city disaster council, and it is hereby empowered to develop and recommend for adoption by the city council, emergency and mutual aid plans and agreements and such ordinances and resolutions and rules and regulations as are necessary to implement such plans and agreements. The disaster council shall meet upon call of the chairman or, in his absence from the city or inability to call such meeting, upon call of the vice-chairman.

All officers and employees of this city, together with those volunteer forces enrolled to aid them during an emergency, and all groups, organizations and persons who may by agreement or operation of law, including persons impressed into service under the provisions of subsection (a)(6)c of section 7-6, be charged with duties incident to the protection of life and property in this city during such emergency, shall constitute the emergency organization of the city.

The city disaster council shall be responsible for the development of the city emergency plan, which plan shall provide for the effective mobilization of all of the resources of this city, both public and private, to meet any condition constituting a local emergency, state of emergency or state of war emergency; and shall provide for the organization, powers and duties, services and staff of the emergency organization. Such plan shall take effect upon adoption by resolution of the city council.

Fire Protection (Chapter 9)

The 2013 California Fire Code, including all state-adopted appendices, including its Appendix Chapters 1—4 and Appendices B—H, is hereby adopted as the Fire Code of the City of Colusa, in regulating and governing the safeguarding of life and property from fire and explosion hazards arising from the storage, handling, and use of hazardous substances, materials and devices, and from conditions hazardous to life or property in the occupancy of buildings and premises as herein provided; providing for the issuance of permits and collection of fees therefore; and each and all of the regulations, provisions, penalties, conditions and terms of said fire code on file in the office of the city clerk are hereby referred to, adopted, and made a part hereof, as if fully set out in this chapter, with the additions, insertions, deletions and changes, if any, prescribed in this chapter.

A fire department for the city is hereby established. The fire department shall be under the charge of a chief, who shall have had previous training and experience as a fireman. The other members of the fire department shall consist of paid firemen or such companies of volunteer firemen as the city council may determine.

Zoning (Appendix A)

here is hereby adopted a Zoning Ordinance for the City of Colusa, as provided by Section 65000 et seq. of the Government Code of the State of California. This ordinance constitutes a precise plan for the use of land in conformity with the adopted City of Colusa General Plan.

This ordinance shall be known and cited as the "Zoning Ordinance of the City of Colusa." In any administrative action taken by any public official under the authority set forth in the ordinance the use of the term "zoning ordinance," unless further modified shall also refer to and mean this ordinance.

The plan is adopted to provide reasonable protective regulations designed to promote and protect the public health, safety, peace, morals, comfort, convenience and general welfare, and:

- To protect the established character and the social and economic stability of agricultural, residential, commercial, industrial and other types of improved areas, and:
- To assist in providing a definite comprehensive plan for sound and orderly development, and to guide and regulate such development in accordance with the General Plan and the objectives and standards set forth therein.

The Zoning Plan consists of the establishment of various districts within same, all of which shall it be lawful, and within same, all or none of which it shall be unlawful to erect, construct, alter, move, locate or maintain certain buildings or to carry on certain trades or occupations or to conduct certain uses of land or buildings; within which the heights and bulk of future buildings, shall be limited; within which certain open spaces shall be required about future buildings and consisting further of appropriate additional regulations to be enforced in such districts, all as set forth in this ordinance.

The Zoning Plan is intended to apply to all private, public, quasi-public, institutional, and public utility properties and all other lands, buildings and structures within the incorporated area of the City of Colusa.

Floodplain Management (Appendix A - Article 39)

The flood hazard areas of the City of Colusa 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 contribute to the flood loss. It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- Protect human life and health.
- Minimize expenditure of public money for costly flood control projects.
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.
- Minimize prolonged business interruptions.
- Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, and streets and bridges located in areas of special flood hazard.
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage.
- Ensure that potential buyers are notified that property is in an area of special flood hazard.
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

In order to accomplish its purposes, this ordinance includes methods and provisions to:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities.
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters.
- Control filling, grading, dredging, and other development which may increase flood damage.
- Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

A new development in Colusa, Sunrise Landing, has Five Phases. Phase 1 and Phase 2 have been completed, and Phase 3 is shovel ready. FEMA created the new Flood Plain Map before Phase 1 was started and did not consider the rise in elevation during construction and mapped this entire development as BFE. This area should be reconsidered by FEMA as not being below the Flood Plain Elevation.

A.5.2. Administrative/Technical Mitigation Capabilities

Table A-51 identifies the City department(s) responsible for activities related to mitigation and loss prevention in the City of Colusa.

Table A-51 City of Colusa'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	
Civil Engineer, including dam and levee safety	Y	
Community Planner	**Y**	
Emergency Manager	Y	
Floodplain Administrator	Y	
GIS Coordinator	N	We do not currently have a GIS plan in place, but will be exploring this in the near future
Planning Commission	Y	Planning Commission capability / defined roles are limited to land use planning, development, and flood plain variances. Mitigation review is on limited projects only.
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing		
Hazard data and information	Y	
GIS analysis		

Mutual aid agreements	Y	The City has the capability to assist and received assistance for mutual aid with the County and the State.
Other		
How can these capabilities be expanded and improved to reduce risk?		
Increase capacity through enhanced education and training. Along with this, seeking after funding opportunities like grants, building our social media presence, and making the community more aware of the training, education, and emergencies.		

Source: City of Colusa

A.5.3. Fiscal Mitigation Capabilities

Table A-52 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table A-52 City of Colusa'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	Yes – Infrastructure Upgrades. Yes
Community Development Block Grant	Y	No – Applications made not funded
Federal funding programs (non-FEMA)	Y	Unknown
Fees for water, sewer, gas, or electric services	Y	No
Impact fees for new development	Y	Yes – Combine with street projects
State funding programs	Y	Yes – Partnership with other agencies
Stormwater utility fee	Y	No
Other		
How can these capabilities be expanded and improved to reduce risk?		
Increase capacity through enhanced education and training. Along with this, seeking after funding opportunities like grants, building our social media presence, and making the community more aware of the training, education, and emergencies.		

Source: City of Colusa

A.5.4. Mitigation Education, Outreach, and Partnerships

Table A-53 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-53 City of Colusa's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters		

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	Fire prevention, risk management and worker safety training and CPR training is offered regularly by/through the City Fire Dept.
Local news		
Organizations that interact with underserved and vulnerable communities		
Social media		
How can these capabilities be expanded and improved to reduce risk?		
Increase capacity through enhanced education and training. Along with this, seeking after funding opportunities like grants, building our social media presence, and making the community more aware of the training, education, and emergencies.		

Source: City of Colusa

A.5.5. Other Mitigation Efforts

The City has many other completed or ongoing mitigation projects/efforts that include the following:

- City road and drainage maintenance has seen improvements, and the City now has additional staff employed to better prepare for the severe weather.
- Annual Fire department training on flood related emergencies and is working with Colusa County fire agencies when providing pre-Positions for high water or severe weather. The pre-position task force is staffed with fire department personnel that are trained in swift water rescue and flood water emergencies.
- Street project currently bid and beginning construction to install underground storm drain in Harris Street and 6th Street. The City noted that there have been visible improvements from these repairs.
- Bridge Street partnership project, where the City has partnered with Cal Trans for the installation of two 48" storm drain pipes to travers Bridge Street between Main and Wescott Road.

A.6 Mitigation Strategy

A.6.1. Mitigation Goals and Objectives

The City of Colusa 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 Colusa joined the National Flood Insurance Program (NFIP) as an emergency entrant on February 9, 1973. The City followed up with a regular entry on June 30, 1976. As a participant of the NFIP, the City of Colusa 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 Colusa will continue to comply with the requirements of the NFIP in the future.

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 Colusa 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 Colusa is not a current participant in the CRS program.

More information about the floodplain administration in the City of Colusa can be found in Table A-54.

Table A-54 City of Colusa 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)?	The City manager or his or her designee shall serve as City's floodplain administrator and shall administer, implement, and enforce this ordinance by granting or denying development permits in accord with its provisions. The City manager does server other roles.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	No
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)	This is discussed in the cell titled "Provide an explanation of the permitting process" below.
What are the barriers to running an effective NFIP program in the community, if any?	Recent additions of multiple properties to the NFIP floodplain may cause staffing issues.
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	75 policies $42,482 in annual premiums $26,650,000 of insurance in force
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?	13 paid losses $101,045.82 in paid claims. $0 substantial damage claims
How many structures (residential and non-residential) are exposed to flood risk within the community?	355 in 1% annual chance flood zone 15 in 0.2% annual chance flood zone
Are there Repetitive Loss (RL) and Severe Repetitive Loss Properties (SRL) structures in the community?	2 RL (FEMA PIVOT database shows these have been mitigated) 0 SRL

NFIP Topic	Comments
Describe any areas of flood risk with limited NFIP policy coverage	County was recently remapped by FEMA resulting in a base BFE approx. 2.5ft higher than the previous Flood Plain Mapping, resulting in expanded SFHA's being created throughout the city and county.
How does the community teach property owners or other stakeholders about the importance flood insurance?	Completes education and outreach by sending letters
What digital sources (like the FEMA Map Service Center, National Flood Hazard Layer) or non-regulatory tools does the community use?	DFIRMs are used.
Compliance History	
Is the community in good standing with the NFIP?	Yes
Are there any outstanding compliance issues (i.e., current violations)?	No

NFIP Topic	Comments
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?	For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the floodplain administrator, in coordination with the building official, shall: Estimate the market value, or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made. Compare the cost to perform the improvement, the cost to repair the damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, when applicable, to the market value of the building or structure. Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage. Notify the applicant when it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the building code is required and notify the applicant when it is determined that work does not constitute substantial improvement or repair of substantial damage. Map determinations. Make interpretations where needed, as to the location of the boundaries of the areas of special flood hazard. Where there appears to be a conflict between a mapped boundary and actual field condition, grade and base flood elevations shall be used to determine the boundaries of the special flood hazard area. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in section 39.06. Require applicants who submit hydrologic and hydraulic engineering analyses to support permit applications to submit to FEMA the data and information necessary to maintain the flood insurance rate maps when the analyses indicate changes in base flood elevations, flood hazard area boundaries, or floodway designations; such submissions shall be made within six months of such data becoming available. The analyses shall be prepared by a qualified registered professional engineer in a format required by FEMA.
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	CAV – 5/1/2015
Is a CAV or CAC scheduled or needed?	N

NFIP Topic	Comments
Regulation	
When did the community enter the NFIP?	6/30/1976
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?	Meets, we just adopted a new Flood Plain Ordinance in Feb 2024
Has the community adopted the latest effective FIRM? Date adopted?	Yes.
How does the community enforce local floodplain regulations and monitor compliance?	This is discussed in the cell titled "Provide an explanation of the permitting process" below.
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	The City's regulations meet the minimum requirements of the NFIP and the CRS.
How are Letters of Map Change (LOMCs) tracked and compiled?	New DFIRMs are downloaded regularly which include the latest LOMCs, LOMRs, and CLOMRs.
Provide an explanation of the permitting process.	When building permits are being pulled, if it is eligible, the property is flagged as being in the flood plain.
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 Colusa

A.6.3. Mitigation Actions

The Planning Team for the City of Colusa 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:

- Dam Failure
- Drought & Water shortage
- Earthquake
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Levee Failure
- Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)

Low priority hazards for mitigation planning include:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change

- Landslide, Mudslide, and Debris Flow
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: High Winds and Tornados
- Stream Bank Erosion
- Subsidence
- Wildfire

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 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 plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Mitigation Actions

Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Hazards Addressed: Multi-hazard (Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Levee Failure, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning))

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: 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: City of Colusa Planning Department

Priority (H, M, L): High

Potential Funding: Local budgets

Benefits (avoided Losses): Incorporation of an adopted LHMP into the Safety Element of the General Plan will help jurisdictions maximize the cost recovery potential following a disaster.

Schedule: As soon as possible

Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness

Hazards Addressed: Multi-hazard (Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Levee Failure, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning))

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: 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 County 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 County outreach programs will be reviewed for effectiveness and leveraged and expanded upon to reach the broader region.

Responsible Office: City of Colusa in partnership with the County

Participating Jurisdictions: County and all cities.

Priority (H, M, L): High

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 (like CA DWR, Cal OESPDM, HMGP, FMA, BRIC, or other sources).

Timeline: Ongoing/Annual public awareness campaign

Action 3. Evacuation Training for the Community of Colusa

Hazards Addressed: Dam Failure

Goals Addressed: 1, 2, 3, 4, 5

Issue/Background: The pump stations are critical for preventing interior flooding of the District. If the pump stations were to lose power, interior flooding may occur. Generators have been installed, but if they were unable to keep up, or access to them was prohibited, a greater evacuation plan should be in place for the community.

Project Description: Colusa is situated on the southern bank of a bend in the Sacramento River, which drains the northern half of the Central Valley. No other major bodies of water are located within the Planning Area. The river levee that protects the City from catastrophic flooding falls under the jurisdiction of Reclamation District No. 108 and is maintained by the Sacramento West Levee District. The main channel for the Colusa Drain is an excavated earthen channel. The channel has levees on both sides for the most part, and levee height varies to a maximum of approximately six feet. Additional levees along tributary drains connect to the Colusa Drain. The information presented above shall be used for emergency planning and is based on worst case scenarios. The time factors indicated appear to allow for safe evacuation out of the Colusa area both to the south and west. Also, it should be noted that the probability of dam failure at any given time is low. The Division of Safety of Dams, a division of the California Department of Water Resources, inspects dams under state jurisdiction on a periodic basis for structural integrity. Responsibility for the safety of dams under federal jurisdiction belongs to the agency constructing the dam. Federal agency programs to maintain dam safety are based on the Federal Guidelines for Dam Safety prepared by FEMA

Other Alternatives: The City will continue to train City public safety employees in the Safety Assessment Program offered by the Governor's Office of Emergency Services.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Safety Element of General Plan

Responsible Office/Partners: City of Colusa Planning Department, City of Colusa Fire Department

Benefits (Losses Avoided): In the event of generator failure, an evacuation plan is in place

Potential Funding: Local budgets/Grants (like CA DWR, Cal OESPDM, HMGP, FMA, BRIC, or other sources).

Timeline: Ongoing

Project Priority (H, M, L): High

Action 4. Fire and sanitation water is needed in case of emergency in the City of Colusa during a drought.

Hazards Addressed: Drought & Water Shortage & Fire Risk

Goals Addressed: 1, 3, 4

Issue/Background: Fires can be significant hazards in developed areas. Even well-constructed buildings may suffer damage from fires started accidentally or intentionally. In addition, structures located adjacent to fields and wildlands may be vulnerable to fires started on such lands. In addition to property damage, fires pose a threat to human life. The City of Colusa, surrounded by agricultural fields, is in an area of low potential for wildfires. Cultivated and irrigated fields have a low incidence of fire, unless these fields are burned as part of agricultural operations. Such burning would pose a threat only to City structures adjacent to these fields. However, in recent years the State of California has sought to discourage burning of agricultural fields, particularly rice fields that are widespread in Colusa County. The City of Colusa Fire Chief has expressed concern that this could lead to a greater potential for vegetation fires, as fields are not maintained. This could become more of a concern as the City annexes agricultural fields that may not be developed immediately. Fires originating in these fields could threaten adjacent existing buildings. The riparian area adjacent to the Sacramento River is a potential source of wildland fires, started by either natural or human causes. This hazard would be greatest during the summer and early autumn. Lack of rain lowers river levels, and low humidity and high temperatures cause some vegetation to lose moisture. Given its proximity to the Sacramento River, the riparian area is unlikely to go completely dry, except during times of severe drought. Most of the riparian area is separated from the City by the levee in the downtown area. However, it is possible that fires in the riparian area would jump over the levee and threaten adjacent buildings. In summary, the potential fire hazard to Colusa from adjacent open space and agricultural areas is not considered significant. Fires started in buildings and other structures in the City are considered a more significant threat.

Project Description: Water storage tanks sizable to fit the needs of the Fire Department for fires and sanitation. Currently there are tanks on the Cortina Rancheria, and new larger storage is still needed. CIP has a 2 wells that we currently have an emergency inter-tie agreement that we would use.

Other Alternatives: The Cortina Rancheria seeks to enlarge this tank and desires to build a 50,000 water tank up the hill from the existing tank.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Safety Element Plan, Fire Prevention Programs and Fire Plans.

Responsible Office/Partners: City of Colusa Fire Department and County

Benefits (Losses Avoided): Provide for fire protection and increase water supply for residents in case of emergency.

Potential Funding: Local budgets/Grants(like CA DWR, Cal OESPDM, HMGP, FMA, BRIC, or other sources)/WUI Funds

Timeline: When funding is available

Project Priority (H, M, L): High

Action 5. URM Mapping and Identification

Hazards Addressed: Earthquake

Goals Addressed: 1, 3, 4

Issue/Background: The City will consider a plan to identify older masonry structures that could be significantly impacted due to an earthquake including an inventory of un-reinforced masonry buildings and an assessment of their damage potential, a program to retrofit un-reinforced masonry buildings or to take other actions to reduce the potential risk, and funding sources for the adopted program

Project Description: This project would map URM buildings in the City.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Safety Element of General Plan

Responsible Office/Partners: City of Colusa Planning Department

Benefits (Losses Avoided): Reduced risk to people and property from building collapse during earthquake.

Potential Funding: Local budgets/Grants (like CA DWR, Cal OESPDM, HMGP, FMA, BRIC, or other sources).

Timeline: On Going

Project Priority (H, M, L): High

Action 6. Project improvements to Decrease Flooding

Hazards Addressed: Flood: 1%/0.2% annual chance; Levee Failure; Flood: Localized/Stormwater

Goals Addressed: 1, 3, 4, 5

Issue/Background: The City of Colusa is vulnerable to flooding from both the east and the west; to the east the existing levees experience seepage during high water events. To the west, the Colusa Basin Drain is partially leveed using levees with insufficient freeboard and inadequate levee geometry profiles.

Project Description: The City shall continue to regulate all uses and development in areas subject to potential flooding through land use planning, zoning and other appropriate actions.

The City will review and revise its Zoning and Subdivision Ordinances as needed to incorporate specific data and design requirements related to flooding hazards that are contained in this General Plan update and other future flood hazard studies.

The City will pursue mechanisms to finance flood prevention and storm maintenance programs, including local, state, and federal sources. If necessary, the City will consider alternative funding sources, including development impact fees and the establishment of a drainage utility and assessment district

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Public Works Department will take the lead with support from OES, other county departments, California Department of Water Resources (CA DWR), Sacramento River West Side Levee District (SRWSLD), and the City of Colusa

Responsible Office/Partners: City Public Works, City Planning

Benefits (Losses Avoided): Life safety from flooding and improved drainage

Potential Funding: Local budgets/Grants (like CA DWR, Cal OESPDM, HMGP, FMA, BRIC, or other sources).

Timeline: Ongoing

Project Priority (H, M, L): High

Action 7. Levee Mitigation

Hazards Addressed: Levee Failure

Goals Addressed: 1, 3, 4, 5

Issue/Background: The City of Colusa is vulnerable to flooding from both the east and the west; to the east the existing levees experience seepage during high water events. To the west, the Colusa Basin Drain is partially leveed using levees with insufficient freeboard and inadequate levee geometry profiles.

Project Description: Mitigate against seepage on the Sacramento River Right Bank Levees near the City of Colusa through the installation of seepage prevention measures (e.g. Bentonite Slurry Cut-off Wall) along a reach approximately 22,000 feet in length. Construct new levees to the north and south totaling 12,000 feet in length. Rehabilitate existing levees to the west totaling 19,000 feet in length and construct a new levee to the west totaling 18,000 feet in length.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Public Works Department will take the lead with support from OES, other county departments, California Department of Water Resources (CA DWR), Sacramento River West Side Levee District (SRWSLD), and the City of Colusa

Responsible Office/Partners: County Department of Public Works, County OES, CA DWR, SRWSLD, City of Colusa

Benefits (Losses Avoided): Life safety from levee failure; levee damage; improved drainage

Potential Funding: Federal grant funds: FEMA HMGP, CIP funding, Mitigation Grant Funding

Timeline: 2028

Project Priority (H, M, L): High

Action 8. Colusa Basin Drain

Hazards Addressed: Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 3, 4, 5

Issue/Background: The Colusa Basin Drain levees are prone to instability issues due to the clay levee construction during severe weather.

Project Description: Stability repairs would be designed and constructed. Typical fixes include stability berms, slope flattening or levee realignment.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office/Partners: City of Colusa Planning Department, City of Colusa Fire Department

Benefits (Losses Avoided): Reduced risk of levee failure. Life safety and property protection.

Potential Funding: DWR grant, PDM, HMGP

Timeline: As soon as possible/ Work in progress

Project Priority (H, M, L): High

Annex B City of Williams

B.1 Introduction

This Annex details the hazard mitigation planning elements specific to the City of Williams, a previously participating jurisdiction to the 2018 Colusa 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 Williams, 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 Williams followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Colusa 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 Williams – Planning Team

Name	Position/Title	How Participated
Katheryn Ramsaur	City Planner	Completed and returned all requested forms. Took the lead on Annex development. Attended Meetings. Reviewed and provided comments on Plan Drafts.

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.

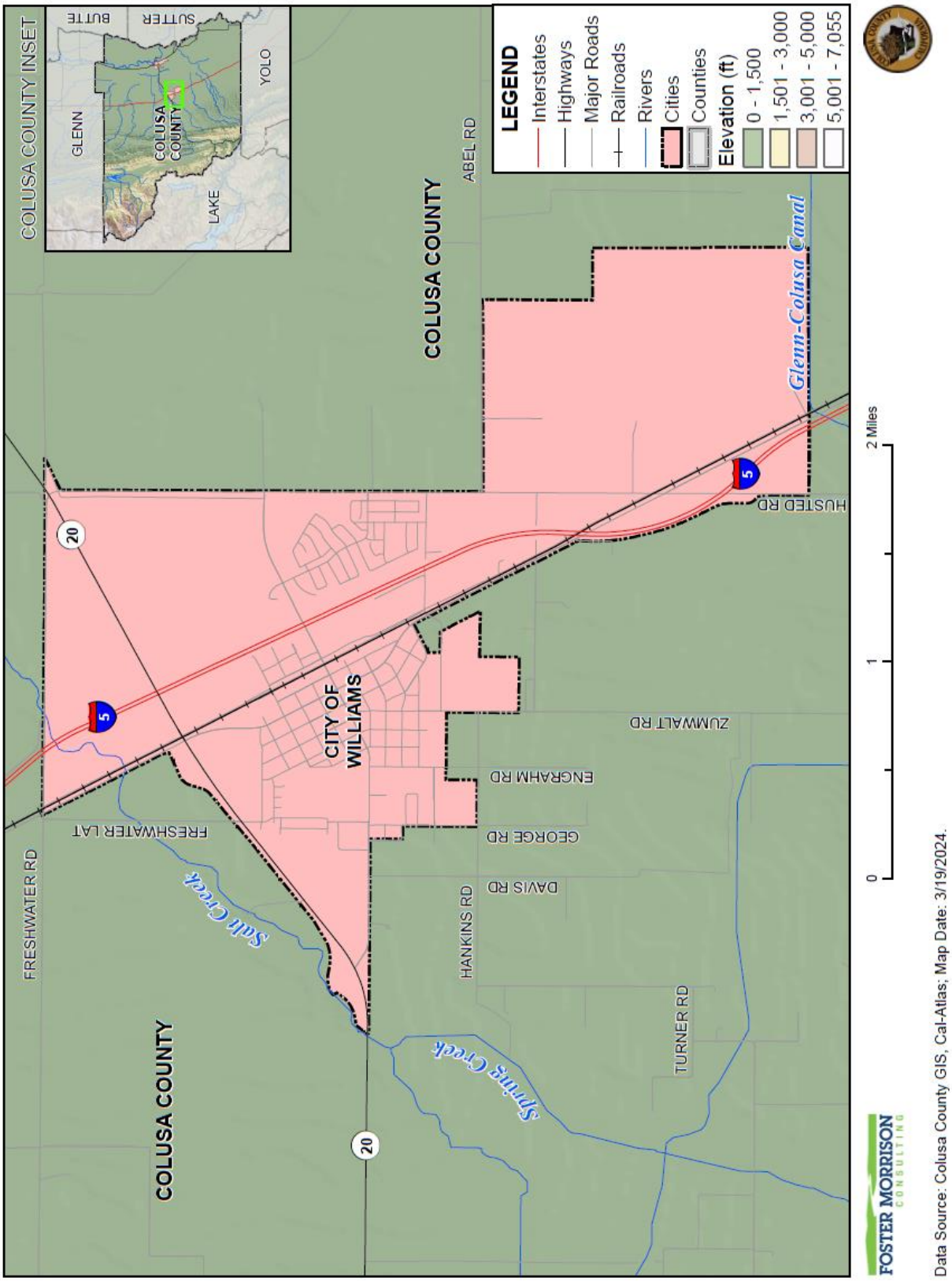
Table B-2 2018 LHMP Incorporation

Planning Mechanism 2018 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
General Plan: Public Safety Element	Incorporated by reference into the Safety Element of the General Plan in 2023. The LHMP was used as a basis for mitigation priorities. The key issues addressed were Flooding, Fire, Police, Hazardous Waste, and Climate Change

B.3 Community Profile

The community profile for the City of Williams is detailed in the following sections. Figure B-1 displays a City map and the location of the City within Colusa County.

Figure B-1 City of Williams



B.3.1. Geography and Climate

The 2010 City of Williams General Plan noted that the City is Williams is a community located at the crossroads of Interstate 5 and State Route 20, 60 miles north of Sacramento and mid-way between the Sierras and the Pacific Coast. The City of Williams is the gateway to the Northern California hunting and fishing mecca. The nearby foothill regions and the proximity to the Sacramento River, are within easy driving distance. Located in the Sacramento Valley, Williams is an agriculturally oriented community. Summers are typically hot and dry with little or no rainfall between May and September. More than 80% of the annual precipitation occurs between November and March. Winter temperatures are generally mild with frost and freezing temperatures infrequent.

The ground in and around the City of Williams is composed of a mixture of upland and valley soils. The upper watershed of the west end of the City is composed of soils found predominately throughout the Coast Range, while the agricultural lowlands contain terrace soils and valley deposits consistent with its history of outwash and floodplain activity. The topography is generally hills, valleys, and agricultural plains. The City sits at an elevation of 82' above mean sea level.

B.3.2. History

According to the City of Williams 2010 General Plan, Williams was founded in 1874 and was first known as Central. In 1876, it was later renamed Williams to honor William Williams, who gave much of the land for the townsite. The gold rush triggered not only the rapid expansion of agriculture, but also the development of manufacturing and commerce. The major development of the immediate post-gold rush era was the conception of a transcontinental railroad. The first passenger service was offered by the Sacramento Valley Railroad, a short line between Sacramento and Folsom. In 1863, the Central Pacific was under construction as part of an ambitious plan to link the West Coast with the East.

Construction of the Northern Railway would link agricultural communities on the west side of Sacramento Valley. Knowing of the railroads' plans, Williams advertised town lots of 125 by 150 feet with 32 lots per block. In 1876, Williams circulated maps showing the advantages of living here. The first train arrived in Williams on June 23, 1877.

In 1912, C.K. Sweet established the Williams water works. By 1918, Williams was the second largest city in Colusa County, with a population of 1,000. The town boasted of electricity, its new water works, and more paved streets than any town its size in the State. George C. Comstock, Inc. located one of its largest department stores here. Williams was made a General Law City on May 20, 1920.

Despite the depression of the 1930's, the older residential blocks in Williams continued to gradually fill. In 1938, construction of the new city hall was completed. During this time, talks at the Williams Farm Center meetings revolved around the shortage of farm machinery. Other concerns of the time included water purification in the event the town's water supply was cut off.

In 1955, construction began on the new Williams high school. Californian experienced unparalleled prosperity during that decade. Highway 99W in Williams was lined with motels, gas stations, repair

facilities, and drive-ins. By the early 1960's, it was lined with store fronts advertising A&W Root Beer, 7UP, Mobil, Shell, Standard Oil, Bank of America, cafes, motels, and bowling.

Later growth in Williams has not proven entirely beneficial for the City's historical resources, especially for the buildings that are 50 years or older. The route through town of old Highway 99W is largely stripped of its once familiar landmarks. Construction of Interstate 5 probably had much to do with the demise of many businesses associated with the car culture along Highway 99W.

B.3.3. Economy and Tax Base

Williams' economy ties into a regional network of producers, consumers, and the organizations and agencies that represent them. More than 60 percent of Williams' economy is tied up in agriculture; educational, health, and social services; and entertainment, accommodation, and food services. (2010 General Plan)

US Census estimates (from 2022) show economic characteristics for the City of Williams. These are shown in Table B-3 and Table B-4. Mean household income in the City was $94,753. Median household income in the City was $84,457.

Table B-3 City of Williams – Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	476	19.3%
Construction	85	3.4%
Manufacturing	235	9.5%
Wholesale trade	108	4.4%
Retail trade	194	7.9%
Transportation and warehousing, and utilities	376	15.3%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	0	0.0%
Professional, scientific, and management, and administrative and waste management services	47	1.9%
Educational services, and health care and social assistance	358	14.5%
Arts, entertainment, and recreation, and accommodation and food services	324	13.1%
Other services, except public administration	97	3.9%
Public administration	164	6.7%

Source: US Census Bureau American Community Survey 2022 Estimates

Table B-4 City of Williams – Income Brackets and Percentages

Income Bracket	Percent
<$10,000	1.1%
$10,000 – $14,999	2.5%

Income Bracket	Percent
$15,000 - $24,9999	9.3%
$25,000 – $34,999	7.8%
$35,000 – $49,999	10.7%
$50,000 – $74,999	12.3%
$75,000 – $99,999	21.9%
$100,000 – $149,999	12.9%
$150,000 – $199,999	11.9%
$200,000 or more	9.5%

Source: US Census Bureau American Community Survey 2022 Estimates

The City's largest employers include:

- Granzella's
- Morning Star
- Vann Brothers
- Du Pue Warehouse
- Bar Ale
- Valley West Care Center
- Williams Unified School District
- City of Williams

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 Williams 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 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. 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 Williams'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 Williams'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 socially 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 has 5,528 residents, as of January 1, 2024. Population growth was sizable until 2010 when it levelled off. Williams has seen growth rates as shown in Table B-5.

Table B-5 City of Williams– Population Changes Since 1950

Year	Population	% Change
1950	1,134	–
1960	1,370	39.3%
1970	1,571	20.8%
1980	1,655	14.7%
1990	2,297	5.3%
2000	3,670	59.8%

Year	Population	% Change
2010	5,123	39.6%
2020	5,538	8.1%
2023	5,528	-0.1%

Source: US Census Bureau, California Department of Finance (2024)

Special Populations and Disadvantaged Communities

The City is a very 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

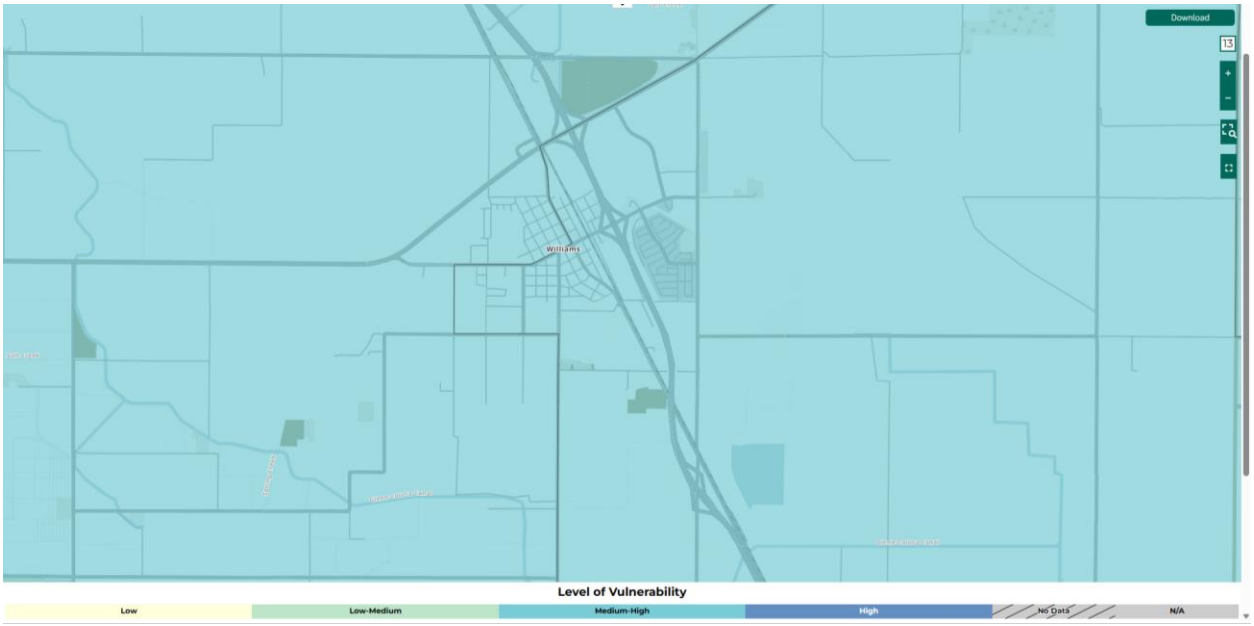
Every community must prepare for and respond to a hazard event, including the range of natural hazards addressed in this Plan, from severe weather extremes to large potentially catastrophic events such as wildfires or earthquakes. A number of factors, including poverty, lack of access to transportation, 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.

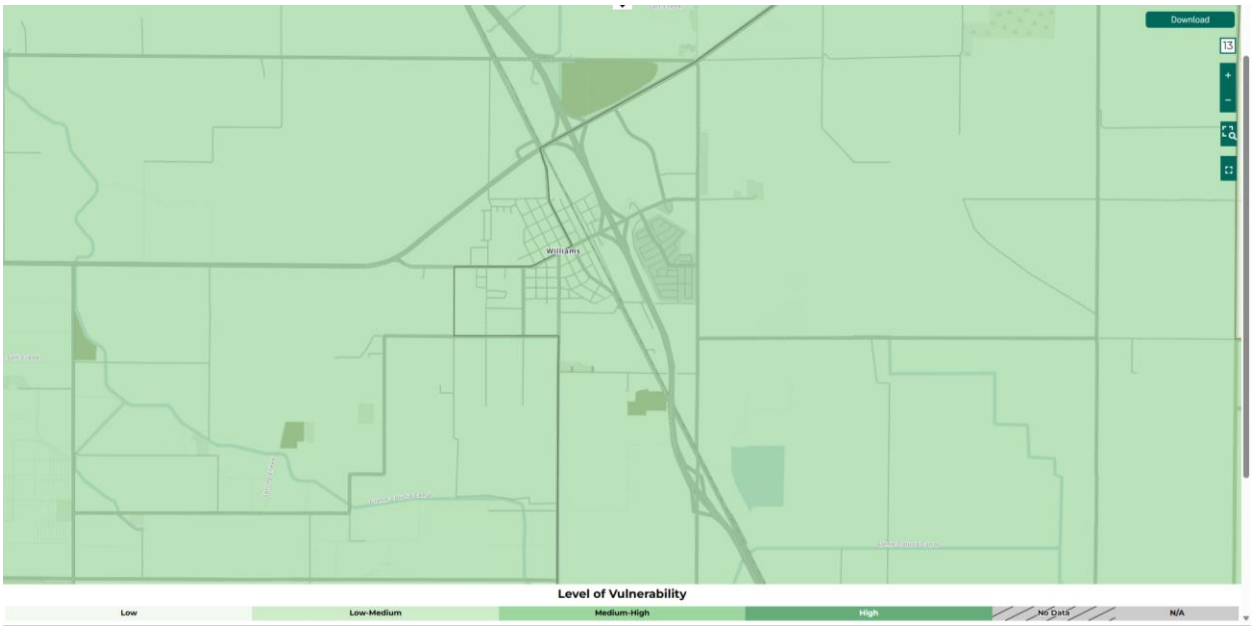
The overall SVI map is shown in Figure B-2; the socioeconomic SVI for the census tracts in and around the City are shown in Figure B-3; the household composition SVI is shown in Figure B-4; the minority and language SVI is shown in Figure B-5; and the housing and transportation SVI is shown in Figure B-6. Overall, the maps indicate that, in general, the City's social vulnerability is classified as medium high and sees little change in social vulnerability regardless of location.

Figure B-2 City of Williams – Overall Social Vulnerability



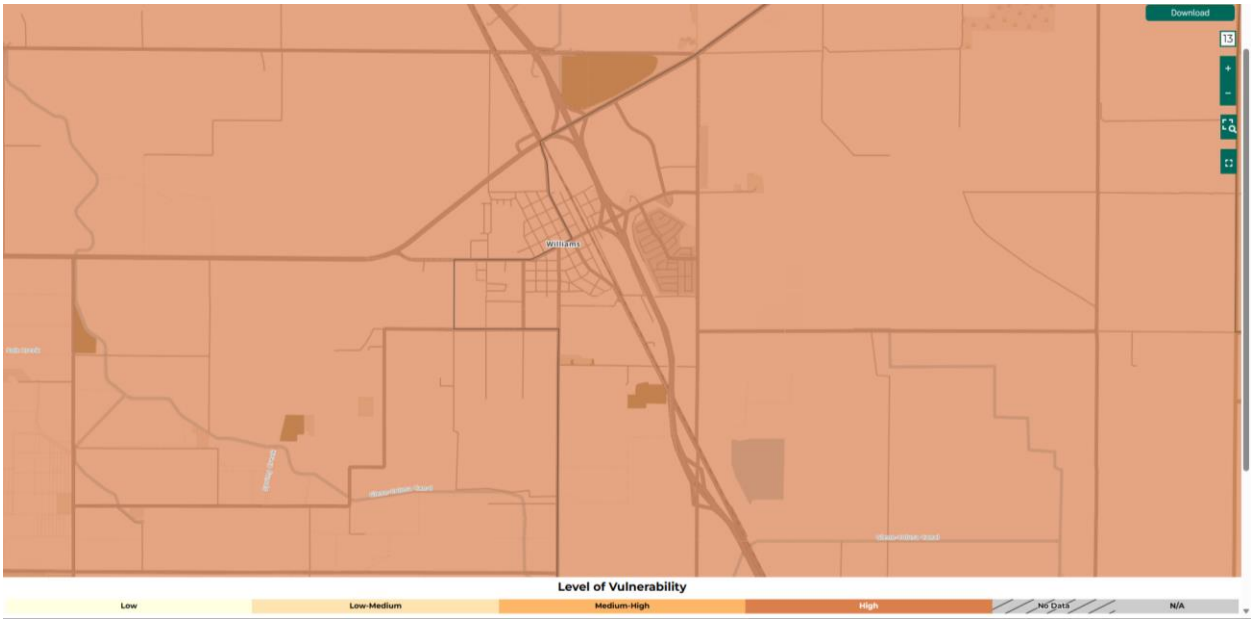
Source: CDC Social Vulnerability Index – map retrieved 3/14/2024
Level of Vulnerability Rating: **Yellow** – Low; **Green** – Low/Medium; **Aqua** – Medium/High; **Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure B-3 City of Williams – Socioeconomic Status Vulnerability



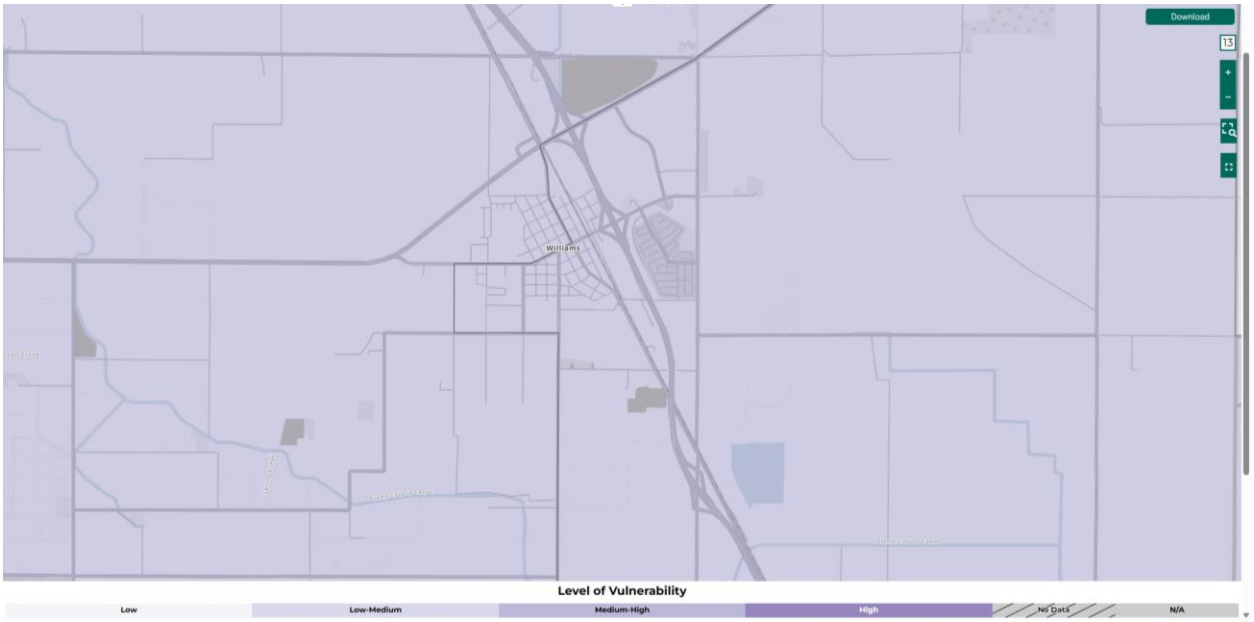
Source: CDC Social Vulnerability Index – map retrieved 3/14/2024
Level of Vulnerability Rating: **Faint Green** – Low; **Light Green** – Low/Medium; **Green** – Medium/High; **Dark Green** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure B-4 City of Williams – Household Characteristics



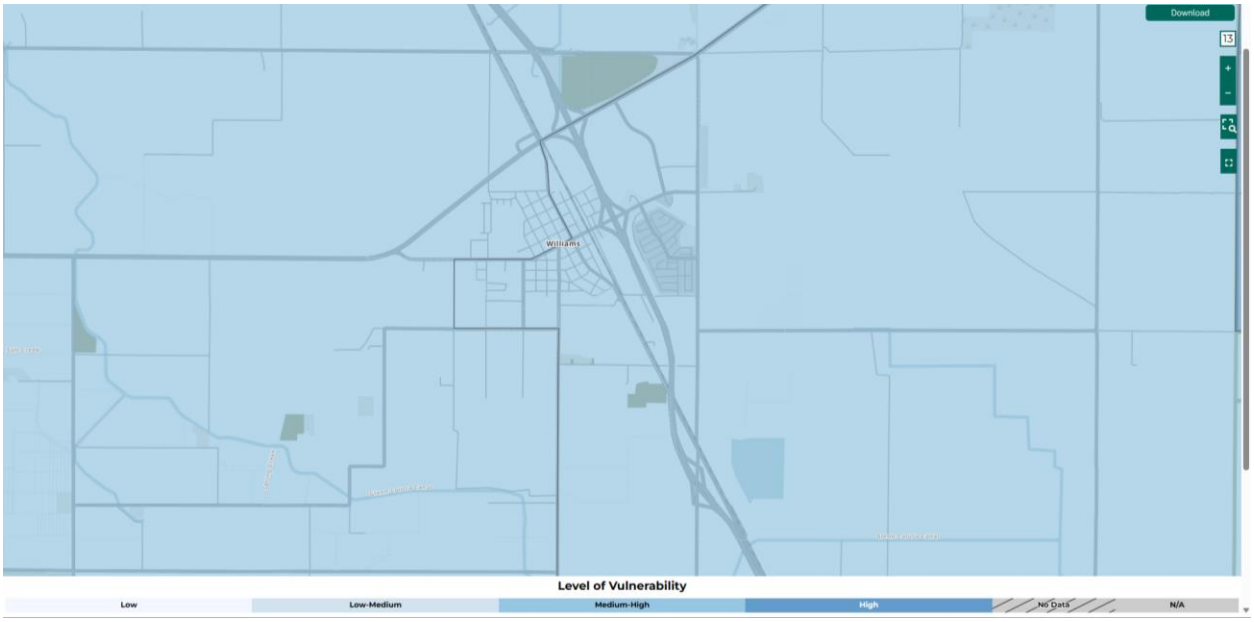
Source: CDC Social Vulnerability Index – map retrieved 3/14/2024
Level of Vulnerability Rating: **Faint Orange** – Low; **Light Orange**– Low/Medium; **Orange** – Medium/High; **Dark Orange** – High; **Grey Hatched** – No Data; **Grey** – Not Available

Figure B-5 City of Williams – Racial and Ethnic Minority Status



Source: CDC Social Vulnerability Index – map retrieved 3/14/2024
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 Williams – Housing Type and Transportation

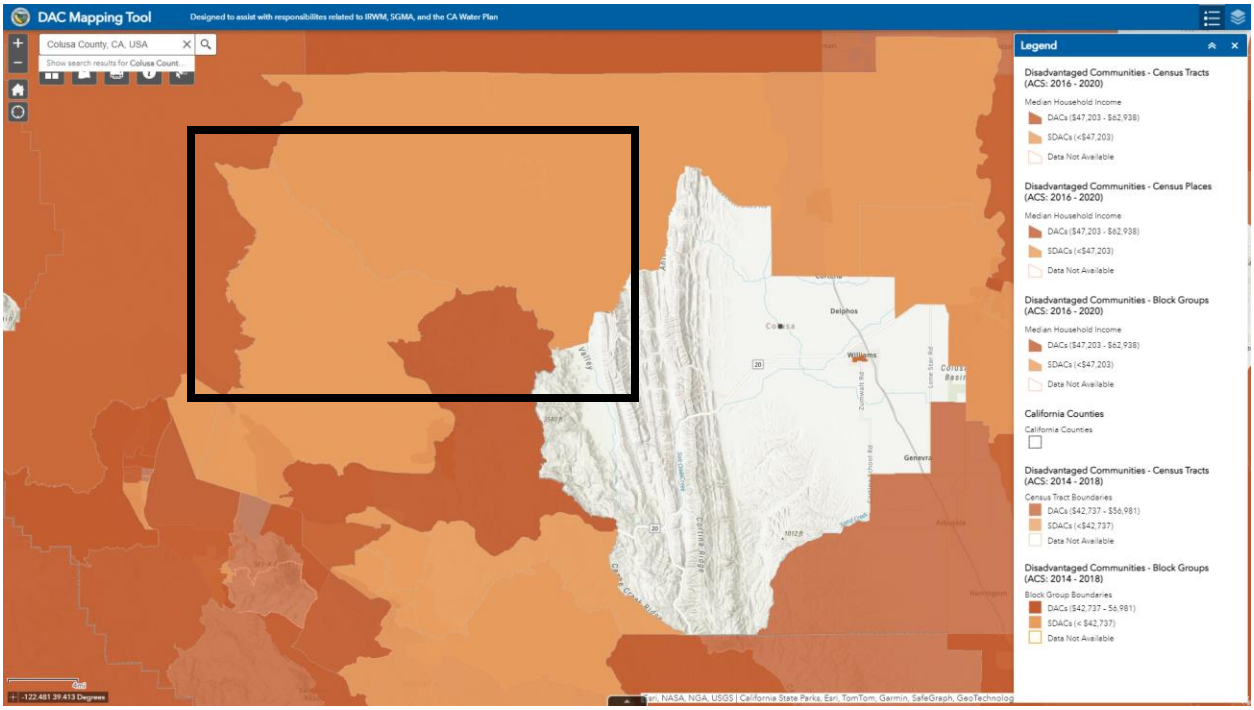


Source: CDC Social Vulnerability Index – map retrieved 3/14/2024
Level of Vulnerability Rating: **Faint Blue** – Low; **Light Blue** – Low/Medium; **Blue** – Medium/High; **Dark Blue** – High; **Grey Hatched** – No Data; **Grey** – Not Available

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 of Willims considered disadvantaged are shown (by the black box) in Figure B-7.

Figure B-7 Colusa County Planning Area – Disadvantaged Areas

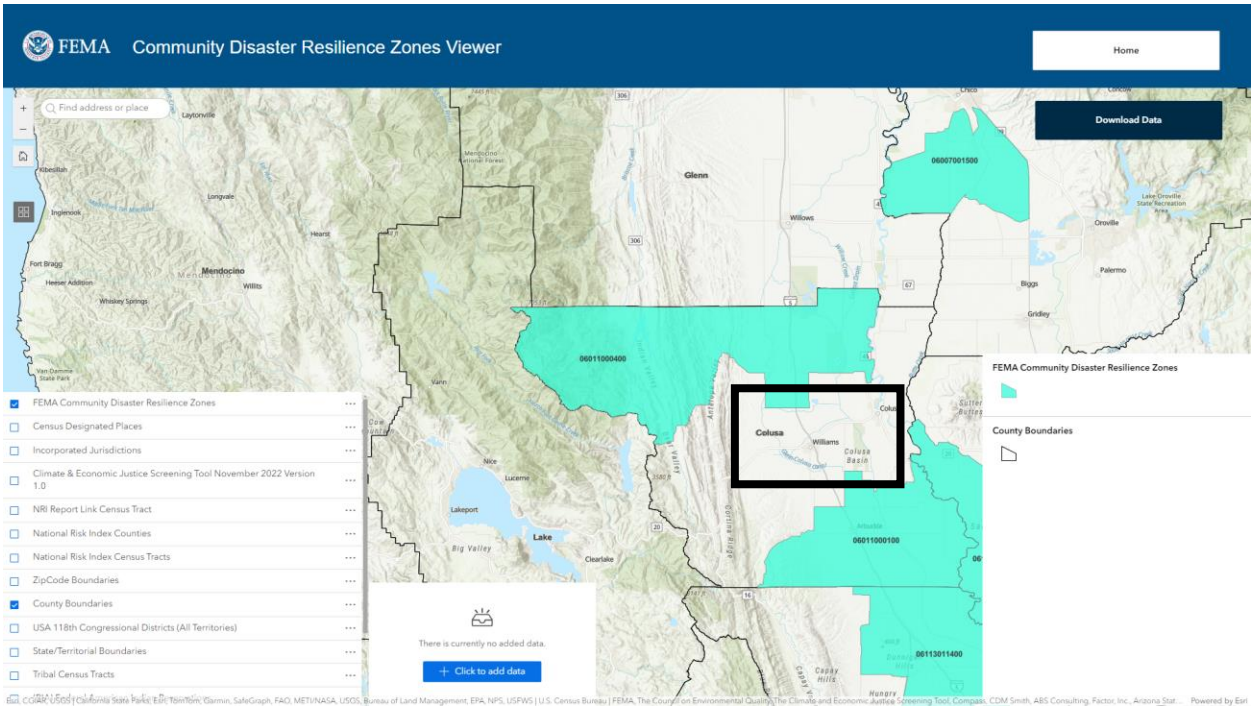


Source: Cal DWR DAC Mapping Tool – retrieved 3/14/2023

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, the City of Williams is outside these zones, but adjacent to it.

Figure B-8 Colusa County Planning Area – FEMA Community Disaster Resilience Zones



Source: FEMA. Map retrieved 3/15/2024.

City Planning Team Input

The City noted that the Critical Facilities and Infrastructure section below includes the facilities used by At-Risk populations. 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.

The City noted two separate discussions on local populations: the City of Williams General Plan 2020-2028 Housing Element and the 2023 Environmental Justice Element. Information from those documents follows.

2020-2028 City of Williams Housing Element

Household groups with special needs include seniors, developmentally and physically disabled persons, large-family households, female-headed households, agricultural workers, and homeless persons. 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. Special housing needs are projected through 2028.

Lower Income Households

A Housing Income Survey was conducted by RCAC in 2015. The survey concluded that the City's Median Household Income was $33,419. This is significantly lower than estimated in the 2010 Census. Williams is therefore considered a severely disadvantaged community with over 50% of its households less than 60% of the State's median household income.

Extremely Low-Income Households

Extremely low-income households consist of those with incomes of between 0 and 30 percent of the County's median income. Based on 2019 Income Limits from HCD, the maximum income for an extremely low-income family of four would be $25,750. Extremely low-income households and very low-income households (particularly renters) experience the highest incidences of overpayment for housing and are most at risk of becoming homeless or temporarily homeless. These households can also consist of families of farmworkers/farm laborers. Based on 2012-2016 CHAS (Comprehensive Housing Affordability Strategy) data, about 80 households in the City are considered to be extremely low-income.

Homeless

Homeless individuals, generally in the extremely low-income category, include, but are not limited to victims of domestic violence, persons with mental illness, persons suffering from addiction, families with single heads-of-household and unaccompanied minors. Homeless also include individuals who have purchased parcels of land but are unable to afford site improvements or a home (and are often found living year-round in tents, small trailers or other permanent camp-type arrangements).

The Continuum of Care study, prepared by the U.S. Department of Housing and Urban Development (HUD) in 2019 indicates that the 5-county area, consisting of Colusa, Glenn, Tehama, Trinity and Lake Counties, estimated that there were 192 homeless individuals in this region. This is an increase of about 9% over the 2017 count. The 2019 count estimated that 57 of these individuals (about 30%) were located in Colusa County. However, the counts did not differentiate how many resided in Williams. Based on discussions with the City of Williams Chief of Police, James Saso, on April 2, 2020, there are no known homeless encampments in the City and few if any identifiable homeless in Williams other than the occasional person walking or hitchhiking through town. In accordance with SB 2, the City amended the Zoning Code (§ 17.01.030.4) to unconditionally allow homeless shelter uses on properties zoned Business Park (BP) District. Though there appears to be a presence of few homeless in Williams, some extremely low-income households are most at risk of becoming homeless.

Transitional, Supportive and Low Barrier Navigation Housing

Beginning in 2008 Colusa County established two transitional houses, one of which is located at 713 D Street adjacent to the City of Colusa and one of which is in the unincorporated area of Colusa. Both facilities provide services to homeless and potential homeless people in Colusa County, including those in Williams. Colusa County constructed and operates this transitional housing facility which provides temporary housing for adults and children with five units and 19 beds. The facility is intended to help recently homeless folks' transition back to independence. Individuals residing in transitional housing must participate in services, such as job counseling or behavioral health services. Residence in a transitional housing unit is limited to 18 months.

Seniors

Seniors are considered persons aged 65 or older in this housing element. Seniors have special housing needs primarily resulting from physical disabilities and limitations, fixed or limited income, and health care costs. Additionally, senior households also have other needs to preserve their independence including supportive

services to maintain their health and safety, in-home support services to perform activities of daily living, conservators to assist with personal care and financial affairs, public administration assistance to manage and resolve estate issues and networks of care to provide a wide variety of services and daily assistance.

Approximately 236 persons in Williams (16.3%) were 65 years and older in 2016. There was an overall increase of 62 people in this age group between 2011 and 2016. This resulted in an overall 3% increase in seniors as a proportion of the City overall population. The largest change in age group was in the 65 to 74 years category, which increased by 47 seniors. Also, noteworthy was that from the 85 years and over category at 20 seniors.

Large Households

Large households are defined as those households containing 5 or more persons. Income is a major factor that constrains the ability of households to obtain adequate housing. Larger units are more expensive and most units with over 3 bedrooms are typically single-family homes, instead of multi-family rental units. Large family households are considered a special needs group because there is limited supply of adequately sized housing to accommodate their needs. Between 2011 and 2016, the total number and percentage of large households in Williams decreased from 257 to 140. In 2016, there were no large ownership households, but large renter households increased by 42.

Female Headed (Woman) Households

There are about 292 female headed households (single without husbands) which consists of about 23% of all households in Williams. The number of woman households increased by 43 (17.6%) between 2011 and 2016. Over 58% of these woman households were below the poverty rate. 3.14% of the workforce are employed persons with a disability. It should also be pointed out that many of these who are employed are low wage earners.

Disabled Persons

A disability includes, but is not limited to, any physical or mental disability as defined in California Government Code § 12926. A mental disability involves having any mental or psychological disorder or condition, such as a mental retardation, organic brain syndrome, emotional or mental illness, or specific learning disabilities that limits a major life activity. A physical disability involves having any physiological disease, disorder, condition, cosmetic disfigurement, or anatomical loss that affects body systems including neurological, immunological, musculoskeletal, special sense organs, respiratory, speech organs, cardiovascular, reproductive, digestive, genitourinary, hemic and lymphatic, skin and endocrine.

The 2016 ACS reports that of the 414 disabilities in the City, over half of those (282) were ambulatory disabilities.

Persons with a Developmental Disability

Disability categories include persons with developmental disabilities. “Developmental disability” means a disability that originates before an individual attains age 18 years, continues, or can be expected to continue, indefinitely, and constitutes a substantial disability for that individual. The California Department of

Developmental Services (DDS) maintains data regarding people with developmental disabilities, defined as those with severe life-long disabilities attributable to mental and/or physical impairments. DDS data indicates that approximately 24 developmentally disabled persons reside in Williams. Of these persons, only 3 are living independently, while 18 live with a parent or guardian.

Farm Workers

Agriculture continues to be Colusa County's major producing industry. According to the 2013-2017 ACS, approximately 33% of all workers in unincorporated Colusa County were employed in occupations related to agriculture, forestry, fishing/hunting and mining. Census data does not identify how many of these workers are employed only in farm industries and not fishing/hunting, forestry or mining. These figures also do not indicate whether the employment is seasonal or permanent. There is a significant amount of agricultural production in Colusa County. According to the 2018 U.S. Census it was estimated that 715 people were employed in the agricultural sector.

2023 Williams General Plan - Environmental Justice Element

The purpose of the Environmental Justice (EJ) Element is to identify goals and policies that promote environmental justice citywide with a focus on reducing disproportionate impacts on the City's most vulnerable populations such as low-income residents, communities of color, and immigrant communities.

Senate Bill 1000 (SB 1000), the Planning for Healthy Communities Act, was signed into law by Governor Edmond G. Brown, Jr. on September 24, 2016. Per SB 1000, when a City revises two or more General Plan elements concurrently and has areas defined as "Disadvantaged Communities" (DACs), the City must address environmental justice (EJ) in their General Plan. The City can choose to either adopt a new, stand-alone element or integrate EJ policies and goals into existing elements of the General Plan. (Government Code Section 65302[h][2]).

The California Communities Environmental Health Screening Tool ("CalEnviroScreen") version 4.0, developed by the California Environmental Protection Agency (CalEPA), is the recommended method to identify DACs. CalEPA defines a DAC as a "low-income area that is disproportionately affected by environmental pollution and other hazards that can lead to negative health effects, exposure, or environmental degradation." CalEnviroScreen assigns composite scores to census tracts in California based on aggregate data from 21 indicators including potential exposures to pollutants, adverse environmental conditions, socioeconomic factors, and the prevalence of certain health conditions.

Census tracts with a composite CalEnviroScreen score of 75 or higher are considered DACs. The City of Williams is within one census tract (6011000300) which has a CalEnviroScreen 4.0 score of 54. Based on this score, *Williams is not considered a DAC*. However, the City elected to prepare a new, stand-alone EJ Element so that all existing EJ-related goals and policies are conveniently located in one document for easy reference. Additionally, the new EJ Element identifies new goals, policies, and programs relevant to the City of Williams.

Within the City, there are three low-income Senior Housing Apartment Complexes to help support this vulnerable population. A fourth location is currently in the building phase, with an expected completion

date of 2025. Also as noted in the critical facility analysis, other vulnerable populations in the City include those associated with the migrant housing, mobile home parks, and schools.

Structures

This section looks at the parcels (and associated structures) that make up the built environment of the City. The following data from the Colusa County Assessor's Office is based on the 2023 Assessor's data, and the associated parcel layer. 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), and other values is the same as 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 generally the value of the infrastructure or improvements to the land that is of concern or at risk. Generally, the land itself is not a loss. 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-6 shows the Colusa County Parcel/Assessor Data values and content replacement values (e.g., the values at risk) broken down by property use for the City.

Table B-6 City of Williams – Total Parcels (and Structures) by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	64	13	$8,310,938	$2,022,288	$164,824	$2,022,288	$12,520,338
Commercial	203	122	$35,628,350	$68,288,498	$14,801,069	$68,288,498	$187,006,415
Government	86	22	$4,473,081	$31,675,235	$20,935,374	$31,675,235	$88,758,925
Industrial	14	11	$2,408,330	$24,689,619	$71,956,510	$37,034,430	$136,088,889
Institutional	16	11	$284,919	$3,853,811	$1,726,541	$3,853,811	$9,719,082
Miscellaneous	17	1	$389,391	$3,718,064	$0	$3,718,064	$7,825,519
Residential	1,355	1,297	$58,678,977	$215,215,035	$17,317,643	$107,607,514	$398,819,169
City of Williams Total	**1,755**	**1,477**	**$110,173,986**	**$349,462,550**	**$126,901,961**	**$254,199,840**	**$840,738,337**

Source: 2023 Colusa 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 Williams 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 and (2) At-Risk Populations Facilities:

- **Essential Service Facility**: A facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions.
- **At-Risk Populations**: Pre-schools, public and private primary and secondary schools, before and after school care centers, daycare centers, group homes, and assisted living residential or congregate care facilities with multiple residents.

Critical facilities in the City are shown on Figure B-9. A summary of critical facilities in the City is shown in Table B-7 and detailed in Table B-8. Additional details of individual critical facilities can be found in Appendix F of this Plan Update.

Figure B-9 City of Williams – Critical Facilities

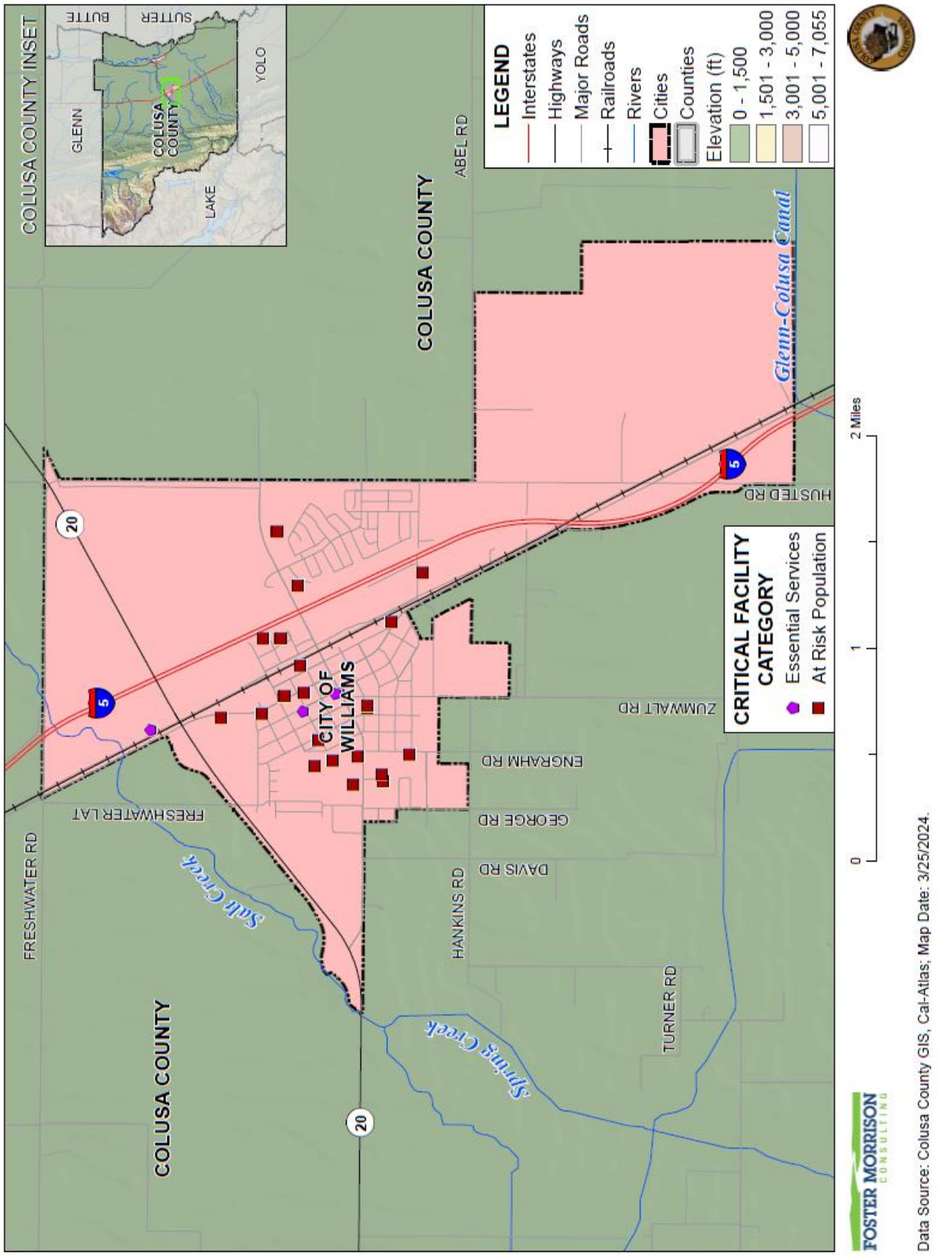


Table B-7 City of Williams – Critical Facilities by Category

Critical Facility Category	Facility Count
Essential Services Facilities	5
At Risk Population Facilities	22
City of Williams Total	**27**

Source: City of Williams GIS

Table B-8 City of Williams – Critical Facilities by Category and Type

Critical Facility Category	Facility Type	Facility Count
Essential Services Facilities	Emergency Response	2
	Fire Station	1
	Public Services	1
	Utility Facility	1
	Essential Services Facilities Total	**5**
At Risk Population Facilities	Apartment Complex	4
	Hotel or Motel	8
	Migrant Housing	1
	Mobile Home Park	2
	School	4
	Senior Living Facility	3
	At Risk Population Facilities Total	**22**
City of Williams Total		**27**

Source: Colusa County GIS

Community Lifelines

Assessing the vulnerability of the City of Williams 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 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.

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 Colusa County Planning Area as a partnership between the cities, local special districts, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the City's community lifelines overlap the County's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the City and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the City of Williams 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 of Williams contains a variety of natural resources. Natural resources are unique to each area and are difficult to replace. Should a natural disaster occur, these species, resources, and locations are at risk.

The City is built on an alluvial floodplain formed from sedimentary igneous and metamorphic rocks deposited by the Sacramento River and various channels. The soil is primarily characterized by finely textured, clay soils with slow water infiltration and transmission rates. Rice production is common in these poor drainage conditions.

The soils have been assigned to Group D hydrologic group, or high runoff potential soils, which have a high clay content, high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material. These attributes partly explain the area's flood frequency and agricultural practices.

Williams is primarily situated in the Freshwater Creek Basin. One of its tributaries, Salt Creek, runs through the City limits and flows into the Sacramento River, which drains in a southerly direction toward the San Francisco Bay. Spring Creek merges into Salt Creek to the southwest of the City, and Freshwater Creek merges into Salt Creek further downstream to the northeast of the City.

Groundwater for Williams' residents is drawn from the Sacramento River groundwater basin. The source has been historically reliable and of generally good quality, although groundwater closer to Salt Creek is sometimes affected by drainage from saline springs in the upper part of the watershed. The water is generally very shallow within the City's sphere of influence (SOI), with depths estimated to be as shallow as five or six feet below ground surface. The actual depth to groundwater varies across the sphere and is subject to seasonal fluctuation.

According to the California Natural Diversity Database (CNDD) and California Native Plant Society (CNPS), the Williams does not have any occurrences of special-status plants (i.e. endangered, threatened, or species of special importance) within the City limits.

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. 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.

Wetlands in the City are shown in Section 4.2.1 and detailed in Table B-9.

The City of Williams does not have any lakes. The U.S. National Wetlands Inventory has incorrectly identified the cooling ponds for Morning Star as lakes which they most definitely are not. Based on this data it also appears that the sewer ponds at the Williams Sewer Plant are incorrectly labeled as freshwater ponds. That water is certainly not fresh and while they are ponds, they should be included in the below inventory. The US Fish and Wildlife inventory for the City has been modified to reflect the City's clarifying input.

Table B-9 City of Williams – Wetland Types and Acreages

Wetlands Area Type	Wetlands Count	Wetlands Area (in Acres)
Freshwater Emergent Wetland	1	1
Freshwater Forested/Shrub Wetland	0	0
Freshwater Pond	7	18
Lake	1	55
Riverine	102	27
Estuarine and Marine Wetland	0	0
City of Williams Total	**111**	**101**

Source: US Fish and Wildlife

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 Williams 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 1 historic building in the Williams in the OHP Database.

Table B-10 City of Williams – Historic Resources

Resource Name (Plaque Number)	National Register	State Landmark	Point of Interest	Date Listed	City/ Community
Original Williams High School, Sacramento Valley Museum (P550)			X	6/6/1980	Williams

Source: California Department of Parks and Recreation Office of Historic Preservation, http://ohp.parks.ca.gov/. Retrieved March 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.

According to the 2010 General Plan, the Information center staff identified 10 listings located in and around Williams on the State Office of Historic Preservation of Properties in the Historic Data File for Colusa County. These are:

- 39 10th Street: Residence constructed in 1925*
- 460 10th Street: Residence constructed in 1925*
- 441 9th Street: Residence constructed in 1900*
- 1491 E Street: Williams High School, constructed in 1911 834 North Street: Residence constructed in 1905*
- 1201 State Route 99W: Building constructed in 1889*
- Bridge #15C000; Wilbur Springs Road, constructed in 1910
- 3375 Wilbur Springs Road, Wilbur Hot Springs Resort, constructed in 1875*
- Bridge #15-1300, State Route 20, constructed in 1930*
- State Route 20/Salt Creek Road, constructed in 1920*

The eight structures marked with an asterisk above, were all determined not eligible for the National Register of Historic Places. However, these structures were not evaluated for the California Register of Historic Places for local listing as a significant historical resource.

In addition to these, the City noted that on the east side of town lies the Sacramento Valley Museum, an old High School, gymnasium, and agricultural barn constructed in 1911. The building and grounds are now owned and maintained by the City of Williams although the museum is run by local volunteers of the Sacramento Valley Museum Organization. In the heart of downtown is the old Odd Fellows lodge that was dedicated on February 19, 1904.

The City of Williams has preserved a diverse collection of landmarks and cultural resources that attract visitors. Although the City does not have any historic landmarks registered through the State of California's Office of Historic Preservation or the National Park Service of the U.S. Department of the Interior, the architecture, amenities, and historical remnants contribute to the community's present and future identity.

Prehistoric and historic Native American habitation sites are most often found along creeks and near other water sources. However, dry camp sites used during seasonal gathering and hunting activities also can be found away from water sources. Even though no Native American archeological sites have been documented within the planning area surrounding Williams, the most likely areas of sensitivity for such sites would be the original watershed areas of Salt Creek and Old Cortina Creek.

A number of buildings and structures dating back to the founding of Williams were destroyed by fire or simply removed. Historical archeology offers a means of filling in the gaps left in written history. While future development has the potential to disturb or destroy historic archeological resources, particularly sensitive areas would include the older residential, commercial, and industrial neighborhoods in use for 50 years or longer or were in use 50 or more years ago.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the City of Williams 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 Williams, this includes the following:

- Granzella's
- Local agricultural industries
- Bar Ale

- Seminis/Bayer
- Morning Star

Community Activities of Value

Inventorying economic assets in the City of Williams 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

The City noted the following community activities of value:

- Pioneer Day (first Saturday in June)
- Festival of Lights (first Saturday in December)

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.

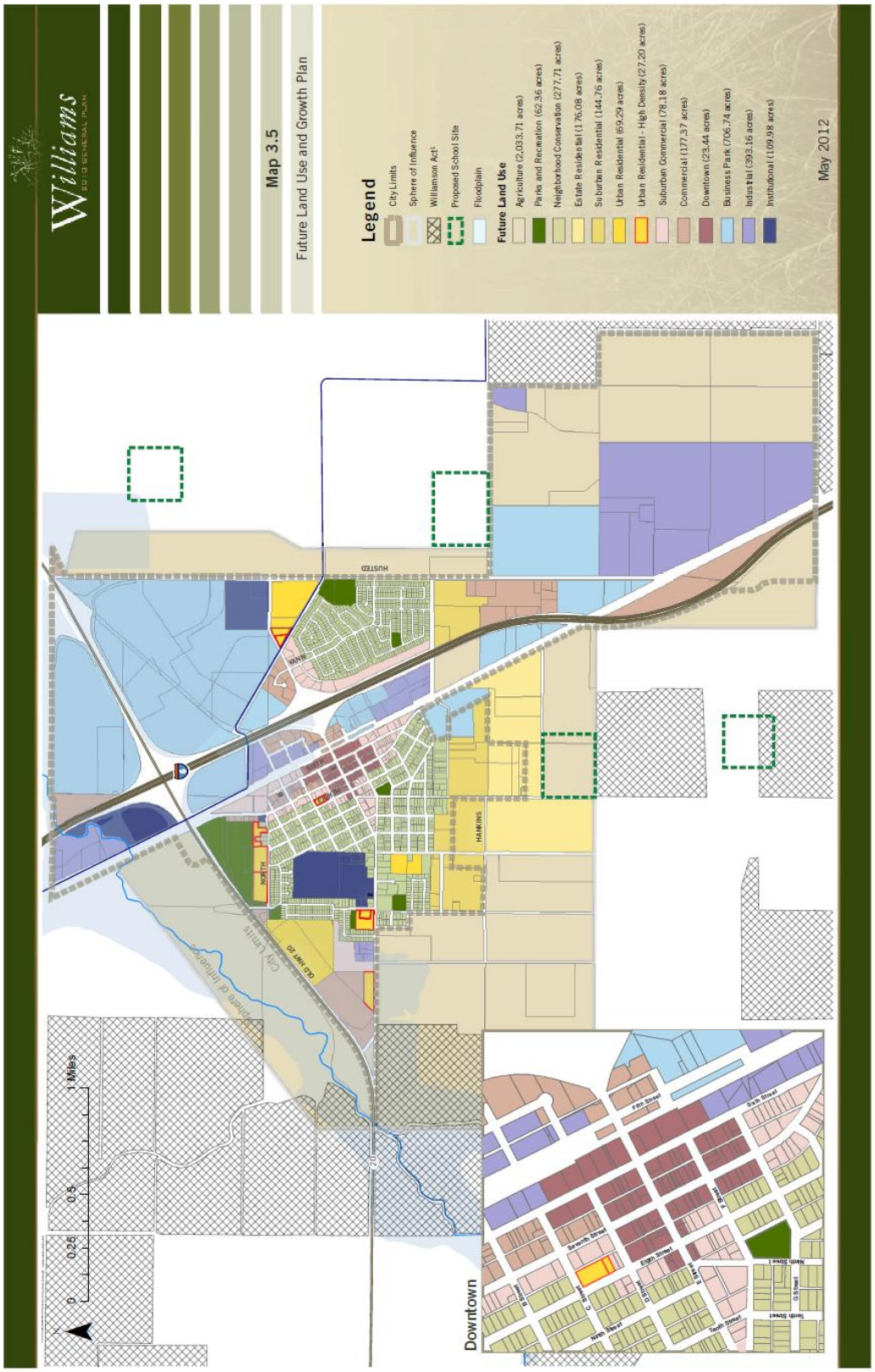
Land Use

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)). William's land use designations are generally described below and mapped on the Land Use Diagram (Figure B-10). The City of Williams 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 Williams. 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 Williams residents.

Future land use for the City of Williams from the 2012 City of Williams General Plan Land Use Element is shown on Figure B-10.

Figure B-10 City of Williams – Land Use Diagram



Source: City of Williams 2012 General Plan Land Use Element

Population Trends and Projections

The City is expected to continue to increase in population. The 2020-2028 City of Williams Housing Element contained population projections for the City from 2020 to 2028. These are shown on Table B-11.

Table B-11 City of Williams – Future Population Projections

Forecast Factor	2020	2025	2045
Population	5,426	5,751	6,077

Source: 2020-2028 City of Williams Housing Element

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 Building 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 Williams – Total Development Since 2018

Property Use	2019	2020	2021	2022	2023
Residential	27	14	4	7	10
Commercial	2	1	0	1	1
Industrial					
Other					
Total	**29**	**15**	**4**	**8**	**11**

Source: City of Williams Building Department

Table B-13 City of Williams – Development in Hazard Areas since 2018

Property Use	1% Annual Chance Flood	Levee Protected Areas	Moderate or Higher Fire Hazard Severity Zones	Other
Residential	0	0	0	0
Commercial	1	0	0	0
Industrial	0	0	0	0
Other	0	0	0	0
Total	**1**	**0**	**0**	**0**

Source: City of Williams Building Department

[1]Moderate or higher wildfire risk area

One commercial property was built in the floodplain but was built to the existing floodplain ordinance standards to reduce flood risk. No development in levee protected areas or in moderate or higher wildfire risk areas occurred. If it were, it would be completed in accordance with all current and applicable development codes and 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 noted that in 2023 the Williams Planning Commission approved the Final Map for a 9-parcel commercial subdivision in the City's Business Park on the Northeast end of town. The location of the 9 commercial parcels is in flood zone.

GIS Analysis

The City provided 8 future development areas which were used as the basis for the inventory of future development for the City. These were mapped in GIS. Where multiple parcels are listed, the parcels are merged to form one polygon, and the hazards assigned are based on the centroid of the polygon. Figure B-11 show the locations of the future development areas in the City, while Table B-14 shows the details of the future development areas by acres and parcels.

Figure B-11 City of Williams – Future Development Areas

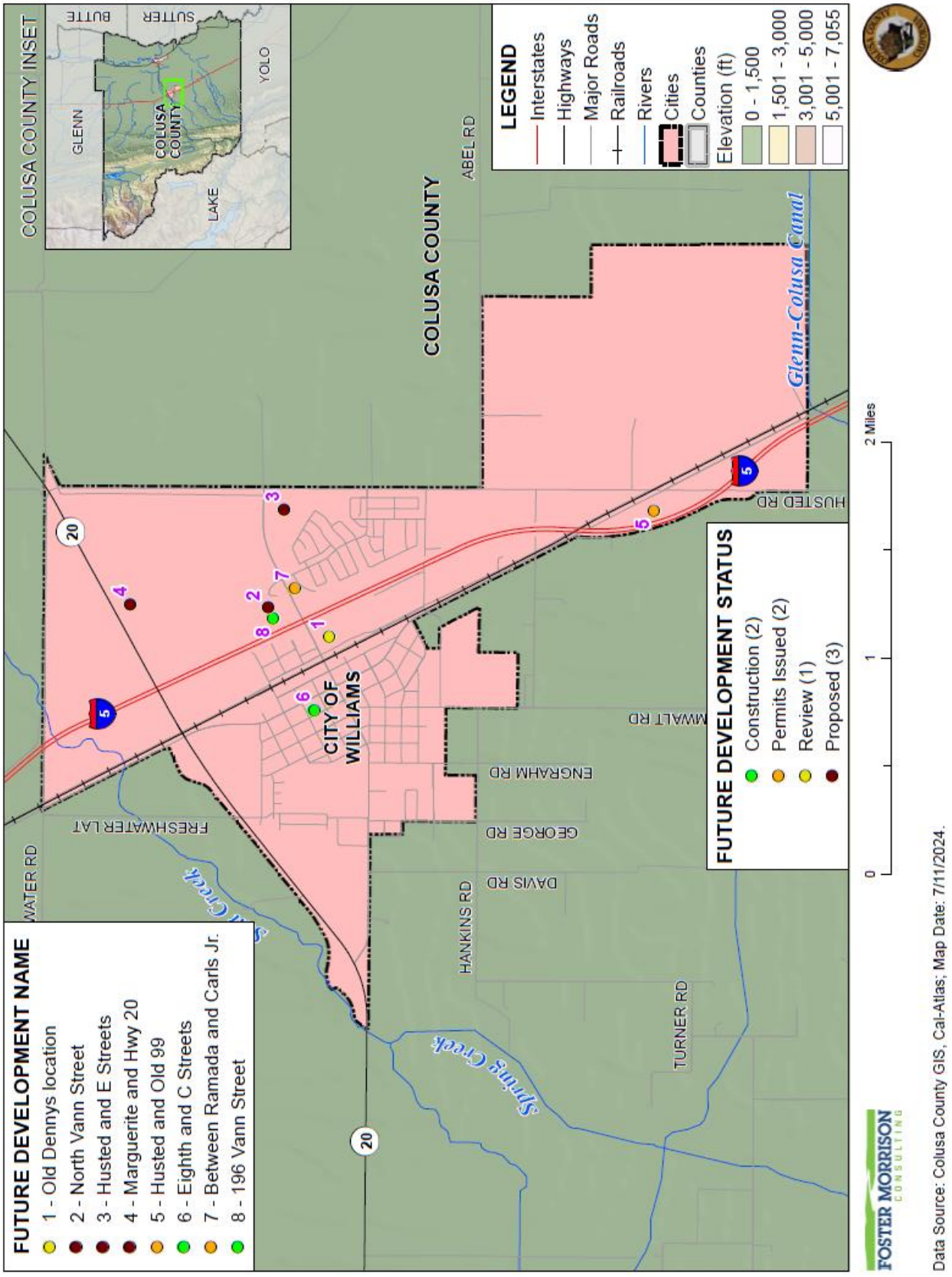


Table B-14 City of Williams – Future Development Areas by Acres, Development Type, and Units

Future Development Site Number	Future Development Name	Acres	Future Development Type	Units	Future Development Status
1	Old Dennys location	4.342	Commercial	1	Review
2	North Vann Street	14.15	Commercial	8	Proposed
3	Husted and E Streets	17.27	Single Family Homes	103	Proposed
4	Marguerite and Hwy 20	2.29	Commercial	1	Proposed
5	Husted and Old 99	9.09	Commercial	1	Permits Issued
6	Eighth and C Streets	1.08	Multi-family	31	Construction
7	Between Ramada and Carls Jr.	0.95	Commercial	1	Permits Issued
8	196 Vann Street	4.065	Commercial	1	Construction

Source: City of Williams

B.4.2. Hazard Identification

The City of Williams 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).

Table B-15 City of Williams—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Limited	Occasional	Limited	Low	Medium
Climate Change	Extensive	Highly Likely	Critical	Medium	–
Dam Failure	Extensive	Unlikely	Catastrophic	Low	Medium
Drought & Water shortage	Extensive	Likely	Catastrophic	Medium	High
Earthquake	Significant	Unlikely	Critical	Medium	Low
Floods: 1%/0.2% annual chance	Extensive	Occasional/ Unlikely	Catastrophic	High	Medium
Floods: Localized Stormwater	Significant	Likely	Critical	Medium	Medium
Landslide, Mudslide, and Debris Flow	Likely	Unlikely	Negligible	Low	Medium
Levee Failure	Likely	Unlikely	Negligible	Low	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Highly Likely	Critical	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	Low	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: High Winds and Tornados	Extensive	Highly Likely	Critical	Low	Low
Stream Bank Erosion	Extensive	Highly Likely	Catastrophic	High	Medium
Subsidence	Significant	Occasional	Critical	Low	Low
Wildfire	Significant	Occasional	Limited	Low	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 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 Williams (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 Colusa 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 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 that follow. 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 format as in Section B.4.1 above. This includes sections on: People and Populations; Structures; Critical Facilities and Infrastructure, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **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. Impacts are also affected by the community's ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by 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)

A new intentional disruption type of power shortage/failure event has been recently occurring 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), are coordinating to prepare 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 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

The City noted that power in Williams will flicker or go out for short periods of time during high wind or high heat situations, in accordance with PSPS events. There have been three events in 2023 and three events in 2024 that have been of note for the City. Dates for these events are listed below:

- 1-15-2023
- 4-11-2023
- 10-28-2023
- 4-9-2024
- 5-16-2024
- 6-9-2024
- 7-15-2024

On June 15th, 2024, power went out on the West side of town during a City Council meeting. While City Staff were able to rely on a generator, the City expressed concerns that not all residents have that resource. Along with this, a high wind event in 2022 caused balloons to be caught in the power lines. This disrupted power to a section of town for hours.

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 of Williams 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 Williams, the Colusa 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 Williams Events

The City noted that drought and water shortage lower the groundwater tables. The decrease in available water causes impacts to the wastewater treatment plant as the ponds are a source of water for wildlife and insects, impacting the City's ability to treat wastewater. The City expressed concern about this water source as midge flies brought larva to wastewater basins. This upset the microbes and raised levels out of compliance, which significantly raised costs to treat the wastewater.

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 vulnerabilities to this hazard.

The City Planning Team noted that storms tend to have grown in intensity. The City is getting larger quantities of water in shorter periods of time and the City watershed flows are strained by the inability of the natural drainage system's ability to accept them.

Assets at Risk

Assets at risk from climate change include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. 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 socially vulnerable or underserved populations (as shown in the Special Populations 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 or flood 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 or flood 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.

Community Lifelines

Due to the slow onset of climate change, community lifelines in the City are expected to adapt over time to new climate normal. It is thought that community lifelines in the City would not be overwhelmed by climate change.

Natural, Historic, and Cultural Resources

The rivers, streams, agricultural areas, and open space areas of the City support 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 contributes to changes in wildfire patterns, all areas (on land) of the City are at increased risk from fire – including areas of 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.

Economic Assets and Community Activities of Value

All economic assets and community activities of value in the City are at some measure of risk to hazards exacerbated by climate change. Should storms or other climate-related hazard events occur, certain economic assets and activities could be adversely affected as described throughout this risk assessment.

Drought caused by climate change reduces the water resources available to the area, especially for farmers. In years with limited water, moratoriums are put on field watering essentially ending rice farming, a staple for the City and its residents.

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 of Williams is part of:

- Increased temperatures
- Reduced precipitation
- Public health – heat and air pollution
- Reduced agricultural productivity (e.g., wine grapes)
- 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 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Future development considerations need to be made, as having more or less people in a community affects the overall hazard vulnerability that can impact the City. Ensuring that regulatory requirements, such as building codes, are followed along with considering different demographic groups with intersecting identities that reside within the City can help to make a more resilient community. This resiliency will be achieved through connection with the community as well as through the mitigation actions presented in this document.

Climate change can influence development in the City of Williams over time. 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 affect the City. While there are currently no formal studies of specific migration patterns expected to impact the City, climate-induced migration was recognized within the UNFCCC Conference of Parties Paris Agreement of 2022. Climate Change issues affecting future development in the City will likely include:

- **Climate change will stress water resources**. Water is an issue in every region, but the nature of the potential impacts varies. Drought, related to reduced precipitation, increased evaporation, and increased water loss from plants, is an important issue in many U.S. regions, especially in the West. Floods, water quality problems, and impacts on aquatic ecosystems and species are likely to be amplified by climate change. The ability to secure and provide water for new development requires on-going monitoring and assurances. It is recommended that the ability to provide a reliable water supply from the appropriate water purveyor continue to be in the conditions for project approval, and such assurances shall be verified and in place prior to issuing building permits.
- **Similarly, protecting and enhancing water supply will also need to be addressed**. California's Sustainable Groundwater Management Act (SGMA) will contribute to addressing groundwater and aquifer recharge needs. Good groundwater management by the City and the surrounding County will provide a buffer against drought and climate change and contribute to reliable water supplies regardless of weather patterns. California depends on groundwater for a major portion of its annual water supply, and sustainable groundwater management is essential to a reliable and resilient water system. Protection of critical recharge areas should be addressed across the City. Further, these plans should include provisions that guide development or curtail development in areas that would harm or compromise recharge areas.
- **Climate change will affect land uses and planning**. Climate change coupled with shifting demographics and market conditions, could impact both the location of desired developments and the nature of development. The value of open space, urban greening, green infrastructure, tree canopy expansion and pressure to preserve it will likely increase, due in part to its restorative, recreational, environmental, and habitat, and physical and mental health benefits but also for its ability to sequester carbon and cool the surrounding environment.

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 is often 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.

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

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. Current drought conditions in the City are shown in Section 4.3.9 of the Base Plan.

Past Occurrences

Disaster Declaration History

There have been one federal and three state disaster declarations from drought. This can be seen in Table B-16.

Table B-16 Colusa County – State and Federal Drought Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Drought	1	1977	3	1976, 2014, 2021

Source: Cal OES, FEMA

NCDC Events

There have been 58 NCDC drought events in Colusa County. These most likely had some impact on the City.

City of Williams Events

In the most recent cycle of drought the water at Well # 8 dropped significantly and could do so again in another major drought and water shortage year.

The City also noted that during the recent drought, midge flies brought larva to the City's wastewater basins which upset the microbes and raised levels out of compliance which raised costs to treat the wastewater significantly.

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 2021 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 and generally show drought conditions worsening over time.

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.

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 Williams 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.

Tree Mortality and Drought

One of the specific impacts of drought in the City of Williams and the Colusa 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.

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 vulnerabilities to this hazard.

Drought and water shortage is a regional phenomenon, which affects the entirety of the City. The main water well for the City of Williams is Well # 8 and is located in the center of town. With the lowering of groundwater levels in Well #8 as evidenced during the most recent drought the City's water supply is at risk. The City noted that lowering groundwater tables present an ongoing concern. Impacts to the City's wastewater treatment plant are also a concern during periods of drought (as ponds seem to be a source of water for wildlife and insects) which impact the City's ability to treat wastewater.

The City received complaints in 2019, 2021, and 2022 due to falling limbs of City trees causing residential damage. These complaints occurred during strong wind events; however, the damage may have never occurred if the trees were not already weakened from the exacerbating effects of drought and water shortage.

Assets at Risk

Assets at risk from drought and water shortage include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. 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. 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.

Community Lifelines

While limited, community lifelines can have a vulnerability to drought and water shortage (like the wastewater treatment plant discussed above). Many of the City's community lifelines are the same as or similar to Colusa County's. Drought will most likely not overwhelm these community lifelines. This was discussed in greater detail in Section 4.3.9 of the Base Plan.

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. 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.

Economic Assets and Community Activities of Value

Economic assets and community activities in the City of Williams generally have a limited vulnerability to drought and water shortage. The overall economic assets and community activities of value for the City were discussed in Section B.4.1. Drought affects rural small business owners such as farmers and agricultural contractors who rely on water for their crops. Given that agriculture is very important in the

County, this could have economic impacts in the City. Water supply issues can also affect businesses such as cafes and restaurants in more developed areas. Drought impacts to the agricultural industry can affect the supply chain and increase the cost of food and water, and adversely impact businesses tied to these industries. Reduction in or interruption of the water supply could also lead to lower productivity or closure of manufacturing facilities. Other economic sectors with a heavy reliance on water may also be affected. Depending upon how severe the conditions get and how long they last, drought and water shortage can restrict recreational and community activities, all of which can stress businesses and local economies over time.

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 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 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 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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City of Williams 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 has recently slowed. According to the HMPC, the City and Colusa 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 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. If agricultural lands are reduced, it seems likely that there would be less of a competing demand for water. However, more development will 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.

As the community continues to grow, additional water storage and delivery infrastructure will be needed. This may include an additional ground storage tank, booster pumps, and other infrastructure. The City is working towards increasing efforts to reduce the demand for water, and to move toward more sustainable water use. The City continues to make efforts to be proactive on future drought and water supply issues.

Earthquake

Likelihood of Future Occurrence–Unlikely
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, 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 Williams, Colusa 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. These include the Great Valley Fault, an inferred fault located within Colusa County, and the Sutter Buttes Fault and other faults located

in nearby Sutter and Lake counties. A significant seismic event on any of these major faults could cause serious damage in Williams.

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 4.3.10 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 may 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 Colusa County and the City fall within a low to moderate shake risk.

Past Occurrences

Disaster Declaration History

The City noted that there has been no state or federal disaster declarations from earthquake.

NCDC Events

The NCDC does not track earthquake events.

City of Williams Events

The City noted that no damage from past earthquakes occurring in or near the Colusa County Planning Area could be recalled.

Climate Change and Earthquake

Climate change is unlikely to increase earthquake frequency or strength. More information on future impacts to the City 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 and more rural areas are less vulnerable. The primary impacts of concern are life safety and property damage. Although several faults are located in and near the Colusa County Planning Area, seismic hazard mapping indicates that the City of Williams has low to moderate seismic hazard potential. However, there is the potential for the City of Williams and Planning Area to be subject to some level of moderate or higher seismic shaking in future events. Some degree of structural

damage due to stronger seismic shaking could be expected in earthquakes occurring with an epicenter near the City.

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 vulnerabilities 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 Williams is within Zone 3.

The City Planning Team noted that in the heart of downtown is the old Odd Fellows Lodge; dedicated on February 19, 1904. This building is still standing albeit in an unimproved state. Without proper structural improvements, an earthquake of high magnitude nearby could conceivably cause irreparable damage to this and other vulnerable structures.

Assets at Risk

Many assets in the City are at risk to ground shaking. Assets at risk from earthquake include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations

All people and populations are at risk from earthquake shaking and surface fault. Those at heightened risk include:

- The unsheltered
- Infants and children under age five and their caregivers
- Elderly (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 below specific to the City of Williams. More information on the Hazus

scenarios and how the Colusa County Planning Area 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. Unreinforced masonry (URM) and other types of older buildings are at a much greater risk to earthquakes. Fault ruptures itself contributes very little to damage unless the structure or system element crosses the active fault. In general, newer construction is more earthquake resistant than older construction due to enforcement of improved building codes. Manufactured housing is very susceptible to damage because their foundation systems are rarely braced for earthquake motions. Locally generated earthquake motions, even from very moderate events, tend to be more damaging to some buildings, especially those constructed of unreinforced masonry, as was seen in the Oroville, Coalinga, Santa Cruz, and Paso Robles earthquakes. There are less than 5 URM buildings withing the City of Williams and those are privately owned.

Critical Facilities and Infrastructure

Earthquake and its related hazards are a concern to the City. Earthquakes can damage critical facilities and infrastructure that provide vital services to the City. The critical facilities at risk to earthquake are presented in the Hazus analysis in Section 4.3.10 of the Base Plan.

Community Lifelines

All community lifelines in the City are vulnerable to earthquakes, depending on the severity and location of the shake. A major earthquake event could cause these lifelines to be overwhelmed. Some of these would be able to be restored to service quickly, while others would take more time having a prolonged impact on the people and structures within the City of Williams. More information on lifelines at risk can be seen in the Hazus scenarios in Section 4.3.10 of the Base Plan.

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. 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.

Economic Assets and Community Activities of Value

All economic assets in the City are vulnerable to earthquakes, depending on the severity and location of the shake and associated cascading hazards and impacts. The overall economic assets and community activities of value for the City were discussed in Section B.4.1. Should an earthquake occur causing significant damages, the local economy can be affected for an extended period until recovery occurs and businesses

and other economic drivers are operational. More information on economic assets at risk can be seen in the Hazus scenarios in Section 4.3.10 of the Base Plan. All community activities of value would be affected by an earthquake if they were underway during an earthquake event and may be postponed or cancelled until the City has sufficiently recovered.

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 City of Williams residents and visitors. Other impacts to the City 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; damages to structures and other development; and possible loss of life and injuries.

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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City of Williams 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 of Williams has recently slowed. 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.
- Land use planning should be proactive to address future hazard conditions. However, 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 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. Those with AFN, the unhoused, the elderly, and the very young may experience disproportionate impacts if an earthquake were to occur. However, 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.

Flood: 1%/0.2% Annual Chance

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 may 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. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures including the numerous levee systems located throughout the Colusa County Planning Area. 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.

Location and Extent

The City of Williams has areas located in the 1% and 0.2% annual chance flood zones. This is seen in Figure B-12. As shown, these areas fall on the northern side of the City.

Figure B-12 City of Williams – FEMA DFIRM Flood Zones

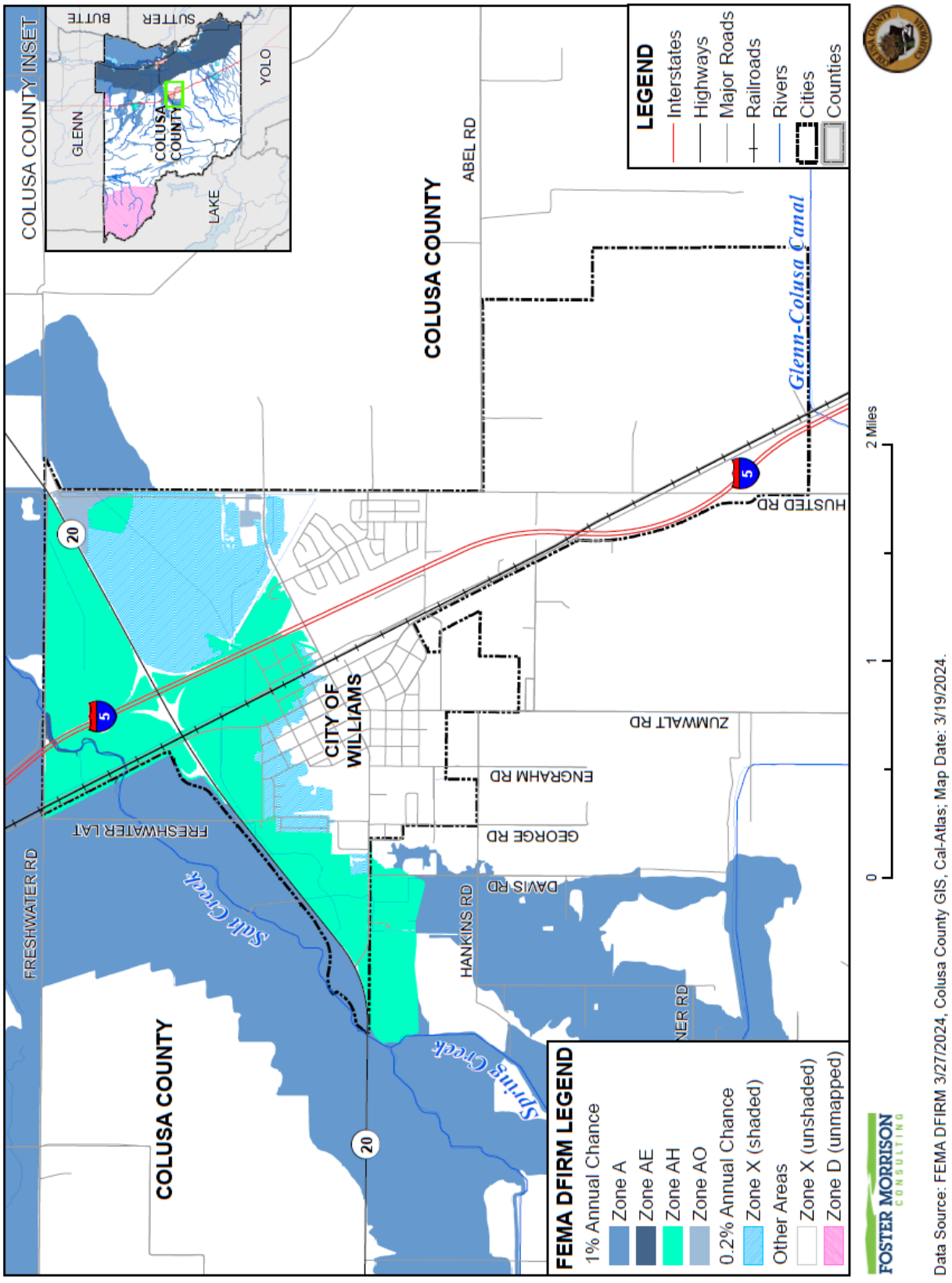


Table B-17 details the DFIRM mapped flood zones located within the City.

Table B-17 City of Williams– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone present in City of Williams
A	1% annual chance flooding: No base flood elevations provided	X
AE	1% annual chance flooding: Base flood elevations provided	
AH	1% annual chance flood areas of shallow flooding between one to three feet deep. Regulatory floodway; Base flood elevations provided	X
AO	1% annual chance flooding: sheet flow areas. BFEs derived from detailed hydraulic analyses are shown in this zone.	X
Shaded X	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 (unshaded)	No flood hazard	X
D	Areas with a potentially moderate to high risk of flooding, but the probability has not been determined.	

Source: FEMA DFIRM 3/27/2024

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-18.

Table B-18 City of Williams – 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	1,866	27.72%	226	12.13%	1,640	33.67%
0.2% Annual Chance Flood Hazard	855	12.70%	245	13.19%	610	12.52%
Other Areas	4,010	59.57%	1,388	74.67%	2,621	53.81%
City of Williams Total	**6,731**	**100.00%**	**1,859**	**100.00%**	**4,871**	**100.00%**

Source: FEMA DFIRM 3/27/2024

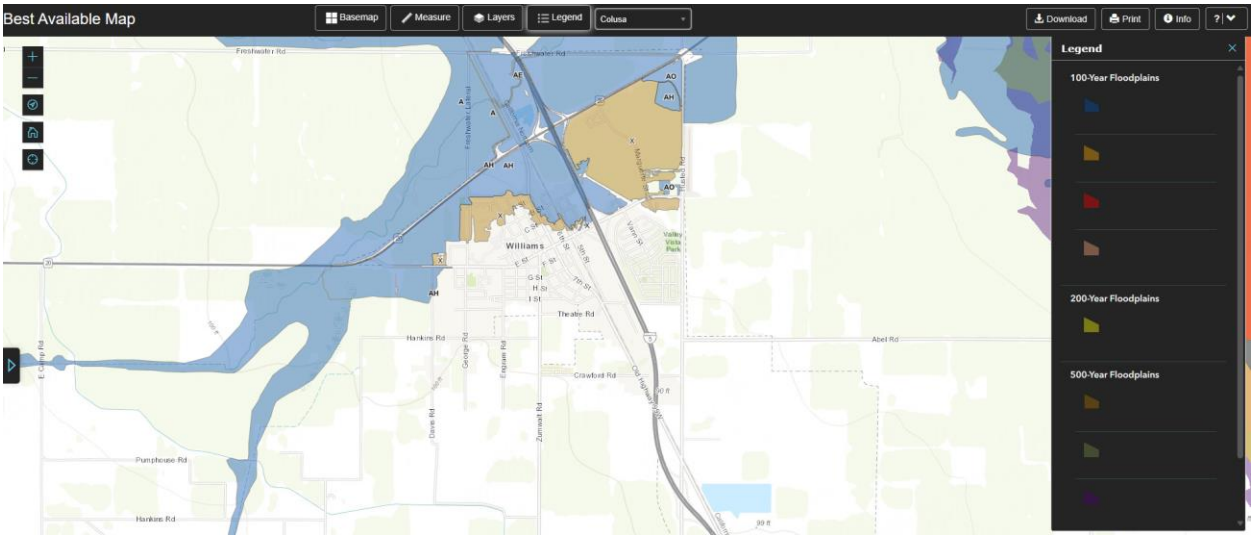
California Department of Water Resources Best Available Maps (BAM)

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 of Williams is shown in Figure B-13.

Figure B-13 City of Williams – Best Available Map



Source: California DWR. Retrieved 3/13/2024.
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 Colusa County from flooding is shown on Table B-19. These events also likely affected the City to some degree.

Table B-19 Colusa County – Federal and State Disaster Declarations from Flood 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Colusa County has seen 14 events. These events most likely had some impact on the City of Williams.

City of Williams Events

The City of Williams experiences flooding during periods of heavy rains and storms. Many of these flood events have caused damages as detailed below:

May 2024 – Heavy rains fell in and around the City of Williams. This caused flooding in the City as shown on Figure B-14 and Figure B-15.

Figure B-14 City of Williams – 2024 Flooding

Source: City of Williams Public Works

Figure B-15 City of Williams – 2024 Flooding

Source: City of Williams Public Works

2017 - In February of 2017, the flooding in the north end of town inundated twelve homes with 4-5 ft. depth near 6th and B Streets. Additionally in 2017, the City built a berm to protect the waters from slowly inundating the rest of the City from overflow of Salt Creek.

- Valley Ranch subdivision due to inundated stormwater conveyance systems
- Flooding in 2017 at the Wastewater Treatment Facility
- Flooding in January 2007 storms similar to the types of flooding in 2017
- In 1998 I-5 was closed for several miles both directions, the Water Treatment Facility was inundated by floodwaters and since then a small levee was erected to protect the facility from future flooding

Figure B-16 shows 2017 flooding near of Salt Creek at the Wastewater Treatment Plant.

Figure B-16 City of Williams – Flooding near Wastewater Treatment Plant

Source: City of Williams

The City noted that most of the recent flooding since the 2018 LHMP has been localized stormwater flooding. Flooding occurs annually in the area near Salt Creek and the Wastewater Treatment Plant.

Climate Change and Flood

It is likely that climate change will increase the chance of future occurrence as well 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 CAS, climate change may affect flooding in California, the Colusa County Planning Area, including the City of Williams. 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, and generally show worsening flooding.

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 of Williams.

Much 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 vulnerabilities to this hazard.

The 2012 City of Williams General Plan Safety Element as well as the 2003 Flood Hazard Mitigation Study both noted that Williams is confronted with persistent flood hazards due largely to the upstream watershed. In general, there are approximately 125 square miles of mountains and farmland that drain into the network of creeks and drainage canals above the Williams. Rainfall events often exceed the capacity of the conveyance systems, which results in overflows of storm waters that flow into developed portions of the City. As a result, the City has had several disaster declarations, which has resulted in costly damages and emergency construction.

The 2023 General Plan Public Safety Element noted that the City lies mostly within the Freshwater Creek Basin. Two of the basin's tributaries include Salt Creek and Spring Creek, both of which flow through the

City and its sphere of influence. The northern portion of the community is subject to flooding from Salt Creek. Flowing from west to east, Salt Creek is the most significant drainage feature in the study area. During storms and high water events the culverts beneath the Union Pacific Railroad (UPRR) and north of SR 20 exceed capacity causing water to flow southward along the west side of the railroad tracks and inundating the area north of E Street.

Assets at Risk

Assets at risk from flood include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. 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. In addition, there is one mobile home park within the City that lies within the 1% annual chance floodplain that may also be more vulnerable to major flood events.

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 Williams's residential population residing within these hazard areas, the DFIRM flood zones were overlayed on the parcel layer. Those residential parcel centroids that intersect the flood zones were counted and multiplied by the 2022 Census Bureau average household factors for the City of Williams – 3.58. According to this analysis, there is a total population of 48 and 428 residents of the City at risk to flooding in the 1% and 0.2% annual chance floodplains, respectively. This is shown in Table B-20.

Table B-20 City of Williams – 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 Williams	19	48	168	428

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 Parcel/Assessor Data, US Census Bureau American Community Survey 2022 Household Size Estimates.

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 of Williams 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 Williams. 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 B-21 is a summary table for the City of Williams. Parcel counts, land and improved values (i.e., those with a structure improvement on the parcel), other 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-22 breaks down Table B-21 and shows the same analysis further broken out by detailed FEMA flood zone and property use.

Table B-21 City of Williams – Count and Value of Parcels (and Structures) at Risk in Summary DFIRM Flood Zone

Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard	115	53	$9,814,990	$22,835,847	$3,087,632	$35,738,469
0.2% Annual Chance Flood Hazard	204	183	$17,819,160	$61,549,910	$26,998,809	$106,367,879
Other Areas	1,436	1,241	$82,539,836	$265,076,793	$96,815,520	$444,432,149
City of Williams Total	**1,755**	**1,477**	**$110,173,986**	**$349,462,550**	**$126,901,961**	**$586,538,497**

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 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-22 City of Williams – Count and Values of Parcels (and Structures) at Risk by Detailed DFIRM Flood Zone and Property Use

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard							
Zone A							
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	0	0	$0	$0	$0	$0	$0
Government	2	0	$65,627	$0	$0	$0	$65,627
Industrial	0	0	$0	$0	$0	$0	$0

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	1	0	$8,009	$0	$0	$0	$8,009
Residential	0	0	$0	$0	$0	$0	$0
Zone A Total	**3**	**0**	**$73,636**	**$0**	**$0**	**$0**	**$73,636**
Zone AH							
Agricultural	16	1	$1,316,219	$37,491	$0	$37,491	$1,391,201
Commercial	46	27	$7,117,957	$19,163,089	$2,926,495	$19,163,089	$48,370,630
Government	9	2	$214,992	$463,094	$2,197	$463,094	$1,143,377
Industrial	4	4	$273,106	$2,017,498	$158,940	$3,026,247	$5,475,791
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	6	0	$2,460	$0	$0	$0	$2,460
Residential	27	19	$798,223	$1,154,675	$0	$577,337	$2,530,235
Zone AH Total	**108**	**53**	**$9,722,957**	**$22,835,847**	**$3,087,632**	**$23,267,258**	**$58,913,694**
Zone AO							
Agricultural	3	0	$18,397	$0	$0	$0	$18,397
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
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0	$0
Zone AO Total	**4**	**0**	**$18,397**	**$0**	**$0**	**$0**	**$18,397**
1% Annual Chance Flood Hazard Total	**115**	**53**	**$9,814,990**	**$22,835,847**	**$3,087,632**	**$23,267,258**	**$59,005,727**
0.2% Annual Chance Flood Hazard							
Zone X (shaded)							
Agricultural	6	1	$840,345	$46,884	$0	$46,884	$934,113
Commercial	19	10	$9,633,788	$21,551,039	$5,212,288	$21,551,039	$57,948,154
Government	4	3	$610,661	$14,222,526	$14,317,132	$14,222,526	$43,372,845
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	2	1	$58,075	$2,329,286	$22,755	$2,329,286	$4,739,402
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	173	168	$6,676,291	$23,400,175	$7,446,634	$11,700,085	$49,223,185
Zone X (shaded) Total	**204**	**183**	**$17,819,160**	**$61,549,910**	**$26,998,809**	**$49,849,820**	**$156,217,699**

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
0.2% Annual Chance Flood Hazard Total	**204**	**183**	**$17,819,160**	**$61,549,910**	**$26,998,809**	**$49,849,820**	**$156,217,699**
Other Areas							
Zone X (unshaded)							
Agricultural	39	11	$6,135,977	$1,937,913	$164,824	$1,937,913	$10,176,627
Commercial	138	85	$18,876,605	$27,574,370	$6,662,286	$27,574,370	$80,687,631
Government	70	17	$3,581,801	$16,989,615	$6,616,045	$16,989,615	$44,177,076
Industrial	10	7	$2,135,224	$22,672,121	$71,797,570	$34,008,183	$130,613,098
Institutional	14	10	$226,844	$1,524,525	$1,703,786	$1,524,525	$4,979,680
Miscellaneous	10	1	$378,922	$3,718,064	$0	$3,718,064	$7,815,050
Residential	1,155	1,110	$51,204,463	$190,660,185	$9,871,009	$95,330,092	$347,065,749
Zone X (unshaded) Total	**1,436**	**1,241**	**$82,539,836**	**$265,076,793**	**$96,815,520**	**$181,082,762**	**$625,514,911**
Other Areas Total	**1,436**	**1,241**	**$82,539,836**	**$265,076,793**	**$96,815,520**	**$181,082,762**	**$625,514,911**
City of Williams Total	**1,755**	**1,477**	**$110,173,986**	**$349,462,550**	**$126,901,961**	**$254,199,840**	**$840,738,337**

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 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-23 summarizes Table B-22 and shows City of Williams loss estimates and improved values at risk by FEMA 1% and 0.2% annual chance flood zones. According to Table B-22 and Table B-23, the City of Williams has 53 parcels and $49.2 million of structure and contents values or values in the 1% annual chance flood zone, and 183 improved parcels and $138 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 $9.84 million in damage and a 0.2% chance in any given year of a flood event causing $27.7 million in damage in the City of Williams. The loss ratio of 0.00% indicates that flood losses for 1% annual chance flooding would be relatively minor and the City would be able recover. The loss ratio of 0.01% indicates that flood losses for 0.2% annual chance flooding would be relatively minor and the City would be able recover relatively quickly.

Table B-23 City of Williams – Flood Loss Estimates

Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance	115	53	$9,814,990	$22,835,847	$3,087,632	$23,267,258	$49,190,737	$9,838,147	0.00%
0.2% Annual Chance	204	183	$17,819,160	$61,549,910	$26,998,809	$49,849,820	$138,398,539	$27,679,708	0.01%
Total	**1,755**	**1,477**	**$110,173,986**	**$349,462,550**	**$126,901,961**	**$254,199,840**	**$730,564,351**	**$146,112,870**	**0.01%**

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 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

Flooding presents a threat to threat to both critical facilities and infrastructure. Critical facilities and infrastructure plays an immensely important role in our communities. Communities rely on roads and related biking and pedestrian routes for transportation, and on water infrastructure for drinking water, wastewater service, and draining streets of rainwater. 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 the Colusa County Planning Area and the City.

A separate analysis was performed on the critical facility inventory in the City of Williams to determine critical facilities that fall within the DFIRM flood zones. Using GIS, the DFIRM flood zones were overlayed on the critical facility GIS layer. This is shown on Figure B-17. Table B-24 details which critical facilities fall in which flood zone. Details of critical facility categories, type, name, and address by detailed flood zone are listed in Appendix F.

Figure B-17 City of Williams – Critical Facilities in DFIRM Flood Zones

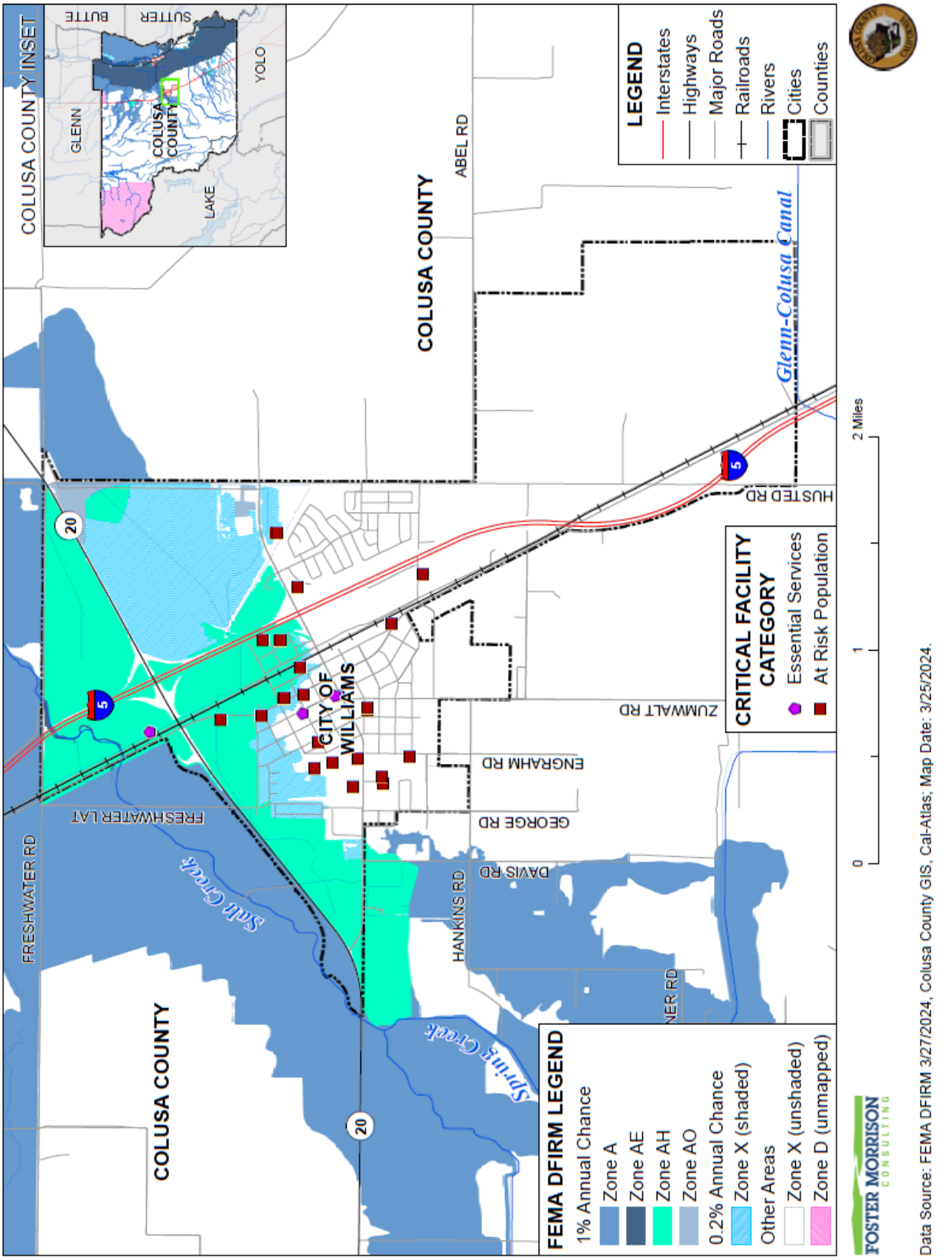


Table B-24 City of Williams – Critical Facilities in DFIRM Flood Zones by Category and Type

Critical Facility Category	Facility Type	Facility Count
1% Annual Chance Flood Hazard		
Zone AH		
Essential Services Facilities	Utility Facility	1
	Total	**1**
At Risk Population Facilities	Hotel or Motel	2
	Mobile Home Park	1
	Total	**3**
Zone AH Total		**4**
1% Annual Chance Flood Hazard Total		**4**
0.2% Annual Chance Flood Hazard		
Zone X (shaded)		
At Risk Population Facilities	Hotel or Motel	3
	Total	**3**
Zone X (shaded) Total		**3**
0.2% Annual Chance Flood Hazard Total		**3**
Other Areas		
Zone X (unshaded)		
Essential Services Facilities	Emergency Response	2
	Fire Station	1
	Public Services	1
	Total	**4**
At Risk Population Facilities	Apartment Complex	4
	Hotel or Motel	3
	Migrant Housing	1
	Mobile Home Park	1
	School	4
	Senior Living Facility	3
	Total	**16**
Zone X (unshaded) Total		**20**
Other Areas Total		**20**
City of Williams Total		**27**

Source: FEMA DFIRM 3/27/2024, City of Williams GIS

Community Lifelines

1% and 0.2% annual chance flooding presents a threat to life and property, including community lifelines in the City. The community lifelines for the City of Williams include those identified for the Colusa County Planning Area. This was discussed in greater detail in Section 4.3.11 of the Base Plan. Generally, even major flood events are temporary events with flood waters receding back to pre-storm levels at the conclusion of the storm. However, depending on the location, duration, and magnitude and severity of any given flood event, some of these community lifelines may be overwhelmed in the short term.

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 that fall in the flood zones shown on Figure B-12 would be vulnerable.

Economic Assets and Community Activities of Value

Major flood events could affect any economic asset that lies in the floodplain and can have long lasting effects. The overall economic assets and community activities of value for the City were discussed in Section B.4.1. This could cause those businesses and economic assets within these areas to close or relocate. This could cause temporary or permanent loss of sales tax revenue. It could also cause agricultural losses. These events can also affect those economic assets outside of the floodplain, at least in the short term until the City has sufficiently recovered.

The Williams Police Department is located within the AH flood zone at the corner of North and 7th Streets. The Police Department requires many expensive equipment pieces that are housed on site. Total loss would be devastating for the City as getting operations up and running in a different location would be a challenging and arduous process.

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 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Health Hazards from Flooding

According to FEMA, certain health hazards are also common to flood events. 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 other livestock 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 problem arises 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, the elderly, and those that are medically vulnerable.

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 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 structure 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.

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 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 Williams joined the National Flood Insurance Program (NFIP) on April 22, 1980. The City does not participate in CRS program. NFIP data indicates that as of February 2, 2024, there were 11 flood insurance policies in force in the City with $6,302,000 of coverage. Of the 11 policies: 5 were for single family homes were residential (single-family homes), and 6 were for non-residential properties. Of the 11 policies in force, 3 were in A Zones and 8 were in B, C, and X zones. The GIS parcel analysis detailed above identified 53 improved parcels in the 1% annual chance flood zone. There have been 11 historical claims for flood losses totaling $55,416.69. NFIP data further indicates that there are no repetitive loss (RL) or severe repetitive loss (SRL) buildings in Williams. There has been 1 substantial damage claims since 1978 in the City.

Based on this analysis of insurance coverage, the City has values at risk to the 1% annual chance and greater floods. Of the 53 improved parcels within the 1% annual chance flood zone, only 3 (or 5.7 percent) of those parcels maintain flood insurance. This can be seen on Table B-25.

Table B-25 City of Williams – 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 Williams	53	3	5.7%

Source: FEMA DFIRM 3/27/2024, Colusa County 2023 Parcel/Assessor Data, NFIP CIS data 7/2023.

As the levees are decertified, an increased number of City residents are placed in the floodplain. Table B-26 illustrates the changes in the number of insured structures in the 1% annual chance floodplain. As seen in the table, the overall percentage of policy holders dropped from 20.8% in 2018 to 5.7% in 2024.

Thus, flood insurance education and promotion will be an important focus moving forward with the recent DFIRM update putting more people and structures within the 1% annual chance floodplain.

Table B-26 Colusa County Planning Area– Comparison of 2024 and 2018 Percentage of Policy Holders to Improved Parcels in the 1% Annual Chance Floodplain

Jurisdiction	2024 LHMP			2018 LHMP		
	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	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 Williams	53	3	5.7%	53	11	20.8%

Source: FEMA DFIRM 3/27/2024, 2023 Colusa County Parcel/Assessor's Data, 2018 Colusa County LHMP Update

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 Williams 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.
- Population growth in the City of Williams has recently slowed; however, additional growth within the floodplain areas of the City would place additional populations at risk to flood. Additional population growth would likely bring continued diversity to the City. 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.
- 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 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. 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.

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. As levees are decertified, vulnerability increases, and certain populations may experience a disproportionate impact due to lack of access to resources.

The City enforces its floodplain management ordinance. More detail on the specifics of the floodplain ordinance can be found in the Capability section below. A discussion of general considerations follows.

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. The City of Williams's floodplain management ordinance provides standards for development, subdivision of land, construction of buildings, and improvements and repairs to buildings that meet the minimum requirements of the NFIP and also the requirements of the City's current adopted version of the California Building Code (and International Building Code), which in some areas exceed the base requirements of the NFIP.

The International Residential Code and International Building Code, 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 City may be built in the floodplain, in conformance to the standards of the floodplain ordinance. The City enforces the floodplain ordinance on new development in Williams. With the new FEMA DFIRMs in place, the City should consider additional flood protection standards with their flood ordinance update.

The City's Planning Department has plans to build an additional Detention Pond in the north area and then create a series of smaller detention basins throughout the City. There are also plans to create a series of levees on the west side of town to stop the water from flowing directly into the City. The Business Park

detention pond located in the North East of the City is currently in the engineering phase for a buildout large enough to accommodate full development on the east side of town.

The risk of flooding to future development can also be minimized by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the flooding will reduce future risks of losses. Any future development will take all potential flooding into consideration when approving/implementing new development projects to ensure the best possible outcome in future flood events.

Future development areas and their vulnerability to DFIRM flooding is discussed further in the below GIS analysis.

GIS Analysis

The City provided 8 future development areas which were used as the basis for the inventory of future development for the City. These were mapped in GIS. Utilizing the future development area spatial layer, the parcel centroid data was intersected to determine the future development areas within each FEMA DFIRM flood zone. Figure B-18 show the locations of the future development areas overlayed on the FEMA DFIRM flood zones. Table B-27 shows each future development area in the City in these zones.

Figure B-18 City of Williams – Future Development in DFIRM Flood Zones

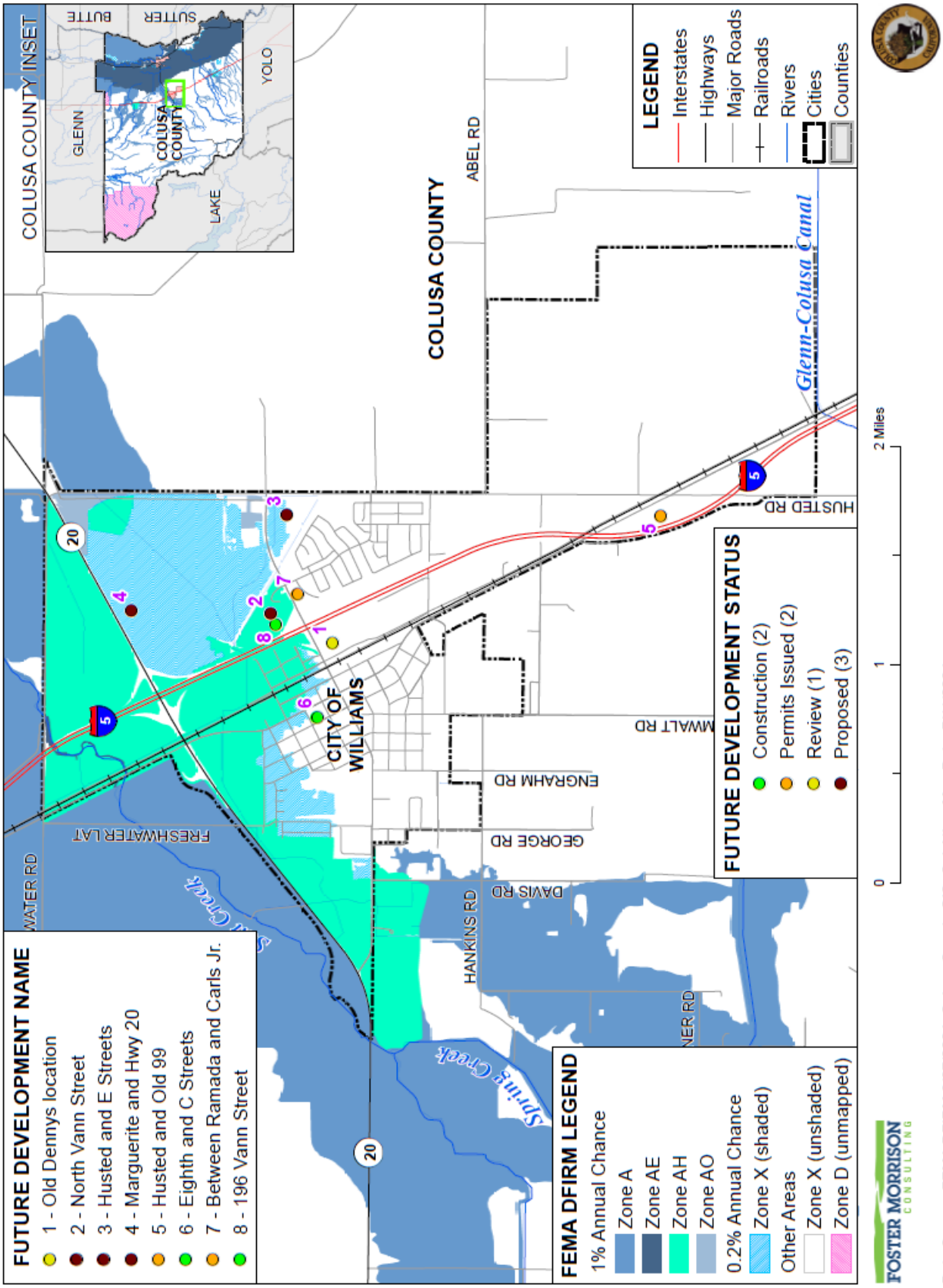


Table B-27 City of Williams – Future Development in DFIRM Flood Zones

Flood Zone	Future Development Status	Future Development Site Number	Future Development Name	Total Parcel Count	Total Acres
1% Annual Chance Flood Hazard					
Zone AH	Proposed	2	North Vann Street	1	14.15
		Proposed Total		**1**	**14.15**
	Construction	8	196 Vann Street	1	4.065
		Construction Total		**1**	**4.065**
	Zone AH Total			**2**	**18.215**
1% Annual Chance Flood Hazard Total				**2**	**18.215**
Other Areas					
Zone X (unshaded)	Proposed	3	Husted and E Streets	1	17.27
		Proposed Total		**1**	**17.27**
	Permits Issued	5	Husted and Old 99	1	9.09
		7	Between Ramada and Carl's Jr.	1	0.95
		Permits Issued Total		**2**	**10.04**
	Review	1	Old Dennys location	1	4.342
		Review Total		**1**	**4.342**
	Construction	6	Eighth and C Streets	1	1.08
		Construction Total		**1**	**1.08**
	Zone X (unshaded) Total			**5**	**32.732**
Other Areas Total				**5**	**32.732**
0.2% Annual Chance Flood Hazard					
Zone X (shaded)	Proposed	4	Marguerite and Hwy 20	1	2.29
		Proposed Total		**1**	**2.29**
Zone X (shaded) Total				**1**	**2.29**
0.2% Annual Chance Flood Hazard Total				**1**	**2.29**
Grand Total				**8**	**53.237**

Source: FEMA 3/27/2024 DFIRM, City of Williams

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 contributes to a large volume of runoff resulting in high peak flows of moderate duration.

Location and Extent

The City of Williams is subject to localized flooding throughout the City. This is discussed in Table B-28 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 past occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile above.

City of Williams Events

The City noted the following past occurrences of localized flooding:

- Localized flooding at Hwy 20 and San Jose Road
- Lone star Road from Abel to Hahn Roads
- Old Hwy 20 from D Street to 4th Street and over to 7th Street
- E Street (Old Hwy 20 and 6th Street
- City Water Treatment Facility

Figure B-19 shows the reoccurring flooding at the corner of 6th & E Streets

Figure B-19 City of Williams – Localized Flooding at 6th and E Streets

Source: City of Williams

Climate Change and Localized Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with 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 vulnerabilities to this hazard.

As stated in the 1%/2% annual chance flood profile above, Williams is confronted with persistent flood hazards due largely to the upstream watershed. In general, there are approximately 125 square miles of mountains and farmland that drain into the network of creeks and drainage canals above the City. Therefore, rainfall events often exceed the capacity of the conveyance systems, which results in overflows of storm waters that flow into developed portions of the City. As a result, the City has had several disaster declarations, which has resulted in costly damages and emergency construction.

The City of Williams lies mostly within the Freshwater Creek Basin. Two of the basin's tributaries include Salt Creek and Spring Creek, both of which flow through the City and its sphere of influence. As the primary conveyances, the capacity of these stream channels is often exceeded, even with modest rainfall events. This is due, in part, to the external hazards attributed to the runoff generated in areas of the watersheds that are outside of the City. Since these areas are largely rural and have less effect on property, these watersheds have not been extensively studied nor have significant, near-term improvements been identified. Secondly, flooding is caused by a lack of storm drainage infrastructure within the City. Since much of the drainage within the City is by way of overland sheet flow and above ground facilities like roadside ditches, valley gutters, and surface drainage in streets, there is simply an insufficient capacity to adequately handle the volume of storm water that is generated outside of and within the City.

The City tracks localized flooding areas. Affected localized flood areas identified by the City of Williams are summarized in Table B-28.

Table B-28 City of Williams – List of Localized Flooding Problem Areas

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris	Downed Trees
Husted	X	X					
Old 99 N of SR20	X	X		X		X	
E Street @ Davis	X	X					
10th Street N of E	X	X					
6th Steet N of E	X						
Old 99 @ SR20	X			X		X	
Hwy 20 and San Jose Road	X						

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris	Downed Trees
Old Hwy 20 from D Street to 4th Street and over to 7th Street	X						
Lone Star Road from Abel to Hahn Roads	X						
City Water Treatment Facility	X						

Source: City of Williams

The City noted the following root causes of localized flooding associated with these problem areas:

- **Husted** – old County Road. Road is sinking. Drought and flood cycle is weakening the road structure, particularly with canal and storm drainage on west side, as well as critter infiltration.
- **Old 99 N of SR20** – debris must be removed at the bridge north of SR20 during every storm event. Trees/brush/beaver dams flow down Salt Creek and block the bridge forcing water to flow over the bridge and down the street if not removed. Sediment deposition has blocked the north span and scour has undermined the south abutment.
- **E Street @ Davis** – heavy flows from the mountains tend to flood the City in two ways. The first is from the north under SR20 on old highway 99. The second is overland from the west as it overtops the banks of Salt Creek. The first location that this hits puts E Street under water at around Davis Street as the system isn't capable of handling the flows.
- **10th Street N of E** – existing system insufficient to handle flows coming from E Street. 10th Street floods North of E Street during every storm event mostly because of factors such as the insufficient capacity and lack of maintenance of the ditch system north on SR20 along Freshwater Lateral Road; insufficient capacity of the ditch running along North and Virginia Streets, and the lack of an underground storm sewer along 10th Street.
- **6th Street N of E** – storm drains on the east side of 6th Street have sewer crossings in them which collect debris, and back up the system.
- **Old 99 at SR20** – When Salt Creek overflows its banks, that water heads south into the City limits under the SR20 bridge adjacent to the railroad. Every wet year, the City is forced to construct a temporary berm under the crossing to prevent the City from flooding from the north. In the past two years, the City has had to obtain permission to build that berm over the top of the railroad, closing the railroad as well as the street.

Assets at Risk

Assets at risk from localized flood include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. 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 damages.

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.

Community Lifelines

Due to the relatively minor nature of localized flooding, community lifelines are unlikely to be overwhelmed. Many of the City's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.12 of the Base Plan.

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 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.

Economic Assets and Community Activities of Value

Localized flooding occurs on an annual basis throughout the City during storm events. The overall economic assets and community activities of value for the City were discussed in Section B.4.1. Most of these events have limited impacts and include those associated with localized flooding due to undersized drainage systems, affecting nearby roads, structures, and other nearby assets. Unless directly affected by localized flooding, these events are unlikely to affect the City's key economic assets.

Community activities of value may have minor vulnerabilities if a localized flood event were to occur during the activity. This may cause the activity to be relocated, cancelled, or rescheduled.

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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City of Williams 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 Williams has recently slowed. 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 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 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. Creating 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.

Future development in the City will add more impervious surfaces causing an increase in stormwater runoff and the continued need to drain these waters. 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 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: 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.

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-28 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 Colusa 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.

Colusa County and much of California can be affected by a phenomenon known as an atmospheric river. These types of storms occurred frequently in the winter of 2022/2023. 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. More information on atmospheric rains 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 is the cause of many of the federal disaster declarations related to flooding. Disaster declarations from flooding are shown on Table B-29.

Table B-29 Colusa County – Federal and State Disaster Declarations from Flood (Heavy Rain and Storms) 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC data recorded 30 hail, heavy rain, and winter weather incidents for Colusa County since 1950.

City of Williams Events

The City noted that there have not been any disaster declarations that significantly impacted the City since the last LHMP update. There have been events where the City dispatched a team to mediate high wind and flooding issues. These dates are listed below:

- 1-27-21 Flooding
- 2-2-21 High Winds
- 1-24-22 High Wind
- 1-23-22 High Wind
- 1-9-23 High Winds/Floods
- 1-11-23 Floods
- 1-14-23 Flood
- 10-24-21 High Winds/Flooding
- 1-9-24 Floods
- 1-14-24 Flood/Wind
- 2-17-24 Flood

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 associated with 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 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. 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.

These heavy rains and storms can cause damages from localized flooding. This was discussed in the Flood: Localized Stormwater Flooding section above.

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 vulnerabilities to this hazard.

The City of Williams Police Department is located in the flood zone. The City actively mitigates the amount of water coming in from the Northside of town each year, utilizing berms along salt creek to minimize the effects of flood and prevent flood damage to the P.D.

The City also noted that heavy rains and storms cause localized flooding in the City. The problem areas area shown on Table B-28 above.

Assets at Risk

Assets at risk from heavy rain and storms include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. 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 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 affected 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.

Community Lifelines

Community lifelines are likely to have some vulnerability to heavy rains and storms. Many of the City's community lifelines are the same as or similar to Colusa County's. These were discussed in greater detail in Section 4.3.4 of the Base Plan.

Short-term, heavy rains and storms can cause both widespread flooding as well as extensive localized drainage issues throughout the City. As storms continue to increase in intensity, existing drainage and stormwater systems may be overwhelmed at least temporarily contributing to an increase in flooding related impacts. While components of these lifelines may be damaged or otherwise impacted, it is unlikely that large storm events would overwhelm and take out any of these lifelines in the City as a whole.

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.

Economic Assets and Community Activities of Value

Heavy rain and storm events can cause direct damage to economic assets such as businesses and commercial centers. The overall economic assets and community activities of value for the City were discussed in Section B.4.1. During extreme events, the economy may slow as people stay home or inside. Business revenue may be reduced during extended storm events. Community activities of value may see a reduction in attendance, impacting revenues associated with these events, especially those that occur outdoors. Events may be cancelled or rescheduled.

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 and erosion that would likely have the greatest impact.

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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City Williams 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 is expected to decrease for the City of Williams; however, the vulnerability may change depending on changes to the makeup of more vulnerable populations. Certain vulnerable populations, such as the unhoused, 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 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. 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. 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. With adherence to development standards, future losses to new development should be minimal.

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 population could increase the number of people impacted by heavy rains and storms. 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.

Stream Bank Erosion

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile

Erosion is the general process whereby rocks and soils are broken down, removed by weathering, or fragmented and then deposited in other places by water or air. Stream bank erosion poses problems for the City. The rate of erosion depends on many variables, including the soil or rock texture and composition, soil permeability, slope, extent of vegetative cover, and precipitation amounts and patterns. Erosion increases with increasing slope and precipitation and with decreasing vegetative cover, which includes areas where protective vegetation has been removed by fire, construction, or cultivation. The City is traversed by many waterways. These locations are all subject to bank erosion. Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects.

Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response

to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield, often impacting stream flows.

Location and Extent

Stream bank erosion occurs on rivers, streams, and other moving waterways, including leveed areas, in the City. The speed of onset of stream bank erosion is slow, as the erosion takes place over periods of years. This can be sped up and occur quickly during times of high water (as during heavy rains and storms). Duration of erosion is extended. Greater erosion occurs during periods of high stream flow and during storm and wind events when wave action contributes to the extent and speed of streambank erosion.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations related to erosion.

NCDC

The NCDC does not track stream bank erosion.

City of Williams Events

February 2017 - Salt Creek experienced about 150 feet of stream bank erosion at Old Highway 99 and Highway 20. Figure B-20 shows some of the damage and erosion along the bridge.

Figure B-20 City of Williams – Erosion Issues on Salt Creek

Source: City of Williams

Climate Change and Stream Bank Erosion

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with stream bank erosion. 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 CAS, climate change may affect flooding which contributes to erosion in Colusa County. 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. Future precipitation projections were shown in Section 4.3.4 of the Base Plan. 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. All of the events above could exacerbate stream bank erosion in the County.

Vulnerability to Stream Bank Erosion

Parts of the City located along streambanks are at some measure of vulnerability to streambank erosion. An assessment of a community's vulnerability begins with an understanding of local exposure to streambank erosion. 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 vulnerabilities to this hazard.

A primary location for stream bank erosion within the City of Williams is along Salt Creek. The erosion often occurs at Old Highway 99 and Salt Creek. When Salt Creek overflows its banks, water heads south into the city limits under the SR20 bridge adjacent to the railroad. Every wet year, the City is forced to construct a temporary berm under the crossing to prevent the City from flooding from the north. In the past two years (2022/2023), the City has also had to obtain permission to build that berm over the top of the railroad, closing the railroad as well as the street.

There are various impacts to the City of Williams as a result of stream bank erosion. This includes the City's Solar Field which could be damaged from floodwaters, the City Wastewater Treatment Plant, and the overall water supply which could be contaminated from floodwaters.

Assets at Risk

Assets at risk from streambank erosion include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations

Streambank erosion will have a minimal direct effect on people and populations in the City (unless it causes a levee failure which would have larger impacts on the City). Indirect effects on people and populations include damages to roads or bridges from streambank erosion, causing transportation issues. Streambank erosion can also cause high sediment loads. While rare, this can cause water quality impacts. Water quality can be impacted causing health problems, especially to vulnerable populations where access to clean water supplies can be more challenging.

Structures

Structures near rivers are at some risk from the effects of streambank erosion. Streambank erosion can undercut structure foundations causing instability and other issues. Structures that are in areas protected by levees are at greater risk of streambank erosion. Should levees erode quickly, their risk of failure increases. Those structures behind the levees would be at risk. This is discussed in greater detail in Levee Failure section above.

Critical Facilities and Infrastructure

Streambank erosion (especially that which causes levee failures) presents a threat to critical facilities and infrastructure, and community lifelines. Critical infrastructure plays an immensely important role in our communities. As previously noted, communities rely on roads, bridges, and related biking and pedestrian routes for transportation, and on water infrastructure for drinking water, wastewater service, and draining streets of rainwater. 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.

Community Lifelines

Streambank erosion that causes significant impacts such as levee failures presents a threat to life and property, including community lifelines in the City. Many of the City's community lifelines are the same as or similar to Colusa County's. It is unlikely these community lifelines would be overwhelmed, unless the streambank erosion caused a levee failure. This were discussed in greater detail in Section 4.3.15 of the Base Plan.

Natural, Historic, and Cultural Resources

Streambank erosion could have a minor effect on those resources that are near areas where streambank erosion occurs. The greater risk is from streambank erosion that could cause levee failure flooding. 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.

Economic Assets and Community Activities of Value

Streambank erosion could have a minor effect on those assets that are near areas where streambank erosion occurs. The overall economic assets and community activities of value for the City were discussed in Section B.4.1. Activities of value are thought to be minimally affected. The greater risk is from streambank erosion that could cause levee failure flooding. Major flood events could affect any economic asset that lies in the floodplain and can have long lasting effects. This could cause those businesses and economic assets within these areas to close or relocate. This could cause temporary or permanent loss of sales tax revenue. This is also true if agricultural areas are flooded in the County (discussed in greater detail in Section 4.3.6 of the Base Plan). These events can also affect those economic assets outside of the floodplain, at least in the short term until the Planning Area has sufficiently recovered. Community activities of value can also be disrupted by floods, though many of these events take place in the summer months, which are less likely to flood.

Impacts from Streambank Erosion

Stream bank erosion and deposition are occurring continually at varying rates over the City and larger Planning Area. Swiftly moving floodwaters cause rapid local erosion as the water carries away earth materials. This is especially problematic in leveed areas. Severe erosion removes the earth from beneath bridges, roads and foundations of structures adjacent to streams. By undercutting it can lead to increased rockfall and landslide hazard. The deposition of material can block culverts, aggravate flooding, destroy crops and lawns by burying them, and reduce the capacity of water reservoirs as the deposited materials displace water.

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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City of Williams include the following:

- Climate change is likely to exacerbate future streambank erosion conditions and associated impacts and vulnerability of the City to levee failures.
- Population growth in the City has recently slowed. Additional population growth would likely bring continued diversity to the County. Vulnerable population groups could face disproportionate effects from streambank erosion (and resultant levee failure) and should be planned for. Changes in population and population patterns will likely 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. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires land use planning, enforcing regulatory requirements, and an understanding of both stream dynamics and the management of streamside vegetation. 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 City to this hazard.

Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires an understanding of both stream dynamics and the management of streamside vegetation.

Planned developments should take erosion risk areas into account during the construction of new homes and commercial properties.

Wildfire

Likelihood of Future Occurrence–Occasional
Vulnerability–Low

Note: though considered a low priority hazard by the City, due to significance in the County and in the State of California, wildfire is profiled here. It is not considered a priority hazard for mitigation actions.

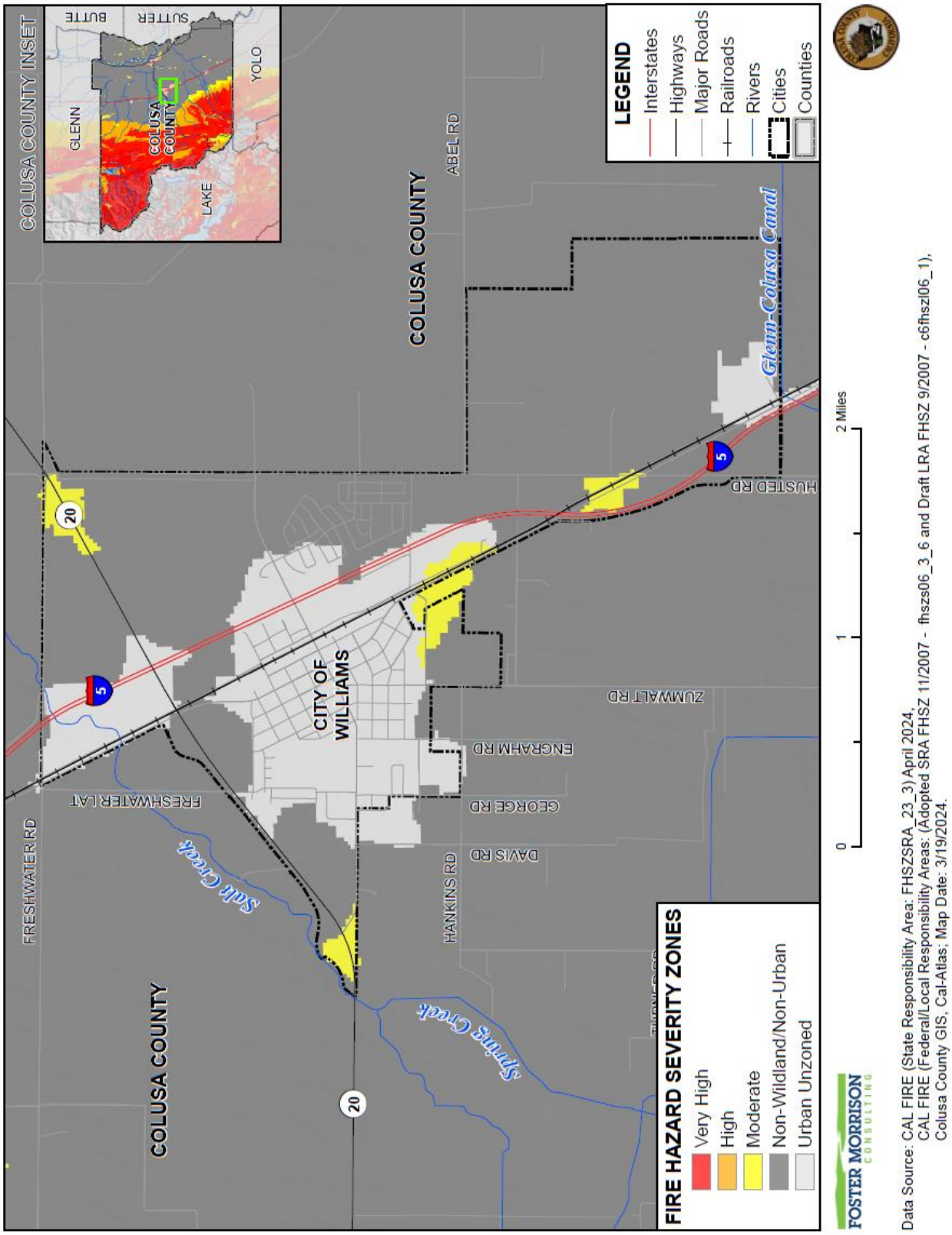
Hazard Profile

Wildland fire and the risk of a conflagration is an ongoing concern for the City of Williams. 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/ESPS 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, urban 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 Colusa County Planning Area and the City.

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 maps showing risk variance. Following the methodology described in Section 4.3.17 of the Base Plan, wildfire maps for the City of Williams were created. Figure B-21 shows the CAL FIRE Fire Hazard Severity Zone (FHSZ) in the City. As shown on the maps, FHSZs within the City range from Urban Unzoned to Moderate.

Figure B-21 City of Williams – CAL FIRE Fire Hazard Severity Zones



Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on 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 extent from CAL FIRE is shown in Table B-30.

Table B-30 City of Williams – CAL FIRE 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
Very High	0	0.00%	0	0.00%	0	0.00%
High	0	0.00%	0	0.00%	0	0.00%
Moderate	96	3.30%	27	2.55%	69	3.74%
Non-Wildland/Non-Urban	2,047	70.59%	603	56.76%	1,444	78.59%
Urban Unzoned	757	26.11%	432	40.69%	325	17.67%
City of Williams Total	**2,900**	**100.00%**	**1,062**	**100.00%**	**1,838**	**100.00%**

Source: CAL FIRE

Wildfires that burn in the County, as well as those that burn outside the County may cause wildfire smoke to occur. This does not affect structures but can affect human health. Durations of wildfire smoke can be long, depending on the burn area and the prevailing winds. More information can be found in the Vulnerability Assessment below.

Past Occurrences

Disaster Declaration History

There has been one federal and two state disaster declaration due to fire, as shown in Table B-31.

Table B-31 Colusa County – Federal and State Wildfire Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Wildfire	1	2018	2	1987, 2018

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked 13 wildfire events in the County dating back to 1993.

City of Williams Events

There have been no past occurrences of wildfires within the City of Williams. The wildfires that have occurred in California in recent years have not been in the City of Williams but due to the City's location in the Sacramento Valley, residents have been negatively affected by the smoke. As a precaution the City has asked all Public Works personnel to stay indoors if the air quality reaches dangerous levels, but this practice is not written in any policy.

A wildland fire on October 27, 2019, started by PG&E equipment during high wind event, burned around 100 acres at Husted and Highway 20.

Climate Change and Wildfire

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with 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 4.3.17 of the Base Plan. Based on this model, Cal-Adapt predicts that wildfire risk in Colusa 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 Colusa 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 of Williams from wildfire is of limited 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 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.

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 the 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 North Complex Fire, as well as others that affected the nearby areas.

Assets at Risk

Assets at risk from wildfire include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

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 vulnerabilities to this hazard.

No wildfires have impacted the City of Williams directly. The City's Fire Protection Agency is a subsidiary of CAL FIRE so City fire staff is often fully involved with fires throughout the State. The Williams Fire Protection Agency keeps the local department adequately staffed while still supporting CAL FIRE with resources and manpower.

The 2023 Safety Element Update noted that although wildfire risk is relatively low within City limits, it is important for the City to remain cognizant of this potential threat, and to prepare itself in a manner that protects life, property, and resources from wildfires. Therefore, it is prudent for the City to adapt its fire protection planning to incorporate good practices for limiting the exposure to unnecessary fire hazards.

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
- Elderly (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 parcel centroids that intersect the FHSZs were counted and multiplied by the 2022 Census Bureau average household factors for the City of Williams – 3.58.

According to this analysis, there is a total population of 8 residents of the City of Williams at risk to moderate or higher FHSZs. This is shown in Table B-32.

Table B-32 City of Williams – Improved Residential Parcels and Population by CAL FIRE 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 Williams	0	0	0	0	3	8

Source: CAL FIRE, Colusa County 2023 Parcel/Assessor Data, US Census Bureau American Community Survey 2022 Household Size Estimates.

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

All structures in the City have some risk to wildfire. GIS was used to determine the possible impacts of wildfire within the City of Williams. The methodology described in Section 4.3.17 of the Base Plan was followed in determining structures and values at risk in CAL FIRE's Fire Hazard Severity Zone layer. Summary analysis results for the City of Williams are shown in Table B-33, which summarizes total parcel counts, improved parcel counts and their land and structure values by fire hazard severity zone.

Table B-33 City of Williams – Count and Value of Parcels (and Structures) by CAL FIRE Fire Hazard Severity Zone and Property Use

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Moderate							
Agricultural	3	1	$178,061	$35,700	$0	$35,700	$249,461
Commercial	5	3	$684,987	$1,334,788	$333,680	$1,334,788	$3,688,243
Government	3	0	$170,821	$0	$0	$0	$170,821
Industrial	0	0	$0	$0	$0	$0	$0
Institutional	0	0	$0	$0	$0	$0	$0
Miscellaneous	0	0	$0	$0	$0	$0	$0
Residential	3	3	$179,691	$507,130		$253,565	$940,386
Moderate Total	**14**	**7**	**$1,213,560**	**$1,877,618**	**$333,680**	**$1,624,053**	**$5,048,911**
Non-Wildland/Non-Urban							
Agricultural	49	10	$7,152,090	$1,925,167	$164,824	$1,925,167	$11,167,248
Commercial	21	7	$14,348,778	$20,616,958	$5,239,411	$20,616,958	$60,822,105
Government	20	1	$2,233,757	$13,785,660	$14,311,276	$13,785,660	$44,116,353

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Industrial	6	4	$817,269	$3,472,755	$2,405,890	$5,209,133	$11,905,047
Institutional	1	1	$60,493	$289,304	$349,797	$289,304	$988,898
Miscellaneous	10	0	$19,024	$0	$0	$0	$19,024
Residential	517	510	$25,526,535	$116,264,336	$16,962,312	$58,132,163	$216,885,346
Non-Wildland/Non-Urban Total	**624**	**533**	**$50,157,946**	**$156,354,180**	**$39,433,510**	**$99,958,385**	**$345,904,021**
Urban Unzoned							
Agricultural	12	2	$980,787	$61,421	$0	$61,421	$1,103,629
Commercial	177	112	$20,594,585	$46,336,752	$9,227,978	$46,336,752	$122,496,067
Government	63	21	$2,068,503	$17,889,575	$6,624,098	$17,889,575	$44,471,751
Industrial	8	7	$1,591,061	$21,216,864	$69,550,620	$31,825,297	$124,183,842
Institutional	15	10	$224,426	$3,564,507	$1,376,744	$3,564,507	$8,730,184
Miscellaneous	7	1	$370,367	$3,718,064	$0	$3,718,064	$7,806,495
Residential	835	784	$32,972,751	$98,443,569	$355,331	$49,221,786	$180,993,437
Urban Unzoned Total	**1,117**	**937**	**$58,802,480**	**$191,230,752**	**$87,134,771**	**$152,617,402**	**$489,785,405**
City of Williams Total	**1,755**	**1,477**	**$110,173,986**	**$349,462,550**	**$126,901,961**	**$254,199,840**	**$840,738,337**

Source: CAL FIRE, Colusa County 2023 Parcel/Assessor Data

Critical Facilities and Infrastructure

Wildfire presents a threat to critical facilities and infrastructure. The following analysis identifies critical facilities and infrastructure at risk to wildfire. An analysis was performed on the critical facility inventory in the City of Williams in identified Cal Fire's FHSZ mapping. Critical facilities in CAL FIRE FHSZs in the City of Williams are shown in Figure B-22 and detailed in Table B-34. As shown, no critical facilities fall in the FHSZs in the City. Details of critical facility definition, type, name and address and jurisdiction by fire hazard severity zone are listed in Appendix F.

Figure B-22 City of Williams – Critical Facilities in Fire Hazard Severity Zones

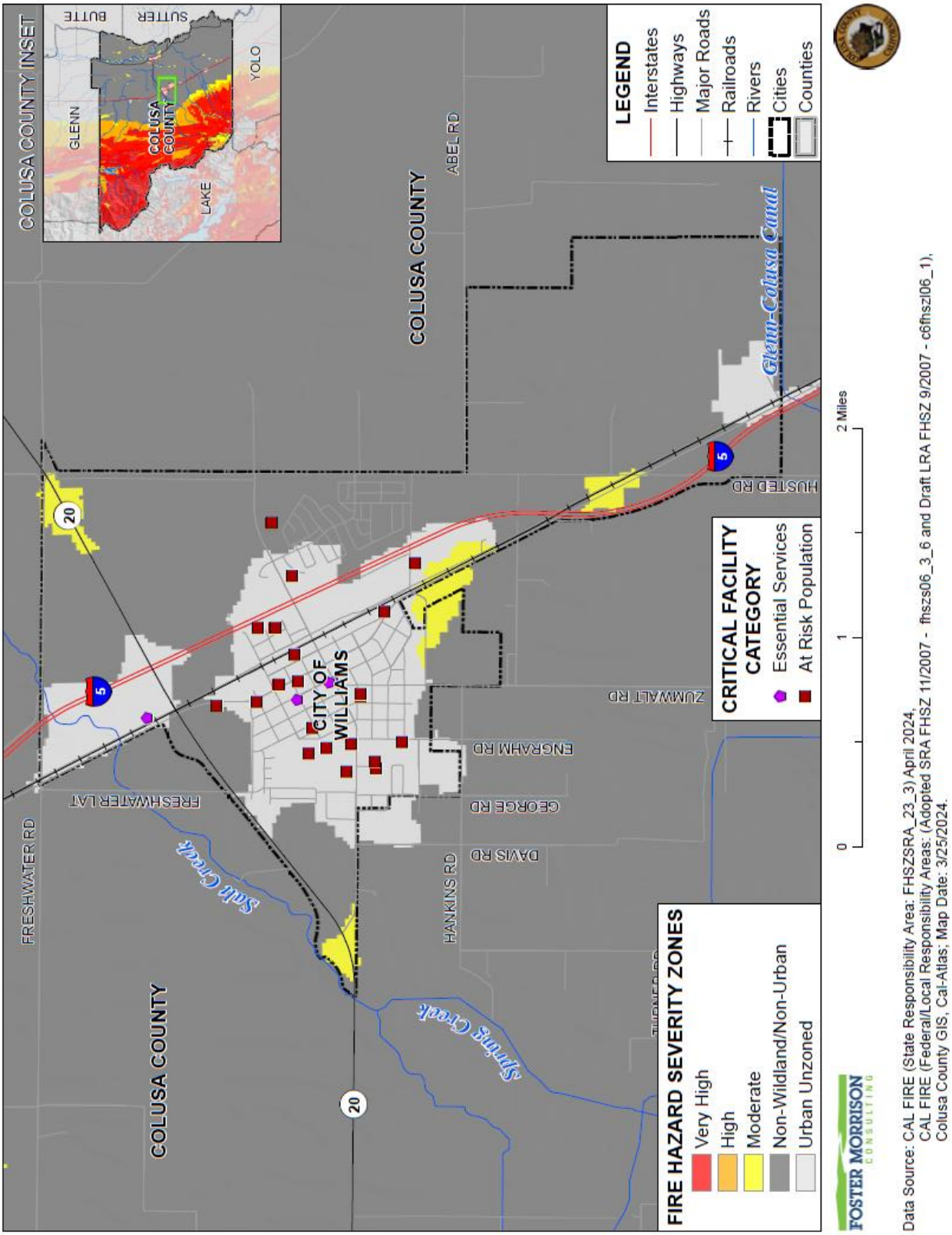


Table B-34 City of Williams – Critical Facilities by Fire Hazard Severity Zone

Fire Hazard Severity Zone	Critical Facility Category	Facility Type	Facility Count
Non-Wildland/Non-Urban			
Non-Wildland/Non-Urban	At Risk Population Facilities	Mobile Home Park	1
		Senior Living Facility	1
		Total	**2**
Non-Wildland/Non-Urban Total			**2**
Urban Unzoned			
Urban Unzoned	Essential Services Facilities	Emergency Response	2
		Fire Station	1
		Public Services	1
		Utility Facility	1
		Total	**5**
	At Risk Population Facilities	Apartment Complex	4
		Hotel or Motel	8
		Migrant Housing	1
		Mobile Home Park	1
		School	4
		Senior Living Facility	2
		Total	**20**
Urban Unzoned Total			**25**
City of Williams Total			**27**

Source: CAL FIRE, City of Williams GIS

Community Lifelines

Wildfire presents a threat to life and property, including to community lifelines in the City. Many of the City's community lifelines are the same as or similar to Colusa County's. These were discussed in greater detail in Section 4.3.17 of the Base Plan. A large wildfire near the City could overwhelm community lifelines.

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 of Williams, 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 affected and are often more vulnerable due to their older age, construction type, and lack of fire prevention infrastructure such as sprinklers.

Economic Assets and Community Activities of Value

Wildfires in the City can cause direct damage to economic assets such as businesses and commercial centers located in affected areas. The overall economic assets and community activities of value for the City were discussed in Section B.4.1. During extreme events, the economy may slow while recovery efforts are prioritized. Business revenue may be reduced during extended events. Community activities and events in areas affected by wildfire (and smoke and air quality issues) may be cancelled or rescheduled.

There have been wildfire occurrences to the northwest of the City in the areas of Sites/Leesville/Walker Ridge such as the 2024 Sites fire, however, all these events have been contained miles from the City limits. Although depending on the fire, wildfire smoke from nearby wildfire events can affect air quality in the City and impact outdoor events such as Pioneer Day which occurs in June.

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 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 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 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. Changes in population patterns and land use, and the extent to which they affect this hazard, 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 this for the City of Williams 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 of Williams has recently slowed. 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.
- 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. However, City 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 most 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 City to this hazard.

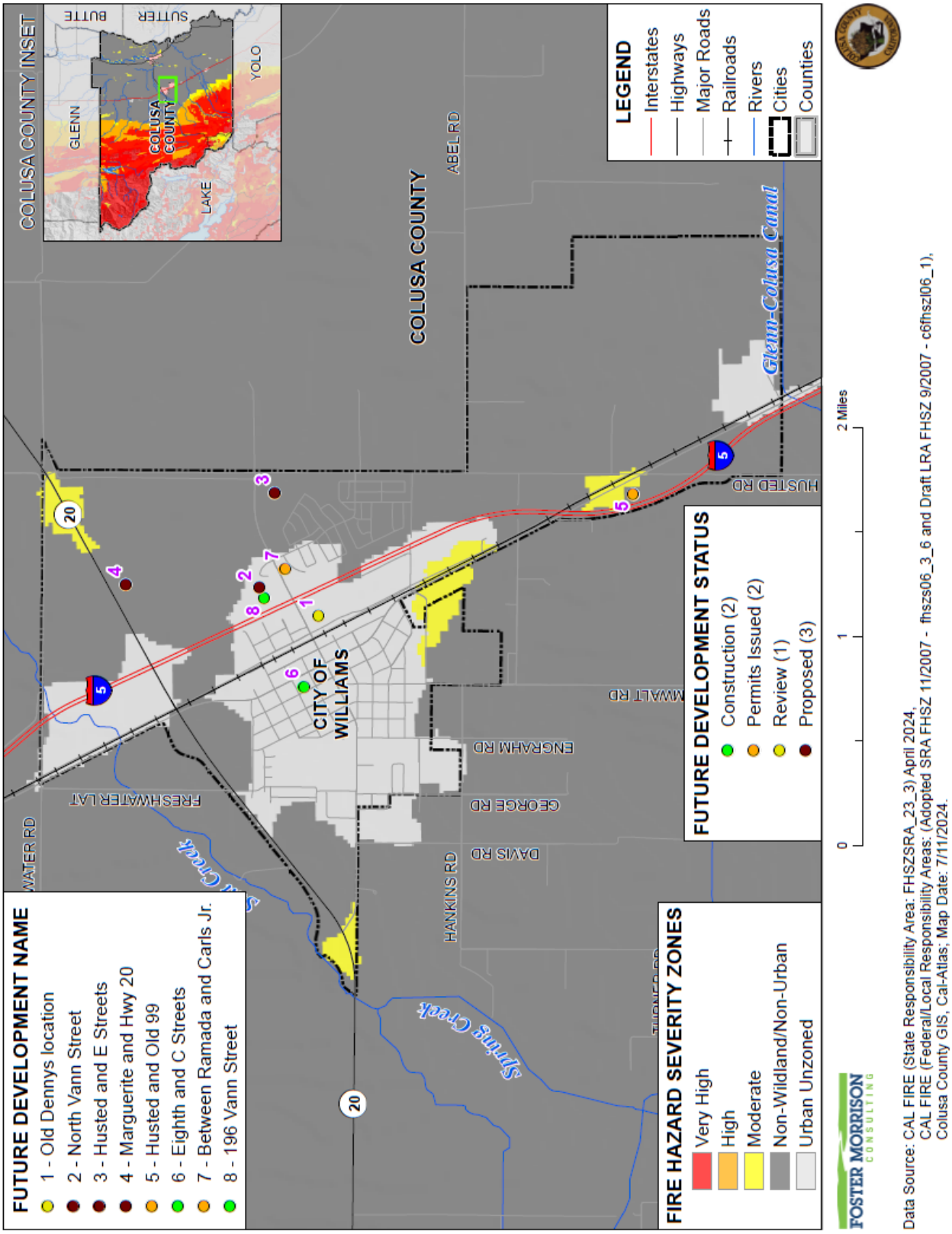
Additional growth and development within moderate or higher fire hazard severity zones in the City would place additional values at risk to wildfire. City building codes are in effect and should continue to be updated as appropriate to reduce this risk.

Future development areas and their vulnerability to wildfire are discussed further in the below GIS analysis.

GIS Analysis

The City provided 8 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-23 show the locations of the future development areas overlayed on the CAL FIRE FHSZs. As shown, no future development areas fall in moderate or higher FHSZs, as such, no tabular analysis is presented.

Figure B-23 City of Williams – Future Development in FHSZs



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-35 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 Williams.

Table B-35 City of Williams'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	N	
Climate Change Adaptation Plan	Y	Addresses: temperature, reduced precipitation, flooding, reduced agriculture, reduced water, wildfire, heat, reduced tourism
Community Wildfire Protection Plan	Y	Colusa County Community Wildfire Protection Plan
Comprehensive/Master Plan	Y	The General Plan addresses various hazards but does not identify any mitigation projects. The General Plan does not implement mitigation.
Continuity of Operations Plan	N	
Economic Development Plan	N	
Land Use Plan	Y	The General Plan Land Use was last updated in 2012. This plan does not implement mitigation.
Local Emergency Operations Plan	Y	The EOP is updated as necessary by the Emergency Manager.
Stormwater Management Plan	N	
Transportation Plan	Y	Circulation Element
Other (describe)		
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 and Yes
Building code	Y	Yes and Yes. Updated 2023
Flood insurance rate maps	Y	Yes and Yes.
Floodplain ordinance	Y	Yes and Yes. Updated Jan. 2024

Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	Y	Yes and Yes
Zoning ordinance	Y	Yes and Yes
Other		
How can these capabilities be expanded and improved to reduce risk?		
Ordinances are regularly updated to State standards as well as on an as needed basis to reduce hazard. These ordinances will be kept current to reduce risk in the City.		

Source: City of Williams

The City of Williams General Plan Program, 2012 (Safety Element updated in 2023)

The City of Williams General Plan Program serves as the blueprint for future growth and development and provides comprehensive planning for the future. It encompasses what the City is now, and what it intends to be, and provides the overall framework of how to achieve this future condition (see the discussion in Section 4.3.1 Growth and Development Trends).

The General Plan includes a Safety Element (updated in 2023) that focuses on safety issues to be considered in planning for the present and future development of the Williams Planning Area. Identified hazards include wildfire, geologic/seismic, flooding, and other natural and man-made hazards (such as hazardous materials). Mitigation-related actions and objective summaries are as follows:

- Flooding – 18 policies and 21 actions
- Seismic and Geologic Hazards – 4 policies and 3 actions
- Fire – 14 policies and 11 actions

Flood Hazard Mitigation Study (2003)

This final report provides background information and discusses alternatives to mitigate historical flood hazards in the city and its surrounding watersheds. Several approaches are presented in this document, both structural and non-structural, that address the problems specific to Williams. Alone or in combination with other approaches, these measures lend varying degrees of protection against future flood impacts. From supporting engineering analyses, these approaches were screened and two project alternatives were analyzed: first an engineered levee accompanied by internal drainage improvements within the city and, second, a proposal to elevate or retrofit existing structures in the floodplain against future flood damages. The two alternatives have been conceptualized to a level of detail that permits an understanding of project impacts, key components, and construction costs.

Mitigation Related Ordinances

Buildings and Construction (Title 15)

The following codes are adopted by the city for purposes of construction:

- The California Building Code, 2019 Edition, Volumes 1 and 2, including Chapter 1, which incorporates and amends the International Building Code, 2018 Edition published by the International Code Council,

is hereby adopted by this reference and incorporated herein as if set forth in full, as the building code of the city.

- The California Residential Code, 2019 Edition, including Chapter 1, which incorporates and amends the International Residential Code, 2018 Edition, published by the International Code Council, is hereby adopted by this reference and incorporated herein as if set forth in full, as the residential code of the city.
- The California Plumbing Code, 2019 Edition, including Chapter 1, which incorporates and amends the Uniform Plumbing Code, 2018 Edition, published by the International Association of Plumbing and Mechanical Officials, is hereby adopted by this reference and incorporated herein as if set forth in full, as the plumbing code of the city.
- The California Green Building Standards Code, 2019 Edition is hereby adopted by this reference and incorporated herein as if set forth in full, as the green building standards code of the city.
- The California Electrical Code, 2019 Edition, including Article 89, which incorporates and amends the National Electrical Code, 2017 Edition, published by the National Fire Protection Association, is hereby adopted by this reference and incorporated herein as if set forth in full, as the electrical code of the city.
- The Uniform Housing Code, 1997 Edition, published by the International Conference of Building Officials, is adopted by this reference and incorporated herein as if set forth in full, as the housing code of the city.
- The Uniform Code for the Abatement of Dangerous Buildings, 1997 Edition, published by the International Conference of Building Officials, is adopted by this reference and incorporated herein as if set forth in full as the abatement code for the city.
- The California Fire Code, 2016 Edition, including Chapter 1 with the exception of Section 103.2, which incorporates and amends the International Fire Code, 2015 Edition, published by the International Code Council, is hereby adopted by this reference and incorporated herein as if set forth in full, as the fire code of the city.
- The California Mechanical Code, 2019 Edition, including Chapter 1, which incorporates and amends the Uniform Mechanical Code, 2018 Edition, published by the International Association of Plumbing and Mechanical Officials, is hereby adopted by this reference and incorporated herein as if set forth in full, as the mechanical code of the city.

Subdivisions (Title 16)

This title shall be known and may be cited as the "Williams Subdivision Ordinance." This title is enacted for the purpose of adopting standards, regulations and procedures for the subdivision and other specified types of division and utilization of land in the incorporated area of the city, as authorized and directed by the Subdivision Map Act and other applicable provisions of law. This title regulates and controls subdivisions for which the Subdivision Map Act requires a tentative and final or parcel map, and other divisions and subdivisions as authorized by the act. This title also provides for the reversion to acreage of lands previously divided, and for exclusions from subdivisions.

Zoning (Title 17)

This chapter divides the city into zoning districts, and sets out which uses of land are permitted by right, conditionally permitted, and prohibited in each zoning district. It also provides limitations, separation, and special bulk standards for certain uses. The City of Williams is divided into the eleven zoning districts. The creation of these districts is consistent with the land use and community character designations used in the Williams General Plan.

Civil Defense Shelters (Section 15.28)

All buildings and structures which are designed primarily as civil defense shelters are exempt from the provisions of the building code of the city, except as such provisions may be adopted by the civil defense shelter board.

Flood Damage Preventions (Section 15.30)

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 City Council of the City of Williams, California does hereby adopt the following floodplain management regulations. (Ord. No. 190-12, § 1(exh. A), 2-15-2012)

The flood hazard areas of the City of Williams 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. 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.

No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this chapter and other applicable regulations. Violation of the requirements (including violations of conditions and safeguards) shall constitute a misdemeanor. Nothing herein shall prevent the city council from taking such lawful action as is necessary to prevent or remedy any violation.

B.5.2. Administrative/Technical Mitigation Capabilities

Table B-36 identifies the City department(s) responsible for activities related to mitigation and loss prevention in the City of Williams.

Table B-36 City of Williams'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	The Building Inspector is a full-time position required to inspect and certify that all buildings conform to code mitigating possible hazards.
Civil Engineer, including dam and levee safety	Y	The City Engineer is a full-time position. The City Engineer is trained in hazards and their mitigation and has been actively enforcing mitigation measures to combat the localized flooding north of the city.
Community Planner	Y	The City Planner is a full-time position. The City Planner stays up to date on state requirements updating zoning ordinances as necessary.
Emergency Manager	Y	The Fire Chief of the Williams Fire Protection Agency is the Emergency Manager for the city's Emergency Operations Plan.
Floodplain Administrator	Y	The duties of this position were previously assigned to the City Administrator but were updated in January of 2024 to assign administrator duties to the City Engineer.
GIS Coordinator	N	
Planning Commission	Y	Planning Commission capability/defined roles are limited to land use planning, development, and flood plain variances. Mitigation review is on limited projects.
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	N	
Hazard data and information	N	
GIS analysis	N	
Mutual aid agreements	N	
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 Williams

B.5.3. Fiscal Mitigation Capabilities

Table B-37 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table B-37 City of Williams'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	N	
Community Development Block Grant	Y	The city is currently using CDBG funds to rehabilitate an old building into a food distribution center. CDBG funds are unlikely to be used for mitigation actions since their funding regulations are so specific.
Federal funding programs (non-FEMA)		
Fees for water, sewer, gas, or electric services	Y	No gas/electric.
Impact fees for new development	Y	Schools, fire, police, parks, city facilities, roads, flood
State funding programs	N	
Stormwater utility fee	N	
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 Williams

B.5.4. Mitigation Education, Outreach, and Partnerships

Table B-38 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-38 City of Williams's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	The City posts newsletters from local assistance organizations to keep the citizens up to date on local resources and distributions.
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	Y	Fire prevention, risk management, and worker safety training and CPR training is offered regularly by/through the Fire Department
Local news	Y	All public notices and outreach are posted in the local newspaper
Organizations that interact with underserved and vulnerable communities	Y	First 5 and the Williams Community Church post food distribution days in City Facilities. CDBG funds will give these organizations a central location to serve the community.

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Social media	Y	The City utilizes both a City and Parks and Recreations Facebook pages for outreach.
Other	Y	The City installed two digital marquee boards on either side of town for outreach messages.
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 Williams

B.5.5. Other Mitigation Efforts

The City has many other completed or ongoing mitigation projects/efforts that include the following:

- The City has become more aggressive with its preventative measures during potential flood events. The City stages public works around the clock and install earthen/sandbag berm to prevent flooding to the north side of town.
- The newly formed Environmental Justice Element found that while Williams does not have an area that meets the threshold of a Disadvantaged Community, it does have unique health hazards to the area. One example is due to the large agricultural uses both in the City and in the surrounding area, there is a higher chance of residents coming in contact with harmful levels of air or water pollutants associated with agricultural byproducts. To combat these effects, the city has many policies in place such as Public Safety Policy 4.53, Land Use Policy 3.44, and Land Use Policy 3.47.

B.6 Mitigation Strategy

B.6.1. Mitigation Goals and Objectives

The City of Williams 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 Williams joined the National Flood Insurance Program (NFIP) on April 22, 1980. As a participant of the NFIP, the City of Williams 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 Williams will continue to comply with the requirements of the NFIP in the future.

The City of Williams Planning and Public Works Departments 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 Public Works Departments provides information about our

stormwater management program and up-to-date information related to the maintenance of our drainage system.

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 Williams is not a current participant in the CRS program.

More information about the floodplain administration in the City of Williams can be found in Table B-39.

Table B-39 City of Williams 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)?	The city manager or his or her designee shall serve as city's floodplain administrator and shall administer, implement, and enforce this ordinance by granting or denying development permits in accord with its provisions The City Manager does server other roles.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	No
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)	This is discussed in the cell titled "Provide an explanation of the permitting process" below.
What are the barriers to running an effective NFIP program in the community, if any?	Lack of staffing
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	11 policies $12,777 in total premiums $6,302,000 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?	11 losses paid $55,416.69 in paid losses 1 substantial damage claim
How many structures (residential and non-residential) are exposed to flood risk within the community?	53 in 1% annual chance flood zone 183 in 0.2% annual chance flood zone
Are there Repetitive Loss (RL) and Severe Repetitive Loss Properties (SRL) structures in the community?	0 RL or SRL properties
Describe any areas of flood risk with limited NFIP policy coverage	None.
How does the community teach property owners or other stakeholders about the importance flood insurance?	Flyers, social media outreach, and other efforts are used. City website is also used.
What digital sources (like the FEMA Map Service Center, National Flood Hazard Layer) or non-regulatory tools does the community use?	DFIRMs are used.

NFIP Topic	Comments
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?	This is a combination of the City engineer and the Planning Department. Substantial damaged structures are identified after flood assessments are done. The City follows NFIP guidelines to make sure these structures are brought into compliance.
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	CAV 8/28/2017
Is a CAV or CAC scheduled or needed?	N
Regulation	
When did the community enter the NFIP?	4/22/1980
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?	The community has adopted a floodplain ordinance that meets or exceeds the NFIP minimum regulations. It was last adopted on 8/19/2020.
Has the community adopted the latest effective FIRM? Date adopted?	Yes.
How does the community enforce local floodplain regulations and monitor compliance?	This is discussed in the cell titled "Provide an explanation of the permitting process" below.
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	The City's regulations meet the minimum requirements of the NFIP and the CBS.
How are Letters of Map Change (LOMCs) tracked and compiled?	New DFIRMs are downloaded regularly which include the latest LOMCs, LOMRs, and CLOMRs.

NFIP Topic	Comments
Provide an explanation of the permitting process.	Development permit applications are submitted to the Planning Department where the project is reviewed for zoning and code requirements. The application is then submitted to the Building Department for plan check review. Larger project applications are submitted to the Planning Department for initial review, after which they are reviewed by the Technical Advisory Committee (TAC), which includes all City departments. Planning Staff then completes the environmental review process and prepares a staff report, project conditions, and recommendations to the Planning Commission. The Planning Commission can then approve or deny the applications. For development within a Special flood hazard area (SFHA), section 15.30.150 of the municipal code requires permit applications to include: 1. Location of the regulatory floodway 2. BFE 3. Proposed elevation of the lowest floor 4. Proposed elevation to which any nonresidential structure will be flood proofed 5. Location and total net area of foundation openings 6. The extent to which any watercourse will be altered or relocated. Certified elevations for final construction are required for: 1. Lowest floor elevations for residential structures 2. Lowest floor elevations or elevations of flood proofing for nonresidential structures.
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 Williams

B.6.3. Mitigation Actions

The Planning Team for the City of Williams 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
- Drought & Water shortage
- Earthquake
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)
- Stream Bank Erosion

- Wildfire

The following hazards were considered as non-priority hazards for mitigation planning purposes:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Landslide, Mudslide, and Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: High Winds and Tornados
- Dam Failure
- Subsidence

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 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 plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Mitigation Actions

Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Hazards Addressed: Multi-hazard (Climate Change, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Stream Bank Erosion, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: 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: City of Williams Planning Department

Priority (H, M, L): High

Cost Estimate: Jurisdictional board/staff time

Potential Funding: Local budgets

Benefits (avoided Losses): Incorporation of an adopted LHMP into the Safety Element of the General Plan will help jurisdictions maximize the cost recovery potential following a disaster.

Schedule: As soon as possible

Action 2. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness

Hazards Addressed: Multi-hazard (Climate Change, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Stream Bank Erosion, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: 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, will include elements to meet the objectives of Goal 3 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.

Location of Project: Citywide

Other Alternatives: Continue public information activities currently in place.

Existing Planning Mechanism(s) 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.

Responsible Office: City of Williams in partnership with the County

Priority (H, M, L): High

Cost Estimate: Annual costs to be determined, and will depend on the scope and frequency of activities and events as well as volunteer participation

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

Timeline: Ongoing/Annual public awareness campaign

Action 3. Aquifer Recharge Project

Hazards Addressed: Drought and Water Shortage

Goals Addressed: 1, 3, 4

Issue/Background: Drought and water shortage lower the groundwater tables. This causes impacts to the wastewater treatment plant as the ponds seem to be a source of water for wildlife and insects, impacting our ability to treat wastewater. For example: midge flies brought larva to our wastewater basins which upset the microbes and raised our levels out of compliance which raised our costs to treat the wastewater significantly. Replenishing the groundwater table will assist the city as we navigate this new drought climate.

Project Description: Recharge the local aquifers using boreholes or dug wells and shafts. To be cost effective the city may explore locating and utilizing abandoned wells that have run dry as candidates for reverse drainage.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The City enforces watering schedules during the warmer months with high water usage. The City provides a phone number for residents to call to report violators.

Responsible Office/Partners: Public Works Department, Planning Department

Cost Estimate: $390 per acre foot

Benefits (Losses Avoided): Sustaining the City's aquifer may enable the city to assist our neighbors in the county by selling water to maintain the homes in the more rural areas where wells have run dry. This practice has been used in extreme drought years but recharging the aquifer may enable the City of Williams to continue this practice.

Potential Funding: Sustainable Groundwater Management Grant Program; Prop 68 Water Recycling

Timeline: 5 years

Project Priority: High

Action 4. Storm Drain Master Plan

Hazards Addressed: Flood – Localized Stormwater, Heavy Rains and Storms

Goals Addressed: 1, 3, 4, 5

Issue/Background: Storms tend to have grown in intensity. We are getting larger quantities of water in shorter periods of time and the city watershed flows are strained by the inability of the natural drainage system's ability to accept them.

Project Description: Create and adopt a new Storm Drain Master Plan.

Other Alternatives: Status quo, responding to issues rather than proactively planning for them.

Existing Planning Mechanism(s) through which Action Will Be Implemented: New Storm Drain Master Plan. Curbs gutters and sidewalks are required for future development, similarly open space requirements encourage the addition of impervious surfaces for water drainage. New subdivisions are often required to install detention basins to combat the increased water runoff.

Responsible Office/Partners: Public Works, Planning Department

Cost Estimate: To be determined.

Benefits (Losses Avoided): Reduced flood risk to people and property.

Potential Funding: Prop 1 Storm Water Grants Program (SWGP)

Timeline: 5 years

Project Priority: High

Action 5. Salt Creek Erosion Control

Hazards Addressed: Streambank Erosion, Floods 1%/0.2%

Goals Addressed: 1, 3, 4, 5

Issue/Background: Erosion and sedimentation at Old 99 bridge north of SR20. When Salt Creek overflows its banks, water heads south into the city limits under the SR20 bridge adjacent to the railroad. Every wet year, the city is forced to construct a temporary berm under the crossing to prevent the city from flooding from the north. In the past two years, we have also had to obtain permission to build that berm over the top of the railroad, closing the railroad as well as the street.

Project Description: Evaluate a create a plan to manage and keep water from flooding into the town from the north by increasing the capacity of water downstream from the city limits.

Other Alternatives: In order to prevent flow from Salt Creek or other conveyance systems from inundating the City, a flood wall or similar construction could be constructed at the Highway 99W and Hwy 20 underpass to keep flood stages to the north of Hwy 20.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Public Works department currently maintains the ditches along Old 99 as well as sections of Salt Creek.

Responsible Office/Partners: City of Williams Public Works, Colusa County Public Works

Cost Estimate: To be determined.

Benefits (Losses Avoided): Reducing flooding to the north of town will protect the homes and properties along North Street, Virginia Street, and North 7th Street.

Potential Funding: Floodplain Management, Protection, and Risk Awareness Grant Program (when open)

Timeline: 5 years

Project Priority: High

Action 6. Underground Powerlines

Hazards Addressed: Earthquake, Wildfire (PSPS)

Goals Addressed: 1, 3, 4

Issue/Background: The City of Williams has a high occurrence of high North winds that funnel down the I-5 corridor. The city has received multiple complaints and three formal claims caused by damage to cars or fences from fallen trees. The city received complaints in 2019, 2021, and 2022 with two occurrences of tree to car damage and one tree to fence. Similarly, high winds frequently remove power from the city.

Project Description: As the City of Williams continues to grow, we will continue to require undergrounding of all utilities. The City will also assess current utility poles and see if any meet the qualification criteria to be undergrounded using PG&E 20A funding. Many of the old power poles along Old Highway 99 sit in access points impeding ADA access to city streets which is a qualifier.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Planning Department requires new development to underground utilities.

Responsible Office/Partners: Planning Department

Benefits (Losses Avoided): Reduced risk of power failure, which can be a life safety issue for those dependent on medical devices.

Potential Funding: Rule 20A

Timeline: 5 years

Project Priority (H, M, L): High

Action 7. Healthy Trees Program

Hazards Addressed: Severe Weather – Heavy Rain and Storms, Climate Change, Drought

Goals Addressed: 1, 3, 4

Issue/Background: The City of Williams has a high occurrence of high North winds that funnel down the I-5 corridor. The city has received multiple complaints and three formal claims caused by damage to cars or fences from fallen trees. The city received complaints in 2019, 2021, and 2022 with two occurrences of tree to car damage and one tree to fence. Similarly, high winds frequently remove power from the city.

Project Description: Assess the health of all city trees for removal and replacement. Maintain and trim established trees to encourage growth. Add more trees to city properties increasing the tree canopy and reduce urban heat.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Planning Department currently requires all new developments to have at least one tree in the yard. In the established section of town, street tree removal is prohibited, with regular maintenance encouraged.

Responsible Office/Partners: Planning Department

Benefits (Losses Avoided): Improving the health of all trees in town will lessen the chance of people or personal properties being impacted from falling tree parts.

Potential Funding: Urban and Community Forestry Program; Extreme Heat and Resilience Program

Timeline: 5 years

Project Priority (H, M, L): High

Action 8. EQ Vulnerability Study and Retrofit of City Assets

Hazards Addressed: Earthquake

Goals Addressed: 1,2,3

Issue/Background: Several City assets are older and need to be evaluated for EQ vulnerability. This can be completed using Matterport 3D scanning that evaluates the structural integrity of the building. The city has used this in the past on the newly acquired Old Bowling Alley building.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be Implemented: Currently all building remodels are required to meet earthquake safety standards, this is enforced through the city's building code.

Responsible Office: City of Williams Building and Planning Departments

Potential Funding: National Endowment for Humanities

Benefits (Losses Avoided): Life and property preservation

Schedule: Three to Five Years

Priority (H, M, L): Low

Action 9. Detention Basin Construction (continuing from the 2018 LHMP)

Hazards Addressed: Flood: 100/200/500; Localized Flooding; Stream Bank Erosion, Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 4

Issue/Background: In order to prevent flow from Salt Creek or other conveyance systems from inundating the City, a detention basin(s) could be constructed in the north end of the city to capture the water, and then additionally smaller basins could be completed throughout the City to collect the water from the conveyances that are often overwhelmed during storm events. The city is currently in the design phase of a detention basin for the Northeast section of town where water from our developing Business Park is located.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be Implemented: Stormwater Master Plan

Responsible Office: City of Williams Planning Department

Cost Estimate: Approximately $137 million.

Potential Funding: CA DWR, Cal OES, FMA, BRIC, and HMGP grants.

Benefits (avoided Losses): Reduced flood risk, which reduces risk to people and property.

Schedule: As soon as possible

Priority (H, M, L): High

Annex C Colusa County Resource Conservation District

C.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Colusa County Resource Conservation District (CCRCD or District), a new participating jurisdiction to the 2024 Colusa 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 District. This Annex provides additional information specific to the District, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this District.

C.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Colusa County Hazard Mitigation Planning Committee (HMPC), the District 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 C-1. Additional details on Plan participation and District representatives are included in Appendix A.

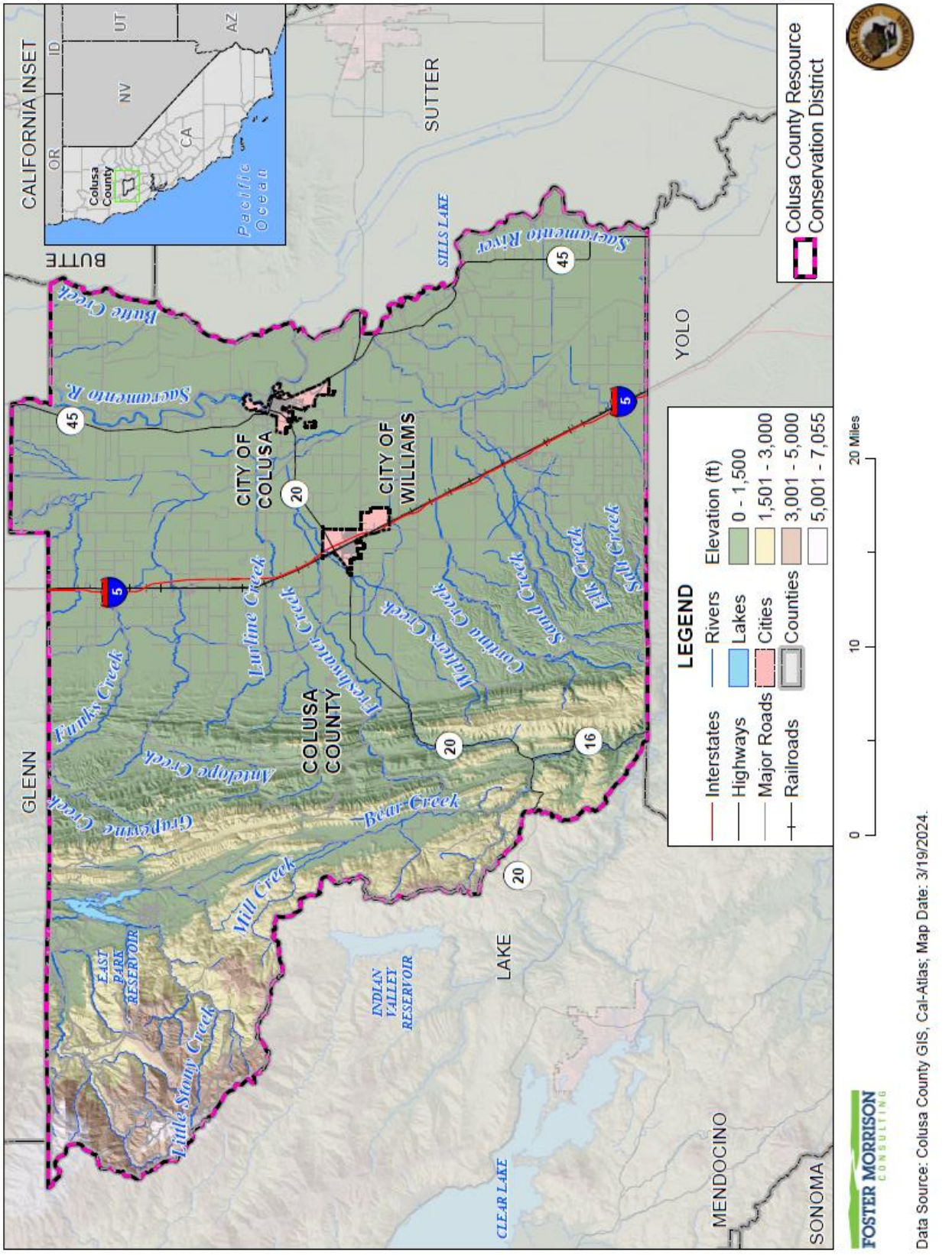
Table C-1 CCRCD – Planning Team

Name	Position/Title	How Participated
Liz Harper	Executive Director	Attended Meetings And Developed Plan
Margot Flynn	Sacramento Valley Climate And Agriculture Hub Coordinator	Attended Meetings And Developed Plan
Eduardo Blancas-Alcantara	Conservation Program Coordinator	Attended Meetings And Developed Plan

C.3 District Profile

The District profile for the CCRCD is detailed in the following sections. Figure C-1 displays a map and the location of the District within Colusa County.

Figure C-1 CCRCD



C.3.1. Overview and Background

Soil Conservation Districts, now known as Resource Conservation Districts or RCD's, were formed in the 1930's after the unparalleled ecological disaster known as the Dust Bowl. At the present time every county in the United States has a conservation district.

Originally Colusa County had two Districts, voluntarily organized by landowners, under the provisions of Division 9 of the Public Resource Code of the State of California. The Stonyford Resource Conservation District (Western portion of Colusa County) was formed in 1956 and the Colusa County Resource Conservation District (Eastern Colusa County) was organized in 1959. In 1996 the two separate districts merged to better serve the needs of Colusa County in its entirety. This united district became known as the "Colusa County Resource Conservation District."

The mission of the CCRCD is to protect, conserve, and restore natural resources through locally led education and implementation activities that support a healthy environment and provide economic sustainability through wise land use.

C.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 CCRCD 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 District's potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Overview and Background above, a risk assessment was performed for the District. This includes the following sections:

- C.4.1 District Assets Inventory and Growth and Development Trends
- C.4.2 Hazard Identification
- C.4.3 Hazard Profiles and Vulnerability to Specific Hazards

C.4.1. District Assets Inventory and Growth and Development Trends

This section provides an inventory of the District'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 District'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 District, potentially at risk to identified hazards as discussed in Section C.4.3 Hazard Profiles and Vulnerability to Specific Hazards.

- **Growth and Development Trends** – A discussion of growth and development trends in the District, both current and future, is presented.

Assets Inventory

The District's asset inventory is detailed in the following sections:

- People and Populations (Populations Served)
- 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 C.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the District. The District provides services to all landowners within the whole of Colusa County. People and populations in the County can be seen in 4.2.1 of the Base Plan.

Special Populations and Disadvantaged Communities

The District provides services to the whole of Colusa County. Special populations in the County can be seen in 4.2.1 of the Base Plan.

Structures and Critical Facilities

This section considers the CCRCD's assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan 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.***

CCRCD owns no facilities or properties.

Community Lifelines

Assessing the vulnerability of the District 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 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.

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 District as a partnership between the District, local cities, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the District's community lifelines overlap the County's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the District and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in the Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the District 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 CCRCD has the same boundaries as Colusa County. As such, the natural resources of the RCD parallel that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Historic and Cultural Resources

The CCRCD has the same boundaries as Colusa County. As such, the historic and cultural resources parallels that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the CCRCD to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the District.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. Economic assets for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Community Activities of Value

Inventorying economic assets in the District 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. Community Activities of Value for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Growth and Development Trends

As part of the planning process, the District 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.

Population Trends and Projections

General growth in the District parallels that of the Colusa County Planning Area as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Future Development Areas

The District has no control over future development in areas the District services. Future development in these areas parallels that of the Colusa County Planning Area. More general information on growth and development in Colusa County as a whole can be found in "Growth and Development Trends" in Section 4.2.2 of the Base Plan.

C.4.2. Hazard Identification

CCRCD identified the hazards that affect the District and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the District (see Table C-2).

Table C-2 CCRCD—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Extensive	Highly Likely	Critical	High	Medium
Climate Change	Extensive	Likely	Critical	High	–
Dam Failure	–	–	–	–	Medium
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake	–	–	–	–	Low
Floods: 1%/0.2% annual chance	–	–	–	–	Medium
Floods: Localized Stormwater	Limited	Highly Likely	Negligible	Medium	Medium
Landslide, Mudslide, and Debris Flow	–	–	–	–	Medium
Levee Failure	–	–	–	–	Medium
Severe Weather: Extreme Cold and Freeze	–	–	–	–	Medium
Severe Weather: Extreme Heat	–	–	–	–	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	–	–	–	–	Medium
Severe Weather: High Winds and Tornados	–	–	–	–	Low
Stream Bank Erosion	Limited	Highly Likely	Limited	Medium	Medium
Subsidence	Significant	Likely	Limited	High	Low
Wildfire	Significant	Likely	Limited	High	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 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

C.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 District (as identified in the Significance column of Table C-2) 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 District. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Colusa 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 Format

Each hazard is profiled in the following format:

- **Hazard Profile**—A hazard profile is included for each hazard. This includes information on:
  - ✓ A general discussion of the hazard and related issues.
  - ✓ **Location** and **Extent**—Location is the geographic area within the District 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. NCDC events are also discussed. A discussion of disaster declarations is included in each hazard section. Other past occurrence data specific to the District follows the disaster declarations 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 District to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. 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 District provided information on how the District is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same format as in Section C.4.1 above. This includes sections on: People and Populations Served; Structures and Critical Facilities, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the District and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset. Impacts are also affected by the community's ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by the hazard is also included.

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)

A new intentional disruption type of power shortage/failure event has been recently occurring 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), are coordinating to prepare 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 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

Local concerns of the District are the same as that of Colusa County as a whole. Those are found in Section 4.3 of the Base Plan

Ag Hazards: Severe Weather/Invasive Species

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

Hazard Profile

The County is highly agrarian. Farming and related agricultural industries are not only the backbone of Colusa County's economy, but 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 Colusa County and has continually grown and changed along with the County. Agriculture in the County can be affected by severe weather, as well as invasive species (pests and weeds).

According to the HMPC, agricultural losses occur on an annual basis and are usually associated with severe weather events, including heavy rains, floods, 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.

Invasive species are organisms that are introduced into an area beyond their natural range and become a pest in the new environment. This hazard addresses the issues related to invasive pests including those that pose a significant threat to the agricultural industry and are therefore a concern in the Colusa County Planning Area. This hazard does not address pest and plants that cause impacts to human health, as those issues are addressed in other planning mechanisms in the County.

Location and Extent

Agricultural hazards, including issues associated with severe weather as well as insects and pests, occur throughout the County where lands are used for farming and grazing. The larger County has large swaths of agricultural lands. Areas not as greatly affected by insects and pests are the cities in the County, as well as the upper portions of elevation 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: severe weather, as well as invasive species. 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. Invasive species like insect 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

There are no state or federal disaster declarations issued by Cal OES or FEMA. There have been 19 USDA Secretarial Disaster Declarations for the County since 2012 (as shown in the Past Occurrences in Section 4.3.12 of the Base Plan). 14 were from drought, 3 were from freeze, and 2 were from severe weather.

NCDC Events

The NCDC does not track agricultural events.

CCRCD Events

The CCRD noted the following events:

In **2021-2022**- Almond crop was severely damaged during the frost event.

In **2022**, walnut and other crops were damaged from an extreme heat wave, making their value drop in the market due to quality.

During the **2022** drought surface water supplies were significantly reduced. Colusa County planted 82,256 less acres of rice in 2022 and groundwater extractions resulted in a significant overdraft for the year and for the cumulative overdraft dating back to the previous drought.

Climate Change and Agricultural Hazards

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with agricultural hazards. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 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 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 to Invasive Species: Plants and Pests

According to historical hazard data, both severe weather affecting agriculture and invasive species (insect pests and weeds) are an annual occurrence in the District. If left unchecked, 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.

An assessment of a community's vulnerability to this hazard begins with an understanding of local exposure to the CCRCD. 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 entire District. These sections include assets at risk, impacts, and how future development can be affected by this hazard.

Local Concerns

The District and 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.

Permanent crops such as almonds and pistachios that rely on Bureau of Reclamation water allocations are a very significant economic asset. The orchards that rely on Tehama – Colusa Canal for conveyance are very dependent on Bureau of Reclamation surface water allocations because of limited groundwater conjunctive capacity. Rice acreage is also very dependent on surface water allocations.

Wildfire and fuel loads in high-risk areas for fire severity: Colusa County is two-thirds unirrigated land. These rain-fed systems are vulnerable to wildfires. The forest and rangeland in the district provide important habitat for wildlife and also important food sources for livestock.

Assets at Risk

Assets at risk from ag hazards include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

Agricultural hazards have a minimal effect on people and populations in the District. However, damage to crops from invasive and nuisance species can cause significant increases in food prices and food insecurity among low-income communities.

Structures and Critical Facilities

The District owns no facilities, so there are no structures or critical facilities at risk to this hazard.

Community Lifelines

Community lifelines will be minimally affected by agricultural hazards. This was discussed in greater detail in Section 4.3.12 of the Base Plan.

Natural, Historic, and Cultural Resources

Natural can be affected by agricultural hazards. Negative impacts of 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.12 of the Base Plan.

Impacts from Severe Weather/Invasive Species

According to the HMPC, the consequences of agricultural disasters to the District and larger Colusa County 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, the CCRCD, and the entire Colusa County Planning Area.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. A discussion on these items can be found in Section 4.3.12 of the Base Plan.

Future Conditions/Future Development

The District owns no property and has no plans to build facilities in the future. As such, the District will not be at future risk to this hazard.

Climate Change

Likelihood of Future Occurrence–Likely
Vulnerability–High

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 District 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 CCRCD, the Colusa 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.

CCRCD Events

The District Planning Team noted that all weather-based events correlate to the changing climate, most noteably climate change exacerbates the impacts of the weather event. No past events provided evidence solely linked to Climate Change.

Vulnerability to Climate Change

The whole of the District is at some measure of vulnerability to climate change. The District Planning Team has concerns that the vulnerability of the District will grow to be greater 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 District's Assets at Risk to this hazard.

Local Concerns

The District and 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.

The CCRCD's is concerned about the vulnerabilities of farms, ranches and wildland areas. These working and natural landscapes use, protect, conserve, and provide natural resources for the District.

Assets at Risk

Assets at risk from climate change include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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 socially vulnerable or underserved populations (as shown in the Special Populations discussion in Section C.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 and Critical Facilities

The District owns no facilities, so there are no structures or critical facilities at risk to this hazard.

Community Lifelines

Due to the slow onset of climate change, community lifelines in the District are expected to adapt over time to new climate normal. It is thought that community lifelines in the District would not be overwhelmed by climate change. This was discussed in greater detail in Section 4.3.7 of the Base Plan.

Natural, Historic, and Cultural Resources

The rivers, streams, agricultural areas, and open space areas of the District supports rich biodiversity, including many special-status species. These are all at risk from the effects of climate change. In addition, if heat contributes to changes in wildfire patterns, all areas (on land) of the District 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.7 of the Base Plan.

Impacts from Climate Change

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Central Valley region in which the District is part of:

- Increased temperatures
- Reduced precipitation
- Public health – heat and air pollution
- Reduced agricultural productivity (e.g., wine grapes)
- 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 District may be affected in the future by changes in population patterns (migration, density, or the makeup of socially vulnerable

populations), and changes in land use and development. A discussion on these items can be found in Section 4.3.7 of the Base Plan.

Future Conditions/Future Development

The District owns no property and has no plans to build facilities in the future. As such, the District will not be at future risk to this hazard.

Drought & Water Shortage

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile

Drought and water shortages are a complex issue 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.

Location and Extent

Drought and water shortage are regional phenomenon. The whole of the District 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

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. Current drought conditions in the District are shown in Section 4.3.9 of the Base Plan.

Past Occurrences

Disaster Declaration History

There have been one federal and three state disaster declarations from drought. This can be seen in Table C-3.

Table C-3 Colusa County – Federal and State Drought Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Drought	1	1977	3	1976, 2014, 2021

Source: Cal OES, FEMA

NCDC Events

There have been 58 NCDC drought events in Colusa County. These most likely had some impact on the District.

CCRCD Events

In 2022, 82,256 less acres of rice were planted due to water restrictions. Over 15,000 acre feet of groundwater were extracted in or near the area of subsidence impact for conveyance in the TC Canal under the Warren Act. Other portions of the groundwater aquifer were heavily extracted. Migratory bird and other wildlife habitat were drastically reduced due to the extensive fallowing of rice acreage.

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 District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

It is likely that climate change will increase the chance of future occurrence as well as future impacts. More information on future impacts 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 2021 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 in California, including the District, 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 CCRCD 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.

Tree Mortality and Drought

One of the specific impacts of drought in the District and Colusa County 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 District.

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.

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 District and 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.

The implementation of the proposed Bay-Delta Plan is a significant risk to the environment and economy of Colusa County. Regulatory drought imposed by Bay Delta curtailments is probably more detrimental than physical drought because surface water supplies will likely be curtailed even in years that in the past would not have had curtailments.

CCRCD has seen extensive losses in the riparian forest north of Colusa due to fire and drought. Many large trees on Sycamore slough have died.

Assets at Risk

Assets at risk from drought and water shortage include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

The people and populations of the District 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 District 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 District residents. Water shortages can have an effect on all of the population in the District, 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 and Critical Facilities

The District owns no facilities, so there are no structures or critical facilities at risk to this hazard.

Community Lifelines

While limited, community lifelines can have a vulnerability to drought and water shortage. Many of the District's community lifelines are the same as or similar to Colusa County's. Drought will most likely not overwhelm these community lifelines. This was discussed in greater detail in Section 4.3.9 of the Base Plan.

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 District are at risk to drought impacts and a reduction in water supply. These trees provide a wealth of social and environmental benefits to District 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. 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 District.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.9 of the Base Plan.

Impacts from Drought and Water Shortage

The vulnerability of the District to drought is Districtwide, 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.

Other qualitative impacts associated with drought in the District 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. Drought can also lead to turf losses and cause tree die off within the District and County.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. A discussion on these items can be found in Section 4.3.9 of the Base Plan.

Future Conditions/Future Development

The District owns no property and has no plans to build facilities in the future. As such, the District will not be at future risk to this hazard.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

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 District 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.

Location and Extent

The CCRCD is subject to localized flooding throughout the District. This is discussed in Table C-4 below. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District 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 District 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.

NCDC Events

The past occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile above.

CCRCD Events

The District noted the following past occurrences of localized flooding:

Flooding in winter **2022- 2023**- Impacted farmland and county infrastructure due to flash flood conditions. Water quality and quantity, flooding, and streambank erosion issues occurred.

The District also noted that in general, drought followed by heavy rain events impact the watersheds within the District.

Climate Change and Localized Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with localized flood. More information on future impacts to the District 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 District 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 District. 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 District are minor, localized flood events that are more of a nuisance than a disaster.

Many areas of the District 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 District's Assets at Risk to this hazard.

Local Concerns

The District and 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.

Historically, the District has been affected by flooding of streams and creeks occurring during heavy rain and storm events. Additional development in the District 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 District.

The District noted there are areas of inadequate drainage conveyance. Lack of dredging of sandbar, gravel, and sand in the Colusa Basin Drain north of College City south of Davis Weir Dam cause localized flooding. The District tracks localized flooding areas. Affected localized flood areas identified by the CCRCD are summarized in Table C-4.

Table C-4 CCRCD – List of Localized Flooding Problem Areas

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris	Downed Trees
Bailey Road	Yes	Yes	Yes			Yes	
Hahn Road	Yes	Yes				Yes	
Grime Arbuckle Rd	Yes					Yes	

Source: CCRCD

Assets at Risk

Assets at risk from localized flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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 District.

Structures and Critical Facilities

The District owns no facilities, so there are no structures or critical facilities at risk to this hazard.

Community Lifelines

Due to the relatively minor nature of localized flooding, community lifelines are unlikely to be overwhelmed. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.12 of the Base Plan.

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 District 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.12 of the Base Plan.

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. Localized flooding impacts may be exacerbated in the future due to the effects of climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change, changes in population patterns (migration, density, or the makeup of

socially vulnerable populations), and changes in land use and development. A discussion on these items can be found in Section 4.3.12 of the Base Plan.

Future Conditions/Future Development

The District owns no property and has no plans to build facilities in the future. As such, the District will not be at future risk to this hazard.

Stream Bank Erosion

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile

Erosion is the general process whereby rocks and soils are broken down, removed by weathering, or fragmented and then deposited in other places by water or air. Stream bank erosion poses problems for the District. The rate of erosion depends on many variables, including the soil or rock texture and composition, soil permeability, slope, extent of vegetative cover, and precipitation amounts and patterns. Erosion increases with increasing slope and precipitation and with decreasing vegetative cover, which includes areas where protective vegetation has been removed by fire, construction, or cultivation. The District is traversed by many waterways, including leveed areas. These locations are all subject to bank erosion. Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects.

Location and Extent

Stream bank erosion occurs on rivers, streams, and other moving waterways, including leveed areas, in the District. Erosion and deposition are occurring continually at varying rates over the Planning Area. Swiftly moving floodwaters cause rapid local erosion as the water carries away earth materials. This is especially problematic in leveed areas. Severe erosion removes the earth from beneath bridges, roads and foundations of structures adjacent to streams. By undercutting it can lead to increased rockfall and landslide hazard. The deposition of material can block culverts, aggravate flooding, destroy crops and lawns by burying them, and reduce the capacity of water reservoirs as the deposited materials displace water.

The speed of onset of stream bank erosion is slow, as the erosion takes place over periods of years. Duration of erosion is extended. Greater erosion occurs during periods of high stream flow and during storm and wind events when wave action contributes to the extent and speed of streambank erosion.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations related to erosion.

NCDC

The NCDC does not track stream bank erosion.

CCRCD Events

The CCRD noted that stream bank erosion is constantly occurring at various levels throughout the County. During every heavy rain, some measure of streambank erosion occurs.

Climate Change and Stream Bank Erosion

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with streambank erosion. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding and thereby erosion in Colusa County. 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. Future precipitation projections were shown in Section 4.3.4 of the Base Plan. 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. All of the events above could exacerbate stream bank erosion in the County.

Vulnerability to Stream Bank Erosion

Parts of the District located along streambanks are at some measure of vulnerability to streambank erosion. An assessment of a community's vulnerability begins with an understanding of local exposure to streambank erosion. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard.

Local Concerns

The District and 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.

Certain developed areas that abut creeks and rivers in the County are at risk to continued bank erosion. Levees are at risk to erosion as well, due to the channelization due to narrow river channels. Significant erosion can cause degradation and loss of levee stability. This is the main concern regarding erosion in Colusa County. This is the case in many locations, but a few examples are included here:

- Lack of shoulder for road on Road 1 at Yolo County Border from Tehama Colusa Canal west to the intersection of Road 1 and Road 84. There has been substantial erosion on both sides of Road 1 which could result in a falling power pole or a car overturning in the steep ditch.
- Deterioration of the east side of the Levee on the Colusa Basin Drain east of the Colusa National Refuge at MA12 7.0 – this has been deteriorating for over a year. There are markers which might indicate the site will be repaired. This levee is under the control of CA DWR out of its Hwy 20 office.

Assets at Risk

Assets at risk from streambank erosion include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations

Streambank erosion will have a minimal direct effect on District staff, people, and populations in the District. Indirect effects on people and populations include damages to roads or bridges from streambank erosion, causing transportation issues. Streambank erosion can also cause high sediment loads. While rare, this can cause water quality impacts. Water quality can be impacted causing health problems, especially to vulnerable populations where access to clean water supplies can be more challenging.

Structures and Critical Facilities

The District owns no facilities, so there are no structures or critical facilities at risk to this hazard.

Community Lifelines

Streambank erosion that causes levee failures presents a threat to life and property, including community lifelines in the District. Many of the District's community lifelines are the same as or similar to Colusa County's. Streambank erosion is not likely to overwhelm the community lifelines. These were discussed in greater detail in Section 4.3.15 of the Base Plan.

Natural, Historic, and Cultural Resources

Streambank erosion could cause levee failure flooding. 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.15 of the Base Plan.

Impacts from Streambank Erosion

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

These impacts may be exacerbated by the effects of climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. A discussion on these items can be found in Section 4.3.15 of the Base Plan.

Future Conditions/Future Development

The District owns no property and has no plans to build facilities in the future. As such, the District will not be at future risk to this hazard.

Subsidence

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

Land subsidence is defined as the sinking of the land over man-made or natural underground voids. Subsidence can result in serious structural damage to buildings, roads, irrigation ditches, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Weight, including surface developments such as roads, reservoirs, and buildings and manmade vibrations from such activities as blasting or heavy truck or train traffic can accelerate the natural processes of subsidence. In Colusa County, there are generally two types of subsidence of concern: subsidence from groundwater pumping and the settling of the ground over abandoned mine workings (i.e., the creation of sinkholes).

Location and Extent

Subsidence has been documented in some areas of the Sacramento Valley. In the Sacramento/San Joaquin Delta, subsidence has been associated with the drainage of organic soils and sediment compaction, which has been exacerbated by biological oxidation and extreme desiccation. Minimal subsidence locations in the District have been reported. According to the HMPC, any groundwater pumping areas in the eastern portion of the County may be at risk to subsidence. The HMPC noted that the Arbuckle area of the County is an area subject to subsidence associated with the drawdown of the water table. This is also where 5 wells went dry during the most recent drought.

There is no scientific scale or measurement system of subsidence. Changing elevations and groundwater tables can be measured over time, if areas are suspected of being affected by subsidence. The speed of onset of subsidence is slow, making it hard to determine with certainty that subsidence has occurred. According to the HMPC, subsidence in the District and County is caused by groundwater pumping, which affects the areas near the groundwater pumping area.

No known and mapped mining areas fall inside the District. However, it should be noted that not all mining locations in the District or County have been mapped and accounted for.

Past Occurrences

Disaster Declaration History

There have been no state or federal disaster declarations from subsidence.

NCDC Events

The NCDC does not track subsidence.

CCRCD Events

The District noted that subsidence occurs, but could recall no instances where damages in the County occurred.

Climate Change and Subsidence

It is possible that climate change will increase the chance of future occurrence as well as future impacts associated with subsidence. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Climate change may cause additional subsidence in the County during times of drought and additional groundwater pumping. Data is showing that the groundwater table is lowering causing subsidence in California which can be compounded by the changes in precipitation and periods of drought.

Vulnerability to Subsidence

Portions of the District are at some measure of vulnerability to subsidence. An assessment of a community's vulnerability begins with an understanding of local exposure to subsidence. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard.

Local Concerns

The District and 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.

The District noted there is significant subsidence near Arbuckle. The operational conveyance of the Tehama-Colusa Canal, I-5, and potentially the railroad tracts east of I-5 are all at risk.

OTHER SPECIFIC VULNERABILITY CONCERNS? WHICH AREAS ARE MOST LIKELY AFFECTED? WHICH AREAS WILL MITIGATION EFFORTS FOCUS ON?

Assets at Risk

Assets at risk from subsidence include people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

Since subsidence generally happens over a long period of time, there is only a minimal risk to people and populations, including vulnerable populations. Areas in the eastern portion of the Colusa County Planning Area around the District have had groundwater levels lowered due to pumping; and subsidence has occurred. Since subsidence from groundwater pumping is a slowly occurring phenomenon, it is unlikely to affect populations in the short term. Given the lack of data on mines in the District and County, it is unknown whether people or populations will have any measurable risk to mine-related subsidence.

Structures and Critical Facilities

The District owns no facilities, so there are no structures or critical facilities at risk to this hazard.

Community Lifelines

Community lifelines are unlikely to be affected by subsidence due to its slow onset. Many of the District's community lifelines are the same as or similar to Colusa County's. Subsidence is not likely to overwhelm the community lifelines. These were discussed in greater detail in Section 4.3.16 of the Base Plan.

Natural, Historic, and Cultural Resources

All natural, historic, and cultural resources in the District bear some measure of risk to subsidence. Gradual sinking could cause foundation damages. A sinkhole from an abandoned mine location could affect a

structure. Historic structures built when building codes were less restrictive may be at greater risk should a sinkhole occur. The likelihood of this is low.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.16 of the Base Plan.

Impacts from Subsidence

Effects of land subsidence in California include increased flood risk in low-lying areas, damage to buildings and infrastructure, loss of groundwater aquifers, and damage to aquatic ecosystems. As the land sinks, it can experience increased flooding and adverse impacts on sewer lines, stormwater drainage systems, and other impacts to critical facilities and infrastructure. As subsidence progresses, areas protected by levees can be impacted. Compaction of the aquifer system due to subsidence may permanently decrease its capacity to store water

These impacts may be exacerbated by the effects of climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. A discussion on these items can be found in Section 4.3.16 of the Base Plan.

Future Conditions/Future Development

The District owns no property and has no plans to build facilities in the future. As such, the District will not be at future risk to this hazard.

Wildfire

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile

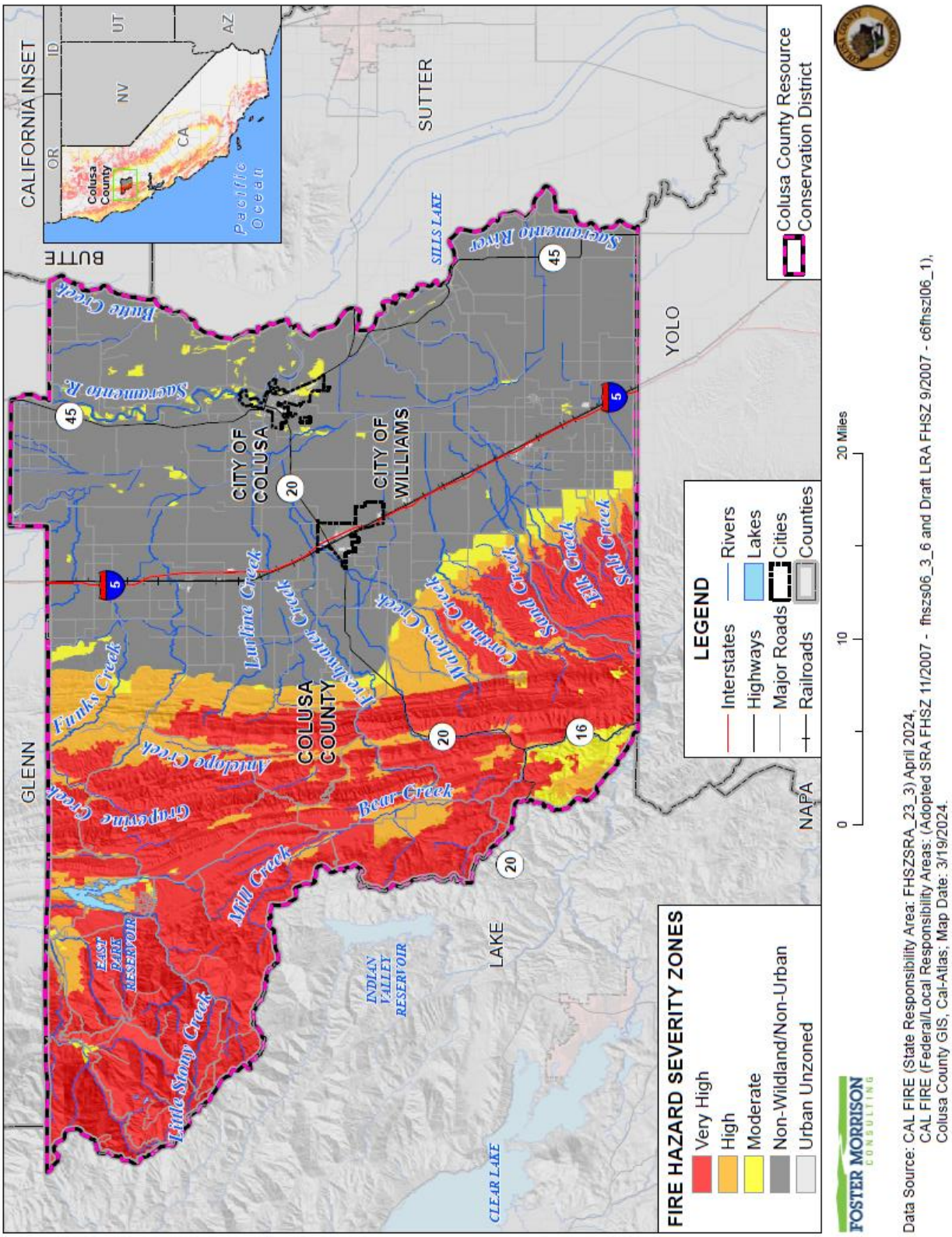
Wildland fire and the risk of a conflagration is an ongoing concern for the CCRCD. Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of 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 District. 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, urban 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.

Location and Extent

Wildfire can affect all areas of the District. CAL FIRE has estimated that the risk varies across the District and has created maps showing risk variance. Following the methodology described in Section 4.3.17 of the Base Plan, wildfire maps for the CCRCD were created. Figure C-2 shows the CAL FIRE Fire Hazard Severity Zone (FHSZ) in the District. As shown on the maps, FHSZs within the District range from Urban Unzoned to Very High.

Figure C-2 CCRCD – CAL FIRE Fire Hazard Severity Zones



Past Occurrences

Disaster Declaration History

There has been one federal and two state disaster declaration due to fire, as shown in Table C-5.

Table C-5 Colusa County – Federal and State Wildfire Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Wildfire	1	2018	2	1987, 2018

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked 13 wildfire events in the County dating back to 1993.

CCRCD Events

The District noted the following events:

Ranch Fire **2018**- Mendocino National Forest was burned significantly impacting the watershed above Stonyford.

Colusa River Fire **2021**- burned in wildlands along river threatening the town of Colusa. There remains dead standing trees with risk to those who recreate along the river and public park.

Princeton Fire **2022**- wildfire burned along river impacting wildlife and threatening the town.

Although it was not a major fire in acreage, there was a fire that destroyed the riparian forest on the Sacramento River north of Colusa in **2022**.

Sites Fire **2024**- destroyed rangeland and foothill habitat and ranching infrastructure with some structures destroyed, over 10,000 acres impacted.

Climate Change and Wildfire

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with wildfire. More information on future impacts to the District 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 4.3.17 of the Base Plan. Based on this model, Cal-Adapt predicts that wildfire risk in Colusa 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 Colusa 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 District from wildfire is of concern. Wildfires that occur in the District occur from a variety of both natural and manmade causes. The District can be affected both by fires that start on or near District lands as well as those that start elsewhere and move into the District. In addition to burning large areas of land, air quality can be affected in the District by fires occurring inside the District as well as those from many miles away. As growth continues and populations increase in the District, the potential for wildfires will also increase.

The whole of the District 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 District and unincorporated County has certain specific concerns regarding this hazard. The District concerns are the same as the County, which can be seen in Section 4.3.17 of the Base Plan.

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 the 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 North Complex Fire, as well as others that affected the nearby areas. This also occurred to some measure during every event listed in the Past Occurrences section above.

Assets at Risk

Assets at risk from wildfire include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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
- Elderly (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

Structures and Critical Facilities

The District owns no facilities, so there are no structures or critical facilities at risk to this hazard.

Community Lifelines

Wildfire presents a threat to life and property, including to community lifelines in the District. Many of the District's community lifelines are the same as or similar to Colusa County's. These were discussed in greater detail in Section 4.3.17 of the Base Plan. A large wildfire in the County could overwhelm community lifelines.

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 District, 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 affected and are often more vulnerable due to their older age, construction type, and lack of fire prevention infrastructure such as sprinklers.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.17 of the Base Plan.

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

District. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the District 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 District; smoke and air pollution from wildfires can be a severe health hazard. Smoke impacts may come from wildfires outside the District, as well as from within.

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

These impacts may be exacerbated by the effects of climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. A discussion on these items can be found in Section 4.3.17 of the Base Plan.

Future Conditions/Future Development

The District owns no property and has no plans to build facilities in the future. As such, the District will not be at future risk to this hazard.

C.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.

It should be noted (for all of the tables in the sections below) that these tables were designed to display capability information for a county or city. The District has very few of these capabilities, due to their lack of size, lack of complexity, as well as their lack of statutory ability to regulate. The District depends on other jurisdictions for many of these capabilities, and partners with them on case-by-case issues that affect the District.

C.5.1. Regulatory Mitigation Capabilities

Table C-6 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 CCRCD.

Table C-6 CCRCD'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	N	NA
Climate Change Adaptation Plan	N	Has not been created and reliant on county
Community Wildfire Protection Plan	Y	Project, Risk Assessment, Hazards Identified, Yes, updated 2021
Comprehensive/Master Plan	N	NA
Continuity of Operations Plan	N	NA
Economic Development Plan	N	NA
Land Use Plan	N	NA
Local Emergency Operations Plan	N	NA
Stormwater Management Plan	N	NA
Transportation Plan	N	NA
Other (describe)	Y	Long Range Plan (2023-2028)
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	N	
Building code	N	
Flood insurance rate maps	N	
Floodplain ordinance	N	
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	N	
Zoning ordinance	N	
Other	N	

How can these capabilities be expanded and improved to reduce risk?
The District will assist with planning and providing input on natural resource protection, management practices, and mitigation projects within any plan or ordinance. The CCRCD should be represented at plan development meetings especially the Climate Change Adaptation Plan

Source: CCRCD

CCRCD 5 Year Plan (2023-2028)

The CCRCD 5-Year Plan has multiple mitigation related planning mechanisms. These are shown in Table C-7.

Table C-7 CCRCD 5-Year Plan Mitigation Related Items

Funder/ Grant Agency	Project Name	Start Date	End Date	Award	Project Description	Potential Hazard Mitigation	Location in Colusa County
Natural Resource Conservation Service (NRCS)	Cooperative Agreement-Soil Health Technical Assistance	9/30/2021	7/31/2025	$180,000	Providing Technical Assistance to Private Landowners (Farmers/Ranchers) for soil health and management practices	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Cropland and Rangeland and post-fire forestland
Colusa Glenn Subwatershed Program (CGSP)	Program Support	1/1/2022	12/31/2024	$90,000	Provides reporting assistance and education/outreach to members that have irrigated cropland to adhere to water quality regulations	Subsidence, Drought and water shortages, Climate change, Water Quality	Cropland Colusa County
California Department of Fire and Forestry (CAL Fire)	2019 Forest Health Grant-Upper Little Stony Post Ranch Fire Watershed Restoration Project	4/22/2020	3/31/2024	$1,882,529	Post-fire watershed scale restoration and reforestation effort across 13 private innholders within the Goat Mt. area of the Mendocino National Forest.	Wildfire, Invasive Species, Climate Change, Landslide/Mudslide/Debris Flow	Mendocino National Forest
California Department of Fire and Forestry (CAL Fire)	2021 Forest Health Grant-Goat Mountain Forest Infrastructure Improvements for Fire Resilience	9/20/2021	3/31/2025	$1,619,686	Pest management and fuel break infrastructure improvements along private and public roadways.	Wildfire, Invasive Species, Climate Change, Landslide/Mudslide/Debris Flow	Mendocino National Forest

Funder/ Grant Agency	Project Name	Start Date	End Date	Award	Project Description	Potential Hazard Mitigation	Location in Colusa County
Department of Conservation (DOC)	Regional Fire and Fuel Capacity Program (RFFC)- Inter-Coastal Range	11/15/2021	3/31/2028	$1,187,120	Supports development and implementation of projects and plans to improve forest health and fire resiliency.	Wildfire, Invasive Species, Climate Change, Landslide/Mudslide/Debris Flow	All fuel types in Colusa County including forests, chaparral, oak woodland, grasslands, and riparian areas.
Napa County Resource Conservation District and Conservation Works	Regional Conservation Partnership Program- Building Fire Resiliency in California's Coast Range Forests and Grasslands)	9/21/2022	3/31/2026	$117,086	Provide technical and project financial assistance to grassland and forest landowners for wildfire prevention and/or recovery and overall forest/grassland health/resilience	Wildfire, Invasive Species, Climate Change, Landslide/Mudslide/Debris Flow	Private Rangeland and Forestland in Colusa County
California Department of Food and Agriculture (CDFA)	Climate Smart Agriculture Practices: Healthy Soils Incentive Program Technical Assistance	9/12/2021	3/31/2024	$58,799	Assist local landowners and managers with planning, implementing and applying for financial assistance for soil health management practices	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Private Lands in Colusa County, Ag Land
California Department of Food and Agriculture (CDFA)	Climate Smart Agriculture Practices: State Water Efficiency and Enhancement Program Technical Assistance	9/12/2021	3/31/2024	$58,086	Assist local landowners and managers with planning, implementing and applying for financial assistance for Irrigation water management practices	Climate Change, Ag Hazards (Dust Bowl), Erosion, Drought, Water Availability	Private Lands in Colusa County, Ag Land

Funder/ Grant Agency	Project Name	Start Date	End Date	Award	Project Description	Potential Hazard Mitigation	Location in Colusa County
California Department of Food and Agriculture (CDFA)	Continued-Climate Smart Agriculture Practices: State Water Efficiency and Enhancement Program Technical Assistance	11/1/2023	10/31/2026	$150,000	Assist local landowners and managers with planning, implementing and applying for financial assistance for Irrigation water management practices	Climate Change, Ag Hazards (Dust Bowl), Erosion, Drought, Water Availability	Private Lands in Colusa County, Ag Land
California Department of Food and Agriculture (CDFA)	Pollinator Habitat Program-Colusa County's Integrating Pollinator Habitat on Working Lands	5/1/2023	4/30/2026	$299,248	The grant funds will be used to incentivize conservation practices on working lands that create, enhance, or sustain pollinator habitat.	Loss of critical habitat, climate change, ecosystem health	Private Lands in Colusa County, Ag Land
County of Colusa	County Coordinator-Fire Mitigation Planning	4/18/2023	12/31/2024	$100,000	Development of county-wide education and collaboration among fire mitigation groups and stakeholders to organize and identify fire mitigation projects and efforts.	Wildfire, Invasive Species, Climate Change, Landslide/Mudslide/Debris Flow	All fuel types in Colusa County including forests, chaparral, oak woodland, grasslands, and riparian areas.
California Association of Resource Conservation Districts (CARCD) and Wildlife Conservation Board (WCB)	Climate Resilience Through Habitat Restoration	2/14/2023	2/28/2027	$250,000	Establishing and enhancing, Planting native plant species to support pollinating species (native bees, monarchs, flies, birds)	Loss of critical habitat, climate change, ecosystem health	Private Lands in Colusa County, Ag Land

Funder/ Grant Agency	Project Name	Start Date	End Date	Award	Project Description	Potential Hazard Mitigation	Location in Colusa County
Yolo County Resource Conservation District (YCRCD)	Agriculture Conservation Planning	6/15/2023	6/14/2025	$60,500	Creating conservation plans for private landowners who are interested in implementing conservation practices into their farm or ranch. These plans include Carbon Farm Plans, Habitat Restoration Plans, and Soil Health Plans	Climate Change, Ag Hazards (Dust Bowl), Erosion, Habitat, Stormwater Flooding	Private Lands in Colusa County, Ag Land
Carbon Cycle Institute (CCI)	Sacramento Valley Climate and Agriculture Regional Coordinator	7/1/2023	7/31/2026	$360,000	Funds a regional coordinator for the Sacramento Valley to promote and scale climate smart agriculture practices, develop regional partnerships and programs and advocate for funding to farms and ranches that employ natural resource conservation practices	Climate Change, Ag Hazards (Dust Bowl), Erosion, Habitat, Stormwater Flooding	Private Lands in Colusa County, Ag Land
Colusa Indian Community (CIC)	Healthy Soils Block Grant-Technical Assistance	pending	pending	$100,000	Assist local landowners and managers with planning, implementing and applying for financial assistance for soil health management practices	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Private Lands in Colusa County, Ag Land
Colusa Indian Community (CIC)	State Water Efficiency and Enhancement Program BLOCK Technical Grant Assistance	pending	pending	$100,000	Assist local landowners and managers with planning, implementing and applying for financial assistance for Irrigation water management practices	Climate Change, Ag Hazards (Dust Bowl), Erosion, Drought, Water Availability	Private Lands in Colusa County, Ag Land

Funder/ Grant Agency	Project Name	Start Date	End Date	Award	Project Description	Potential Hazard Mitigation	Location in Colusa County
Total Funds				$6,613,054			

Source: CCRCD 5-Year Plan

Additionally, the CCRCD has spearheaded or participated in multiple planning efforts. These are included below:

Colusa Basin Watershed Assessment (Colusa Basin – December 15th, 2008)

The Colusa County RCD was granted funding through the Department of Water Resources (DWR) as an implementing agency for the CALFED Bay Delta Watershed Program grant under Water Security, Clean Drinking Waters, Coastal and Beach Protection Act of 2002 (Proposition 50) for developing and implementing the Colusa Basin Watershed Assessment. The Colusa Basin Watershed (Basin) envelopes the upper portion of Yolo County, the majority of Colusa County, and the southern part of Glenn County with all the major tributaries draining into the Bay Delta in one way or another. The Colusa Basin Watershed Assessment can be characterized as a "current conditions report" and will help to illustrate where there are information gaps, what changes have occurred in the basin, why these changes happened, if they were good changes or bad changes, land use patterns, social characteristics, and more. The consulting firm H.T. Harvey and Associates worked on the information gathering process for the Assessment. The idea was not to reinvent the wheel, but to make it more functional. Our hope is that this working document will assist local stakeholders in making informed land management decisions that will improve the holistic health of the watershed.

Colusa Basin Watershed Management Plan (Colusa Basin – December 2016)

The health of our communities and natural resources is dependent upon the overall health of our watershed. Similarly, the health of our watershed is dependent upon the actions of those living within its boundaries. The Colusa County Resource Conservation District (CCRCD) Watershed Coordinator has created the Colusa Basin Watershed Management Plan (Plan) to function as a road map to watershed health by addressing the issues and concerns of stakeholders in the watershed and providing guidance in watershed stewardship through cooperative planning.

Bear Creek Watershed Assessment (Bear Creek – June 7th, 2010)

Bear Creek watershed encompasses 103 square miles (266 km2) at the interface of the North Coast Range on the west side of the Sacramento River Valley in Colusa County. The watershed has varied in terrain, from the nearly flat Bear Valley to steep, highly dissected canyons at the northwest, west, and southeast edges of the watershed. A series of rolling hills of blue oak woodland form the east boundary. Although the watershed is sparsely populated today, people over the past 150 years have transformed large portions of the landscape, particularly in Bear Valley and in Sulphur Creek sub watershed. Mercury mining, cattle ranching, and hot springs resorts have been the mainstays of the economic life of the watershed. The purpose/goals of this project are to improve water quality, restore hydrologic function, conserve topsoil and stabilize erosion-prone areas, protect and enhance biological diversity, and much more.

Colusa Basin Streambank Analysis (County of Colusa Streambanks – February 25th, 2010)

Following the completion of the Colusa Basin Watershed Assessment, a Streambank Analysis study was completed on 36 foothill streams in the watershed. These streams were mapped for erosion potential, riparian habitat quality and invasive species infestation. Next, 24 critical management reaches were selected that showed potential for restoration projects. The purpose of the Streambank Analysis study is to fill in some of the data gaps from the Watershed Assessment by defining areas along streams in the Colusa Basin Watershed that would benefit most from restoration projects. These projects will ultimately improve the overall health of the Watershed and quality of water flowing into the Bay Delta from the Colusa County streams.

Community Wildfire Protection Plan 2021 (Colusa County – January 2021)

In 2019, the CCRCD received funding through the California Fire Safe Council and from Colusa County to develop a Community Wildfire Protection Plan. This plan covers all wildland within the county addressing potential risks to wildfire and identifying projects that would protect the people and property of our county. These projects range from organizational projects such as developing a locally-led fire safe council and homeowner education to on-the-ground projects such as fuel management and prescribed fire.

Oak Woodland Management Plan (Colusa County's Rangeland and Oak Woodlands)

The Colusa County Resource Conservation District (CCRCD), along with local landowners worked over a long period of time to create an Oak Woodlands Management Plan (OWMP) for Colusa County. The OWMP was a non-regulatory, voluntary plan that will give landowners a tool to utilize in knowing how to practice better stewardship among the Oak Woodlands on their land. On May 18th, 2008, the CCRCD attended a board meeting of the Colusa County Board of Supervisors to answer questions that they might have about the proposed plan. There was minimal discussion to be had, and the plan was passed and adopted by the Board of Supervisors without reservation.

C.5.2. Administrative/Technical Mitigation Capabilities

Table C-8 identifies the District department(s) responsible for activities related to mitigation and loss prevention in CCRCD.

Table C-8 CCRCD'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	Non-regulatory agency
Civil Engineer, including dam and levee safety	N	Non-regulatory agency

Community Planner	N	Non-regulatory agency
Emergency Manager	N	Non-regulatory agency
Floodplain Administrator	N	Non-regulatory agency
GIS Coordinator	Y	Capable of mapping on GIS software
Planning Commission	N	Non-regulatory agency
Other	N	Non-regulatory agency
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	Y	We are grant funded so all projects, including those to mitigate risk are a result of successful grant writing
Hazard data and information	Y	Yes Wildfire
GIS analysis	Y	Yes Wildfire
Mutual aid agreements	N	We don't provide services that would require mutual aid agreements
Other	Y	Project identified and developed with private landowners impacted
How can these capabilities be expanded and improved to reduce risk?		
Seeking grant funds for a Climate Change Adaptation Plan will enhance the roadmap to hazard mitigation through climate change mitigation and adaptation in our natural and working lands. Adding remote sensing to existing GIS projects can help scale up the impact of our forestry and agricultural work through remote sensing		

Source: CCRCD

C.5.3. Fiscal Mitigation Capabilities

Table C-9 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table C-9 CCRCD'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	N	NA
Community Development Block Grant	N	NA
Federal funding programs (non-FEMA)	Y	Natural Resource Conservation Service
Fees for water, sewer, gas, or electric services	N	NA
Impact fees for new development	N	NA
State funding programs	Y	Calfiornia Dept of Food and Ag, Wildlife Conservation Board, Department of Conservation, Department of Water Resource, CalFire
Stormwater utility fee	N	NA

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?
Other	Y	Non-governmental agencies such as The Nature Conservancy, Carbon Cycle Institute, Zero Foodprint
How can these capabilities be expanded and improved to reduce risk?		
Diverse funding streams from both state and federal sources will ensure that programming at the district can continue to serve the community consistently and dependably. Building more non-agency partnerships open up opportunities to build capacity and grow district programming within our county. Adding a full-time grant writer to our district staff will also ensure continual funds are available for district operations and programming.		

Source: CCRCD

C.5.4. Mitigation Education, Outreach, and Partnerships

Table C-10 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 C-10 CCRCD's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	200 Subscribers
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	Y	Farm Show, Community Meetings
Local news	Y	Articles and Press Release in local paper
Organizations that interact with underserved and vulnerable communities	Y	CCRCD staff is fluent in Spanish to serve local landowners that are non-native English speakers
Social media	Y	400 Followers
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
The District provides programs and project funding for local landowners and partners to address and mitigate a natural resource concern. Campaigns to add to community newsletters and social media followers will be engaged and expanded.		

Source: CCRCD

C.5.5. Other Mitigation Efforts

The District has many other completed or ongoing mitigation projects/efforts that include the following:

Some of the previous 5-Year Plans had hazard mitigation components. Those are shown on Figure C-3.

Figure C-3 CCRCD – Past 5-Year Plan Mitigation Related Items

Funder/ Grant Agency	Project Name	End Date	Award	Project Description	Natural Resource Concern	Hazards	Location in Colusa County
Resource Conservation District of Tehama County	Firescape Mendocino (member)	6/30/2021	$1,000	Regional partnership building for agencies and other stakeholders that work within the Mendocino Nation Forest. Monthly meetings to share projects, develop partnership charter, and plan regional efforts	Forest Health, Watershed Health	Wildfire, Invasive Species, Climate Change, Landslide/Mudslide/Debris Flow	USFS and Private Lands within Colusa County and the MNF
California Fire Safe Council	Listos-Emergency Preparedness Program	5/14/2021	$3,000	Disperse marketing materials for emergency preparedness in Spanish and English throughout the County through online social platforms and in-person events	Wildfire, vegetation and watershed health	flood, wildfire, etc	Countywide
Community Alliance of Family Farms	Specialty Crop Hub Technical Assistance	12/31/2021	$4,500	A series of outreach events were planned to highlight conservation practices within orchard systems in Colusa, Glenn, Yolo, Solano counties	Soil-Farmland	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Private Lands in Colusa County, Ag Land
Yolo County Resource Conservation District (YCRCD)	Regional Carbon Hub Development to scale Carbon Farm Planning in the Sacramento Valley	2020	$3,250	This was a planning grant to solidify partners and assess potential climate impacts of agriculture in the Sacramento Valley and how to support farms and ranches adapt to climate change through conservation practice implementation	Soil, Sustainable Ag, Watershed Health, Habitat	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Private Lands in Colusa County, Ag Land

Funder/ Grant Agency	Project Name	End Date	Award	Project Description	Natural Resource Concern	Hazards	Location in Colusa County
Zero Food Print	Technical Assistance to a farm implementing soil health practice- compost application	6/1/2022	$1,200	CCRCD supported a farm plan, apply and verify a soil health practice. Often the CCRCD acts as a third-party to ensure funding is being used properly and practice is being implemented properly	Soil-Farmland	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Private Lands in Colusa County, Ag Land
One Tree Planted	Funds to purchase seedlings and plant in burn scare	10/31/2022	$45,643	Grant that funded the purchased of 400,000 trees to be planted in the Mendocino National Forest after a wildfire.	Forest Health, Watershed Health	Wildfire, Invasive Species, Climate Change, Landslide/Mudslide/Debris Flow	Private Lands within Colusa County and the MNF
County of Colusa	Community Wildfire Protection Plan	6/19/2020	$10,000	CCRCD planned and published a Community Wildfire Protection Plan through holding stakeholder meetings, identifying areas that are under threat of wildfire, and projects that mitigate the risk of wildfire damage to private property, human life, community assets and the environment	Forest Health, Watershed Health	Wildfire, Invasive Species, Climate Change, Landslide/Mudslide/Debris Flow	Countywide
California Fire Safe Council	Community Wildfire Protection Plan	6/19/2020	$10,000				
California Department of Food and Agriculture (CDFA)	2018 Healthy Soil Incentive Program Technical Assistance	6/30/2020	$44,000	Assist local landowners and managers with planning, implementing and applying for financial assistance for soil health management practices	Soil-Farmland	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Private Lands in Colusa County, Ag Land

Funder/ Grant Agency	Project Name	End Date	Award	Project Description	Natural Resource Concern	Hazards	Location in Colusa County
Carbon Cycle Institute (CCI) and California Association of RCDs (CARCD)	Carbon Farm Plan Development	6/30/2020	$15,000	The CCRCD created a Carbon Farm Plan for Davis Ranches in Colusa, County. The plan consisted of a series of recommended conservation practices that addressed the farm's natural resource concerns. The plan also provided the climate benefit if the conservation practice were implemented. The benefits quantified by calculating the metric tons of carbon or equivalent that is offset and/or captured from practice implementation.	Soil, Sustainable Ag, Watershed Health, Habitat	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Private Lands in Colusa County, Ag Land
Sutter County Resource Conservation District (SCRCD)	National Air Quality Initiative Program Technical Assistance	7/31/2021	$20,000	This program provides financial assistance to farmers that need to replace old tractors with new more efficient farming equipment. The technical assistant reviews contracts and plans then verifies the new tractor and the destruction of the old tractor.	Air Quality	Climate Change, Air Pollution	Private lands in Sutter County, Farmers replacing equipment

Funder/ Grant Agency	Project Name	End Date	Award	Project Description	Natural Resource Concern	Hazards	Location in Colusa County
The Nature Conservancy (TNC)	Outreach	9/31/2021	$5,400	Provided Outreach to private landowners to gauge interest in groundwater recharge and bird habitat return programs, which entailed flooding fields after harvest	Habitat, Groundwater Quantity, Watershed Health	Loss of critical habitat, climate change, ecosystem health, Drought, Groundwater Depletion	Private Lands in Colusa County, Ag Land
California Association of RCDs	Monarch Habitat Conservation Planning Grant	12/31/2022	$33,369	This was a planning grant to create habitat conservation plans on private lands within working lands. The habitat conservation plans suggested best management practices to provide and protect habitat for pollinators and the monarch butterfly. The RCD produced 4 plans.	Habitat, CA Native Species (plant and pollinating insects)	Loss of critical habitat, climate change, ecosystem health	Private Lands in Colusa County, Ag Land
Colusa Glenn Subwatershed Program (CGSP)	Program Support	12/31/2021	$53,280	Provides reporting assistance and education/outreach to members that have irrigated cropland to adhere to water quality regulation	Water Quality	Subsidence, Drought and water shortage, Climate change, Water Quality	Cropland Colusa County
University of California Cooperative Extension	Healthy Soils Demonstration Site	3/31/2023	$18,856	Assist local landowners and managers with planning, implementing and applying for financial assistance for soil health management practices	Soil-Farmland	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Private Lands in Colusa County, Ag Land

Funder/ Grant Agency	Project Name	End Date	Award	Project Description	Natural Resource Concern	Hazards	Location in Colusa County
Natural Resource Conservation Service (NRCS)	Cooperative Agreement-Soil Health Technical Assistance	7/31/2021	$180,000	Providing Technical Assistance to Private Landowners (Farmers/Ranchers) for soil health and management practices	Soil-Farmland	Climate Change, Ag Hazards (Dust Bowl), Erosion, Stormwater Flooding	Cropland and Rangeland and post-fire forestland

Source: CCRCD

C.6 Mitigation Strategy

C.6.1. Mitigation Goals and Objectives

The CCRCD adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

C.6.2. Mitigation Actions

The planning team for the CCRCD 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:

- Ag Hazards: Severe Weather/Invasive Species
- Climate Change
- Drought & Water shortage
- Floods: Localized Stormwater
- Stream Bank Erosion
- Subsidence
- Wildfire

Low priority hazards not considered for mitigation planning include

- Dam Failure
- Earthquake
- Floods: 1%/0.5%/0.2% annual chance
- Landslide, Mudslide, and Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)
- Severe Weather: High Winds and Tornados

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 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 plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Mitigation Actions

Action 1. Abandoned Agricultural Lands Pest Management

Hazards Addressed: Agriculture Hazards

Goals Addressed: 1, 3, 4, 6

Issue/Background: Colusa County has abandoned croplands that pose a threat to nearby productive land. A high number of invertebrate and vertebrate pests that live on unmanaged, abandoned land can cause crop damage to adjacent fields.

Project Description: Orchard removal, mulching to improve soil health, and reestablishing beneficial insect habitat.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Wildlife Conservation Board (WCB), CDFA, Colusa County Wildfire Mitigation Action Plan (2024)

Responsible Office/Partners: CCRCD, Colusa Agricultural Commissioner Office

Benefits (Losses Avoided): Pest management, crop damage mitigation

Potential Funding: CDFA, WCB

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 2. Beetle-killed Tree Removal

Hazards Addressed: Wildfire, Drought and Water Shortage, Climate Change, Ag Hazards

Goals Addressed: 1, 3, 4, 6

Issue/Background: Colusa County has a high number of bark-beetle infested trees that are now dead and require removal to minimize fire risk. Beetle populations increase over time and threaten infestation of healthy nearby trees.

Project Description: CCRCD will work with US Forest Service and local landowners to remove beetle infested trees.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Colusa County Community Wildfire Protection Plans, Colusa County Fire Mitigation Project (2024)

Responsible Office/Partners: CCRCD, US Forest Service

Benefits (Losses Avoided): Pest management, wildfire protection

Potential Funding: Cal Fire

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 3. Climate Action Plan

Hazards Addressed: Climate change

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: Climate change threatens the wellbeing of Colusa County residents, landowners, and natural resources. Drought, fire, flood, and severe weather are all poised to intensify as climate change continues to impact California. Greenhouse gas emissions contribute to the problem and must be identified and mitigated to make progress towards a more climate-resilient future.

Project Description: Typically led by the County, climate action plans have taken shape across the state and identify plans to mitigate greenhouse gas emissions. Climate action planning will require input from all major jurisdictions in the area. Colusa County RCD will support the writing of a climate action plan for the county and contribute to the natural and working lands section of the publication.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Governor's Office 30x30 – Working Lands Solutions

Responsible Office/Partners: Colusa County, CCRCD, Colusa Dept of Agriculture, Colusa County Air Resources Board, any additional County departments

Benefits (Losses Avoided): Damage and stress from climate change, minimizing pollution, improving air quality and quality of life for County residents and landowners

Potential Funding: State and federal grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 4. Climate-smart Agricultural Planning

Hazards Addressed: Climate change, air quality

Goals Addressed: 1, 3, 4, 6

Issue/Background: Climate change threatens the food security and economic viability of agriculture in Colusa 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 our region.

Project Description: CCRCD will incorporate conservation agriculture practices to conserve resources and limit the exacerbation of climate change, while also reaching farmers to aid in climate change adaptation and resiliency on farms.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Regional Climate and Agriculture Hub, CDFA programming

Responsible Office/Partners: CCRCD, USDA-NRCS

Benefits (Losses Avoided): Climate change adaptation and resiliency, carbon sequestration, mitigation of greenhouse gas emissions

Potential Funding: State ag grants, USDA grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 5. Update and Implement Community Wildfire Protection Plan

Hazards Addressed: Fire mitigation

Goals Addressed: 1, 3, 4, 6

Issue/Background: Wildfire threatens the hills of Western Colusa County and poses a risk to structures and valuable natural resources in the area. CCRCD has been forming a Community Wildfire Protection Plan to gain stakeholder input and develop a collective understanding of the risks and solutions associated with wildfire in the region.

Project Description: CCRCD will update the CWPP and work to implement project ideas in the county.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CWPP development, Fire Safe Council, Colusa County Coordinator Fire Mitigation Plan (2024)

Responsible Office/Partners: CCRCD, Cal Fire, County of Colusa Community Development, local fire authorities

Benefits (Losses Avoided): Decreased wildfire risk, high community input on climate solutions, conservation of natural resources (timber and natural lands)

Potential Funding: CAL FIRE grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 6. Colusa County Fire Mitigation Plan of 2024 Implementation

Hazards Addressed: Fire mitigation

Goals Addressed: 1, 3, 4,6

Issue/Background: Wildfire threatens the hills of Western Colusa County and poses a risk to structures and valuable natural resources in the area.

Project Description: CCRCD will implement projects outlined in the fire mitigation plan. This plan identifies new projects to be added to the community wildfire protection plan (CWPP) and reestablishes stakeholder engagement that began with the CWPP. New projects have been prioritized and identified through this effort between CCRCD and the County of Colusa Community Development Department. Projects include fuel breaks, prescribed burning on private lands, and community programs to increase defensible space in neighborhoods.

Other Alternatives: Deal with fires after the start.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CWPP, Fire Safe Council, Colusa County Coordinator Fire Mitigation Plan (2024)

Responsible Office/Partners: CCRCD, Cal Fire, County of Colusa Community Development, local fire authorities, US Forest Service

Benefits (Losses Avoided): Decreased wildfire risk, community input on climate solutions, conservation of natural resources

Potential Funding: CAL FIRE grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 7. Colusa County Fire Safe Council

Hazards Addressed: Fire mitigation

Goals Addressed: 1, 3, 4, 6

Issue/Background: Wildfire threatens the hills of Western Colusa County and poses a risk to structures and valuable natural resources in the area.

Project Description: CCRCD will support the development and oversight of a Fire Safe Council, which is a group of stakeholders that meet regularly to prioritize and implement projects outlined in wildfire mitigation plans.

Other Alternatives: Status quo.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CWPP, Fire Safe Council, Colusa County Coordinator Fire Mitigation Plan (2024)

Responsible Office/Partners: CCRCD, Cal Fire, County of Colusa Community Development, local fire authorities, US Forest Service

Benefits (Losses Avoided): Decreased wildfire risk, high community input on climate solutions, conservation of natural resources

Potential Funding: CAL FIRE grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 8. Groundwater Recharge

Hazards Addressed: Drought and water shortage, agriculture, subsidence

Goals Addressed: 1, 3, 4, 6

Issue/Background: Climate instability has led to increased extreme precipitation events. Due to the prevalence of extreme precipitation events and drought, it may prove beneficial to harness the surface runoff in wet years by recharging the aquifer.

Project Description: CCRCD will support farmers and landowners interested in installing groundwater recharge projects on their land.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: DWR Programming, USDA-NRCS Conservation Innovation, CDFA

Responsible Office/Partners: CCRCD, DWR, USDA-NRCS Conservation Innovation, CDFA, various NGOs

Benefits (Losses Avoided): Food security, long-term water storage for dry years, aquifer recharge/maintenance

Potential Funding: CA DWR, CDFA, USDA grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 9. Invasive Species Removal from Waterways

Hazards Addressed: Drought and water storage, agriculture

Goals Addressed: 1, 3, 4, 6

Issue/Background: California Invasive Plant Council (Cal IPC) mapped arundo and tamarisk throughout Colusa County watersheds and identified these species as an invasive species due to being high water demand plants, spreading vigorously, displacing native species and a fire hazard.

Project Description: CCRCD will work with a neighboring RCD and the Colusa Agriculture Department to continue removing arundo in upper Stony Creek and other water ways throughout the county.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Cal IPC report, Glenn County and Colusa County Community Wildfire Protection Plans

Responsible Office/Partners: CCRCD, Colusa County Dept of Agriculture, Glenn County RCD

Benefits (Losses Avoided): Invasive plant control, water security, streambank stability, wildfire protection

Potential Funding: Cal Fire, CDFA

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 10. Irrigation Efficiency Technical Assistance

Hazards Addressed: Drought and water shortage, agriculture

Goals Addressed: 1, 3, 4, 6

Issue/Background: Drought has worsened in the Sacramento Valley and water prices have risen, making agriculture less feasible for farmers in Colusa County and destabilizing our local food system.

Project Description: CCRCD will provide planning and financial assistance to farms to increase water use efficiency on farms. CCRCD will help farmers upgrade water and pumping infrastructure, introduce farmers to climate-smart agriculture, irrigation management, increase uptake of soil health practices, land management technical assistance for water quantity and quality.

Other Alternatives: No action, which may keep water prices higher for longer.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CDFA SWEEP, Regional Mobile Irrigation Lab

Responsible Office/Partners: CCRCD, USDA-NRCS, Yolo RCD, Glenn RCD

Benefits (Losses Avoided): Increased water use efficiency on farmland/farm adaptation to drought, food security, economic benefits for farmers

Potential Funding: CA DWR, CAL FIRE grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 11. Localized Stormwater Management and Streambank Erosion Mitigation

Hazards Addressed: Flooding, severe weather, stream bank erosion

Goals Addressed: 1, 3, 4, 5

Issue/Background: Climate instability has led to increased extreme precipitation events. Due to the prevalence of extreme precipitation events, Colusa County needs to adapt natural lands to be more resilient to flooding and waterway erosion.

Project Description: CCRCD will update our streambank erosion plan, update the Colusa Basin Watershed Assessment, restore floodplain/wetland habitat, do rangeland and upper watershed management

to mitigate erosion, instream restoration of stream beds, implement conservation practices along streambanks and ditches (grassed waterways, low water crossings)

Other Alternatives: Allow erosion to occur and fix on a case by case basis.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Colusa Basin Watershed Assessment, Streambank Erosion Plan, SGMA Action Plan

Responsible Office/Partners: CCRCD, DWR

Benefits (Losses Avoided): Reduced runoff, reduced soil erosion/loss, increased water quality

Potential Funding: CA DWR grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Action 12. On-farm Water Storage Projects

Hazards Addressed: Drought and water shortage, agriculture

Goals Addressed: 1, 3, 4, 6

Issue/Background: Drought has worsened in the Sacramento Valley and water prices have risen, making agriculture less feasible for farmers in Colusa County and destabilizing our local food system. Water storage provides a localized way to address this issue and improve the economic viability of farms and ranches.

Project Description: CCRCD will improve or install water storage on farms and ranches in Colusa County based on NRCS conservation practice recommendations. Rangeland planting for upper watershed management may also be included in this project.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CDFA SWEEP, DWR Programming

Responsible Office/Partners: CCRCD, USDA-NRCS

Benefits (Losses Avoided): Farm adaptation to drought, food security, long-term water storage for dry years, economic benefit for farmers, habitat establishment in upper watershed

Potential Funding: CDFA, CA DWR grants.

Timeline: 2025 – 2030

Project Priority (H, M, L): High

Annex D Cortina Community Services District

D.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Cortina Community Services District (CCSD or District), a new participating jurisdiction to the 2024 Colusa 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 District. This Annex provides additional information specific to CCSD, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this District.

D.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Colusa County Hazard Mitigation Planning Committee (HMPC), the District 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 D-1. Additional details on Plan participation and District representatives are included in Appendix A.

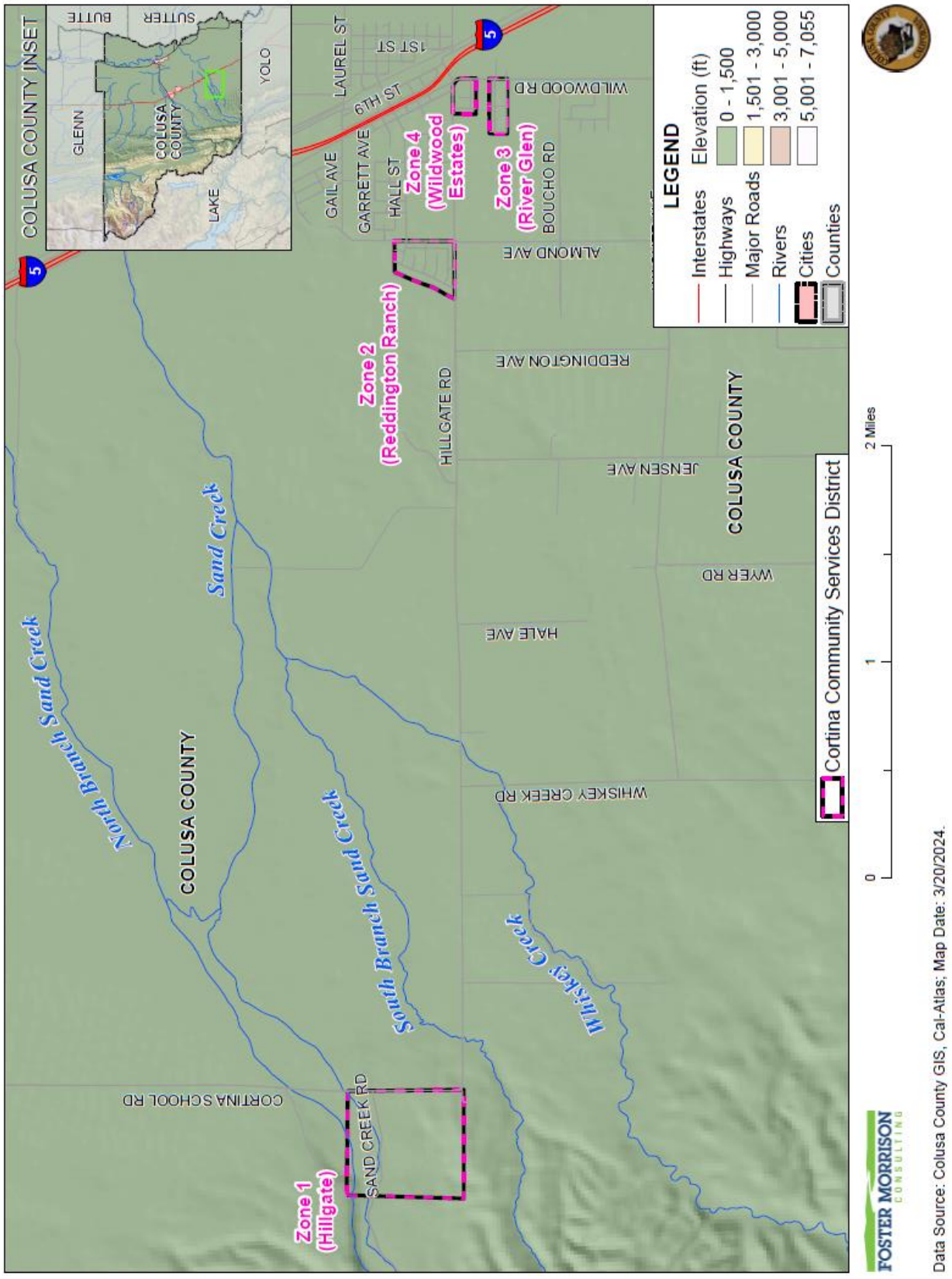
Table D-1 CCSD – Planning Team

Name	Position/Title	How Participated
Karl Drexel	General Manager	Provided data on hazards, facilities, capabilities, and mitigation actions. Attended HMPC meetings.

D.3 District Profile

The District profile for the CCSD is detailed in the following sections. Figure D-1 displays a map and the location of the District within Colusa County.

Figure D-1 CCSD



D.3.1. Overview and Background

The Colusa County Board of Supervisors passed Resolution 2005-40 for the formation of Cortina CSD and establishment of a Sphere of Influence coterminous with its boundaries. The establishment of the Cortina CSD in 2006 allowed the provision of necessary services for the four previously approved subdivision applications (totaling 225.53 acres) shown below:

- Hillgate (formerly Rancho Cortina) APNs: 018-250-018, (tax rate area 067-052) 018-250-019, 018-250-020, 018-250-017 (USA) Located at the northwest corner of Cortina School Road and Hillgate Road, west of Arbuckle.
- Reddington Ranch (now called Honey Grove) APNs: 018-280-010, 018-280-011, 018-280-013 Located at the northwest corner of Almond Avenue and Hillgate Road, west of Arbuckle. Annexed to Arbuckle PUD June 1, 2006 (Colusa LAFCO No. 2005-05, Tim Lewis).
- River Glen APNs: 020-200-01 through 41-- tax rate area 067-054 Located on the west side of Wildwood Road, north of Boucho Road, west of Arbuckle. Annexed to Arbuckle PUD 1992 (Colusa LAFCO No. 91-06, Arbuckle Land Company).
- Wildwood Estates (five lots are developed) APN: 021-300-018 Located and the southwest corner of Wildwood Road and Hillgate Road, west of Arbuckle. Annexed to Arbuckle PUD July 15, 2005 (Colusa LAFCO No. 2004-01, Tomlinson).

The development of these parcels into residential subdivisions created the need for the following services as authorized in Colusa LAFCO Resolution 2006-0002:

- Street light maintenance,
- Road/Street maintenance
- Pedestrian and/or bicycle trail maintenance
- Landscape maintenance
- Open space maintenance
- Collection, treatment and disposal of storm water
- Maintenance of drainage and floodway facilities
- Water not within the Arbuckle PUD or its Sphere
- Wastewater not within the Arbuckle PUD or its Sphere
- Police and Fire Infrastructure financing

The Cortina Community Services District is located west of Arbuckle. Arbuckle is a census-designated place (CDP) which means that census data is available for the community. The population was 3,424 at the 2020 census, 3,028 at the 2010 census, and 2,332 at the 2000 census. The area has seen consistent growth. The area is characterized by single-family residences, multiple-family units, some mobile homes, and commercial activities. Land surrounding Arbuckle is mostly agricultural including cultivated annual crops, and both active and unmaintained orchards (primarily almonds). Regional access is provided by the north-south running Interstate 5.

D.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 CCSD 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 District's potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Overview and Background above, a risk assessment was performed for the District. This includes the following sections:

- D.4.1 District Assets Inventory and Growth and Development Trends
- D.4.2 Hazard Identification
- D.4.3 Hazard Profiles and Vulnerability to Specific Hazards

D.4.1. District Assets Inventory and Growth and Development Trends

This section provides an inventory of the District'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 District'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 District, potentially at risk to identified hazards as discussed in Section D.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the District, both current and future, is presented.

Assets Inventory

The District's asset inventory is detailed in the following sections:

- People and Populations (Populations Served)
- 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 D.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the District. The District provides services to 780-800 people in approximately 208 residences. The day-to-day activities of the Cortina CSD are administered by a part time general manager, who is responsible for the work of independent contractors performing landscape and other maintenance services. The CCSD does not have any regular employees.

Special Populations and Disadvantaged Communities

The District noted that its special populations and disadvantaged communities mirror that of Arbuckle, CA as a whole. The CCSD serves a population with a median household income of $79,312. The District Planninte Team noted that there are disadvantaged communities in the District – namely those who are Hispanic or Latino, as well as the elderly. The District also parallels Colusa County as a whole. Those populations and communities can be found in more detail in Section 4.2.1 of the Base Plan.

Structures and Critical Facilities

This section considers the CCSD's assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan 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.***

Table D-2 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. CCSD's physical assets, valued at over $2 million, consist of the buildings and infrastructure to support the District's operations.

Table D-2 CCSD Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Reddington Ranch Greenway	Community Parkway/Greenway	$1,000,000	Floods: 1%,0.5%,0.2% Floods: Local Storm Water, Landslide Debris Flow, Stream Bank Erosion
River Glen Roads and Storm drains	Streets and Roads, Stormwater Retention	$1,000,000	Floods: 1%,0.5%,0.2% Floods: Local Storm Water, Landslide Debris Flow,
Total		**$2,000,000**	

Source: CCSD

Community Lifelines

Assessing the vulnerability of the District 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 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.

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 District as a partnership between the District, local cities, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the District's community lifelines overlap the County's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the District and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in the Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the District 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

CCSD has a variety of natural resources of value to the District. In 2006, the three residential developments went through a screening for natural resources of significance. Nothing unique to the District was found. It was noted that the District's natural resources parallels that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Historic and Cultural Resources

CCSD has a variety of historic and cultural resources of value to the District. In 2006, the three residential developments went through a screening for cultural and historical significance. Nothing unique to the District was found. It was noted that the historic and cultural resources parallels that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the CCSD to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the District.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. Economic assets for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Community Activities of Value

Inventorying economic assets in the District 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. Community Activities of Value for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Growth and Development Trends

As part of the planning process, the District 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.

Population Trends and Projections

The District noted there is has been limited past growth since surrounding agricultural land is developed by the County and it is rarely developed. The District has 208 houses it serves.

Future Development Areas

It is important to review future development plans for the District. 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 District has noted that there is no growth anticipated or future developments at this time.

D.4.2. Hazard Identification

CCSD identified the hazards that affect the District and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the District (see Table D-3).

Table D-3 CCSD—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	–	–	–	–	Medium
Climate Change	–	–	–	–	–
Dam Failure	–	–	–	–	Medium
Drought & Water shortage	–	–	–	–	High
Earthquake	–	–	–	–	Low
Floods: 1%/0.2% annual chance	Significant	Likely	Critical	High	Medium
Floods: Localized Stormwater	Significant	Likely	Critical	High	Medium
Landslide, Mudslide, and Debris Flow	–	–	–	–	Medium
Levee Failure	–	–	–	–	Medium
Severe Weather: Extreme Cold and Freeze	–	–	–	–	Medium
Severe Weather: Extreme Heat	–	–	–	–	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	–	–	–	–	Medium
Severe Weather: High Winds and Tornados	–	–	–	–	Low
Stream Bank Erosion	Significant	Likely	Critical	High	Medium
Subsidence	–	–	–	–	Low
Wildfire	–	–	–	–	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 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

D.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 District (as identified in the Significance column of Table D-3) 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 District. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Colusa 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 Format

Each hazard is profiled in the following format:

- **Hazard Profile**– A hazard profile is included for each hazard. This includes information on:
  - ✓ A general discussion of the hazard and related issues.
  - ✓ **Location** and **Extent** - Location is the geographic area within the District 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. NCDC events are also discussed. A discussion of disaster declarations is included in each hazard section. Other past occurrence data specific to the District follows the disaster declarations 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 District to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. 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 District provided information on how the District is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same format as in Section D.4.1 above. This includes sections on: People and Populations Served; Structures and Critical Facilities, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the District and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset. Impacts are also affected by the community's ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by the hazard is also included.

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)

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), are coordinating to prepare all Californians for the threat of wildfires and power outages during times of extreme (fire) weather. To help protect customers and communities during extreme weather fire events, electric power may be shut off for public safety in an effort to 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

The District noted that PSPSs have not been of concern. The irrigation system does run using electrical power but has not been defined as key infrastructure.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Likely
Vulnerability–High

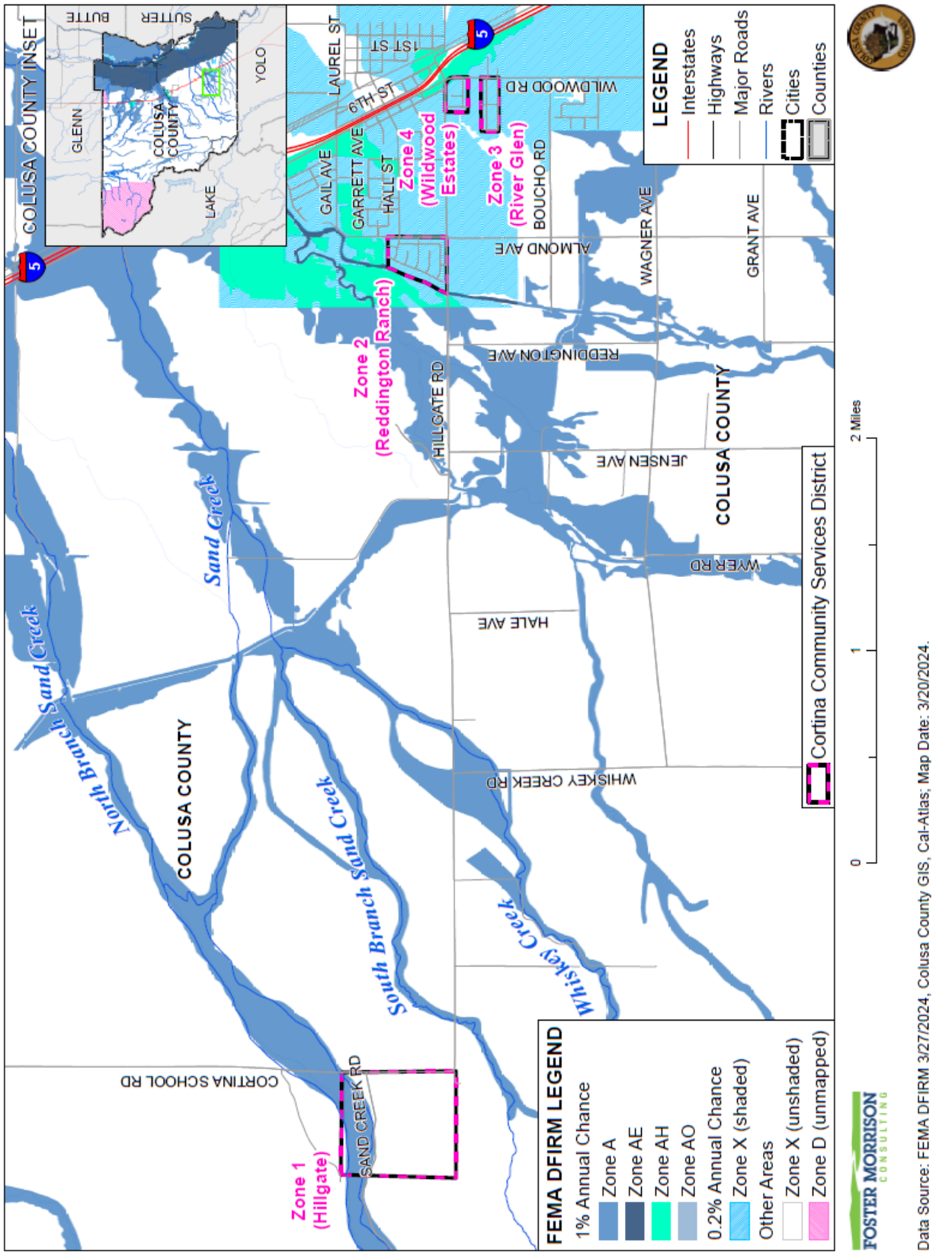
Hazard Profile

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 District and may have caused damage in the past. Flooding can be a significant problem in the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the District swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. 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.

Location and Extent

The CCSD has areas located in the 1% and 0.2% annual chance flood zones. This is seen in Figure D-2.

Figure D-2 CCSD – FEMA DFIRM Flood Zones



Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the District vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the District 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 District tends to have a shorter speed of onset, due to the amount of water that flows through the District.

Past Occurrences

Disaster Declaration History

A list of state and federal disaster declarations for Colusa County from flooding is shown on Table D-4. These events also likely affected the District to some degree.

Table D-4 Colusa County – State and Federal Disaster Declarations from Flood 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Colusa County has seen 14 events. These events most likely had some impact on the District.

CCSD Events

The District noted multiple recent storms.

2019 Flooding

In 2019 there were storms that affected the District. Heavy rains caused flooding in the District. Images from Barbara Way in the River Glen neighborhood are shown on Figure D-3 and Figure D-4.

Figure D-3 CCSD – 2019 Flooding on a Flood Retention Pond at Barbara Way in River Glen Neighborhood

Source: CCSD

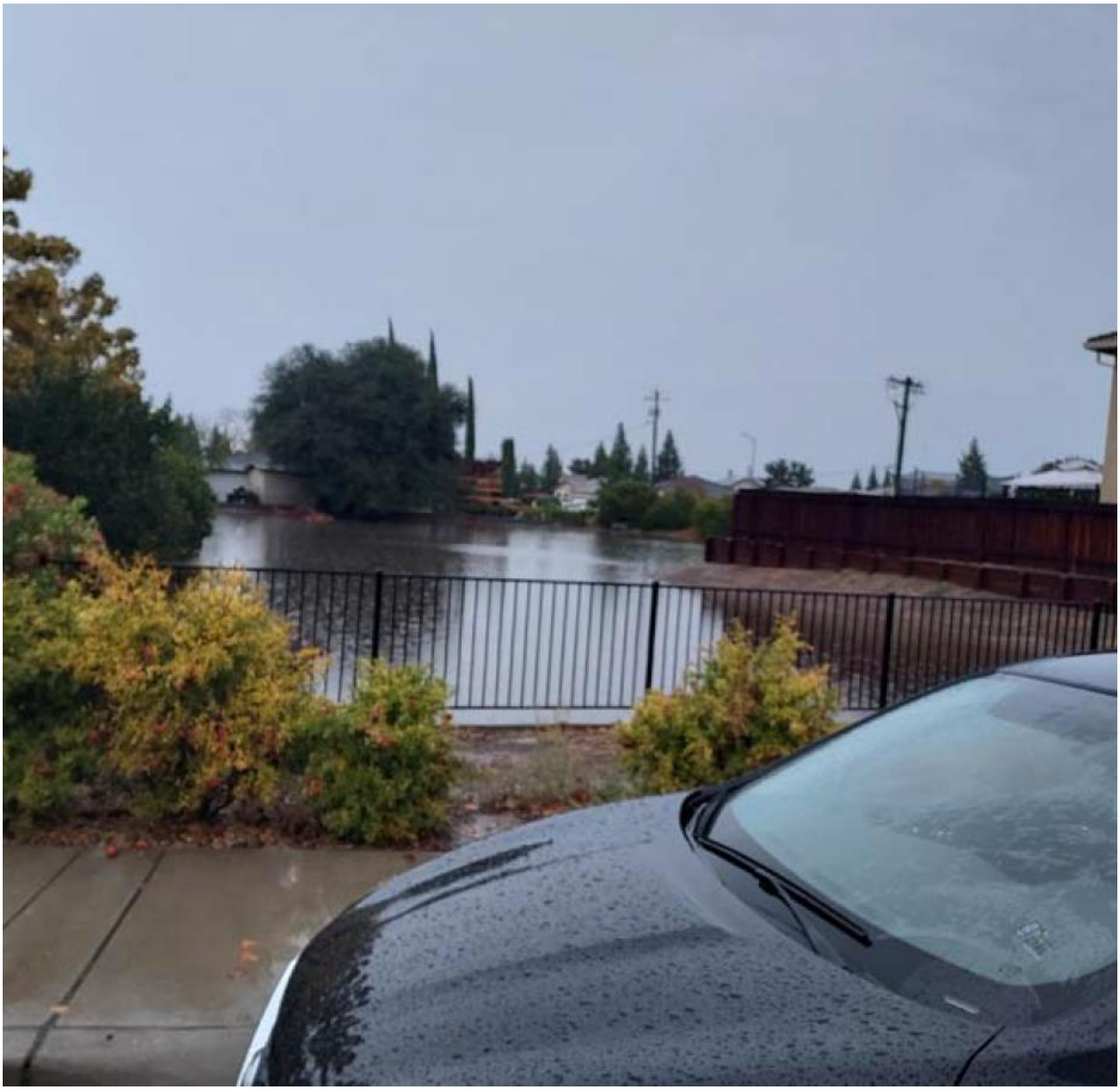
Figure D-4 CCSD – 2019 Street Flooding at Barbara Way and Wildwood

Source: CCSD

2021 Floods

Heavy rains caused flooding in the District. Images from flooding are shown on Figure D-5 and Figure D-6.

Figure D-5 CCSD – Flooding at Flood Retention Pond at Hall Road in Reddington Ranch



Source: CCSD

Figure D-6 CCSD – Flooding at Barbara Way and Wildwood (across from High School)

Source: CCSD

2023 Floods

Heavy rains and storms from atmospheric river events caused flooding in the District. This caused flooding on Salt Creek. This can be seen on Figure D-7. This caused streambank erosion in the District. More information on that erosion can be found in the Past Occurrences of the Stream Bank Erosion section below.

Figure D-7 CCSD – Flood Waters on Salt Creek in 2023

Source: CCSD

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 District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding in California and the Colusa County Planning Area, including the District. 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 District'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 District.

The whole of the District 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 District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

Within the District, the flooding and bank erosion during high rain events has been eroding the property next to the resident's greenway and walking path and potential park property. There are numerous residences adjacent to the walking path that over the years may be vulnerable to flooding if the bank continues to be wiped out by flood waters. The District's only infrastructure is the irrigation system that will also need to be replaced if the erosion continues. The Creek bank needs to be armored, while also considering the best environmentally sound way to eliminate future erosion. Removal of the built-up silt in the river bed to get the river flow directed back to the way it was, down the middle of the creek rather than directed toward the bank is also a priority for the District.

Assets at Risk

Assets at risk from flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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.

District 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. The District has only one employee who would be at risk during a flood event.

Structures and Critical Facilities

Certain structures in the District are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. The District noted that the properties and assets listed in Table D-2 are at risk to flooding.

Flooding presents a threat to threat to both critical facilities and infrastructure, as well as community lifelines. Critical infrastructure plays an immensely important role in our communities. Communities rely on roads, rail corridors, and related biking and pedestrian routes for transportation, and on water infrastructure for drinking water, wastewater service, and draining streets of rainwater. 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.

Community Lifelines

1% and 0.2% annual chance flooding presents a threat to life and property, including community lifelines in the District. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.11 of the Base Plan. Generally, even major flood events are temporary events with flood waters receding back to pre-storm levels at the conclusion of the storm. However, depending on the location, duration, and magnitude and severity of any given flood event, some of these community lifelines may be overwhelmed in the short term.

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 that fall in the flood zones shown on Figure D-2 would be vulnerable. This is especially true if a 0.2% annual chance flood event occurs.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.11 of the Base Plan.

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. 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 District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. While population projections for the area served by the District show additional expected growth, these anticipated future changes in population are expected to be relatively small, which limits additional impacts to the CCSD. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect streambank erosion in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

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 District may be built in the floodplain, in conformance to the standards of the floodplain ordinance. The District enforces the floodplain ordinance on new development in CCSD.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Likely
Vulnerability–High

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 District 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.

Location and Extent

The CCSD is subject to localized flooding throughout the District. This is discussed in Table D-5 below. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District 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 District 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.

NCDC Events

The past occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile above.

CCSD Events

Past events of flooding (where localized flood occurred) are discussed in the CCSD Events under Past Occurrences in the Flood: 1%/0.2% Annual Chance section.

Climate Change and Localized Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with localized flood. More information on future impacts to the District 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 District 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 District. 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 District are minor, localized flood events that are more of a nuisance than a disaster.

Many areas of the District 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 District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

Historically, the District has been affected by flooding of streams and creeks occurring during heavy rain and storm events. Additional development in the District 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 District.

The District tracks localized flooding areas. Affected localized flood areas identified by the CCSD are summarized in Table D-5. The District noted that there is a lack of bank stabilization in Salt Creek, as well as a lack of a storm drain system on County Road Wildwood for the River Glen neighborhood.

Table D-5 CCSD – List of Localized Flooding Problem Areas

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris	Downed Trees
Salt Creek	yes	yes	yes	yes	Bank Erosion	yes	no
Wildwood at Barbara	yes	yes	no	High water	Mud and debris	yes	no
Wildwood at Kleeman	yes	yes	no	High water	some	some	no

Source: CCSD

Within the District, the flooding and bank erosion during high rain events has been eroding the property next to the resident's greenway and walking path and potential park property. There are numerous residences adjacent to the walking path that over the years may be vulnerable to flooding if the bank continues to be wiped out by flood waters. The District's only infrastructure is the irrigation system that will also need to be replaced if the erosion continues. The Creek bank needs to be armored, while also considering the best environmentally sound way to eliminate future erosion. Removal of the built-up silt in the river bed to get the river flow directed back to the way it was, down the middle of the creek rather than directed toward the bank is also a priority for the District.

Assets at Risk

Assets at risk from localized flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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 District. The District has only one employee who would be at risk during a flood event.

Structures and Critical Facilities

Structures and critical facilities 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 damages.

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.

Community Lifelines

Due to the relatively minor nature of localized flooding, community lifelines are unlikely to be overwhelmed. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.12 of the Base Plan.

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 District 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.12 of the Base Plan.

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. Localized flooding impacts may be exacerbated in the future due to the effects of climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. While population projections for the area served by the District show additional expected growth, these anticipated future changes in population are expected to be relatively small, which limits additional impacts to the CCSD. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect streambank erosion in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Future development in the District will add more impervious surfaces causing an increase in stormwater runoff and the continued need to drain these waters. The District 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 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.

Stream Bank Erosion

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile

Erosion is the general process whereby rocks and soils are broken down, removed by weathering, or fragmented and then deposited in other places by water or air. Stream bank erosion poses problems for the District. The rate of erosion depends on many variables, including the soil or rock texture and composition, soil permeability, slope, extent of vegetative cover, and precipitation amounts and patterns. Erosion increases with increasing slope and precipitation and with decreasing vegetative cover, which includes areas where protective vegetation has been removed by fire, construction, or cultivation. The District is traversed by many waterways. These locations are all subject to bank erosion. Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects.

Location and Extent

Stream bank erosion occurs on rivers, streams, and other moving waterways, including leveed areas, in the District. Erosion and deposition are occurring continually at varying rates over the Planning Area. Swiftly moving floodwaters cause rapid local erosion as the water carries away earth materials. This is especially problematic in leveed areas. Severe erosion removes the earth from beneath bridges, roads and foundations of structures adjacent to streams. By undercutting it can lead to increased rockfall and landslide hazard. The deposition of material can block culverts, aggravate flooding, destroy crops and lawns by burying them, and reduce the capacity of water reservoirs as the deposited materials displace water.

The speed of onset of stream bank erosion is slow, as the erosion takes place over periods of years. Duration of erosion is extended. Greater erosion occurs during periods of high stream flow and during storm and wind events when wave action contributes to the extent and speed of streambank erosion.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations related to erosion.

NCDC

The NCDC does not track stream bank erosion.

CCSD Events

The District noted that in 2022/2023, 1,600 lineal feet of bank erosion occurred on Salt Creek along the Community parkway/greenway. This is typically an annual occurrence which the District noted high levels of concern. These events were confirmed to have occurred in 2019, 2021, 2023, and 2024. There have been multiple events before 2006, however exact dates are not available. This can be seen on the images on Figure D-8 and Figure D-9. Continued erosion without mitigation could erode all the way to houses adjacent to the Creek.

Figure D-8 CCSD – Streambank Erosion on Salt Creek

Source: CCSD

Figure D-9 CCSD – Streambank Erosion on Salt Creek

Source: CCSD

Other past events of flooding (where stream bank erosion likely occurred) are discussed in the CCSD Events under Past Occurrences in the Flood: 1%/0.2% Annual Chance section.

Climate Change and Stream Bank Erosion

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with streambank erosion. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding which contributes to erosion in Colusa County. 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. Future precipitation projections were shown in Section 4.3.4 of the Base Plan. 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. All of the events above could exacerbate stream bank erosion in the County.

Vulnerability to Stream Bank Erosion

Parts of the District located along streambanks are at some measure of vulnerability to streambank erosion. An assessment of a community's vulnerability begins with an understanding of local exposure to streambank erosion. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

The District noted that in 2022/2023, 1,600 lineal feet of bank erosion occurred on Salt Creek along the Community parkway/greenway. The District has concerns that continued erosion without mitigation could erode all the way to houses adjacent to the Creek. There is concern that longer and heavier storms due to climate change could worsen the problem.

Assets at Risk

Assets at risk from streambank erosion include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations

Streambank erosion will have a minimal direct effect on District staff, people, and populations in the District. Indirect effects on people and populations include damages to roads or bridges from streambank erosion, causing transportation issues. Streambank erosion can also cause high sediment loads. While rare, this can cause water quality impacts. Water quality can be impacted causing health problems, especially to vulnerable populations where access to clean water supplies can be more challenging. The District has only one employee who would be at risk during a flood or streambank erosion event.

Structures and Critical Facilities

Structures and critical facilities near rivers are at some risk from the effects of streambank erosion. Streambank erosion can undercut structure foundations causing instability and other issues. Structures that are in areas protected by levees are at greater risk of streambank erosion. Should levees erode quickly, their risk of failure increases. Those structures behind the levees would be at risk. This is discussed in greater detail in Levee Failure section above. 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 District noted that the properties and assets listed in Table D-2 are at risk to streambank erosion.

Community Lifelines

Streambank erosion that causes significant impacts such as levee failures presents a threat to life and property, including community lifelines in the District. Many of the District's community lifelines are the same as or similar to Colusa County's. Streambank erosion is unlikely to overwhelm community lifelines. These were discussed in greater detail in Section 4.3.15 of the Base Plan.

Natural, Historic, and Cultural Resources

Streambank erosion could cause levee failure flooding. 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.15 of the Base Plan.

Impacts from Streambank Erosion

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. While population projections for the area served by the District show additional expected growth, these anticipated future changes in population are expected to be relatively small, which limits additional impacts to the CCSD. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect streambank erosion in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires an understanding of both stream dynamics and the management of streamside vegetation.

Planned developments should take erosion risk areas into account during the construction of new homes and commercial properties

D.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.

It should be noted (for all of the tables in the sections below) that these tables were designed to display capability information for a county or city. The District has very few of these capabilities, due to their lack of size, lack of complexity, as well as their lack of statutory ability to regulate. The District depends on other jurisdictions for many of these capabilities, and partners with them on case-by-case issues that affect the District.

D.5.1. Regulatory Mitigation Capabilities

Table D-6 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 CCSD.

Table D-6 CCSD'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	N	
Climate Change Adaptation Plan	N	
Community Wildfire Protection Plan	N	
Comprehensive/Master Plan	N	
Continuity of Operations Plan	N	
Economic Development Plan	N	
Land Use Plan	N	
Local Emergency Operations Plan	N	
Stormwater Management Plan	N	
Transportation Plan	N	
Other (describe)		
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	N	
Building code	N	
Flood insurance rate maps	N	
Floodplain ordinance	N	
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	N	
Zoning ordinance	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
The Cortina CSD is fully built out with no commercial property and no economic development. The District also has limited ability to regulate this development. The District will continue to work with Arbuckle and the County on any planning or regulatory issues that arise.		

Source: CCSD

D.5.2. Administrative/Technical Mitigation Capabilities

Table D-7 identifies the District department(s) responsible for activities related to mitigation and loss prevention in the District.

Table D-7 CCSD'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	No District Staff
Civil Engineer, including dam and levee safety	N	No District Staff
Community Planner	N	No District Staff – Community built out
Emergency Manager	N	GM Assumes
Floodplain Administrator	N	GM Assumes
GIS Coordinator	N	County is GIS Coordinator
Planning Commission	N	District is built out
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	Y	GM Assumes
Hazard data and information	N	
GIS analysis	N	
Mutual aid agreements	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
The District has limited staffing. Only one employee is currently with the District, and serves in a part time capacity. Capabilities could be expanded by converting that employee to full time status. This would cause an impact to District finances.		

Source: CCSD

D.5.3. Fiscal Mitigation Capabilities

Table D-8 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table D-8 CCSD'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	N	
Community Development Block Grant	N	

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?
Federal funding programs (non-FEMA)	N	
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
State funding programs	N	
Stormwater utility fee	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
District Funding is through property assessments for street and road maintenance and street lights cannot be used for mitigation.		

Source: CCSD

D.5.4. Mitigation Education, Outreach, and Partnerships

Table D-9 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 D-9 CCSD's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	Occasional letter goes out to all community members
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	N	
Local news	N	
Organizations that interact with underserved and vulnerable communities	N	
Social media	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Nextdoor would be a good local news media. This will be researched and possibly used to expand these capabilities.		

Source: CCSD

D.5.5. Other Mitigation Efforts

The District has many other completed or ongoing mitigation projects/efforts that include the following:

- The District attempted to mitigate stream bank erosion and flood repairs after the 2022-2023 Winter Storm and were rejected. Joining the 2024 Colusa County LHMP should help the District secure possible funding streams in the future.

D.6 Mitigation Strategy

D.6.1. Mitigation Goals and Objectives

The CCSD adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

D.6.2. Mitigation Actions

The planning team for the CCSD 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:

- Flood: 1%/0.2% Annual Chance
- Flood: Localized Flood
- Stream Bank Erosion

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 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 plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Mitigation Actions

Action 1. Armor the Salt Creek Bank

Hazards Addressed: Flooding, Localized Flooding, Bank Erosion

Goals Addressed: 1, 3, 4, 5

Issue/Background: Salt Creek, running adjacent to the Reddington Ranch residential development and greenway, has flooded during high rain events and erodes the bank and the District's property and causes

localized flooding. The property next to the creek has been identified as a possible park site and further erosion would be devastating.

Project Description: To armor 1,600 feet of creek bank with rip rap or other environmentally acceptable armoring acceptable to California Department of Fish and Wildlife to prevent further erosion and flooding.

Other Alternatives: Continue to have flooding and erosion during high rain events

Existing Planning Mechanism(s) through which Action Will Be Implemented: Unknown

Responsible Office/Partners: Cortina Community Services District, Colusa County, Dept of Fish and Wildlife

Benefits (Losses Avoided): To protect further erosion an encroachment into District property and nearby residential area.

Potential Funding: Cal OES, FEMA HMGP

Timeline: Within 1 year if funding is available.

Project Priority (H, M, L): High

Annex E Kletsel Dehe Wintun Nation

E.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Kletsel Dehe Winun Nation (KDWN, Tribe, or Nation), a new participating jurisdiction to the 2024 Colusa 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 Nation. This Annex provides additional information specific to the Nation, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for the Tribe.

E.2 Planning Process

As described above, the Nation followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Colusa County Hazard Mitigation Planning Committee (HMPC), the Nation 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 E-1. Additional details on Plan participation and Nation representatives are included in Appendix A.

Table E-1 KDWN – Planning Team

Name	Position/Title	How Participated
Kelly Baucom	Environmental Director	Provided hazard ID table. Attended meetings. Provided input on annex development and drafts.
Charlie Wright	Tribal Chairman	Provided input on hazard ID table, local concerns on hazards and past events

E.3 Nation Profile

The Nation profile for the KDWN is detailed in the following sections. Figure E-1 displays a map and the location of the Tribe's lands within Colusa County. Figure E-2 shows the parcels that lie inside the Tribe's lands.

Figure E-1 KDWN

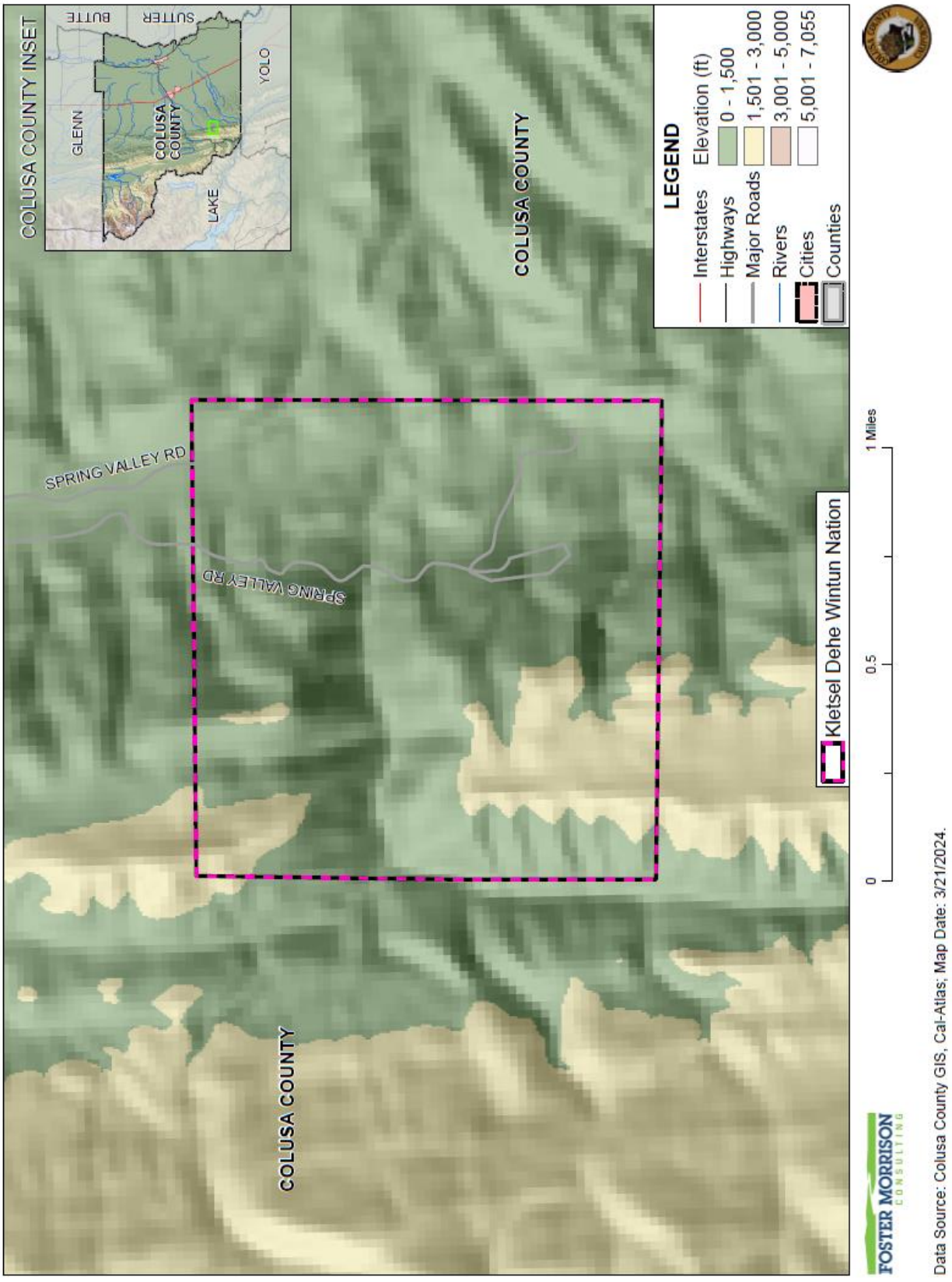
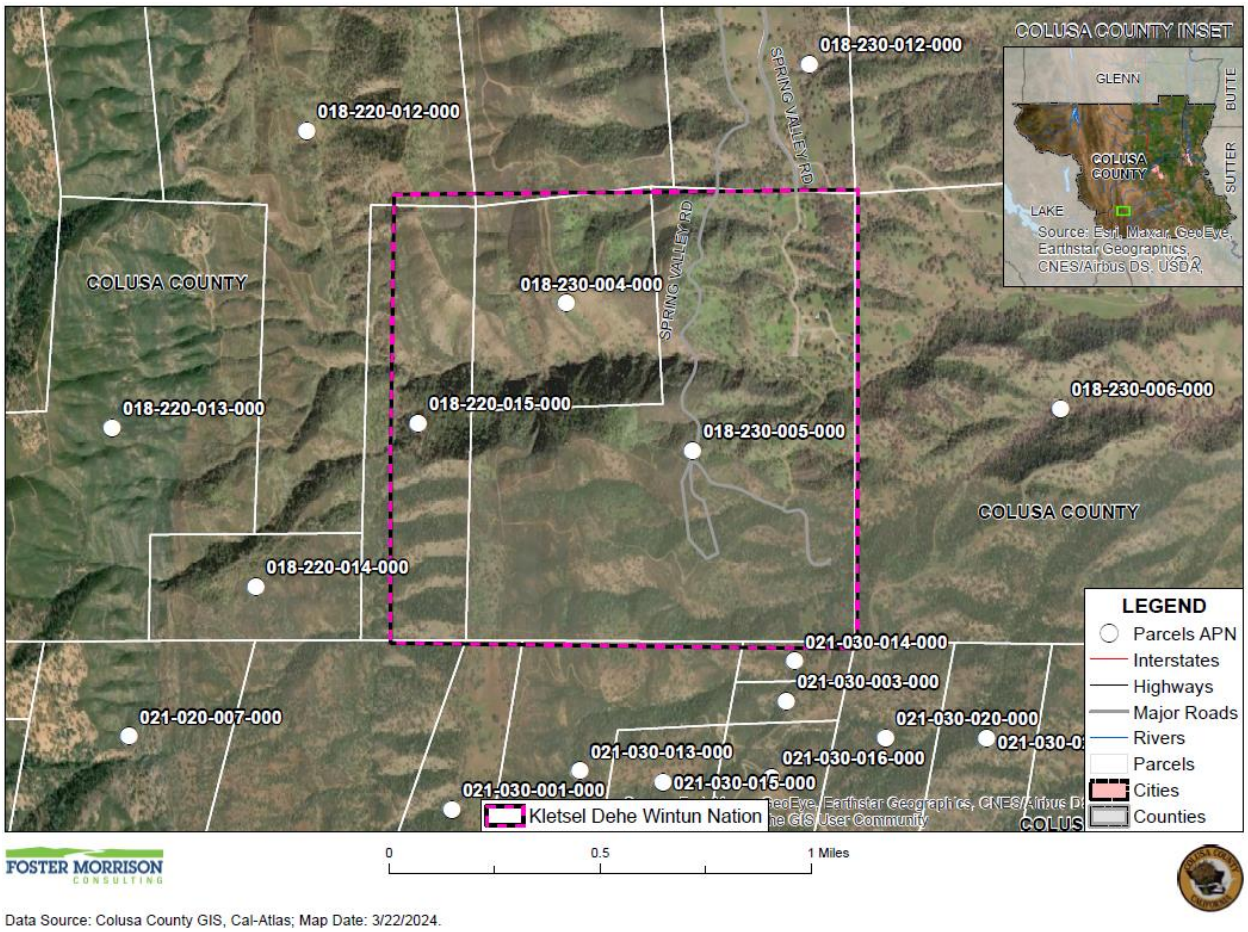


Figure E-2 KDWN - Parcels Map



Data Source: Colusa County GIS, Cal-Atlas; Map Date: 3/22/2024.

E.3.1. Overview and Background

The KDWN website noted that the Nation is a federally recognized tribal nation located in southwestern Colusa County, California. The Nation's population at present stands at 249 tribal citizens located primarily within a four-county service area in California including and adjacent to Colusa County. The Cortina Indian Rancheria was established on June 26, 1907, by order of the Secretary of the Interior, to set aside 160 acres of land for the exclusive use of the tribe, subsequently ordering an additional 480 acres of land adding to the initial trust land holdings bringing the total to 640 acres comprising the Cortina Indian Rancheria.

On December 15, 2018, the voters of the tribe amended the Constitution and Bylaws of the Cortina Band of Wintun Indians and adopted the Governing Law of the Kletsel Dehe Wintun Nation as well an updated name for the Nation, which was a return to the traditional name of the Nation while retaining the name of Cortina Rancheria as the official name of the Nation's federal trust land. The Kletsel Dehe Wintun Nation's historical territory encompassed much of southwestern Colusa County totaling more than 200 Square miles of oak forests, chaparral, foothills, canyons, creeks, springs, and parts of valley plains. The Nation identifies by its traditional name of Kletsel Dehe which means Home of the Ground squirrel Tribe, and by the specific name of Kletwin which means Ground Squirrel People, as well as more general names such as Wintun, Patwin and Hill-Patwin.

The Nation recognizes thirteen traditional villages that once comprised the villages of Kletwin Peoples including: Klet, Ko-Te-Nah, Nik-me, Shoo-Koo-ee, Ke-der Hlab-be, Loo-Kus, Bah-kah-'Hhlab-be, Cho-Che, Wi-Ko'Sel, Oo-Le, Mun-Maht-Lah, To-e-de-he, Yakut.

The Seal of Nation holds many symbolic meanings, starting from the center, four acorns arranged in for directions to pay respect to the primary traditional food source of the Nation, then a basket design known as the "Stairway to Heaven" design, followed by two sets of thirteen diamonds on either side to represent the thirteen traditional villages of the Nation, followed by the first federally recognized name of the Nation and establishment year of 1907, and followed finally by the current name of the Nation as the Kletsel Dehe Wintun Nation bracketed by four diamonds in four directions to honor balance in all directions with the primary colors of the Nation being red black and white.

A 2020 Water Quality Standards report for the KDWN noted that the KDWN Rancheria is located in southwestern Colusa County. The Rancheria covers 640 acres at the base of the Coast Range foothills. The topography mainly consists of rolling to steep hills with elevations ranging from 610 feet above mean sea level (msl) to 1,718 feet msl. There are six canyons and a relatively flat area on the northeastern portion of the Rancheria. The Rancheria is located within the Strode Creek Sub watershed of Cortina Creek Watershed. Strode Creek (i.e. Canyon Creek) drains into Cortina Creek (approximately 1.81 miles). From there the water continues down to the Colusa Basin Drainage Ditch (approximately 19.2 miles) and finally into the Sacramento River at Knights Landing (approximately 31.5 miles).

Strode Creek flows within Strode Canyon, the main topographic feature traversing through the Rancheria from west to east. Strode Creek is spring-fed and flows during the wet season (winter through spring) and is mostly dry during summer and early fall with the exception of some pooling within Strode Canyon. The Rancheria has had limited residences (currently less than five (5) housing units) mostly due to the lack of high-quality potable water.

The 2023 KDWN Emergency Response Plan noted that there are two major geologic formations underlying the Rancheria. The oldest of these, the Cortina Formation, covers roughly the western half of the Rancheria. It is characterized by steep, easterly dipping saline water-bearing rocks of the Cretaceous age, consisting of two separate units: an upper unit of interbedded sandstones, siltstones, and mudstones, and a lower unit that dominates most of the outcrop area and is characterized by a predominance of sandstone. The Cortina Formation is overlain by a Monoclinal fold, which covers the eastern third of the Rancheria, and consists of a distinctive formation of fresh water-bearing rocks of clay stone, which contain beds and lenses of poorly indurated conglomerate, sandstone, and siltstone.

The surface water resources of the Rancheria consist of approximately 7.65 miles of perennial, intermittent, and ephemeral streams in four main drainage ways, of which approximately 1.26 miles are perennial streams and 6.39 miles are ephemeral and intermittent streams. Additionally, there are nine seeps, one spring, and 0.011 acres of wetlands. Surface water flows and ponding are primarily a result of surface runoff during storm events, although some surface flow is a result of springs and seepage areas. The principal stream on the Rancheria is spring-fed Strode Creek, which is a third-order channel that drains a 4,800-acre (7.5-square-mile) watershed. Strode Creek and its ephemeral drainages flow into Cortina Creek at a point that is approximately 1.80 miles east of the Rancheria. Cortina Creek drains a (40.6-square-mile) watershed that flows 19.2 miles east-northeast to the Colusa Basin Drainage Canal, or (Irrigation Trough). The Colusa

Basin Drainage Canal drains a 650,000-acre (1,016-square-mile) watershed in the western Sacramento Valley, which continues southeast approximately 31.5 miles before discharging into the Sacramento River at Knights Landing.

E.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 KDWN 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 Nation's potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Overview and Background above, a risk assessment was performed for the Nation. This includes the following sections:

- E.4.1 Nation Assets Inventory and Growth and Development Trends
- E.4.2 Hazard Identification
- E.4.3 Hazard Profiles and Vulnerability to Specific Hazards

E.4.1. Nation Assets Inventory and Growth and Development Trends

This section provides an inventory of the Nation'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 Nation'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 Nation, potentially at risk to identified hazards as discussed in Section E.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the Nation, both current and future, is presented.

Assets Inventory

The Nation's asset inventory is detailed in the following sections:

- People and Populations (Populations Served)
- 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 E.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the Nation. The Nation has 249 members, though very few live on the tribal lands. Only five residences are currently on KDWN lands.

Special Populations and Disadvantaged Communities

The entire Nation is considered a disadvantaged community. Many are elderly and low-income residents. The Tribe is considered a SB 535 Disadvantaged Community.

Structures and Critical Facilities

This section considers the KDWN's assets at risk, with a focus on key Nation assets such as critical facilities, infrastructure, and other Nation assets and their values. With respect to Nation assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan 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.***

Table E-2 lists critical facilities and other Nation assets identified by the Nation Planning Team as important to protect in the event of a disaster. KDWN's physical assets, valued at over $1.5 million, consist of the buildings and infrastructure to support the Nation's operations. These can be seen on Figure E-3.

Table E-2 KDWN Critical Facilities, Infrastructure, and Other Nation Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Water Tank	Infrastructure	$25,000	Climate Change, Drought and Water Shortage, Landslide, Extreme Heat, Wildfire
Community Building	Building	Est. $1,100,000 $1,500,000?	Climate Change, Drought and Water Shortage, Landslide, Extreme Heat, Wildfire
Roads	Infrastructure	N/A	Landslide, Streambank erosion
Water Treatment Building	Building	$50,000	Climate Change, Drought and Water Shortage, Landslide, Wildfire

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Total		**$1,175,000-1,575,000**	

Source: KDWN

Figure E-3 KDWN Assets

Source: KDWN

Community Lifelines

Assessing the vulnerability of the Nation 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 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.

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 Nation as a partnership between the Nation, local cities, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the Nation's community lifelines overlap the County's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the Nation and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in the Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the Nation 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 KDWN has a variety of natural resources of value to the Nation. Some of these natural resources parallels that of Colusa County as a whole. A Water Quality Standards report noted natural resources in the Nation. It noted that surface waters indicate the ability to support wildlife habitat and aquatic uses. California species of special concern include the Northern Western Pond Turtle and Foothill Yellow-legged Frog, both have been observed in Strode Creek. To date neither of these two species have been Federally listed. The presence of fish on the Rancheria has not been documented. There are reports of sightings of a small fish in Strode Creek. Until the Nation can verify these sightings we will maintain the status of no fish on the Rancheria.

The Nation Planning Team noted that about 76% of the Rancheria supports blue oak-gray pine woodlands, 18% is occupied by non-commercial brush species, and 3% is non-forested. Riparian areas along streams make up about 3% of the Rancheria. No mining, quarrying, forestry, fishing, or other industry currently operates within the Rancheria.

Historic and Cultural Resources

KDWN has a variety of historic and cultural resources of value to the Nation. Many of these historic resources are sacred to the Nation and its members. Due to the sensitive nature of these locations, they are not presented in this LHMP Update.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the KDWN to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the Nation.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. There are limited economic assets in the Nation, due to its size, topography, and lack of potable water.

Community Activities of Value

Inventorying economic assets in the Nation 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. Community Activities of Value for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the Nation.

Growth and Development Trends

As part of the planning process, the Nation 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.

Population Trends and Projections

There is limited development that has occurred in the KDWN. Much of this is due to topography and a lack of water supply.

Future Development Areas

It is important to review future development plans for the Nation. 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. There are not future developments plans for the Nation at this juncture.

E.4.2. Hazard Identification

KDWN identified the hazards that affect the Nation and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the Nation (see Table E-3).

Table E-3 KDWN—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Significant	Likely	Limited	Low	Medium
Climate Change	Extensive	Highly Likely	Limited	High	–
Dam Failure	Limited	Unlikely	Negligible	Low	Medium
Drought & Water shortage	Extensive	Highly Likely	Critical	High	High
Earthquake	Extensive	Occasional	Critical	Low	Low
Floods: 1%/0.5%/0.2% annual chance	Significant	Occasional	Critical	Low	Medium
Floods: Localized Stormwater	Significant	Likely	Limited	Low	Medium
Landslide, Mudslide, and Debris Flow	Significant	Highly Likely	Critical	Medium	Medium
Levee Failure	Limited	Unlikely	Negligible	Low	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Highly Likely	Limited	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: High Winds and Tornados	Extensive	Highly Likely/ Occasional	Limited	Low	Low
Stream Bank Erosion	Significant	Highly Likely	Critical	Medium	Medium
Subsidence	Limited	Likely	Limited	Low	Low
Wildfire	Extensive	Highly Likely	Catastrophic	High	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 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

E.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 Nation (as identified in the Significance column of Table E-3) 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 Nation. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Colusa 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 Format

Each hazard is profiled in the following format:

- **Hazard Profile**– A hazard profile is included for each hazard. This includes information on:
  - ✓ A general discussion of the hazard and related issues.
  - ✓ **Location** and **Extent** - Location is the geographic area within the Nation 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. NCDC events are also discussed. A discussion of disaster declarations is included in each hazard section. Other past occurrence data specific to the Nation follows the disaster declarations 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 Nation to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. 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 Nation provided information on how the Nation is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same format as in Section E.4.1 above. This includes sections on: People and Populations Served; Structures and Critical Facilities, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the Nation and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset. Impacts are also affected by the community's ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by the hazard is also included.

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)

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), are coordinating to prepare 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 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

The Tribe is affected by PSPS shutoffs during periods of high fire danger. Loss of power can cause issues for residents including loss of HVAC systems during extreme heat, and loss of refrigeration for food preservation.

Climate Change

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

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 Nation 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 KDWN, the Colusa 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.

KDWN Events

Members of the KDWD Planning Team noted that groundwater wells continue to have to be dug deeper due to a lowering water table from extreme heat and climate change. Climate change is expected to exacerbate multiple other hazards that affect the Rancheria, including extreme heat and wildfire.

Vulnerability to Climate Change

The whole of the Nation is at some measure of vulnerability to climate change. The Nation Planning Team has concerns that the vulnerability of the Nation will grow to be greater 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 Nation's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

The 2017 KDWN Climate Action Plan noted that The findings of likely climate change for the Rancheria are that temperatures already are increasing and will continue to increase. The local climate data from the WEPA weather station suggests increases in summer maximum daily temperatures starting about 2014. Also, about 2013, winter daily maximum temperatures appear to show increased warming. WEPA monthly rainfall shows a trend of increases for the years 2011-2014 versus the years 2007-2010. Long-term data sets from climate stations in nearby cities in the northern California region suggest slow warming has been occurring since the 1960's. These long-term data precipitation data from Sacramento indicates a pattern of decline in precipitation beginning about 1995 with increases since 2001. The Cal-adapt website using Global Circulation Models (GCMs) downscaled for the general area of the Rancheria forecast increasing temperatures and precipitation. These models forecast increases in the annual mean of the daily maximum temperatures for the Rancheria of about 8° F by the end of the century. The Cal-adapt models for annual precipitation forecast a 12 % increase by the end of the century. A review of the literature shows a consensus that fire frequency is increasing in northern California and the western US, at least for acres burned or sizes of fires.

After reviewing the evidence for climate change, the effects on three areas considered most vulnerable for the Rancheria were assessed. These three areas were fire severity hazard, vegetation changes, and human health responses. Other areas such as ground water levels, ground water chemistry, soils and erosion, and wildlife species based on data sets of WEPA and discussion with WEPA staff were also considered but changes in these were judged to be due mostly to other factors than climate change. Though declines in groundwater elevations since 2003 may be related to changes in hydrology that could be climate related.

KDWN also noted that depth to water in groundwater wells shows a gradual decrease year-to-year due to prolonged drought conditions. There has been an increased risk of wildfires during summer months. Heat waves are more intense.

Assets at Risk

Assets at risk from climate change include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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 socially vulnerable or underserved populations, which includes the whole of the KDWN (as shown in the Special Populations discussion in Section E.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 and Critical Facilities

Climate change, on its own, does not generally impact structures. However, structures in areas of increased wildfire or flood 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. As with structures, critical facilities and infrastructure in areas of increased wildfire or flood 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 natural hazards.

Community Lifelines

Due to the slow onset of climate change, community lifelines in the Nation are expected to adapt over time to new climate normal. It is thought that community lifelines in the Nation would not be overwhelmed by climate change. This was discussed in greater detail in Section 4.3.7 of the Base Plan.

Natural, Historic, and Cultural Resources

The rivers, streams, agricultural areas, and open space areas of the Nation supports rich biodiversity, including many special-status species. These are all at risk from the effects of climate change. In addition, if heat contributes to changes in wildfire patterns, all areas (on land) of the Nation are at increased risk from fire – including areas of 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.7 of the Base Plan.

Impacts from Climate Change

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Central Valley region in which the Nation is part of:

- Increased temperatures
- Reduced precipitation
- Public health – heat and air pollution
- Reduced agricultural productivity (e.g., wine grapes)
- 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 Nation 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to get worse over time. Due to limited water resources, anticipated changes in population for the KDWN are relatively small, which limits

additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in future land use and development will affect climate change in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Climate change can influence development in the Nation over time. The Nation could see population fluctuations as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to affect the Nation. While there are currently no formal studies of specific migration patterns expected to impact the Nation, climate-induced migration was recognized within the UNFCCC Conference of Parties Paris Agreement of 2022.

Drought & Water Shortage

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

Hazard Profile

Drought and water shortages 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 is often 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.

Location and Extent

Drought and water shortage are regional phenomenon. The whole of the Nation 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

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. Current drought conditions in the Nation are shown in Section 4.3.9 of the Base Plan.

Past Occurrences

Disaster Declaration History

There have been one federal and three state disaster declarations from drought. This can be seen in Table E-4.

Table E-4 Colusa County – Federal and State Drought Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Drought	1	1977	3	1976, 2014, 2021

Source: Cal OES, FEMA

NCDC Events

There have been 58 NCDC drought events in Colusa County. These most likely had some impact on the Nation.

KDWN Events

During the most recent drought (from 2014 until 2022), KDWN had issues with drought and water shortage impacts. Tree mortality, plant moisture stress and increased insect populations occurred, causing increased fuel load and reducing forest resilience to wildfire. There were increasing invasive species such as yellow starthistle that choked out native species.

Climate Change and Drought and Water Shortage

It is likely that climate change will increase the chance of future occurrence as well future impacts associated with drought and water shortage. More information on future impacts to the KDWN 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 2021 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 2017 KDWN Climate Plan noted that groundwater elevations do not track annual precipitation totals very well. The increase in groundwater elevations between 1995 and 2003 occurred during the period of

apparent decrease in total annual precipitation. The decline in groundwater elevations, particularly since 2013 has occurred during an apparent increase in total annual precipitation. Perhaps one would need to examine the rainfall intensity events as some models predict more rain but in more intense storm events. Indeed, the year-to-year variability of annual rainfall is increasing since 2011 and the WEPA data show two months of unusually high precipitation in 2012 and 2014. More intense rainstorms while increasing total rainfall, will likely result is a greater proportion of the rainfall to be diverted as runoff and reduced infiltration to the underlying aquifer.

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 in California, including the Nation, 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 Nation 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.

Tree Mortality and Drought

One of the specific impacts of drought in the Nation and Colusa 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 Nation.

The tree mortality and dieback problem 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.

The whole of the Nation 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 Nation's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

The KDWN relies on a network of groundwater wells. However, water produced by these wells is not potable due to naturally high saline and mineral concentrations. Residences instead make use of 2 solar distillation panels at each house, which provide potable water at low quantities (3-5 liters/day). Prior to installation of solar panels (Summer 2023), residents had to purchase potable water and bring it onto the Rancheria.

The 2023 KDWN Emergency Response Plan noted that Groundwater elevation contours reveal substantial differences in the gradients between the Cortina and Tehama Formations, both of which are present below the Rancheria. Depth to groundwater on the Rancheria was found to range from zero to as much as 280 feet below the ground surface, and contours of first encountered groundwater in the Cortina Formation indicate a subdued image of the surface topography and a generally eastward flow, with a steep gradient (25 percent to 50 percent) in some areas. The groundwater table in the Tehama Formation, unlike the Cortina Formation, does not appear to be influenced by topography, even though the groundwater has an eastward flow direction. Groundwater elevations in the Tehama Formation are much more consistent than in the Cortina Formation, which runs consistently between 610 and 670 feet above sea level. Wells completed in the Tehama Formation above these elevations are dry. These observations suggest that the Tehama Formation is both more transmissive and more homogeneous than the Cortina Formation. Although the Tehama contains apparently low-permeability materials, groundwater occurs under unconfined conditions. Monitoring wells drilled in 1995 into the Cortina and Tehama layers have shown varied degrees of water quality and quantity.

Assets at Risk

Assets at risk from drought and water shortage include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

The people and populations of the Nation 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 Nation 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 Nation residents. Water shortages can have an effect on all of the population in the Nation, 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 and Critical Facilities

Most Nation structures and critical facilities 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 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. 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.

The District noted the following assets (from Table E-2) at risk to drought:

- Water Tank
- Community Building
- Water Treatment Building

Community Lifelines

While limited, community lifelines can have a vulnerability to drought and water shortage. Many of the Nation's community lifelines are the same as or similar to Colusa County's. Drought is unlikely to overwhelm community lifelines. This was discussed in greater detail in Section 4.3.9 of the Base Plan.

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 Nation are at risk to drought impacts and a reduction in water supply. These trees provide a wealth of social and environmental benefits to Nation 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. 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 Nation.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.9 of the Base Plan.

Impacts from Drought and Water Shortage

The vulnerability of the Nation to drought is Nationwide, 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 can also lead to turf losses and cause tree die off within the City.

Other qualitative impacts associated with drought in the Nation 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 Nation 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. With respect to changes in populations, due to the current limited water supplies, anticipated changes in population are relatively small, which limits additional impacts. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect drought and water shortage in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions

As the population in the area continues to grow, so will the demand for water. Ongoing planning will be needed by the Nation and water companies to account for population growth and increased future water demands. The Nation continues to make efforts to be proactive on future drought and water supply issues.

Landslide, Mudslide, and Debris Flow

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile

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.

Natural 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 the Wildfire section below)
- Road building, excavation, and grading
- Earthquake

The 2023 California State 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 sloped areas that reside in the in the Nation.

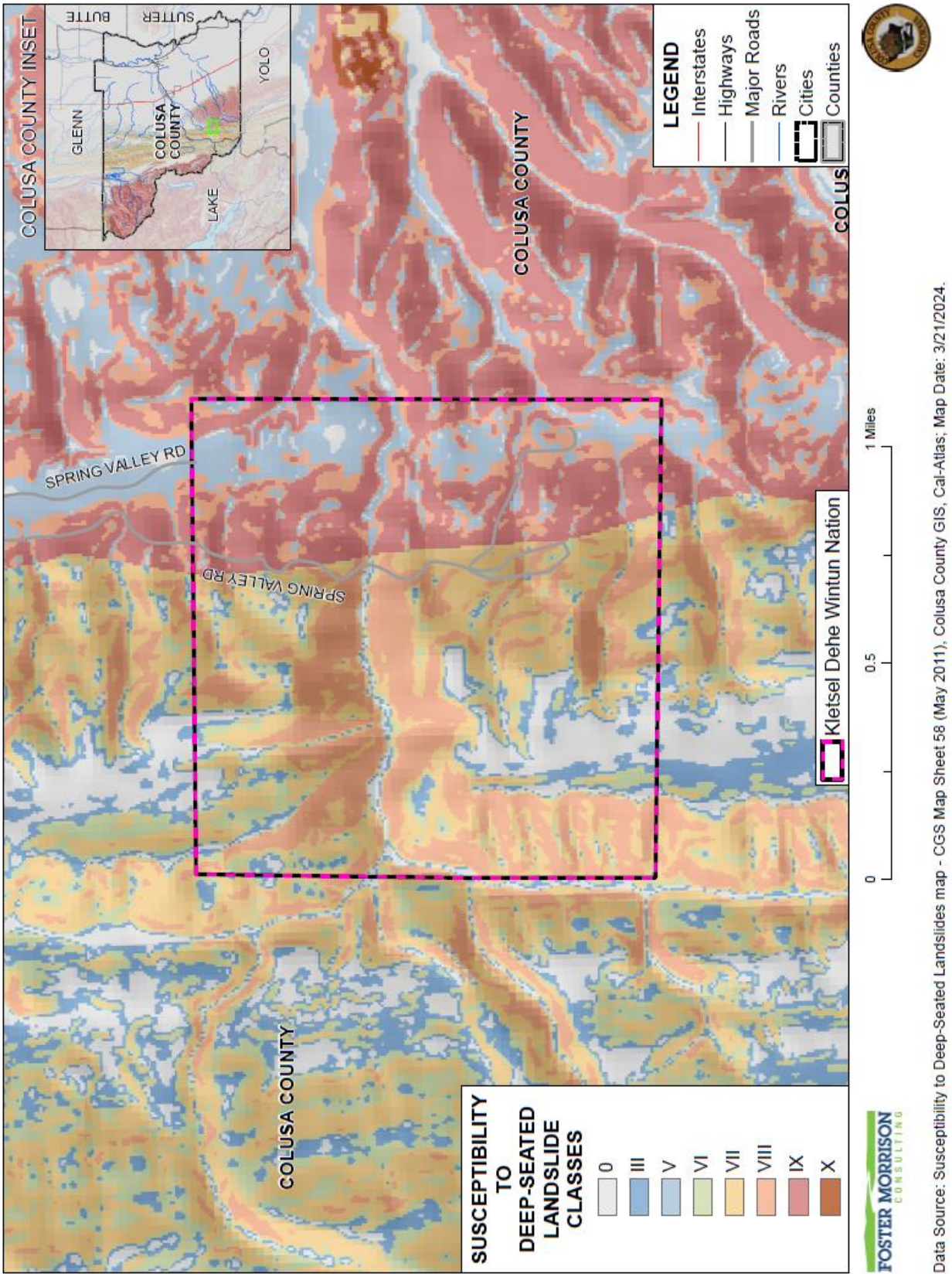
Location and Extent

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 E-4 shows the CGS areas at susceptible to deep-seated landslides. The legend on Figure E-4 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. 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 Nation and surrounding area are at high to very high susceptibility areas for landslides. 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.

Figure E-4 KDWN – Susceptibility to Deep-Seated Landslides



Past Occurrences

Disaster Declarations

There have been no federal or state disaster declarations from landslide.

NCDC Events

The NCDC contains no records for landslides in Colusa County.

KDWN Events

None have occurred in recent years, according to the KDWN Planning Team.

Climate Change and Landslide and Debris Flows

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with landslide and debris flow. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 2021 CAS, climate change may result in precipitation extremes (i.e., wetter wet periods and drier dry periods). 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 from Landslide

Portions of the Nation are at some measure of vulnerability to landslide. An assessment of a community's vulnerability to landslide begins with an understanding of local exposure to landslide. This is included in the Local Concerns section below followed by a discussion of the Nation's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

Steep terrain on rancheria increases risk of landslides. Most roads are unpaved, and there are limited ingress/egress routes to the Nation. A landslide affecting a road would cause great impacts to the KDWN. Additionally, slopes are susceptible to erosion caused by stormwater runoff.

Rancheria residents noted that landslides have occurred in the past, mainly in the areas surrounding Strode Creek, but have not yet affected residences.

Assets at Risk

Assets at risk from landslide include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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.

Nation 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.

Structures and Critical Facilities

Landslides can affect the built environment of the Nation 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 District noted the following assets (from Table E-2) at risk to landslide:

- Water Tank
- Community Building
- Roads
- Water Treatment Building

Community Lifelines

Community lifelines may be affected by landslide. Many of the Nation's community lifelines are the same as or similar to Colusa County's. Landslide is unlikely to overwhelm community lifelines. This was discussed in greater detail in Section 4.3.13 of the Base Plan.

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 areas shown on Figure E-4 would be most vulnerable, as well as those in the run-out areas.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.13 of the Base Plan.

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. Large landslides can collapse into water bodies, causing seiches. Landslides can relocate river channels. Landslides and debris flows can also 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 Nation susceptible to landslide. Based on the risk assessment, there is sizable potential for significant landslides to occur in the Nation. 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 Nation 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect landslides in the Nation. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions,

Although new growth and development corridors may fall in areas affected by High or Very High risk of landslide (shown as classes VII to X), Nation building codes in effect regarding the siting and construction of structures in identified hazard areas should limit risk to future development.

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 Nation, 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 Nation.

Location and Extent

Heat is a regional phenomenon and affects the whole of the Nation. The Nation experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 105-110°F in rather extreme situations. 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 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 38 extreme heat incidents for Colusa County since 1993.

KDWN Events

The Nation noted that extreme heat occurs every year, causing the issues discussed in the Local Concerns section below.

Climate Change and Extreme Heat

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with extreme heat. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

The California Climate Adaptation Strategy (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 Colusa 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 2013 California Climate Adaptation Study (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 Colusa 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 Nation. In recent years, compounded by climate change conditions, summer months continue to get a bit hotter. The whole of the Nation 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 Nation's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

Extreme summertime heat, high wind events, rainwater runoff causing increased erosion of slopes, unpaved roads can be hazardous during wet periods. Rancheria is subject to PSPS shutoffs during extreme weather events and periods of elevated fire risk. There are concerns due to the age of Rancheria residents, the lack

of HVAC systems, and accompanying heat stroke. Only one house has a landline, and cell service is spotty so residents use Starlink for Wifi calling on their cell phones.

Assets at Risk

Assets at risk from extreme heat include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

All populations within the Nation are vulnerable to extreme heat, but it generally affects people (including Nation staff) 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 and Critical Facilities

Extreme heat normally does not generally impact structures and critical facilities, 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 Nation 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.

The District noted the following assets (from Table E-2) at risk to extreme heat:

- Water Tank
- Community Building

Community Lifelines

Community lifelines may be affected by extreme heat. Many of the Nation's community lifelines are the same as or similar to Colusa County's. Extreme heat is unlikely to overwhelm community lifelines. These were discussed in greater detail in Section 4.3.2 of the Base Plan.

Natural, Historic, and Cultural Resources

Natural resource assets in the Nation may be vulnerable during periods of extreme heat. These include turfed areas; landscapes, Nation trees, wildlife and habitat areas, and wetlands and marsh lands. Recently, trees were lost in areas of the Nation 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.2 of the Base Plan.

Impacts from Severe Weather: Extreme Heat

The Nation 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 Nation may see an increase in dry fuels. Also, power outage and PSPS events may occur during these times as well. Health issues are the primary concern with this hazard, although economic impacts can also be an issue.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect extreme heat in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Future development of new buildings in the Nation 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 Nation.

Severe Weather: Heavy Rains and Storms

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile

Storms in the Nation 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 Nation falls mainly in the fall, winter, and spring months. Wind often accompanies these storms; hail and lightning are rare in the Nation.

Location and Extent

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the Nation. All portions of the Nation are at risk to heavy rains and storms. Most of the severe rains occur during the fall, winter, and spring months in the Nation. 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 rare in the Nation and Colusa County. Duration of severe storms in the Nation 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 Nation. This is the cause of many of the federal disaster declarations related to flooding. Disaster declarations from flooding are shown on Table E-5.

Table E-5 Colusa County Disaster Declarations from Flood (Heavy Rain and Storms) 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC data recorded 30 hail, heavy rain, and winter weather incidents for Colusa County since 1950.

KDWN Events

The KDWN noted that during atmospheric river events Strode Creek can have high flows. This occurred in the winter of 2022/2023.

The Rancheria is susceptible to road flooding, especially during El Nino years. KDWN Residents specified the years '95 and '97, noting that the flooding of 1997 caused residents to be trapped on the Rancheria for a period of two weeks.

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 associated with heavy rains and storms. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 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. 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 Nation. 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 Nation, but also can cause damage, with lightning occasionally igniting wildfires.

The whole of the Nation 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 Nation's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

KDWN noted that Strode Creek runs adjacent to the Rancheria. Strode Creek causes some erosion within the Rancheria during high flow periods. Extreme erosion can endanger nearby dirt roads and limit access to undeveloped parts of Rancheria. The Rancheria is susceptible to road flooding, especially during El Nino years. KDWN Residents specified the years '95 and '97, noting that the flooding of 1997 caused residents to be trapped on the Rancheria for a period of two weeks.

Assets at Risk

Assets at risk from heavy rain and storms include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

All populations in the Nation 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 and floodplains (discussed in further detail in the Flood: Localized Stormwater Flooding section above).

Structures and Critical Facilities

Structures and critical facilities in the Nation 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. Water intrusion into facilities and infrastructure can impact operations. Older 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. In certain areas, large storms can cause erosion and localized landslides which can impact affected 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.

The District noted the following assets (from Table E-2) at risk to flooding from heavy rains and storms:

- Roads

Community Lifelines

Community lifelines may be affected by heavy rains and storms. Many of the Nation's community lifelines are the same as or similar to Colusa County's. Heavy rains and storms are unlikely to overwhelm community lifelines. These were discussed in greater detail in Section 4.3.4 of the Base Plan.

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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.4 of the Base Plan.

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. 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 and erosion that would likely have the greatest impact.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect heavy rains and storms in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Building codes in the Nation ensure that new development is built to current building standards, which should reduce the risk to future development in the Nation 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 population could increase the number of people impacted by heavy rains and storms. 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 Nation.

Stream Bank Erosion

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile

Erosion is the general process whereby rocks and soils are broken down, removed by weathering, or fragmented and then deposited in other places by water or air. Stream bank erosion poses problems for the Nation. The rate of erosion depends on many variables, including the soil or rock texture and composition, soil permeability, slope, extent of vegetative cover, and precipitation amounts and patterns. Erosion increases with increasing slope and precipitation and with decreasing vegetative cover, which includes areas where protective vegetation has been removed by fire, construction, or cultivation. The Nation is traversed by many waterways. These locations are all subject to bank erosion. Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects.

Location and Extent

Stream bank erosion occurs on rivers, streams, and other moving waterways, including leveed areas, in the Nation. Erosion and deposition are occurring continually at varying rates over the Planning Area. Swiftly moving floodwaters cause rapid local erosion as the water carries away earth materials. Severe erosion removes the earth from beneath bridges, roads and foundations of structures adjacent to streams. By undercutting it can lead to increased rockfall and landslide hazard. The deposition of material can block culverts, aggravate flooding, destroy crops and lawns by burying them, and reduce the capacity of water reservoirs as the deposited materials displace water.

The speed of onset of stream bank erosion is slow, as the erosion takes place over periods of years. Duration of erosion is extended. Greater erosion occurs during periods of high stream flow and during storm and wind events when wave action contributes to the extent and speed of streambank erosion.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations related to erosion.

NCDC

The NCDC does not track stream bank erosion.

KDWN Events

The KDWN noted that streambank erosion occurs every year, but in years of high water flows it is worse.

Climate Change and Stream Bank Erosion

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with streambank erosion. More information on future impacts to the KDWN can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding which contributes to erosion in Colusa County. 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. Future precipitation projections were shown in Section 4.3.4 of the Base Plan. 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. All of the events above could exacerbate stream bank erosion in the County.

Vulnerability to Stream Bank Erosion

Parts of the Nation located along streambanks are at some measure of vulnerability to streambank erosion. An assessment of a community's vulnerability begins with an understanding of local exposure to streambank erosion. This is included in the Local Concerns section below followed by a discussion of the Nation's Assets at Risk to this hazard.

Local Concerns

The 2020 Water Quality Standards Report noted that Strode Creek is located within Strode Canyon which is steep-walled and rock-lined for the majority of its length. There are several areas along Strode Creek where water pools and is present for most of the year. Drainage channels 1 through 11 are located throughout the Rancheria, within the banks of ephemeral drainages. Seeps 1, 2, 3, 8, and 9 are located on the southern half of the Rancheria with Seep 6 located near the southeastern corner. Seeps 3, 4, and 5 are located on the northwestern portion with Seep 4 being located within Strode Canyon just east (downstream) of the surface water sampling location within Cortina Creek. The seeps are formed from either underground water percolating from a spring, or in places where the water table is high due to excessive water within Strode Creek or other ephemeral drainages. The Canyon 4 wetland is located directly adjacent to an asbestos containment/settlement pond. The asbestos settlement pond was built and used for monofil settlement and is a potential contaminate source for surface and groundwater on the Rancheria. The Canyon

4 wetland appears to be influenced by a dirt road embankment which allows water to collect on the west side of the road: making a wetland type habitat. The Strode Creek wetland area is influenced by a dirt road and a paved creek crossing. The majority of the area spans the lower portion of Strode Creek prior to crossing the road.

Strode Creek causes some erosion within the Rancheria during high flow periods. Extreme erosion can endanger nearby dirt roads and limit access to undeveloped parts of Rancheria. Mitigation efforts for streambank erosion will focus on stabilization of at-risk areas.

Assets at Risk

Assets at risk from streambank erosion include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations

Streambank erosion will have a minimal direct effect on Nation staff, people, and populations in the Nation. Indirect effects on people and populations include damages to roads or bridges from streambank erosion, causing transportation issues. Streambank erosion can also cause high sediment loads. While rare, this can cause water quality impacts. Water quality can be impacted causing health problems, especially to vulnerable populations where access to clean water supplies can be more challenging.

Structures and Critical Facilities

Structures and critical facilities near rivers are at some risk from the effects of streambank erosion. Streambank erosion can undercut structure foundations causing instability and other issues. Structures that are in areas protected by levees are at greater risk of streambank erosion. Should levees erode quickly, their risk of failure increases. Those structures behind the levees would be at risk. This is discussed in greater detail in Levee Failure section above. 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 District noted the following assets (from Table E-2) at risk to stream bank erosion:

- Roads

Community Lifelines

Streambank erosion that causes significant impacts such as levee failures presents a threat to life and property, including community lifelines in the Nation. Many of the Nation's community lifelines are the same as or similar to Colusa County's. These were discussed in greater detail in Section 4.3.15 of the Base Plan.

Natural, Historic, and Cultural Resources

Streambank erosion could cause levee failure flooding. 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.15 of the Base Plan.

Impacts from Streambank Erosion

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes

in land use and development will affect stream bank erosion in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires an understanding of both stream dynamics and the management of streamside vegetation.

Planned developments should take erosion risk areas into account during the construction of new homes and commercial properties

Wildfire

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

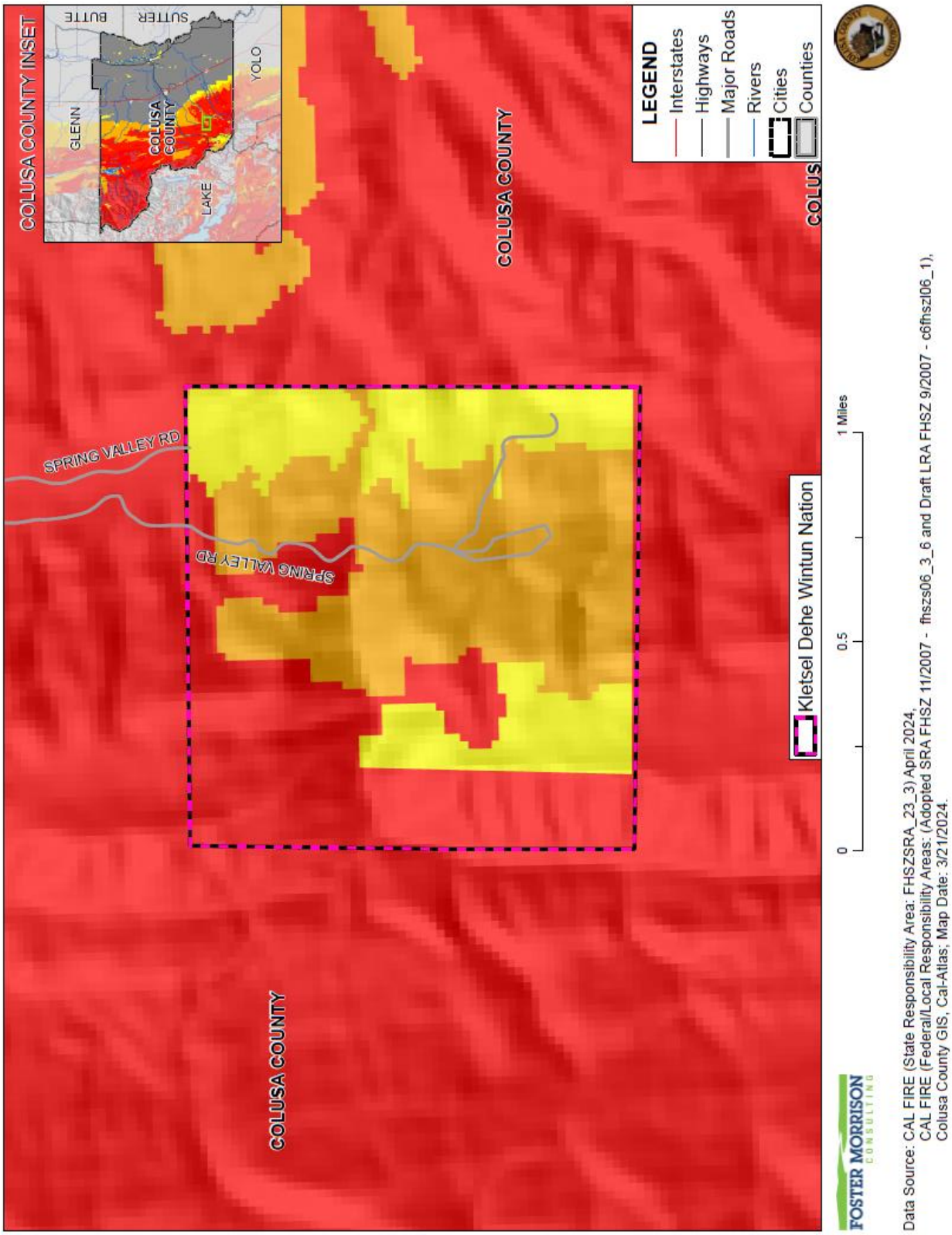
Hazard Profile

Wildland fire and the risk of a conflagration is an ongoing concern for the KDWN. 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 Nation. 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, urban 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 becomes an issue, both from fires occurring inside and outside of the Colusa County Planning Area and the City.

Location and Extent

Wildfire can affect all areas of the Nation. CAL FIRE has estimated that the risk varies across the Nation and has created maps showing risk variance. Following the methodology described in Section 4.3.17 of the Base Plan, wildfire maps for the KDWN were created. Figure E-5 shows the CAL FIRE Fire Hazard Severity Zone (FHSZ) in the Nation. As shown on the maps, FHSZs within the Nation range from Moderate to Very High.

Figure E-5 KDWN – CAL FIRE Fire Hazard Severity Zones



Past Occurrences

Disaster Declaration History

There has been one federal and two state disaster declaration due to fire, as shown in Table E-6.

Table E-6 Colusa County – Federal and State Wildfire Disaster Declarations 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Wildfire	1	2018	2	1987, 2018

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked 13 wildfire events in the County dating back to 1993.

KDWN Events

No wildfires have occurred within the area of the rancheria since 2012 (Sixteen Complex Fire). The human-caused Sixteen Complex fire (CA-LNU-7072) started on Bureau of Land Management land southwest of Cortina Rancheria September 4, 2012. The complex (two fires in Yolo and Colusa counties) eventually burned a total of 17,944 acres. It spread onto ten acres of the Cortina Rancheria at approximately 1100 hours on September 7, and was attacked by Cal Fire and Tribal units consisting of several Type 2 hand crews, two dozers, five engines (Types 3, 4, & 5), and four water tenders at 1130 hours. The fire burned through mature chaparral on the western part of the Rancheria, burning 600 out of the 640 acres held in trust. Since Wildland Urban Interface (WUI) hazardous fuel reduction treatments had recently been completed on the west side of the main reservation road, BIA 236, the crews were able to use the treated area as a fuel break and burn out from it, protecting both structures and cultural resources from the fire in the process.

The Rancheria also noted that it occasionally receives fugitive smoke from regional wildfires. These include major fires from the past five years, including the Camp Fire and the Dixie Fire.

Climate Change and Wildfire

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with wildfire. More information on future impacts to the KDWN 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 4.3.17 of the Base Plan. Based on this model, Cal-Adapt predicts that wildfire risk in Colusa 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 Colusa 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 Nation from wildfire is of limited concern. Wildfires that occur in the Nation occur from a variety of both natural and manmade causes. The Nation can be affected both by fires that start on or near Nation lands as well as those that start elsewhere and move into the Nation. In addition to burning large areas of land, air quality can be affected in the Nation by fires occurring inside the Nation as well as those from many miles away. As growth continues and populations increase in the Nation, the potential for wildfires will also increase.

The whole of the Nation 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 District 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 vulnerabilities to this hazard.

The 2023 KDWN Emergency Response Plan noted that due to the location and facilities within the Plan Area, structural and wildfires pose risks to residences, community buildings, people, and natural resources. The rolling oak and grasslands include limited underbrush; however, wind-driven grass fires are a threat, whether caused by nature or humans. The City of Williams Fire Department (Williams Fire Department) provides emergency medical services to the City and surrounding rural areas, including the Rancheria and Plan Area. The Williams Fire Department is located at 810 E Street in Williams, California, approximately 12 miles northeast of the Plan Area. This station houses two Type-1 engines, two Type-3 engines (including a 77-foot ladder truck and two water tenders), and one heavy-duty rescue engine. Typically, the Williams Fire Department responds to approximately 1,000 calls per year. The Williams Fire Department also has mutual aid agreements with the California Department of Forestry and Fire Protection (CAL FIRE). The Plan Area is located in a high-fire hazard area within a State Responsibility Area, as mapped by CAL FIRE, where CAL FIRE is responsible to provide wildland fire protection services.

The KDWN also noted that regional smoke drift and ensuing health/respiratory problems is the main concern from wildfire. Another concern is that there is only one ingress/egress point from the Rancheria, so evacuation can be at risk if that road is blocked.

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 the 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 North Complex Fire, as well as others that affected the nearby areas.

Assets at Risk

Assets at risk from wildfire include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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
- Elderly (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

Structures and Critical Facilities

All structures in the Nation have some risk to wildfire. Wildfire presents a threat to critical facilities and infrastructure. The District noted the following assets (from Table E-2) at risk to wildfire:

- Water Tank
- Community Building
- Roads
- Water Treatment Building

Community Lifelines

Wildfire presents a threat to life and property, including to community lifelines in the Nation. Many of the Nation's community lifelines are the same as or similar to Colusa County's. A large wildfire may temporarily overwhelm these community lifelines. These were discussed in greater detail in Section 4.3.17 of the Base Plan.

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 Nation, 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 affected and are often more vulnerable due to their older age, construction type, and lack of fire prevention infrastructure such as sprinklers.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the Nation are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.17 of the Base Plan.

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 Nation. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the Nation 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 Nation; smoke and air pollution from wildfires can be a severe health hazard. Smoke impacts may come from wildfires outside the Nation, as well as from within.

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

Impacts to identified assets at risk to this hazard and the overall vulnerability of the Nation 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. Additional growth within the WUI and other high fire hazard areas of the County would place additional populations at risk to wildfire. Due to limited water resources, these anticipated changes in population for the KDWN are relatively small, which limits additional future impacts to the Tribe. The Tribe noted it has little to no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in future land use and development will affect wildfire in the KDWN. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future wildfire conditions.

Additional growth and development within moderate or higher fire hazard severity zones in the Nation would place additional values at risk to wildfire. Tribal building codes are in effect and should continue to be updated as appropriate to reduce this risk.

E.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.

It should be noted (for all of the tables in the sections below) that these tables were designed to display capability information for a county or city. The Nation has very few of these capabilities, due to their lack of size, lack of complexity, as well as their lack of statutory ability to regulate. The District depends on other jurisdictions for many of these capabilities, and partners with them on case-by-case issues that affect the District.

E.5.1. Regulatory Mitigation Capabilities

Table E-7 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 KDWN.

Table E-7 KDWN'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	N	
Climate Change Adaptation Plan	Y	Last updated 2017
Community Wildfire Protection Plan	N	Wildfire assessment, 2023
Comprehensive/Master Plan	N	
Continuity of Operations Plan	N	
Economic Development Plan	N	
Land Use Plan		
Local Emergency Operations Plan	N	Not an emergency operations plan, but we have an emergency response plan from 2023
Stormwater Management Plan	N	
Transportation Plan	N	
Other (describe)		Drought assessment, 2023. Emergency Response Plan, 2023.
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	N	
Building code	N	
Flood insurance rate maps	N	
Floodplain ordinance	N	
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	N	
Zoning ordinance	N	
Other	Y	Air Quality Ordinance, Environmental Code, General Water Pollution Ordinance, Pesticide Ordinance, Public Utilities Ordinance, Solid Waste Management Code, Source Water Protection Resolution, Surface and Groundwater Antidegradation Policy, Water Quality Standards, Well Standards Ordinance
How can these capabilities be expanded and improved to reduce risk?		
Expanding land use planning and ordinances.		

Source: KDWN

E.5.2. Administrative/Technical Mitigation Capabilities

Table E-8 identifies the Nation department(s) responsible for activities related to mitigation and loss prevention in the Nation.

Table E-8 KDWN'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	N	
Community Planner	N	
Emergency Manager	N	
Floodplain Administrator	N	
GIS Coordinator	N	
Planning Commission	N	
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	N	
Hazard data and information	N	
GIS analysis	N	
Mutual aid agreements	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Staff is small and specific roles are usually wearing multiple hats. GIS analysis, grant writing, and hazard information, for example, could be done by the Environmental Department but there is currently no specific staff role for it.		

Source: KDWN

E.5.3. Fiscal Mitigation Capabilities

Table E-9 identifies financial tools or resources that the Nation could potentially use to help fund mitigation activities.

Table E-9 KDWN'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	Eligible	
Community Development Block Grant	Eligible	

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?
Federal funding programs (non-FEMA)	Y	Yes, EPA grants can include activities such as fuel reduction and erosion control
Fees for water, sewer, gas, or electric services	N/A	
Impact fees for new development	Unknown	
State funding programs	Eligible	
Stormwater utility fee	Unknown	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Expanding active grant programs and applying for additional grants		

Source: KDWN

E.5.4. Mitigation Education, Outreach, and Partnerships

Table E-10 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 E-10 KDWN's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	Quarterly newsletters go out to all tribal members via email
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	N	
Local news	N	
Organizations that interact with underserved and vulnerable communities	N	
Social media	Y	Facebook page and tribal website: KletselDehe.org
Other		
How can these capabilities be expanded and improved to reduce risk?		
More frequent updates to Facebook page and tribal website, providing links to hazard awareness campaigns such as those suggested. Newsletters do occasionally provide resources like these especially for fire hazards and severe weather. Could also potentially increase frequency of newsletters from quarterly to bimonthly		

Source: KDWN

E.5.5. Other Mitigation Efforts

The Nation has many other completed or ongoing mitigation projects/efforts that include the following:

- Past fuel reduction projects via CAL FIRE, erosion control on Strode Creek.

E.6 Mitigation Strategy

E.6.1. Mitigation Goals and Objectives

The KDWN adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

E.6.2. Mitigation Actions

The planning team for the KDWN 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
- Drought and Water Shortage
- Landslide, Mudslide, and Debris Flow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms
- Stream Bank Erosion
- Wildfire

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 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 plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Mitigation Actions

Action 1. Update Cortina Rancheria Climate Change Adaptation Plan (2017)

Hazards Addressed: All

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: Climate change continues to cause more extreme climate hazards and influences the severity of existing natural hazards

Project Description: The Rancheria's last climate change adaptation plan was prepared in 2017 and needs updating to include the drought and precipitation swings of the last several years. Updating the plan will also improve future climate change mitigation planning.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Environmental Regulatory Authority

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Enhance planning process for climate-change driven hazards and vulnerabilities

Potential Funding: Grant funding, EPA

Timeline: 2029

Project Priority (H, M, L): Medium

Action 2. Water Tank

Hazards Addressed: Climate Change; Drought/Water Storage; Severe Weather: Extreme Heat; Wildfire

Goals Addressed: 1, 3, 4

Issue/Background: The Rancheria currently has a 10,000 gallon tank, but an increased supply of fire and sanitation water is needed in case of emergency

Project Description: Replace existing tank with a new 50,000 gallon water tank

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Fire plan, drought plan

Responsible Office/Partners: Kletsel Environmental Regulatory Authority

Benefits (Losses Avoided): Provide for fire protection and increase water supply for residents in case of emergency

Potential Funding: Grant funding, EPA, BIA WUI

Timeline: When funding is available

Project Priority (H, M, L): High

Action 3. Emergency Generator

Hazards Addressed: All

Goals Addressed: 1, 3, 4

Issue/Background: The Cortina Rancheria is isolated and vulnerable to power loss during natural disasters and emergencies. Loss of power can also occur during PSPS shutdowns.

Project Description: Purchase and install a new backup generator

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Dehe Wintun Nation Tribal Office, Kletsel Environmental Regulatory Authority

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Preservation of life and property

Potential Funding: Grant funds, FEMA

Timeline: 2024-2030

Project Priority (H, M, L): High

Action 4. Improve Erosion Control Management Practices

Hazards Addressed: Landslide, Mudslide, and Debris Flow; Stream Bank Erosion

Goals Addressed: 1, 3, 4

I**ssue/Background**: Many roads in the rancheria are unpaved, increasing risk of erosion caused by runoff, and Strode creek is a source of stream bank erosion

Project Description: Soil control and drainage, possible culvert work or rip rap for erosion projects within rancheria

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Environmental Regulatory Authority erosion control program

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Safety, evacuation, avoiding repetitive road damage, improving road conditions

Potential Funding: Grant funding, EPA, FEMA, OES

Timeline: By 2029

Project Priority (H, M, L): High

Action 5. Secondary Evacuation Route

Hazards Addressed: All

Goals Addressed: 1, 3, 4

Issue/Background: Green Road, once a county-maintained road, has been gated and is no longer accessible to the Rancheria.

Project Description: There is currently only one road in and out of the Rancheria; the lack of a secondary egress point means the evacuation route can be easily blocked off or compromised in the event of a natural disaster or other hazard. Restoring the use of a secondary road would provide an alternate exit from the Rancheria.

Other Alternatives: Request that Colusa County maintain Green Road again

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Dehe Wintun Nation Tribal Office

Responsible Office/Partners: Kletsel Dehe Wintun Nation, Colusa County

Benefits (Losses Avoided): Increased safety with additional ingress and egress point. Also allows emergency services better access to Rancheria during natural disasters

Potential Funding: General fund

Timeline: As soon as possible

Project Priority (H, M, L): High

Action 6. Fuel Reduction and Defensible Space Projects

Hazards Addressed: Wildfire

Goals Addressed: 1, 3, 4

Issue/Background: Threat of wildfire is very high for our area, and fuel reduction will reduce risk of structure loss in the event of a wildfire

Project Description: Remove grass and brush from within 300 feet of the residential areas for fire safety. Reduce fuel in other community locations.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Environmental Regulatory Authority

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Reduction in wildfire severity, protection of existing structures

Potential Funding: Grant funding, EPA, OES, Cal Fire, BIA WUI, USFS

Timeline: Annually

Project Priority (H, M, L): High

Action 7. Enhanced Mapping and Assessing Rancheria Vulnerability to Hazards

Hazards Addressed: Climate change; Landslide, Mudslide and Debris Flow; Stream Bank Erosion; Wildfire

Goals Addressed: 1, 3, 4

Issue/Background: Lack of high-quality mapping for most of the Rancheria makes it difficult to assess hazard risks

Project Description: KERA will undertake mapping projects to develop better knowledge of rancheria vulnerability to various hazards.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: Kletsel Environmental Regulatory Authority

Responsible Office/Partners: KERA

Benefits (Losses Avoided): Improving knowledge of potential hazard areas, protecting lives and reducing damages from hazards

Potential Funding: Grants, EPA

Timeline: 2029

Project Priority (H, M, L): Medium

Action 8. Public Education and Outreach

Hazards Addressed: Climate Change; Drought/Water Shortage; Severe Weather: Extreme Heat; Wildfire

Goals Addressed: 1, 2, 3, 4

Issue/Background: Communicating potential risks and community vulnerabilities to natural hazard is of vital importance for residents of the Cortina Rancheria, and will allow residents to be better informed of hazards and potential actions prior to the next event.

Project Description: Enhancing the Rancheria's public outreach to develop consistent communication with residents, in order to convey the risk and vulnerability of natural hazards of concern to the community. This will include information about local hazards as well as measures the public can take to be better prepared and reduce damages and other impacts from a hazard event.

Other Alternatives: Continue public information activities currently in place

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing Rancheria outreach programs will be reviewed and expanded upon

Responsible Office/Partners: Kletsel Dehe Wintun Nation, Kletsel Environmental Regulatory Authority

Benefits (Losses Avoided): Increasing residents' knowledge of potential hazards and activities, protecting lives and reducing damages from hazards

Potential Funding: Grant funds

Timeline: Annually throughout the year

Project Priority (H, M, L): Medium

Annex F RD 108

F.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Reclamation District 108 (RD 108 or District), a previously participating jurisdiction to the 2018 Colusa 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 District. This Annex provides additional information specific to RD 108, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this District.

F.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Colusa County Hazard Mitigation Planning Committee (HMPC), the District 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 F-1. Additional details on Plan participation and District representatives are included in Appendix A.

Table F-1 RD 108 – Planning Team

Name	Position/Title	How Participated
Meegan Nagy	Deputy Manager	Coordination of planning project internal to District, Plan development, review and implementation, Internal Planning Team
Elizabeth Ramos	Assistant District Engineer	Plan development, review and implementation, Internal Planning Team
Jordon Navarro	Superintendent	Plan development, review and implementation, Internal Planning Team

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the District integrated the previously approved 2018 LHMP into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2018 LHMP through other plans and programs shown in Table F-2.

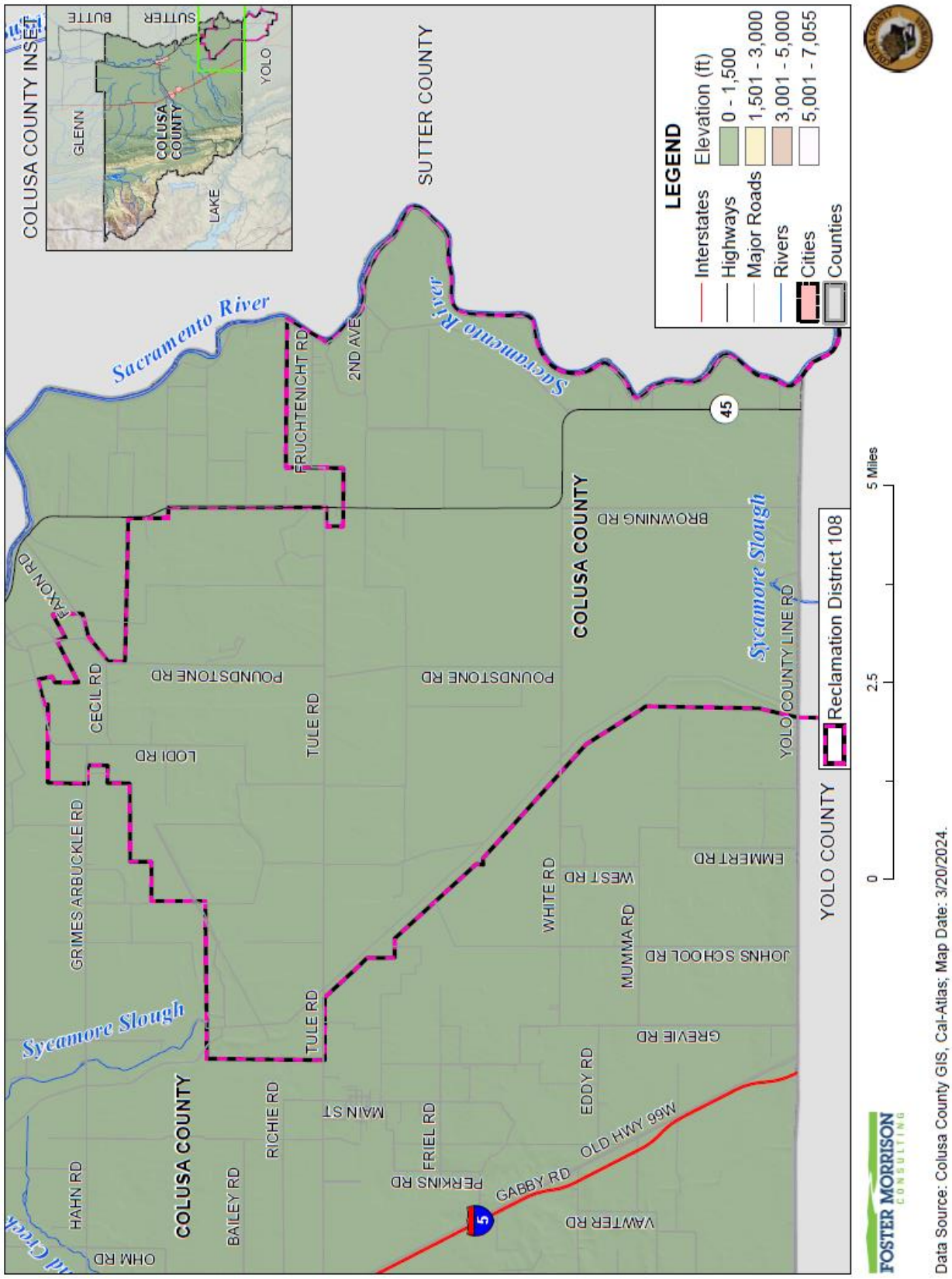
Table F-2 2018 LHMP Incorporation

Planning Mechanism 2018 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
2023 Emergency Operations Plan	Multiple hazard sections inform the EOP.

F.3 District Profile

The District profile for the RD 108 is detailed in the following sections. Figure F-1 displays a map and the location of the District within Colusa County.

Figure F-1 RD 108



F.3.1. Overview and Background

Reclamation District (RD) 108 is located along the western edge of the Sacramento River and delivers water to nearly 48,000 acres of farmland within southern Colusa County and northern Yolo County. RD 108 receives water from the Sacramento River under riparian water rights, licenses for appropriation of surface water, and a Settlement Contract with the US Bureau of Reclamation. The first irrigated crops were grains, mostly barley but today include rice, wheat, corn, safflower, tomatoes, beans, vineseeds, cotton, walnuts, and fruit.

The District was formed in 1870 under the Reclamation District Law of 1868 for the purpose of forming a district to build levees and "reclaim" land subject to periodic overflow from neighboring rivers and water bodies. At this time the Government was promoting reclamation to develop swamp lands for the improvement and cultivation of the thousands of acres in California. On October 4, 1870, the landowners submitted a petition to the Colusa and Yolo County Boards of Supervisors authorizing the formation of a new Reclamation District and assigned it the number 108.

RD 108 is surrounded on three sides by levees, that include the west-side levees from Colusa to Knights Landing along the Sacramento River, a Back Levee along the District's western boundary to prevent flooding from the Colusa Basin, and then along the slough in the South that at one time took drainage water from the Colusa Basin back to the Sacramento River. The District works in coordination with the Sacramento River West Side Levee District and the Knights Landing Ridge Drainage District to provide maintenance to over 90 miles of levees. All of the levees were originally built by the local landowners using whatever materials available and whatever criteria they chose but have since become part of the federally sponsored Sacramento River Flood Control Project. The levees protect the rural communities in Yolo and Colusa Counties. These levees are integral to the system-wide performance of the Sacramento River Flood Control Project and provide indirect protection to the cities of Sacramento and West Sacramento. Since formation of the levee districts, Sacramento River West Side Levee District and Knights Landing Ridge Drainage District have shared management, personnel, and equipment with RD 108. The flood control districts reimburse RD 108 for management and work performed.

In addition to maintaining flood control infrastructure, the District manages drainage and the delivery of water to nearly 48,000 acres of farmland within southern Colusa County and northern Yolo County.

F.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 RD 108 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 District's potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Overview and Background above, a risk assessment was performed for the District. This includes the following sections:

- F.4.1 District Assets Inventory and Growth and Development Trends
- F.4.2 Hazard Identification
- F.4.3 Hazard Profiles and Vulnerability to Specific Hazards

F.4.1. District Assets Inventory and Growth and Development Trends

This section provides an inventory of the District'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 District'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 District, potentially at risk to identified hazards as discussed in Section F.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the District, both current and future, is presented.

Assets Inventory

The District's asset inventory is detailed in the following sections:

- People and Populations (Populations Served)
- 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 F.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the District. The District provides services to 480 to 500 people. The District currently employes approximately 30 staff members.

Special Populations and Disadvantaged Communities

The District noted that there are no special populations or disadvantaged communities that could be adversely affected by hazard events impacting district facilities or operations.

Structures and Critical Facilities

This section considers RD 108's assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan 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.***

Table F-3 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. RD 108's physical assets, valued at over $220 million, consist of the buildings and infrastructure to support the District's operations.

Table F-3 RD 108 Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
RD 108 Headquarters	Office/Shops	N/A	Flooding, Localized Flood, Levee Failure
Colusa Basin Drain Levee	Levee	$220,000,000	Flooding, Localized Flood, Levee Failure
Pump Stations	Pump Stations	N/A	Flooding, Localized Flood, Levee Failure
Tract 6	Cropland	N/A	Flooding, Localized Flood, Levee Failure
Total		**$220,000,000**	

Source: RD 108

Community Lifelines

Assessing the vulnerability of the District 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 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.

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 District as a partnership between the District, local cities, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the District's community lifelines overlap the County's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the District and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in the Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the District 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

RD 108 has a variety of natural resources of value to the District. These natural resources parallel that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Historic and Cultural Resources

RD 108 has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallel that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the RD 108 to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the District.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. Economic assets for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Community Activities of Value

Inventorying economic assets in the District 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. Community Activities of Value for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Growth and Development Trends

As part of the planning process, the District 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.

Population Trends and Projections

The District follows and parallels the County projections for population; however, new growth is not expected during the planning period.

Development since 2018 Plan

The District noted that there has been no development since the 2018 LHMP.

Future Development Areas

It is important to review future development plans for the District. 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 District has no control over future development in areas protected by District levees. Future development in these areas parallels that of the County as a whole, the District does not expect any future development in the upcoming planning period.

F.4.2. Hazard Identification

RD 108 identified the hazards that affect the District and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the District (see Table F-4).

Table F-4 RD 108—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude / Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	–	–	–	–	–
Climate Change	Extensive	Highly Likely	Critical	Low	–
Dam Failure	Extensive	Occasional	Catastrophic	Low	Medium
Drought & Water shortage	Extensive	Likely	Critical	Low	High
Earthquake	Limited	Occasional/ Unlikely	Limited	Low	Low
Floods: 1%/0.5%/0.2% annual chance	Extensive	Occasional/ Unlikely	Catastrophic	High	High
Floods: Localized Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, and Debris Flow	–	–	–	–	–
Levee Failure	Extensive	Likely	Catastrophic	High	Medium
Severe Weather: Extreme Cold and Freeze	Limited	Unlikely	Negligible	Low	Low
Severe Weather: Extreme Heat	–	–	–	–	–
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	–	–	–	–	–
Severe Weather: High Winds and Tornados	–	–	–	–	–
Stream Bank Erosion	Extensive	Highly Likely	Limited	Low	Medium
Subsidence	Limited	Occasional	Limited	Low	Medium
Wildfire	Limited	Occasional	Limited	Low	Low

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

F.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 District (as identified in the Significance column of Table F-4) 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 District. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Colusa 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 Format

Each hazard is profiled in the following format:

- **Hazard Profile**– A hazard profile is included for each hazard. This includes information on:
  - ✓ A general discussion of the hazard and related issues.
  - ✓ **Location** and **Extent** - Location is the geographic area within the District 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. NCDC events are also discussed. A discussion of disaster declarations is included in each hazard section. Other past occurrence data specific to the District follows the disaster declarations 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 District to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. 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 District provided information on how the District is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same format as in Section F.4.1 above. This includes sections on: People and Populations Served; Structures and Critical Facilities, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the District and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset. Impacts are also affected by the community's ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by the hazard is also included.

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)

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), are coordinating to prepare 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 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

The District noted that there is concern about a PSPS event. Pump stations that require electricity to function would be impacted during an extended period without power. There is potential for flooding due to internal drainage issues that these stations may experience.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–High

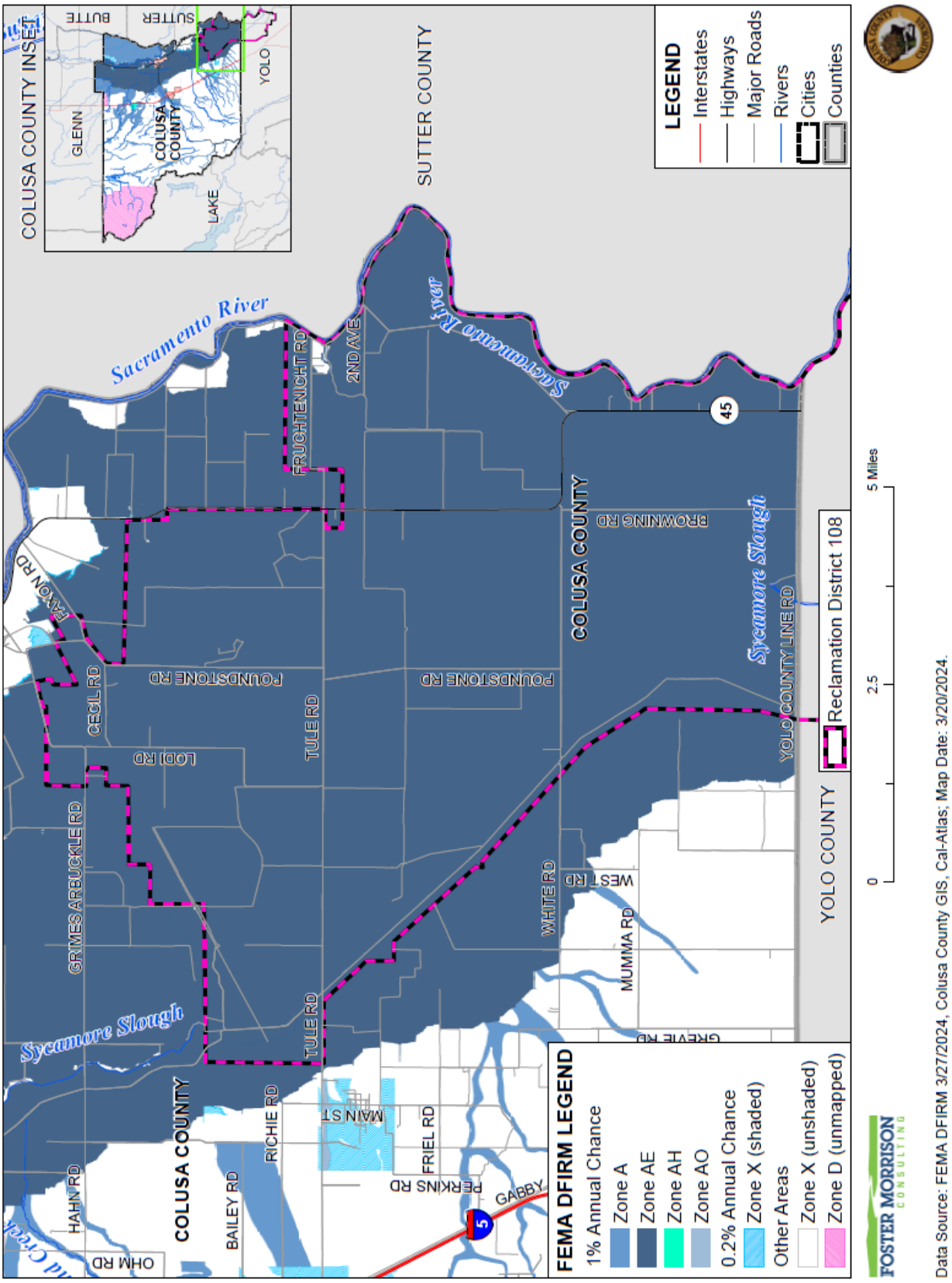
Hazard Profile

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 District and may have caused damage in the past. Flooding can be a significant problem in the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the District swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. 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.

Location and Extent

RD 108 has areas located in the 1% and 0.2% annual chance flood zones. This is seen in Figure F-2.

Figure F-2 RD 108 – FEMA DFIRM Flood Zones



Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the District vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the District 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 District tends to have a shorter speed of onset, due to the amount of water that flows through the District.

Past Occurrences

Disaster Declaration History

A list of state and federal disaster declarations for Colusa County from flooding is shown on Table F-5. These events also likely affected the District to some degree.

Table F-5 Colusa County – State and Federal Disaster Declarations from Flood 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Colusa County has seen 14 events. These events most likely had some impact on the District.

RD 108 Events

The District Planning Team noted that flood damages have occurred in 2023, 2019, 2017, 2011, 2006, 1998, 1997, 1986, and 1955. Typical damage includes wave wash and erosion, slope stability, and downed trees for each of these events. Information on recent events follows:

- **February 25-27, 2019 -** a severe storm caused a long duration, high water event. The resulting event caused an estimated $20,000,000 in damages and impacted back erosion, seepage, and slips caused by high winds. Various locations on the RD-108 levee and District wide were in the affected area. The District noted that an event like this is highly likely to occur again.
- **December 28, 2023, to February 9th, 2024 -** a series of heavy rains and storms caused record breaking snowpack to form District wide and along various locations on RD-108 levees. This event caused high water to form along with power outages. Major property damage occurred due to bank erosion, seepage, two major slips, and emergency pumping that needed to transpire. The District noted that an event like this is highly likely to occur again.

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 District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding in California, and the Colusa County Planning Area, including the District. 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 District'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% chance flooding are generally confined to areas near the waterways of the District.

The whole of the District 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 District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

The 2007 Colusa County General Plan also noted that flooding within the District's boundaries occur and can do so even during mild storms. Flooding and other issues caused by severe weather events, primarily heavy rains and thunderstorms, can often pose a risk to the District. Should the District levees fail as a result of large flood events, all of the area protected by RD 108 would be at risk causing impacts to property and posing life safety concerns. Additional impacts include dewatering of the levee protected areas, as well as erosion of leveed areas, and the rebuilding of the levees.

The 2023 RD 108 Emergency Operations Plan noted that flood waters at the southern end of the Colusa Basin Drain south of County Line Road can pool and back up toward the west and north in flood events and form a fetch of up to 5 miles in extent. Knights Landing Ridge Cut mouth is the only area of significance that potentially could be impacted. Maintenance Area 12 levee along levee miles 4, 5, and 6 is exposed to wave wash erosion due to lack of vegetation within Colusa Drain in that area. Heavier vegetation to the north of that stretch dampens waves. Flood waters pond and build toward east and north at north end of

Maintenance Area 12 levee reaching Wescott Road, an abandoned railroad embankment and Highway 20. Flood fighting these structures is necessary to prevent property loss and loss of use of Highway 20.

Assets at Risk

Assets at risk from flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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.

District 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.

Structures and Critical Facilities

Certain structures in the District are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. As shown in Table F-3, all District assets are at risk to this hazard.

Flooding presents a threat to threat to both critical facilities and infrastructure, as well as community lifelines. Critical infrastructure plays an immensely important role in our communities. Communities rely on roads, rail corridors, and related biking and pedestrian routes for transportation, and on water infrastructure for drinking water, wastewater service, and draining streets of rainwater. 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.

Community Lifelines

1% and 0.2% annual chance flooding presents a threat to life and property, including community lifelines in the District. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.11 of the Base Plan. Generally, even major flood events are temporary events with flood waters receding back to pre-storm levels at the conclusion of the storm. However, depending on the location, duration, and magnitude and severity of any given flood event, some of these community lifelines may be overwhelmed in the short term.

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 that fall in the flood zones shown on Figure F-2 would be vulnerable. This is especially true if a 0.2% annual chance flood event occurs.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.11 of the Base Plan.

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. 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 District 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. Changes in population patterns and land use, and

the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 108 are relatively small, which limits additional future impacts to RD 108. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect levee failure in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

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 District 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 RD 108. RD 108 does not control future development in areas protected by levees, that is the purview of the County or cities of Colusa and Williams. RD 108 will continue to work with these entities in the future to ensure that future development is sited in proper areas.

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 District 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.

Location and Extent

RD 108 is subject to localized flooding throughout the District. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District 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 District 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.

NCDC Events

The past occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile above.

RD 108 Events

The District noted past occurrences of localized flooding have occurred that parallel the flood events listed in the Past Occurrences of Flood: 1%/0.2% Annual Chance above.

Climate Change and Localized Flood

It is likely that climate change will increase the chance of future occurrence as well future impacts associated with flood. More information on future impacts to the District 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 District 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 District. 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 District are minor, localized flood events that are more of a nuisance than a disaster.

Many areas of the District 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 District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

Historically, the District has been affected by flooding of streams and creeks occurring during heavy rain and storm events. Additional development in the District 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 District.

Localized flooding events occurring during periods of heavy rains pose an ongoing concern to the District. Primary concerns include flooding of RD levees and facilities and impacts to infrastructure that provides a means of ingress and egress throughout the District. Ground saturation can result in instability, collapse, or other damage to District facilities. Loss of power or pump failure can also occur during a strong storm or flood event which could make the pump stations inoperable.

RD 108 provides drainage to approximately 48,000 acres of farmland. Pump stations are used during rain events to drain water out of the District. Pump stations used for drainage operations are located at El Dorado Pumping Plant, Rough and Ready Pumping Plant, Riggs Pumping Plant, and Sycamore Slough.

The District noted that pumps and drainage canal system do a very good job of draining the District. The District received no complaints of localized flooding in 2017. The District's biggest concern would be one of the pumps malfunctioning or losing power. If that were to occur, localized flooding is likely to occur.

In 2023, the District noted that two pump stations lost power for a period of time. There was localized flooding that occurred, but power was restored before it could impact the District. If the outage had extended for a longer period of time, flooding would have begun to impact Highway 45 and other local roads; some of which are used for emergency evacuations.

The District tracks localized flooding areas. Affected localized flood areas identified by the RD 108 are roads such as Fruchteniecht, Tule, County Line, as well as smaller county roads. The loss of these routes is of high concern to the District as it would impede evacuation procedures, emergency response, and potential search and rescue.

Assets at Risk

Assets at risk from localized flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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 District.

Structures and Critical Facilities

Structures and critical facilities 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 damages. As shown in Table F-3, all District assets are at risk to this hazard.

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.

Community Lifelines

Due to the relatively minor nature of localized flooding, community lifelines are unlikely to be overwhelmed. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.12 of the Base Plan.

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 District 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.12 of the Base Plan.

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 District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 108 are relatively small, which limits additional future impacts to RD 108. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect levee failure in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Future development in the District will add more impervious surfaces causing an increase in stormwater runoff and the continued need to drain these waters. The District 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.

RD 108 does not control future development in areas protected by levees, which is the purview of the County or cities of Colusa and Williams. RD 108 will continue to work with these entities in the future to ensure that future development is sited in proper areas.

Levee Failure

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile

A levee is a raised area that runs along the banks of a river, stream, or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main channel of a stream. 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.

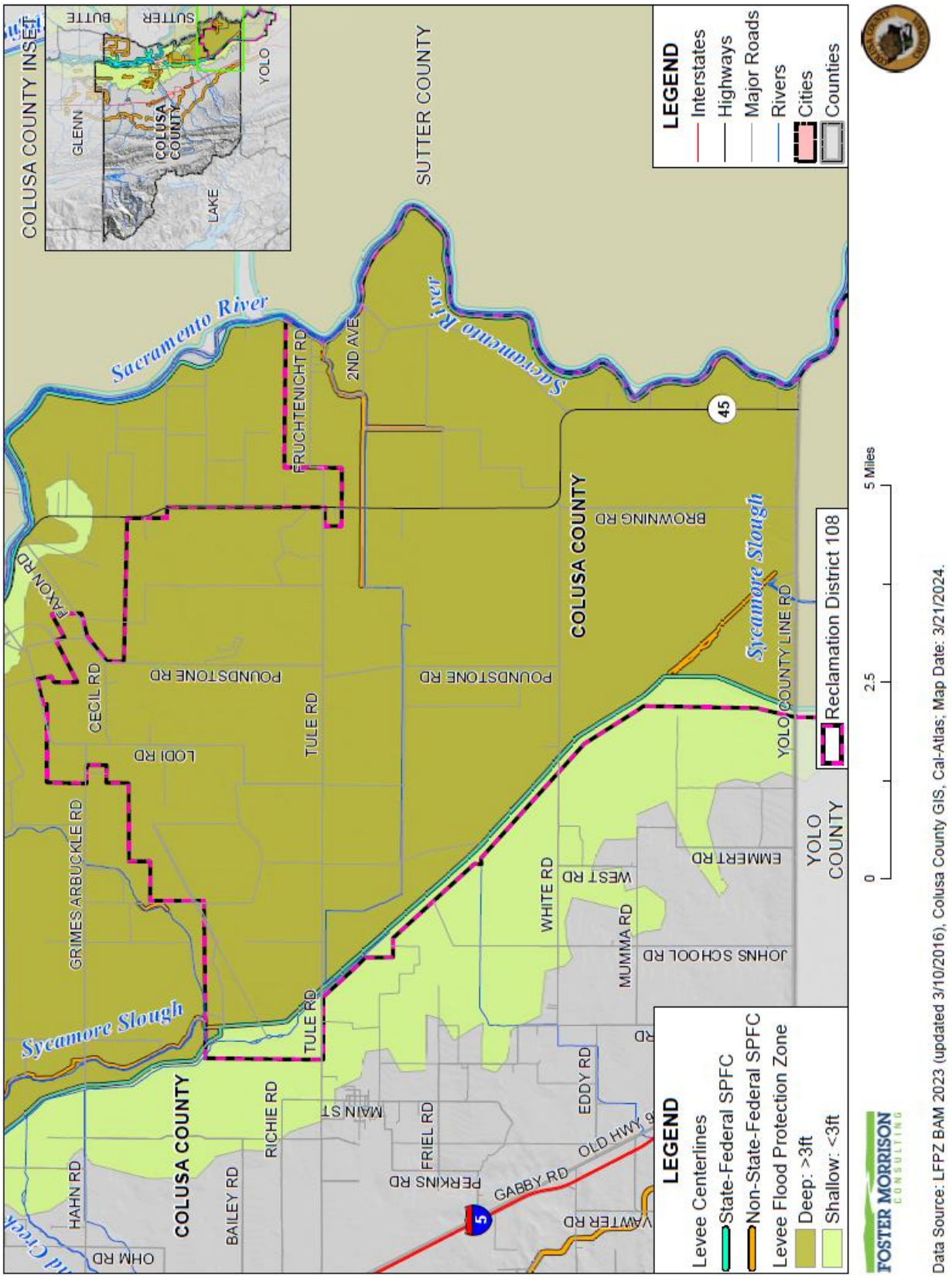
Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce, 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. Levee failure can occur through overtopping or from seepage issues resulting from burrowing rodents, general erosion, excessive vegetation and root systems, and other factors that compromise the integrity of the levee. 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.

Location and Extent

Numerous levees are located throughout the District (as shown in Section 4.3.14 of the Base Plan. Figure F-3 shows the Levee Flood Protection Zones (LFPZs) in the District. Since the decertification of the levees, there is no FEMA DFIRM X Protected by Levee Flood Zone. However, analysis is performed using the LFPZ data for expected flood depths.

There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District are not fully known, but the LFPZ maps provide a rough estimation. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of a levee failure can be hours to weeks, depending on the water flows that the levee holds back. The District noted that when northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on District levees.

Figure F-3 RD 108 – LFPZs



Past Occurrences

Disaster Declarations

There have been no state or federal disaster declarations from levee failure.

NCDC Events

There have been no NCDC levee failure events in Colusa County.

RD 108 Events

There are no recorded catastrophic levee failures of RD 108 levees within the Colusa County Planning Area. However, the Colusa Basin Drain levees are prone to ongoing erosion and stability issues. As recent as 2017, 2019, and 2023, the levees suffered wind wave damage as well as multiple slips which resulted in levee instability. The District actively performed flood fighting to stop the failure from progressing.

Two events causing high water have occurred in the District, one in 2019 and another in 2023. While the levees held and didn't break, there was bank erosion and seepage that happened. More information can be found in the Past Occurrences of the Flood: 1%/0.2% Annual Chance section.

Climate Change and Levee Failure

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 District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

In general, increased flood frequency in California is a predicted consequence of climate change. Mechanisms whereby climate change leads to an elevated flood risk include more extreme precipitation events and shifts in the seasonal timing of river flows. This threat may be particularly significant because recent estimates indicate the additional force exerted upon the levees is equivalent to the square of the water level rise. These extremes are most likely to occur during storm events, leading to more severe damage from waves and floods.

Vulnerability to Levee Failure

The probability of levee failure is increasing over time due to increased storms and flooding potential from global climate change. Levee failure flooding can occur as the result of partial or complete collapse of an impoundment, and often results from prolonged rainfall and flooding. A levee failure can range from a small uncontrolled release to a catastrophic failure. The primary danger associated with levee failure is the high velocity flooding of those properties downstream of the breach. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the levee. In addition, levee failure can cause stream bank erosion, which can in some instances have effects worse than those of flooding itself.

Portions of the District are at some measure of vulnerability to levee failure as shown by the LFPZs. An assessment of a community's vulnerability to levee failure begins with an understanding of local exposure

to levee failure. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard. It should be noted that in the following sections, only the certified levees are analyzed.

Local Concerns

The District 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 vulnerabilities to this hazard.

Levees provide strong flood protection, but they are not failsafe. A levee system failure or overtopping can create severe flooding and high-water velocities. Should the District levees fail, all of the areas protected by RD 108 would be at risk, causing property damage and life safety concerns. All of RD 108 facilities would be at risk. Approximately 8,000 people are at risk as well as over $1.3 billion in property damage. Flood depths can be as deep as 15' within the County and greater than 15' to the south, in Yolo County, where the floodwaters would ultimately pool against the Colusa Basin Drain levee. Relief cuts would be necessary to minimize damage and dewater the basin. Additional issues include dewatering of the levee protected areas, as well as the rebuilding of the levees.

Assets at Risk

Assets at risk from levee failure include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

Populations in the floodplains are at risk to flooding, including the LFPZ. Certain vulnerable populations may be at a greater risk of a sudden levee failure, including the unsheltered, those with limited mobility and those that lack the resources to leave the area. District residents that live in the LFPZ 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.

Structures and Critical Facilities

A levee failure can affect the District, with some structures and critical facilities in the District at risk to a levee failure event. Structures protected by levees that fail are often total losses. The extent and depth of actual flooding and associated damage will vary depending on the location, nature, depth, and extent of any levee break. Critical infrastructure failures such as loss of power, impacts to potable and wastewater treatment systems, and road and bridge failures can all be caused by levee failure events, depending on the magnitude of the resulting flood. As shown in Table F-3, all District assets are at risk to this hazard.

Community Lifelines

Community lifelines may be affected by levee failure. Many of the District's community lifelines are the same as or similar to Colusa County's. A large wildfire may overwhelm these community lifelines. These were discussed in greater detail in Section 4.3.14 of the Base Plan.

Natural, Historic, and Cultural Resources

Large levee failure events can affect natural, historic, and cultural resources. There are a number of ways levee failures and associated floodwaters can impact natural resources and the environment in the District. Wildlife habitats can be destroyed. 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 areas protected by levees, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme levee failure events. Any of these that fall in the LFPZ flood zones would be vulnerable.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.14 of the Base Plan.

Impacts from Levee Failure

Floods and their impacts vary by location, including the added impacts associated with a levee failure flood event, and will only affect certain areas of the District that are in areas protected by levees. Based on the LFPZ analysis, it is evident that levee failure floods could potentially have significant impacts to areas of the District protected by levees, depending on the severity of the event. Impacts that are not quantified, but could be anticipated in large future levee failure events, include:

- Injury and loss of life.
- Commercial and residential structural and property damage.
- Disruption of and damage to public critical infrastructure and services.
- Health hazards associated with mold and mildew, contamination of drinking water, etc.
- Impacts to natural resource areas, including stream bank erosion.
- Damage to roads/bridges resulting in loss of mobility.

In addition to flood related levee failures, the levees in the District are at risk to failure during earthquake. Levee failure flooding could accompany an earthquake if a dam or storage reservoir or tank fails. Severe ground shaking from an earthquake event can cause a dam to fail or overflow to the surrounding area. Channels and water courses with earthen banks and levees are particularly vulnerable and could collapse in a major earthquake resulting in partial or complete blockage of channels causing flooding upstream of the

impoundment. Levees are especially susceptible to rapid settlement due to liquefaction or horizontal spreading of underlying soils.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 108 are relatively small, which limits additional future impacts to RD 108. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect levee failure in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Future development in levee protected areas may be affected by this hazard. RD 108 does not control future development in areas protected by levees, that is the purview of the County or cities of Colusa and Williams. RD 108 will continue to work with these entities in the future to ensure that future development is sited in proper areas.

F.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.

It should be noted (for all of the tables in the sections below) that these tables were designed to display capability information for a county or city. The District has very few of these capabilities, due to their lack of size, lack of complexity, as well as their lack of statutory ability to regulate. The District depends on other jurisdictions for many of these capabilities, and partners with them on case-by-case issues that affect the District.

F.5.1. Regulatory Mitigation Capabilities

Table F-6 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 RD 108.

Table F-6 RD 108'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	N	
Climate Change Adaptation Plan		
Community Wildfire Protection Plan	N	
Comprehensive/Master Plan	N	
Continuity of Operations Plan	N	
Economic Development Plan	N	
Land Use Plan		
Local Emergency Operations Plan	Y	
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	N	
Building code	N	
Flood insurance rate maps	N	
Floodplain ordinance	N	
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	N	
Zoning ordinance	N	
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: RD 108

Grimes Basin EOP (2023)

The purpose of this Reclamation District 108 (RD108), Reclamation District 787 (RD787), Sacramento River Westside Levee District (SRWSLD), and Maintenance Area 12 (MA 12) joint flood safety plan, collectively named the Grimes Basin Flood Safety Plan, is to ensure that the staffs of these levee maintaining agencies (LMAs) can meet response objectives in a flood emergency and interact efficiently with each other and with jurisdictions performing public safety emergency functions within the Grimes Basin. This plan is intended to be used in conjunction with the emergency operations plans of the State of

California and the Colusa and Yolo Operational Areas to facilitate multi-jurisdictional coordination within LMA boundaries.

Levee maintaining agencies (e.g. reclamation district, levee district, State levee maintenance area) have responsibility for the maintenance of the levee, and sometimes for associated drainage systems, within their jurisdictional boundaries. While the LMAs will work with, and assist if possible, the local jurisdiction(s) responsible for other public safety functions within the LMA, this LMA emergency operations plan only contains detailed procedures for those direct levee flood fight emergency responsibilities. The manner of interacting with other jurisdictions is described, but the operational plans or procedures of other jurisdictions with public safety responsibilities within the area protected by the Grimes Basin levees are only referenced in this document.

F.5.2. Administrative/Technical Mitigation Capabilities

Table F-7 identifies the District department(s) responsible for activities related to mitigation and loss prevention in the District.

Table F-7 RD 108'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	Under contract
Community Planner	N	
Emergency Manager	Y	General Manager, Deputy Manager and Superintendent can all serve as Emergency Manager.
Floodplain Administrator	N	
GIS Coordinator	N	
Planning Commission	N	
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	Y	General Manager and Deputy Manager write all grant applications with support from contractors.
Hazard data and information	Y	Engineering firms of record provide this support.
GIS analysis	Y	Engineering firms of record provide this support.
Mutual aid agreements	Y	
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: RD 108

F.5.3. Fiscal Mitigation Capabilities

Table F-8 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table F-8 RD 108'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	Typically cost shared with State grants.
Community Development Block Grant	N	
Federal funding programs (non-FEMA)	Y	Bureau of Reclamation Grants
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
State funding programs	Y	Multiple grants through the State
Stormwater utility fee	N	
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: RD 108

F.5.4. Mitigation Education, Outreach, and Partnerships

Table F-9 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 F-9 RD 108's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	Quarterly newsletters in conjunction with RD 108
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	N	They are included as appropriate in County outreach efforts

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Local news	N	They are included as appropriate in County outreach efforts
Organizations that interact with underserved and vulnerable communities	N	
Social media		
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: RD 108

F.5.5. Other Mitigation Efforts

The District has many other completed or ongoing mitigation projects/efforts that include the following:

The District has levee patrol plans, dewatering plans, and evacuations plans for the District's levees. This applies to flooding, levee failure, and localized flooding. The dewatering plan also has a strategy for Grimes Basin relief cuts to reduce the amount of water that would affect critical facilities and populations.

F.6 Mitigation Strategy

F.6.1. Mitigation Goals and Objectives

The RD 108 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

F.6.2. Mitigation Actions

The planning team for RD 108 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:

- Flood: 1%/0.02% Annual Chance Flood
- Flood: Localized Flood
- Levee Failure

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 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 plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Mitigation Actions

Action 1. Emergency Generator Maintenance and Upkeep – District Office

Hazards Addressed: Flood: 1%/0.02% Annual Chance Flood, Flood: Localized Flood, Levee Failure

Goals Addressed: 1, 3, 4, 5

Issue/Background: The RD 108 office serves as the hub of emergency response activities for RD 108, SRWSLD and KLRDD. The office does not currently have a backup generator.

Project Description: The District now has an emergency generator. It will need to be maintained to ensure its reliability during power outages.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: None.

Responsible Office/Partners: RD 108

Benefits (Losses Avoided): Power for staff to work during power outages from severe weather and PSPS events.

Potential Funding: PDM, HMGP

Timeline: Generator installed in 2020. Upkeep and maintenance are an ongoing annual occurrence.

Project Priority (H, M, L): Medium

Action 2. Emergency Generator – Pump Stations

Hazards Addressed: Flood: 1%/0.02% Annual Chance Flood, Flood: Localized Flood, Levee Failure

Goals Addressed: 1, 3, 4, 5

Issue/Background: The pump stations are critical for preventing interior flooding of the District. If the pump stations were to lose power, interior flooding may occur.

Project Description: Emergency generators will be added to reduce risk to the District.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: None.

Responsible Office/Partners: RD 108

Benefits (Losses Avoided): Power for pumps to continue working during power outages from severe weather and PSPS events.

Potential Funding: PDM, HMGP, USBR grants

Timeline: In progress. Design initiated 2020.

Project Priority (H, M, L): High

Action 3. Stabilization of Colusa Basin Drain Levee

Hazards Addressed: Flood: 1%/0.02% Annual Chance Flood, Flood: Localized Flood, Levee Failure

Goals Addressed: 1, 3, 4, 5

Issue/Background: The Colusa Basin Drain levees are prone to instability issues during highwater events.

Project Description: Stability repairs would be designed and constructed. Typical fixes include stability berms, slope flattening or levee realignment.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office/Partners: RD 108

Benefits (Losses Avoided): Reduced risk to people and property.

Potential Funding: DWR Grant, PDM, HMGP

Timeline: In progress. Design initiated 2024.

Project Priority (H, M, L): High

Annex G Reclamation District 479

G.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Reclamation District 479 (RD 479 or District), a new participating jurisdiction to the 2024 Colusa 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 District. This Annex provides additional information specific to RD 479, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this District.

G.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Colusa County Hazard Mitigation Planning Committee (HMPC), the District 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 G-1. Additional details on Plan participation and District representatives are included in Appendix A.

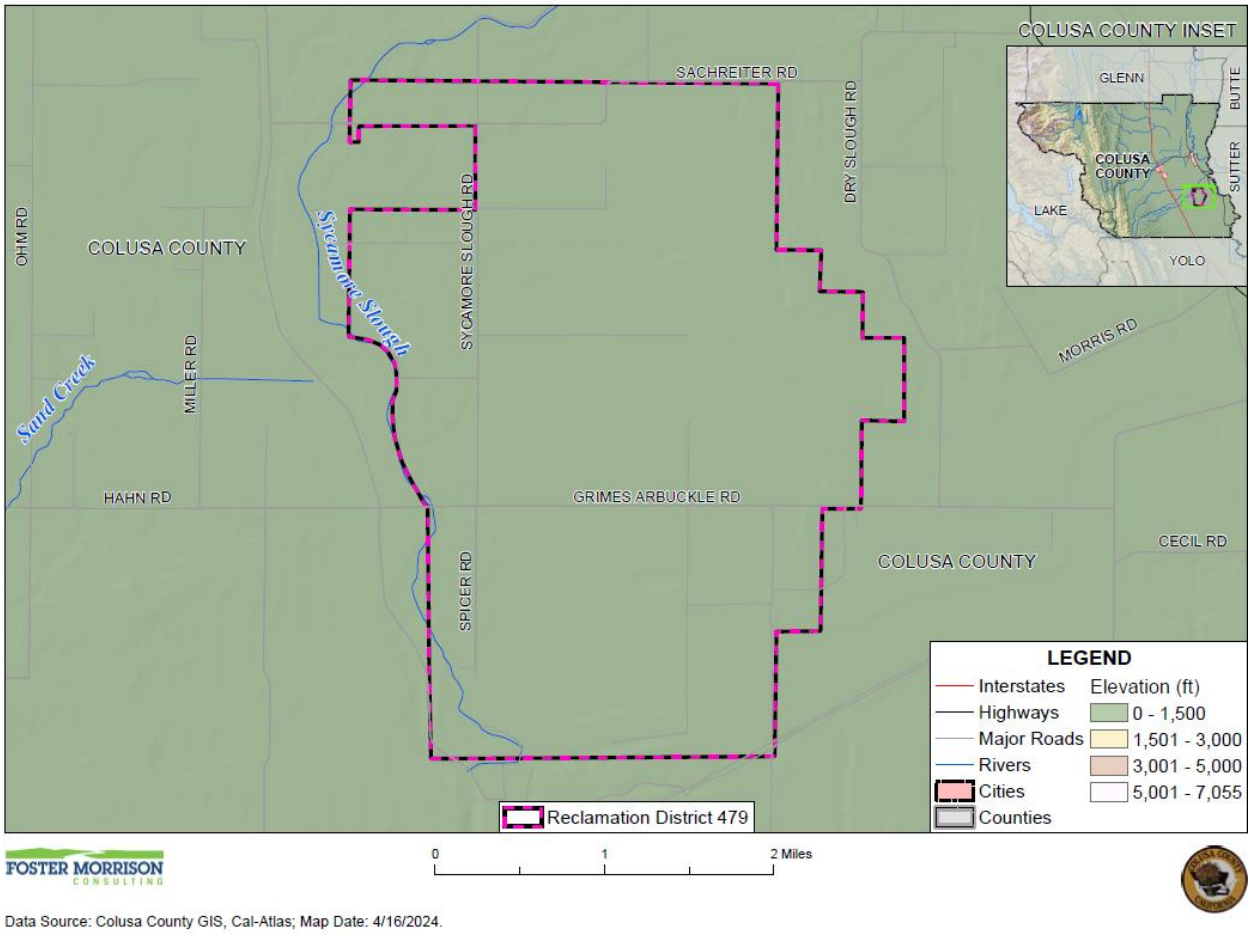
Table G-1 RD 479 – Planning Team

Name	Position/Title	How Participated
Derick Strain	President	Attended LHMP Meetings and provided all paperwork and input to Annex.

G.3 District Profile

The District profile for RD 479 is detailed in the following sections. Figure G-1 displays a map and the location of the District within Colusa County.

Figure G-1 RD 479



Data Source: Colusa County GIS, Cal-Atlas; Map Date: 4/16/2024.

G.3.1. Overview and Background

Reclamation District 479 is located south of Colusa and north of RD 108. The District is almost completely within the Sacramento River West Side Levee District with a total acreage of 5,951.97. RD 479 was formed in 1885 and covers the southern part of the Mormon Basin, a portion of the much larger Colusa Basin. The chief characteristic of these basins is that their edges or rims have been built up by alluvial deposits during flood periods so that the edges are higher than the central portion of the area.

RD 479's purpose and primary objective is to manage drainage water for over 6,000 acres in the Mormon Basin, a part of the much larger Colusa Basin. The District is primarily concerned with drain water and makes sure that all of the drain water enters the 2047 canal. Though its name does not indicate it, the District also serves as a flood control agency to keep the water in the basin, especially during wet winters, from adversely affecting public travel, namely on Grimes-Arbuckle Rd. It is very important that this district's infrastructure is properly maintained and cared for to primarily serve the needs of the farmers and their farmland, along with serving local landowners, the county, and those who travel through it.

G.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 RD 479 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 District's potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Overview and Background above, a risk assessment was performed for the District. This includes the following sections:

- G.4.1 District Assets Inventory and Growth and Development Trends
- G.4.2 Hazard Identification
- G.4.3 Hazard Profiles and Vulnerability to Specific Hazards

G.4.1. District Assets Inventory and Growth and Development Trends

This section provides an inventory of the District'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 District'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 District, potentially at risk to identified hazards as discussed in Section G.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the District, both current and future, is presented.

Assets Inventory

The District's asset inventory is detailed in the following sections:

- People and Populations (Populations Served)
- 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 G.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the District. The District provides services to 25 farming entities. The District currently maintains four staff.

Special Populations and Disadvantaged Communities

The District noted very few vulnerable and underserved populations in the District. These populations are discussed in Section 4.3.1 of the Base Plan.

Structures and Critical Facilities

This section considers the RD 479's assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan 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.***

Table G-2 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. RD 479's physical assets, valued at $3.15 million, consist of the buildings and infrastructure to support the District's operations.

Table G-2 RD 479 Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Drain Pumps	RD Infrastructure	$450,000	Flood, Localized Flood, Levee Failure
Drain Box	RD Infrastructure	$400,000	Flood, Localized Flood, Levee Failure
Drain Pipe	RD Infrastructure	$300,000	Flood, Localized Flood, Levee Failure
Drain Ditches & Conveyance	RD Infrastructure	$2,000,000	Flood, Localized Flood, Levee Failure, Streambank Erosion
Total		**$3,150,000**	

Source: RD 479

Community Lifelines

Assessing the vulnerability of the District 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 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.

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 District as a partnership between the District, local cities, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the District's community lifelines overlap the County's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the District and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in the Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the District 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

RD 479 has a variety of natural resources of value to the District. The basin is rich in natural gas and contains a lot of rice acreage, which provides habitat to thousands of wintering birds in the area. These natural resources parallel that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Historic and Cultural Resources

RD 479 has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallel that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the RD 479 to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the District.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. Economic assets for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Community Activities of Value

Inventorying economic assets in the District 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. Community Activities of Value for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Growth and Development Trends

As part of the planning process, the District 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.

Population Trends and Projections

The District does not expect there to be future growth, however, did note that the acres within the District must be maintained.

Future Development Areas

It is important to review future development plans for the District. 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. While agricultural developments have changed and shaped the landscape in the District, there are no major future development plans currently.

G.4.2. Hazard Identification

RD 479 identified the hazards that affect the District and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the District (see Table G-3).

Table G-3 RD 479—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Extensive	Occasional	Limited	Low	Medium
Climate Change	Extensive	Likely	Limited	Medium	–
Dam Failure	N/A	N/A	N/A	N/A	N/A
Drought & Water shortage	N/A	N/A	N/A	N/A	N/A
Earthquake	Extensive	Unlikely	Negligible	Low	Low
Floods: 1%/0.2% annual chance	Extensive	Occasional	Critical	Medium	Medium
Floods: Localized Stormwater	Extensive	Likely	Critical	Medium	Medium
Landslide, Mudslide, and Debris Flow	N/A	N/A	N/A	N/A	N/A
Levee Failure	Extensive	Unlikely	Catastrophic	High	Medium
Severe Weather: Extreme Cold and Freeze	N/A	N/A	N/A	N/A	N/A
Severe Weather: Extreme Heat	N/A	N/A	N/A	N/A	N/A
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	N/A	N/A	N/A	N/A	N/A
Severe Weather: High Winds and Tornados	N/A	N/A	N/A	N/A	N/A
Stream Bank Erosion	Extensive	Unlikely	Catastrophic	High	Medium
Subsidence	N/A	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A	N/A

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

G.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 District (as identified in the Significance column of Table G-3) 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 District. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Colusa 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 Format

Each hazard is profiled in the following format:

- **Hazard Profile**– A hazard profile is included for each hazard. This includes information on:
  - ✓ A general discussion of the hazard and related issues.
  - ✓ **Location** and **Extent** - Location is the geographic area within the District 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. NCDC events are also discussed. A discussion of disaster declarations is included in each hazard section. Other past occurrence data specific to the District follows the disaster declarations 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 District to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. 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 District provided information on how the District is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same format as in Section G.4.1 above. This includes sections on: People and Populations Served; Structures and Critical Facilities, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the District and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset. Impacts are also affected by the community's ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by the hazard is also included.

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)

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), are coordinating to prepare 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 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

The District noted that there was minimal concern in relation to PSPS events.

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 District 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 RD 479, the Colusa 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.

RD 479 Events

The frequency and severity of extreme swings in weather have impacted the District. In times of drought, the District is minimally affected; however, the periods of high precipitation high levels of stress on the District's infrastructure. High water flows in the ditches create more stream bank erosion. The more precipitation the District receives, the higher the concern for the integrity of the infrastructure, pumps, and pipes maintained by RD 479.

Vulnerability to Climate Change

The whole of the District is at some measure of vulnerability to climate change. The District Planning Team has concerns that the vulnerability of the District will grow to be greater 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 District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

Assets at Risk

Assets at risk from climate change include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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 socially vulnerable or underserved populations (as shown in the Special Populations discussion in Section G.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 and Critical Facilities

Climate change, on its own, does not generally impact structures. However, structures in areas of increased wildfire or flood 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. As with structures, critical facilities and infrastructure in areas of

increased wildfire or flood 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 natural hazards.

Community Lifelines

Due to the slow onset of climate change, community lifelines in the District are expected to adapt over time to new climate normal. It is thought that community lifelines in the District would not be overwhelmed by climate change. This was discussed in greater detail in Section 4.3.7 of the Base Plan.

Natural, Historic, and Cultural Resources

The rivers, streams, agricultural areas, and open space areas of the District supports rich biodiversity, including many special-status species. These are all at risk from the effects of climate change. In addition, if heat contributes to changes in wildfire patterns, all areas (on land) of the District are at increased risk from fire – including areas of 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.7 of the Base Plan.

Impacts from Climate Change

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Central Valley region in which the District is part of:

- Increased temperatures
- Reduced precipitation
- Public health – heat and air pollution
- Reduced agricultural productivity (e.g., wine grapes)
- 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 District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

Climate change is anticipated to worsen over time. The anticipated future changes in population in the areas served by RD 479 are relatively small, which limits additional impacts to RD 479. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect streambank erosion in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Climate change can influence development in the District over time. The District could see population fluctuations as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to affect the District. While there are currently no formal studies of specific migration patterns expected to impact the District, climate-induced migration was recognized within the UNFCCC Conference of Parties Paris Agreement of 2022.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–Medium

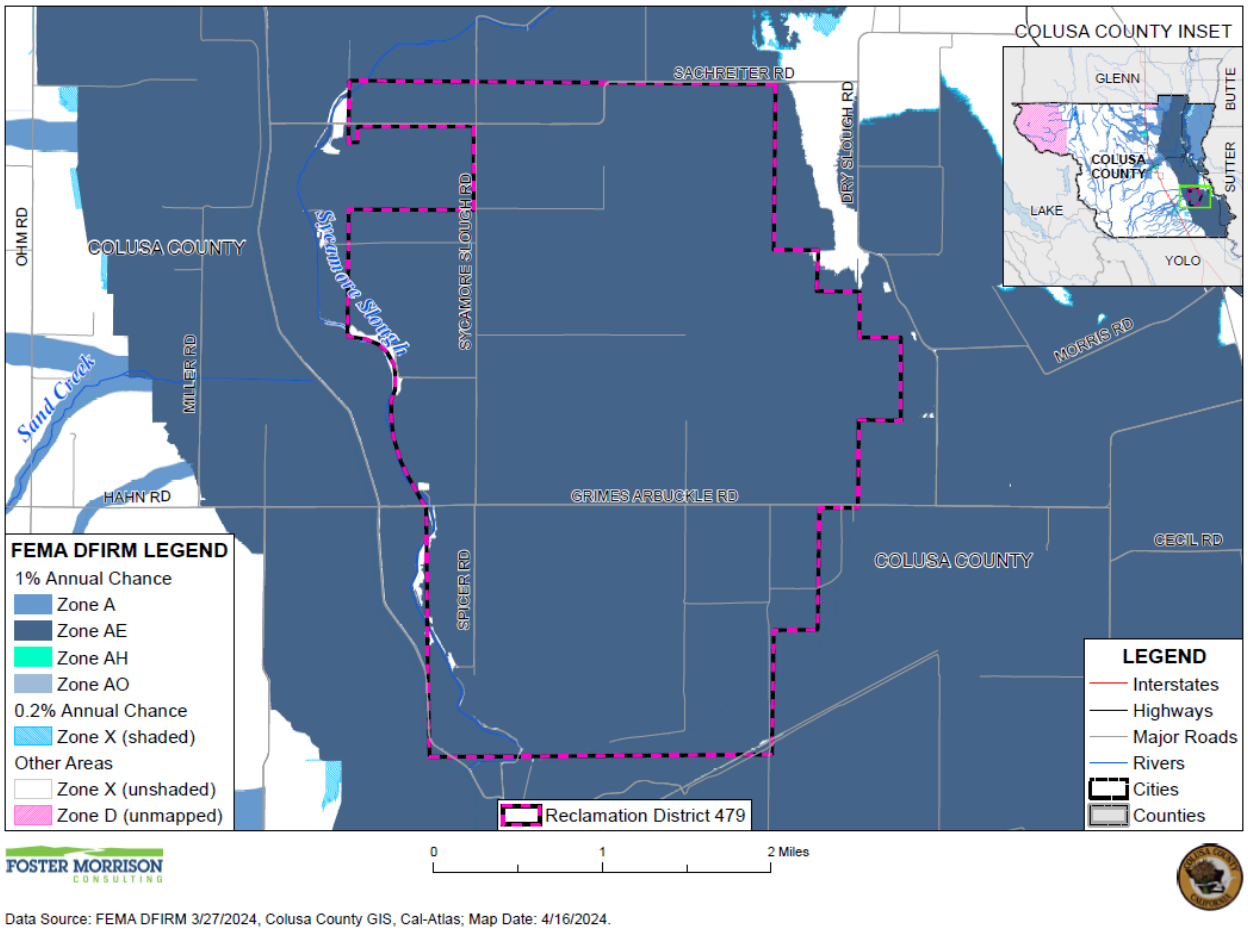
Hazard Profile

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 District and may have caused damage in the past. Flooding can be a significant problem in the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the District swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. 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.

Location and Extent

RD 479 has areas located in the 1% and 0.2% annual chance flood zones. This is seen in Figure G-2.

Figure G-2 RD 479 – FEMA DFIRM Flood Zones



Data Source: FEMA DFIRM 3/27/2024, Colusa County GIS, Cal-Atlas; Map Date: 4/16/2024.

Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the District vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the District 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 District tends to have a shorter speed of onset, due to the amount of water that flows through the District.

Past Occurrences

Disaster Declaration History

A list of state and federal disaster declarations for Colusa County from flooding is shown on Table G-4. These events also likely affected the District to some degree.

Table G-4 Colusa County – State and Federal Disaster Declarations from Flood 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Colusa County has seen 14 events. These events most likely had some impact on the District.

RD 479 Events

The most recent flood event occurred in the winter of 2020. The District noted that there were areas of stream bank erosion along its network of ditches. The District was granted FEMA funding for stream bank erosion repairs, which began in 2021.

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 District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding in California and the Colusa County Planning Area, including the District. 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 District'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 1% and 0.2% chance of flooding are generally confined to areas near the waterways of the District.

The whole of the District 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 District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

The main issue for the District lies in their existing infrastructure. A key part and area of concern is a steel box used to build up water pressure to drain water out of the basin of the drainage system which will fail at some point. If this pressure box and/or the original foundation underneath it fails during a critical time, the basin may experience massive damage. The current pressure box, as it sits, was installed as a temporary fix in 1998 when the old system failed at a critical time, causing flooding in the basin. This 25+ year old steel box is feared to fail again someday, causing flooding, erosion, property damage, and road closures. An example of this can be seen in Figure G-3.

Figure G-3 RD 479 Steel Box

Source: RD 479

A display of the operational pumps at the foot of the drain canal. The pump engines are underneath the canopy.

There are multiple vulnerable areas on the District's drainage pump system. While the pipe from the steel pressure box pictured above to the canal was replaced in 2015, the largest concern for the District is the infrastructure of the steel box. The length of integrity is unknown, but a failure could be catastrophic. The pressure box is deemed the most vulnerable at this point. Next to the pressure box, the pumps sit at a vulnerable elevation. Raising their height above the drain ditch from where they currently sit would help mitigate vulnerability.

Assets at Risk

Assets at risk from flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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.

District 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.

Structures and Critical Facilities

Certain structures in the District are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. As shown in Table G-2, all District assets are at risk to this hazard.

Flooding presents a threat to threat to both critical facilities and infrastructure, as well as community lifelines. Critical 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 water infrastructure for drinking water, wastewater service, and draining streets of rainwater. 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.

Community Lifelines

1% and 0.2% annual chance flooding presents a threat to life and property, including community lifelines in the District. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.11 of the Base Plan. Generally, even major flood events are temporary events with flood waters receding back to pre-storm levels at the conclusion of the storm. However, depending on the location, duration, and magnitude and severity of any given flood event, some of these community lifelines may be overwhelmed in the short term.

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 that fall in the flood zones shown on Figure G-2 would be vulnerable. This is especially true if a 0.2% annual chance flood event occurs.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.11 of the Base Plan.

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. 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 District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 479 are relatively small, which limits additional impacts to RD 479. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect streambank erosion in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

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 District may be built in the floodplain, in conformance to the standards of the floodplain ordinance. The District enforces the floodplain ordinance on new development in RD 479.

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 District 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.

Location and Extent

RD 479 is subject to localized flooding throughout the District. This is discussed in Table G-5 below. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District 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 District 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.

NCDC Events

The past occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile above.

RD 479 Events

The District noted the following past occurrences of localized flooding:

The District noted localized flooding in **1983**. According to local farmers present at the time, this localized flooding caused road closures at Grimes-Arbuckle Rd and Sycamore Slough Rd

The old pressure box failed in **1997/98**. The steel box which is currently in use was installed as an emergency fix in 1998. It was never intended to be the permanent pressure box. At the time, the plan was to replace the steel box with a permanent concrete one eventually, though there was no specific timeline for completing that project.

The District noted that there have been failures prior to 1997 as well, though they are not documented.

Climate Change and Localized Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with localized flood. More information on future impacts to the District 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 District 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 District. 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 District are minor, localized flood events that are more of a nuisance than a disaster.

Many areas of the District 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 District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

Historically, the District has been affected by flooding of streams and creeks occurring during heavy rain and storm events. Additional development in the District 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 District.

The District tracks localized flooding areas. Affected localized flood areas identified by the RD 479 are summarized in Table G-5.

Table G-5 RD 479 – List of Localized Flooding Problem Areas

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris	Downed Trees
Grimes-Arbuckle Rd	Yes	Unknown	Unknown	Not if extreme	No	No	No
Sycamore Slough Rd	Yes	Unknown	Unknown	Not if extreme	No	No	No

Source: RD 479

The pump station and surrounding infrastructure are the most likely to be affected, as well as the section of the ditch closest to the pumps. Near these locations, water velocity appears to be the highest and therefore is a greater factor for stream bank erosion.

Assets at Risk

Assets at risk from localized flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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 District.

Structures and Critical Facilities

Structures and critical facilities 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 damages. As shown in Table G-2, all District assets are at risk to this hazard.

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.

Community Lifelines

Due to the relatively minor nature of localized flooding, community lifelines are unlikely to be overwhelmed. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.12 of the Base Plan.

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 District 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.12 of the Base Plan.

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. Localized flooding impacts may be exacerbated in the future due to the effects of climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 479 are relatively small, which limits additional impacts to RD 479. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect streambank erosion in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Future development in the District will add more impervious surfaces causing an increase in stormwater runoff and the continued need to drain these waters. The District 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 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. The District noted that major developments are not likely in the near future.

Levee Failure

Likelihood of Future Occurrence–Unlikely
Vulnerability–High

Hazard Profile

A levee is a raised area that runs along the banks of a river, stream, or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main channel of a stream. 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.

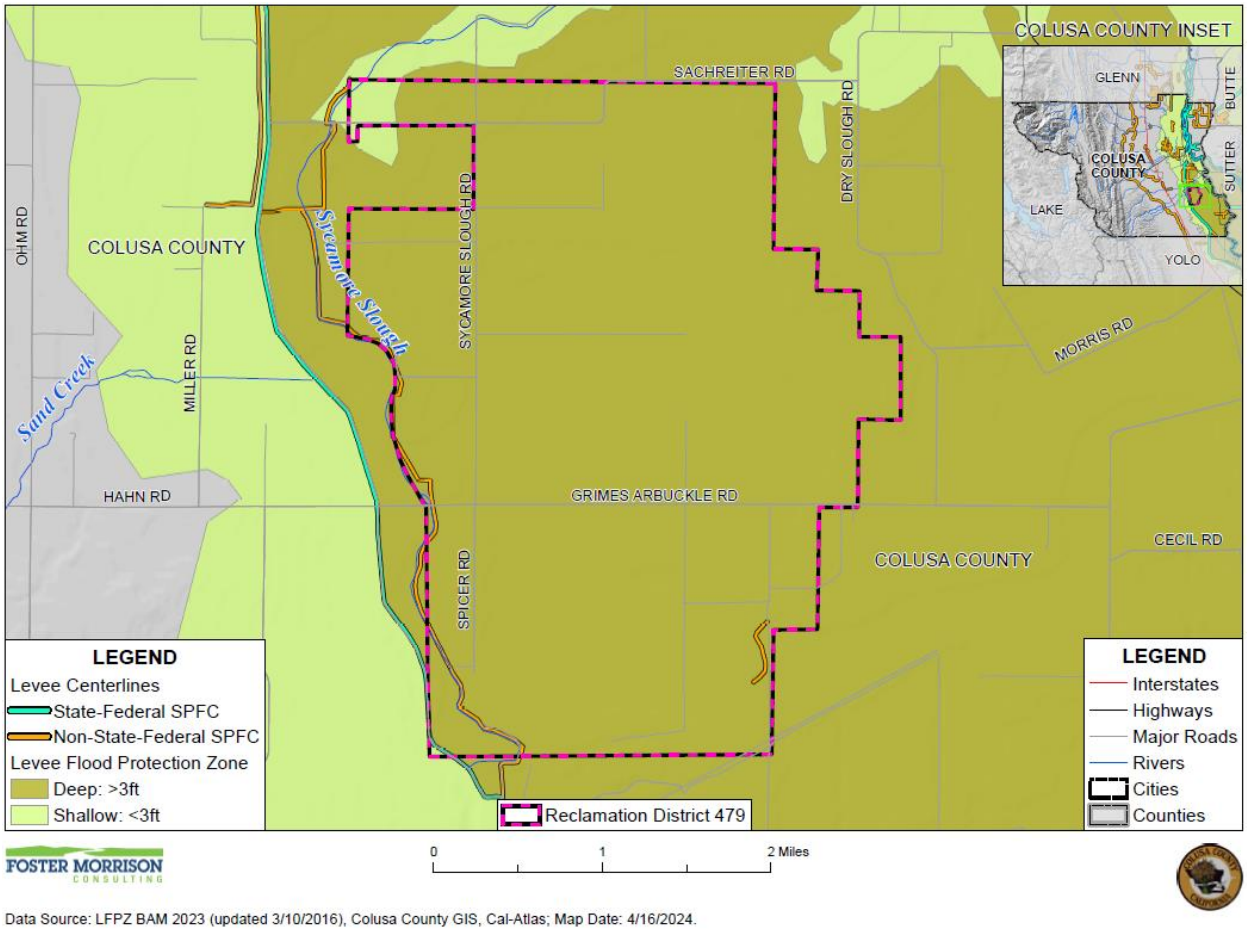
Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce, 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. Levee failure can occur through overtopping or from seepage issues resulting from burrowing rodents, general erosion, excessive vegetation and root systems, and other factors that compromise the integrity of the levee. 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.

Location and Extent

Numerous levees are located throughout the District (as shown in Section 4.3.14 of the Base Plan. Figure G-4 shows the Levee Flood Protection Zones (LFPZs) in the District. Since the decertification of the levees, there is no FEMA DFIRM X Protected by Levee Flood Zone. However, analysis is performed using the LFPZ data for expected flood depths.

There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District are not fully known, but the LFPZ maps provide a rough estimation. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of a levee failure can be hours to weeks, depending on the water flows that the levee holds back. The District noted that when northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on District levees.

Figure G-4 RD 479 – LFPZs



Data Source: LFPZ BAM 2023 (updated 3/10/2016), Colusa County GIS, Cal-Atlas; Map Date: 4/16/2024.

Past Occurrences

Disaster Declarations

There have been no state or federal disaster declarations from levee failure.

NCDC Events

There have been no NCDC levee failure events in Colusa County.

RD 479 Events

The District noted that there have been no levee failure events that have impacted the area.

Climate Change and Levee Failure

is likely that climate change will increase the chance of future occurrence as well as future impacts associated with levee failure. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

In general, increased flood frequency in California is a predicted consequence of climate change. Mechanisms whereby climate change leads to an elevated flood risk include more extreme precipitation events and shifts in the seasonal timing of river flows. This threat may be particularly significant because recent estimates indicate the additional force exerted upon the levees is equivalent to the square of the water level rise. These extremes are most likely to occur during storm events, leading to more severe damage from waves and floods.

Vulnerability to Levee Failure

The probability of levee failure is increasing over time due to increased storms and flooding potential from global climate change. Levee failure flooding can occur as the result of partial or complete collapse of an impoundment, and often results from prolonged rainfall and flooding. A levee failure can range from a small uncontrolled release to a catastrophic failure. The primary danger associated with levee failure is the high velocity flooding of those properties downstream of the breach. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the levee. In addition, levee failure can cause stream bank erosion, which can in some instances have effects worse than those of flooding itself.

All of the District are at some measure of vulnerability to levee failure as shown by the LFPZs. An assessment of a community's vulnerability to levee failure begins with an understanding of local exposure to levee failure. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard. It should be noted that in the following sections, only the certified levees are analyzed.

Local Concerns

The District 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 vulnerabilities to this hazard.

RD479's purpose is to manage drainage water for over 6,000 acres in the Mormon Basin, a part of the much larger Colusa Basin. We are primarily concerned with preserving the use of farmland by actively maintaining drainage and seepage water in the basin to serve the needs of farmers. Though its name does not indicate it, RD479 also serves as a flood control agency to keep the water in the basin from adversely affecting farmland and public travel, namely on Grimes-Arbuckle Rd.

It is unknown to the District which parts of the 2047 canal levee are the most vulnerable to the District. DWR maintains this levee to which RD479 may be vulnerable to if there was a failure. The Sacramento River levee is outside of RD479's boundary and is not foreseen as a hazard to the district.

Assets at Risk

Assets at risk from levee failure include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

Populations in the floodplains are at risk to flooding, including the LFPZ. Certain vulnerable populations may be at a greater risk of a sudden levee failure, including the unsheltered, those with limited mobility and those that lack the resources to leave the area. District residents that live in the LFPZ 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.

Structures and Critical Facilities

A levee failure can affect the District, with some structures and critical facilities in the District at risk to a levee failure event. Structures protected by levees that fail are often total losses. The extent and depth of actual flooding and associated damage will vary depending on the location, nature, depth, and extent of any levee break. Critical infrastructure failures such as loss of power, impacts to potable and wastewater treatment systems, and road and bridge failures can all be caused by levee failure events, depending on the magnitude of the resulting flood. As shown in Table G-2, all District assets are at risk to this hazard.

Community Lifelines

Community lifelines may be affected by levee failure. Many of the District's community lifelines are the same as or similar to Colusa County's. Levee failure may overwhelm community lifelines. These were discussed in greater detail in Section 4.3.14 of the Base Plan.

Natural, Historic, and Cultural Resources

Large levee failure events can affect natural, historic, and cultural resources. There are a number of ways levee failures and associated floodwaters can impact natural resources and the environment in the District. Wildlife habitats can be destroyed. 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 areas protected by levees, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme levee failure events. Any of these that fall in the LFPZ flood zones would be vulnerable.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.14 of the Base Plan.

Impacts from Levee Failure

Floods and their impacts vary by location, including the added impacts associated with a levee failure flood event, and will only affect certain areas of the District that are in areas protected by levees. Based on the

LFPZ analysis, it is evident that levee failure floods could potentially have significant impacts to areas of the District protected by levees, depending on the severity of the event. Impacts that are not quantified, but could be anticipated in large future levee failure events, include:

- Injury and loss of life.
- Commercial and residential structural and property damage.
- Disruption of and damage to public critical infrastructure and services.
- Health hazards associated with mold and mildew, contamination of drinking water, etc.
- Impacts to natural resource areas, including stream bank erosion.
- Damage to roads/bridges resulting in loss of mobility.

In addition to flood related levee failures, the levees in the District are at risk to failure during earthquake. Levee failure flooding could accompany an earthquake if a dam or storage reservoir or tank fails. Severe ground shaking from an earthquake event can cause a dam to fail or overflow to the surrounding area. Channels and water courses with earthen banks and levees are particularly vulnerable and could collapse in a major earthquake resulting in partial or complete blockage of channels causing flooding upstream of the impoundment. Levees are especially susceptible to rapid settlement due to liquefaction or horizontal spreading of underlying soils.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 479 are relatively small, which limits additional impacts to RD 479. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect streambank erosion in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Future development in levee protected areas may be affected by this hazard. However, in these areas the District's floodplain management ordinance would be enforced.

Stream Bank Erosion

Likelihood of Future Occurrence– Likely
Vulnerability–High

Hazard Profile

Erosion is the general process whereby rocks and soils are broken down, removed by weathering, or fragmented and then deposited in other places by water or air. Stream bank erosion poses problems for the District. The rate of erosion depends on many variables, including the soil or rock texture and composition, soil permeability, slope, extent of vegetative cover, and precipitation amounts and patterns. Erosion increases with increasing slope and precipitation and with decreasing vegetative cover, which includes areas where protective vegetation has been removed by fire, construction, or cultivation. The District is traversed by many waterways, including leveed areas. These locations are all subject to bank erosion. Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects.

Location and Extent

Stream bank erosion occurs on rivers, streams, and other moving waterways, including leveed areas, in the District. Erosion and deposition are occurring continually at varying rates over the Planning Area. Swiftly moving floodwaters cause rapid local erosion as the water carries away earth materials. This is especially problematic in leveed areas. Severe erosion removes the earth from beneath bridges, roads and foundations of structures adjacent to streams. By undercutting it can lead to increased rockfall and landslide hazard. The deposition of material can block culverts, aggravate flooding, destroy crops and lawns by burying them, and reduce the capacity of water reservoirs as the deposited materials displace water.

The speed of onset of stream bank erosion is slow, as the erosion takes place over periods of years. Duration of erosion is extended. Greater erosion occurs during periods of high stream flow and during storm and wind events when wave action contributes to the extent and speed of streambank erosion.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declarations related to erosion.

NCDC

The NCDC does not track stream bank erosion.

RD 479 Events

The winter of 2020 created stream bank erosion on the District's ditch banks. There were several areas in the District ditches that were reinforced via FEMA funding following this event.

Climate Change and Stream Bank Erosion

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with stream bank erosion. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding which contributes to erosion in Colusa County. 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. Future precipitation projections were shown in Section 4.3.4 of the Base Plan. 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. All of the events above could exacerbate stream bank erosion in the County.

Vulnerability to Stream Bank Erosion

Parts of the District located along streambanks are at some measure of vulnerability to streambank erosion. An assessment of a community's vulnerability begins with an understanding of local exposure to streambank erosion. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

The District noted that sections of ditches that are already showing damage are of concern, especially where the water moves fastest and crosses underneath county and private roads.

Assets at Risk

Assets at risk from streambank erosion include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations

Streambank erosion will have a minimal direct effect on District staff, people, and populations in the District. Indirect effects on people and populations include damages to roads or bridges from streambank erosion, causing transportation issues. Streambank erosion can also cause high sediment loads. While rare, this can cause water quality impacts. Water quality can be impacted causing health problems, especially to vulnerable populations where access to clean water supplies can be more challenging.

Structures and Critical Facilities

Structures and critical facilities near rivers are at some risk from the effects of streambank erosion. Structures that are in areas protected by levees are at greater risk of streambank erosion. Streambank

erosion can undercut structure foundations causing instability and other issues. Should levees erode quickly, their risk of failure increases. Those structures behind the levees would be at risk. This is discussed in greater detail in Levee Failure section above. 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. As shown in Table G-2, many District assets are at risk to this hazard.

Community Lifelines

Streambank erosion that causes significant impacts such as levee failures presents a threat to life and property, including community lifelines in the District. Many of the District's community lifelines are the same as or similar to Colusa County's. These were discussed in greater detail in Section 4.3.15 of the Base Plan.

Natural, Historic, and Cultural Resources

Streambank erosion could cause levee failure flooding. 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.15 of the Base Plan.

Impacts from Streambank Erosion

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 479 are relatively small, which limits additional impacts to RD 479. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect streambank erosion in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires an understanding of both stream dynamics and the management of streamside vegetation.

Planned developments should take erosion risk areas into account during the construction of new homes and commercial properties

G.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.

It should be noted (for all of the tables in the sections below) that these tables were designed to display capability information for a county or city. The District has very few of these capabilities, due to their lack of size, lack of complexity, as well as their lack of statutory ability to regulate. The District depends on other jurisdictions for many of these capabilities, and partners with them on case-by-case issues that affect the District.

G.5.1. Regulatory Mitigation Capabilities

Table G-6 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 RD 479.

Table G-6 RD 479'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	N	
Climate Change Adaptation Plan	N	
Community Wildfire Protection Plan	N	
Comprehensive/Master Plan	N	
Continuity of Operations Plan	N	
Economic Development Plan	N	
Land Use Plan	N	
Local Emergency Operations Plan	N	
Stormwater Management Plan	N	
Transportation Plan	N	
Other (describe)	N	
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	N	
Building code	N	
Flood insurance rate maps	N	
Floodplain ordinance	N	
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	N	
Zoning ordinance	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
The District relies on the County to provide regulatory mitigation in the District. RD 479 will continue to partner and look for opportunities to inform the County on regulations needed to reduce hazard impacts in the District.		

Source: RD 479

G.5.2. Administrative/Technical Mitigation Capabilities

Table G-7 identifies the District department(s) responsible for activities related to mitigation and loss prevention in the District.

Table G-7 RD 479'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	N	
Community Planner	N	
Emergency Manager	N	
Floodplain Administrator	N	
GIS Coordinator	N	
Planning Commission	N	
Other	N	
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	N	
Hazard data and information	N	
GIS analysis	N	
Mutual aid agreements	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
The District is very small in size and has limited staff. However, the District would like to increase its grant writing capabilities and will seek ways to do that in the future.		

Source: RD 479

G.5.3. Fiscal Mitigation Capabilities

Table G-8 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table G-8 RD 479'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	N	
Community Development Block Grant	N	
Federal funding programs (non-FEMA)	N	

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	Yes, for district improvements as needed and afforded. Dry years help build capital in the District to spend on projects for mitigation. Wet years use up District funds to drain district, so there typically isn't much capital left to spend on improvement projects.
Impact fees for new development	N	
State funding programs	N	
Stormwater utility fee	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
An increase in funding will allow the District to handle mitigation projects in a more timely manner, instead of waiting for a hazard event to occur. The District will seek funding to improve RD 479 infrastructure.		

Source: RD 479

G.5.4. Mitigation Education, Outreach, and Partnerships

Table G-9 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 G-9 RD 479's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	N	
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	N	
Local news	N	
Organizations that interact with underserved and vulnerable communities	N	
Social media	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
The District board is made up of landowners and seems to attract very little interest from invested parties. Implementing education, outreach, and partnerships will be pursued as staff time and budgets allow. The District will seek to partner with the County on any education events that occur within RD 479 boundaries.		

Source: RD 479

G.5.5. Other Mitigation Efforts

The District feels the lists above adequately reflect the District's mitigation capabilities.

G.6 Mitigation Strategy

G.6.1. Mitigation Goals and Objectives

RD 479 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

G.6.2. Mitigation Actions

The planning team for RD 479 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
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Levee Failure
- Stream Bank Erosion

Non-priority hazards for the District include:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Dam Failure
- Drought & Water shortage
- Earthquake
- Landslide, Mudslide, and Debris Flow
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)
- Severe Weather: High Winds and Tornados
- Subsidence
- Wildfire

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 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 plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Mitigation Actions

Action 1. RD479 Integrity Preservation

Hazards Addressed: Flood: 1%/0.5%/0.2%, Flood: Localized Stormwater Flooding, Climate Change, Stream Bank Erosion

Goals Addressed: 1, 3, 4, 5

Issue/Background: RD479's purpose is to manage drainage water for over 6,000 acres in the Mormon Basin, a part of the much larger Colusa Basin. We are primarily concerned with preserving the use of farmland by actively maintaining drainage and seepage water in the basin to serve the needs of farmers. Though its name does not indicate it, RD479 also serves as a flood control agency to keep the water in the basin from adversely affecting farmland and public travel, namely on Grimes-Arbuckle Rd.

Our main issue lies in our infrastructure. A key part of our drainage system will fail at some point. This area of concern is a steel box used to build up water pressure to drain water out of the basin. If this pressure box and/or the original foundation underneath it fails during a critical time, the basin may experience massive damage. The current pressure box, as it sits, was installed as a temporary fix in 1998 when the old system failed at a critical time, causing flooding in the basin. This 25+ year old temporary fix is feared to fail again someday, causing flooding, erosion, property damage, and road closures.

Project Description: Being able to minimize downtime on this project will be critical because of the demand on the system. The best way to complete this project is to build a new pressure box next to the existing one. Once construction is complete, the old box and pipes will need to be removed and connections will need to be made to pumps upstream, and drainpipe downstream. On a normal year, there is about a 3-week window in the fall in which the drain pumps and system aren't operating.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: 5-year Plan

Responsible Office/Partners: RD479 – Derick Strain

Benefits (Losses Avoided): Flooding, Farmland damage, Streambank erosion damage, public road damage

Potential Funding: State grants through CA DWR and others, possible FEMA FMA or BRIC grants.

Timeline: Summer/Fall work will be performed when grant funding is available. The goal is to complete this in the next 5 years.

Project Priority (H, M, L): Medium

Annex H Sacramento River West Side Levee District

H.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Sacramento River West Side Levee District (SRWSLD or District), a previously participating jurisdiction to the 2018 Colusa 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 District. This Annex provides additional information specific to Sacramento River West Side Levee District, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this District.

H.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Colusa County Hazard Mitigation Planning Committee (HMPC), the District 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 H-1. Additional details on Plan participation and District representatives are included in Appendix A.

Table H-1 Sacramento River West Side Levee District – Planning Team

Name	Position/Title	How Participated
Meegan Nagy	Deputy Manager	Coordination of planning project internal to District, Plan development, review and implementation, Internal Planning Team
Elizabeth Ramos	Assistant District Engineer	Plan development, review and implementation, Internal Planning Team
Jordon Navarro	Superintendent	Plan development, review and implementation, Internal Planning Team

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the District integrated the previously approved 2018 LHMP into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2018 LHMP through other plans and programs shown in Table H-2.

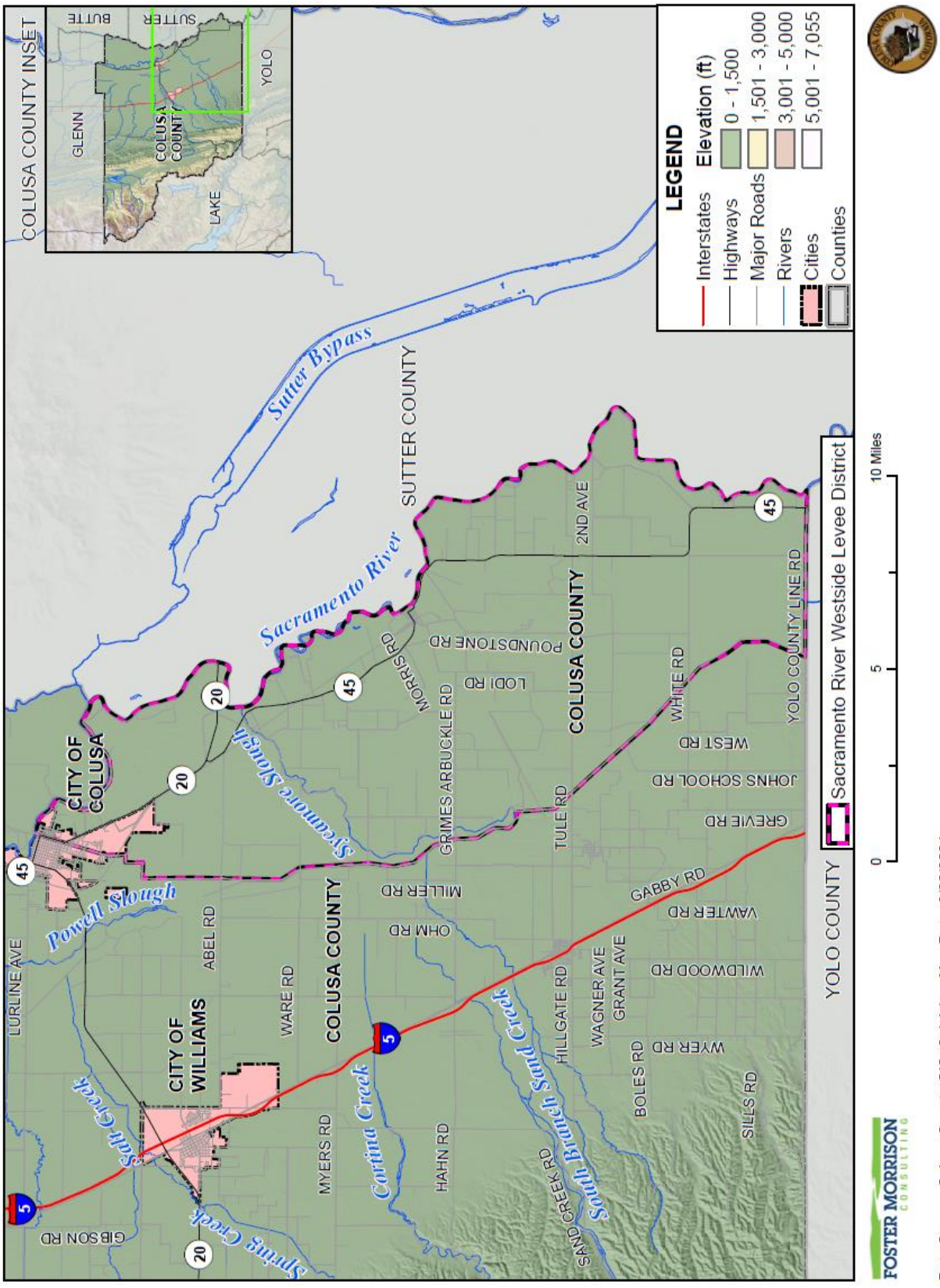
Table H-2 2018 LHMP Incorporation

Planning Mechanism 2018 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
2023 Emergency Operations Plan	Multiple hazard sections to inform the District EOP update.

H.3 District Profile

The District profile for the Sacramento River West Side Levee District is detailed in the following sections. Figure H-1 displays a map and the location of the District within Colusa County.

Figure H-1 Sacramento River West Side Levee District



Overview and Background

Prior to construction of the levees, the Sacramento River would rise up out of its banks during the wet winter months to form an inland sea across the valley floor. Many miners who had previously been farmers, recognized the potential of the fertile soils that covered the Sacramento Valley and set out to reclaim the swamp lands from overflow.

The first levees were built by individual landowners using substandard materials. The Sacramento Flood Control Project was authorized by Congress in 1917 and completed by the Army Corps of Engineers in 1960. Today the flood control districts act as the local maintaining agency to perform maintenance on the levees. All of the levees constructed have now become part of the federally authorized Sacramento River Flood Control Project. There are over 1,600 miles of State/Federal Project levees.

The levees south of Colusa were initially maintained by Reclamation District No. 108, but the costs for levee construction and maintenance were high and borne by few landowners whereas the benefits of flood protection extended beyond RD 108 boundaries. In 1915 the legislature created the Sacramento River West Side Levee District to more accurately reflect the lands benefited. All of the levees were originally built by landowners and have become part of the federally authorized Sacramento River Flood Control Project.

According to the Grimes Basin EOP, the SRWSLD maintains levees along the Sacramento River protecting nearly 194,000 acres of farmland, the City of Colusa, and Town of Grimes. SRWSLD currently does not have any staff. RD 108 staff maintain the levees and infrastructures of the Sacramento River West Side Levee District under contract.

H.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 Sacramento River West Side Levee District 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 District's potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Overview and Background above, a risk assessment was performed for the District. This includes the following sections:

- H.4.1 District Assets Inventory and Growth and Development Trends
- H.4.2 Hazard Identification
- H.4.3 Hazard Profiles and Vulnerability to Specific Hazards

H.4.1. District Assets Inventory and Growth and Development Trends

This section provides an inventory of the District'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 District'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 District, potentially at risk to identified hazards as discussed in Section H.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the District, both current and future, is presented.

Assets Inventory

The District's asset inventory is detailed in the following sections:

- People and Populations (Populations Served)
- 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 H.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the District. The District provides services to approximately 10,000 people residing within the District's boundaries. There are no staff members for this District, the work is instead contracted out to RD 108.

Special Populations and Disadvantaged Communities

The District noted that there are several special populations and disadvantaged communities that reside within the boundaries of the District. These individuals served that could be adversely affected by impacted district facilities or operations include the elderly, migrant farm workers, and individuals with access and/or functional needs.

Structures and Critical Facilities

This section considers the Sacramento River West Side Levee District's assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan 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.

Table H-3 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. Sacramento River West Side Levee District's physical assets, valued at over $550 million, consists of the buildings and infrastructure to support the District's operations.

Table H-3 Sacramento River West Side Levee District Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Levees	Essential Service	$550,000,000	Flood, Localized Flood, Levee Failure
Total		**$550,000,000**	

Source: Sacramento River West Side Levee District

Community Lifelines

Assessing the vulnerability of the District 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 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.

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 District as a partnership between the District, local cities, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the District's community lifelines overlap the County's. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the District and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in the Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the District 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

Sacramento River West Side Levee District has a variety of natural resources of value to the District. These natural resources parallels that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Historic and Cultural Resources

Sacramento River West Side Levee District has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallels that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the Sacramento River West Side Levee District to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the District.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. Economic assets for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Community Activities of Value

Inventorying economic assets in the District 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. Community Activities of Value for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Growth and Development Trends

As part of the planning process, the District 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.

Population Trends and Projections

The District follows and parallels the County projections for population; however, new growth is not expected during the planning period.

Development since 2018 Plan

The District noted that there has been no development since the 2018 LHMP.

Future Development Areas

It is important to review future development plans for the District. 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 District has no control over future development in areas protected by District levees. Future development in these areas parallels that of the County as a whole, the District does not expect any future development in the upcoming planning period, the District does not expect any future development in the upcoming planning period.

H.4.2. Hazard Identification

Sacramento River West Side Levee District identified the hazards that affect the District and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the District (see Table H-4).

Table H-4 Sacramento River West Side Levee District—Hazard Identification Assessment

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Insect Pests	–	–	–	–	–
Climate Change	Extensive	Highly Likely	Critical	Low	–
Dam Failure	Extensive	Occasional	Catastrophic	Low	Medium
Drought and Water Shortage	–	–	–	–	–
Earthquake(minor/major)	Limited	Occasional/ Unlikely	Limited	Low	Low
Flood: 100/200/500-year	Extensive	Occasional/ Unlikely	Catastrophic	High	High
Flood: Localized/Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Hazardous Materials Transportation	–	–	–	–	–
Landslide, Mudslide, and Debris Flows	Limited	Unlikely	Negligible	Low	Low
Levee Failure	Extensive	Likely	Catastrophic	High	Medium
Severe Weather: Extreme Cold and Freeze	–	–	–	–	–
Severe Weather: Extreme Heat	–	–	–	–	–
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Limited	Low	High
Severe Weather: High Winds/Tornadoes	Extensive	Highly Likely	Limited	Low	Medium
Stream Bank Erosion	Significant	Likely	Limited	Low	Medium
Subsidence	–	–	–	–	–
Volcano	–	–	–	–	–
Wildfire (smoke, tree mortality)	Limited	Unlikely	Negligible	Low	Low

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 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 Impact:
Low: Not likely to increase the probability of this hazard.
Medium: Is likely to increase the probability of this hazard.
High: Is very likely to increase the probability of this hazard.

H.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 District (as identified in the Significance column of Table H-4) 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 District. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Colusa 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 Format

Each hazard is profiled in the following format:

- **Hazard Profile**– A hazard profile is included for each hazard. This includes information on:
  - ✓ A general discussion of the hazard and related issues.
  - ✓ **Location** and **Extent** - Location is the geographic area within the District 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. NCDC events are also discussed. A discussion of disaster declarations is included in each hazard section. Other past occurrence data specific to the District follows the disaster declarations 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 District to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. 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 District provided information on how the District is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same format as in Section H.4.1 above. This includes sections on: People and Populations Served; Structures and Critical Facilities, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the District and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset. Impacts are also affected by the community's ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by the hazard is also included.

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)

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), are coordinating to prepare 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 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

The District noted that there is concern about a PSPS event. RD 108 and RD 787 pump stations require electricity to function and would be impacted during an extended period without power. There is potential for flooding due to internal drainage issues that these stations may experience.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–High

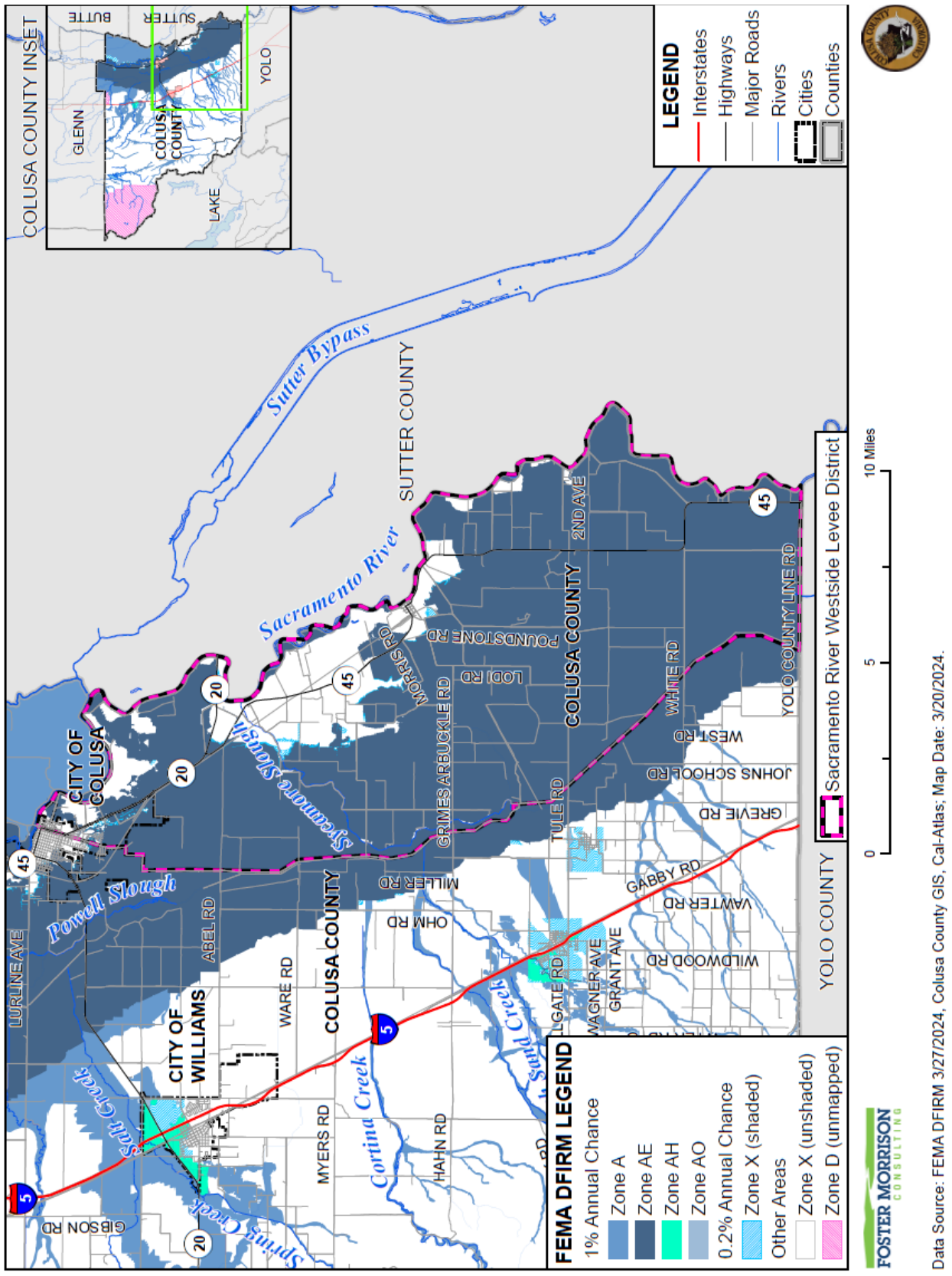
Hazard Profile

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 District and may have caused damage in the past. Flooding can be a significant problem in the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the District swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. 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.

Location and Extent

The Sacramento River West Side Levee District has areas located in the 1% and 0.2% annual chance flood zones. This is seen in Figure H-2.

Figure H-2 Sacramento River West Side Levee District – FEMA DFIRM Flood Zones



Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the District vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the District 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 District tends to have a shorter speed of onset, due to the amount of water that flows through the District.

Past Occurrences

Disaster Declaration History

A list of state and federal disaster declarations for Colusa County from flooding is shown on Table H-5. These events also likely affected the District to some degree.

Table H-5 Colusa County – State and Federal Disaster Declarations from Flood 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Colusa County has seen 14 events. These events most likely had some impact on the District.

Sacramento River West Side Levee District Events

The District Planning Team noted that flood damages have occurred in 2023, 2019, 2017, 2011, 2006, 1998, 1997, 1986, and 1955. Typical damage includes, erosion, seepage and boils, downed trees, and stability issues. More information about the events since the last LHMP is included below:

- **February 25-27, 2019** - A long duration AR impacted Northern California between 25 and 27 February 2019. The District saw bank erosion and seepage in multiple areas along the District's levees.
- **December 28, 2023,** to **February 25, 2024** – High water and long duration Event + Power Outage. A series of atmospheric rivers impacted Northern California between 12/28/2023 – 2/9/202023; which record-breaking snowpack. The District saw bank erosion in multiple areas along the District's levees.

Climate Change and Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with flooding. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding in California, and the Colusa County Planning Area, including the District. 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 District'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% chance flooding are generally confined to areas near the waterways of the District.

The whole of the District 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 District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

Flooding is a significant problem in Colusa County. Historically, the Colusa County Planning Area has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage. The 2007 General Plan also noted that flooding within the City's Planning Area occurs, and can do so even during mild storms. Periods of flooding can cause significant circulation problems and has resulted in some property damage in flood-prone areas.

Should the District levees fail as a result of a large flood event, all of the areas protected by SRWSLD would be at risk causing impacts to property and posing life safety concerns. Additional impacts include dewatering of the levee protected areas, as well as erosion of leveed areas, and the rebuilding of the levees. The District Planning Team noted that the levees would be at risk to this hazard.

Assets at Risk

Assets at risk from flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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.

District 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.

Structures and Critical Facilities

Certain structures in the District are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. These include those the District's assets shown in Table H-3 above.

Flooding presents a threat to threat to both critical facilities and infrastructure, as well as community lifelines. Critical infrastructure plays an immensely important role in our communities. Communities rely on roads, rail corridors, and related biking and pedestrian routes for transportation, and on water infrastructure for drinking water, wastewater service, and draining streets of rainwater. 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.

Community Lifelines

1% and 0.2% annual chance flooding presents a threat to life and property, including community lifelines in the District. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.11 of the Base Plan. Generally, even major flood events are temporary events with flood waters receding back to pre-storm levels at the conclusion of the storm. However, depending on the location, duration, and magnitude and severity of any given flood event, some of these community lifelines may be overwhelmed in the short term.

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 that fall in the flood zones shown on Figure H-2 would be vulnerable. This is especially true if a 0.2% annual chance flood event occurs.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.11 of the Base Plan.

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. 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 District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 479 are relatively small, which limits additional future impacts to RD 479. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use

and development will affect levee failure in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

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 District may be built in the floodplain, in conformance to the standards of the floodplain ordinance. Colusa County enforces the floodplain ordinance on new development in Sacramento River West Side Levee District. SRWSLD does not control future development in areas protected by levees, that is the purview of the County or cities of Colusa and Williams. SRWSLD will continue to work with these entities in the future to ensure that future development is sited in proper areas.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Low

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 District 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.

Location and Extent

The Sacramento River West Side Levee District is subject to localized flooding throughout the District. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District 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 District 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.

NCDC Events

The past occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile above.

Sacramento River West Side Levee District Events

The District noted the following past occurrences of localized flooding occurred during the flooding discussed in the Past Occurrences of the Flood: 1%/0.2% Annual Chance section above.

Climate Change and Localized Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with localized flood. More information on future impacts to the District 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 District 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 District. 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 District are minor, localized flood events that are more of a nuisance than a disaster.

Many areas of the District 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 District's Assets at Risk to this hazard.

Local Concerns

The District 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 vulnerabilities to this hazard.

Historically, the District has been affected by flooding of streams and creeks occurring during heavy rain and storm events. Additional development in the District 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 District.

The District tracks localized flooding areas. Affected localized flood areas identified by the Sacramento River West Side Levee District are roads such as Fruchteniecht, Tule, County Line, Highway 45, as well as smaller county roads. The loss of these routes is of high concern to the District as it would impede evacuation procedures, emergency response, and potential search and rescue.

Assets at Risk

Assets at risk from localized flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

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 District.

Structures and Critical Facilities

Structures and critical facilities 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 damages. Those District facilities in Table H-3 would be at risk from localized flood.

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.

Community Lifelines

Due to the relatively minor nature of localized flooding, community lifelines are unlikely to be overwhelmed. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.12 of the Base Plan.

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 District 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.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.12 of the Base Plan.

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 District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 479 are relatively small, which limits additional future impacts to RD 479. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use

and development will affect levee failure in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Future development in the District will add more impervious surfaces causing an increase in stormwater runoff and the continued need to drain these waters. The District 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.

Levee Failure

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile

A levee is a raised area that runs along the banks of a river, stream, or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main channel of a stream. 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.

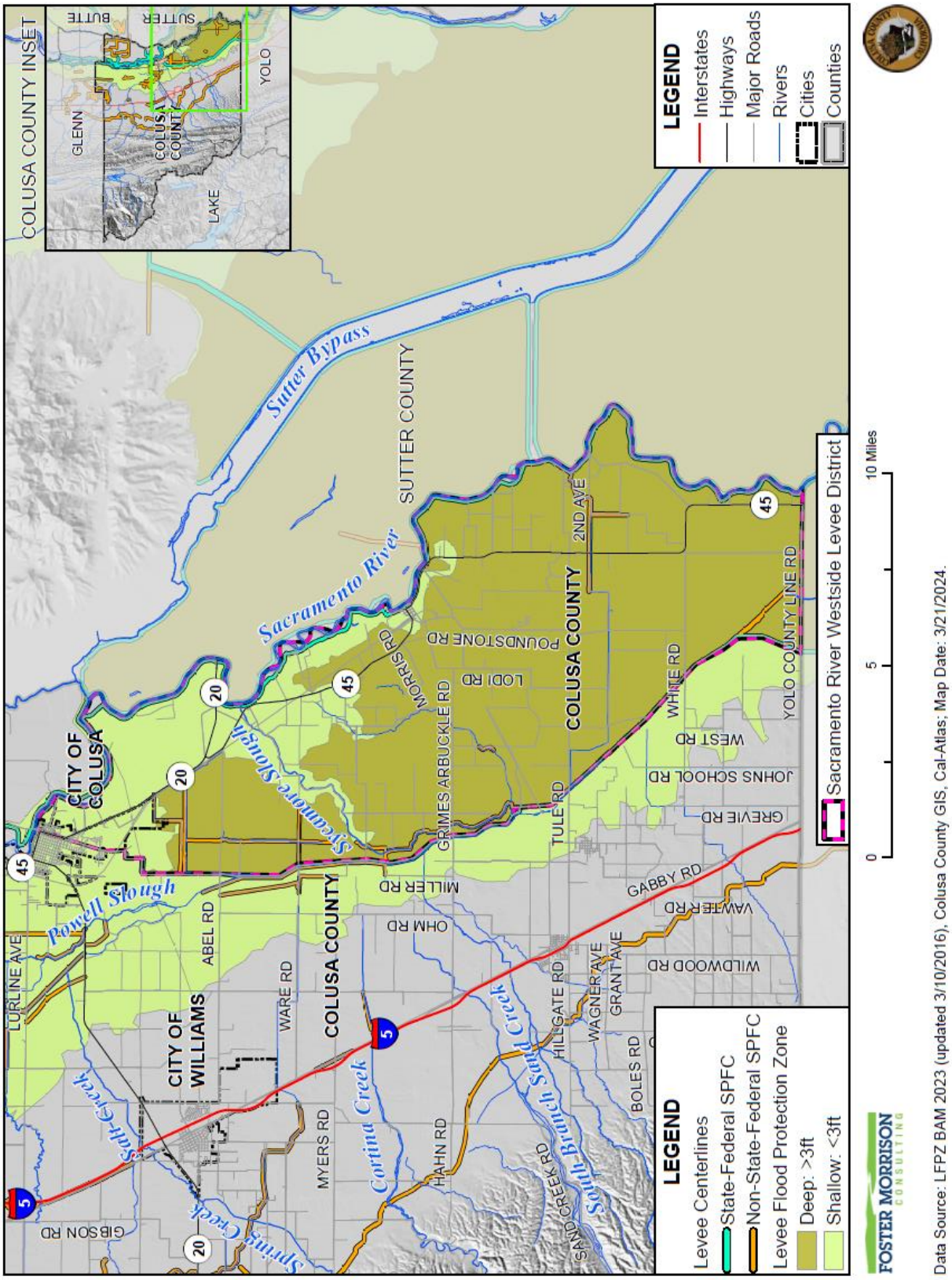
Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce, 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. Levee failure can occur through overtopping or from seepage issues resulting from burrowing rodents, general erosion, excessive vegetation and root systems, and other factors that compromise the integrity of the levee. 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.

Location and Extent

Numerous levees are located throughout the District (as shown in Section 4.3.14 of the Base Plan. Since the decertification of the levees, there is no FEMA DFIRM X Protected by Levee Flood Zone. Figure H-3 shows the Levee Flood Protection Zones (LFPZs) in the District. However, analysis is performed using the LFPZ data for expected flood depths.

There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District are not fully known, but the LFPZ maps provide a rough estimation. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of a levee failure can be hours to weeks, depending on the water flows that the levee holds back. The District noted that when northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on District levees.

Figure H-3 Sacramento River West Side Levee District – LFPZs



Past Occurrences

Disaster Declarations

There have been no state or federal disaster declarations from levee failure.

NCDC Events

There have been no NCDC levee failure events in Colusa County.

Sacramento River West Side Levee District Events

A levee failure occurred north of Grimes in 1915. There are no recorded catastrophic levee failures of SRWSLD levees following improvement of the levees as part of the State Plan of Flood Control within the Colusa County Planning Area. In 2017, the SRWSLD had damages to levees consisting of seepage and boils as well as erosion. Active flood fighting occurred, including sand back rings to stop boils and an emergency seepage berm.

The District noted recent past occurrences where the levees were threatened occurred. This is discussed in the Past Occurrences of the Flood: 1%/0.2% Annual Chance section above.

Climate Change and Levee Failure

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with levee failure. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

In general, increased flood frequency in California is a predicted consequence of climate change. Mechanisms whereby climate change leads to an elevated flood risk include more extreme precipitation events and shifts in the seasonal timing of river flows. This threat may be particularly significant because recent estimates indicate the additional force exerted upon the levees is equivalent to the square of the water level rise. These extremes are most likely to occur during storm events, leading to more severe damage from waves and floods.

Vulnerability to Levee Failure

The probability of levee failure is increasing over time due to increased storms and flooding potential from global climate change. Levee failure flooding can occur as the result of partial or complete collapse of an impoundment, and often results from prolonged rainfall and flooding. A levee failure can range from a small uncontrolled release to a catastrophic failure. The primary danger associated with levee failure is the high velocity flooding of those properties downstream of the breach. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the levee. In addition, levee failure can cause stream bank erosion, which can in some instances have effects worse than those of flooding itself.

Portions of the District are at some measure of vulnerability to levee failure as shown by the LFPZs. An assessment of a community's vulnerability to levee failure begins with an understanding of local exposure

to levee failure. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard. It should be noted that in the following sections, only the certified levees are analyzed.

Local Concerns

The District 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 vulnerabilities to this hazard.

Levees within the District are primarily comprised of sand which contributes to through seepage. In addition, foundation materials in various locations are sandy. These conditions allow water to seep through the levee or foundation placing the levee at risk of failure during major or long duration floods.

A levee system failure or overtopping can create severe flooding and high-water velocities. It's important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure. Should the District levees fail, all of the areas protected by SRWSLD would be at risk causing property damage and life safety concerns. Approximately 8,000 people are at risk as well as over $1.3 billion in property damage. Flood depths can be as deep as 15' within the County and greater than 15' to the south, in Yolo County, where the floodwaters would ultimately pool against the Colusa Basin Drain levee. Relief cuts would be necessary to minimize damage and dewater the basin. Additional issues include dewatering of the levee protected areas, as well as the rebuilding of the levees.

Assets at Risk

Assets at risk from levee failure include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

Populations in the floodplains are at risk to flooding, including the LFPZ. Certain vulnerable populations may be at a greater risk of a sudden levee failure, including the unsheltered, those with limited mobility and those that lack the resources to leave the area. District residents that live in the LFPZ 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.

Structures and Critical Facilities

A levee failure can affect the District, with some structures and critical facilities in the District at risk to a levee failure event. Structures protected by levees that fail are often total losses. The extent and depth of actual flooding and associated damage will vary depending on the location, nature, depth, and extent of any levee break. Critical infrastructure failures such as loss of power, impacts to potable and wastewater treatment systems, and road and bridge failures can all be caused by levee failure events, depending on the magnitude of the resulting flood. Those District facilities in Table H-3 would be at risk from levee failure.

Community Lifelines

Community lifelines may be affected by levee failure. Many of the District's community lifelines are the same as or similar to Colusa County's. A levee failure may overwhelm community lifelines, at least in the short-term. These were discussed in greater detail in Section 4.3.14 of the Base Plan.

Natural, Historic, and Cultural Resources

Large levee failure events can affect natural, historic, and cultural resources. There are a number of ways levee failures and associated floodwaters can impact natural resources and the environment in the District. Wildlife habitats can be destroyed. 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 areas protected by levees, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged, and lost during extreme levee failure events. Any of these that fall in the LFPZ flood zones would be vulnerable.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.14 of the Base Plan.

Impacts from Levee Failure

Floods and their impacts vary by location, including the added impacts associated with a levee failure flood event, and will only affect certain areas of the District that are in areas protected by levees. Based on the LFPZ analysis, it is evident that levee failure floods could potentially have significant impacts to areas of the District protected by levees, depending on the severity of the event. Impacts that are not quantified, but could be anticipated in large future levee failure events, include:

- Injury and loss of life.
- Commercial and residential structural and property damage.
- Disruption of and damage to public critical infrastructure and services.
- Health hazards associated with mold and mildew, contamination of drinking water, etc.
- Impacts to natural resource areas, including stream bank erosion.
- Damage to roads/bridges resulting in loss of mobility.

In addition to flood related levee failures, the levees in the District are at risk to failure during earthquake. Levee failure flooding could accompany an earthquake if a dam or storage reservoir or tank fails. Severe ground shaking from an earthquake event can cause a dam to fail or overflow to the surrounding area. Channels and water courses with earthen banks and levees are particularly vulnerable and could collapse in a major earthquake resulting in partial or complete blockage of channels causing flooding upstream of the

impoundment. Levees are especially susceptible to rapid settlement due to liquefaction or horizontal spreading of underlying soils.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District 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. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 479 are relatively small, which limits additional future impacts to RD 479. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect levee failure in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Future development in levee protected areas may be affected by this hazard. However, in these areas the District's floodplain management ordinance would be enforced. SRWSLD does not control future development in areas protected by levees, that is the purview of the County or cities of Colusa and Williams. SRWSLD will continue to work with these entities in the future to ensure that future development is sited in proper areas.

H.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.

It should be noted (for all of the tables in the sections below) that these tables were designed to display capability information for a county or city. The District has very few of these capabilities, due to their lack of size, lack of complexity, as well as their lack of statutory ability to regulate. The District depends on other jurisdictions for many of these capabilities, and partners with them on case-by-case issues that affect the District.

H.5.1. Regulatory Mitigation Capabilities

Table H-6 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 Sacramento River West Side Levee District.

Table H-6 Sacramento River West Side Levee District'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	N	
Climate Change Adaptation Plan		
Community Wildfire Protection Plan	N	
Comprehensive/Master Plan	N	
Continuity of Operations Plan	N	
Economic Development Plan	N	
Land Use Plan		
Local Emergency Operations Plan	Y	The plan addresses hazards. 2017
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	N	
Building code	N	
Flood insurance rate maps	N	
Floodplain ordinance	N	
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	N	
Zoning ordinance	N	
Other	N	
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: Sacramento River West Side Levee District

Grimes Basin EOP (2023)

The purpose of this Reclamation District 108 (RD108), Reclamation District 787 (RD787), Sacramento River Westside Levee District (SRWSLD), and Maintenance Area 12 (MA 12) joint flood safety plan, collectively named the Grimes Basin Flood Safety Plan, is to ensure that the staffs of these levee maintaining agencies (LMAs) can meet response objectives in a flood emergency and interact efficiently with each other and with jurisdictions performing public safety emergency functions within the Grimes Basin. This plan is intended to be used in conjunction with the emergency operations plans of the State of

California and the Colusa and Yolo Operational Areas to facilitate multi-jurisdictional coordination within LMA boundaries.

Levee maintaining agencies (e.g. reclamation district, levee district, State levee maintenance area) have responsibility for the maintenance of the levee, and sometimes for associated drainage systems, within their jurisdictional boundaries. While the LMAs will work with, and assist if possible, the local jurisdiction(s) responsible for other public safety functions within the LMA, this LMA emergency operations plan only contains detailed procedures for those direct levee flood fight emergency responsibilities. The manner of interacting with other jurisdictions is described, but the operational plans or procedures of other jurisdictions with public safety responsibilities within the area protected by the Grimes Basin levees are only referenced in this document.

H.5.2. Administrative/Technical Mitigation Capabilities

Table H-7 identifies the District department(s) responsible for activities related to mitigation and loss prevention in the District.

Table H-7 Sacramento River West Side Levee District'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	Under contract
Community Planner	**N**	
Emergency Manager	Y	General Manager, Deputy Manager and Superintendent can all serve as Emergency Manager.
Floodplain Administrator	N	
GIS Coordinator	N	
Planning Commission	N	
Other		
Technical	**Y/N**	**Has capability been used to assess/mitigate risk in the past?**
Grant writing	Y	General Manager and Deputy Manager write all grant applications with support from contractors.
Hazard data and information	N	The District Engineers provide this support as needed.
GIS analysis	N	The District Engineers provide this support as needed.
Mutual aid agreements	Y	

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: Sacramento River West Side Levee District

H.5.3. Fiscal Mitigation Capabilities

Table H-8 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table H-8 Sacramento River West Side Levee District'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	Typically cost shared with State grants.
Community Development Block Grant	N	
Federal funding programs (non-FEMA)	N	
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
State funding programs	Y	Multiple grants through the State.
Stormwater utility fee	N	
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: Sacramento River West Side Levee District

H.5.4. Mitigation Education, Outreach, and Partnerships

Table H-9 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 H-9 Sacramento River West Side Levee District's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	Quarterly newsletters in conjunction with RD 108

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)	N	The District is included in the County outreach efforts as appropriate.
Local news	N	The District is included in the County outreach efforts as appropriate.
Organizations that interact with underserved and vulnerable communities	N	
Social media		
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: Sacramento River West Side Levee District

H.5.5. Other Mitigation Efforts

The District has many other completed or ongoing mitigation projects/efforts that include the following:

The District has levee patrol plans, dewatering plans, and evacuations plans for the District's levees. This applies to flooding, levee failure, and localized flooding. The dewatering plan also has a strategy for Grimes Basin relief cuts to reduce the amount of water that would affect critical facilities and populations.

H.6 Mitigation Strategy

H.6.1. Mitigation Goals and Objectives

The Sacramento River West Side Levee District adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

H.6.2. Mitigation Actions

The planning team for the Sacramento River West Side Levee District identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included. The following hazards were considered a priority for purposes of mitigation action planning:

- Flood: 1%/0.02% Annual Chance Flood
- Flood: Localized Flood
- Levee Failure

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 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 plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Multi-Hazard Actions

Action 1. Seepage Mitigation of Sacramento River Levees

Hazards Addressed: Flooding / Levee Failure

Goals Addressed: 1, 3, 4, 5

Issue/Background: Levees within the District are primarily comprised of sand which contributes to through seepage. In addition, foundation materials in various locations are sandy. These conditions allow water to seep through the levee or foundation placing the levee at risk of failure during major or long duration floods.

Project Description: Seepage remediation would be designed and constructed that would mitigate for the through and/or underseepage. Typical seepage repairs consist of drained berms, cutoff walls, or levee realignment.

Other Alternatives: Fix on a case-by-case basis.

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office/Partners: SRWSLD

Benefits (Losses Avoided): Protection against levees being partially compromised or failing completely.

Potential Funding: DWR grant, local cost share PDM, HMGP, BRIC

Timeline: 2025 (Design and permitting initiated)

Project Priority (H, M, L): High

Action 2. Hardening of Sacramento River Levees

Hazards Addressed: Flooding / Levee Failure

Goals Addressed: 1, 3, 4, 5

Issue/Background: The banks of the Sacramento river are susceptible to erosion. There are areas that historically erode quickly during high water.

Project Description: Erosion protection would be placed on the waterside slope preventing future erosion.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office/Partners: SRWSLD

Benefits (Losses Avoided): $1.3B in property and approximately 8,000 lives

Potential Funding: DWR grant, PDM, HMGP

Timeline: 2025 (problem identification)

Project Priority (H, M, L): High

Action 3. BRIC Project EMF-2021-BR-089-0008: Grimes Floodplain Restoration and Levee Resiliency Project

Hazards Addressed: Flooding / Levee Failure/ Localized Flood

Goals Addressed: 1, 3, 4, 5

Issue/Background: Levees within the District are primarily comprised of sand which contributes to through seepage. In addition, foundation materials in various locations are sandy. These conditions allow water to seep through the levee or foundation placing the levee at risk of failure during major or long duration floods.

Project Description: The Sacramento River West Side Levee District (SRWSLD) proposes to construct: approximately 9,500 feet seepage cutoff wall along the Sacramento River West Side Levee District levee along the town of Grimes in Colusa County between river mile 125 and 126 to strengthen against catastrophic failure; levee waterside hardening (rock slope protection) to protect the levee from potential critical erosion and a nature-based solution element which involves restoring approximately 18 acres of floodplain on the Sacramento River to create riparian habitat for endangered species and to resist river erosive forces on the levee.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Delta Small Communities Plan, 5-year Plan

Responsible Office/Partners: SRWSLD

Cost Estimate: $24M

Benefits (Losses Avoided): Life safety, property protection, natural resource protection

Potential Funding: DWR Small Community Flood Risk Reduction Feasibility Grant Program Phase II; FEMA BRIC; Local Assessments

Timeline: 2026

Project Priority (H, M, L): High

Appendix A Planning Process

A.1 Lists of HMPC Invites/Stakeholders

A.1.1. LHMP Invite List

Agency	Name
Participating Jurisdictions and Agencies	
Colusa County Ag Commissioner	Anastacia Allen
Colusa County Assessor	Arnie Gross
Dir., Colusa County Planning & Building	Greg Plucker
Dir., Colusa County Environmental Health	Kuljeet Mundi
Colusa Fire Chief	Logan Conley
Williams Fire Chief	Jeff Gilbert
Sacramento River Fire Station, Chief	Jeff Winters
Maxwell Fire Chief	Kenny Cohen
Princeton Fire Chief	Jimmy Zoller
Indian Valley Fire Chief	Barney Cook
Indian Valley Fire Chief - Assist.	Sandy Corbin
Dir., Colusa County DHHS	Elizabeth Kelly
Asst. Colusa County DHHS	Abigale Henderson
Dir. Colusa County Public Works	Mike Azevedo
Colusa County Library	Stacey Costello
Colusa County Sheriff & OES Director	Joe Garofalo
Colusa County Department of Education	Mike West
City of Colusa Public Works Administrator	Jesse Cain
Colusa County Sheriff's Office	Jose Ruiz
Colusa County Sheriff's Office	Jackie Olivares
Colusa County Sheriff's Office	Kris Cooper
Colusa County Sheriff's Office	leanne knutson
Colusa County Sheriff's Office	Mike Bradwell
Colusa County Environmental Health	Kuljeet Mundi, Director
Colusa County Agricultural Dept	Ryan Jennings
Colusa County Planning	Steve Geiger
Colusa County USDA-NRCS	Owen Hemming
Colusa DHHS	Ted Mamoulelis

Agency	Name
Colusa	Amilcar Avendaño
Administrator, City of Williams	Frank Kennedy
City of Williams Public Works	Colt Esenwein
City of Williams Planning	Tracy Byee
Sacramento Westside Levee District	Lewis Bair
Reclamation District 108	Lewis Bair, General Manager
Reclamation District 108	Meegan Nagy, Program Manager
Reclamation District 479	Derick Strain
Reclamation District 479	Robbi Powers
Reclamation District 1004	Terry Bressler, General Manager
Reclamation District 2047	John Garner, VP
Colusa Basin Drainage District	Merrilee Vanderwaal
Colusa County Board of Supervisors	Janice Bell, District 5
California Highway Patrol	Joe Monsingi
Colusa Police Department	Chief Josh Fitch
Williams Police Department	Chris Miller
Departent of Water Resources	Joel Farias, Superintendent
Kletsel Dehe Wintun	Kelly Baucom
Colusa County Pioneer Review	Paul Scholl
Colusa Indian Community Council	Wayne Mitchum Jr.
RD108/Sac River West Side Dist.	Elizabeth Ramos
Colusa Med Center	Rhonda Anderson
Cortina Community Service District	Karl Drexel
Emergency Management Agencies	
Cal OES	Victoria LaMar Haas
Cal OES	Kyle Noderer
FEMA Region IX	Emily Breen
National Weather Service/NOAA	Courtney Carpenter
Lake County OES	Leah Sautelet
Sutter County OES	Zach Hamill
Yolo County OES	Krist Weivoda
Other Agencies/Districts	
Fish and Game	Brett Gomes, Wildlife Specialist
Red Cross	Nate Russell
Cal Fire	Miguel Watson
US Forest Service	Tadd Call
Resource Conservation Districts	Liz Harper

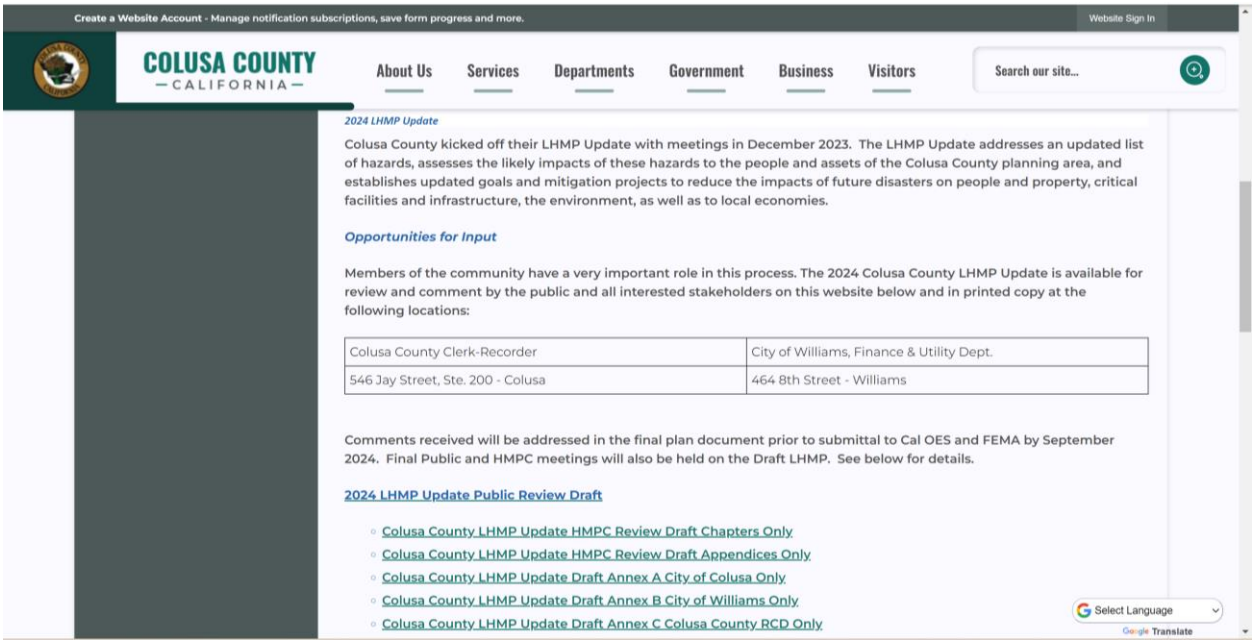
Agency	Name
Resource Conservation Districts	Ben King
Colusa Fire Safe Council	Director
Cal Trans	Steve Paine
USACE	Regional Director
Bureau of Reclamation	Joel Farias
Utilities	
PG&E	Mike Weber
CHP	Joe Monsingi
Arbuckle- College City Fire District	Casey Cox, Fire Chief
Arbuckle Park & Rec	Mary Grimmer
Arbuckle Cemetery	Cathy Marsh

A.1.2. HMPC Participant List

Agency	Name
Participating Jurisdictions and Agencies	
Colusa County Ag Commissioner	Anastacia Allen
Dir., Colusa County Planning & Building	Greg Plucker
Colusa Fire Chief	Logan Conley
Asst. Colusa County DHHS	Abigale Henderson
Colusa County Sheriff's Office	Jackie Olivares
Colusa County Sheriff's Office	Kris Cooper
Colusa County Sheriff's Office	Mike Bradwell
Colusa County Planning	Steve Geiger
Colusa DHHS	Ted Mamoulelis
Colusa	Amilcar Avendaño
City of Williams Administrator,	Frank Kennedy
City of Williams Public Works	Colt Esenwein
City of Williams Planning	Tracy Byee
Reclamation District 108	Meegan Nagy, Program Manager
Reclamation District 479	Derick Strain
Colusa County Board of Supervisors	Janice Bell, District 5
Williams Police Department	Chris Miller
Kletsel Dehe Wintun	Kelly Baucom
RD108/Sac River West Side Dist.	Elizabeth Ramos
Colusa Med Center	Rhonda Anderson
Cortina Community Service District	Karl Drexel

Agency	Name
City of Williams	Katheryn Ramsaur
RD 108	Brenna Howell
Sacramento River Westside Levee District	Brenna Howell
City of Colusa Planning	Mark Tomey
Colusa County RCD	Margot Flynn?
Sacramento River Fire	Patrick Trotter
Colusa County Board	Victor Zarate
Colusa PD	Sara Martin
Colusa County Planning	Alison Cunningham
Colusa Co DHHS	Stacy Woods
RD 479	Sadie Strain
Colusa County RCD	Eduardo Blancos-Alcontara
Colusa Co DHHS	Ricky Carmona
Cal Fire Battalion Chief	Trevyn Close
Colusa County Ag Dept	Mike Bowles
Colusa County Water District	Shelly Murphy
Colusa County DHHS	Sofia Becerra
Colusa County Public Works	Brian Mickelson
Colusa County RCD	Ben King
Emergency Management Agencies	
Cal OES	Kyle Noderer
Other Agencies/Districts	
Cal Fire	Miguel Watson
Resource Conservation Districts	Liz Harper
PG&E	Mike Weber
CHP	Joe Monsingi
Arbuckle Park & Rec	Mary Grimmer

A.2 Website for Hazard Mitigation Plan: Early Project Website and Project Website Updated for Final Meetings on the Draft Plan



A.3 HMPC Meeting #1: Kickoff Meeting

A.3.1. Kickoff Meeting Invite to HMPC and Stakeholders

From: Jackie Olivares <jtolivares@countyofcolusa.com>
Sent: Monday, November 20, 2023 12:56 PM
To: Anastacia Allen <mallen@countyofcolusa.com>; Arnie Gross <agross@countyofcolusa.com>; Greg Plucker <gplucker@countyofcolusa.com>; Kuljeet Mundi <Kuljeet.Mundi@countyofcolusa.com>; Chief Logan Conely (cfdlogan@gmail.com) <cfdlogan@gmail.com>; Williams Fire Department [External] <wfpa@williamsfire.net>; wfdc300@frontier.com; Maxwell Fire <maxwellfire@frontiernet.net>; jzoller5@gmail.com; barbgriffin31@yahoo.com; Elizabeth Kelly <Elizabeth.Kelly@countyofcolusa.com>; Michael Azevedo <mjazevedo@countyofcolusa.com>; Stacey Costello <scostello@countyofcolusa.com>; Joe Garofalo <jgarofalo@countyofcolusa.com>; mwest@ccoe.net; Jesse Cain <publicworks@cityofcolusa.com>; Frank Kennedy <fkennedy@cityofwilliams.org>; desenwein@cityofwilliams.org; lbair@rd108.org; Meegan Nagy <mnagy@rd108.org>; reclamationdistrict479@gmail.com; rd1004@comcast.net; pcgid1@aol.com; Colusa Basin Drainage District <cbdd61@yahoo.com>; Ann Nordyke <boardclerk@countyofcolusa.com>; Lt. Bill Filman <bfillman@chp.ca.gov>; Chief Josh Fitch <jfitch@colusapd.org>; info@williamspd.net; Joel Farias <joel.farias@water.ca.gov>; Kelly Baucom <kelly.baucom@kletseldehe.org>; publisher@mpg8.com; mwest@colusa-nsn.gov; LaMar-Haas, Victoria@CalOES <Victoria.LaMar-Haas@CalOES.ca.gov>; Kyle Noderer <kyle.noderer@caloes.ca.gov>; emily.breen@fema.dhs.gov; Courtney Carpenter - NOAA Federal <courtney.carpenter@noaa.gov>; lakesheriffoes@lakecountyca.gov; Zachary Hamill <zhamill@co.sutter.ca.us>; kristen.weivoda@yolocounty.org; Amy Travis <atravis@countyofglenn.net>; Russell, Nate <nate.russell3@redcross.org>; sjmoore@fs.fed.us; Elizabeth Harper <liz@colusarcd.org>; steve.paine@dot.ca.gov; mike.weber2@pge.com; michael.lenahan@chp.ca.gov; Jose Ruiz <jruiz@countyofcolusa.com>; Michael Bradwell <mbradwell@countyofcolusa.com>; Ryan Jennings <rjennings@countyofcolusa.com>; Steve Geiger <sgeiger@countyofcolusa.com>; wendy.drehhbrel@ca.usda.gov; Arbuckle College City Fire Protection Chief [External] <chief5100@frontiernet.net>; karl@kdmanagement.us; Joseph Marsh <1cjm@frontiernet.net>; Mary Grimmer- APRD Manager <aprd.mgrimmer@gmail.com>; justin.benjuerel@fire.ca.gov; miguel.watson@fire.ca.gov
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>; Kristopher Cooper <kcooper@countyofcolusa.com>
Subject: Colusa Co. Local Hazard Mitigation Plan Planning Meeting

Greetings:

Colusa County is kicking off our 2024 Local Hazard Mitigation Planning Update efforts with a planning meeting on Wednesday, December 13, 2023 at 1:00 – 4:00pm, please see attached flier. We will hold a public meeting that evening at 5:30 – 7:00pm at the Veterans Hall in Colusa for public input.

Will be sending a calendar invite following this email.

Thanks,

Jackie Olivares, OES Technician
Colusa County Office of Emergency Services
Colusa County Sheriff's Office
929 Bridge Street
Colusa, CA 95932
530-458-0218, f 530-458-4697

Attachment text for above email

Greetings:

Colusa County is kicking off efforts to develop a Local Hazard Mitigation Plan (LHMP) Update to their 2018 LHMP. The County is partnering with the two incorporated communities, the Kletsen Dehe Wintun Nation, and numerous Special Districts for the Update. The purpose of the LHMP development process is to help reduce the impacts of natural hazards to the citizens, property, critical facilities and 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.

You are receiving this email because we would like to invite you to take part in this LHMP Update as a member of the Hazard Mitigation Planning Committee (HMPC).

County, city, district, agency, and stakeholder participation and coordination is a requirement of an approved plan, as is the inclusion of any hazard data, information, and mitigation projects your department or agency considers important to the development of the LHMP. Thus, your input will be critical to the success of this project. Participation includes:

- Attending and participating in the HMPC meetings (5 anticipated over the next 11 months)
- Providing available data/information requested of the HMPC
- Reviewing and providing comments on the plan drafts

Colusa County, Office of Emergency Services, is taking the lead on coordinating this project for the County. A project kickoff meeting of the HMPC will be held at the following time and location:

December 13, 2023 (Wednesday), 1:00 - 4:00 pm
Colusa County Sheriff Office - Training Room
929 Bridge Street
Colusa, CA 95932

The kickoff meeting will explain the LHMP development process and how you can be involved. A public stakeholder meeting will also be held the evening of the same day of the kickoff meeting. Details on the public meeting will be forthcoming.

Please RSVP and plan on attending or delegating attendance to this important meeting.

Thank you,

Jackie Olivares

A.3.2. HMPC #1: Kickoff Meeting Agenda

COLUSA COUNTY
LOCAL HAZARD MITIGATION PLAN (LHMP)
HMPC MEETING #1
December 13, 2023

1. Introductions
2. Hazard Mitigation & the Disaster Mitigation Act Planning Requirements
3. The Role of the Hazard Mitigation Planning Committee (HMPC)
4. Planning for Public Input
5. Coordinating with other Agencies
6. Hazard Identification
7. Schedule
8. Data Needs
9. Questions and Answers

A.3.3. HMPC #1: Kickoff Meeting Sign-in Sheet

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #1: Project Kickoff
December 13, 2023 (1:00-4:00 pm)
Colusa County Sheriff's Office Training Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
SCOTT ESENWEIN PUBLIC WORKS DIR	sesenwein@cityofwilliams.org	805 846-9542	CITY OF WILLIAMS
Janice Bell Supervisor D5	jbell@countyofcolusa.com	530-821-9561	County of Colusa Board of Supervisors
Mike Weber	Mike.weber2@pge.com	209-237-7170	PG&E
Rhonda Anderson	Rhonda.Anderson@colusamedcenter.org	530 619 0812	Colusa Med Ctr
Kyle Noderer	kyle.noderer@caldot.ca.gov	916-709-5482	Cal DOT, Local Assist
Miguel Watson	Miguel.Watson@fire.ca.gov	707 480 0178	CAL FIRE
Frankie Kennedy	FKennedy@CityofWilliams.org	530-473-2935	Williams
Kathryn Ramsaur	kramsaur@cityofwilliams.org	473-2955 113	Williams
Tracy Bybee Inspector	tbybee@cityofwilliams.org	530.473.2955	Williams
CHRIS MILLER POLICE CHIEF	CMILLER@WILLIAMSPD.NET	473-2661	WILLIAMS PD
ELIZABETH RAMOS/ENGINEER	ERAMOS@KSNINC.COM	(209)623-5040	RD 108 & SAC RIVER WEST SIDE LEVEE DISTRICT (KSN ENGINEERS/ DISTRICT ENGINEERS)

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #1: Project Kickoff
December 13, 2023 (1:00-4:00 pm)
Colusa County Sheriff's Office Training Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
KARL DRESSEL G.M	KARL@RDmanagement.us	(707) 318-7369	GLENN CSD
JOE MOSINSKI SGT.	JMOSINSKI@CHP.CA.GOV	530 473-6000	CHP - WILLIAMS
STEVE GEIGER, COLUSA COUNTY PRINCIPAL PLANNER	sgeiger@countyofcolusa.com	530-458-0891	COMMUNITY DEVELOPMENT
Anastacia Allen AG COMMISSIONER APCO MIGRANT	mallen@countyofcolusa.com	530.458.0580	AG MIGRANT AIR POLLUTION
Kelly Bancum KDWN Environmental Director	Kelly.Bancum@KDWN.org	(530) 419-5090	Klehel Debe Wintun
Tel Manor Ellis	tel.manor-ellis@countyofcolusa.com	530-458-0854	Colusa DHHS
MIKE BRADWELL	MBRADWELL@COLUSASHERIFF.COM	530-682-4319	CCSO
Kris Cooper	KCooper@COLUSASHERIFF.com	(530) 458-0644	CCSO
Jackie Olivares	Jolivares@countyofcolusa.com	530-458-0218	CCSO - OES

A.4 HMPC #2: Risk Assessment Meeting

A.4.1. Emailed Invite to Risk Assessment Meeting

From: Jackie Olivares <jtolivares@countyofcolusa.com>
Sent: Friday, July 5, 2024 8:11 AM
To: Jackie Olivares; Anastacia Allen; Arnie Gross; Greg Plucker; Kuljeet Mundi; l.conley@colusafire.org; wfdc300@frontiernet.net; Sacramento River Fire District [External]; Maxwell Fire; jzoller5@gmail.com; barbgriffin31@yahoo.com; slcorbin67@yahoo.com; Elizabeth Kelly; Abigale Henderson; Ted Mamoulelis; Amilcar Avendaño; Michael Azevedo; Stacey Costello; Joe Garofalo; mwest@ccoe.net; Jesse Cain; Frank Kennedy; cesenwein@cityofwilliams.org; tbybee@cityofwilliams.org; lbair@rd108.org; Meegan Nagy; reclamationdistrict479@gmail.com; rd1004@comcast.net; pcgid1@aol.com; Colusa Basin Drainage District; Ann Nordyke; Janice Bell; jmosinsgi@chp.ca.gov; Chief Josh Fitch; cmiller@williamspd.net; Joel Farias; Kelly Baucom; publisher@mpg8.com; mwest@colusa-nsn.gov; eramos@ksninc.com; rhonda.anderson@colusamedcenter.org; karl@kdmanagement.us; LaMar-Haas, Victoria@CalOES; Kyle Noderer; emily.breen@fema.dhs.gov; Courtney Carpenter - NOAA Federal; lakesheriffoes@lakecountyca.gov; Zachary Hamill; Russell, Nate; miguel.watson@fire.ca.gov; tadd.call@fs.fed.us; Elizabeth Harper; steve.paine@dot.ca.gov; mike.weber2@pge.com; Kristopher Cooper; Michael Bradwell; Ryan Jennings; Steve Geiger; owen.hemming@usda.gov; Casey Cox; Arbuckle College City Fire Protection [External]; Alison Cunningham; Mary Grimmer- APRD Manager; Joseph Marsh
Subject: Colusa County LHMP Update: HMPC Meeting #2 - Risk Assessment
When: Wednesday, March 27, 2024 1:00 PM-4:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Sheriff Training Room

Good Afternoon:

In December, we kicked off the **Colusa County 2024 Multi-jurisdictional Local Hazard Mitigation Plan** (LHMP) Update project. That meeting provided an overview of the project and was used to identify a list of natural hazards (e.g., earthquake, wildfire, flood, severe weather, etc.) to include in the LHMP. Since then, Foster Morrison Consulting has been collecting data and preparing a risk assessment – which will consist of a written profile and analysis of each identified natural hazard, supported by technical, historical, and authoritative data. The risk assessment will become a part of the new LHMP.

****SAVE THE DATE** Please join us for our second Hazard Mitigation Planning Committee Meeting, as follows.** The purpose of this meeting is to share draft risk assessment materials – including mapping, data, and other information – and invite your feedback.

Wednesday, March 27, 2024 (1:00 - 4:00 pm)
Colusa County Sheriff Office - Training Room
929 Bridge Street
Colusa, CA 95932

Questions? Please feel free to reach out to myself or Jeanine Foster, Foster Morrison Consulting, at 303 717-7171 or jeanine.foster@fostermorrison.com. For more information about the project, visit: 2024 Local Hazard Mitigation Plan | Colusa County, CA - Official Website (countyofcolusa.org).

Thank you,

Jackie Olivares, OES Technician
Colusa County Office of Emergency Services

A.4.2. HMPC #2: Risk Assessment Meeting Agenda

COLUSA COUNTY
Local Hazard Mitigation Plan (LHMP) Update
Risk Assessment Meeting
March 27, 2024

1. Introductions
2. Status of the DMA Planning Process
3. Review (and discussions/input) of the Risk Assessment
4. Open Discussion and Input on the Risk Assessment (Handout)
5. Review of Data Needs
6. Next Steps

A.4.3. HMPC #2: Risk Assessment Meeting Sign in Sheet

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #2: Risk Assessment
March 27, 2024 (1:00-4:00 pm)
Colusa County Sheriff's Office Training Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
LOGAN CONLEY FIRE-CHIEF	L.CONLEY@COLUSAFIRE.ORG	530-682-5377	COLUSA CITY FIRE
MARK TOMEY	Planning@cityofcolusa.com	530-458-4941 X3103	City Planning
ELIZABETH RAMOS / DISTRICT ENGINEERS 3 RCD	ERAMOS@CKSNINC.COM	209-623-5040	RD 108 & RD SAC RIVER WEST SIDE LEVEE DISTRICT
Kelly Baucom Cortina Rancheria Env. Director	kelly.baucom@KDWN.org	530-419-5080	Cortina Rancheria / Rietta Dehe
FRmil Kennedy	JKennedy@cityofwilliams.org	530-473-3955	City of Williams
Abigale Henderson	abigale.henderson@countyofcolusa.com	530 458 02266	DHSS
Liz Harper	liz@colusarcd.org	530 458 1610	CCRCD
Margot Flynn	margot@svsoilhub.org	530-501-8351	CCRCD
Kyle Anderer	kyle.anderer@caloes.ca.gov	916-709-5892	Cal OES, Inland Region
Amilcar Avendaño Prog. Manager	amilcar.avendaño@countyofcolusa	530-458-0250	DHHS
Janice Bell	jbellecountyofcolusa.com	530-821-9561	Board of Supes
Patrick Trotter	Sacriverfire ptrotter@gmail.com	530-458-0239	Sacramento River Fire Protection district
Jackie Olivares	jolivares@countyofcolusa.com	530-458-0165	CCSO - OES.

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #2: Risk Assessment
March 27, 2024 (1:00-4:00 pm)
Colusa County Sheriff's Office Training Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
KARL DREXER GM	KARL @ KDMANAGEMENT.US	707-318-7369	CORTINA CSD
Victor Zarate/Board of Director	Zacate3135@gmail.com	530-908-0569	Cortina District
Kris Cooper	KCooper@colusasheriff.com	530 458-0644	Colusa Co SO
SARA MARTIN	SMARTIN@COLUSAPD.ORG	530-458-7777	CPD
Mary Grimmer	aprd.mgrimmer@gmail.com	530 723 2205	APRD
Alison B. Cunningham	acunningham@countyofcolusa.com	Call Planning Dept. 530-458-0	Colusa County
Stacy Woods, Dept Sec.	stacy.woods@countyofcolusa	530.458.0254	DHHS
Sadie Strain	sstrain@strainranches.com	530.237.6327	RD 479 #108
Derick Strain	dstrain@strainranches.com	530.237.7505	RD 479 #108
Eduardo Blancas-Alcantara	eduardo@colusarcd.org	530 701 8443	Colusa RCD
Ricky Carmona/System Support Analyst	ricardo.carmona@countyofcolusa.com EXT 269		Colusa DHHS
Katheryn Ponsaur/City Planner	kponsaur@cityofwilliams.org	237-3270 ext 113	City of Williams

A.5 HMPC #3 & #4: Mitigation Strategy Meetings

A.5.1. Email Invites to Mitigation Strategy Meetings

From: Jackie Olivares
Sent: Tuesday, April 2, 2024 1:20 PM
To: Anastacia Allen <mallen@countyofcolusa.com>; Arnie Gross <agross@countyofcolusa.com>; Greg Plucker <gplucker@countyofcolusa.com>; Kuljeet Mundi <Kuljeet.Mundi@countyofcolusa.com>; 'l.conley@colusafire.org' <l.conley@colusafire.org>; 'wfdc300@frontiernet.net' <wfdc300@frontiernet.net>; Williams Fire Department [External] <wfpa@williamsfire.net>; Sacramento River Fire District [External] <sacriverfire100@frontier.com>; 'sacriverfireptrotter@gmail.com' <sacriverfireptrotter@gmail.com>; Maxwell Fire <maxwellfire@frontiernet.net>; Kenny Cohen <kennycohen316@yahoo.com>; 'jzoller5@gmail.com' <jzoller5@gmail.com>; 'barbgriffin31@yahoo.com' <barbgriffin31@yahoo.com>; 'slcorbin67@yahoo.com' <slcorbin67@yahoo.com>; Elizabeth Kelly <Elizabeth.Kelly@countyofcolusa.com>; Abigale Henderson <abigale.henderson@countyofcolusa.com>; Michael Azevedo <mjazevedo@countyofcolusa.com>; Stacey Costello <scostello@countyofcolusa.com>; Joe Garofalo <jgarofalo@countyofcolusa.com>; 'mwest@ccoe.net' <mwest@ccoe.net>; Jesse Cain <publicworks@cityofcolusa.com>; 'planning@cityofcolusa.com' <planning@cityofcolusa.com>; 'cesenwein@cityofwilliams.org' <cesenwein@cityofwilliams.org>; 'tbybee@cityofwilliams.org' <tbybee@cityofwilliams.org>; 'lbair@rd108.org' <lbair@rd108.org>; 'Meegan Nagy' <mnagy@rd108.org>; 'sstrain@strainranches.com' <sstrain@strainranches.com>; 'Derick Strain' <dstrain@strainranches.com>; 'rd1004@comcast.net' <rd1004@comcast.net>; 'pcgid1@aol.com' <pcgid1@aol.com>; 'Colusa Basin Drainage District' <cbdd61@yahoo.com>; Ann Nordyke <boardclerk@countyofcolusa.com>; Janice Bell <jbell@countyofcolusa.com>; Chief Josh Fitch <jfitch@colusapd.org>; 'smartin@colusapd.org' <smartin@colusapd.org>; 'cmiller@williamspd.net' <cmiller@williamspd.net>; Joel Farias <joel.farias@water.ca.gov>; 'Kelly Baucom' <kelly.baucom@kletseldehe.org>; 'mwest@colusa-nsn.gov' <mwest@colusa-nsn.gov>; 'eramos@ksninc.com' <eramos@ksninc.com>; 'rhonda.anderson@colusamedcenter.org' <rhonda.anderson@colusamedcenter.org>; 'karl@kdmanagement.us' <karl@kdmanagement.us>; 'victor zarate' <zarate3135@gmail.com>; 'LaMar-Haas, Victoria@CalOES' <Victoria.LaMar-Haas@CalOES.ca.gov>; Kyle Noderer <kyle.noderer@caloes.ca.gov>; 'emily.breen@fema.dhs.gov' <emily.breen@fema.dhs.gov>; 'Courtney Carpenter - NOAA Federal' <courtney.carpenter@noaa.gov>; 'Zachary Hamill' <zhamill@co.sutter.ca.us>; 'miguel.watson@fire.ca.gov' <miguel.watson@fire.ca.gov>; 'margot@svsoilhub.org' <margot@svsoilhub.org>; 'steve.paine@dot.ca.gov' <steve.paine@dot.ca.gov>; 'mike.weber2@pge.com' <mike.weber2@pge.com>; Kristopher Cooper <kcooper@countyofcolusa.com>; Michael Bradwell <mbradwell@countyofcolusa.com>; Ryan Jennings <rjennings@countyofcolusa.com>; Steve Geiger <sgeiger@countyofcolusa.com>; Alison Cunningham <acunningham@countyofcolusa.com>; 'owen.hemming@usda.gov' <owen.hemming@usda.gov>; Ted Mamoulelis <Ted.Mamoulelis@countyofcolusa.com>; Amilcar Avendaño <amilcar.avendano@countyofcolusa.com>; Ricardo Carmona <ricardo.carmona@countyofcolusa.com>; 'brenna@brennahowell.com' <brenna@brennahowell.com>; 'Casey Cox' <chief5100@frontiernet.net>; 'Mary Grimmer- APRD Manager' <aprd.mgrimmer@gmail.com>; 'Joseph Marsh' <1cjm@frontiernet.net>; 'jackieolivares1977@comcast.net' <jackieolivares1977@comcast.net>
Cc: 'Jeanine Foster' <jeanine.foster@fostermorrison.com>
Subject: Colusa County LHMP Update: Mitigation Strategy Meetings

All,

In preparation for the upcoming **Colusa County Local Hazard Mitigation Plan Update Mitigation Strategy meetings**, please see below:

1. **Prep for these working meetings.**
   Identify and bring your mitigation project ideas to the meetings!

   These are the two most important meetings for this LHMP Update project:
   - ✓ **Wednesday, April 24 (1:00 - 4:00 pm)** - we will be briefly revisiting the risk assessment data developed to date and will be establishing updated LHMP goals and objectives.
   - ✓ **Thursday, April 25 (9:00 am - noon)** - we will be working to identify and discuss potential mitigation actions and projects for reducing Colusa County's risk and vulnerability to identified hazards and disasters.

   Note: Will be sending out two calendar invites concurrently after this email

   Meeting Location (For both April 24th and 25th meetings):
   Colusa County Sheriff's Office
   929 Bridge Street
   Colusa, CA 95932

   Please make sure everyone attends that has mitigation actions and projects to include in the LHMP Update for all identified priority hazards.

2. **Attached is the Mitigation Action Status summary from the 2018 LHMP**. Each participating jurisdiction to the 2018 LHMP should review their previous mitigation actions and complete both the table and the text that follows the table to provide a brief status update of previous actions/projects and to determine which 2018 actions you may want to include in this LHMP Update. Bring your completed status summary to the meetings. Note, we will also need you to email us a copy of your status summary for inclusion in the updated plan.

3. **Also attached is a FEMA publication – Mitigation Ideas**
   Take a look – it is easy to skim through and will give you mitigation ideas, by hazard. What fits for Colusa County? Your Jurisdiction?

Agency and stakeholder participation and coordination is a requirement of an approved LHMP, as is the inclusion of any hazard data, information, and mitigation projects your department or agency may want to see included in the plan. Your continued participation and input is critical to the success of this project!

Please reach out to myself or Jeanine Foster at Jeanine.foster@fostermorrison.com if you have questions.

Look forward to seeing everyone.

A.5.2. HMPC #3 & #4: Email Invite (Reminder) to Mitigation Strategy Meetings

From: Jackie Olivares <jtolivares@countyofcolusaca.gov>
Sent: Friday, April 19, 2024 9:57 AM
To: Abigale Henderson <abigale.henderson@countyofcolusa.com>; Alison Cunningham <acunningham@countyofcolusa.com>; Amilcar Avendaño <amilcar.avendano@countyofcolusa.com>; Anastacia Allen <mallen@countyofcolusa.com>; Ann Nordyke <boardclerk@countyofcolusa.com>; Arbuckle Cemetery <1cjm@frontiernet.net>; Arbuckle Park & Rec <aprd.mgrimmer@gmail.com>; Arnie Gross <agross@countyofcolusa.com>; Brenna Howell <brenna@brennahowell.com>; Cal Fire <miguel.watson@fire.ca.gov>; Arbuckle College City Fire Protection Chief [External] <chief5100@frontiernet.net>; Chief Barney Cook <barbgriffins31@yahoo.com>; Chief Jimmy Zoller <jtzoller5@gmail.com>; Chief Josh Fitch <jfitch@colusapd.org>; Chris Miller <cmiller@williamspd.net>; Colt Esenwein <cesenwein@cityofwilliams.org>; Colusa Indian Community Council <mwest@colusa-nsn.gov>; Courtney Carpenter <courtney.carpenter@noaa.gov>; Derick Strain <dstrain@strainranches.com>; Elizabeth Kelly <Elizabeth.Kelly@countyofcolusa.com>; Elizabeth Ramos <eramos@ksninc.com>; Emily Breen <emily.breen@fema.dhs.gov>; Frank Kennedy <fkennedy@cityofwilliams.org>; Greg Plucker <gplucker@countyofcolusa.com>; Janice Bell <jbell@countyofcolusa.com>; Jeff Gilber <wfdc300@frontiernet.net>; Jesse Cain <publicworks@cityofcolusa.com>; Joe Garofalo <jgarofalo@countyofcolusa.com>; Joel Farias, Superintendent <Joel.Farias@water.ca.gov>; John Garner <pcgid1@aol.com>; Karl Drexel <karl@kdmanagement.us>; Kathleen Schaefer <kkschaefer@ucdavis.edu>; Katie Ramsaur <kramsaur@cityofwilliams.org>; Kelly Baucom <kelly.baucom@kletseldehe.org>; Krist Weivoda <kristin.weivoda@yolocounty.org>; Kristopher Cooper <kcooper@countyofcolusa.com>; Kuljeet Mundi <Kuljeet.Mundi@countyofcolusa.com>; Kyle Noderer <kyle.noderer@caloes.ca.gov>; Leah Sautelet <lakesheriffoes@lakecountyca.gov>; Lewis Blair <lblair@rd108.org>; City of Colusa Fire Dept [External] <l.conley@colusafire.org>; Margot Flynn <margot@svsoilhub.org>; Mark Tomey <planning@cityofcolusa.com>; Maxwell Fire <maxwellfire@frontiernet.net>; Meegan Nagy <mnagy@rd108.org>; Merrilee Vanderwaal <cbdd61@yahoo.com>; Michael Azevedo <mjazevedo@countyofcolusa.com>; Michael Bradwell <mbradwell@countyofcolusa.com>; Mike Weber <mike.weber2@pge.com>; Mike West <mwest@ccoe.net>; Owen Hemming <owen.hemming@usda.gov>; Paul Scholl <publisher@mpg8.com>; Rhonda Anderson <rhonda.anderson@colusamedcenter.org>; Ricardo Carmona <ricardo.carmona@countyofcolusa.com>; Ryan Jennings <rjennings@countyofcolusa.com>; Sacramento River Fire District [External] <sacriverfire100@frontier.com>; Sadie Strain <sstrain@strainranches.com>; Sandi Corbin <slcorbin67@yahoo.com>; Sara Martin <smartin@colusapd.org>; Stacey Costello <scostello@countyofcolusa.com>; Steve Geiger <sgeiger@countyofcolusa.com>; Ted Mamoulelis <Ted.Mamoulelis@countyofcolusa.com>; Terry Bressler <rd1004@comcast.net>; Tracy Byee <tbybee@cityofwilliams.org>; Victor Zarate <zarate3135@gmail.com>; Victoria LaMar Haas <Victoria.LaMar-Haas@CalOES.ca.gov>; Zach Hamill <zhamill@co.sutter.ca.us>
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>
Subject: FW: Colusa County LHMP Update: Mitigation Strategy Meetings
Importance: High

All,

This is a reminder of the upcoming meetings next week. See below original email for detail information.

Meeting Location (For both April 24th and 25th meetings):
Colusa County Sheriff's Office
929 Bridge Street
Colusa, CA 95932

Please reach out to myself or Jeanine Foster at Jeanine.foster@fostermorrison.com if you have questions.

Look forward to seeing everyone.

Thanks,

Jackie Olivares, OES Technician
Colusa County Office of Emergency Services
Colusa County Sheriff's Office
929 Bridge Street, Colusa, CA 95932
530-458-0165, f 530-458-4697

A.5.3. HMPC #3 & #4: Mitigation Strategy Meeting Agenda

Colusa County
Local Hazard Mitigation Plan (LHMP) Update
Mitigation Strategy Meetings
April 24 and 25, 2024

HMPC Meeting #3:

1. Introductions
2. LHMP Project Status and Next Steps/Timeline
3. Priority Hazards Review
4. Develop Plan Goals and Objectives
5. 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. Review of Voting Process for Prioritization of Mitigation Actions/Projects
5. Questions

A.5.4. HMPC #3 & #4: Mitigation Strategy Meeting Sign in Sheets

April 24 Meeting

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #3: Mitigation Strategy Meeting
April 24, 2024 (1:00-4:00 pm)
Colusa County Sheriff's Office Training Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Brenna Howell	brenna@brennahowell.com	(916) 202-2675	RD108/SRWUD/KSN
KARL DREXEL	CORTonACSD@Sonic.net	(707) 318-7369	Cortana CSD
Trevyn Close Battalion Chief	trevyn.close@fire.ca.gov	(707) 369-0778	CAL FIRE
Anastacia Allen	mallen@countyofcolusa.com	530.458.0580	AG DEPT/AIR POLLUTION MIGRANT HOUSING
Mike Bowles	mbowles@countyofcolusa.com		Ag Dept
Ricky Carmona/Systems Analyst	ricardo-carmona@countyofcolusa.com	458-269	DHHS
Kelly Baucom	kelly.baucom@KDWN.org	(530)419-5090	Kletzel Dehe/Cortina Rancheria
Shelly Murphy	Smurphy@colcwd.com	(530)476-2669	Colusa County Water Dist
Alison Cunningham	a.cunningham@countyofcolusa.com		Planning and Building
Stacy Woods/Dept Secretary	Stacy.Woods@countyofcolusa	530-458-0254	DHHS.
Amilcar Avendaño/Program manager	amilcar.avendaño@countyofcolusa		DHHS
Dustin Strain	dstrain@straincranches.com	530-237-7505	2D479

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #3: Mitigation Strategy Meeting
April 24, 2024 (1:00-4:00 pm)
Colusa County Sheriff's Office Training Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Kathryn Ramsaur/City Planner	kramsaur@cityofwilliams.org	235-3279	City of Williams
Mary Grimmer	aprd.mgrimmer@gmail.com	723-2705	APRD
Sofia Becerra/Health Prog Spec	sofia.becerra@countyofcolusa		DHHS/PH
Janice Bell/Supervisor Dist 5	jbell@countyofcolusa.com		BOS
Liz Harper CCRCD	liz@colusaresd.org	[redacted]	CCRCD
Jackie Olivares	jtolivares@countyofcolusa.com		CCSO-OES
Kris Cooper	KCooper@countyofcolusa.com		CCSO-OES

April 25 Meeting

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #4: Mitigation Strategy Meeting
April 25, 2024 (9:00 am -12:00 pm)
Colusa County Sheriff's Office Training Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Karl Drexel, GM	Coastinacsd@sonic.net	707-318-7369	Cortina CSD
Kathryn Ramsaur	kramsaur@cityofwilliams.org	235-3279	City of Williams
Stacy Woods/Dept Secretary	stacy.woods@countyofcolusa	458-0254	DHHS
Alison Cunningham	acunningham@county of colusa.com		Planning + Building County
Kelly Baucom	kelly.baucom@KDWN.org	530-419-5090	Klamath Basin/Cortina Rancheria
BRIAN MICKELSON	bmickelson@countyofcolusa.com	530 457-0892	PW
MARK TOMEY	Planning@cityofcolusa.com	530 458-4941 x3103	Planning (City)
Margot Flynn	margot@svso.1hub.org		Colusa RCD
Sofia Becerra	sofia.becerra@countyofcolusa.com	(530)458-0156	Colusa DHHS
Ricky Carmona	ricardo.carmona@countyofcolusa.com	458-0264	Colusa DHHS
Anastacia Allen	mallen@countyofcolusa.com	530.458.0580.	AG DEPT./APCD MIGRANT
Trevyn Close BC	trevyn.close@fire.ca.gov	707-369-0778	CAL FIRE LNU

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Meeting #4: Mitigation Strategy Meeting
April 25, 2024 (9:00 am -12:00 pm)
Colusa County Sheriff's Office Training Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Derick Strain	dstrain@strainranches.com	530-237-7505	RD479
Shelly Murphy	S.murphy@colcwd.com	530 476-2669	Colusa County WD
Amilcar Avendaño Program Manager	amilcar.avendano@countyofcolusa.com	530-458-0398	DHHS
LOGAN CONLEZ	L.CONLEZ@COLUSAFIRE.ORG	530-682-5377	CITY OF COLUSA FIRE
Janice Bell / DIST 5 Supervisor	JBell@countyofcolusa.com		BOS
Liz Harper	liz@colusarcd.org	530-473-9346	CCRCD
Kris Cooper	KCooper@colusasheriff.com	530 458 0644	CCSO
Brenna Harrell	brenna@brennaharrell.com	916 207 7635	RD108/SRWUA
Jackie Olivares	jtolivares@countyofcolusa.com		CCSO-OES

A.6 HMPC #5: Final HMPC Meeting

A.6.1. Final HMPC Meeting Invite

From: Jackie Olivares <jtolivares@countyofcolusaca.gov>
Sent: Friday, July 19, 2024 4:24 PM
To: Abigale Henderson <abigale.henderson@countyofcolusa.com>; Alison Cunningham <acunningham@countyofcolusa.com>; Amilcar Avendaño <amilcar.avendano@countyofcolusa.com>; Anastacia Allen <mallen@countyofcolusa.com>; Ann Nordyke <boardclerk@countyofcolusa.com>; Arbuckle Cemetery <1cjm@frontiernet.net>; Arbuckle Park & Rec <aprd.mgrimmer@gmail.com>; Arnie Gross <agross@countyofcolusa.com>; barbgriffin31@yahoo.com; Brenna Howell <brenna@brennahowell.com>; Brian Mickelson <bmickelson@countyofcolusa.com>; Cal Fire (trevyn.close@fire.ca.gov) <trevyn.close@fire.ca.gov>; Arbuckle College City Fire Protection Chief [External] <chief5100@frontiernet.net>; Chief Jimmy Zoller <jtzoller5@gmail.com>; Chief Josh Fitch <jfitch@colusapd.org>; Chris Miller <cmiller@williamspd.net>; Colt Esenwein <cesenwein@cityofwilliams.org>; Colusa County Water District <s.murphy@colcwd.com>; Colusa Indian Community Council <mwest@colusa-nsn.gov>; Courtney Carpenter <courtney.carpenter@noaa.gov>; Derick Strain <dstrain@strainranches.com>; Elizabeth Kelly <Elizabeth.Kelly@countyofcolusa.com>; Elizabeth Ramos <eramos@ksninc.com>; Emily Breen <emily.breen@fema.dhs.gov>; Frank Kennedy <fkennedy@cityofwilliams.org>; Greg Plucker <gplucker@countyofcolusa.com>; Janice Bell <jbell@countyofcolusa.com>; Jeff Gilber <wfdc300@frontiernet.net>; Jesse Cain <publicworks@cityofcolusa.com>; Joe Garofalo <jgarofalo@countyofcolusa.com>; Joel Farias, Superintendent <Joel.Farias@water.ca.gov>; John Garner <pcgid1@aol.com>; Karl Drexel <karl@kdmanagement.us>; Kathleen Schaefer <kkschaefer@ucdavis.edu>; Katie Ramsaur <kramsaur@cityofwilliams.org>; Kelly Baucom <kelly.baucom@kletseldehe.org>; Krist Weivoda <kristin.weivoda@yolocounty.org>; Kristopher Cooper <kcooper@countyofcolusa.com>; Kuljeet Mundi <Kuljeet.Mundi@countyofcolusa.com>; Kyle Noderer <kyle.noderer@caloes.ca.gov>; lbair@rd108.org; Leah Sautelet <lakesheriffoes@lakecountyca.gov>; City of Colusa Fire Dept [External] <l.conley@colusafire.org>; Margot Flynn <margot@svsoilhub.org>; Mark Tomey <planning@cityofcolusa.com>; Maxwell Fire <maxwellfire@frontiernet.net>; Meegan Nagy <mnagy@rd108.org>; Merrilee Vanderwaal <cbdd61@yahoo.com>; Michael Azevedo <mjazevedo@countyofcolusa.com>; Michael Bradwell <mbradwell@countyofcolusa.com>; Mike Weber <mike.weber2@pge.com>; Mike West <mwest@ccoe.net>; Owen Hemming <owen.hemming@usda.gov>; Rhonda Anderson <rhonda.anderson@colusamedcenter.org>; Ricardo Carmona <ricardo.carmona@countyofcolusa.com>; Ryan Jennings <rjennings@countyofcolusa.com>; Sacramento River Fire District [External] <sacriverfire100@frontier.com>; Sadie Strain <sstrain@strainranches.com>; Sandi Corbin <slcorbin67@yahoo.com>; Sara Martin <smartin@colusapd.org>; Sofia Becerra <sofia.becerra@countyofcolusa.com>; Stacey Costello <scostello@countyofcolusa.com>; Stacy Woods <stacy.woods@countyofcolusa.com>; Steve Geiger <sgeiger@countyofcolusa.com>; Ted Mamoulelis <Ted.Mamoulelis@countyofcolusa.com>; Terry Bressler <rd1004@comcast.net>; Tracy Byee <tbybee@cityofwilliams.org>; Victor Zarate <zarate3135@gmail.com>; Victoria LaMar Haas <Victoria.LaMar-Haas@CalOES.ca.gov>
Cc: Jeanine Foster <jeanine.foster@fostermorrison.com>
Subject: Colusa County LHMP Update: Final Meeting and Input on Draft Plan

All,

Please see below information on the final steps for the Colusa County LHMP Update project:

LHMP Public Review Draft and Public Meeting. The LHMP Public Review Draft is up on the County website for public review and comment

at: https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan. A printed copy of the LHMP has also been placed for review at the following locations.

Colusa County Clerk-Recorder
546 Jay Street, Ste. 200 - Colusa

City of Williams, Finance & Utility Dept.
464 8th Street - Williams

A public meeting on the Draft LHMP will be held Wednesday, August 14, 2024 from 5:30 -7:00 pm at the Williams Elementary School – Multipurpose Room 1404 E Street in Williams. A press release is being issued by the County. **Please help get the word out to the public.**

Final HMPC Meeting. Our final planning committee meeting is scheduled for Thursday August 14 from 9–12:00, at the Colusa County Sheriff's Office Training Room at 929 Bridge Street in Colusa. It is important that everyone attend this final meeting to address any public comments received and to finalize all input to the LHMP. At this meeting we will also be evaluating any changes in hazard vulnerabilities and mitigation priorities to the Colusa Planning Area over the last five years for inclusion in the final LHMP document.

Final LHMP Input. All final planning committee (and public and stakeholder) input on the Draft LHMP needs to be provided no later than August 21, 2024. Please take time to download and review the Plan from the County website.

There are several options for providing comments on the LHMP Public Review Draft:

- Email comments to Jeanine.foster@fostermorrison.com or jolivares@countyofcolusaca.gov
- Drop off written comments or send by mail to: Colusa County Sheriff's Office, Attn. Jackie Olivares, 929 Bridge St. Colusa, CA 95932
- Bring comments to the public or planning committee meeting

If you have any questions, please contact Jeanine Foster at Jeanine.foster@fostermorrison.com or Jackie Olivares at jtolivares@countyofcolusaca.gov.

Thank you for your continued engagement in the process.

Jackie Olivares, OES Technician
Colusa County Office of Emergency Services
Colusa County Sheriff's Office
929 Bridge Street, Colusa, CA 95932
530-458-0165, f 530-458-4697

A.6.2. HMPC #5: Final HMPC Meeting Agenda

AGENDA
Colusa County
Local Hazard Mitigation Plan Update
Final HMPC Meeting
August 15, 2024

1. Introductions
2. Status of the LHMP Update Process
3. Addressing Public Comments
4. Final HMPC Input: Outstanding Items
5. Summary of Changes in Colusa Planning Area Hazard Vulnerabilities/ Mitigation Priorities
6. Final Steps
7. Questions

A.6.3. HMPC #5: Final Meeting Sign In Sheets

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
Final HMPC Meeting #5
August 15, 2024 (9:00-12:00 pm)
Colusa County Sheriff's Office Training Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Jackie Olivares	jtolivares@countyofcolusaca.gov	530-458-0165	OES
MARK TOMEY	Planning@cityofcolusa.com	530-458-4941 x3103	City of Colusa
Kathryn Ramsaur	kramsaur@cityofwilliams.org	530-235-3279	City of Williams
Liz Ramos	ERAMOS@KSNINC.COM	(209)623-5040	RD 108
Liz Ramos	ERAMOS@KSNINC.COM	(209) 623-5040	SRWSLD
Kyle Nodera	kyle.nodera@calocs.ca.gov	916-709-5792	Col 025, Island Reclam
Kelly Baucom	kelly.baucom@KDWN.org	530-414-5040	Klamath Dike Winter Natural
STEVE GEIGER	sgeiger@countyofcolusaca.gov		COLUSA COUNTY COMMUNITY DEVELOPMENT DEPT

A.7 Public Involvement

A.7.1. Public Meeting Outreach Flyers and Posting Locations: Project Announcement and Kickoff Meetings

Help Reduce Disaster Losses in Your Community by Participating in the Colusa County 2024 Local Hazard Mitigation Plan Update

Colusa County is developing a Local Hazard Mitigation Plan (LHMP) Update to their 2018 plan. The purpose of the 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 Colusa and Williams, the Cachil Dehe Band of Wintun Indians, and many special districts located throughout the County.

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 Colusa County have been affected by natural hazards in one way or another. Colusa County and its residents are vulnerable to a variety of hazards including floods, dam failure, 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.

2024 Local Hazard Mitigation Plan and Plan Update Process

Colusa County is leading the effort, along with the cities of Colusa and Williams, the Cachil Dehe Band of Wintun Indians, and many special districts, to develop an update to their 2018 LHMP. The 2024 LHMP Update is being developed by a Hazard Mitigation Planning Committee (HMPC) comprised of representatives from various County, Tribal, and City departments; 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 Colusa 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 2024 Colusa County LHMP Update will be available late summer 2024 for review and comment by the public and all interested stakeholders on the County LHMP website at: https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan 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 late summer 2024. All interested stakeholders and members of the public are encouraged to attend the planning committee and public meetings.

For more information on this project contact the following individuals:

Jackie Olivares	**Jeanine Foster**
Colusa County, Office of Emergency Services	Foster Morrison Consulting Ltd.
Phone: (530) 458-0218	Phone: (303) 717-7171
jtoliveras@countyofcolusa.com	jeanine.foster@fostermorrison.com

Posting Locations – County Post Offices: Most have an outdoor community bulletin board for local postings. This includes:

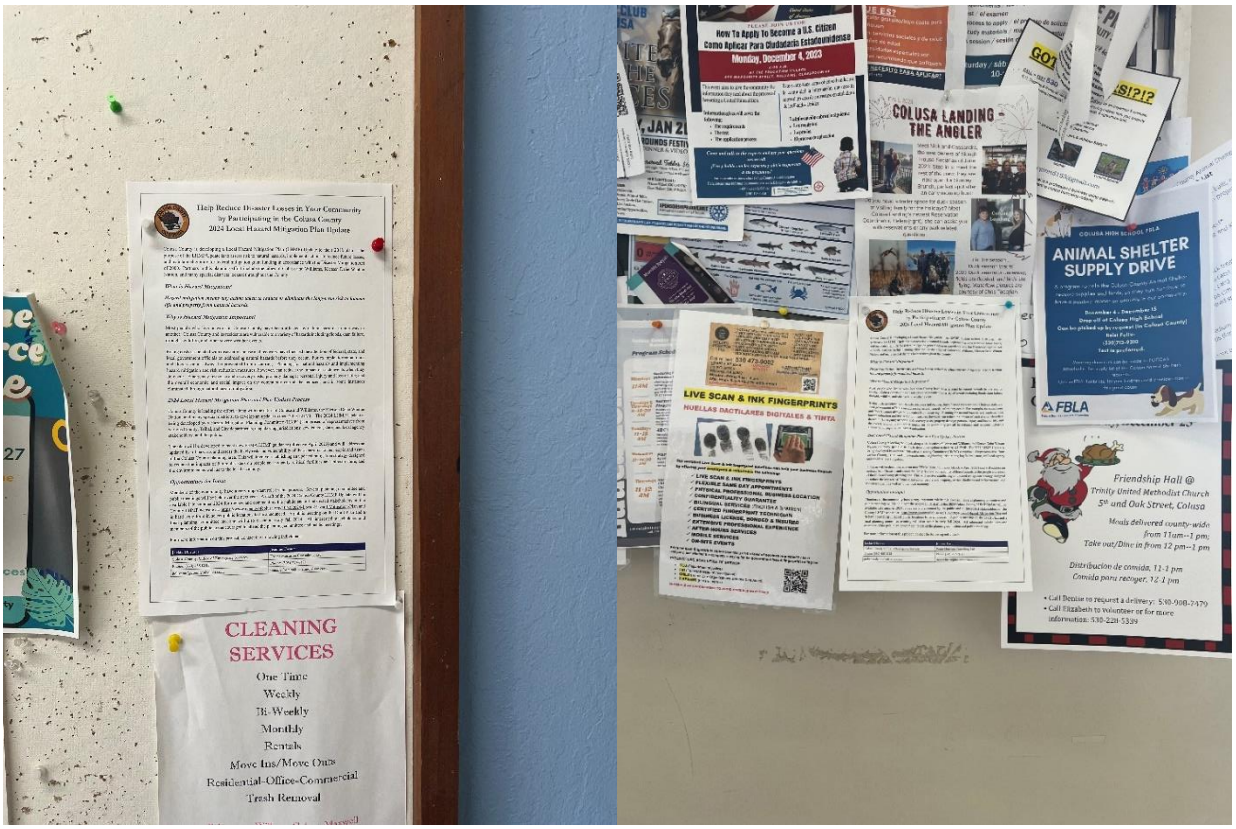
- Grimes – 170 Main Street

- Arbuckle – 415 5th Street
- Williams – 801 E. Street
- Maxwell – 260 Oak Street
- Princeton – 149 Commercial Street
- Colusa – 357 Market Street
- Stonyford – 259 Market Street

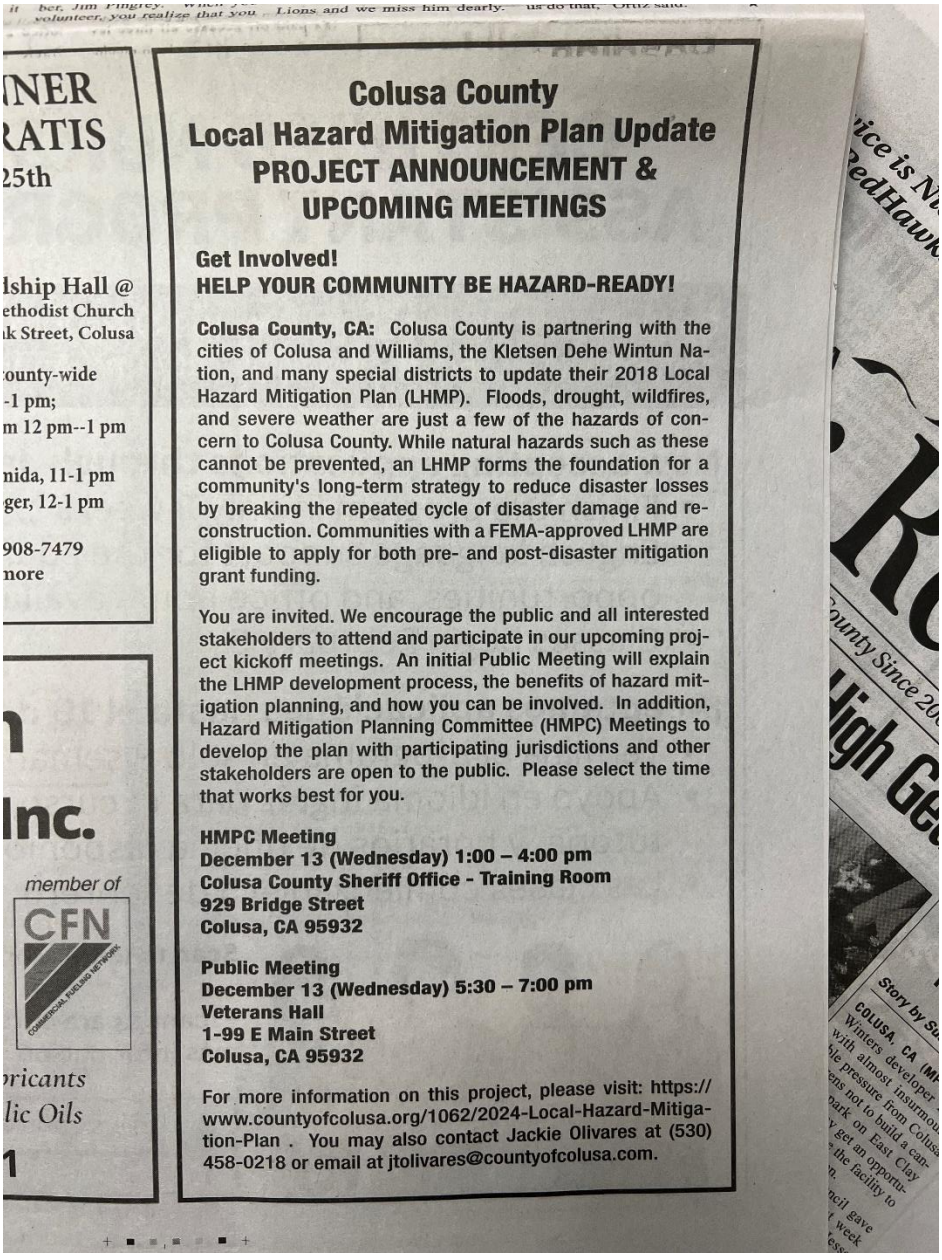
County Library:

- Grimes – 240 Main Street
- Arbuckle – 610 King Street
- Williams – 901 E. Street
- Maxwell – 34 Oak Street
- Princeton – 232 Prince Street
- Colusa – 738 Market Street
- Stonyford – 5080 Stonyford/Lodoga Road

Example at Princeton Post Office and Colusa Post Office



A.7.2. Project Announcement/Public Meeting #1 Press Release in Pioneer Review



Colusa County
Local Hazard Mitigation Plan Update
PROJECT ANNOUNCEMENT & UPCOMING MEETINGS

Get Involved!
HELP YOUR COMMUNITY BE HAZARD-READY!

Colusa County, CA: Colusa County is partnering with the cities of Colusa and Williams, the Kletsen Dehe Wintun Nation, and many special districts 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 Colusa 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.

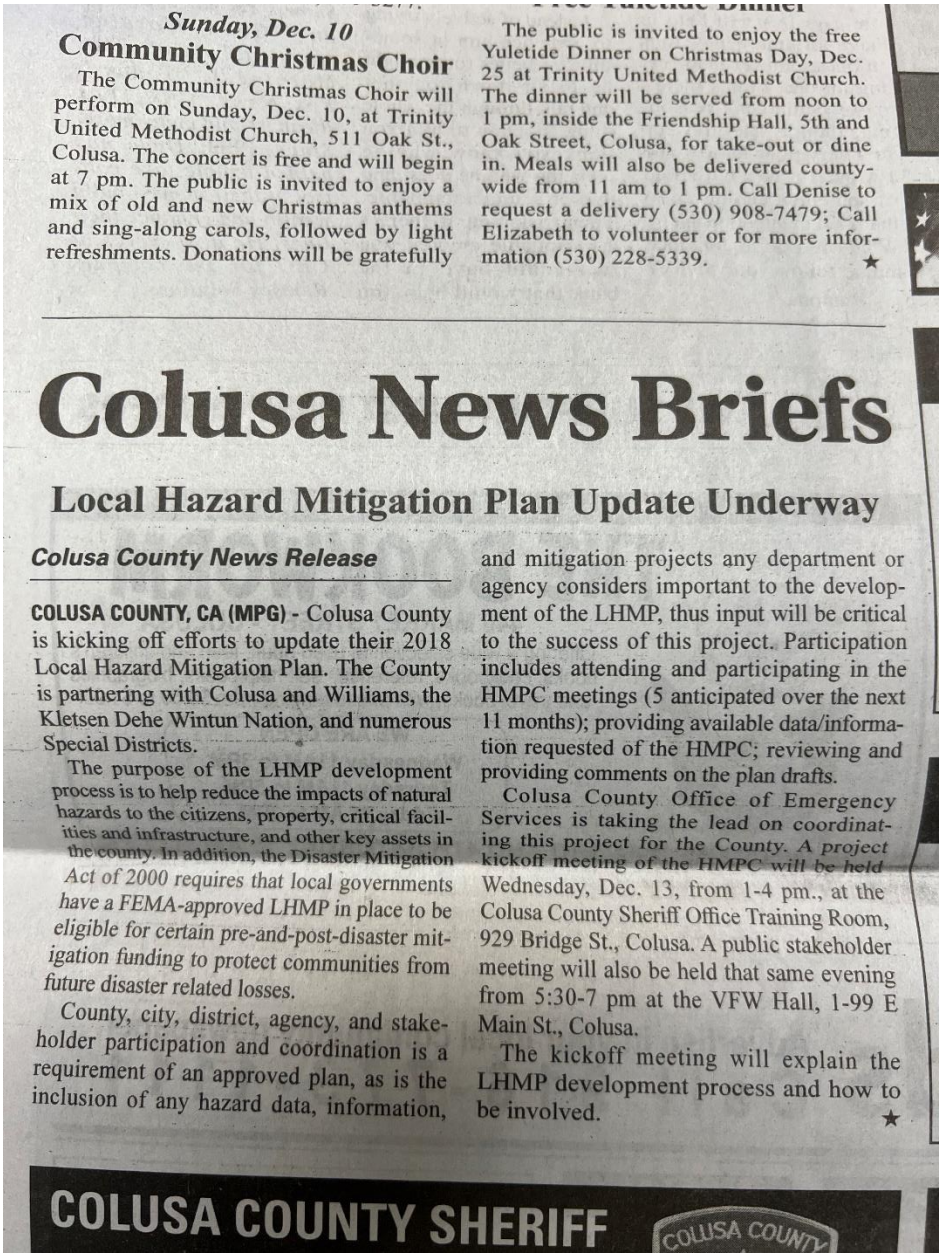
You are invited. We encourage the public and all interested stakeholders to attend and participate in our upcoming project kickoff meetings. An initial Public Meeting will explain the LHMP development process, the benefits of hazard mitigation planning, and how you can be involved. In addition, Hazard 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
December 13 (Wednesday) 1:00 – 4:00 pm
Colusa County Sheriff Office - Training Room
929 Bridge Street
Colusa, CA 95932

Public Meeting
December 13 (Wednesday) 5:30 – 7:00 pm
Veterans Hall
1-99 E Main Street
Colusa, CA 95932

For more information on this project, please visit: https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan . You may also contact Jackie Olivares at (530) 458-0218 or email at jtolivares@countyofcolusa.com.

A.7.3. Article in Pioneer Review on Project Announcement/Kickoff Meetings



Sunday, Dec. 10

Community Christmas Choir

The Community Christmas Choir will perform on Sunday, Dec. 10, at Trinity United Methodist Church, 511 Oak St., Colusa. The concert is free and will begin at 7 pm. The public is invited to enjoy a mix of old and new Christmas anthems and sing-along carols, followed by light refreshments. Donations will be gratefully

The public is invited to enjoy the free Yuletide Dinner on Christmas Day, Dec. 25 at Trinity United Methodist Church. The dinner will be served from noon to 1 pm, inside the Friendship Hall, 5th and Oak Street, Colusa, for take-out or dine in. Meals will also be delivered county-wide from 11 am to 1 pm. Call Denise to request a delivery (530) 908-7479; Call Elizabeth to volunteer or for more information (530) 228-5339. ★

Colusa News Briefs

Local Hazard Mitigation Plan Update Underway

Colusa County News Release

COLUSA COUNTY, CA (MPG) - Colusa County is kicking off efforts to update their 2018 Local Hazard Mitigation Plan. The County is partnering with Colusa and Williams, the Kletsen Dehe Wintun Nation, and numerous Special Districts.

The purpose of the LHMP development process is to help reduce the impacts of natural hazards to the citizens, property, critical facilities and infrastructure, and other key assets in the county. In addition, the Disaster Mitigation Act of 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.

County, city, district, agency, and stakeholder participation and coordination is a requirement of an approved plan, as is the inclusion of any hazard data, information, and mitigation projects any department or agency considers important to the development of the LHMP, thus input will be critical to the success of this project. Participation includes attending and participating in the HMPC meetings (5 anticipated over the next 11 months); providing available data/information requested of the HMPC; reviewing and providing comments on the plan drafts.

Colusa County Office of Emergency Services is taking the lead on coordinating this project for the County. A project kickoff meeting of the HMPC will be held Wednesday, Dec. 13, from 1-4 pm., at the Colusa County Sheriff Office Training Room, 929 Bridge St., Colusa. A public stakeholder meeting will also be held that same evening from 5:30-7 pm at the VFW Hall, 1-99 E Main St., Colusa.

The kickoff meeting will explain the LHMP development process and how to be involved. ★

COLUSA COUNTY SHERIFF

A.7.4. Project Announcement/Public Meeting #1 Article in Sun-Herald.com (November 27, 2023)

com/colusa_sun_herald/colusa-county-public-hazard-mitigation-plan-meeting-scheduled/article_6661763c-8d67-11ee-b8ce-c3a9a98bdd45.html

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Colusa County public hazard mitigation plan meeting scheduled

Tri-County News Nov 27, 2023

In partnership with the cities of Colusa and Williams, the Kletsen Dehe Wintun Nation, and many special districts, Colusa County is holding its kickoff meeting to update its 2018 Local Hazard Mitigation Plan (LHMP) on Dec. 13 at two different sites and times in an effort to solicit public attendance.

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

Colusa County administration said communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding.

Colusa County residents and stakeholders are invited to attend one of both of the meetings on Dec.

47°

Weather Sponsored By:

Online Poll

Are you concerned about the rising tensions with North Korea?

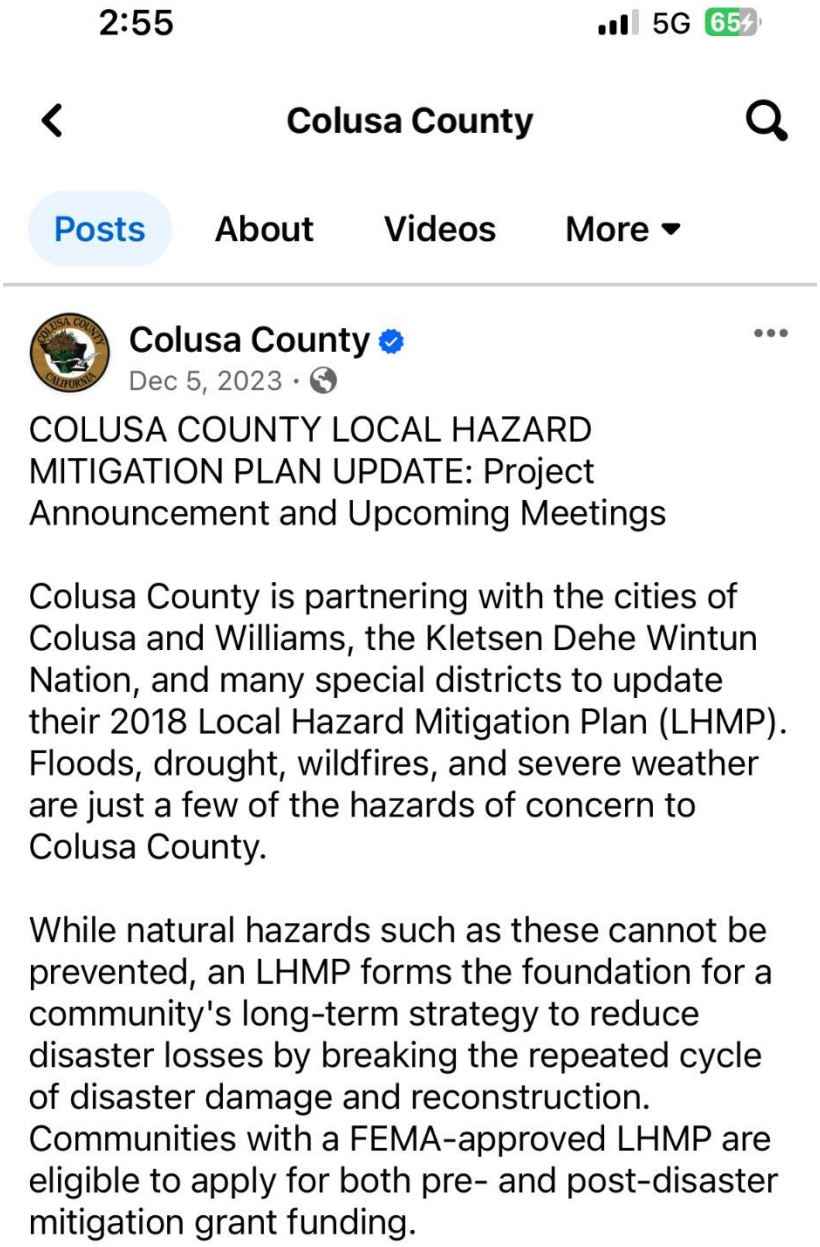
Share your views with us.

- Not at all. It just seems like a lot of back-and-forth talk.
- Yes. I'm growing very worried over what might happen.
- If it keeps up, I might be a little more concerned.

A.7.5. Project Announcement/Public Meeting #1 Instagram Invite

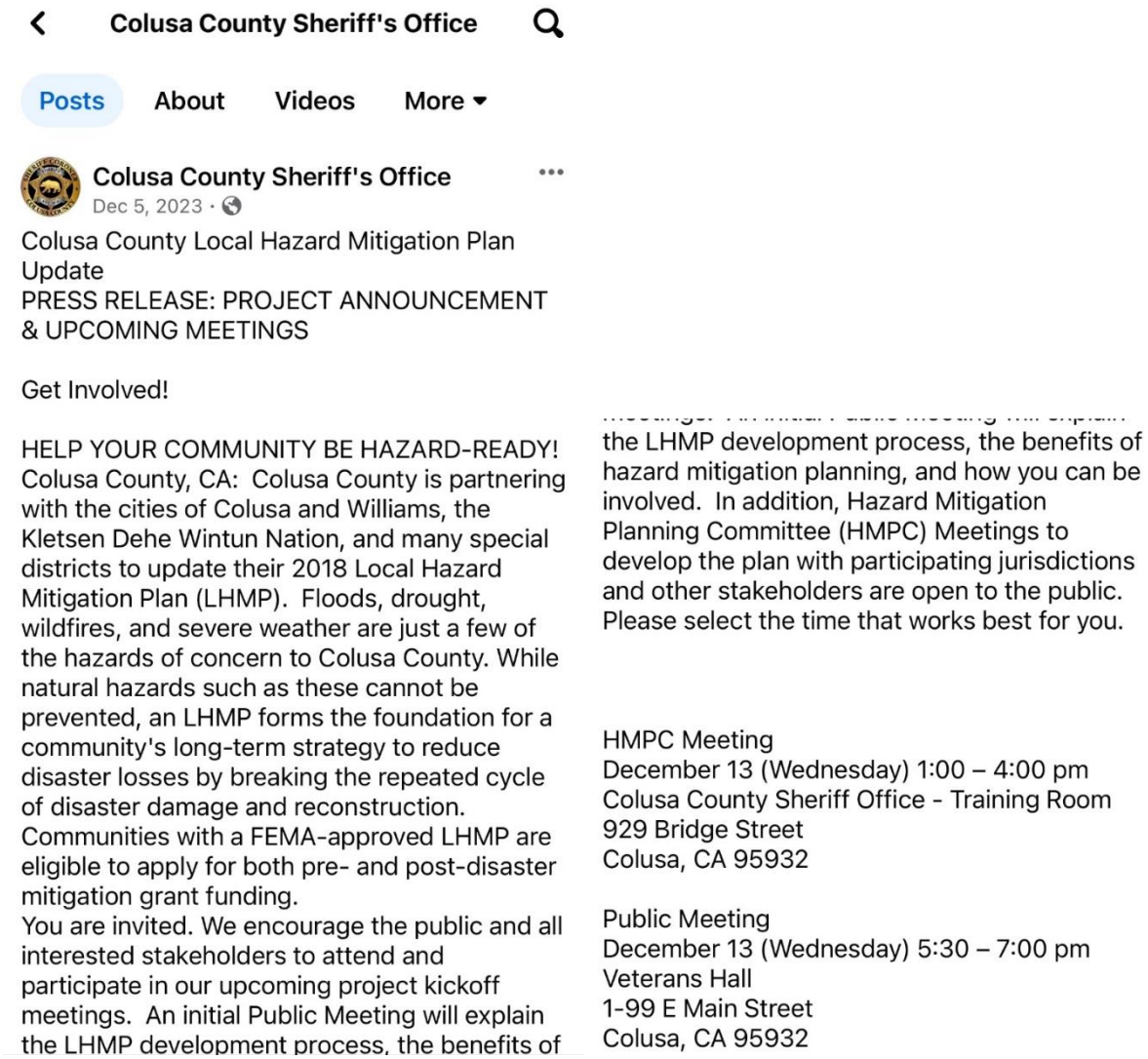
Source: Colusa County

A.7.6. Project Announcement/Public Meeting #1 on Colusa County Facebook Invite



Source: Colusa County

A.7.7. Project Announcement/Public Meeting #1 on Colusa County Sheriff's Office Facebook Invite



Colusa County Sheriff's Office

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Colusa County Sheriff's Office
Dec 5, 2023 ·

Colusa County Local Hazard Mitigation Plan Update
PRESS RELEASE: PROJECT ANNOUNCEMENT & UPCOMING MEETINGS

Get Involved!

HELP YOUR COMMUNITY BE HAZARD-READY!
Colusa County, CA: Colusa County is partnering with the cities of Colusa and Williams, the Kletsen Dehe Wintun Nation, and many special districts 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 Colusa 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

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
December 13 (Wednesday) 1:00 – 4:00 pm
Colusa County Sheriff Office - Training Room
929 Bridge Street
Colusa, CA 95932

Public Meeting
December 13 (Wednesday) 5:30 – 7:00 pm
Veterans Hall
1-99 E Main Street
Colusa, CA 95932

Source: Colusa County

A.7.8. Public Meeting #1: Public Agenda

COLUSA COUNTY
LOCAL HAZARD MITIGATION PLAN (LHMP)
PUBLIC MEETING #1
DECEMBER 19, 2023

1. Introductions
2. Hazard Mitigation & the Disaster Mitigation Act Planning Requirements
3. Hazard Identification and Profiles
4. Opportunities for Public Participation and Input
5. Schedule
6. Questions and Answers

A.7.9. Public Meeting #1: Public Sign in Sheet

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
Public Meeting #1: Project Kickoff
December 13, 2023 (5:30-7:00 pm)
Veterans Hall | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
BEN KING	bking@pacgoldag.com	(530) 723-3119	PACIFIC GOLD AGRICULTURAL
Janice Bell, D5	jbellecountyofcolusa.com	530 821-9561	Colusa County Board of Supes

A.7.10. Public Meeting #2 (for Providers Serving Vulnerable Populations): Invitation: Draft LHMP

From: Amilcar Avendaño <amilcar.avendano@countyofcolusaca.gov>
Sent: Wednesday, August 14, 2024 3:51 PM
To: Jackie Olivares; Jeanine Foster; Gus Becerra; Alisha Parker; Donna Dennis; Jennifer McAllister; Lauren Still; Adriana Saavedra; Don Parsons; Brown, Jaime; 'Tootie Hacket'; Pastor Nicole Kringle; 'Jason McMullan'; Abigale Henderson; Ricardo Carmona; Stacy Woods; mtinoco@altaregional.org; Cassandra Ortiz; Valerie Stirling; Jeannie Armstrong
Cc: Don Parsons; don_parsons@outlook.com
Subject: LHMP Public Review Draft and Public Meetings
When: Wednesday, August 14, 2024 2:00 PM-3:30 PM (UTC-08:00) Pacific Time (US & Canada).
Where: 738 Market St Colusa CA

> ✉ **NOTICE:** County of Colusa has a new email domain: @countyofcolusaca.gov. Please update your records accordingly.

Greetings:

YOU ARE INVITED!

Public Meetings are being held on the Draft Local Hazard Mitigation Plan being developed for Colusa County, Cities and many Special Districts.

Please see below information on the final steps for the Colusa County 2024 LHMP Update project and See attached Flyer.

LHMP Public Review Draft and Public Meetings. The LHMP Public Review Draft is up on the County website for public review and comment at: https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan. A printed copy of the LHMP has also been placed for review at the following locations.

Colusa County Clerk-Recorder
546 Jay Street, Ste. 200 - Colusa

City of Williams, Finance & Utility Dept.
464 8th Street - Williams

Public Meeting: Providers Serving Vulnerable Populations
August 14 (Wednesday) 2:00-3:30 pm

Colusa Library Morse Conference Room (Hybrid)
ZOOM: https://countyofcolusa.zoom.us/j/4528645270?pwd=SXUyMjd2Vms2YWMwU0tnK3RKY21YUT09&omn=82402366589

Meeting ID: 452 864 5270
Passcode: 667723

A link to virtual attendance for the Hybrid public meeting will be provided on the LHMP website: https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan

Final LHMP Input. All final public and stakeholder input on the Draft LHMP needs to be provided no later than August 21, 2024. Please take time to download and review the Plan from the County website.

There are several options for providing comments on the LHMP Public Review Draft:

- Email comments to Jeanine.foster@fostermorrison.com or jolivares@countyofcolusaca.gov
- Drop off written comments or send by mail to: Colusa County Sheriff's Office, Attn. Jackie Olivares, 929 Bridge St. Colusa, CA 95932
- Bring comments to the public or planning committee meeting

If you have any questions, please contact Jeanine Foster at Jeanine.foster@fostermorrison.com or Jackie Olivares at jolivares@countyofcolusaca.gov.

Thank you for your continued engagement in the process.

Best Regards,

County of Colusa
Department of Health
& Human Services

www.countyofcolusa.org

Amilcar Avendaño
Program Manager
Pronouns: He/Him

251 E. Webster Street Colusa, CA 95932
T: 530.458.0398
amilcar.avendano@countyofcolusa.com

This email along with any attachments, is considered confidential and may well be legally privileged. If you have received it in error, you're are on notice of its status. Please notify us immediately by reply e-mail and then delete this message from your system. Please do not copy it or use it for any purposes, or disclose its contents to any other person. Thank you for your cooperation.

A.7.11. Public meeting #2 (for Providers Serving Vulnerable Populations): Invite List of Providers

Jackie Olivares <jtolivares@countyofcolusaca.gov>;

Jeanine Foster <jeanine.foster@fostermorrison.com>;

Gus Becerra <g.becerra@regionalha.org>; **Regional Housing Authority**

Alisha Parker <a.parker@regionalha.org>; **Regional Housing Authority**

Donna Dennis <Donna.Dennis@countyofcolusa.com>; **Public Guardian, APS/CPS**

Jennifer McAllister <jmcallister@countyofcolusa.com>; **Behavioral Health Program Manger**

Lauren Still <lstill@glennmed.org>; **Colusa Medical**

Adriana Saavedra <ASaavedra@tricountiescap.org>; **TCCAP – Cal AIM /LICN**

Don Parsons <Don.Parsons@countyofcolusa.com>; **Veteran Service/ City of Williams**

Brown, Jaime <jaime.brown6@redcross.org>; **Red Cross Volunteers**

'Tootie Hacket' <chieffan@citlink.com>; **Karen's House DV Center**

Pastor Nicole Kringle <nkringle@pneumacare.org>; **Pneumacare**

'Jason McMullan' <jmcmullan@colusamacc.org>; **Ministerial Association**

Abigale Henderson <abigale.henderson@countyofcolusa.com>; **Public Health**

Ricardo Carmona <ricardo.carmona@countyofcolusa.com>; **DHHS**

Stacy Woods <stacy.woods@countyofcolusa.com>; **DHHS**

mtinoco@altaregional.org; **Alta Regional**

Cassandra Ortiz <cassandra.ortiz@countyofcolusa.com>; **Migrant Housing**

Valerie Stirling <vstirling@countyofcolusa.com>; **Safe Haven Adult Center**

Jeannie Armstrong <jarmstrong@countyofcolusa.com>; **Behavioral Health**

Don Parsons <don.parsons@gmail.com>; don_parsons@outlook.com **Veteran Services / Karen's House**

A.7.12. Public Meeting #2 (for Providers Serving Vulnerable Populations): Agenda: Draft Plan

AGENDA
COLUSA COUNTY
Local Hazard Mitigation Plan
Public Meeting #2 – Draft Plan
For: Providers Serving Vulnerable Populations
August 14, 2024
(Hybrid Meeting Format)

1. Introductions
2. Overview of the LHMP Development Process
3. Overview of the Colusa County LHMP
4. Public Comments and Input
5. Next Steps
6. Questions

A.7.13. Public Meeting #2 (for Providers Serving Vulnerable Populations): Sign in Sheet

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
Public Meeting #2: Public Review Draft LHMP
August 14, 2024 (2:00-3:30 pm)
Library Morse Conference Room | Colusa, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation	
Ricky Carmona Systems Analyst	ricardo.carmona@countyofcolusa.gov	EXT 269	Colusa County DHHS	In-Person
Jennifer McAllister Clinical Program Manager	jmcallister@countyofcolusa.gov	Ext 817	Behavioral Health	In-Person
Amilcar Avendano Program Manager DHHS	amilcar.avendano@countyofcolusa.com	ext 598	DHHS	In-Person
Chris Morisson	Chris_morrison@fostermorrison.com		Foster-Morisson	Hybrid
Donna Dennis	Donna.Dennis@countyofcolusaca.gov	530.458.0290	DHHS	Hybrid
Valerie Stirling	vstirling@countyofcolusaca.gov	530-458-0707	Safe Haven - BH	Hybrid
Abigale Henderson	abigale.henderson@countyofcolusaca.gov	530-458-0266	DHHS	Hybrid
Jackie Olivares	jtolivares@countyofcolusaca.gov	530-458-0165	OES	In-Person

A.7.14. Public Meeting #3: Draft Plan Outreach Flyers

Help Reduce Disaster Losses in Your Community by Participating in the Colusa County 2024 Local Hazard Mitigation Plan Update

Colusa County is developing a Local Hazard Mitigation Plan (LHMP) Update to their 2018 plan. The purpose of the 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 Colusa and Williams, the Kletsel Dehe Wintun Nation, and many special districts located throughout the County.

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 Colusa County have been affected by natural hazards in one way or another. Colusa County and its residents are vulnerable to a variety of hazards including floods, dam failure, 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.

2024 Local Hazard Mitigation Plan and Plan Update Process

The LHMP development process began in November 2023. A Hazard Mitigation Planning Committee (HMPC) comprised of representatives from the County, Cities, Tribe, and Districts; federal, state, and local agency stakeholders; and the public is guiding development of the updated plan. The LHMP Update is addressing natural hazards of concern and is assessing the likely impacts these hazards pose to people, property, and other assets in the Colusa County planning area. Additionally, the plan is developing an updated mitigation strategy including updated goals and mitigation actions and projects designed to reduce natural hazard risk and future disaster losses.

Opportunities for Input: Draft Plan and Final Meetings

Members of the community have a very important role in this process. A draft of the 2024 Colusa County LHMP Update is available for review and comment by the public and all interested stakeholders on the County LHMP website at: https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan. It is also available in printed copies at the following locations:

Colusa County Clerk-Recorder
546 Jay Street, Ste. 200 - Colusa

City of Williams, Finance & Utility Dept.
464 8th Street - Williams

Comments on the Public Review Draft (Final comments due by August 21, 2024)

There are several options for providing comments on the Public Review Draft LHMP:

- Email comments to Jeanine.foster@fostermorrison.com or jolivares@countyofcolusaca.gov
- Drop off written comments or send by mail to: Colusa County Sheriff's Office, Attn. Jackie Olivares, 929 Bridge St. Colusa, CA 95932
- Bring comments to the public or planning committee meeting

Final Public and HMPC Meetings on the Public Review Draft LHMP

Public Meeting
August 14 (Wednesday) 5:30-7:00 pm
Williams Elementary School-
Multipurpose Room
1404 E Street - Williams

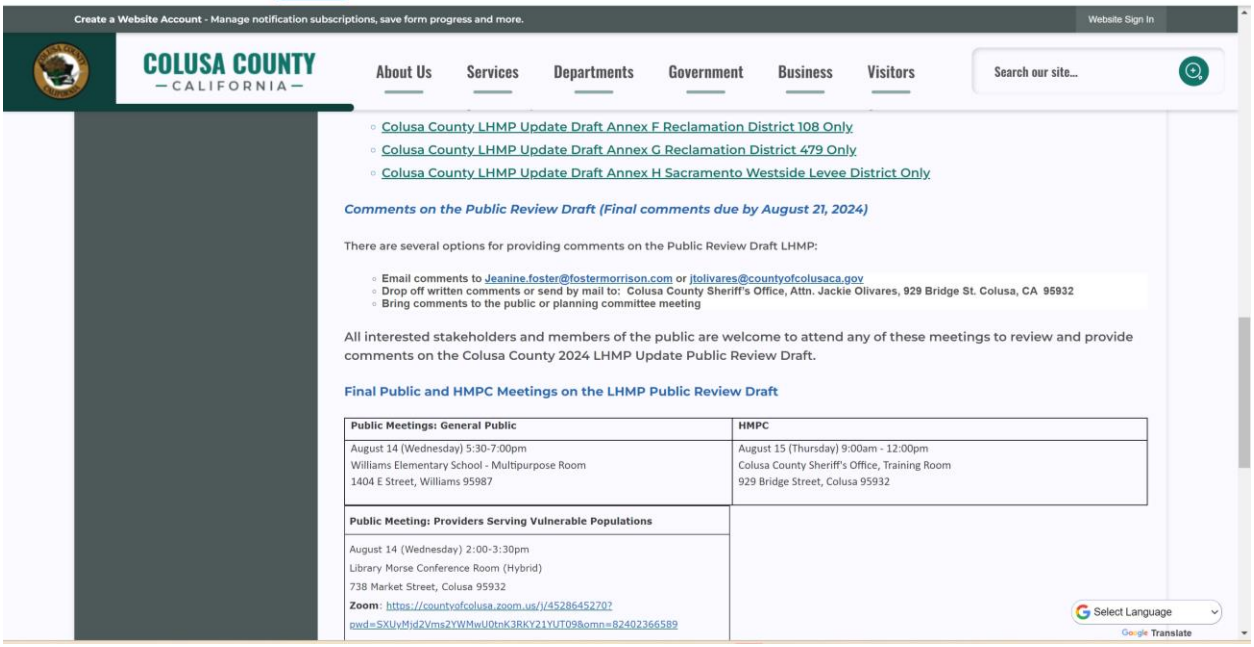
HMPC Meeting
August 15 (Thursday) 9:00-12:00 pm
Colusa County Sheriff's Office
929 Bridge Street - Colusa

All interested stakeholders and members of the public are encouraged to attend either of these meetings.

For more information on this project, visit https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan or contact the following individuals:

Jackie Olivares	Jeanine Foster
Colusa County, Office of Emergency Services	Foster Morrison Consulting Ltd.
Phone: (530) 458-0218	Phone: (303) 717-7171
jtoliveras@countyofcolusa.com	jeanine.foster@fostermorrison.com

A.7.15. Public Meeting #3: Public Meeting Invite on Draft Plan



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COLUSA COUNTY — CALIFORNIA —

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- Colusa County LHMP Update Draft Annex F Reclamation District 108 Only
- Colusa County LHMP Update Draft Annex G Reclamation District 479 Only
- Colusa County LHMP Update Draft Annex H Sacramento Westside Levee District Only

Comments on the Public Review Draft (Final comments due by August 21, 2024)

There are several options for providing comments on the Public Review Draft LHMP:

- **Email comments to Jeanine.foster@fostermorrison.com or jtolivares@countyofcolusaca.gov**
- **Drop off written comments or send by mail to: Colusa County Sheriff's Office, Attn. Jackie Olivares, 929 Bridge St. Colusa, CA 95932**
- **Bring comments to the public or planning committee meeting**

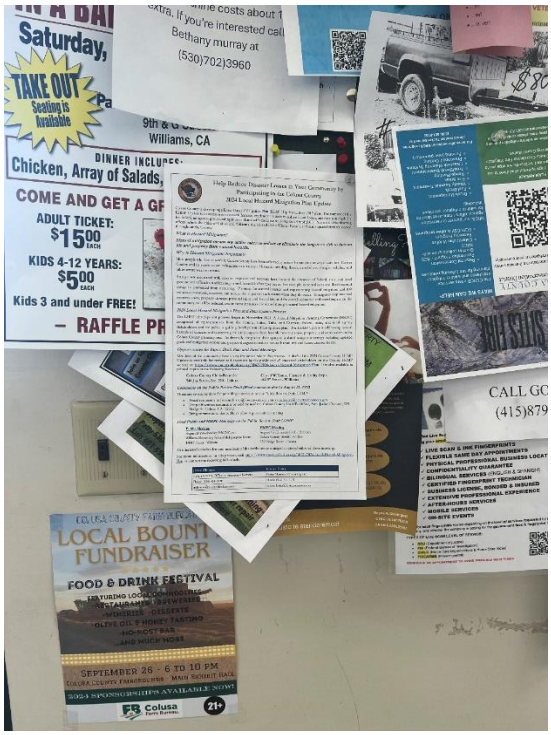
All interested stakeholders and members of the public are welcome to attend any of these meetings to review and provide comments on the Colusa County 2024 LHMP Update Public Review Draft.

Final Public and HMPC Meetings on the LHMP Public Review Draft

Public Meetings: General Public	HMPC
August 14 (Wednesday) 5:30-7:00pm Williams Elementary School - Multipurpose Room 1404 E Street, Williams 95987	August 15 (Thursday) 9:00am - 12:00pm Colusa County Sheriff's Office, Training Room 929 Bridge Street, Colusa 95932
Public Meeting: Providers Serving Vulnerable Populations	
August 14 (Wednesday) 2:00-3:30pm Library Morse Conference Room (Hybrid) 738 Market Street, Colusa 95932 **Zoom**: https://countyofcolusa.zoom.us/j/4528645270?pwd=SXUyMjd2Vms2YWMwU0tnK3RKY21YUT09&omn=82402366589	

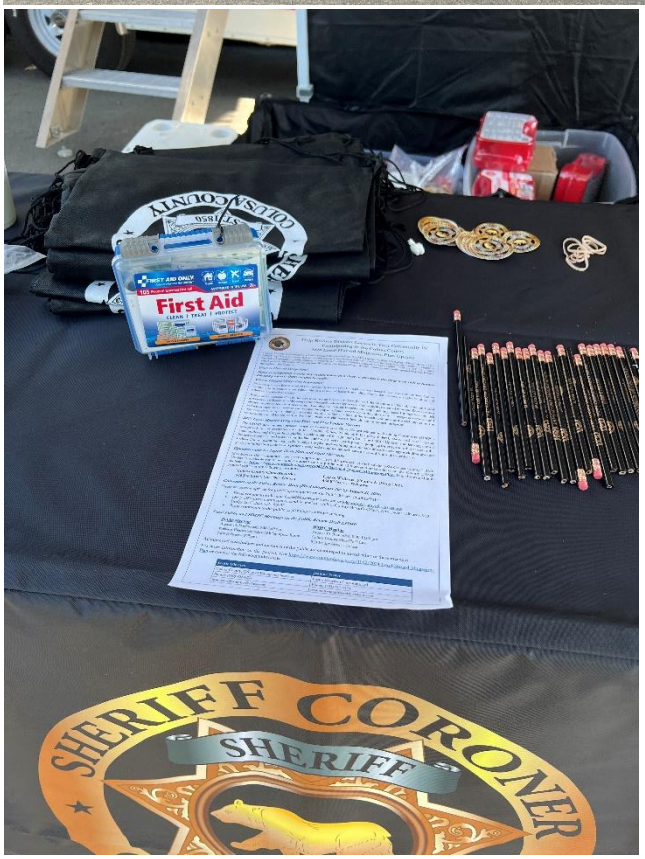
Select Language — Google Translate

A.7.16. Public Meeting #3: Draft Plan – Posting of LHMP Public Information Flyer at County Post Offices in Colusa, Grimes, Arbuckle, and Maxwell

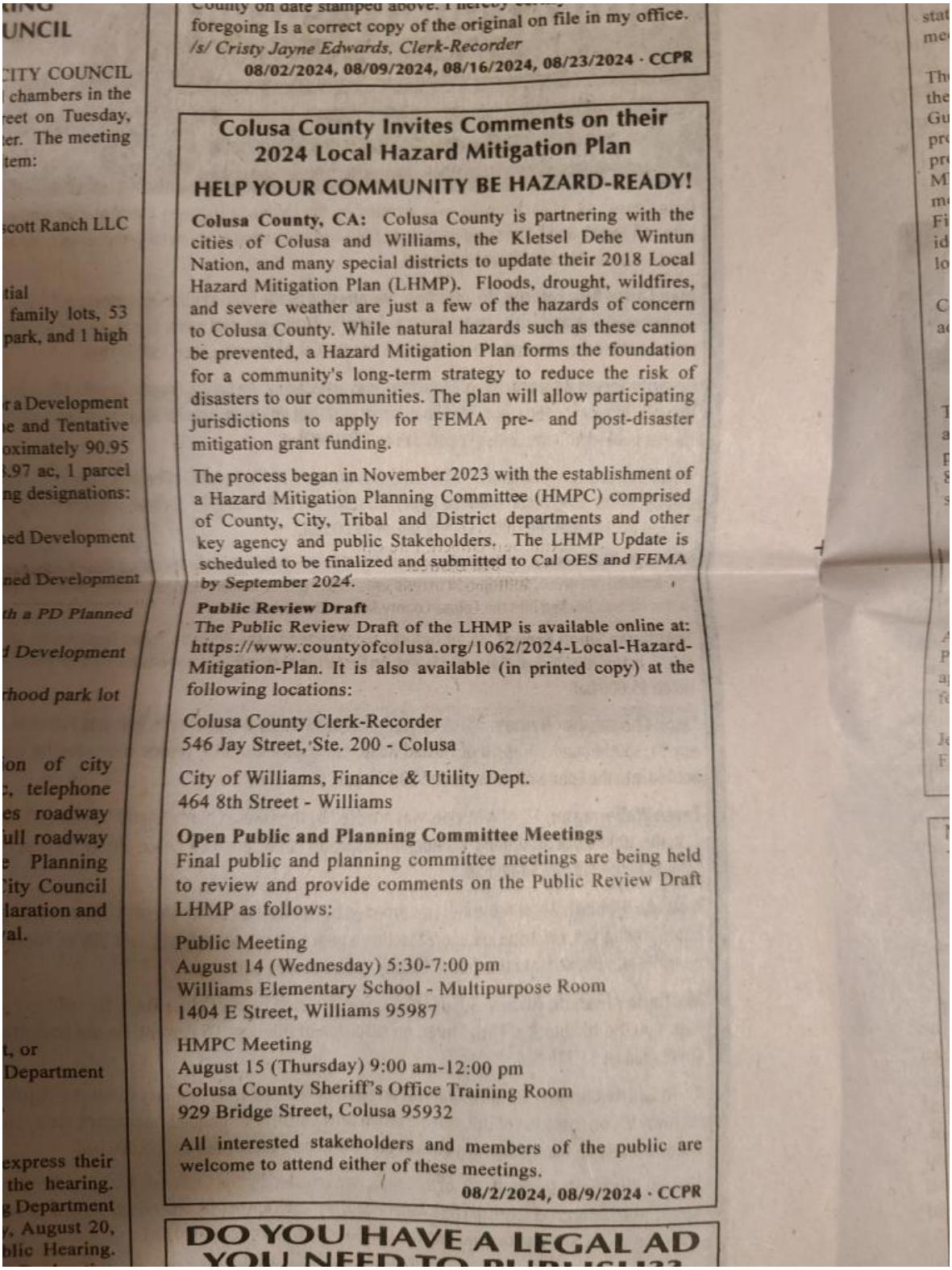


A.7.17. Public Meeting #3: Draft Plan – Public Outreach Flyers Posted at Ampla Health Event in Arbuckle on 8/5/2024 (as well as on 8/6 and 8/7)

A.7.18. Public Meeting #3: Draft Plan – Public Outreach at National Night Out in Williams on 8/6/2024



A.7.19. Public Meeting #3: Draft Plan - Press Release in Pioneer Review (Published 8/2 and 8/7)



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CITY COUNCIL
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County on date stamped above. I hereby
foregoing Is a correct copy of the original on file in my office.
/s/ Cristy Jayne Edwards, Clerk-Recorder
08/02/2024, 08/09/2024, 08/16/2024, 08/23/2024 · CCPR

Colusa County Invites Comments on their 2024 Local Hazard Mitigation Plan

HELP YOUR COMMUNITY BE HAZARD-READY!

Colusa County, CA: Colusa County is partnering with the cities of Colusa and Williams, the Kletsel Dehe Wintun Nation, and many special districts 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 Colusa County. While natural hazards such as these cannot be prevented, a Hazard Mitigation Plan forms the foundation for a community's long-term strategy to reduce the risk of disasters to our communities. The plan will allow participating jurisdictions to apply for FEMA pre- and post-disaster mitigation grant funding.

The process began in November 2023 with the establishment of a Hazard Mitigation Planning Committee (HMPC) comprised of County, City, Tribal and District departments and other key agency and public Stakeholders. The LHMP Update is scheduled to be finalized and submitted to Cal OES and FEMA by September 2024.

Public Review Draft

The Public Review Draft of the LHMP is available online at: https://www.countyofcolusa.org/1062/2024-Local-Hazard-Mitigation-Plan. It is also available (in printed copy) at the following locations:

Colusa County Clerk-Recorder
546 Jay Street, Ste. 200 - Colusa

City of Williams, Finance & Utility Dept.
464 8th Street - Williams

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
August 14 (Wednesday) 5:30-7:00 pm
Williams Elementary School - Multipurpose Room
1404 E Street, Williams 95987

HMPC Meeting
August 15 (Thursday) 9:00 am-12:00 pm
Colusa County Sheriff's Office Training Room
929 Bridge Street, Colusa 95932

All interested stakeholders and members of the public are welcome to attend either of these meetings.

08/2/2024, 08/9/2024 · CCPR

DO YOU HAVE A LEGAL AD YOU NEED TO PUBLISH?

A.7.20. Public Meeting #3: Draft Plan Pioneer Review Affidavit of Publication

COLUSA COUNTY
Pioneer Review

430 Market Street, Suite E, Colusa, CA 95932
(530) 458-4141

Affidavit of Publication

STATE OF CALIFORNIA, COLUSA COUNTY

COLUSA COUNTY
SHERIFFS OFFICE
2024 LOCAL HAZARD MITIGATION PLAN

I am not a party to, nor interested in the above entitled matter. I am the principal clerk of the printer and publisher of the Colusa County Pioneer Review, a newspaper of general circulation, published in the County of Colusa, to which Newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Colusa, State of California, under the date of September 19, 2017, Case No. CV24253, that the notice of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

Dates: AUGUST 2, 9,2024

I certify (or declare) under the penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Carol Anderson
Signature

Executed in Colusa, Colusa County, California on

AUGUST 9, 2024
Date

RECEIVED
AUG 14 2024
COLUSA COUNTY SHERIFF'S OFFICE
EMERGENCY SERVICES

Colusa County Invites Comments on their 2024 Local Hazard Mitigation Plan

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08/2/2024, 08/9/2024 - CCPR

A.7.21. Public Meeting #3: Agenda

AGENDA
COLUSA COUNTY
Local Hazard Mitigation Plan
Public Meeting #3: Draft Plan
August 14, 2024

1. Introductions
2. Overview of the LHMP Development Process
3. Overview of the Colusa County LHMP
4. Public Comments and Input
5. Next Steps
6. Questions

A.7.22. Public Meeting #3: Sign in Sheets

SIGN-IN SHEET
COLUSA COUNTY LOCAL HAZARD MITIGATION PLANNING PROJECT
Public Meeting #3: Public Review Draft LHMP
August 14, 2024 (5:30-7:00 pm)
Williams Elementary School | Williams, California

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Janice Bell/Supervisor	Jbell@countyofcolusaca.com	530-473-9975	County of Colusa Board of Supervisors
Jackie Olivares	jtolivares@countyofcolusaca.gov	530-458-0105	OES

A.7.23. Public Comments

No public or other stakeholder comments were received during the 2024 LHMP Update development process.

A.8 Meeting Handouts

Below are the handouts for each meeting. Handouts specific to the Mitigation Strategy Meetings can be found in Appendix C.

A.8.1. HMPC Meeting #1: Kickoff Meeting Handouts

Colusa County Disaster History

Colusa County – Disaster Declarations 1950-2023

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2023	California Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	DR-4683	–	1/14/2023
2023	California Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	EM-3591	–	1/9/2023
2020	California Covid 19 Pandemic	Biological	Pandemic	DR-4482	3/4/2020	3/22/2020
2020	California Covid 19	Biological	Pandemic	EM-3428	3/4/2020	3/13/2020
2019	California Severe Winter Storms, Flooding, Landslides, and Mudslides	Flood	Storms	DR-4434	–	5/17/2019
2019	California Severe Winter Storms, Flooding, Landslides, and Mudslides	Flood	Storms	DR-4431	–	5/1/2019
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4308	3/31/2017	4/1/2017
2014	California Drought	Drought	Drought	GP 2014-13	1/17/2014	–
2008	2008 January Storms	Flood	Storms	GP-2008-1	1/5/2008	–

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2005/2006	2005/06 Winter Storms	Flood	Storms	DR-1628	–	2/3/2006
2005	Hurricane Katrina Evacuations	Economic	Hurricane	EM-3248 2005	–	9/13/2005
2003	State Road Damage	Road Damage	Flood	GP 2003	1/1/2003	–
2001	Energy Emergency	Economic	Greed	GP 2001	1/1/2001	–
1998	1998 El Nino Floods	Flood	Storms	DR-1203	Proclaimed	2/19/1998
1997	1997 January Floods	Flood	Storms	DR-1155	1/2/97-1/31/97	1/4/1997
1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	Flood	Storms	DR-1046	Proclaimed	3/12/1995
1995	1995 Severe Winter Storms	Flood	Storms	DR-1044	1/6/95-3/14/95	1/13/1995
1990	1990 Freeze	Freeze	Freeze	DR-894	12/19/90	2/11/1991
1987	1987 Fires	Fire	Fire	GP	9/10/87, 9/3/87	–
1986	1986 Storms	Flood	Storms	DR-758	2/18-86-3/12/86	2/18/1986
1983	Winter Storms	Flood	Flood	DR-677	12/8/82-3/21/83	2/9/1983
1979	Gasoline Shortage	Economic	OPEC	–	5/8/1979-11/13/79	–
1978	Heavy Rains	Flood	Storms	DC 78-06-11	2/13/1978	–
1976	1976 Drought	Drought	Drought	–	2/9/76, 2/13,76, 2/24/76, 3/26/76, 7/6/76	–
1973	1973 Storms and Floods	Flood	Storms	–	2/28/1973	–
1972	1972 Freeze	Freeze	Freeze	–	7/13/1972	–
1970	1970 Northern California Flooding	Flood	Flood	DR 283	1/27/1970 - 3/2/1970	2/16/1970
1964	1964 Late Winter Storms	Flood	Storms	DR-183	–	12/24/1964

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
1963	1963 Floods and Rains	Flood	Storms	DR-145	2/7/63, 2/26/63, 2/29/63, & 4/22/63	2/25/63
1963	1963 Floods	Flood	Storms	–	2/14/1964	–
1958	1958 April Storms and Floods	Flood	Storms	DR-52	4/5/1958	4/4/1958
1958	1958 February Storms and Floods	Flood	Storms	CDO 58-03	2/26/1958	–
1955	1955 Floods	Flood	Flood	DR-47	12/22/1955	12/23/1955
1950	1950 Floods	Flood	Flood	OCD 50-01	11/21/1950	–

Source: FEMA, Cal OES, November 2023

Colusa County Disaster Declaration Summary Table by Hazard Type 1950-2023

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Drought	0	–	2	1976, 2014
Economic	0	–	2	1979, 2001
Fire	0	–	1	1987
Flood	17	1955, 1958, 1963, 1964, 1970, 1983, 1986, 1995, 1997 (twice), 1998, 2006, 2017, 2019 (twice), 2023 (twice)	18	1950, 1955, 1958 (twice), 1963 (twice), 1970, 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2003, 2008, 2017
Freeze	1	1991	2	1972, 1990
Hurricane	1	2005	0	–
Pandemic	2	2020 (twice)	2	2020 (twice)
Road Damage	0	–	1	2003
Totals	**21**	–	**28**	**–**

Source: FEMA, Cal OES, December 2023

Colusa County Disasters since 2018 LHMP

- 2019 Floods (two federal)
- 2020 Pandemic (two federal and two state)
- 2023 Floods (two federal)

Severe Weather Events

NCDC Severe Weather Events for Colusa County 1950-8/31/2023*

Event Type	Number of Events	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Cold/Wind Chill	2	0	0	0	0	$0	$0
Dense Fog	3	0	7	0	1	$0	$0
Drought	58	0	0	0	0	$0	$0
Excessive Heat	21	0	0	0	0	$0	$0
Flash Flood	1	0	0	0	0	$0	$0
Flood	13	0	0	0	0	$32,900,000	$0
Frost/Freeze	2	0	0	0	0	$0	$0
Funnel Cloud	2	0	0	0	0	$0	$0
Hail	1	0	0	0	0	$0	$0
Heat	17	0	0	0	0	$0	$0
Heavy Rain	5	0	0	0	0	$0	$0
Heavy Snow	5	0	0	0	0	$100,000	$0
High Wind	22	0	0	0	0	$35,000	$0
Strong Wind	7	0	0	0	0	$50,000	$0
Thunderstorm Wind	2	0	0	0	0	$0	$0
Tornado	4	0	0	0	0	$70,000	$0
Wildfire	13	7	1	37	5	$0	$0
Winter Storm	21	0	0	0	0	$0	$0
Winter weather	3	0	0	0	0	$0	$0
Total	**202**	**7**	**8**	**37**	**6**	**$33,155,000**	**$0**

Source: National Climatic Data Center

*Note: Losses reflect totals for all impacted areas

**Due to the regional nature of reporting certain hazard events, these hazards are included in the NCDC database for Colusa County

2024 Colusa County Hazards Comparison Summary

2019 Colusa County LHMP	Colusa County General Plan Safety Element	2023 State of California Plan Applicable Hazards*	Proposed 2024 Hazards*
Ag Hazards: Severe Weather/Insect Pests	–	Invasive and Nuisance Species	Ag Hazards: Severe Weather/Invasive Species
Climate Change	–	Climate Change and Related Hazards	Climate Change
Dam Failure	Dam Inundation	Dam Failure	Dam Failure
Drought and Water Shortage	–	Droughts and Water Shortage	Drought & Water shortage (tree mortality)
Earthquake (minor/major)	Seismic and Geologic Hazards	Earthquake	Earthquake (and all subhazards)
Flood: 100/200/500-year	Flooding Hazards	Riverine, Stream, and Alluvial Flood	Floods: 1%/0.5%/0.2% year
Flood: Localized/Stormwater	Flooding Hazards	Riverine, Stream, and Alluvial Flood	Floods: Localized Stormwater
Hazardous Materials Transportation	Hazardous Materials	Hazardous Materials Release	–
Landslide, Mudslide, and Debris Flows	Seismic and Geologic Hazards	Landslide, Debris Flow, and other Mass Movements	Landslide, Mudslide, and Debris Flow
Levee Failure	Flooding Hazards	Levee Failure	Levee Failure
Severe Weather: Extreme Cold and Freeze	–	Severe Wind, Weather, and Storms	Severe Weather: Extreme Cold and Freeze
Severe Weather: Extreme Heat	–	Extreme Heat	Severe Weather: Extreme Heat
Severe Weather: Heavy Rains and Storms (winds, hail, lightning)	Flooding Hazards	Severe Wind, Weather, and Storms	Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)
Severe Weather: High Winds/Tornadoes	–	Severe Wind, Weather, and Storms	Severe Weather: High Winds and Tornados
Stream Bank Erosion	–	Dealt with as part of Coastal Hazards, as well as Landslide, Debris Flow, and other Mass Movements	Address in earthquake, flood hazards and other, as an secondary hazard/impact of these hazards
Subsidence	Seismic and Geologic Hazards	Subsidence	Subsidence
Volcano	Seismic and Geologic Hazards	Volcano	–
Wildfire (smoke, tree mortality)	Fire Hazards	Wildfire	Wildfire (smoke/air quality)

*Power Outages will be discussed as a vulnerability of all hazards.

Colusa County Hazard Identification 2024: Colusa County Planning Area

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species					Medium
Climate Change					–
Dam Failure					Medium
Drought & Water shortage					High
Earthquake					Low
Floods: 1%/0.5%/0.2% annual chance					Medium
Floods: Localized Stormwater					Medium
Landslide, Mudslide, and Debris Flow					Medium
Levee Failure					Medium
Severe Weather: Extreme Cold and Freeze					Medium
Severe Weather: Extreme Heat					High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)					Medium
Severe Weather: High Winds and Tornados					Low
Subsidence					Low
Wildfire					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 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.8.2. HMPC Meeting #2: Risk Assessment Meeting Handouts

Status of the 2024 Colusa County LHMP Update Project/Next Steps

LHMP Update Project Schedule/Key Dates

2024 LHMP Update Meetings

- **March 27** (Wednesday) HMPC* Meeting #2 (Risk Assessment) (1:00-4:00 pm)
- **April 24** (Wednesday): HMPC Meetings #3 (Mitigation Strategy: Goals Development) (1:00 – 4:00 pm;
- **April 25** (Thursday): HMPC Meetings #4 (Mitigation Strategy: Actions and Projects) (9:00 am – 12:00 pm)
- **August 14** (Wednesday) Final Public Meeting #3 (5:30 – 7:00 pm)
- **August 15** (Thursday) Final HMPC Meeting #5 (9:00 – 12:00 pm)

Mitigation Strategy Meetings - Follow up

- **May 8** (Wednesday): Mitigation Strategy (goals/actions) follow up processed and sent to Colusa/HMPC
- **May 31** (Friday): Mitigation Action (Project) Worksheets due to Foster Morrison

LHMP Document Drafts

- **June 7** (Friday): HMPC (First) Draft LHMP to Colusa/HMPC
- **June 28** (Friday): HMPC comments due on Draft Plan
- **July 12** (Friday): Comments incorporated into Public Review (Second) Draft to Colusa/HMPC
- **July 17** (Wednesday): Public Review Draft on County website
- **August 21** (Wednesday): all Jurisdictional, HMPC, and public input to Foster Morrison
- **August 30** (Friday): Public and final comments incorporated and LHMP ready for submittal to Cal OES – **August 2024**

*HMPC = Hazard Mitigation Planning Committee

2024 Hazard Identification & Profiles: Colusa County

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species	Extensive	Highly Likely	Catastrophic	High	Medium
Climate Change	Extensive	Highly Likely	Limited	Medium	–
Dam Failure	Extensive	Occasional	Catastrophic	High	Medium
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake	Extensive	Likely /Unlikely	Critical	Medium	Low
Floods: 1%/0.2% annual chance	Extensive	Occasional / Unlikely	Catastrophic	High	Medium
Floods: Localized Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, and Debris Flow	Limited	Likely	Limited	Medium	Medium
Levee Failure	Extensive	Occasional	Catastrophic	High	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: High Winds and Tornados	Extensive	Highly Likely / Occasional	Limited	Medium	Low
Stream Bank Erosion	Significant	Highly Likely	Limited	Medium	Medium
Subsidence	Limited	Likely	Limited	Medium	Low
Wildfire	Significant	Highly Likely	Critical	High	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.
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Significance
Low: Minimal potential impact
Medium: Moderate potential impact
High: Widespread potential impact

Climate Change Influence
Low: Minimal potential impact
Medium: Moderate potential impact
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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: Colusa County Planning Area

Agricultural Hazard: Severe Weather/Invasive Species

- Most agricultural disasters in Colusa County are associated with severe weather events, including heavy rains, floods, heat, freeze, and drought. Insects and noxious weeds are also a concern.
- 19 USDA disaster declarations from 2012-2023. 14 related to drought; 3 for freezing temperatures, and 2 for severe weather, including rains, high winds, cold temperatures.
- The recent drought noted the following drought related impacts to Ag impacts:
  - ✓ Rice production value dropped 80%
  - ✓ Overall crop values fell by $394,739,000
  - ✓ Over 350,000 acres of farmland fallowed in the Sacramento Valley
  - ✓ Water allocations cut to 18% of contracted amounts
- Record low temperatures for 5 days in February 2022 resulted in 65% overall crop loss to area growers. Extreme late season high temperatures in fall of 2022 impacted the growing season for walnuts, resulting in an unmarketable product.
- OTHER AG CONCERNS/ISSUES TO NOTE?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

Climate Change

- The 2023 State of California Hazard Mitigation Plan stated that climate change is clearly 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. The number, magnitude, and severity of hazard events and disasters are significantly increasing resulting in catastrophic events. Climate Change has the potential to significantly alter the nature and frequency of most hazards.
- The atmospheric river events of the last couple of years have been significant. HAVE THESE HAD SIGNIFICANT IMPACTS TO THE COLUSA PLANNING AREA?
- UNIQUE ISSUES/CONCERNS ASSOCIATED WITH CLIMATE CHANGE?
- COLUSA COUNTY/CITIES - IS ANYONE IN PROCESS WITH DEVELOPMENT OF ANY CAPS/CLIMATE VULNERABILITY ASSESSMENTS?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

Dam Failure

- Based on DSOD and NID data, there are 6 dams in Colusa County with a potential to impact the Planning Area: East Park (High), Funks (Low), Rainbow Diversion (Low), Rancho Rubini (High), Upper Letts (High), and York Hill (Low).

- 9 additional dams are located in other counties with dam inundation areas in Colusa County: Oroville (Extremely High), Shasta (High), Whiskeytown (High), Black Butte (High), Davis Creek (High), Indian Valley (Extremely High), Lake Almonor (Extremely High), Thermalito (Extremely High). The failure of a dam may affect the dam site, downstream areas, floodwater routing, or all three.
- DAMS OF CONCERN/ISSUES TO HIGHLIGHT?
- Past dam events include the Oroville spillway event in 2017. Impacts included evacuees coming in to Colusa. Had the dam failed, Colusa would have seen inundation as well. It was also noted that the County is trying to get the East Park dam (really just a stockpond?) off the official dam list – status?
- Likelihood of Future Occurrence: Occasional
- Vulnerability: Extremely High
- Priority Hazard

Drought and Water Shortage

- The County has been mostly in and out of drought since 2014. Historical drought data for the Colusa County Planning Area and region indicate there have been 5 significant droughts in the last 86 years.
- 2 federal (1977, 2014) disaster declarations for Colusa County since 1950. In addition, there have been 14 USDA drought disaster declarations since 2012. There have been 58 NCDC drought events in Colusa County, almost all related to events in the 2014 to 2023 drought. In addition, the Colusa County EOC was activated 3 times during the most recent drought: 2015, 2017, 2019.
- During periods of drought, wells have gone dry, ag industry has been significantly affected.
- The 2010 General Plan Background Report, and the 2021 Colusa County Groundwater Sustainability Report noted that water supplied to Colusa County comes from two sources: groundwater and surface water. All domestic water systems in the County are supplied with groundwater, while most irrigation systems are supplied with surface water from the Tehama-Colusa or Glenn-Colusa Canals, the Colusa Drain, or the Sacramento River. The surface water supplies available for use in Colusa County are significant.
- WHAT HAS BEEN IMPACTED THE MOST? HOW HAS WATER SUPPLY BEEN AFFECTED? WHAT ARE THE MOST SIGNIFICANT ISSUES/CONCERNS RELATED TO DROUGHT?
- Likelihood of Future Occurrence: Drought - Likely/Water supply - Occasional
- Vulnerability: High
- Priority Hazard

Earthquake

- The General Plan Background Report noted that there are no known active faults within the County; however, the area could experience considerable ground shaking generated by faults outside Colusa County. The Great Valley Fault is an inferred fault in the County.
- The USGS National Seismic Hazard Maps provides acceleration and probabilities for various time periods. This data indicates that the expected severity of earthquakes in the region is mostly low to moderate, with areas in the southwest corner of the County in the higher range.
- 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.
- WHAT WERE THE ISSUES FROM HISTORICAL EARTHQUAKES? HAVE ANY STUDIES BEEN DONE ON EARTHQUAKE AND SECONDARY IMPACTS SUCH AS TO DAMS AND LEVEES?

- Likelihood of Future Occurrence: Unlikely – large, damaging earthquake; Occasional – minor earthquake
- Vulnerability: High
- Priority Hazard

Flood Hazards

100/500 year

- Historically, portions of Colusa County have always been at risk to flooding because of its annual percentage of rainfall in the winter and the number of watercourses that traverse the County. Flooding in Colusa County results from prolonged heavy rainfall over tributary areas during the period from November through March. The 2024 FIS noted that as a result of limited channel capacities, agricultural lands along the Colusa Basin Drain have experienced relatively frequent flooding.
- Of the 28 state and 21 federal declarations from 1950-present– 18 state and 17 federal declarations were for heavy rains, storms, and flooding. 4 federal disaster declarations (2 in 2023 and 2 in 2019) have occurred since the previous LHMP. 14 NCDC events related to flood from 1993 to 2023. 6 EOC activations from flood and storms from 2008 to 2023.
- HMPC - REVIEW RISK ASSESSMENT AND ADD INFORMATION ON MAJOR FLOOD EVENTS. NEED SUMMARY OF IMPACTS FROM 2019 - 2023 FLOOD EVENTS (Have for County).
- Likelihood of Future Occurrence: 100-Occasional; 200 – Unlikely; 500-Unlikely
- Vulnerability: High
- Priority Hazard

Localized/Stormwater flooding

- Significant localized flood history in the County – occurs annually
- CAN THE HMPC PROVIDE DETAILS ON THESE AREAS? PICTURES/DESCRIPTIONS - NEED SPECIFIC TO EACH JURISDICTION.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Landslides, Mudslides, and Debris Flows

- The General Plan Background Report noted that the landslide susceptibility in the eastern half of the County is generally low. A north-south band of moderate landslide potential stretches from East Park Reservoir south to the Bear Valley. Only the northwestern portion of the county is within a sub-region of high landslide susceptibility. This area of high susceptibility is almost entirely within the boundaries of the Mendocino National Forest.
- The HMPC noted that many areas in southwest Colusa County are also rated high in their susceptibility to landslide due to erosive soils, and from hydrophobic soils from past wildfire burn scars.
- In Colusa County, landslides generally occur where there is very little population or infrastructure.
- There have been no disaster declarations associated with landslides in Colusa County. The NCDC contains no records of landslides in the County.

- WHAT SPECIFIC AREAS ARE AT RISK TO LANDSLIDES? CAN THE COUNTY/CITIES/DISTRICTS PROVIDE INFORMATION ON PAST OR ONGOING LANDSLIDE EVENTS/AREAS?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard?

Levee Failure

- Agricultural and flood control levees have been constructed in many areas of Colusa, mostly on the eastern side of the County. Many of the agricultural levees only provide protection from the 5 to 20 year flood events. While flood control levees generally provide greater protection. Multiple agencies have levee ownership and responsibility in the County.
- All levees have been deaccredited as part of the new effective DFIRMs.
- No disaster declarations associated with levee failures; the NCDC does not identify any levee failure events. The previous LHMP noted levee issues during storm events in 2017, 2015, and 1978 floods.
- ANY PAST LEVEE FAILURE EVENTS OR ISSUES TO NOTE? 2019 - 2023 ISSUES?
- Likelihood of Future Occurrence: Occasional
- Vulnerability: High? Extremely High?
- Priority Hazard

Severe weather

Extreme Cold and Freeze

- Annual occurrences of cold temperatures. Monthly average minimum temperatures from November through April range from the mid-30s to mid-40s. The lowest recorded daily extreme was 14°F on December 15 and 16, 2022. In a typical year, minimum temperatures fall below 32°F on 25.1 days with no days falling below 0°F.
- The County has had 1 past federal (1991) and 2 past state (1972, 1990) disaster declarations for extreme cold and freeze. NCDC did not identify any extreme cold or freeze events. USDA events include 3 associated with freezing temperatures.
- PLEASE PROVIDE DETAILS ON EXTREME COLD AND FREEZE EVENTS IN THE COUNTY. WHAT ARE THE MOST SIGNIFICANT ISSUES/CONCERNS?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Extreme Heat

- Annual occurrences of hot temperatures. Monthly average maximum temperatures in the warmest months (May through October) range from the mid-70s to the low 90s. The highest recorded daily extreme was 113°F on August 9, 1978. In a typical year, maximum temperatures exceed 90°F on 88.9 days.
- 38 extreme heat events (NCDC) since 1993. No state or federal disaster declarations.
- From the last LHMP, the HMPC did indicate that between 2014 and 2016, some trees within the County experience Sudden Limb Drop which can occur during hot weather.

- PLEASE PROVIDE DETAILS ON EXTREME HEAT EVENTS IN THE COUNTY. WHAT IS MOST VULNERABLE? WHAT ARE THE MOST SIGNIFICANT ISSUES/CONCERNS?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Heavy rains and storms (Hail, Lightning)

- Significant County history: annual occurrences.
- Significant County history: annual occurrences. Average annual precipitation in Colusa County is 16.22 inches per year. The highest recorded annual precipitation is 35.68 inches in 1983; the highest recorded precipitation for a 24-hour period is 3.56 inches on February 2, 1998. The lowest recorded annual precipitation was 4.20 inches in 1976.
- There have been 18 state and 17 federal disaster declarations since 1950 for flooding, including heavy rains and storms.
- The NCDC data recorded 30 hail, heavy rain, and winter weather incidents for Colusa County since 1950. Winter weather events tend to be rain in the lower elevations of the County, while relatively rare, snow can fall in the upper elevations. No incidents of lightning were found in the NCDC database. The USDA had 2 events since 2012 related to heavy rains and storms.
- County EOC activated 5 times for heavy rains and storms and associated flooding: 2008, 2010, 2011, 2012, and 2017.
- CAN THE HMPC PROVIDE DETAILS ON HEAVY RAIN AND STORM EVENTS IN THE COUNTY. 2019 - 2023 STORMS – PA SHEETS?
- Severe storms/heavy rains are the primary cause of most major flooding.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

High Winds and Tornadoes

- Annual occurrences.
- No state or federal disaster declarations from high winds or tornadoes.
- The NCDC data recorded 31 high wind and 4 tornado incidents for Colusa County since 1950. All tornado events were EF0 intensities.
- CAN THE HMPC PROVIDE INFORMATION ON PAST HIGH WINDS AND TORNADO EVENTS AND DAMAGES? WHAT ARE THE PRIMARY CONCERNS/ISSUES/VULNERABILITIES TO THE COUNTY?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Stream Bank Erosion

- Stream bank erosion processes are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Stream bank erosion occurs on rivers, streams, and other moving waterways in the County

- WHAT ARE THE PRIMARY AREAS/CONCERNS/IMPACTS ASSOCIATED WITH STREAM BANK EROSION IN THE COUNTY? DO THE COUNTY/CITIES/DISTRICTS HAVE MAPS/DATA OF PROBLEM AREAS? DO WAVE ACTIONS DURING HIGH WINDS CONTRIBUTE SIGNIFICANTLY TO STREAM BANK EROSION ALONG LEVEES?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Subsidence

- Land subsidence is defined as the sinking of the land over man-made or natural underground voids.
- There are two primary causes of subsidence in the County: subsidence from groundwater pumping and the settling of the ground over abandoned mine workings.
- ARE THERE SPECIFIC KNOWN AREAS PRONE TO SUBSIDENCE? CAN YOU CONFIRM THE PRIMARY CAUSES OF SUBSIDENCE IN THE COUNTY? CAN THE COUNTY PROVIDE INFORMATION ON PAST SUBSIDENCE EVENTS?
- Likelihood of Future Occurrence: Occasional
- Vulnerability: Medium
- Non-Priority Hazard

Wildfire

- Wildfires occur on an annual basis in the Colusa County Planning Area.
- The General Plan indicates that wildfires are a minor threat to the Colusa County Planning Area, based on historical data, and input from area fire departments.
- Any ignition has the potential to become an out of control wildfire. But, due to terrain, fuels (vast ag land), and location of built environment and populations, wildfire risk had not been a significant concern in the County until more recently.
- 1 state disaster declarations for Wildfire in 1987; 13 NCDC wildfire events.
- Recent fires in affecting Colusa include: 2018 Pawnee Fire (15,197 total acres; 43 acres in Colusa); 2018 Ranch Fire (410,202 total acres; 73,721 acres in Colusa); 2020 Hennessey Fire (305,352 total acres; 1,465 acres in Colusa); 2020 August Complex Fire (1,032,700 acres; 51 acres in Colusa). Smoke and air quality were also issues associated with these and other regional fires.
- Colusa County has their first Community Wildfire Protection Plan (2021 CWPP) and is considering establishing a Fire Safe Council as wildfire becomes more of a concern to the County Planning Area.
- CAN THE HMPC PROVIDE INFORMATION ON PAST DAMAGES/IMPACTS FROM THESE RECENT FIRES? WHAT ARE THE PRIMARY CONCERNS/ISSUES/VULNERABILITIES FROM WILDFIRE?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

Data Needs

Review of Key Items to date:

- Hazard-specific data
  - ✓ Hazard ID tables – **due by 12/8/23**
  - ✓ Historic Hazard Worksheets or list of past hazard occurrences and impact to jurisdiction – **due by 12/8/23**
- Risk Assessment Worksheets – **due by 3/15/24**

Other Data Items:

- Logos for each participating jurisdiction
- Photos, Photos, Photos

A.8.3. HMPC #3 & #4: Mitigation Strategy Meeting Handouts

These can be found in Appendix C of this Plan.

A.8.4. HMPC #5: Final Meeting Handouts for HMPC

The handout used for the HMPC is in Section 2.2 of the Base Plan.

A.8.5. Public Meeting #1: Kickoff Meeting Handouts

Colusa County LHMP Update: 2024 Hazards (DRAFT)

- Ag Hazards: Severe Weather/Invasive Species
- Climate Change
- Dam Failure
- Drought & Water Shortage (with tree mortality)
- Earthquake (and subhazards)
- Flood: 1%/0.5%/0.2%
- Flood: Localized Stormwater Flooding
- Landslide, Mudslide, and Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Wind, Hail, Lightning)
- Severe Weather: High Winds and Tornadoes
- Subsidence
- Wildfire (with smoke and air quality)

Colusa 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.8.6. Public Meeting #2: Draft Plan (Vulnerable Populations Meeting) Handouts

COLUSA COUNTY
2024 LOCAL HAZARD MITIGATION PLAN (LHMP)
FINAL PUBLIC MEETING #2
August 14, 2024

Participating Jurisdictions

- Colusa County*
- City of Colusa*
- City of Williams*
- Colusa County RCD
- Cortina Community Services District
- Kletsel Dehe Wintun Nation
- Reclamation District 108*
- RD 479
- Sacramento River West Side Levee District*

* Participated in 2018 Colusa County LHMP

Hazards List

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change
- Dam Failure
- Drought & Water Shortage (with tree mortality)
- Earthquake (and subhazards)
- Flood: 1%/0.5%/0.2%
- Flood: Localized Stormwater Flooding
- Landslide, Mudslide, and Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold and Freeze (with snow)
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Wind, Hail, Lightning)
- Severe Weather: High Winds and Tornadoes
- Stream Bank Erosion
- Subsidence
- Wildfire (with smoke/air quality)

Mitigation Strategy: Colusa County Planning Area Goals

Goal 1: Minimize risk and vulnerability of Colusa County to natural hazards (including climate change considerations) and protect lives and prevent losses to property, public health, economy, and the environment

- Provide protection for existing and future development
- Provide protection for critical facilities, infrastructure, and services and minimize disruptions
- Provide protection for natural resources
- Reduce the number of emergency incidents
- Consider future impacts of climate change in natural hazard mitigation
- Foster an economy that promotes and values a proactive approach to mitigation
- Preserve the functionality of property, economy, and commerce, that may be affected by infrastructure vulnerability

Goal 2: Increase community/public outreach, education, and awareness for all hazards to minimize hazard-related losses

- Increase public awareness of hazard risk, vulnerability, and mitigation
- Enhance outreach and education of community members to promote a hazard resilient community
- Educate citizens and farmers on water conservation methods to provide protection from future hazard events and build support for water storage projects
- Educate and increase awareness and understanding of migrant and other transient residents on hazards and natural hazard mitigation
- Increase education and awareness and ensure adequate resources among historically underserved populations, individual with access and functional needs, and populations impacted by natural hazards and disasters

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

- Increase communities' capabilities to respond to increased climate impacts, (e.g., legislation, education, projects)
- Make better use of technology to predict and mitigate damage
- Increase the use of shared resources and multi-agency efforts
- Continued improvements to emergency services and public safety capabilities
- Increase participation by all County entities and agencies operating in Colusa County in disaster planning activities to improve hazard awareness, intra-and inter-agency communications, mitigation action implementation, and coordinated response and recovery efforts
- Enhance Tribal coordination for disasters
- Maintain Colusa County communities' eligibility for FEMA grant funding and other FEMA programs

Goal 4: 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

- Increase education, outreach, and awareness of natural hazards and disasters and ensure adequate resources with a focus on the whole community

- Reduce hazard risk and vulnerability and increase disaster resilience through the equitable and accessible planning and implementation of hazard mitigation actions and priorities
- Enhance natural hazard mitigation strategies to protect the most rural, vulnerable areas

Goal 5: Improve community resiliency to flooding in Colusa County

- Reduce the flood risk and vulnerability in Colusa County
- Reduce life safety issues, property loss, and damages associated with flooding
- Reduce flooding adjacent to streams, residential areas, and areas with critical infrastructure
- Improve stream flow to reduce bank erosion
- Maintain/improve flood protection and control measures, including maintenance and improvements to the levee systems, to minimize future flood related impacts and damages

Goal 6: Continue to protect and promote Colusa County agriculture by ensuring safe and effective farming practices that protect the citizens and environment and that minimize future hazard related losses

- Reduce the impacts to and loss of agricultural resources from natural hazards and disasters
- Support and implement water projects that replenish the aquifer, increase available agricultural water during critical times of need for local crops, and ensure a consistent water supply and distribution to County residents.
- Educate County citizens as to how they can help protect Colusa's agriculture from noxious weeds and pests
- Work with local farmers to keep canals, ditches, and streambeds clear of debris reducing downstream flooding and other impacts

Mitigation Strategy: Colusa County Planning Area Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Colusa 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	Public Education
Action 3. Alert and Warning System for Sheriff's Office and Public Health	New Action	X	X		Emergency Services
Action 4. Technology Enhancements to Support Hazard Mitigation Planning and Project Implementation and for use in Disaster Preparedness, Response, and Recovery Efforts (e.g., GIS Application Enhancements)	New Action	X	X	X	Prevention Public Information Emergency Services Property Protection
Action 5. Vulnerable Population Planning	New Action	X	X		Prevention Public Information Emergency Services
Action 6. Update 211 system	New Action	X	X		Emergency Services
Action 7. Coordinate with the American Red Cross (ARC) for Mass Care Planning	New Action	X	X		Prevention Public Information Emergency Services
Action 8. Vulnerable Population Planning (with a focus on Access and Functional Needs)	New Action	X	X		Prevention Public Information Emergency Services
Action 9. Coordination with Community Based Organizations	New Action	X	X		Prevention Public Information Emergency Services
Action 10. Public Education and Community Outreach Countywide	Previous Action	X	X		Public Education
Action 11. Enhance Tribal Coordination for Disasters	New Action	X	X		Prevention Emergency Services
Action 12. Generator Purchases to Enhance Project Power for Colusa County	New Action	X	X	X	Emergency Services Property Protection
Action 13. EOP Update & Implementation	New Action	X	X		Prevention Emergency Services
Action 14. Evacuation Planning Countywide	Previous Action	X	X		Emergency Services

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 15. Migrant Center Improvements/House Vulnerable Populations During Disaster					
Agricultural Hazards: Severe Weather/Invasive Species (Pests and Weeds)					
Action 16. Pest and Rodent Prevention Project for Infrastructure Protection	New Action	X	X		
Action 17. Development of Ordinance and Zoning to Limit/Manage Pest Introduction into Colusa County	New Action	X	X		
Action 18. Abandoned Agricultural Lands Pest Management (joint with RCD)	New Action	X	X		
Climate Change Actions					
Action 19. Climate Change Mitigation Adaptation Action Plan	New Action	X	X	X	Prevention
Action 20. Climate-smart Agricultural Planning (joint with RCD)	New Action	X	X		
Dam Failure Actions					
Action 21. Continue Communication about Dam Safety and Awareness County-wide	New Action	X	X	X	Prevention Public Information Emergency Services
Action 22. Dam Failure Mitigation, Education, and Awareness	Previous Action	X	X	X	Prevention Public Information Emergency Services
Drought and Water Shortage Actions					
Action 23. Groundwater Recharge (joint with RCD)	New Action	X	X		
Action 24. Invasive Species Removal from Waterways (joint with RCD)	New Action	X	X		
Action 25. Irrigation Efficiency Technical Assistance (joint with RCD)	New Action	X	X		
Action 26. On-farm Water Storage Projects (joint with RCD)	New Action	X	X		
Earthquake Actions					
Action 27. NEED					
Flood, Localized Flood, Levee Failure, and Heavy Rains and Storm Actions					
Action 28. Flood ordinance updates		X	X	X	Prevention

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 29. Localized Stormwater Management and Streambank Erosion Mitigation (joint with RCD)	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 30. Princeton Storm Water Drainage Assessment	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Landslide, Mudslide, and Debris Flow					
Action 31. NEED					
Severe Weather Actions					
Action 32. Sheltering for unhoused (winter weather)	New Action	X	X		Prevention Emergency Services
Action 33. Sheltering for Unhoused (Extreme Heat)	New Action	X	X		Prevention Emergency Services
Action 34. Severe Weather Plan Update	New Action	X	X	X	Prevention Emergency Services
Subsidence Actions					
Action 35. NEED					
Wildfire Actions					
Action 36. Beetle-killed Tree Removal (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 37. Update and Implement Community Wildfire Protection Plan (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 38. Colusa County Fire Mitigation Plan of 2024 Implementation (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 39. Colusa County Fire Safe Council (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
City of Colusa					
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	Public Education

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 3. Evacuation Training for the Community of Colusa	New Action				Emergency Services
Action 4. Fire and sanitation water is needed in case of emergency in the City of Colusa during a drought	New Action	X	X		Prevention Emergency Servies Property Protection
Action 5. URM Mapping and Identification	Previous Action	X	X		Prevention Property Protection
Action 6. Project improvements to Decrease Flooding	New Action	X	X	X	Property Protection Structural Projects
Action 7. Levee Mitigation	New Action	X	X	X	Property Protection Structural Projects
Action 8. Colusa Basin Drain	New Action	X	X	X	Property Protection Structural Projects
City of Williams					
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		Public Information
Action 3. Aquifer Recharge Project	New Action	X	X		Property Protection Natural Resource Protection
Action 4. Storm Drain Master Plan	Previous Action	X	X	X	Property Protection Structural Projects Natural Resource Protection
Action 5. Salt Creek Erosion Control	New Action	X	X	X	Property Protection Natural Resource Protection
Action 6. Underground Powerlines	New Action	X	X		Property Protection Structural Projects
Action 7. Healthy Trees Program	New Action	X	X		Property Protection Natural Resource Protection
Colusa County RCD					
Action 1. Abandoned Agricultural Lands Pest Management	New Action	X	X		Property Protection Natural Resource Protection
Action 2. Beetle-killed Tree Removal	New Action	X	X		Property Protection Natural Resource Protection
Action 3. Climate Action Plan	New Action	X	X	X	Prevention

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 4. Climate-smart Agricultural Planning	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 5. Update and Implement Community Wildfire Protection Plan	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 6. Colusa County Fire Mitigation Plan of 2024 Implementation	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 7. Colusa County Fire Safe Council	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 8. Groundwater Recharge	New Action	X	X		Property Protection Natural Resource Protection
Action 9. Invasive Species Removal from Waterways	New Action	X	X	X	Property Protection Natural Resource Protection
Action 10. Irrigation Efficiency Technical Assistance	New Action	X	X		Property Protection Natural Resource Protection
Action 11. Localized Stormwater Management and Streambank Erosion Mitigation	New Action	X	X	X	Property Protection Natural Resource Protection
Action 12. On-farm Water Storage Projects	New Action	X	X		Property Protection Natural Resource Protection
Cortina Community Services District					
Action 1. Armor the Salt Creek Bank	New Action	X	X	X	Property Protection Natural Resource Protection
Kletsel Dehe Wintun Nation					
Action 2. Update Cortina Rancheria Climate Change Adaptation Plan (2017)	New Action	X	X	X	Prevention
Action 3. Water Tank	New Action	X	X		Property Protection Structural Project
Action 4. Emergency Generator	New Action	X	X		Emergency Services Property Protection
Action 5. Improve Erosion Control Management Practices	New Action	X	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 6. Secondary Evacuation Route	New Action	X	X		Emergency Services
Action 7. Fuel Reduction and Defensible Space Projects	New Action	X	X		Property Protection Natural Resource Protection
Action 8. Enhanced Mapping and Assessing Rancheria Vulnerability to Hazards	New Action	X	X		Prevention Emergency Services Property Protection
Action 9. Public Education and Outreach	New Action	X	X	X	Public Information
RD 108					
Action 10. Emergency Generator Maintenance and Upkeep - District Office	Previous Action	X	X	X	Emergency Services Property Protection
Action 11. Emergency Generator - Pump Stations	Previous Action	X	X	X	Emergency Services Property Protection
Action 12. Stabilization of Colusa Basin Drain Levee	Previous Action	X	X	X	Property Protection Structural Projects
RD 479					
Action 13. RD 479 Integrity Preservation	New Action	X	X	X	Property Protection Structural Projects
Sacramento Westside Levee District					
Action 14. Seepage Mitigation of Sacramento River Levee	Previous Action	X	X	X	Property Protection Structural Projects
Action 15. Hardening of Sacramento River Levee	Previous Action	X	X	X	Property Protection Structural Projects

Action 4: Technology Enhancements to Support Hazard Mitigation Planning and Project Implementation and for use in Disaster Preparedness, Response, and Recovery Efforts (e.g., GIS Application Enhancements)

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: Colusa County requires a high-impact response and recovery plan with the right resources in the right place at the right time due to its geography. Cities within the county are separated by miles with limited to no infrastructure in between. GIS can forecast surge and optimize resource allocation resources can be placed precisely where they are most needed. Mapping and analysis can expose gaps in

capacity, show at-risk populations' needs, aid in effectively distributing supplies, and inform personnel allocation. Location intelligence supports the distribution of resources where people and need intersect.

Project Description: Geographic information Software will serve as the common denominator for Colusa County DHHS preparedness solution because location data is essential to every phase of planning, response, and recovery. GIS scales to events ranging from inclement weather conditions to pandemics. It helps state and local governments scope out the extent of a public health crisis and predict the path forward for allocating resources and monitoring processes and outcomes. Maps and apps enable public health officials to coordinate efforts with other agencies and external stakeholders. The public health preparedness community can make major inroads by embracing GIS data, models, communication and engagement hubs, and location-centric applications.

Other Alternatives: There are no **Other Alternatives**

Existing Planning Mechanism(s) through which Action Will Be Implemented: This plan will be implemented through our ArcGIS Organizational Account.

Responsible Office/Partners: Department of Health and Human Services

Benefits (Losses Avoided): Using Esri Software for Health and Human services professionals to provide insights, Spatial data and geographic information system (GIS) technology to underscore coverage gaps in the populations we hope to reach, to create opportunities to improve workflows, and the ability to plan for and mitigate against unforeseen events.

Potential Funding: Behavioral Health Bridge Housing Program Round 3

Timeline: November 2024- March 2025

Project Priority (H, M, L): H

Action 5. Vulnerable Population Planning

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5,

Issue/Background: During disasters, people with higher needs for care require specialized sheltering options. This may include shelter similar to skilled nursing or psychiatric care hospitals, identifying the County's need and resources. During the 2018 Camp Fire Colusa assisted Butte county by providing sheltering for vulnerable populations in the Williams Migrant Center.

Project Description: Development of a shelter plan focused on vulnerable populations, this may include the use of Williams Migrant Center, Local Motels and Hotels or an MOU with a neighboring county to assist in sheltering vulnerable populations.

Other Alternatives: Formalize MOUS with neighboring County to provide care for our vulnerable populations.

Existing Planning Mechanism(s) through which Action Will Be Implemented: There is an existing reoccurring multidisciplinary meeting in which partner organizations meet to discuss the safety and well-being of vulnerable county residents as well as high intensity users of services.

Responsible Office/Partners: Public Health, Fire, Police, Sheriff, Behavioral Health, Red Cross, APS/CPS Units

Benefits (Losses Avoided): Avoid exacerbation of existing conditions due to complications related to vulnerable populations. The mitigation of specialized need reduces the strain placed on EMS services and first responders that are responding to primary incidents.

Potential Funding: FEMA disaster funding: HMGP, HHAP Funds,

Timeline: Within 5 years

Project Priority (H, M, L): M

Action 8. Vulnerable Population Planning (with a focus on Access and Functional Needs)

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5

Issue/Background: Vulnerable populations are disproportionately affected by emergencies and disasters than the rest of the population. This occurs for various reasons depending on the hazard and the individual. Colusa County has a history of being underserved in regards to services available and community based organizations.

Project Description: This project will coordinate with various AFN services providers and independent living center organizations to increase capacity and subject matter expertise. It will also facilitate an AFN disaster work group. This work group would support county efforts to support vulnerable populations during disasters.

Other Alternatives: Set-up subcommittee from an already active work group in the county.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Utilize Colusa County Partners for Heath, Healthcare Coalition and Emergency Medical Care Committee to make connections with service providers.

Responsible Office/Partners: DHHS

Benefits (Losses Avoided): Improved community resilience to disasters. Enhanced County coordination and response specific to vulnerable populations during an emergency or disaster.

Potential Funding: CASPHI

Timeline: July 1, 2026

Project Priority (H, M, L): M

Action 15. Migrant Center Improvements/House Vulnerable Populations During Disaster

Hazards Addressed: Multi-hazard (Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds), Climate Change, Dam Failure, Drought & Water shortage, Earthquake, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Cold and Freeze, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning), Severe Weather: High Winds and Tornados, Stream Bank Erosion, Subsidence, Wildfire)

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: The County operates a 100-unit Migrant Farm Housing. These units were intended to be used during the summer months by migrant farm workers. Due to their seasonal use, the units were not built with heating. They only had evaporative cooling to each unit. This prevented them from being used for habitation in the winter months.

Project Description: In 2022, the BOS entered into an agreement with HCD-OMS to provide improvements to the aging Migrant Center. These improvements included Central Heating and Air to all 100 units. This allowed them to be used in the winter months for emergency housing situations. They need to be maintained year-round.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: HCD-OMS agreement.

Responsible Office/Partners: Agreement between property owner and operator (Colusa County) and the CA HCD-OMS building owner and funding authority for the Migrant Center Program.

Benefits (Losses Avoided): Provides housing for vulnerable populations during emergency situations.

Potential Funding: HCD-OMS funding for capital improvement and infrastructure to their buildings.

Timeline: Continual maintenance

Project Priority (H, M, L): Low

A.8.7. Public Meeting #3 Handouts for Public

COLUSA COUNTY
2024 LOCAL HAZARD MITIGATION PLAN (LHMP)
FINAL PUBLIC MEETING
August 14, 2024

Participating Jurisdictions

- Colusa County*
- City of Colusa*
- City of Williams*
- Colusa County RCD
- Cortina Community Services District
- Kletsel Dehe Wintun Nation
- Reclamation District 108*
- RD 479
- Sacramento River West Side Levee District*

* Participated in 2018 Colusa County LHMP

Hazards List

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change
- Dam Failure
- Drought & Water Shortage (with tree mortality)
- Earthquake (and subhazards)
- Flood: 1%/0.5%/0.2%
- Flood: Localized Stormwater Flooding
- Landslide, Mudslide, and Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold and Freeze (with snow)
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Wind, Hail, Lightning)
- Severe Weather: High Winds and Tornadoes
- Stream Bank Erosion
- Subsidence
- Wildfire (with smoke/air quality)

Mitigation Strategy: Colusa County Planning Area Goals

Goal 1: Minimize risk and vulnerability of Colusa County to natural hazards (including climate change considerations) and protect lives and prevent losses to property, public health, economy, and the environment

- Provide protection for existing and future development
- Provide protection for critical facilities, infrastructure, and services and minimize disruptions
- Provide protection for natural resources
- Reduce the number of emergency incidents
- Consider future impacts of climate change in natural hazard mitigation
- Foster an economy that promotes and values a proactive approach to mitigation
- Preserve the functionality of property, economy, and commerce, that may be affected by infrastructure vulnerability

Goal 2: Increase community/public outreach, education, and awareness for all hazards to minimize hazard-related losses

- Increase public awareness of hazard risk, vulnerability, and mitigation
- Enhance outreach and education of community members to promote a hazard resilient community
- Educate citizens and farmers on water conservation methods to provide protection from future hazard events and build support for water storage projects
- Educate and increase awareness and understanding of migrant and other transient residents on hazards and natural hazard mitigation
- Increase education and awareness and ensure adequate resources among historically underserved populations, individual with access and functional needs, and populations impacted by natural hazards and disasters

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

- Increase communities' capabilities to respond to increased climate impacts, (e.g., legislation, education, projects)
- Make better use of technology to predict and mitigate damage
- Increase the use of shared resources and multi-agency efforts
- Continued improvements to emergency services and public safety capabilities
- Increase participation by all County entities and agencies operating in Colusa County in disaster planning activities to improve hazard awareness, intra-and inter-agency communications, mitigation action implementation, and coordinated response and recovery efforts
- Enhance Tribal coordination for disasters
- Maintain Colusa County communities' eligibility for FEMA grant funding and other FEMA programs

Goal 4: 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

- Increase education, outreach, and awareness of natural hazards and disasters and ensure adequate resources with a focus on the whole community

- Reduce hazard risk and vulnerability and increase disaster resilience through the equitable and accessible planning and implementation of hazard mitigation actions and priorities
- Enhance natural hazard mitigation strategies to protect the most rural, vulnerable areas

Goal 5: Improve community resiliency to flooding in Colusa County

- Reduce the flood risk and vulnerability in Colusa County
- Reduce life safety issues, property loss, and damages associated with flooding
- Reduce flooding adjacent to streams, residential areas, and areas with critical infrastructure
- Improve stream flow to reduce bank erosion
- Maintain/improve flood protection and control measures, including maintenance and improvements to the levee systems, to minimize future flood related impacts and damages

Goal 6: Continue to protect and promote Colusa County agriculture by ensuring safe and effective farming practices that protect the citizens and environment and that minimize future hazard related losses

- Reduce the impacts to and loss of agricultural resources from natural hazards and disasters
- Support and implement water projects that replenish the aquifer, increase available agricultural water during critical times of need for local crops, and ensure a consistent water supply and distribution to County residents.
- Educate County citizens as to how they can help protect Colusa's agriculture from noxious weeds and pests
- Work with local farmers to keep canals, ditches, and streambeds clear of debris reducing downstream flooding and other impacts

Mitigation Strategy: Colusa County Planning Area Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Colusa County					
Multi-Hazard Actions					
Action 16. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 17. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	Previous Action	X	X	X	Public Education
Action 18. Alert and Warning System for Sheriff's Office and Public Health	New Action	X	X		Emergency Services
Action 19. Technology Enhancements to Support Hazard Mitigation Planning and Project Implementation and for use in Disaster Preparedness, Response, and Recovery Efforts (e.g., GIS Application Enhancements)	New Action	X	X	X	Prevention Public Information Emergency Services Property Protection
Action 20. Vulnerable Population Planning	New Action	X	X		Prevention Public Information Emergency Services
Action 21. Update 211 system	New Action	X	X		Emergency Services
Action 22. Coordinate with the American Red Cross (ARC) for Mass Care Planning	New Action	X	X		Prevention Public Information Emergency Services
Action 23. Vulnerable Population Planning (with a focus on Access and Functional Needs)	New Action	X	X		Prevention Public Information Emergency Services
Action 24. Coordination with Community Based Organizations	New Action	X	X		Prevention Public Information Emergency Services
Action 25. Public Education and Community Outreach Countywide	Previous Action	X	X		Public Education
Action 26. Enhance Tribal Coordination for Disasters	New Action	X	X		Prevention Emergency Services
Action 27. Generator Purchases to Enhance Project Power for Colusa County	New Action	X	X	X	Emergency Services Property Protection
Action 28. EOP Update & Implementation	New Action	X	X		Prevention Emergency Services

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 29. Evacuation Planning Countywide	Previous Action	X	X		Emergency Services
Action 30. Migrant Center Improvements/House Vulnerable Populations During Disaster					
Agricultural Hazards: Severe Weather/Invasive Species (Pests and Weeds)					
Action 31. Pest and Rodent Prevention Project for Infrastructure Protection	New Action	X	X		
Action 32. Development of Ordinance and Zoning to Limit/Manage Pest Introduction into Colusa County	New Action	X	X		
Action 33. Abandoned Agricultural Lands Pest Management (joint with RCD)	New Action	X	X		
Climate Change Actions					
Action 34. Climate Change Mitigation Adaptation Action Plan	New Action	X	X	X	Prevention
Action 35. Climate-smart Agricultural Planning (joint with RCD)	New Action	X	X		
Dam Failure Actions					
Action 36. Continue Communication about Dam Safety and Awareness County-wide	New Action	X	X	X	Prevention Public Information Emergency Services
Action 37. Dam Failure Mitigation, Education, and Awareness	Previous Action	X	X	X	Prevention Public Information Emergency Services
Drought and Water Shortage Actions					
Action 38. Groundwater Recharge (joint with RCD)	New Action	X	X		
Action 39. Invasive Species Removal from Waterways (joint with RCD)	New Action	X	X		
Action 40. Irrigation Efficiency Technical Assistance (joint with RCD)	New Action	X	X		
Action 41. On-farm Water Storage Projects (joint with RCD)	New Action	X	X		
Earthquake Actions					
Action 42. NEED					
Flood, Localized Flood, Levee Failure, and Heavy Rains and Storm Actions					
Action 43. Flood ordinance updates		X	X	X	Prevention

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 44. Localized Stormwater Management and Streambank Erosion Mitigation (joint with RCD)	New Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 45. Princeton Storm Water Drainage Assessment	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Landslide, Mudslide, and Debris Flow					
Action 46. NEED					
Severe Weather Actions					
Action 47. Sheltering for unhoused (winter weather)	New Action	X	X		Prevention Emergency Services
Action 48. Sheltering for Unhoused (Extreme Heat)	New Action	X	X		Prevention Emergency Services
Action 49. Severe Weather Plan Update	New Action	X	X	X	Prevention Emergency Services
Subsidence Actions					
Action 50. NEED					
Wildfire Actions					
Action 51. Beetle-killed Tree Removal (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 52. Update and Implement Community Wildfire Protection Plan (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 53. Colusa County Fire Mitigation Plan of 2024 Implementation (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
Action 54. Colusa County Fire Safe Council (joint with RCD)	New Action	X	X		Natural Resource Protection Prevention Property Protection
City of Colusa					
Action 55. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 56. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	New Action	X	X	X	Public Education

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 57. Evacuation Training for the Community of Colusa	New Action				Emergency Services
Action 58. Fire and sanitation water is needed in case of emergency in the City of Colusa during a drought	New Action	X	X		Prevention Emergency Servies Property Protection
Action 59. URM Mapping and Identification	Previous Action	X	X		Prevention Property Protection
Action 60. Project improvements to Decrease Flooding	New Action	X	X	X	Property Protection Structural Projects
Action 61. Levee Mitigation	New Action	X	X	X	Property Protection Structural Projects
Action 62. Colusa Basin Drain	New Action	X	X	X	Property Protection Structural Projects
City of Williams					
Action 63. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Previous Action	X	X		Prevention
Action 64. Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness	New Action	X	X		Public Information
Action 65. Aquifer Recharge Project	New Action	X	X		Property Protection Natural Resource Protection
Action 66. Storm Drain Master Plan	Previous Action	X	X	X	Property Protection Structural Projects Natural Resource Protection
Action 67. Salt Creek Erosion Control	New Action	X	X	X	Property Protection Natural Resource Protection
Action 68. Underground Powerlines	New Action	X	X		Property Protection Structural Projects
Action 69. Healthy Trees Program	New Action	X	X		Property Protection Natural Resource Protection
Colusa County RCD					
Action 70. Abandoned Agricultural Lands Pest Management	New Action	X	X		Property Protection Natural Resource Protection
Action 71. Beetle-killed Tree Removal	New Action	X	X		Property Protection Natural Resource Protection
Action 72. Climate Action Plan	New Action	X	X	X	Prevention

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 73. Climate-smart Agricultural Planning	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 74. Update and Implement Community Wildfire Protection Plan	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 75. Colusa County Fire Mitigation Plan of 2024 Implementation	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 76. Colusa County Fire Safe Council	New Action	X	X		Prevention Property Protection Natural Resource Protection
Action 77. Groundwater Recharge	New Action	X	X		Property Protection Natural Resource Protection
Action 78. Invasive Species Removal from Waterways	New Action	X	X	X	Property Protection Natural Resource Protection
Action 79. Irrigation Efficiency Technical Assistance	New Action	X	X		Property Protection Natural Resource Protection
Action 80. Localized Stormwater Management and Streambank Erosion Mitigation	New Action	X	X	X	Property Protection Natural Resource Protection
Action 81. On-farm Water Storage Projects	New Action	X	X		Property Protection Natural Resource Protection
Cortina Community Services District					
Action 82. Armor the Salt Creek Bank	New Action	X	X	X	Property Protection Natural Resource Protection
Kletsel Dehe Wintun Nation					
Action 83. Update Cortina Rancheria Climate Change Adaptation Plan (2017)	New Action	X	X	X	Prevention
Action 84. Water Tank	New Action	X	X		Property Protection Structural Project
Action 85. Emergency Generator	New Action	X	X		Emergency Services Property Protection
Action 86. Improve Erosion Control Management Practices	New Action	X	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 87. Secondary Evacuation Route	New Action	X	X		Emergency Services
Action 88. Fuel Reduction and Defensible Space Projects	New Action	X	X		Property Protection Natural Resource Protection
Action 89. Enhanced Mapping and Assessing Rancheria Vulnerability to Hazards	New Action	X	X		Prevention Emergency Services Property Protection
Action 90. Public Education and Outreach	New Action	X	X	X	Public Information
RD 108					
Action 91. Emergency Generator Maintenance and Upkeep - District Office	Previous Action	X	X	X	Emergency Services Property Protection
Action 92. Emergency Generator - Pump Stations	Previous Action	X	X	X	Emergency Services Property Protection
Action 93. Stabilization of Colusa Basin Drain Levee	Previous Action	X	X	X	Property Protection Structural Projects
RD 479					
Action 94. RD 479 Integrity Preservation	New Action	X	X	X	Property Protection Structural Projects
Sacramento Westside Levee District					
Action 95. Seepage Mitigation of Sacramento River Levee	Previous Action	X	X	X	Property Protection Structural Projects
Action 96. Hardening of Sacramento River Levee	Previous Action	X	X	X	Property Protection Structural Projects

Appendix B References

2010 Colusa County General Plan Background Report

2012 Colusa County General Plan

2012 Sacramento River Individual Agency Summary Reports

2017 California Adaptation Planning Guide

2018 Colusa County Hazard Mitigation Plan

2020 US Census Bureau Average Household Size

2020-2028 Colusa County Housing Element

2021 California Climate Adaptation Study

2021 Colusa County Community Wildfire Protection Plan

2021 Colusa County Groundwater Sustainability Report

2023 Colusa County Parcel/Assessor Data

2023 Fire Plan

2023 State of California Hazard Mitigation Plan

2024 Colusa County Flood Insurance Study

2030 Colusa County General Plan Land Use Element

Cal Adapt – Extended Drought Scenarios

CAL FIRE (FHSZ SRA 2024, FRA & LPA 2007)

CAL FIRE Fire History (4/13/2018)

CAL FIRE Wildfire History Database

Cal-Adapt

Cal-Adapt – Number of Extreme Heat Days by Year

Cal-Adapt – Precipitation: Decadal Averages Map

Cal-Adapt – Temperature: Decadal Averages Map

Cal-Atlas

California Climate Adaptation Strategy

California Department of Conservation

California Department of Conservation, Office of Mine Reclamation

California Department of Finance

California Department of Fish and Wildlife Service

California Department of Parks and Recreation Office of Historic Preservation

California Department of Public Health

California Department of Water Resources

California Department of Water Resources (CA DWR) Special Populations and Disadvantaged Community Mapping

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 Department of Water Resources Groundwater Information Center

California Division of Mines and Geology

California Environmental Protection Agency (Cal EPA) Disadvantaged Communities

California Geological Survey

California Invasive Plant Council

California Natural Diversity Database

California Natural Resource Agency

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California's Drought of 2007-2009, An Overview. State of California Natural Resources Agency, California Department of Water Resources.

Center for Disease Control (CDC) Social Vulnerability Index

Climate Change and Health Profile Report – Colusa County

Climate Change Impacts in the United States

Colusa County Agricultural Commissioner

Colusa County Agricultural Commissioner Crop Reports (2018-2023)

Colusa County Building Department and Planning Department

Colusa County Digital Flood Insurance Rate Map

Colusa County Emergency Management

Colusa County Emergency Operations Plan

Colusa County Flood Insurance Study

Colusa County General Plan Background Report

Colusa County Geographic Information Services

Colusa County GIS

Colusa County Housing Element

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Federal Emergency Management Agency – Wind Zones in the United States

Federal Emergency Management Agency: Building Performance Assessment: Oklahoma and Kansas Tornadoes

Federal Emergency Management Agency: Multi-Hazard Identification and Risk Assessment.

FEMA Community Disaster Resilience Zones

FEMA Disaster Declaration Database

FEMA National Risk Index

Galloway, Jr Dr. Gerald E. Levees in History: The Levee Challenge. Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR.

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HMPC input

Intergovernmental Panel on Climate Change

Levees in History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR

LFPZ BAM (2023)

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 Flood Insurance Program

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

National Integrated Drought Information System

National Inventory of Dams

National Levee Database

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

Public Policy Institute of California. If drought continues: Environment and poor rural communities most likely to suffer. [press release].

Science Magazine

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State of California Department of Conservation Farmland Mapping and Monitoring Program

Susceptibility to Deep-Seated Landslides map – CSG Map Sheet 58 (05/2011)

Underwood, E. Models predict longer, deeper US droughts. Science, 347(6223) 707 DOI: 10.1126/science.347.6223.707. 2015.

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US Army Corps of Engineers

US Bureau of Reclamation

US Census Bureau

US Department of Agriculture

US Department of Agriculture – Farm Service Agency Secretarial Disasters Declarations

US Department of Transportation Pipeline and Hazardous Materials Safety Administration

US Drought Monitor

US Farm Service Agency

US Fish and Wildlife Service

US Forest Service

US Geological Survey – Biological Resource Division

US Geological Survey – Volcanic Ash: Effect & Mitigation Strategies

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 Open File Report 2015-3009

US Geological Survey Publication 2014-3120

US Natural Resource Conservation Service

USA Today

USGS Quaternary Faults 03/24

Vaisala National Lightning Detection Network

Western Regional Climate Center

Appendix C Mitigation Strategy

Colusa County
Local Hazard Mitigation Plan (LHMP) Update
HMPC Meetings #3 & #4 - Mitigation Strategy
April 24 & 25, 2024

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AGENDA

Colusa County
Local Hazard Mitigation Plan (LHMP) Update
HMPC Meetings #3 & #4
Mitigation Strategy

Wednesday April 24, 2024 (1:00 - 4:00 pm)
Thursday April 25, 2024 (9:00 am - 12:00 pm)

Colusa County Sheriff's Office
929 Bridge St.
Colusa, CA 95932

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. Questions

Mitigation Strategy Meetings
April 24 & 25, 2025
Day 1

Status of the 2024 Colusa 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

LHMP Meetings

- **April 24** (Wednesday) HMPC Meeting #3 (Mitigation Strategy: Goals Development) (1:00-4:00 pm)
- **April 25** (Thursday) HMPC Meeting #4 (Mitigation Strategy: Actions and Projects) (9:00 am -12:00 pm)
- **August 14** (Wednesday) Final Public Meeting #3 (6:00-7:30 pm)
- **August 15** (Thursday) HMPC Meeting #5 (9:00 am -12:00 pm)

Mitigation Strategy Meetings - Follow up

- **May 8 (**Wednesday**)** Mitigation Strategy (goals/actions) processed and sent to Colusa/HMPC
- **May 31** (Friday) Mitigation Action (Project) Worksheets and edits/refinement to draft Goals and Objectives due to Foster Morrison

LHMP Document Drafts

- **June 7** (Friday): HMPC (First) Draft LHMP to Colusa/HMPC
- **June 28** (Friday): Colusa/HMPC comments due on Draft Plan
- **July 12** (Friday): Comments incorporated into Public Review (Second) Draft to Colusa/HMPC
- **July 17** (Wednesday): Public Review Draft on County's LHMP website
- **August 21** (Wednesday**):** All Colusa, HMPC, and Public input to Foster Morrison
- **August 30 (Friday):** All final comments incorporated and LHMP submittal to Cal OES – August 2024

*HMPC = Hazard Mitigation Planning Committee

Colusa County Hazard Identification & Profiles

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	Extensive	Highly Likely	Catastrophic	High	Medium
Climate Change	Extensive	Highly Likely	Limited	Medium	–
Dam Failure	Extensive	Occasional	Catastrophic	High	Medium
Drought & Water shortage	Extensive	Likely	Critical	High	High
Earthquake	Extensive	Likely /Unlikely	Critical	Medium	Low
Floods: 1%/0.2% annual chance	Extensive	Occasional / Unlikely	Catastrophic	High	Medium
Floods: Localized Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, and Debris Flow	Limited	Likely	Limited	Medium	Medium
Levee Failure	Extensive	Occasional	Catastrophic	High	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: High Winds and Tornados	Extensive	Highly Likely / Occasional	Limited	Medium	Low
Stream Bank Erosion	Significant	Highly Likely	Limited	Medium	Medium
Subsidence	Limited	Likely	Limited	Medium	Low
Wildfire	Significant	Highly Likely	Critical	High	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 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 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: Colusa County 2024 LHMP

Agricultural Hazard: Severe Weather/Invasive Species

- Most agricultural disasters in Colusa County are associated with severe weather events, including heavy rains, floods, heat, freeze, and drought. Insects and noxious weeds are also a concern.
- 19 USDA disaster declarations from 2012-2023. 14 related to drought; 3 for freezing temperatures, and 2 for severe weather, including rains, high winds, cold temperatures.
- The recent drought noted the following drought related impacts to Ag impacts:
  - ✓ Rice production value dropped 80%
  - ✓ Overall crop values fell by $394,739,000
  - ✓ Over 350,000 acres of farmland fallowed in the Sacramento Valley
  - ✓ Water allocations cut to 18% of contracted amounts
- Record low temperatures for 5 days in February 2022 resulted in 65% overall crop loss to area growers. Extreme late season high temperatures in fall of 2022 impacted the growing season for walnuts, resulting in an unmarketable product.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

Climate Change

- The 2023 State of California Hazard Mitigation Plan stated that climate change is clearly 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. The number, magnitude, and severity of hazard events and disasters are significantly increasing resulting in catastrophic events. Climate Change has the potential to significantly alter the nature and frequency of most hazards.
- The atmospheric river events of the last couple of years have been significant.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

Dam Failure

- Based on DSOD and NID data, there are 6 dams in Colusa County with a potential to impact the Planning Area: East Park (High), Funks (Low), Rainbow Diversion (Low), Rancho Rubini (High), Upper Letts (High), and York Hill (Low).
- 9 additional dams are located in other counties with dam inundation areas in Colusa County: Oroville (Extremely High), Shasta (High), Whiskeytown (High), Black Butte (High), Davis Creek (High), Indian Valley (Extremely High), Lake Almonor (Extremely High), Thermalito (Extremely High). The failure of a dam may affect the dam site, downstream areas, floodwater routing, or all three.

- Past dam events include the Oroville spillway event in 2017. Impacts included evacuees coming in to Colusa. Had the dam failed, Colusa would have seen inundation as well. It was also noted that the County is trying to get the East Park dam (really just a stock pond?) off the official dam list – status?
- Likelihood of Future Occurrence: Occasional
- Vulnerability: Extremely High
- Priority Hazard

Drought and Water Shortage

- The County has been mostly in and out of drought since 2014. Historical drought data for the Colusa County Planning Area and region indicate there have been 5 significant droughts in the last 86 years.
- 2 federal (1977, 2014) disaster declarations for Colusa County since 1950. In addition, there have been 14 USDA drought disaster declarations since 2012. There have been 58 NCDC drought events in Colusa County, almost all related to events in the 2014 to 2023 drought. In addition, the Colusa County EOC was activated 3 times during the most recent drought: 2015, 2017, 2019.
- During periods of drought, wells have gone dry, ag industry has been significantly affected.
- The 2010 General Plan Background Report, and the 2021 Colusa County Groundwater Sustainability Report noted that water supplied to Colusa County comes from two sources: groundwater and surface water. All domestic water systems in the County are supplied with groundwater, while most irrigation systems are supplied with surface water from the Tehama-Colusa or Glenn-Colusa Canals, the Colusa Drain, or the Sacramento River. The surface water supplies available for use in Colusa County are significant.
- Likelihood of Future Occurrence: Drought - Likely/Water supply - Occasional
- Vulnerability: High
- Priority Hazard

Earthquake

- The General Plan Background Report noted that there are no known active faults within the County; however, the area could experience considerable ground shaking generated by faults outside Colusa County. The Great Valley Fault is an inferred fault in the County.
- The USGS National Seismic Hazard Maps provides acceleration and probabilities for various time periods. This data indicates that the expected severity of earthquakes in the region is mostly low to moderate, with areas in the southwest corner of the County in the higher range.
- 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: Extremely High
- Priority Hazard

Flood Hazards

100/500 year

- Historically, portions of Colusa County have always been at risk to flooding because of its annual percentage of rainfall in the winter and the number of watercourses that traverse the County. Flooding

in Colusa County results from prolonged heavy rainfall over tributary areas during the period from November through March. The 2024 FIS noted that as a result of limited channel capacities, agricultural lands along the Colusa Basin Drain have experienced relatively frequent flooding.

- Of the 28 state and 21 federal declarations from 1950-present– 18 state and 17 federal declarations were for heavy rains, storms, and flooding. 4 federal disaster declarations (2 in 2023 and 2 in 2019) have occurred since the previous LHMP. 14 NCDC events related to flood from 1993 to 2023. 6 EOC activations from flood and storms from 2008 to 2023.
- Likelihood of Future Occurrence: 100-Occasional; 500-Unlikely
- Vulnerability: Extremely High
- Priority Hazard

Localized/Stormwater Flooding

- Significant localized flood history in the County – occurs annually
- Need localized flood problem areas identified for each jurisdiction
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Landslides, Mudslides, and Debris Flows

- The General Plan Background Report noted that the landslide susceptibility in the eastern half of the County is generally low. A north-south band of moderate landslide potential stretches from East Park Reservoir south to the Bear Valley. Only the northwestern portion of the county is within a sub-region of high landslide susceptibility. This area of high susceptibility is almost entirely within the boundaries of the Mendocino National Forest.
- The HMPC noted that many areas in southwest Colusa County are also rated high in their susceptibility to landslide due to erosive soils, and from hydrophobic soils from past wildfire burn scars.
- In Colusa County, landslides generally occur where there is very little population or infrastructure.
- There have been no disaster declarations associated with landslides in Colusa County. The NCDC contains no records of landslides in the County.
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Levee Failure

- Agricultural and flood control levees have been constructed in many areas of Colusa, mostly on the eastern side of the County. Many of the agricultural levees only provide protection from the 5 to 20 year flood events. While flood control levees generally provide greater protection. Multiple agencies have levee ownership and responsibility in the County.
- All levees have been deaccredited as part of the new effective DFIRMs.
- No disaster declarations associated with levee failures; the NCDC does not identify any levee failure events. The previous LHMP noted levee issues during storm events in 2017, 2015, and 1978 floods.
- Likelihood of Future Occurrence: Occasional
- Vulnerability: Extremely High
- Priority Hazard

Severe weather

Extreme Cold and Freeze

- Annual occurrences of cold temperatures. Monthly average minimum temperatures from November through April range from the mid-30s to mid-40s. The lowest recorded daily extreme was 14°F on December 15 and 16, 2022. In a typical year, minimum temperatures fall below 32°F on 25.1 days with no days falling below 0°F.
- The County has had 1 past federal (1991) and 2 past state (1972, 1990) disaster declarations for extreme cold and freeze. NCDC did not identify any extreme cold or freeze events. USDA events include 3 associated with freezing temperatures.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Extreme Heat

- Annual occurrences of hot temperatures. Monthly average maximum temperatures in the warmest months (May through October) range from the mid-70s to the low 90s. The highest recorded daily extreme was 113°F on August 9, 1978. In a typical year, maximum temperatures exceed 90°F on 88.9 days.
- 38 extreme heat events (NCDC) since 1993. No state or federal disaster declarations.
- From the last LHMP, the HMPC did indicate that between 2014 and 2016, some trees within the County experience Sudden Limb Drop which can occur during hot weather.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Heavy rains and storms (Hail, Lightning)

- Significant County history: annual occurrences.
- Significant County history: annual occurrences. Average annual precipitation in Colusa County is 16.22 inches per year. The highest recorded annual precipitation is 35.68 inches in 1983; the highest recorded precipitation for a 24-hour period is 3.56 inches on February 2, 1998. The lowest recorded annual precipitation was 4.20 inches in 1976.
- There have been 18 state and 17 federal disaster declarations since 1950 for flooding, including heavy rains and storms.
- The NCDC data recorded 30 hail, heavy rain, and winter weather incidents for Colusa County since 1950. Winter weather events tend to be rain in the lower elevations of the County, while relatively rare, snow can fall in the upper elevations. No incidents of lightning were found in the NCDC database. The USDA had 2 events since 2012 related to heavy rains and storms.
- County EOC activated 5 times for heavy rains and storms and associated flooding: 2008, 2010, 2011, 2012, and 2017.
- Severe storms/heavy rains are the primary cause of most major flooding.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

High Winds and Tornadoes

- Annual occurrences.
- No state or federal disaster declarations from high winds or tornadoes.
- The NCDC data recorded 31 high wind and 4 tornado incidents for Colusa County since 1950. All tornado events were EF0 intensities.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Stream Bank Erosion

- Stream bank erosion processes are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Stream bank erosion occurs on rivers, streams, and other moving waterways in the County.
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Subsidence

- Land subsidence is defined as the sinking of the land over man-made or natural underground voids.
- There are two primary causes of subsidence in the County: subsidence from groundwater pumping and the settling of the ground over abandoned mine workings.
- Likelihood of Future Occurrence: Occasional
- Vulnerability: Medium
- Non-Priority Hazard?

Wildfire

- Wildfires occur on an annual basis in the Colusa County Planning Area.
- The General Plan indicates that wildfires are a minor threat to the Colusa County Planning Area, based on historical data, and input from area fire departments.
- Any ignition has the potential to become an out of control wildfire. But, due to terrain, fuels (vast ag land), and location of built environment and populations, wildfire risk had not been a significant concern in the County until more recently.
- 1 state disaster declarations for Wildfire in 1987; 13 NCDC wildfire events.
- Recent fires in affecting Colusa include: 2018 Pawnee Fire (15,197 total acres; 43 acres in Colusa); 2018 Ranch Fire (410,202 total acres; 73,721 acres in Colusa); 2020 Hennessey Fire (305,352 total acres; 1,465 acres in Colusa); 2020 August Complex Fire (1,032,700 acres; 51 acres in Colusa). Smoke and air quality were also issues associated with these and other regional fires.
- Colusa County has their first Community Wildfire Protection Plan (2021 CWPP) and is considering establishing a Fire Safe Council as wildfire becomes more of a concern to the County Planning Area.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

Data Needs

Review of Key Items to date:

- Hazard-specific data
  - ✓ Hazard ID tables **– due by 12/8/23 (City of Colusa and RD 479 still need to provide Hazard ID table)**
  - ✓ Historic Hazard Worksheets or list of past hazard occurrences and impact to jurisdiction **– due by 12/8/23 (will need to have past occurrences/hazard events in everyone's Annexes for their Priority Hazards)**
- Risk Assessment Worksheets **– due by 3/15/24 (Need for City of Colusa and RD 479 and parts of County, Others?)**

Other Data Items:

- Logos for each participating jurisdiction
- Photos, Photos, Photos

Colusa County Priority Hazards (by Jurisdiction)

Colusa County

Priority Hazards:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Flood: 1%/0.2% annual chance
- Flood: Localized/Stormwater
- Landslide, Mudslide, Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Severe Weather: High Winds and Tornadoes
- Stream Bank Erosion
- Subsidence
- Wildfire

Non-Priority Hazards:

-
-
-
-

City of Colusa ???

Priority Hazards:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Flood: 1%/0.2% annual chance
- Flood: Localized/Stormwater
- Landslide, Mudslide, Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Severe Weather: High Winds and Tornadoes
- Stream Bank Erosion
- Subsidence
- Wildfire

Non-Priority Hazards:

-
-
-
-

City of Williams

Priority Hazards:

- Climate Change
- Drought & Water Shortage
- Earthquake
- Flood: 1%/0.2% annual chance
- Flood: Localized/Stormwater
- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Stream Bank Erosion

Non-Priority Hazards:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Dam Failure
- Landslide, Mudslide, Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: High Winds and Tornadoes
- Subsidence
- Wildfire

Colusa County Resource Conservation District ???

Priority Hazards:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change
- Drought & Water Shortage
- Flood: Localized/Stormwater
- Landslide, Mudslide, Debris Flow
- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Stream Bank Erosion
- Subsidence
- Wildfire

Non-Priority Hazards:

- Dam Failure
- Earthquake
- Flood: 1%/0.2% annual chance
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: High Winds and Tornadoes

Cortina Community Services District

Priority Hazards:

- Flood: 1%/0.2% annual chance
- Flood: Localized/Stormwater
- Landslide, Mudslide, Debris Flow
- Stream Bank Erosion

Non-Priority Hazards:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Severe Weather: High Winds and Tornadoes
- Subsidence
- Wildfire

Kletsel Dehe Wintun Nation

Priority Hazards:

- Climate Change
- Drought & Water Shortage
- Landslide, Mudslide, Debris Flow
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Stream Bank Erosion
- Wildfire

Non-Priority Hazards:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Dam Failure
- Earthquake
- Flood: 1%/0.2% annual chance
- Flood: Localized/Stormwater
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: High Winds and Tornadoes
- Subsidence

RD 108

Priority Hazards:

- Flood: 1%/0.2% annual chance
- Flood: Localized Stormwater
- Levee Failure

Non-Priority Hazards:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Landslide, Mudslide, Debris Flow
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat

- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Severe Weather: High Winds and Tornadoes
- Stream Bank Erosion
- Subsidence
- Wildfire
-

RD 479 ???

Priority Hazards:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Flood: 1%/0.2% annual chance
- Flood: Localized/Stormwater
- Landslide, Mudslide, Debris Flow
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Severe Weather: High Winds and Tornadoes
- Stream Bank Erosion
- Subsidence
- Wildfire

Non-Priority Hazards:

-
-
-
-

Sacramento River West Side Levee District

Priority Hazards:

- Flood: 1%/0.2% annual chance
- Flood: Localized Stormwater
- Levee Failure

Non-Priority Hazards:

- Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)
- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Landslide, Mudslide, Debris Flow
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Severe Weather: High Winds and Tornadoes
- Stream Bank Erosion
- Subsidence
- Wildfire

Mitigation Strategy: Goals

The most important element of the LHMP is the resulting mitigation strategy which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy is comprised of three components:

1. Mitigation Goals
2. Mitigation Actions
3. 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 2024 Colusa County Local Hazard Mitigation Plan Update. From this information, a Risk Assessment has been developed that describes the risk and vulnerability of the Colusa County Planning Area to identified hazards and includes an assessment of the area's current capabilities for countering these threats through existing policies, regulations, programs, and projects.

This analysis identifies areas where improvements could or should be made. Formulating Goals will 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 Colusa County Planning Area more disaster resistant.

Mitigation Goals are general guidelines that represent the community'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 Plans
- Stormwater Program and Plans
- Flood/Levee/Watershed Management Plans and Studies
- Drought Plans, Urban/Integrated Regional Water Management Plans
- Earthquake Studies
- 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 the Colusa County General Plan Safety Element, 2012

Goal SA-1: Ensure the safety of County residents, businesses, and visitors from hazardous conditions, including natural catastrophes and human-caused emergencies.

Objectives:
SA 1-A: Ensure that Colusa County is prepared to provide an organized response to natural and human-caused emergencies
SA 1-B: Ensure that planning and development procedures identify and mitigate potential hazards
SA 1-C: Reduce risks to human life and property from seismic and geologic hazards.
SA 1-D: Take appropriate steps to reduce the risks to life, property, and public services associated with flooding
SA 1-E: Strive to maintain an adequate system of levees that provide flood protection to areas throughout the County
SA 1-F: Reduce risks to life and property from dam inundation
SA 1-G: Minimize risks to human life and property from fire in both developed and undeveloped areas of the County
SA 1-H: Minimize risks to residents and the environment from hazardous materials and waste
SA 1-I: Protect lives and property from hazards associated with airport operations

Goals from the Colusa County Emergency Operations Plan (EOP), 2016

Operational Goals: During the response phase, the agencies that are charged with responsibilities in this plan should focus on the following five goals:

- Mitigate hazards.
- Meet basic human needs.
- Address needs of People with Access and Functional Needs (PAFN).
- Restore essential services.
- Support community and economic recovery.

Operational Priorities: Operational priorities govern resource allocation and the response strategies for the County of Colusa and its political subdivisions during an emergency. Below are operational priorities addressed in this plan:

- **Save Lives** – The preservation of life is the top priority of emergency managers and first responders and takes precedence over all other considerations.
- **Protect Health and Safety** – Measures should be taken to mitigate the emergency's impact on public health and safety.
- **Protect Property** – All feasible efforts must be made to protect public and private property and resources, including critical infrastructure, from damage during and after an emergency.
- **Preserve the Environment** – All possible efforts must be made to preserve California's environment and protect it from damage during an emergency.

2021 Colusa County Community Wildfire Protection Plan (CWPP)

1) reduce the risk of catastrophic wildfire and promote ecosystem health and

2) reduce home losses and provide for the safety of residents and firefighters during wildfire events.

To achieve these equal goals the Colusa County CWPP was developed with the follow objectives in mind:

- Assist stakeholders and communities in identifying and prioritizing areas for hazardous fuel reduction treatments on federal lands and in determining the types and methods of treatment that, if completed, would reduce the risk to the communities.
- Assist stakeholders, communities and landowners in identifying and prioritizing areas for voluntary hazardous fuel reduction treatments on private lands utilizing either public or private project dollars.
- This assistance also includes determining the types and methods of treatment that, if completed, would reduce the risk to the private lands and communities.
- In a collaborative manner and using an array of local stakeholders, execute a Countywide CWPP process that assesses fire related ecosystems and addresses fire related issues and needs on a landscape basis, regardless of political and administrative boundaries.
- Obtain agreement on the contents of the Plan by local and state fire agencies.
- Provide comprehensive wildland fire planning and prioritization of project work that focuses on the protection of at-risk communities and watersheds, or that implement recommendations developed in the planning process and listed in the CWPP.
- Develop a mechanism for federal agencies to provide leadership in the fire planning process that provide meaningful consideration to community priorities, and incorporate these federal efforts in the CWPP.
- Open community debate regarding management options.
- Provide communities with maximum flexibility for determining the substance and detail of their plans.
- Merge the goals and objectives of the landowners with the needs and expectations of the community regarding fire risk reduction.
- Coordinate fire protection strategies across property boundaries.
- Improve the natural environmental systems found in Colusa County that have developed within fire based landscapes, including: improved forage and habitat for wildlife and livestock; increased stream flows and ground water yields; and development of more natural ecosystems containing native plants that have adapted to fire.
- Protection of lands whose primary purpose is for the production of environmental resources, including recreational opportunities.
- Protection of lands whose primary purpose is related to agriculture production.
- Provide funding priority to projects and activities identified in the CWPP and coordinate grant
- funding and federal program budgets necessary to achieve the most effective results utilizing limited funding.
- Assist in the identification and federal listing of newly identified communities at risk of wildfire.
- Identify structures at risk from wildfire.

Colusa County Goals from Previous 2018 LHMP (This is what we are updating)

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

- Provide protection for existing and future development
- Provide protection for critical facilities, infrastructure, and services and minimize disruption

- Prevent repetitive losses and reoccurring damages from happening

Goal 2: Increase community/public outreach, education, and awareness for all hazards to minimize hazard-related losses

- Improve the understanding of Colusa County residents, business owners, and visitors to hazards of concern and how to effectively be prepared and take action to mitigate the impacts of future hazard events

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
- Increase participation by all County entities and agencies operating in Colusa County in disaster planning activities to improve hazard awareness, intra-and inter-agency communications, mitigation action implementation, and coordinated response and recovery efforts

Goal 4: Improve community resiliency to flooding in Colusa County

- Reduce the flood risk and vulnerability in Colusa County
- Reduce life safety issues, property loss, and damages associated with flooding
- Minimize impact of heavy rains and localized flooding
- Maintain/improve flood protection and control measures, including maintenance and improvements to the levee systems, to minimize future flood related impacts and damages

Goal 5: Continue to protect and promote Colusa County agriculture by ensuring safe and effective farming practices that protect the citizens and environment and that minimize future hazard related losses

- Support water projects that increase available agricultural water during critical times of need for local crops while ensuring a consistent water supply and distribution to County residents.
- Educate County citizens as to how they can help protect Colusa's agriculture from noxious weeds and pests

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 County 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 Colusa County 2024 LHMP. Provided above are 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.

You will each be given 3 sticky notes. On each note you will write what you think the goals for this Colusa County 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
April 24 & 25, 2024
Day 2

Mitigation Strategy Action Development: Ground Rules

Rule 1: Each Participating Jurisdiction 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/or within jurisdictional annexes. Note: this might necessitate backfilling the hazard risk assessment data.

Rule 3: The Mitigation Actions/Projects for this 2024 LHMP should reflect each Participating Jurisdictions' 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 2024 LHMP.

Rule 5: While the updated Mitigation Strategy should include all potential Mitigation Actions/Projects for each Participating Jurisdiction (regardless of funding source), keep in mind that no jurisdiction is 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 Department or Agency. This applies to Mitigation Actions/Projects being carried forward from each Jurisdictions' previous LHMPs.

Rule 7: Each Participating Jurisdiction CAN LATER include Mitigation Actions/Projects that might not get identified during this Mitigation Action/Project Prioritization process – the key is to complete a Mitigation Action Worksheet for any project to be included in the LHMP prior to submittal to Cal OES/FEMA.

REMEMBER: Having a FEMA approved LHMP for your Jurisdiction is a prerequisite for being eligible to apply for FEMA pre and post mitigation funding.

Mitigation Strategy: Actions

Mitigation Actions are specific projects and activities that help achieve the 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:

4. Avoidance: setting construction projects back from the stream.
5. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
6. 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 Colusa County LHMP (This is what we are updating)

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update
Colusa County				
All Hazard Actions				
Action 1.Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Action 2.Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness				
Action 3.Access to Locked Gate on Green Rd.				
Action 4.Backup Generator				
Action 5.Alert and Warning System for Sheriff's Office				
Action 6.Generator Purchases to Enhance Project Power for Colusa County				
Action 7.Hard Road Closure Mechanisms, River Road				
Action 8.Conduct Evacuation and Shelter Planning for All Communities Countywide				
Agricultural Hazards Actions				
Action 9.Domestic Pets and Livestock Plan review and update				
Climate Change Actions				
Action 10. Climate Change Mitigation Activities and Education				
Dam Failure Actions				
Action 11. Ensure Communication about Dam Safety and Awareness Countywide				
Drought & Water Shortage Actions				
Action 12. Drought Tolerance and Resilience Project County-wide, including Public Education				
Earthquake Actions				
Action 13. Earthquake Vulnerability Study and Retrofitting of County Assets				
Flood, Localized Flood, Heavy Rain and Storms Actions				
Action 14. Corbin Road Repair				
Action 15. Seepage Mitigation, East Clay Street, Colusa (between city and county)				
Action 16. Highway 20 Flood Prevention				
Action 17. Repair and Enhance Banks at Indian Creek in Lodoga				
Action 18. Lone Star Road Flood-Prevention				
Action 19. Powell Slough Phase II				
Action 20. Repair and Enhance Banks at Salt Creek in Arbuckle				
Action 21. San Jose Road Elevation Project				
Action 22. Colusa County Storm Water Plan Update				

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update
Action 23. Lurline Avenue Culvert Replacement Project				
Action 24. Lonestar Road Culvert Project				
Action 25. Sandbagging Training for county and city personnel; purchase Sandbagging Stations				
Action 26. Leesville Road elevation project, Williams				
Action 27. Princeton Drainage Assessment and Revision				
Flooding, Landslide, High Winds Actions				
Action 28. Goat Mountain Road Erosion Control Project				
Action 29. Fouts Springs Road Drainage Modification and Erosion Control Project				
Action 30. Brim Road Drainage Modification and Erosion Control Project				
Action 31. Cook Springs Road Drainage Modification and Erosion Control Project				
Action 32. Sites Lodoga Road Drainage Modification and Erosion Control Project				
Action 33. Lodoga Stonyford Road Drainage Modification and Erosion Control Project				
Action 34. Ground Surface Soil Stabilization, Western Colusa County in Burn Scar Areas				
Hazardous Materials Actions				
Action 35. Hazardous Materials Area Response Plan Evaluation and Update				
Levee Failure, Flood, Localized Flooding, and Streambank Erosion				
Action 36. Flood Risk Reduction Project for the Unincorporated Town of Princeton				
Action 37. Flood Risk Reduction Project for the City of Colusa				
Action 38. Flood Risk Reduction Project for the Unincorporated Town of Grimes				
Action 39. Map and Assess County-wide Vulnerability to Riverbank Erosion				
Action 40. Seepage Mitigation Projects Countywide				
Action 41. Levee Repair- Rip Rap Maintenance				
Levee Failure and Agricultural Pests and Diseases Actions				
Action 42. Public Awareness Campaign and Weed Abatement Patrols for Squirrel Population Management				
Action 43. Public Awareness Campaign and Weed Abatement Patrols for Soil Absorption Effectiveness				
Severe Weather: Extreme Cold and Freeze Actions				
Action 44. Evaluate Extreme Cold Plan (Including Damage Mitigation; Winter Storm, High Wind and Freeze Communication Actions)				

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update
Subsidence (with Drought and Flood) Actions				
Action 45. Map and Assess Countywide Vulnerability to Subsidence				
Action 46. Surface Water Storage Project Countywide				
Wildfire Actions				
Action 47. Maintain Defensive Space				
Action 48. Fire Fuel Modification and Defensible Space Projects				
Action 49. Wildfire Mitigation				
Wildfire and Drought Actions				
Action 50. 50,000 Gallon Water Tank				
City of Colusa Actions				
All Hazard Actions				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Earthquake Actions				
URM Mapping and Identification				
Flood, Localized Flood, and Heavy Rain and Storms Actions				
Central City Flood Hazard Mitigation Project				
City of Williams Actions				
All Hazard Mitigation Actions				
Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Drought and Water Shortage Actions				
Action 2. Develop Drought Program Plan				
Earthquake Actions				
Action 3. EQ Vulnerability Study and Retrofit of City Assets				
Flood: 100/200/500; Localized Flooding; Levee Failure; Stream Bank Erosion, Heavy Rains and Storms Actions				
Action 4. Levee Construction				
Action 5. Hwy 99W and Hwy 20 Flood Wall or Similar Construction				
Action 6. Detention Basin Construction				
Action 7.Improve Stormwater Management Planning				
RD 108 Actions				
All Hazard Actions				
Emergency Generator – District Office				
Drought and Water Shortage Actions				
Groundwater Wells				
Climate Change, Flood, Localized Flood, Dam Failure, Levee Failure, Streambank Erosion, Heavy Rains and Storms, Winds and Tornado Actions				

Action Title	Complete	Ongoing	Not Yet Started	In 2024 Update
Emergency Generator – Pump Stations				
Stabilization of Colusa Basin Drain Levee				
Hardening of Colusa Basin Drain Levee				
Invasive Species Removal in Canals				
Sacramento River West Side Levee District Actions				
Climate Change, Flood, Localized Flood, Dam Failure, Levee Failure, Heavy Rains and Storms, High Winds, Stream Bank Erosion Actions				
Seepage Mitigation of Sacramento River Levee				
Hardening of Sacramento River Levee				

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.

Colusa County
Mitigation Action Worksheet

Jurisdiction:	
Mitigation Action/Project Title:	
Hazards Addressed:	
Issue/Background:	
Project Description:	
Other Alternatives:	
Existing Planning Mechanism(s) through which Action will be implemented:	
Responsible Office/Partners:	
Cost Estimate:	
Benefits (Losses Avoided):	
Potential Funding:	
Timeline:	
Project Priority (H, M, L):	

Worksheet completed by:	
Name and Title:	
Phone:	

Meetings – Action Prioritization

Actions sorted by Hazard with Prioritization Voting Totals

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
All	1. Enhance Public Education and Outreach program for all hazards (priority and non-priority)/with community preparedness efforts and leveraging of public events	Multi-Hazard	46
	2. Ensure back up power is in place for key critical facilities and infrastructure (e.g.., generators, batteries, solar, etc.)	Multi-Hazard	9
	3. Migrant housing center improvements/updates to accommodate vulnerable populations during disasters	Multi-Hazard	3
	4. Coordinate with MACC and ministerial community within Colusa County to address disasters and vulnerable populations	Multi-Hazard	5
	5. Coordinate with Red Cross for mass care planning	Multi-Hazard	2
	6. Vulnerable population planning	Multi-Hazard	4
	7. Install hard road closure infrastructure	Multi-Hazard	21
	8. Evacuation planning	Multi-Hazard	6
	9. Alert and Warning project, w/technology enhancements	Multi-Hazard	35
	10. Update 211 system	Multi-Hazard	14
	11. Enhance Tribal Coordination for Disasters	Multi-Hazard	15
	12. Technology enhancements to support hazard mitigation planning and project implementation and for use in disaster preparedness, response, and recovery efforts (e.g., GIS application enhancements)	Multi-Hazard	N/A*
County/ Cities	13. EOP Update and Implementation	Multi-Hazard	8
	14. Pests (Rodent) Prevention projects for infrastructure protection	Agricultural Hazards	15
	15. Development of zoning or other ordinance to limit/manage the introduction of pests into Colusa County	Agricultural Hazards	10
	16. Midge Fly infestation mitigation projects (e.g., sewer treatment plants)	Agricultural Hazards	15
County/ Cities	17. Develop Climate Change Adaptation/Action Plans	Climate Change	46
County/ Cities	18. Develop Climate Change Vulnerability Assessments	Climate Change	11
County/ Cities	19. Enhance/Update hydrology parameters to accommodate future conditions	Climate Change	6

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	20. Sites Reservoir, 1.5 acre feet of storage	Dam Failure	60
	21. Continue coordination efforts with dam owners on EAPs and inundation mapping	Dam Failure	15
	22. Dam failure education and awareness	Dam Failure	1
	23. Drought tolerance and resilience project countywide, including public education	Drought & Water Shortage	5
	24. Activate drought task force	Drought & Water Shortage	4
	25. Recharge project on westside, Arbuckle and surrounding areas	Drought & Water Shortage	13
	26. Sites reservoir project: 1.5 million acre feet storage	Drought & Water Shortage	50
	27. Flood diversion and recharge (advisory board)	Drought & Water Shortage	8
	28. Update and implement emergency household water tank program	Drought & Water Shortage	3
	29. Williams reverse well planning and implementation project	Drought & Water Shortage	6
	30. Implement projects in Groundwater Sustainability Plan	Drought & Water Shortage	24
	31. Public Education/Outreach on water usage (conservation measures, drought resistant landscaping, etc.)	Drought & Water Shortage	13
	32. Implement water projects/recharge opportunities that protect and replenish water supplies	Drought & Water Shortage	NA*
	33. URM inventory and assessment of other EQ vulnerable buildings	Earthquake	10
	34. Assessment and hardening of critical facilities and infrastructure to EQ	Earthquake	2
	35. Colusa County Office of Education building (10th & Fremont) retrofit project	Earthquake	4
	36. Corbin Road Repair	Flood: All	0
	37. Seepage Mitigation, East Clay Street, Colusa (between city and county)	Flood: All	0
	38. Mitigation of Hwy 20 flood issues	Flood: All	30
	39. Lone Star Road flood prevention/mitigation	Flood: All	8
	40. Salt Creek area flood repairs/mitigation	Flood: All	15
	41. Road Elevation projects (San Jose, others?)	Flood: All	11

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
County/ Cities	42. Stormwater master plan update and implementation	Flood: All	3
	43. Storm drain ditch installation (Wildwood, others?)	Flood: All	5
	44. Princeton Stormwater drainage project	Flood: All	3
	45. Mitigation of road erosion issues (Pests, water) (Green Bay Road, Arbuckle; Other areas?)	Flood: All	10
	46. Road drainage projects	Flood: All	12
	47. Pipelines and other underground infrastructure mitigation projects	Flood: All	5
Cortina CSD	48. Stormwater retention pond expansion	Flood: All	5
Williams	49. Salt Creek flood mitigation	Flood: All	10
County/ Cities	50. Flood ordinance updates	Flood: All	4
	51. Upper watershed flood management projects	Flood: All	9
	52. Creek/Drainage clearance projects	Flood: All	0
	53. Updated FIRM rollout/Education	Flood: All	6
	54. Stream bank erosion projects	Flood: All/ Stream Bank Erosion	24
	55. Imp off stream storage projects	Flood: All/ Levee Failure	40
	56. DWR flood fight methods training	Flood: All/ Levee Failure	0
RD 108/ Others?	57. Install emergency generators at pump stations and District office	Levee Failure	9
RD 108/ Others?	58. Hardening and stabilization of Colusa Basin Drain levee	Levee Failure	2
	59. Invasive species, rodent, and other pests removal in drainage areas	Levee Failure	4
	60. Countywide levee rip-rap projects	Levee Failure	5
RD 479/ Others?	61. Bank stabilization projects in Arbuckle and other areas as needed	Levee Failure	11
Sac River/ Others?	62. Sacramento River (and countywide) levee seepage mitigation	Levee Failure	35
Sac River/ Others?	63. Sacramento River levee hardening	Levee Failure	9

Agency/ Department	Mitigation Action Title	Hazards Addressed	Votes (Points)
	64. Landslide mitigation and erosion control of Leesville Road, Stonyford, Ladoga areas	Landslide, Mudslide, Debris Flow	0
	65. Sheltering for unhoused (winter weather, extreme heat)	Severe Weather	10
	66. Update Severe Weather Plan	Severe Weather	4
	67. Mitigation/management of crop damage/ hazardous trees	Severe Weather	16
	68. Implement subsidence mitigation projects from Groundwater Sustainability Plan	Subsidence	39
	69. Update and Implement the projects from the new 2021 CWPP	Wildfire	23
	70. Establish a countywide Fire Safe Council at County	Wildfire	17
	71. Fuels management/modification/reduction projects	Wildfire	20
	72. Defensible space inspection projects	Wildfire	11
	73. Defensible space/Property Hardening Assistance Plan/Education for lower income vulnerable populations	Wildfire	9
	74. Air Curtain Incinerator	Wildfire	24
	75. Wildfire mitigation prevention/restoration program for abandoned agricultural lands	Wildfire	13
	76. Continue to strengthen and enforce vegetation management ordinances	Wildfire	7
	77. Vegetation/tree management/fuel break projects for open space areas and trails	Wildfire	20
	78. Establish/enhance ignition resistant hardening requirements for new development	Wildfire	6
	79. Establish and enforce illegal fireworks ordinance	Wildfire	7

Appendix D Adoption Resolution

Note to Reviewers: When this plan has been reviewed and approved pending adoption by FEMA Region IX, the adoption resolutions will be signed by each participating jurisdiction and added to this appendix. Two model resolutions are 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.

Two resolutions were created – one for the County and incorporated communities and one for the Special Districts and Tribe.

Sample Incorporated Community Adoption Resolution

(LOCAL GOVERNMENT: City)

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)

Sample Special District Adoption Resolution

(LOCAL GOVERNMENT: Special Districts)

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).

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 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.

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 Colusa County

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Animals - Amphibians					
Rana boylii	foothill yellow-legged frog	None	Candidate Threatened	SSC	–
Rana draytonii	California red-legged frog	Threatened	None	SSC	–
Spea hammondii	western spadefoot	None	None	SSC	–
Animals - Birds					
Accipiter cooperii	Cooper's hawk	None	None	WL	–
Accipiter gentilis	northern goshawk	None	None	SSC	–
Aquila chrysaetos	golden eagle	None	None	FP ; WL	–
Buteo swainsoni	Swainson's hawk	None	Threatened	-	–
Elanus leucurus	white-tailed kite	None	None	FP	–
Haliaeetus leucocephalus	bald eagle	Delisted	Endangered	FP	–
Pandion haliaetus	osprey	None	None	WL	–
Eremophila alpestris actia	California horned lark	None	None	WL	–
Branta hutchinsii leucopareia	cackling (=Aleutian Canada) goose	Delisted	None	-	–
Ardea alba	great egret	None	None	-	–
Ardea herodias	great blue heron	None	None	-	–
Botaurus lentiginosus	American bittern	None	None	-	–
Egretta thula	snowy egret	None	None	-	–
Ixobrychus exilis	least bittern	None	None	SSC	–
Nycticorax nycticorax	black-crowned night heron	None	None	-	–
Charadrius montanus	mountain plover	None	None	SSC	–
Pica nuttalli	yellow-billed magpie	None	None	-	–
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Threatened	Endangered	-	–
Melospiza melodia	song sparrow	None	None	SSC	–
Falco mexicanus	prairie falcon	None	None	WL	–
Falco peregrinus anatum	American peregrine falcon	Delisted	Delisted	FP	–
Riparia riparia	bank swallow	None	Threatened	-	–
Agelaius tricolor	tricolored blackbird	None	Candidate Endangered	SSC	–
Lanius ludovicianus	loggerhead shrike	None	None	SSC	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Icteria virens	yellow-breasted chat	None	None	SSC	–
Setophaga petechia	yellow warbler	None	None	SSC	–
Phalacrocorax auritus	double-crested cormorant	None	None	WL	–
Asio flammeus	short-eared owl	None	None	SSC	–
Asio otus	long-eared owl	None	None	SSC	–
Athene cunicularia	burrowing owl	None	None	SSC	–
Strix occidentalis caurina	northern spotted owl	Threatened	Threatened	SSC	–
Plegadis chihi	white-faced ibis	None	None	WL	–
Animals - Crustaceans					
Branchinecta lynchi	vernal pool fairy shrimp	Threatened	None	–	–
Linderiella occidentalis	California linderiella	None	None	–	–
Lepidurus packardi	vernal pool tadpole shrimp	Endangered	None	–	–
Animals - Fish					
Lavinia exilicauda exilicauda	Sacramento hitch	None	None	SSC	–
Mylopharodon conocephalus	hardhead	None	None	SSC	–
Pogonichthys macrolepidotus	Sacramento splittail	None	None	SSC	
Hysterocarpus traski traski	Sacramento-San Joaquin tule perch	None	None	–	–
Spirinchus thaleichthys	longfin smelt	Candidate	Threatened	SSC	–
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Threatened	None	–	–
Oncorhynchus tshawytscha pop. 13	chinook salmon - Central Valley fall / late fall-run ESU	None	None	SSC	–
Oncorhynchus tshawytscha pop. 30	chinook salmon - upper Klamath and Trinity Rivers ESU.	None	None	SSC	–
Oncorhynchus tshawytscha pop. 6	chinook salmon - Central Valley spring-run ESU	Threatened	Threatened	–	–
Oncorhynchus tshawytscha pop. 7	chinook salmon - Sacramento River winter-run ESU	Endangered	Endangered	–	–
Animals - Insects					
Bombus crotchii	Crotch bumble bee	None	None	–	–
Trachykele hartmani	serpentine cypress wood-boring beetle	None	None	–	–
Cicindela hirticollis abrupta	Sacramento Valley tiger beetle	None	None	–	–
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Threatened	None	–	–
Paracoenia calida	Wilbur Springs shore fly	None	None	–	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Ochthebius recticulus	Wilbur Springs minute moss beetle	None	None	–	–
Saldula usingeri	Wilbur Springs shorebug	None	None	–	–
Animals - Mammals					
Vulpes vulpes patwin	Sacramento Valley red fox	None	None	–	–
Perognathus inornatus	San Joaquin Pocket Mouse	None	None	–	–
Martes caurina humboldtensis	Humboldt marten	None	Candidate Endangered	SSC	–
Pekania pennanti	fisher - West Coast DPS	None	Threatened	SSC	–
Taxidea taxus	American badger	None	None	SSC	–
Antrozous pallidus	pallid bat	None	None	SSC	–
Corynorhinus townsendii	Townsend's big-eared bat	None	None	SSC	–
Lasionycteris noctivagans	silver-haired bat	None	None	–	–
Lasiurus blossevillii	western red bat	None	None	SSC	–
Lasiurus cinereus	hoary bat	None	None	–	–
Myotis ciliolabrum	western small-footed myotis	None	None	–	–
Myotis evotis	long-eared myotis	None	None	–	–
Myotis lucifugus	little brown bat	None	None	–	–
Myotis volans	long-legged myotis	None	None	–	–
Myotis yumanensis	Yuma myotis	None	None	–	–
Animals - Mollusks					
Anodonta californiensis	California floater	None	None	–	–
Anodonta oregonensis	Oregon floater	None	None	–	–
Gonidea angulata	western ridged mussel	None	None	–	–
Animals - Reptiles					
Masticophis flagellum ruddocki	San Joaquin coachwhip	None	None	SSC	–
Emys marmorata	western pond turtle	None	None	SSC	–
Thamnophis gigas	giant gartersnake	Threatened	Threatened	–	–
Community - Terrestrial					
–	Coastal and Valley Freshwater Marsh	None	None	–	–
–	Great Valley Cottonwood Riparian Forest	None	None	–	–
–	Great Valley Mixed Riparian Forest	None	None	–	–
–	Great Valley Willow Scrub	None	None	–	–
–	Northern Claypan Vernal Pool	None	None	–	–
–	Serpentine Bunchgrass	None	None	–	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
–	Valley Needlegrass Grassland	None	None	–	–
–	Wildflower Field	None	None	–	–
Plants - Vascular					
Chlorogalum pomeridianum var. minus	dwarf soaproot	None	None	–	1B.2
Allium fimbriatum var. purdyi	Purdy's onion	None	None	–	4.3
Lomatium hooveri	Hoover's lomatium	None	None	–	4.3
Asclepias solanoana	serpentine milkweed	None	None	–	4.2
Anisocarpus scabridus	scabrid alpine tarplant	None	None	–	1B.3
Balsamorhiza macrolepis	big-scale balsamroot	None	None	–	1B.2
Calycadenia micrantha	small-flowered calycadenia	None	None	–	1B.2
Centromadia parryi ssp. parryi	pappose tarplant	None	None	–	1B.2
Centromadia parryi ssp. rudis	Parry's rough tarplant	None	None	–	4.2
Erigeron greenei	Greene's narrow-leaved daisy	None	None	–	1B.2
Harmonia hallii	Hall's harmonia	None	None	–	1B.2
Helianthus exilis	serpentine sunflower	None	None	–	4.2
Hesperevax caulescens	hogwallow starfish	None	None	–	4.2
Lasthenia ferrisiae	Ferris' goldfields	None	None	–	4.2
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	None	None	–	1B.1
Layia septentrionalis	Colusa layia	None	None	–	1B.2
Senecio clevelandii var. clevelandii	Cleveland's ragwort	None	None	–	4.3
Trichocoronis wrightii var. wrightii	Wright's trichocoronis	None	None	–	2B.1
Azolla microphylla	Mexican mosquito fern	None	None	–	4.2
Amsinckia lunaris	bent-flowered fiddleneck	None	None	–	1B.2
Cryptantha excavata	deep-scarred cryptantha	None	None	–	1B.1
Hackelia amethystina	amethyst stickseed	None	None	–	4.3
Streptanthus barbiger	bearded jewelflower	None	None	–	4.2
Streptanthus drepanoides	sickle-fruit jewelflower	None	None	–	4.3
Silene campanulata ssp. campanulata	Red Mountain catchfly	None	Endangered	–	4.2
Atriplex cordulata var. cordulata	heartscale	None	None	–	1B.2
Atriplex depressa	brittlescale	None	None	–	1B.2
Atriplex persistens	vernal pool smallscale	None	None	–	1B.2
Extriplex joaquinana	San Joaquin spearscale	None	None	–	1B.2
Calystegia collina ssp. oxyphylla	Mt. Saint Helena morning-glory	None	None	–	4.2
Carex klamathensis	Klamath sedge	None	None	–	1B.2

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Arctostaphylos malloryi	Mallory's manzanita	None	None	–	4.3
Arctostaphylos manzanita ssp. elegans	Konocti manzanita	None	None	–	1B.3
Acmispon rubriflorus	red-flowered bird's-foot-trefoil	None	None	–	1B.1
Astragalus breweri	Brewer's milk-vetch	None	None	–	4.2
Astragalus clevelandii	Cleveland's milk-vetch	None	None	–	4.3
Astragalus rattanii var. jepsonianus	Jepson's milk-vetch	None	None	–	1B.2
Astragalus rattanii var. rattanii	Rattan's milk-vetch	None	None	–	4.3
Astragalus tener var. ferrisiae	Ferris' milk-vetch	None	None	–	1B.1
Lupinus antoninus	Anthony Peak lupine	None	None	–	1B.2
Lupinus milo-bakeri	Milo Baker's lupine	None	Threatened	–	1B.1
Lupinus sericatus	Cobb Mountain lupine	None	None	–	1B.2
Juglans hindsii	Northern California black walnut	None	None	–	1B.1
Fritillaria agrestis	stinkbells	None	None	–	4.2
Fritillaria glauca	Siskiyou fritillaria	None	None	–	4.2
Fritillaria pluriflora	adobe-lily	None	None	–	1B.2
Fritillaria purdyi	Purdy's fritillary	None	None	–	4.3
Hesperolinon drymarioides	drymaria-like western flax	None	None	–	1B.2
Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	None	None	–	1B.2
Iliamna bakeri	Baker's globe mallow	None	None	–	4.2
Malacothamnus helleri	Heller's bush-mallow	None	None	–	3.3
Sidalcea keckii	Keck's checkerbloom	Endangered	None	–	1B.1
Sidalcea oregana ssp. hydrophila	marsh checkerbloom	None	None	–	1B.2
Calyptridium quadripetalum	four-petaled pussypaws	None	None	–	4.3
Clarkia gracilis ssp. tracyi	Tracy's clarkia	None	None	–	4.2
Epilobium nivium	Snow Mountain willowherb	None	None	–	1B.2
Botrychium crenulatum	scalloped moonwort	None	None	–	2B.2
Piperia leptopetala	narrow-petaled rein orchid	None	None	–	4.3
Castilleja rubicundula var. rubicundula	pink creamsacs	None	None	–	1B.2
Chloropyron palmatum	palmate-bracted salty bird's-beak	Endangered	Endangered	–	1B.1
Cordylanthus tenuis ssp. brunneus	serpentine bird's-beak	None	None	–	4.3
Eschscholzia rhombipetala	diamond-petaled California poppy	None	None	–	1B.1

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Erythranthe nudata	bare monkeyflower	None	None	–	4.3
Antirrhinum subcordatum	dimorphic snapdragon	None	None	–	4.3
Neostapfia colusana	Colusa grass	Threatened	Endangered	–	1B.1
Puccinellia simplex	California alkali grass	None	None	–	1B.2
Collomia diversifolia	serpentine collomia	None	None	–	4.3
Eriastrum tracyi	Tracy's eriastrum	None	Rare	–	3.2
Leptosiphon acicularis	bristly leptosiphon	None	None	–	4.2
Navarretia jepsonii	Jepson's navarretia	None	None	–	4.3
Navarretia leucocephala ssp. bakeri	Baker's navarretia	None	None	–	1B.1
Navarretia nigelliformis ssp. nigelliformis	adobe navarretia	None	None	–	4.2
Navarretia nigelliformis ssp. radians	shining navarretia	None	None	–	1B.2
Navarretia paradoxinota	Porter's navarretia	None	None	–	1B.3
Eriogonum nervulosum	Snow Mountain buckwheat	None	None	–	1B.2
Eriogonum tripodum	tripod buckwheat	None	None	–	4.2
Eriogonum umbellatum var. bahiiforme	bay buckwheat	None	None	–	4.2
Heteranthera dubia	water star-grass	None	None	–	2B.2
Androsace elongata ssp. acuta	California androsace	None	None	–	4.2
Delphinium uliginosum	swamp larkspur	None	None	–	4.2
Myosurus minimus ssp. apus	little mousetail	None	None	–	3.1
Horkelia bolanderi	Bolander's horkelia	None	None	–	1B.2
Galium andrewsii ssp. gatense	phlox-leaf serpentine bedstraw	None	None	–	4.2
Brodiaea rosea	Indian Valley brodiaea	None	Endangered	–	1B.1

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 Colusa County Planning Area Critical Facilities

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Colusa	X	X	–	–	Other Areas	Urban Unzoned	0	Shallow: <3ft
School	After School Program	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Mobile Home Park	Buttes View Mobile Home Park	At Risk Population Facilities	City of Colusa	X	X	–	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft
Mobile Home Park	Colusa County Fair Grounds	At Risk Population Facilities	City of Colusa	X	X	–	X	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft
Jail	Colusa County Jail	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Colusa Garden Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Moderate	0	Shallow: <3ft
Apartment Complex	Colusa Green Apartments	At Risk Population Facilities	City of Colusa	X	X	–		Other Areas	Urban Unzoned	0	Shallow: <3ft
School	Colusa High School	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
School	Colusa Infant Center	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
School	Colusa Kindergarten	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Assisted-Living	Colusa Medical Center Convalescent Center	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Hotel or Motel	Colusa Motel	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Hotel or Motel	Colusa Riverside Inn	At Risk Population Facilities	City of Colusa	X	X		X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Mobile Home Park	Colusa Sacramento River State Park (currently closed)	At Risk Population Facilities	City of Colusa	X	X	X	X	1% Annual Chance Flood Hazard	Non-Wildland/Non-Urban	0	–
Apartment Complex	DelRey Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Moderate	0	Shallow: <3ft
Apartment Complex	Devonshire Apartments	At Risk Population Facilities	City of Colusa	X	X	–	–	Other Areas	Urban Unzoned	0	Shallow: <3ft
Mobile Home Park	Downtown Mobile Home Park	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
School	Egling Middle School	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Senior Living Facility	Eskaton Frank Jaconetti Senior Housing	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Mobile Home Park	Highstreet Trailer Park	At Risk Population Facilities	City of Colusa	X	X	X	X	1% Annual Chance Flood Hazard	Moderate	0	Shallow: <3ft
School	James M. Burchfield Primary School	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Main Street Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
School	Our Lady of Lourdes	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Poolside Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Rancho Colus Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Non-Wildland/Non-Urban	0	Shallow: <3ft
Apartment Complex	Riverbend Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Squire Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
School	Teacher Resource Center	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Townhouse Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Townhouse Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Townhouse Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Townhouse Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Apartment Complex	Townhouse Apartments	At Risk Population Facilities	City of Colusa	X	X	–	X	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Apartment Complex	[Unknown]	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Mobile Home Park	Almond Grove Mobile Home Park	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Hotel or Motel	Capri Motel	At Risk Population Facilities	City of Williams	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–
School	Child Care Development	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Hotel or Motel	El Rancho Motel	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Hotel or Motel	Granzella's Inn	At Risk Population Facilities	City of Williams	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–
Mobile Home Park	I-5 RV Park	At Risk Population Facilities	City of Williams	–	–	–	–	1% Annual Chance Flood Hazard	Non-Wildland/Non-Urban	0	–

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Senior Living Facility	Mirsona Manor	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Hotel or Motel	Motel 6	At Risk Population Facilities	City of Williams	–	–	–	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	–
Apartment Complex	Pinewood Court	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Apartment Complex	Pinewood Manor	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Hotel or Motel	Quality Inn	At Risk Population Facilities	City of Williams	–	–	–	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	–
Hotel or Motel	Ramada Inn	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Hotel or Motel	Stage Stop Inn	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Senior Living Facility	Stony Creek Apartments	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Non-Wildland/Non-Urban	0	–
Hotel or Motel	Traveler's Inn	At Risk Population Facilities	City of Williams	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Senior Living Facility	Valley West Convalescent Hospital	At Risk Population Facilities	City of Williams	–	–	–		Other Areas	Urban Unzoned	0	–
School	Williams Elementary School	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
School	Williams Junior Senior High School	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
School	Williams Middle School	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Migrant Housing	Williams Migrant Family Farm Housing	At Risk Population Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Mobile Home Park	[Unknown]	At Risk Population Facilities	Unincorporated Colusa County	X	X	X	X	1% Annual Chance Flood Hazard	Non-Wildland/Non-Urban	0	–
Apartment Complex	[Unknown]	At Risk Population Facilities	Unincorporated Colusa County	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Alexander Center Apartments	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–
School	Arbuckle Alternative High	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
School	Arbuckle Elementary School	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–
Mobile Home Park	Arbuckle Mobile Home	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–
Casino	Colusa Casino	At Risk Population Facilities	Unincorporated Colusa County	X	X	X	–	Other Areas	Non-Wildland/Non-Urban	0	Shallow: <3ft
Hotel or Motel	Colusa Casino Resort	At Risk Population Facilities	Unincorporated Colusa County	X	X	X	–	Other Areas	Non-Wildland/Non-Urban	0	Shallow: <3ft
Mobile Home Park	Colusa Landing	At Risk Population Facilities	Unincorporated Colusa County	X	X	X	X	1% Annual Chance Flood Hazard	Non-Wildland/Non-Urban	0	–
Mobile Home Park	Colusa Mobile Home Park	At Risk Population Facilities	Unincorporated Colusa County	X	X	X	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Apartment Complex	Creekview Apartments	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	–
School	Grand Island Elementary School	At Risk Population Facilities	Unincorporated Colusa County	–	X	–	–	Other Areas	Urban Unzoned	0	Shallow: <3ft

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Mobile Home Park	Grimes Boat Landing	At Risk Population Facilities	Unincorporated Colusa County	–	X	–	X	1% Annual Chance Flood Hazard	Non-Wildland/Non-Urban	0	–
School	Johnson Junior High School	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–
Mobile Home Park	Lambertville/Clarkville Duck Club	At Risk Population Facilities	Unincorporated Colusa County	–	X	X	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	–
Apartment Complex	Mac's Cabins	At Risk Population Facilities	Unincorporated Colusa County	–	X	–	–	Other Areas	Urban Unzoned	0	Shallow: <3ft
School	Maxwell Elementary School	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	–
School	Maxwell High School	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	Other Areas	Urban Unzoned	0	–
Mobile Home Park	Maxwell Mobile Home & RV Park	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	–
School	Pierce Joint Union High School	At Risk Population Facilities	Unincorporated Colusa County	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Apartment Complex	Princeton Cabins	At Risk Population Facilities	Unincorporated Colusa County	X	X	X	–	1% Annual Chance Flood Hazard	Non-Wildland/Non-Urban	0	Shallow: <3ft
School	Princeton Elementary School	At Risk Population Facilities	Unincorporated Colusa County	X	X	X	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft
School	Princeton Junior/Senior High School	At Risk Population Facilities	Unincorporated Colusa County	X	X	X	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft
Mobile Home Park	Princeton Trailer Park	At Risk Population Facilities	Unincorporated Colusa County	X	X	X	–	1% Annual Chance Flood Hazard	Moderate	0	Shallow: <3ft
Mobile Home Park	Wards Boat Landing	At Risk Population Facilities	Unincorporated Colusa County	X	X	–	X	1% Annual Chance Flood Hazard	Non-Wildland/Non-Urban	0	–
Public Services	City of Colusa, Public Works Department	Essential Services Facilities	City of Colusa	X	X		X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Public Services	Colusa County Airport	Essential Services Facilities	City of Colusa	X	X	–	–	1% Annual Chance Flood Hazard	Moderate	0	Shallow: <3ft
Public Services	Colusa County Department of Public Works	Essential Services Facilities	City of Colusa	X	X	X	X	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Police Station	Colusa County Sheriff's Office	Essential Services Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Fire Station	Colusa Fire Department	Essential Services Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Medical	Colusa Medical Center	Essential Services Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Utility Facility	Colusa Wastewater Treatment Plant	Essential Services Facilities	City of Colusa	X	X	X	X	Other Areas	Non-Wildland/Non-Urban	0	Shallow: <3ft
Utility Facility	McNary Moore Mortuary Services	Essential Services Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Fire Station	Sacramento River Fire Protection District	Essential Services Facilities	City of Colusa	X	X	–	X	Other Areas	Urban Unzoned	0	Shallow: <3ft
Emergency Response	Sierra Sacramento Valley Emergency Medical Services Agency	Essential Services Facilities	City of Colusa	X	X	X	X	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft
Utility Facility	City of Williams - Wastewater Treatment Plants	Essential Services Facilities	City of Williams	–	–	–	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	–
Public Services	City of Williams, Department of Public Works	Essential Services Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Emergency Response	Enloe Colusa Ambulance	Essential Services Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Fire Station	Williams Fire Protection Authority	Essential Services Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Emergency Response	Sierra Sacramento Valley Emergency Medical Services Agency	Essential Services Facilities	City of Williams	–	–	–	–	Other Areas	Urban Unzoned	0	–
Fire Station	Arbuckle College City Fire Protection District	Essential Services Facilities	Unincorporated Colusa County	–	–	–	–	Other Areas	Urban Unzoned	0	–
Utility Facility	Arbuckle Public Utility District	Essential Services Facilities	Unincorporated Colusa County	–	–	–	–	0.2% Annual Chance Flood Hazard	Urban Unzoned	0	–
Fire Station	CDF Leesville Station	Essential Services Facilities	Unincorporated Colusa County	–	–	–	–	Other Areas	Very High	VII	–
Fire Station	CDF Wilbur Springs Station	Essential Services Facilities	Unincorporated Colusa County	–	–	–	–	Other Areas	Very High	III	–
Utility Facility	Colusa Power	Essential Services Facilities	Unincorporated Colusa County	–	–	–	–	Other Areas	Non-Wildland/Non-Urban	0	–
Native American Reservation	Cortina Rancheria	Essential Services Facilities	Unincorporated Colusa County	–	–	–	–	Other Areas	Moderate	V	–
Fire Station	Maxwell Fire Protection District	Essential Services Facilities	Unincorporated Colusa County	–	–	–	–	Other Areas	Urban Unzoned	0	–
Utility Facility	Maxwell Irrigation District	Essential Services Facilities	Unincorporated Colusa County	–	–	–	–	Other Areas	Non-Wildland/Non-Urban	0	–

Type	Name	CF Category	Jurisdiction	Whiskeytown Dam Inundation	Shasta Dam Inundation	Black Butte Dam Inundation	Oroville Dam Inundation	DFIRM Flood Zone	FHSZ	Landslide Class	LFPZ
Utility Facility	Maxwell Public Utility District	Essential Services Facilities	Unincorporated Colusa County	–	–	–	–	Other Areas	Urban Unzoned	0	–
Fire Station	Princeton Fire Protection District	Essential Services Facilities	Unincorporated Colusa County	X	X	X	–	1% Annual Chance Flood Hazard	Urban Unzoned	0	Shallow: <3ft
Fire Station	Sacramento River Fire Protection District - Grand Island Station	Essential Services Facilities	Unincorporated Colusa County	–	X	–	–	Other Areas	Urban Unzoned	0	Shallow: <3ft
Fire Station	USFS Mendocino National Forest	Essential Services Facilities	Unincorporated Colusa County	–	–	–		Other Areas	High	0	–
Utility Facility	Wadham Energy	Essential Services Facilities	Unincorporated Colusa County	–	–	–		Other Areas	Urban Unzoned	0	–

Source: Cal OES/DSOD, FEMA 3/27/2024 DFIRM, CAL FIRE, USGS/CGS, CA DWR

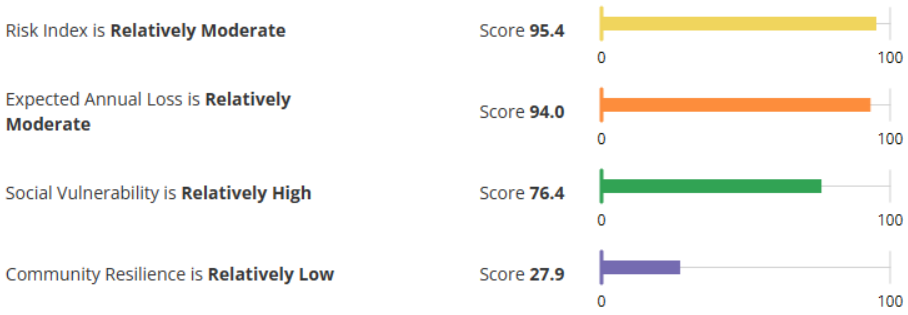
Appendix G Colusa County FEMA National Risk Index Report

National Risk Index

March 27, 2024

Colusa County, California

Summary

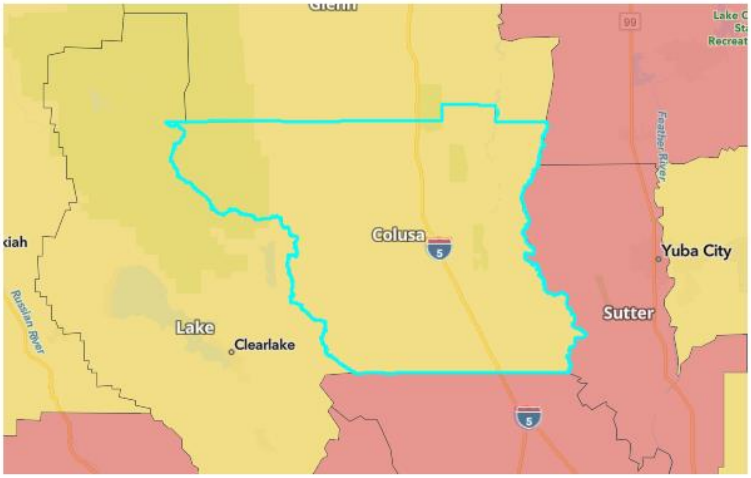


While reviewing this report, keep in mind that low risk is driven by lower loss due to natural hazards, lower social vulnerability, and higher community resilience.

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 **Colusa County, CA** when compared to the rest of the U.S.



Score	95.42

National Percentile
95.42

Percentile Within California
50.00

0 100

95% of U.S. counties have a lower Risk Index

50% 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

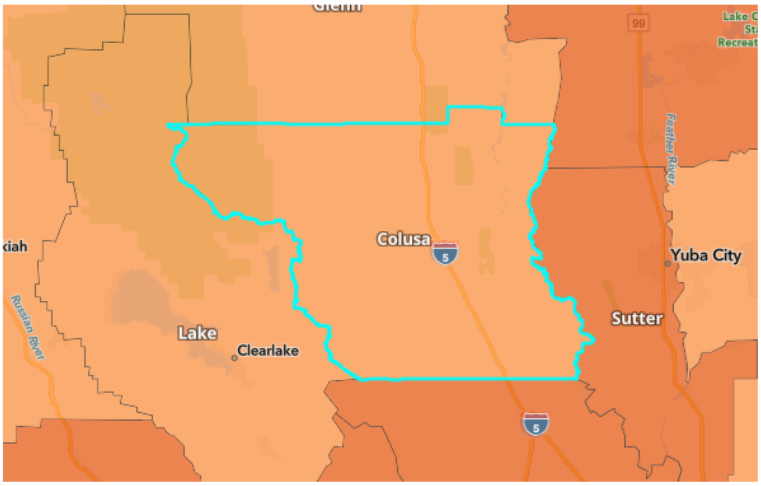
Hazard Type Risk Index

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	Not Applicable	--	
Coastal Flooding	Not Applicable	--	
Cold Wave	No Rating	0	0 100
Drought	Very High	99.9	0 100
Earthquake	Relatively Moderate	95.5	0 100
Hail	Very Low	17.1	0 100
Heat Wave	Relatively Moderate	79.7	0 100
Hurricane	Not Applicable	--	
Ice Storm	Not Applicable	--	
Landslide	Relatively Moderate	93.3	0 100
Lightning	Very Low	8.8	0 100
Riverine Flooding	Relatively Low	70.9	0 100
Strong Wind	Very Low	5.6	0 100
Tornado	Very Low	10.8	0 100
Tsunami	Not Applicable	--	
Volcanic Activity	Not Applicable	--	
Wildfire	Relatively Low	82.1	0 100
Winter Weather	Very Low	2.5	0 100

Expected Annual Loss

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



Score	93.96

National Percentile
93.96
Percentile Within California
46.60
0 100

94% of U.S. counties have a lower Expected Annual Loss

47% 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	**$71,260,808.48**
Composite Expected Annual Loss Rate National Percentile	**99.6**

Building EAL	**$7,109,815.34**	Population EAL	**0.20** fatalities
Building EAL Rate	**$1 per $600.42 of building value**	Population EAL Rate	**1 per 106.95K people**
Agriculture EAL	**$61,785,303.30**	Population Equivalence EAL	**$2,365,689.84**
Agriculture EAL Rate	**$1 per $10.28 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.

12 of 18 hazard types contribute to the expected annual loss for **Colusa County, CA**.

Hazard Type	Expected Annual Loss Rating	EAL Value	Score
Drought	Very High	$61,575,357	99.9
Earthquake	Relatively Moderate	$7,935,200	94.3
Riverine Flooding	Relatively Low	$776,230	65.4
Wildfire	Relatively Low	$389,689	79.2
Heat Wave	Relatively Moderate	$362,004	76.7
Landslide	Relatively Moderate	$138,787	88.0
Tornado	Very Low	$46,316	11.4
Hail	Very Low	$13,171	16.7
Strong Wind	Very Low	$12,553	6.9
Lightning	Very Low	$11,062	6.7
Winter Weather	Very Low	$439	5.0
Cold Wave	No Expected Annual Losses	$0	0.0
Avalanche	Not Applicable	--	--
Coastal Flooding	Not Applicable	--	--
Hurricane	Not Applicable	--	--
Ice Storm	Not Applicable	--	--
Tsunami	Not Applicable	--	--
Volcanic Activity	Not Applicable	--	--

Expected Annual Loss Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	--	--	--	--	--
Coastal Flooding	--	--	--	--	--
Cold Wave	$0	$0	$0	0.00	$0
Drought	$61,575,357	n/a	n/a	n/a	$61,575,357
Earthquake	$7,935,200	$5,960,313	$1,974,887	0.17	n/a
Hail	$13,171	$63	$2,471	0.00	$10,638
Heat Wave	$362,004	$30	$203,327	0.02	$158,647
Hurricane	--	--	--	--	--
Ice Storm	--	--	--	--	--
Landslide	$138,787	$24,927	$113,860	0.01	n/a
Lightning	$11,062	$253	$10,809	0.00	n/a
Riverine Flooding	$776,230	$742,359	$3,489	0.00	$30,382
Strong Wind	$12,553	$1,529	$3,063	0.00	$7,961
Tornado	$46,316	$35,750	$8,784	0.00	$1,782
Tsunami	--	--	--	--	--
Volcanic Activity	--	--	--	--	--
Wildfire	$389,689	$344,549	$44,603	0.00	$537
Winter Weather	$439	$41	$398	0.00	$0

Exposure Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	--	--	--	--	--
Coastal Flooding	--	--	--	--	--
Cold Wave	$0	$0	$0	0.00	$0
Drought	$615,246,746	n/a	n/a	n/a	$615,246,746
Earthquake	$257,601,186,000	$4,268,786,000	$253,332,400,000	21,839.00	n/a
Hail	$257,911,765,560	$4,268,859,170	$253,007,600,000	21,811.00	$635,306,390
Heat Wave	$257,911,765,558	$4,268,859,170	$253,007,600,000	21,811.00	$635,306,388
Hurricane	--	--	--	--	--
Ice Storm	--	--	--	--	--
Landslide	$4,135,461,717	$136,399,267	$3,999,062,450	344.75	n/a
Lightning	$257,276,459,170	$4,268,859,170	$253,007,600,000	21,811.00	n/a
Riverine Flooding	$20,869,013,811	$572,175,453	$20,027,489,024	1,726.51	$269,349,335
Strong Wind	$257,911,765,560	$4,268,859,170	$253,007,600,000	21,811.00	$635,306,390
Tornado	$257,911,765,560	$4,268,859,170	$253,007,600,000	21,811.00	$635,306,390
Tsunami	--	--	--	--	--
Volcanic Activity	--	--	--	--	--
Wildfire	$5,772,432,279	$107,029,974	$5,653,388,735	487.36	$12,013,569
Winter Weather	$257,911,765,558	$4,268,859,170	$253,007,600,000	21,811.00	$635,306,388

Annualized Frequency Values

Hazard Type	Annualized Frequency	Events on Record	Period of Record
Avalanche	--	--	--
Coastal Flooding	--	--	--
Cold Wave	0 events per year	0	2005-2021 (16 years)
Drought	61.7 events per year	1,365	2000-2021 (22 years)
Earthquake	0.772% chance per year	n/a	2021 dataset
Hail	0.1 events per year	3	1986-2021 (34 years)
Heat Wave	3.1 events per year	50	2005-2021 (16 years)
Hurricane	--	--	--
Ice Storm	--	--	--
Landslide	0 events per year	1	2010-2021 (12 years)
Lightning	0.7 events per year	16	1991-2012 (22 years)
Riverine Flooding	0.5 events per year	13	1996-2019 (24 years)
Strong Wind	0 events per year	1	1986-2021 (34 years)
Tornado	0.2 events per year	5	1950-2021 (72 years)
Tsunami	--	--	--
Volcanic Activity	--	--	--
Wildfire	0.382% chance per year	n/a	2021 dataset
Winter Weather	1.4 events per year	23	2005-2021 (16 years)

Historic Loss Ratios

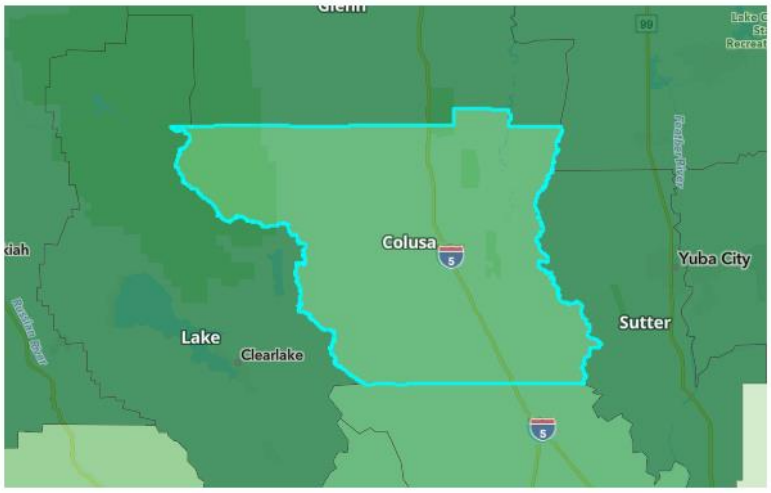
Hazard Type	Overall Rating
Avalanche	--
Coastal Flooding	--
Cold Wave	No Rating
Drought	Relatively Moderate
Earthquake	Relatively High
Hail	Relatively Moderate
Heat Wave	Very Low
Hurricane	--
Ice Storm	--
Landslide	Relatively High
Lightning	Very High
Riverine Flooding	Relatively Low
Strong Wind	Relatively High
Tornado	Very Low
Tsunami	--
Volcanic Activity	--
Wildfire	Relatively High
Winter Weather	Very Low

Expected Annual Loss Rate

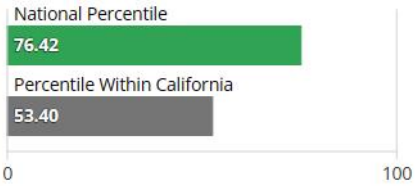
Hazard Type	Building EAL Rate (per building value)	Population EAL Rate (per population)	Agriculture EAL Rate (per agriculture value)
Avalanche	--	--	--
Coastal Flooding	--	--	--
Cold Wave	--	--	--
Drought	--	--	$1 per $10.32
Earthquake	$1 per $716.21	1 per 128.11K	--
Hail	$1 per $68.17M	1 per 102.40M	$1 per $59.72K
Heat Wave	$1 per $140.88M	1 per 1.24M	$1 per $4.00K
Hurricane	--	--	--
Ice Storm	--	--	--
Landslide	$1 per $171.25K	1 per 2.22M	--
Lightning	$1 per $16.86M	1 per 23.41M	--
Riverine Flooding	$1 per $5.75K	1 per 72.51M	$1 per $20.91K
Strong Wind	$1 per $2.79M	1 per 82.60M	$1 per $79.80K
Tornado	$1 per $119.41K	1 per 28.80M	$1 per $356.48K
Tsunami	--	--	--
Volcanic Activity	--	--	--
Wildfire	$1 per $12.39K	1 per 5.67M	$1 per $1.18M
Winter Weather	$1 per $103.76M	1 per 636.03M	$1 per $5.97T

Social Vulnerability

Social groups in **Colusa County, CA** have a **Relatively High** susceptibility to the adverse impacts of natural hazards when compared to the rest of the U.S.



Score **76.42**

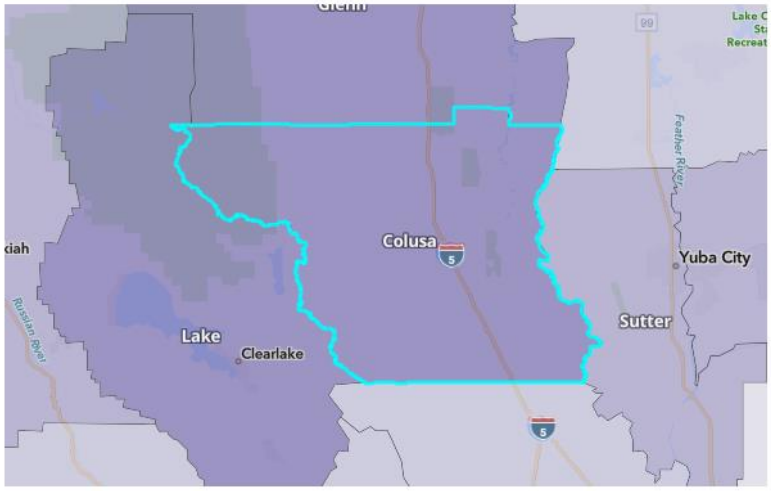


76% of U.S. counties have a lower Social Vulnerability

53% of counties in California have a lower Social Vulnerability

Community Resilience

Communities in **Colusa County, CA** have a **Relatively 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 **27.85**

National Percentile
27.85

Percentile Within California
27.60

0 100

72% of U.S. counties have a higher Community Resilience

73% 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**.