Sutter County
Local Hazard Mitigation Plan

August 2013

amec

EXECUTIVE SUMMARY

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Sutter County developed this Local Hazard Mitigation Plan (LHMP) update to make the County and its residents less vulnerable to future hazard events. This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 so that Sutter County would be eligible for the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation and Hazard Mitigation Grant programs.

The County followed a planning process prescribed by FEMA, which began with the formation of a hazard mitigation planning committee (HMPC) comprised of key County representatives, and other regional stakeholders. The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to the County, assessed the County's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The County is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Floods, levee failures, wildfires, and severe weather are among the hazards that can have a significant impact on the County.

Based on the risk assessment, the HMPC identified goals and objectives for reducing the County's vulnerability to hazards. The goals and objectives of this multi-hazard mitigation plan are:

Master Goal/Mission Statement

To develop sustainable communities to preserve life, protect property, the environment, and the economy from natural hazards by improving the communities' capabilities to prevent losses.

Goal 1: Minimize risk and vulnerability of the community to hazards and reduce damages and protect lives, properties, and public health in Sutter County

- Minimize economic and resource impact
- Minimize impact to both existing and future development
- Prevent and reduce flood-related losses
- Improve integrity of levees
- Prevent and reduce agricultural losses

Goal 2: Provide protection for critical facilities, infrastructure, utilities and services from hazard impacts.

- Update and maintain list of critical facilities: Essential Services, At-Risk Populations, Hazardous Materials Facilities
- Protect evacuation routes

Goal 3: Improve community awareness, education, and preparedness for hazards that threaten our communities

- Enhance public outreach, education and preparedness program to include all hazards of concern
- Increase public knowledge about the risk and vulnerability to identified hazards and recommended responses to disaster events
- Increase public communications to keep the public well informed prior to, during and after a disaster event, including information regarding evacuation and sheltering options
- Provide planning and coordination for "At-Risk" populations
- Increase public's awareness and involvement in communities' mitigation projects

Goal 4: Increase communities' ability to be prepared for, respond to, and recover from a disaster event

- Improve interagency (local, state, federal) emergency coordination and communication to ensure effective community preparedness, response and recovery
- Enhance the use of shared resources/Develop a strong mutual aid support system
- Create and maintain a fully functional, interoperable radio and communication system
- Improve interoperable communication with non-public safety and private partners

Goal 5: Enhance collaboration and coordination of disaster-related plans with local, state, and federal agencies and private partners

- Protect and maintain continuity of operations

Goal 6: Maintain FEMA Eligibility/Position the communities for grant funding.

To meet this identified goal, the plan recommends 56 mitigation actions, which are summarized in the table that follows. This plan has been formally adopted by Sutter County and all participating jurisdictions and will be updated every five years at a minimum.

Table ES.1. Sutter County Planning Area's Mitigation Actions

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Multi-jurisdictional Actions						
Enhance Public Awareness of the Affects of Natural Hazards and Public Understanding of Disaster Preparedness	Sutter County, Live Oak, Yuba City	New Action and Ongoing	X	X	X	Public Information
Planned Multi-Hazard CRS Outreach Projects	Sutter County, Live Oak, Yuba City	New Action	X	X	X	Public Information
Implementation of CRS Activities	Sutter County, Yuba City and Live Oak	New Action and Ongoing	X	X	X	Prevention Emergency Services Property Protection Natural Resource Protection Structural Public Information
Review and Amend Flood Damage Prevention Ordinance, as Appropriate	Sutter County, Yuba City and Live Oak	New Action		X	X	Prevention Property Protection
Evaluate the Development and Implementation of County-Wide Stormwater Management Ordinance	Sutter County, Yuba City and Live Oak	New Action		X	X	Natural Resource Protection Prevention Property Protection
Prepare Post-Disaster Guidance Materials	Sutter County, Yuba City and Live Oak	New Action	X	X		Public Information
Feather River Regional Flood Management Plan	Sutter County, Yuba City and Live Oak	New Action	X	X	X	Structural Natural Resource Protection
Feather River West Levee Rehabilitation Project	Sutter County, Yuba City and Live Oak	New Action	X	X	X	Structural Natural Resource Protection
River Level Gauge System	Sutter County, Yuba City and Live Oak	New Action	X	X		Structural
Sutter Basin Feasibility Study	Sutter County, Yuba City and Live Oak	2007 Action	X	X	X	Structural Natural Resource Protection

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Sutter County Actions						
Flood System Repair Program	Sutter County	New Action	X	X	X	Structural Natural Resource Protection
Robbins Wastewater Plant - Backup Power Source	Sutter County	New Action	X		X	Property Protection
Live Oak Canal - Improvement Project	Sutter County	New Action	X	X	X	Structural
Gilsizer Slough - Master Drainage Study	Sutter County	New Action	X	X	X	Property Protection Structural Natural Resource Protection
Robbins Wastewater Plant - Water Meters & Mains	Sutter County	New Action	X			Structural
NIXLE Text Notification System	Sutter County	New Action	X	X		Emergency Services Property Protection
Robbins Wastewater Plant - Water Treatment Plant	Sutter County	New Action	X			Structural
Eliminate Local Flooding Areas at the Six Locations Identified in the Master Drainage Study	City of Live Oak	New Action	X	X	X	Property Protection Structural Natural Resource Protection
Hwy 99 Improvements	City of Live Oak	New Action	X	X		Structural
EOC Equipment and Supplies	City of Live Oak	New Action	X	X		Emergency Services
Blackboard Connect Upgrades and Maintenance	City of Live Oak	New Action	X	X		Emergency Services
Backup Power to Critical Facilities	City of Live Oak	New Action	X	X		Property Protection Structural
Well, Holding Tank, Water Treatment Equipment with Associated Water lines and Water Main Upgrade	City of Live Oak	New Action	X	X		Structural

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Project Improvements to Decrease Localized Flooding	City of Yuba City	New Action	X	X	X	Prevention Property Protection Structural Natural Resource Protection
Enhance Current Rapid Notify System to Include Cell Phone Enhancements	City of Yuba City	New Action	X	X	X	Emergency Services
Feather River Habitat Restoration	City of Yuba City	New Action	X	X	X	Natural Resource Protection
Fifth Street Bridge Replacement	City of Yuba City	New Action	X	X	X	Prevention Emergency Services Structural
Gilsizer Slough Weir at Bogue Road	City of Yuba City	New Action	X	X	X	Structural Property Protection
Interactive Critical Facility Data Management	City of Yuba City	New Action	X	X	X	Emergency Services Property Protection
Low Lift Pump Station Security Improvements	City of Yuba City	New Action	X	X	X	Emergency Services Property Protection
Hazard Preparedness Public Outreach	City of Yuba City	New Action	X	X	X	Public Information
Relocation of Treated Wastewater Effluent Diffuser Line	City of Yuba City	New Action	X	X	X	Property Protection Emergency Services
Response Logistics Planning	City of Yuba City	New Action	X	X	X	Prevention Emergency Services Public Information
200-Year Flood Protection for Sphere of Influence Area	City of Yuba City	New Action	X	X	X	Structural Property Protection
Alternative Methods to Dispose of Treated Wastewater Effluent	City of Yuba City	New Action	X	X	X	Property Protection Emergency Services
Establish Backup Power Sources for Critical Facilities within Yuba City	City of Yuba City	New Action	X	X	X	Property Protection Emergency Services

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Yuba City Urban Area Emergency Operations Center	City of Yuba City	New Action	X	X	X	Emergency Services Structural
Master Drainage Study and Improvements to Meet 200-YR Flood Protection	Gilsizer County Drainage District	New Action	X	X	X	Property Protection Structural Natural Resource Protection
Revetment of Slough Channel	Gilsizer County Drainage District	2007 Action	X	X	X	Property Protection Structural Natural Resource Protection
Bank Erosion Repairs	Levee District 1	2007 Action	X	X		Property Protection Structural Natural Resource Protection
Alternative Power Source at Pumping Station	RD 70	New Action	X	X	X	Emergency Services Property Protection
Levee/Erosion Repair	RD 70	New Action	X	X		Property Protection Natural Resource Protection Structural
Coordination with State DWR Flood Emergency Response Project	RD 70	New Action	X	X	X	Prevention Emergency Services
Flood System Repair Project #1	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #2	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Flood System Repair Project #3	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Flood System Repair Project #4	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #5	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #6	RD 1001	New Action	X	X		Property Protection Natural Resource Protection

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Flood System Repair Project #7	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #8	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Alternative Power Source at Pump House	RD 1001	New Action	X	X		Property Protection Structural
Flood Emergency Response Project	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Alternative Power Source at Karnak Pump Station	RD 1500	New Action	X	X		Emergency Services Property Protection
Levee Repair	RD 1660	New Action	X	X		Property Protection Natural Resource Protection Structural
Alternative Power Source at Pump Station	RD 1660	New Action	X	X		Emergency Services Property Protection
Coordination with State DWR Flood Emergency Response Project	RD 1660	New Action	X	X		Prevention Emergency Services

TABLE OF CONTENTS

Chapters

1 INTRODUCTION 1.1
- 1.1 Purpose 1.1
- 1.2 Background and Scope 1.1
- 1.3 Community Profile 1.2
  - 1.3.1 History 1.5
  - 1.3.2 Geography and Climate 1.5
  - 1.3.3 Economy and Tax Base 1.5
  - 1.3.4 Population 1.7
- 1.4 Plan Organization 1.7

2 WHAT'S NEW 2.1
- 2.1 What's New in the Plan Update 2.1
- 2.2 2007 LHMP Mitigation Strategy Status and Successes 2.3

3 PLANNING PROCESS 3.1
- 3.1 Local Government Participation 3.2
- 3.2 The 10-Step Planning Process 3.4
  - 3.2.1 Phase 1: Organize Resources 3.5
  - 3.2.2 Phase 2: Assess Risks 3.17
  - 3.2.3 Phase 3: Develop the Mitigation Plan 3.18
  - 3.2.4 Phase 4: Implement the Plan and Monitor Progress 3.18

4 RISK ASSESSMENT 4.1
- 4.1 Hazard Identification: Natural Hazards 4.2
  - 4.1.1 Methodology and Results 4.2
  - 4.1.2 Disaster Declaration History 4.5
- 4.2 Hazard Profiles 4.7
  - 4.2.1 Severe Weather: General 4.8
  - 4.2.2 Severe Weather: Extreme Cold and Freeze 4.10
  - 4.2.3 Severe Weather: Extreme Heat 4.16
  - 4.2.4 Severe Weather: Fog 4.22
  - 4.2.5 Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind 4.26
  - 4.2.6 Severe Weather: Tornado 4.35
  - 4.2.7 Dam Failure 4.38
  - 4.2.8 Drought and Water Shortage 4.42
  - 4.2.9 Earthquake 4.49
  - 4.2.10 Earth Movement: Erosion 4.64
  - 4.2.11 Earth Movement: Landslide 4.71
  - 4.2.12 Flood: 100/500-year and Localized Flooding 4.74

4.2.13 Invasive Species – Pests/Plants....4.108
4.2.14 Levee Failure....4.120
4.2.15 Marine Invasive Species....4.132
4.2.16 Volcano....4.135
4.2.17 Wildfire....4.141
4.2.18 Natural Hazards Summary....4.149
4.3 Vulnerability Assessment....4.150
4.3.1 Sutter County Vulnerability and Assets at Risk....4.151
4.3.2 Sutter County Vulnerability to Specific Hazards....4.190
4.3.3 Dam Failure Vulnerability Assessment....4.192
4.3.4 Drought and Water Storage Vulnerability Assessment....4.197
4.3.5 Earthquake Vulnerability Assessment....4.199
4.3.6 Flood: 100-/500-year Vulnerability Assessment....4.206
4.3.7 Flood: Localized/Stormwater Vulnerability Assessment....4.233
4.3.8 Invasive Species: Plants/Pests Vulnerability Assessment....4.234
4.3.9 Levee Failure Vulnerability Assessment....4.237
4.3.10 Marine Invasive Species Vulnerability Assessment....4.254
4.3.11 Severe Weather: Extreme Cold and Freeze Vulnerability Assessment....4.254
4.3.12 Severe Weather: Extreme Heat Vulnerability Assessment....4.255
4.3.13 Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind Vulnerability Assessment....4.256
4.3.14 Wildfire Vulnerability Assessment....4.257
4.4 Sutter County's Mitigation Capabilities....4.268
4.4.1 Sutter County's Regulatory Mitigation Capabilities....4.268
4.4.2 Sutter County's Administrative/Technical Mitigation Capabilities....4.294
4.4.3 Sutter County's Fiscal Mitigation Capabilities....4.295
4.4.4 Mitigation Outreach and Partnerships....4.295
4.4.5 Other Mitigation Efforts/Projects....4.296

5 MITIGATION STRATEGY....5.1
5.1 Mitigation Strategy: Overview....5.1
5.1.1 Continued Compliance with NFIP....5.2
5.2 Goals and Objectives....5.4
5.3 Identification and Analysis of Mitigation Actions....5.6
5.31 Prioritization Process....5.8
5.4 Mitigation Action Plan....5.9

6 PLAN ADOPTION....6.1

7 PLAN IMPLEMENTATION AND MAINTENANCE....7.1
7.1 Implementation....7.1
7.1.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance....7.2

7.2 Maintenance 7.2
7.2.1 Maintenance Schedule 7.3
7.2.2 Maintenance Evaluation Process 7.3
7.2.3 Incorporation into Existing Planning Mechanisms 7.5
7.2.4 Continued Public Involvement 7.6

Annexes

Annex A: City of Live Oak
Annex B: City of Yuba City
Annex C: Gilsizer Drainage District
Annex D: Levee District 1
Annex E: Reclamation District 70
Annex F: Reclamation District 1001
Annex G: Reclamation District 1500
Annex H: Reclamation District 1660

Appendices

Appendix A: Adoption Resolutions
Appendix B: Planning Process
Appendix C: Mitigation Strategy
Appendix D: References
Appendix E: Critical Facilities
Appendix F: Localized Flooding
Appendix G: Public Survey

1 INTRODUCTION

1.1 Purpose

Sutter County and eight 8 other jurisdictions prepared this Local Hazard Mitigation Plan (LHMP) update to the 2007 Federal Emergency Management Agency (FEMA) approved Sutter County Multi-Hazard Mitigation Plan. The purpose of this plan update is to guide hazard mitigation planning to better protect the people and property of the County from the effects of hazard events. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed, among other things, to ensure Sutter County and participating jurisdictions' continued eligibility for certain federal disaster assistance: specifically, the FEMA Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA). Completion also earns credits for the National Flood Insurance Program's Community Rating System (CRS) which provides for lower flood insurance premiums in CRS communities.

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 additional expenses incurred by 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 reduced or even eliminated.

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 provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council, 2005).

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 Sutter 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.

The Sutter County Local Hazard Mitigation Plan (LHMP) update is a multi-jurisdictional plan that geographically covers the entire area within Sutter County's jurisdictional boundaries (hereinafter referred to as the planning area). The following jurisdictions participated in the planning process and are seeking approval of this LHMP plan update:

- Sutter County*
- City of Live Oak *
- City of Yuba City*
- Gilsizer Drainage District*
- Levee District 1*
- Reclamation District 70*
- Reclamation District 1001*
- Reclamation District 1500*
- Reclamation District 1660*

* Participated in 2007 Plan

This plan 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.) While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet 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). This planning effort also follows FEMA's 2008 Plan Preparation Guidance. Because the Sutter County Planning Area is subject to many kinds of hazards, access to these programs is vital.

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

1.3 Community Profile

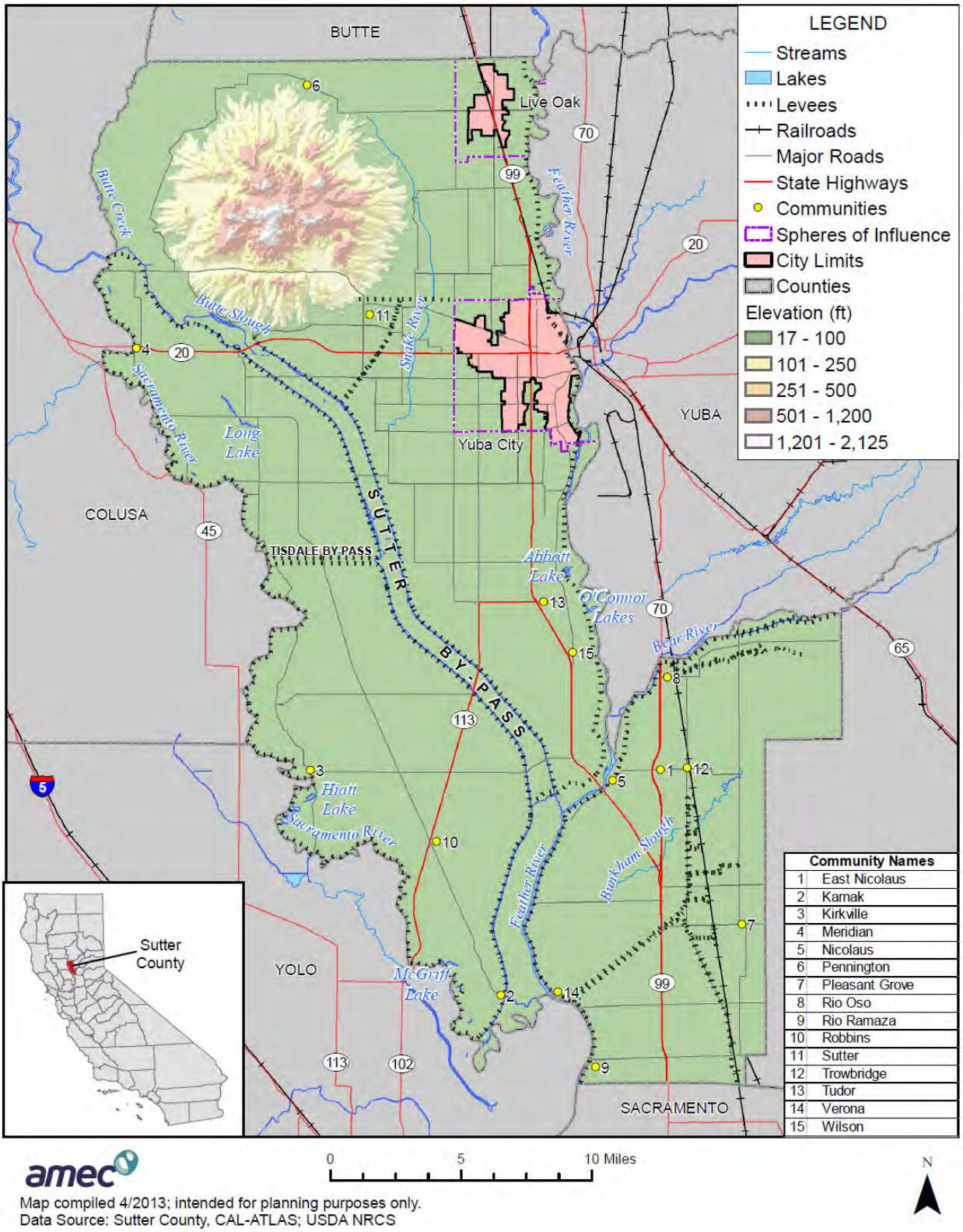
Sutter County lies in a portion of north central California known as the Sacramento Valley, approximately 40 miles north of Sacramento. Sutter County's boundaries are generally defined by Yolo and Colusa Counties to the west with the Sacramento River and Butte Slough forming the western boundary; Butte County to the north; Yuba and Placer Counties to the east with the

Feather and Bear Rivers forming the eastern boundary; and Sacramento County to the south. The County encompasses approximately 607 square miles.

Sutter County includes two incorporated cities (the City of Yuba City and the City of Live Oak) and several unincorporated rural communities. A distinct "Yuba City Urban Area" exists which includes incorporated Yuba City, the unincorporated land area immediately surrounding the incorporated city limits (the urban fringe), and Tierra Buena. 15 separate rural communities are also located within the unincorporated area of the County.

State Highway 99, which extends in a north-south direction through the County, defines the principal transportation corridor connecting the County to the region. State Route 20 is the principal east-west corridor between Highway 99 and Interstate 5. Figure 1.1 illustrates Sutter County's location.

Figure 1.1. Sutter County Base Map



1.3.1 History

In the early 1800's, the area now known as Sutter County was inhabited by the native Maidu Indians. Members of various Spanish expeditions in search of mission sites, and fur trappers lured by the abundant wildlife, traveled through in 1841. The bulk of the territory was deeded by the Mexican Government to the County's namesake, John Sutter. Established in 1842, John Sutter's Hock Farm was the first large-scale agricultural settlement in Northern California, composed of grain, cattle, orchards and vineyards.

Sutter County was incorporated by the California State Legislature on February 18, 1850, as one of the state's original 27 counties. At that time it included the southwest portion of what is now Placer County and a piece of what now belongs to Colusa County. Boundaries were fixed in their present locations around 1856.

The first County Seat was proclaimed by Senator Thomas J. Green to be “a noble city of broad streets, imposing buildings, and splendid public squares.” He convinced the state to declare the land he had bought from John Sutter, which he called "Oro," as the County Seat. However, Senator Green neglected to mention that the grand town of Oro existed only on paper and, in fact, only consisted of one 20 x 20 foot zinc building. Wanting more substantive County Seat, the town of Nicolaus, a bustling trading post and ferry crossing, was selected. After several short-term changes in location, in 1856 the people of Sutter County voted to proclaim Yuba City as the permanent County Seat.

1.3.2 Geography and Climate

The topography of Sutter County is comprised primarily of the gentle flatlands of the Sacramento River Valley. The only prominent topographic feature within the County is the Sutter Buttes, a Pliocene volcanic plug which rises abruptly 2,000 feet above the surrounding valley floor. Geographic features within Sutter County include the Sutter Buttes; the Feather, Sacramento and Bear Rivers, and associated levee system; localized drainage courses; oxbow lakes; the Butte Sink; and the expansive valley floor. The County can be divided into two major geographic units: the valley and the uplands. Sutter County shares the mild climate of its San Joaquin and Sacramento Valley neighbors. Temperatures range from lows, around 36 degrees Fahrenheit in January, to summer month highs, around 96.4°F. The County receives an average annual rainfall of 30.0 inches.

1.3.3 Economy and Tax Base

US Census estimates show economic characteristics for the County. These are shown in Table 1.1.

Table 1.1. Sutter County Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	3,291	8.7%
Construction	3,166	8.3%
Manufacturing	2,636	6.9%
Wholesale trade	1,032	2.7%
Retail trade	5,432	14.3%
Transportation and warehousing, and utilities	2,297	6.0%
Information	431	1.1%
Finance and insurance, and real estate and rental and leasing	1,765	4.6%
Professional, scientific, and management, and administrative and waste management services	2,885	7.6%
Educational services, and health care and social assistance	8,047	21.2%
Arts, entertainment, and recreation, and accommodation and food services	2,645	7.0%
Other services, except public administration	1,713	4.5%
Public administration	2,655	7.0%

Source: US Census Bureau American Community Survey 2009-2011 Estimates

The County has a wide and varied tax base. Table 1.2 shows the breakdown of Live Oak's property tax base.

Table 1.2. Unincorporated Sutter County Property Types and Values

Property Use	Total Parcel Count	Improved Parcel Count	Improved Value	Total Land	Total Value
Agriculture	2,620	1,369	$49,361,511	$472,654,172	$522,015,683
Commercial	155	123	$40,591,912	$18,989,426	$59,581,338
Industrial	195	129	$445,291,303	$24,053,676	$469,344,979
Institutional	534	92	$28,432,670	$20,424,558	$48,857,228
Residential	2,649	2,638	$395,063,028	$357,476,967	$752,539,995
Unclassified	22	0	$0	$0	$0
Vacant Land	6,353	4,537	$512,141,844	$552,294,105	$1,064,435,949
Total	**12,528**	**8,888**	**$1,470,882,268**	**$1,445,892,904**	**$2,916,775,172**

Source: Sutter County 2012 Assessor's Data

The largest employers in the County are shown in Table 1.3.

Table 1.3. Sutter County Ten Largest Employers

Employer	Number of Employees
Fremont-Rideout Health Group	1,800
Yuba City Unified School District	1,358
Sutter County	967
Sunsweet Growers	748
Walmart Supercenter	525
Sutter Medical Foundation	503
Sysco Sacramento, Inc.	369
Home Depot	300
City of Yuba City	263
Holt of California	202

Source: Yuba-Sutter Economic Development Corporation

1.3.4 Population

The California Department of Finance Demographics Research Unit 2012 estimates for population of the County and its jurisdictions are shown in Table 1.4.

Table 1.4. Sutter County Population by Jurisdiction 2012

Jurisdiction	Total Population
Sutter County	21,531
Live Oak	8,252
Yuba City	65,536
Total	**95,119**

Source: California Department of Finance, Demographics Research Unit – E-1: City/County Population Estimates with Annual Percent Change

1.4 Plan Organization

The Sutter County Local Hazard Mitigation Plan update is organized as follows:

- Chapter 2: What's New
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Adoption
- Chapter 7: Plan Implementation and Maintenance
- Jurisdictional Annexes
- Appendices

2 WHAT'S NEW

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

The 2007 Sutter County Multi-Hazard Mitigation Plan contained a risk assessment of identified hazards for the Sutter County planning area and a mitigation strategy to address the risk and vulnerability from these hazards. Since approval of the plan by FEMA, much progress has been made by Sutter County and all participating communities on implementation of the mitigation strategy. This section of the plan provides an overview of the approach to updating the plan, identifies new analyses and information included in this plan update, and highlights key mitigation successes.

2.1 What's New in the Plan Update

This LHMP update involved a comprehensive review and update of each section of the 2007 plan and includes an assessment of the success of the participating communities in evaluating, monitoring and implementing the mitigation strategy outlined in the initial plan. In fact, based in part on the issuance of the new 2008 FEMA Plan Preparation Guidance, the 2007 plan has been reorganized, updated, and rewritten in its entirety. Only the information and data still valid from the 2007 plan was carried forward as applicable into this LHMP update.

Also to be noted, Section 7.0 Implementation and Maintenance of this plan update identifies key requirements for updating future plans:

- 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 inventories; and
- Incorporate new action recommendations or changes in action prioritization.

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

As part of its 2007 Mitigation Strategy, Sutter County and participating jurisdictions recognized that certain data, if available, would enhance the analyses presented in the risk assessment and utilized in the development of the mitigation strategy. This new data and associated analysis

provided valuable input for the development of the mitigation strategy presented in Section 5.0 of this plan.

New information and analyses contained in this plan update includes the following:

- A new assessment of hazards affecting the County was completed resulting in the inclusion of one additional hazard: marine invasive species.
- To better align with the State of California Hazard Mitigation Plan, the agriculture hazard was split out into two hazards: marine invasive species, as indicated above, and invasive species: Pest/Plants.
- The drought hazard was expanded to include water shortage impacts to the County, to better align with the State of California Hazard Mitigation Plan.
- Expansive soils and land subsidence were dropped from this plan due to the low risk these soil hazards pose in Sutter County.
- Levee failure was separated our from the flood hazard and given greater analysis, including a HAZUS analysis of potential losses associated with a composite levee break and inundation scenario provided by the County.
- An entire rework of the risk assessment for each identified hazard. This included reworking the hazard profile and adding new hazard event occurrences; redoing the entire vulnerability analysis to add items identified below and updating the vulnerability assessment based on more recent hazard data as well as using the most current parcel and assessor data for the existing built environment.
- An update of the flood hazard analysis to include an updated analysis of the 100-year flood, an analysis of the 500-year flood, and an enhanced analysis of the localized/stormwater flooding problems affecting the planning area, including the use of the Best Available Maps (BAM) compiled by the state.
- Development of an updated critical facility definition and an initial GIS mapping effort of critical facilities for the planning area.
- An enhanced vulnerability assessment which added an inventory of critical facilities by jurisdiction and a GIS analysis of critical facilities vulnerable to three priority hazards: flood, levee failure, and wildfire.
- An enhanced vulnerability assessment which added an analysis of existing buildings and facilities, by property type, in the hazard areas for four priority hazards: earthquake, flood, levee failure, and wildfire.
- An enhanced vulnerability assessment which added an analysis of populations vulnerable to four hazards: earthquake, flood, levee failure, and wildfire.
- An enhanced vulnerability assessment which added an analysis of future development in the planning area and specific to each of the mapped hazards.
- Incorporation and analysis of the new 2010 Census data was utilized for this LHMP update.
- Also, as required by the 2008 planning guidance, an analysis of each jurisdictions' ongoing and continued compliance with the NFIP, and where applicable, the CRS program.

2.2 2007 Mitigation Strategy Status and Successes

Sutter County and its various communities have been very successful in implementing actions identified in the 2007 LHMP Mitigation Strategy, thus, working diligently towards meeting their 2007 goals.

Success Stories

Noxious Terrestrial Weed Control Project

In calendar year 2010, the Yuba Sutter WMA (YSWMA) saw progress on two Arundo projects. Both projects were conducted within the boundaries of Reclamation District 777 near Live Oak. Project 1 represents the core infested area and centers on the intersection of Larkin and Paseo roads. This project was initially funded in 2007, but delayed until May and June of 2010. Project 2 expanded the range of the first project by targeting the remaining Arundo sites with the 777. Although neither project achieved localized eradication, some of the sites realized strong suppression, which will be protected and enhanced, by continuing to attack the remaining sites in the future.

Multi-Hazard Public Awareness Program

Last year, Sutter County staff and the Sutter-Butte Flood Control Agency continued an aggressive public outreach campaign to raise awareness of the flood hazards facing Sutter County, the flood safety and property protection measures appropriate for these flood hazards, flood-related public information activities implemented within the community, and the anticipated revision of the Flood Insurance Rate Maps (FIRMs) covering all of Sutter County. This annual report evaluates the projects implemented under this public outreach strategy. Overall, the outreach is considered to have been extremely effective, and was comprised of the following elements:

- Letters mailed directly to owners of over 3,600 properties located within Special Flood Hazard Areas;
- Special workshops held for local government officials; engineers, builders & developers; real estate agents, insurance agents and lenders;
- Newspaper interviews and articles published in the local "Appeal Democrat";
- Appearances before the Sutter County - Board of Supervisors (all broadcasted on public access channel);
- Internal training for County staff;
- Public Awareness Month (October); and
- Various public outreach letters required under the Community Rating System.

County staff from the Water Resources Branch responded to over 460 phone inquiries, mostly regarding the flood zone, Base Flood Elevation (BFE), mandatory flood insurance requirements, and construction requirements for local properties.

Past Mitigation Action Update

The 2007 mitigation strategy contained 32 separate mitigation actions benefiting one or more communities within the Sutter County Planning Area. Of these 32 actions, 23 have been completed or are ongoing. 9 have not yet been started due to a variety of reasons such as changes in priorities, lack of funding, or changes to the projects themselves. Because many of these projects are implemented on an annual or other continuous basis and some of the projects have yet to be funded or have otherwise not been initiated, 16 of the 2007 projects have been identified for inclusion in this plan update. Table 2.1 provides a status summary of the mitigation action projects from the 2007 LHMP. Following the table are detailed descriptions of the status of each project.

Table 2.1 Sutter County's 2007 LHMP Update: Mitigation Action Status

Jurisdiction/Hazard/Action	Complete	Ongoing	Not Yet Started	Project in 2013 Update
Multi-Jurisdiction Actions				
Multi-Hazard Public Awareness Program		X		Y
Sutter Basin Feasibility Study and Improvements		X		Y
O'Banion Road DWR Pump Station Improvements			X	N
Noxious Terrestrial Weed Control Project			X	Y
Aquatic Weed Elimination Project		X		Y
Sutter County				
Road Projects to Improve Right of Passage and to Decrease Localized Flooding			X	N
Bypass Crossing @Sacramento Ave.			X	N
Live Oak Canal Constriction Removal			X	Y
Bogue Road Flood Water Diversion Berm			X	Y
City of Live Oak				
Road Projects to Improve Right of Passage and to Decrease Localized Flooding		X		Y
Lift Pump Back Up Generator Improvements		X		Y
Yuba City				
Emergency Communications Improvements		X		Y
Various Street Improvements to Decrease Localized Flooding		X		Y
Low Lift Pump Access Road Improvements	X			N
Relocation of Wastewater Effluent Discharge Ponds			X	Y
East and West Feather River Bank Stabilization	X			N
Gilsizer Slough Weir at Bogue Road			X	N

Jurisdiction/Hazard/Action	Complete	Ongoing	Not Yet Started	Project in 2013 Update
Comprehensive Flood Management Plan		X		N
Implementation of Additional CRS Activities		X		Y
Floodplain Management Planning Outreach		X		Y
Fire Flow Improvements for Groundwater Regions 1, 2 and 3	X			N
Gilsizer County Drainage District				
Revetment of Slough Channel/Headwalls at Road Crossing		X		Y
Levee District One				
Bank Erosion Repairs To Levees in Several Areas		X		Y
Star Bend Set Back Levee	X			N
Relief Well Location (N. Star Bend)	X			N
Reclamation District 70				
Pumping Plant Project	X			N
Reclamation District 1001				
Unit 2 LB Yankee Slough Levee Repairs	X			N
Feather River/Sacramento River Landslide Stability Berm		X		N
North Levee of Natomas Cross Canal Repairs		X		N
Infrastructure Improvements – District-wide and Main Pumping Facility	X			N
Reclamation District 1500				
Karnak Pump Plant Renovation		X		Y
Reclamation District 1660				
Sutter By-Pass Project			X	N

Multi-Jurisdiction Actions

Multi-Hazard Public Awareness Program

Progress to Date: This project has been a success and is ongoing. Staff performed the following in 2011/2012:

- Document informing lenders, real estate agents and insurance agents about Flood Insurance Map Information Services provided by County.
- Annual notice sent to properties within Special Flood Hazard Areas.
- Annual notice regarding property protection sent to Repetitive Loss Areas.
- Newspaper insert run by Appeal Democrat.
- Public presentation to Farm Bureau on the NFIP, minimum standards, the CRS program, and the County ordinance.
- Hosted Annual Pre-season Flood Coordination Meeting with DWR
- Levee Tours conducted by Pro-Act, City of Yuba City, and Levee District 1
- Met with owners of repetitive loss properties to discuss flood risk, mitigation grants.
- First NSV-IRWM Public Workshop on Flood Control and Floodplain Management
- Second NSV-IRWM Public Workshop on Flood Control and Floodplain Management
- Presentation to Sutter County – Board of Supervisors
- Presentation to Sutter County – Board of Supervisors
- Presentation to Board of Realtors providing an Overview on Floodplain Management & NFIP Minimum Requirements
- Presentation to Early Morning Kiwanas Club
- Hosted training on Substantial Improvement / Substantial Damage
- Hosted training on Elevation Certificates

This project will be carried forward in the plan update.

Sutter Basin Feasibility Study and Improvements

Progress to Date: On June 14, 2013, the U.S. Army Corps of Engineers Sacramento District released the draft feasibility study report and environmental impact report/supplemental environmental impact statement for the Sutter Basin Pilot Feasibility Study for public review, officially opening the 45-day public comment period. This project will be carried forward in the Plan update.

O'Banion Road DWR Pump Station Improvements

Progress to Date: This project was not started and will not be carried forward in the Plan update.

Noxious Terrestrial Weed Control Project

Progress to Date: Have not started this project. Weed Management Area funding not available.

Aquatic Weed Elimination Project

Progress to Date: Completed a portion of this project in June 2010. Removed Giant Reed from a dense infestation in a Reclamation District 777 canal near the intersection of Larkin and Paseo Roads. Site requires annual maintenance. Additional work has not begun due to lack of funding and permitting issues.

Sutter County

Road Projects to Improve Right of Passage and to Decrease Localized Flooding

Progress to Date: This project has not yet started, but is a viable mitigation project. It will not be carried forward in the Plan update.

Bypass Crossing @Sacramento Ave.

Progress to Date: This project has not yet started, but is a viable mitigation project. It will not be carried forward in the Plan update.

Live Oak Canal Constriction Removal

Progress to Date: This project has not yet started, but is a viable mitigation project. It will be carried forward in the Plan update.

Bogue Road Flood Water Diversion Berm

Progress to Date: This project has not yet started, but is a viable mitigation project. It will be carried forward in the Plan update.

City of Live Oak

Road Projects to Improve Right of Passage and to Decrease Localized Flooding

Progress to Date: This project is ongoing and will be carried forward in the Plan update.

Lift Pump Back Up Generator Improvements

Progress to Date: This project is ongoing and will be carried forward in the Plan update.

Yuba City

Emergency Communications Improvements

Progress to Date: The City has utilized Homeland Security Grant Funds to purchase fifteen narrow-band compliant interoperable radios to designated key emergency personnel/positions for use during major emergencies. This project will be carried forward in the Plan update under the title "Enhance EOC Communications System."

Various Street Improvements to Decrease Localized Flooding

Progress to Date: The City has completed several projects to decrease localized flooding including the installation of storm drain lines in Rockholt Way and Willow Way. This project will be carried forward in the Plan update.

Low Lift Pump Access Road Improvements

Progress to Date: The project was completed in August 2013. This project will not be carried forward in the Plan update.

Relocation of Wastewater Effluent Discharge Ponds

Progress to Date: The City would like to expand this project to review more alternative methods for disposal of wastewater effluent. This project will be carried forward in the Plan update under the title "Alternative Methods to Dispose of WW Effluent."

East and West Feather River Bank Stabilization

Progress to Date: The United States Army Corps of Engineers completed the project. This project will not be carried forward in the Plan update.

Gilsizer Slough Weir at Bogue Road

Progress to Date: The project will be evaluated further by the Sutter Butte Flood Control Agency in order to determine if there is an alternative project that would meet the same goals to provide backwater protection to the City. This project will be carried forward in the Plan update.

Comprehensive Flood Management Plan

Progress to Date: The Sutter Butte Flood Control Agency (SBFCA) was formed as a joint powers agency in 2007 by the Counties of Butte and Sutter, the Cities of Biggs, Gridley, Live Oak and Yuba City, and Levee Districts 1 and 9. SBFCA is preparing plans to meet the objectives identified in the Action Item and has started construction on the Feather River West Levee Project which will increase public safety by providing 200-yr flood protection for much of the City. This project will not be carried forward in the Plan update.

Implementation of Additional CRS Activities

Progress to Date: The Public Works Department is constantly working on improving the City's CRS classification to increase the discount rate given towards the purchase of flood insurance. This project will be carried forward in the Plan update.

Floodplain Management Planning Outreach

Progress to Date: The City implements this Action Item through the implementation of the CRS program. Publications are mailed to residents annually related to flood outreach and flood insurance. Flood insurance information is also regularly distributed to local real estate agents and insurance agents. In addition, outreach materials are updated and posted on the City's website at www.yubacity.net/flood. This project will be carried forward in the Plan update under the title "Implementation of CRS Activities."

Fire Flow Improvements for Groundwater Regions 1, 2 and 3

Progress to Date: The project was completed in May 2011. This project will not be carried forward in the Plan update.

Gilsizer County Drainage District

Revetment of Slough Channel/Headwalls at Road Crossing

Progress to Date: Improvements are continually being implemented to prevent erosion and reduce the risk of flooding. This project is ongoing and will be carried forward in the Plan update.

Levee District One

Bank Erosion Repairs to Levees in Several Areas

Progress to Date: This project is ongoing and will be carried forward in the Plan update.

Star Bend Set Back Levee

Progress to Date: This project was completed and will not be carried forward in the Plan update.

Relief Well Location (N. Star Bend)

Progress to Date: This project is complete and will not be carried forward in the Plan update.

Reclamation District 70

Pumping Plant Project

Progress to Date: Completed. RD 70 repaid a gravity gate. This allows the district to drain water without having to pump. This helps the district keep cost down and makes it easier to get rid of excess water. This project will not be carried forward in the Plan update.

Reclamation District 1001

Unit 2 LB Yankee Slough Levee Repairs

Progress to Date: 2010 ACOE completed repairs. This project will not be carried forward in the Plan update.

Feather River/Sacramento River Landslide Stability Berm

Progress to Date: Portions have been completed to date. This project will not be carried forward in the Plan update.

North Levee of Natomas Cross Canal Repairs

Progress to Date: 2010 Slip repair and wave wash issues were addressed. More work needs to be completed. This project will not be carried forward in the Plan update.

Infrastructure Improvements – District-wide and Main Pumping Facility

Progress to Date: Autos pipes through levee were repaired and completed 2009. This project will not be carried forward in the Plan update.

Reclamation District 1500

Karnak Pump Plant Renovation

Progress to Date: This project is ongoing and will be carried forward in the Plan update.

Reclamation District 1660

Sutter By-Pass Project

Progress to Date: Not yet started. Project will not be carried forward in the Plan update.

3 PLANNING PROCESS

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

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.

Sutter County recognized the need and importance of the update process for their local hazard mitigation plan and initiated its development. After receiving a grant from the Federal Emergency Management Agency (FEMA), which served as the primary funding source for this plan, the County contracted with AMEC Environment and Infrastructure (AMEC) to facilitate and develop the plan. Jeanine Foster, a professional planner with AMEC, was the project manager and lead planner in charge of overseeing the planning process and the development of this LHMP update. David Stroud, also a professional planner with AMEC, was the CRS lead for the development of this update. The AMEC 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's Community Rating System and the Flood Mitigation Assistance 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 Emergency Management Agency (CAL EMA) and FEMA Region IX plan reviews.

3.1 Local Government Participation

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

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

For the Sutter County Planning Area's HMPC, "participation" meant the following:

- Providing facilities for meetings;
- Attending and participating in the HMPC meetings;
- Completing and returning the AMEC Data Collection Guide;
- Collecting and providing other requested data (as available);
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts; including annexes
- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan;
- Coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the governing boards.

The County and all jurisdictions with annexes to this plan seeking FEMA approval met all of these participation requirements. In most cases one or more representatives for each jurisdiction attended the HMPC meetings described in Table 3.4 and also brought together a local planning team to help collect data, identify mitigation actions and implementation strategies, and review and provide data on plan drafts. In order to promote the integration of CRS into this planning process, the representatives from the County and the Cities of Yuba City and Live Oak were selected based on their areas of expertise relative to the CRS mitigation categories as detailed in Table 3.1. The planning Services Department for Sutter County (Lisa Wilson, Planner), the Community Development and Planning Department from Yuba City (Aaron Bush, Community Development Director), the lead building official, planner and floodplain manager from Live Oak (Jim Little) in association with AMEC Planners were involved in the development of this plan update through attendance at meetings, coordination, providing data, future land use planning support, and help with meeting facilitation.

Table 3.1. Sutter County Staff Capability with Six Mitigation Categories

Jurisdiction/ Department	Prevention	Property Protection	Natural Resource Protection	Emergency Services	Structural Flood Control Projects	Public Information	Other
Sutter County							
Planning Services – Lisa Wilson	X	X	X			X	X
Emergency Management – John DeBeaux	X	X		X	X	X	X
Public Works – Dan Peterson	X	X	X		X	X	X
Information Technology – Jarvis Jones	X		X			X	X
Yuba City							
Community Development/ Planning – Aaron Bush	X	X	X			X	X
Public Works - Diana Langely	X	X	X		X	X	X
Fire - Bill Fuller		X		X		X	X
Live Oak							
Building/ Public Works/ Planning - Jim Little	X	X	X		X	X	X
City Manager – Jim Goodwin	X	X	X	X		X	X
Finance Director – Satwant Takhar	X	X	X	X		X	X

Specific individuals representing the three CRS communities participating in this LHMP Update are identified in Appendix B in the sign-in sheets for the meetings and as referenced in the resolution forming the steering committee also included in this planning process appendix. This Chapter 3 and Appendix B provides additional information and documentation of the planning process and participants to this plan update, including members of the steering and working committees, comprising the HMPC.

3.2 The 10-Step Planning Process

AMEC established the planning process for updating the Sutter County Local Hazard Mitigation Plan using the DMA planning requirements and FEMA's associated guidance. 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, AMEC integrated a more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program; Pre-Disaster Mitigation program; Community Rating System; Flood Mitigation Assistance Program; Severe Repetitive Loss program; and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 3.2 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 3.2. Mitigation Planning Processes Used to Develop the Sutter County Local Hazard Mitigation Plan

DMA Process	Modified CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize to Prepare the Plan
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) Assess the Hazard
201.6(c)(2)(ii)	5) Assess the Problem
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

This LHMP update involved a comprehensive review and update of each section of the 2007 plan and includes an assessment of the success of the participating communities in evaluating,

monitoring and implementing the mitigation strategy outlined in the initial plan, as previously described in more detail in Chapter 2 and throughout Chapter 4. The process followed to update the plan is detailed in the above table and the sections that follow and is the same process that was used to prepare the 2007 plan.

As part of this plan update, all sections of the plan were reviewed and updated to reflect new data, processes, participating jurisdictions, and resulting mitigation strategies. Only the information and data still valid from the 2007 plan was carried forward as applicable into this LHMP update.

3.2.1 Phase 1: Organize Resources

Planning Step 1: Organize the Planning Effort

With Sutter County's and participating jurisdictions' commitment to participate in the DMA planning process and the CRS program, AMEC worked with the County's Office of Emergency Management (OEM) to establish the framework and organization for development of the plan. An initial meeting was held with key community representatives to discuss the organizational and process aspects of this plan update process. At the beginning of this planning process, a resolution was passed by each of the three CRS communities (Sutter County and the cities of Live Oak and Yuba City) establishing the planning process and the Hazard Mitigation Planning Committee (HMPC). The resolution is included in Appendix B.

The initial kick-off meeting was held on February 20, 2013. Invitations to this kickoff meeting were extended to key county departments, the two cities, representatives from special districts for the county and cities, as well as to other federal, state, and local stakeholders, including representatives from the public, that might have an interest in participating in the planning process. Representatives from participating jurisdictions and HMPC members to the 2007 plan were used as a starting point for the invite list, with additional invitations extended as appropriate throughout the planning process. The list of initial invitees is included in Appendix B.

The HMPC was established as a result of these organizational meetings, as well as through interest generated through the initial public meetings and outreach conduced for this project as detailed later in this section. The HMPC, comprising key county, city, special district, and other government and stakeholder representatives, developed the plan with leadership from the County Office of Emergency Management and facilitation by AMEC. Each participating jurisdiction seeking FEMA approval of the plan had representation on the HMPC. Participating jurisdictions also indicated their commitment to participate as evidenced by executing a letter of commitment of participation at the beginning of the planning process. Letters of commitment for participating jurisdictions are included in Appendix B. The HMPC was comprised of members of the steering committee established for this process (as discussed further in this section) as well as other representatives from key county, city, and other government agencies, key stakeholders, and the public, with an interest in hazard mitigation. The following participated on the HMPC:

Sutter County

- Office of Emergency Management
- Sutter County GIS
- Sutter County Planning Services
- Sutter County Public Works
- Sutter County Engineering Department
- Sutter County Fire
- Sutter County Animal Control
- Sutter County Environmental Health
- Sutter County Public Health

Participating Cities

- City of Live Oak*
- City of Yuba City*

Other Government and Stakeholder Representatives:

- Gilsizer Drainage District*
- Levee District 1*
- Reclamation District 70*
- Reclamation District 1001*
- Reclamation District 1500*
- Reclamation District 1660*

*indicates that jurisdiction is also a participating jurisdiction seeking FEMA approval of this plan.

Citizens

- Ron Murdock
- Steve Sweetman
- Eleanor Knox

A list of participating HMPC representatives for each jurisdiction is also included in Appendix B. This list details all HMPC members that attended one or more HMPC meetings detailed in Table 3.4. Each jurisdiction also utilized the support of many other support staff in order to collect and provide requested data and to conduct timely reviews of the draft documents as further detailed in each annex to this plan. Note that the above list of HMPC members also includes several other government and stakeholder representatives that were invited to participate and contributed to the planning process. Specific participants from these other agencies are also identified in Appendix B.

Steering Committee

The HMPC includes both a Steering Committee and Working Group. The Steering Committee is the policy body which has voting privileges and decides what is included in the plan document. The Working Group provides data and information to the Steering Committee for consideration. The Steering Committee is comprised of key representatives from the County and the Cities of Yuba City and Live Oak, other participating jurisdictions, and other agency and public representatives. The non-local government members of the Steering Committee (citizens and other outside stakeholders) represent more than 50% representation of the committee. See Table 3.3 and Appendix B for details on the makeup of the Steering Committee and the larger Working Group.

Table 3.3. Sutter County LHMP Steering Committee

Community	Department/Organization/ Representative	Citizen	Stakeholder	# Meetings
Sutter County				
John DeBeaux	Emergency Management			3
Dan Peterson	Public Works			3
Michael Bessette	Sutter-Buttes Flood Control Agency		Y	3
Ronald Welch	Bi-County Ambulance		Y	3
Lori Rollins	PG & E		Y	2
Steve Sweetman	ARES Ham Radio	Y		1
Yuba City				
Diana Langley	Public Works			3
Bill Fuller	Fire Department			3
Gloria Jennings	Sutter County American Red Cross		Y	3
Scott Vickers	CPN Pipeline		Y	1
Pam Allison	Cleanrite Buildrite		Y	1
Eleanor Knox	ARES Ham Radio	Y		1
Live Oak				
Jim Little	Building Department			3
John Spitler	Golden State Water Company		Y	2
Ron Murdock	ARLL Ham Radio	Y		1
Jerilyn Anderson	Cal-EMA		Y	2
John Gulsarian	Butte County Emergency Management		Y	2
Reclamation District 70 & 1660	Andy Duffy			3
Reclamation District 1001	Andrew Stresser			3
Reclamation District 1500	Jack Bailey & Max Savaxe			2

Community	Department/Organization/ Representative	Citizen	Stakeholder	# Meetings
Levee District 1	Bill Hampton* (out sick in early planning process)			*Coordinated via phone/e-mail
Gilsizer Drainage District	Diana Langley (Yuba City)			3

Based on the area of expertise of each Steering Committee member, Table 3.1 demonstrates the Steering Committee members' expertise in the six mitigation categories (Prevention, Property Protection, Emergency Services, Natural Resource Protection, Structural Flood Control Projects, and Public Information). This table also documents those responsible for community land use and comprehensive planning for each of the three CRS communities were active participants on the HMPC and provided data and information to support development of the plan. This includes the Planning Services Department from Sutter County, the Community Development/Planning Department from the City of Yuba City, and the Building/Public Works/Planning Department form the City of Live Oak as previously described.

The support of staff was called upon to collect and provide requested data and to conduct timely reviews of the draft documents. Note that the above list of HMPC members also includes citizens and several other government and stakeholder representatives that contributed to the planning process. Specific participants from these other agencies are also identified in Appendix B.

Meetings

The planning process officially began with a kick-off meeting held in the City of Yuba City, on February 20, 2013, at 2:00 pm, followed by a public kick-off meeting held the same day at 6:00 pm at the Sutter County Veterans Hall. The meetings covered the scope of work and an introduction to the DMA, CRS, and FMA requirements. During the HMPC Kick-off meeting, participants were provided with a Data Collection Guide, which included worksheets to facilitate the collection of information necessary to support development of the plan. Using FEMA guidance, AMEC designed these worksheets to capture information on past hazard events, identify hazards of concern to each of the participating jurisdictions, quantify values at risk to identified hazards, inventory existing capabilities, and record possible mitigation actions. A copy of AMEC's Data Collection Guide for this project is included in Appendix B. Because this is a plan update, another worksheet was developed, the Mitigation Action Status Summary Worksheet, to capture information on the current status of mitigation action items included in the 2007 plan. This worksheet is also included in Appendix B. The County and each jurisdiction seeking FEMA approval of this plan update completed and returned the worksheets to AMEC for incorporation into the plan document.

During the planning process, the HMPC communicated through face-to-face meetings, email, telephone conversations, a file transfer protocol (ftp) website (an internal planning team

website), and through a County and City developed webpage dedicated to the plan development process. This later websites were 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 and the public could easily access and review them. The LHMP website can be accessed at:

- Sutter County - http://www.co.sutter.ca.us/doc/government/depts/cs/es/hazard_mitigation
- City of Live Oak - http://www.liveoakcity.org/index.php?option=com_content&view=article&id=334:hazard-mitigation-planning-process-begins&catid=19:current-news-items&Itemid=129
- Yuba City - http://www.yubacity.net/public-works/multi-hazard-mitigation-plan.htm

The HMPC met formally four times during the planning period (February 2013- August, 2013) which adequately covers the four phases of DMA and the 10-Step CRS planning process. The formal meetings held and topics discussed are described in Table 3.4. Agendas and sign-in sheets for each of the meetings are included in Appendix B.

Table 3.4. HMPC Meetings

Meeting Type	Meeting Topic	Meeting Date(s)	Meeting Location(s)
HMPC #1 Kick-off Meeting	1) Introduction to DMA and the planning process 2) Overview of current LHMP; 3) Organize Resources: the role of the HMPC, planning for public involvement, coordinating with other agencies/stakeholders 4) Introduction to Hazard Identification	2/20/2013	Sutter County Veteran's Hall, Yuba City
HMPC #2	1) Risk assessment overview and work session 2)Update Plan Goals and Objectives	6/12/2013	City of Yuba City, Wastewater Treatment Plant Conference Room
HMPC #3	1) Review of Mitigation Alternatives 2)Review and update of mitigation actions from the 2007 plan 3) Identify updated list of mitigation actions 4)Review of Mitigation Selection Criteria 5)Update and Prioritize Mitigation Actions	6/13/2013	City of Yuba City, Wastewater Treatment Plant Conference Room
HMPC #4	Review of final HMPC, jurisdictional and public comments and input to plan	8/23/13	Sutter County's CAO's conference room

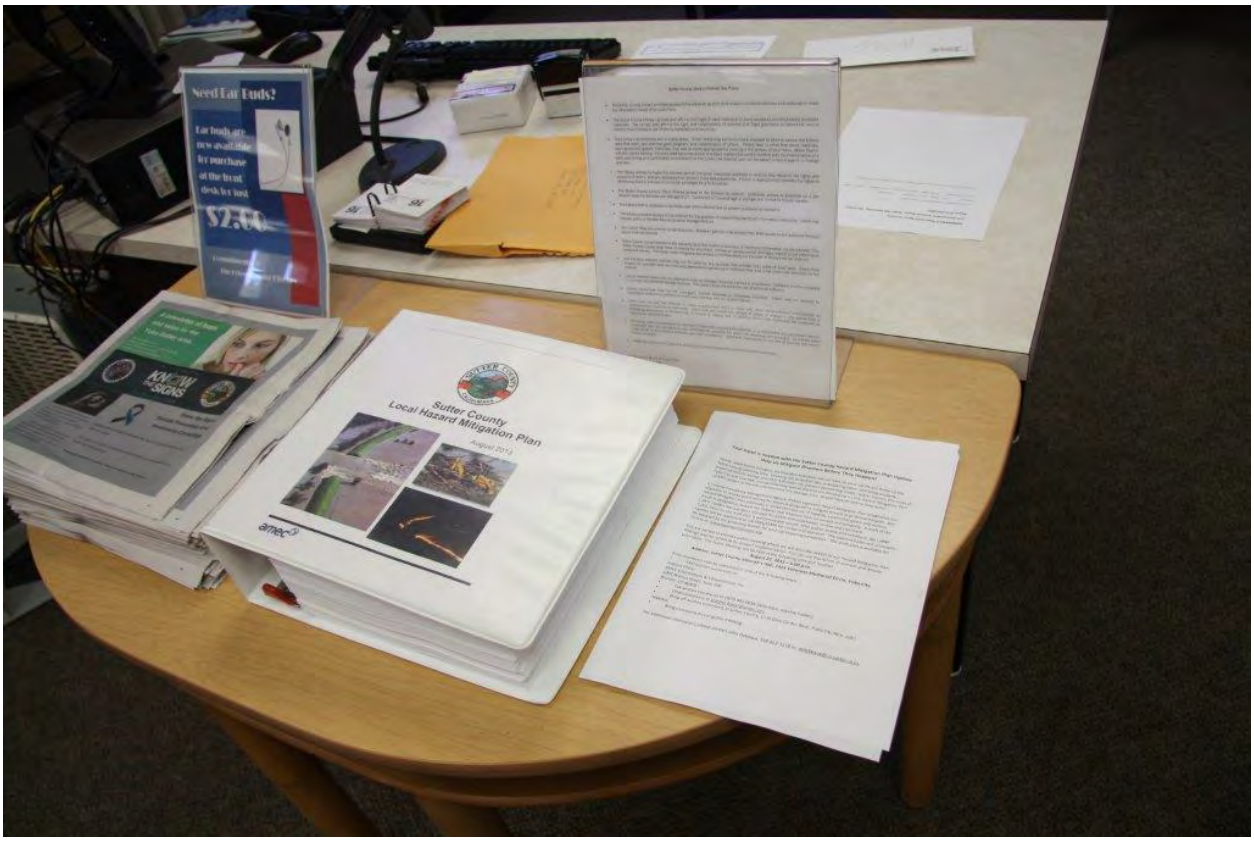
Planning Step 2: Involve the Public

Up-front coordination discussions with the planning contacts for Sutter County, and the Cities of Yuba City and Live Oak, established the initial plan for public involvement. Public outreach for this plan update began at the beginning of the plan development process with an advertisement placed in the local newspaper to inform the public of the purpose of the DMA and the hazard

mitigation planning process for the Sutter County Planning Area and an ad placed to invite the public to an early public meeting held on February 20, 2013 at the Veteran's Memorial Hall in Yuba City to kickoff the project. This meeting location was centrally located in Sutter County with easy access for all county residents. At the planning team 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 community, including the Sutter County Public Information Officer (PIO).

The complete draft of the plan was provided to the HMPC in July of 2013. A public meeting was held on August 22, 2012 to present the draft LHMP and to collect public comments on the plan prior to finalization and submittal to Cal EMA/FEMA. The public meeting was advertised in the local newspaper indicating the date, location and time of the meeting, and where the plan could be accessed in the community. In addition to a copy of the draft plan being placed on the City website, hard copies of the draft of the plan were made available to interested parties at the Sutter County Library.

Figure 3.1. Public Outreach Table at the Sutter County Library



Source: Sutter County Public Information Officer

Documentation to support the final public meeting can be found in Appendix B. In addition to 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 with an interested in the

Sutter County Planning Area. The majority of these people reside in Sutter County or in surrounding communities. Because this is a multi-jurisdictional planning effort, all public outreach activities for this plan update were conducted in cooperation with and on behalf of Sutter County and the Cities of Live Oak and Yuba City as well as for all participating jurisdictions.

Public involvement activities for this plan update included press releases, 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 as further described below, as well as specific targeted outreach to different groups of people and other agencies throughout the county and incorporated municipalities. Information provided to the public included an overview of the mitigation status and successes resulting from implementation of the 2007 plan as well as information on the processes, new risk assessment data, and proposed mitigation strategies for the plan update. As part of the plan development process, a Public Involvement Plan was also developed to ensure a meaningful public process and to focus efforts on maximizing CRS credits for public outreach. The formal public meetings for this project are summarized in Table 3.5.

Table 3.5. Schedule of Public and Stakeholder Meetings

Meeting Topic	Meeting Date	Meeting Locations
1) Intro to DMA and mitigation planning 2) LHMP plan overview and public comments	2/20/2013	Sutter County Veteran's Hall, Yuba City
Presentation of Draft LHMP (this meeting was not advertised but was still held for those invited via email)	8/22/2013	Sutter County Veteran's Hall, Yuba City
Presentation of Draft LHMP (this meeting was advertised and was held to ensure the County and cities received credit from the CRS for the meeting)	8/29/2013	Sutter County Veteran's Hall, Yuba City

Where appropriate, stakeholder and public comments and recommendations were incorporated into the final plan, including the sections that address mitigation goals and strategies. All press releases, newspaper advertisements and articles, website postings, and public outreach efforts are on file with the Sutter County OEM's Public Information Office and are included in Appendix B. Public meetings were advertised in a variety of ways to maximize outreach efforts to both targeted groups and to the public at large and included advertisements in the local paper inviting the public to attend the formal public meetings.

Other Public Outreach Efforts

Beyond these more formal public involvement activities, the update process also included the following public outreach activities in Table 3.6 which are further documented and described in Appendix B in Section B.2.1. The public outreach activities described here were conducted with

participation from and on behalf of all jurisdictions participating in this plan, including the CRS communities of Sutter County, the City of Yuba City and the City of Live Oak.

Table 3.6. Public Outreach Efforts

Effort	Description
Meeting with Amateur Radio Emergency Service	Discussed roles of ARES in communication of disaster information. Sought input on plan development.
Meeting with American Legion	Discussed needs of the Veterans Community in Sutter County and their role in hazard planning. Sought historical data on flooding, levee breaks, and other hazard issues.
Article in Appeal-Democrat	An article was published to make citizens in the County aware of the hazard mitigation update process and invite participation.
Flood Hazard and Flood Insurance Letter	As part of CRS activity 330, a letter was mailed to 2,086 different property owners with properties in the floodplain in July of 2013. These owners actually own 3,992 parcels with structures that fall within a SFHA. The letter included information how to participate on the HMPC
Survey	A public survey was posted on the City's website and on the County's Facebook page inviting the public to comment on how prepared both the County and individuals are for a possible natural disaster.
Facebook	Sutter County informed citizens linked to them that the County was updating the plan, that a copy was available, and that a survey was taking place.
Coordination with Californians for Flood Safety	The County worked with Californians for Flood Safety (a community advocacy group) to advertise the Plan update and survey process on their Facebook page. The draft plan was provided for review and input – on behalf of all 3 CRS communities and also the survey provided.
Public Outreach at Library	The County prepared a table at the Library. Invitations were placed on Facebook to let the public know that the documents were there for review and to remind citizens to take the public survey.
Website	Information on the Plan update process and location of documents was posted on the County website. Links to the County website were placed on the Live Oak and Yuba City websites.

The draft plan is currently available online on the Sutter County website at http://www.co.sutter.ca.us/doc/government/depts/cs/es/hazard_mitigation. The public outreach activities described here were conducted with participation from and on behalf of all jurisdictions participating in this plan, including the CRS communities of Sutter County, the City of Yuba City and the City of Live Oak.

Public Outreach Survey

An integral element in hazard mitigation planning is broad public participation. Information provided by residents fosters a better understanding of local hazard concerns and can spawn innovative ideas to reduce impacts of future hazard events. A public opinion survey was accomplished to gather information from Sutter area residents concerning local hazards. The survey was located on the County's LHMP website and in hard copy at other locations such as the Sutter County Public Library and survey participation was promoted through public

meetings, program websites, press releases, and social media. Following is a summary of survey results. The survey is included in Appendix G.

A total of 67 residents participated in the public information survey. The survey depicts a moderate concern about future hazards from a majority of the participants. Predictably, the major hazard concern revolves around flooding due to heavy storms or infrastructure failure (levee, dam). Over 75 percent of the survey participants have homes or businesses protected by levees. About 45 percent of the participants carry flood insurance, although there is no direct correlation to those with homes/businesses protected by levees. The majority of participants have not been impacted by a natural disaster.

Communication and education is a critically important factor for natural hazard mitigation. Most of the jurisdictions participating in the hazard mitigation planning process have emergency preparedness public information programs. Survey questions were structured to help ascertain the effectiveness of the "community-at-large" programs. The survey indicated a strong preference to receive information through traditional mass media methods: television was rated at 59 percent, newspaper at 26 percent and radio at 23 percent. Text messaging was also highly rated at 70 percent, indicating a trend upward for the future of cellular based media communication.

The survey also sought to ascertain whether or not the County and its residents were ready and prepared for a natural disaster. 64% of residents felt that the County and its residents were prepared for a natural hazard event. 40% of respondents indicated that they had a "go kit" with at least three days of food and water in the event of a natural disaster.

More specific information is contained in Appendix G.

Public Information Program Strategy

Sutter County and the cities of Live Oak and Yuba City have in place a public information program strategy designed to maximize credits under CRS Activity 330. (This annual floodplain management update is being sent to those who may own property located within a floodplain.) The County and cities makes efforts to make available information that pertains to floodplain management to educate and assist Sutter County citizens about developing and living in a floodplain. Numerous FEMA publications and reference materials are made available at the Sutter County Library. County residents may contact Sutter County – Water Resources at (530) 822-3299 or visit the County's website at: http://www.suttercounty.org/doc/government/depts/pw/wr/fp/fphome

Planning Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting other local, state and federal agencies and organizations to participate in the process. Based on their involvement in

hazard mitigation planning, their landowner status in the County, and/or their interest as a neighboring jurisdiction, representatives from the following groups were invited to participate on the HMPC:

- Cal EMA
- Cal Fire
- California Department of Water Resources
- California NFIP Coordinator
- Cities in Sutter County
- Golden State Water Agency
- Levee Districts
- National Weather Service
- NFIP/CRS Program Coordinators
- Pacific Gas & Electric
- Reclamation Districts
- Red Cross
- School Districts
- Sutter Butte Flood Control Agency
- Sutter County and all Agencies
- US Corps of Engineers
- Utility Districts

Coordination with key agencies, organizations, and advisory groups throughout the planning process allowed the HMPC to review common problems, development policies, and mitigation strategies as well as identifying any conflicts or inconsistencies with regional mitigation policies, plans, programs and regulations. Coordination involved contacting these agencies through a variety of mechanisms and informing them on how to participate in the plan update process and if they had any expertise or assistance they could lend to the planning process or specific mitigation strategies. Coordination with these groups included, holding face-to-face meetings, sending outreach letters or e-mails, some with follow up phone calls; and making phone calls alone to out of area agencies. All of these groups and agencies were solicited asking for their assistance and input, telling them how to become involved in the plan update process, and inviting them to HMPC meetings. This coordination with other agencies is documented in Appendix B in Section B.36. 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:

- Ampla Health
- Beale Air Force Base
- Bi-County Ambulance
- Butte County
- CAL EMA
- CAL FIRE

- California Department of Finance
- California Department of Water
- California Department of Water Resources
- California Geological Survey
- California Highway Patrol
- California Highway Patrol
- California Register of Historic Places
- Farmers Insurance
- FEMA
- First American Title Company
- Fremont-Rideout Health Group
- Invasive Species Council of California
- Library of Congress
- Linda Fire
- 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
- NOAA
- Olivehurst Fire
- Pacific Gas and Electric Co.
- Planned Parenthood
- Prudential Real Estate
- REACH
- Recology (the local garbage disposal, landfill, and recycling company)
- Red Cross
- Rideout Health
- Sacramento County
- SSVEMS
- Sutter Butte Flood Control Agency
- Sutter Surgical Hospital
- Sutter Urgent Care
- Sutter-Yuba Mosquito and Vector Control
- Union Bank
- United States Army Corps of Engineers
- United States Bureau of Land Management
- United States Department of Agriculture
- United States Farm Service Agency

- United States Forestry Service
- United States Geological Survey
- Western Regional Climate Center
- Wheatland Fire
- Yuba County Fire
- Yuba County Health
- Yuba Sutter Chamber of Commerce

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 these groups to actively participate on the HMPC. Specific participants from these groups are detailed in Appendix B. Others assisted in the process by providing data directly as requested in the Data Collection Guide 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 meetings and to review and comment on the plan prior to submittal to CAL EMA and FEMA. In addition, as part of the review of the draft plan, key agency stakeholders were contacted and their comments specifically solicited.

Other Community Planning Efforts and Hazard Mitigation Activities

Coordination with other community planning efforts is also paramount to the success of this plan. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. Sutter County uses 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 plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of this plan incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

- Sutter County General Plan
- Sutter County General Plan Environmental Impact Report
- Sutter County General Plan Technical Background Report
- Sutter County Emergency Operations Plan
- Sutter County Flood Insurance Study
- Sutter County Groundwater Management Plan
- City of Live Oak General Plan
- City of Yuba City General Plan
- California State Hazard Mitigation Plan
- California State Drought Contingency Plan
- USDA Census of Agriculture
- Sutter County Agricultural Commissioner Reports

- California Department of Food and Agriculture Invasive Species Report
- Yuba Sutter Regional Conservation Plan
- Sutter Pointe Specific Plan
- Lincoln East Specific Plan
- Sutter County After Action Reports

A key example of coordinating with other planning efforts is the coordination of this LHMP with floodplain ordinances for the County and cities and stormwater master plans. This is critical for two important reasons. First, flooding problems don't stop at corporate or jurisdictional boundaries. Second, a successful mitigation strategy requires that these planning efforts be coordinated.

Another example of coordinating with other planning efforts is the coordination of this LHMP with early Yuba-Sutter County Natural Community Conservation Planning and Habitat Conservation Plan efforts. This is critical for two important reasons as well. First, natural hazards such as flood and wildfire do not just affect areas populated and developed by humans. Secondly, a successful mitigation strategy requires that these planning efforts be coordinated. One result of this coordination is that Sutter County will be eligible for additional CRS credit under Activity 420 – Open Space Preservation: Habitat Conservation Plan.

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 ordinances were incorporated into the risk assessment and hazard vulnerability sections of the plan. Where the data from the existing studies and reports is used in this plan update, the source document is referenced throughout this plan update. The data was also used in determining the capability of the community in being able to implement certain mitigation strategies. Appendix D References provides a detailed list of references used in the preparation of this plan update.

3.2.2 Phase 2: Assess Risks

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

AMEC led the HMPC in an exhaustive research effort to identify, document, and profile all the hazards that have, or could have, an impact the planning area. Starting with the 2007 plan, natural hazards of concern were added, deleted, and modified for the LHMP Update. Data collection worksheets and jurisdictional annexes were developed and used in this effort to aid in determining hazards and vulnerabilities and where the risk varies across the 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 planning area's current capabilities to mitigate risk from and vulnerability to hazards. By collecting information

about existing government 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.

3.2.3 Phase 3: Develop the Mitigation Plan

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

AMEC 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 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, AMEC produced a complete first draft of the plan. This complete draft was posted for HMPC review and comment on the project file transfer protocol (ftp) website. Other agencies were invited to comment on this draft as well. HMPC and agency comments were integrated into the second public review draft, which was advertised and distributed to collect public input and comments. AMEC integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the CAL EMA and FEMA Region IX to review and approve, contingent upon final adoption by the governing boards of each participating jurisdiction.

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 plan, the plan was adopted by the governing boards of each participating jurisdiction using the sample resolution contained in Appendix B.

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. 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 Sutter 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 Sutter County and is addressed further in Chapter 7.

Implementation and Maintenance Process: 2007

The 2007 Sutter County, California Multi-Hazard Mitigation Plan included a process for plan maintenance and implementation of the mitigation strategy as well as formal updates to the plan document. The 2007 process called for annual reviews with the status of mitigation strategy implementation documented in an annual report. In addition the 2007 process called for a formal plan update as required by DMA regulations every 5 years. In accordance with the process outlined in the 2007 plan, annual reviews were conducted and documented, and this LHMP update, once complete, will meet the DMA formal update requirements.

Specifically, Sutter County's existing plan was completed and adopted by the County in 2007. It was anticipated that in compliance with the five-year update requirement, the next complete update of the plan would be in 2012. This current plan update process was begun in early 2013, and finished in August of 2013 with the submittal of this LHMP update to Cal EMA and FEMA Region IX.

The plan implementation and maintenance process as set forth in the 2007 plan has been updated for this LHMP update. The revised update implementation and maintenance process for the Sutter County 2013 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.

4 RISK ASSESSMENT

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

As defined by 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 jurisdiction'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 Sutter County Planning Area (Planning Area) and describes why some hazards have been omitted from further consideration. Section 4.2: Hazard Profiles discusses the threat to the Planning Area and describes previous occurrences of hazard events and the likelihood of future occurrences. Section 4.3: Vulnerability Assessment assesses the Planning Area's exposure to natural hazards; considering assets at risk, critical facilities, and future development trends. Section 4.4: Capability Assessment inventories existing mitigation activities and policies, regulations, and plans that pertain to mitigation and can affect net vulnerability of a community.

This risk assessment covers the entire geographical extent of the Sutter County Planning Area, including the incorporated communities and other participating jurisdictions. Since this plan is a multi-jurisdictional plan, the Hazard Mitigation Planning Committee (HMPC) is required to evaluate how the hazards and risks vary from jurisdiction to jurisdiction. While these differences are noted in this chapter, they are expanded upon in the annexes of the participating jurisdictions. If no additional data is provided in an annex, it should be assumed that the risk and potential

impacts to the affected jurisdiction are similar to those described here for the entire Sutter County Planning Area.

This Local Hazard Mitigation Plan (LHMP) update involved a comprehensive review and update of each section of the 2007 risk assessment. As part of the risk assessment update, new data was used, where available, and new analyses were conducted. Refinements, changes, and new methodologies used in the development of this risk assessment update are summarized in Chapter 2 What's New and detailed in this Risk Assessment portion of the plan.

4.1 Hazard Identification: Natural Hazards

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 Sutter County 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.

4.1.1 Methodology and Results

Using existing natural hazards data and input gained through planning meetings, the HMPC agreed upon a list of natural hazards that could affect Sutter County. Hazards data from the California Emergency Management Agency (CAL EMA), FEMA, the National Oceanic and Atmospheric Administration (NOAA), and many other sources were examined to assess the significance of these hazards to the Planning Area. Significance of each identified hazard was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage. The natural hazards evaluated as part of this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future.

The following hazards in Table 4.1, listed alphabetically were identified and investigated for this plan update. As a starting point, the updated California State Hazard Mitigation Plan was consulted to evaluate the applicability of new hazards of concern to the State to the 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 2007 plan were profiled in this plan, with the exception of expansive soils and subsidence, which has been eliminated from further consideration in this natural hazards plan, as they were determined to be of very low significance to the County.

Table 4.1. Sutter County Hazard Identification and Comparison

2013 Hazards	2007 Hazards	Comment
Dam Failure	Dam Failure	Similar analysis was performed
Drought & Water Shortage	Drought	Additional impacts were examined
Earthquakes	Earthquakes	Similar analysis was performed
Earth Movements: Landslide	Landslide	Similar analysis was performed
Earth Movements: Erosion	Soil Hazards: Erosion	Similar analysis was performed
Floods: 100/500 year	Floods	Greater analysis was performed using DFIRM and Q3 data/
Floods: Localized Stormwater	–	Similar analysis was performed.
Invasive Species: Pests/Plants	Agricultural Hazards/West Nile Virus	Similar analysis was performed
Levee Failure	Floods	This hazard was separated out from the flood hazard and greater analysis was performed.
Marine Invasive Species	–	New Hazard
Severe Weather: Extreme Cold/ Freeze	Severe Weather: Extreme Temperatures	Similar analysis was performed
Severe Weather: Extreme Heat	Severe Weather: Extreme Temperatures	Similar analysis was performed
Severe Weather: Fog	Severe Weather: Fog	Similar analysis was performed
Severe Weather & Storms: Heavy rain, hailstorm, lightning, and wind	Severe Weather: Winter Storms: Heavy Rains/Thunderstorms/Hail/Lightning/Wind	Similar analysis was performed
Severe Weather: Tornado	Severe Weather: Tornadoes	Similar analysis was performed
Volcanoes	Volcanoes	Similar analysis was performed
Wildfires	Wildfires	Greater analysis was done using CAL FIRE Fire Severity data.
–	Soil Hazards: Expansive Soils	This hazard was dropped from plan consideration
–	Soil Hazards: Land Subsidence	This hazard was dropped from plan consideration

The worksheet below was completed by the HMPC to identify, profile, and rate the significance of identified hazards. Only the more significant (or priority) hazards have a more detailed hazard profile and are analyzed further in Section 4.3 Vulnerability Assessment. Table 4.35 in Section 4.2.18 Natural Hazards Summary provides an overview of these significant hazards.

Table 4.2. Sutter County Hazard Identification Worksheet

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure	Extensive	Unlikely	Catastrophic	Medium
Drought & Water shortage	Extensive	Occasional	Critical	Medium
Earthquakes	Limited	Unlikely	Negligible	Low
Earth Movements: Erosion	Limited	Highly Likely	Limited	Low
Earth Movements: Landslide	Limited	Occasional	Negligible	Low
Floods: 100/500 year	Extensive	Occasional	Catastrophic	High
Floods: Localized Stormwater	Limited	Highly Likely	Limited	Medium
Invasive Species: Pests/Plants	Significant	Likely	Limited	Meidum
Levee Failure	Extensive	Occasional	Critical	High
Marine Invasive Species	Limited	Likely	Limited	Medium
Severe Weather: Extreme Cold/ Freeze	Extensive	Likely	Critical	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	Medium
Severe Weather: Fog	Significant	Occasional	Limited	Low
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Extensive	Highly Likely	Critical	Medium
Severe Weather: Tornado	Limited	Likely	Limited	Low
Volcanoes	Significant	Unlikely	Limited	Low
Wildfires	Significant	Likely	Limited	Medium

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

Source: AMEC Data Collection Guide

4.1.2 Disaster Declaration History

One method to identify hazards based upon past occurrence is to look at what events triggered federal and/or state disaster declarations within the Planning Area. Disaster declarations are granted when the severity and magnitude of the event's impact surpass 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, following the local agency's declaration, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state government's capacity is exceeded, a federal disaster declaration may be issued allowing for the provision of federal disaster assistance.

Sutter County has experience 13 federal and 21 state declarations since 1950. 8 of the federal declarations were associated with flood events. Of the 5 remaining federal declarations, four were related to severe storms, and one to freeze. 11 of the state declarations were associated with flood events. Of the 10 remaining state disasters, 8 were related to severe storm, 1 was related to drought, and 1 was related to freeze. A summation of federal and state disaster declarations is shown in Table 4.3.

Table 4.3. Sutter County Federal and State Disaster Declaration History

Hazard Type	Disaster Name	Disaster #	Year	State Declaration	Federal Declaration	Damages*
Flood	Floods	CDO 50-01	1950	11/21/1950	–	9 deaths $32,183,000
Flood	Floods	DR-47	1955	12/22/1955	12/23/1955	74 deaths $200,000,000
Severe Storm, Economic	Unseasonal and Heavy Rainfall	N/A	1957	5/20/1957 (Cherry-producing)	–	2 injuries $6,000,000
Flood	Storm & Flood Damage	CDO 58-03	1958	2/26/1958	–	Not available
Flood	Storm & Flood Damage	N/A	1958	4/2/1958	4/4/1958	13 deaths $24,000,000
Severe Storm	Unseasonal and Heavy Rainfall	N/A	1959	9/17/1959	–	2 deaths $100,000
Flood	Flood and Rainstorm		1962	10/17/1962, 10/25/1962, 10/30/1962, 11/4/1962	10/24/1962	$4,000,000
Severe Storm, Flood	Abnormally Heavy and Continuous Rainfall	N/A	1963	2/14/1964	–	Not Available

Hazard Type	Disaster Name	Disaster #	Year	State Declaration	Federal Declaration	Damages*
Flood	1964 Late Winter Storms	Unknown	1964	12/22/1964, 12/23/1964, 12/28/1964, 1/5/1965, & 1/1/1965	12/29/1964	$213,149,000
Flood	Northern California Flooding	DR-283	1970	1/26/1970, 2/3/1970, 2/10/1970, 3/2/1970	2/16/1970	$27,657,478
Severe Storms	Severe Weather Conditions	N/A	1972	9/3/1972	–	$2,004,300
Flood	Storms and Floods	N/A	1973	2/28/1973	–	$1,864,000
Drought	Drought	N/A	1976	2/9/1976, 2/13/1976, 2/24/1976, 3/26/1976, 7/6/1976	–	$2,664,000,000
Flood, Severe Storm	1982-83 Winter Storms	DR-677	1982	12/8/1982-3/21/1983	2/9/1983	$523,617,032
Severe Storm	Storms	DR-758	1986	2/181986 - 3/12/1986	2/18/1986	13 deaths; $407,538,904
Freeze	Freeze	DR-894	1990	12/19/1990-1/18/1991	2/11/1991	$856,329,675
Severe Storm	Severe Winter Storms	DR-1044	1995	1/6/1995 - 3/14/1995	1/13/1995	11 deaths $741,400,000
Severe Storm, Flood	Late Winter Storms	DR-1046	1995	Proclaimed	1/10/1995	17 deaths; $1,100,000,000
Flood	January 1997 Floods	DR-1155	1997	1/2/97 - 1/31/1997	1/4/1997	8 injuries; $1,800,000,000
Flood	1998 El Nino Flood	DR-1203	1998	Proclaimed	2/19/1998	17 deaths, $385,141,192 in damages
Flood	2005/06 Winter Storms	DR-1628	2006	–	2/3/06	–
Flood	2008 January Storms	GP 2008-01	2008	12/21/2007	–	–

Source: Cal EMA, PERI

4.2 Hazard Profiles

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

The hazards identified in Section 4.1 Hazard Identification Natural Hazards, are profiled individually in this section. In general, information provided by planning team members is integrated into this section with information from other data sources. These profiles set the stage for Section 4.3 Vulnerability Assessment, where the vulnerability is quantified, as data allows, for each of the priority hazards.

Each hazard is profiled in the following format:

- **Hazard/Problem Description**—This section gives a description of the hazard and associated issues followed by details on the hazard specific to the Sutter County Planning Area. Where known, this includes information on the hazard extent, 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. The extent or location of the hazard within or near the Sutter County Planning Area is also included here. Historical incident worksheets were used to capture information from participating jurisdictions on past occurrences.

- **Frequency/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.

Section 4.2.18 Natural Hazards Summary provides an initial assessment of the profiles and assigns a level of significance or priority to each hazard. Those hazards determined to be of medium or high significance were characterized as priority hazards that required further evaluation in Section 4.3 Vulnerability Assessment. Those hazards that occur infrequently or have little or no impact on the 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 and resulting damage, including deaths/injuries and property, crop, and economic damage. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the Planning Area, enabling the County to focus resources where they are most needed.

The following sections provide profiles of the natural hazards that the HMPC identified in Section 4.1 Hazard Identification. Given that most disasters that affect the Planning Area are directly or indirectly related to severe weather events, severe weather hazards begins this section, and the individual hazard profiles following alphabetically.

4.2.1 Severe Weather: General

Severe weather is generally any destructive weather event, but usually occurs in the Sutter County Planning Area as localized storms that bring heavy rain, hail, lightning, and strong winds.

The National Oceanic and Atmospheric Administration'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 16 severe weather events that occurred in Sutter County between January 1, 1950, and December 31, 2012. Table 4.4 summarizes these events.

Table 4.4. NCDC Severe Weather for Sutter County, 1950 to December 31, 2012*

Type	# of Events	Deaths	Injuries	Property Damage	Crop Damage
Downburst	1	0	0	$0	$0
Flood	1	0	0	$900,000	$0
Funnel Cloud	4	0	0	$0	$0
Gustnado	1	0	0	$0	$0
Heavy Rain	4	0	0	$0	$0
Tornado	4	0	0	$8,500	$5,050
Totals	**15**	**0**	**0**	**$908,500**	**$5,050**

Source: NCDC
*Note: Losses reflect totals for all impacted areas

The HMPC supplemented NCDC data with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-2010. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). The database includes every loss causing and/or deadly event between 1960 through 1979 and from 1995 onward. Between 1980 and 1995, SHELDUS reflects only events that caused at least one fatality or more than $50,000 in property or crop damages. For events that covered multiple counties, the dollar losses, deaths, and injuries were equally divided among the affected counties (e.g., if four counties were affected, then a quarter of the dollar losses, injuries, and deaths were attributed to each county). From 1995 to 2011 all events that were reported by the NCDC with a specific dollar amount are included in SHELDUS. SHELDUS contains information of 88 severe weather events that occurred in Sutter County between 1960 and 2011. These events are shown and summarized in Table 4.5.

Table 4.5. SHELDUS Severe Weather Report for Sutter County 1960 to 2011

Type	# of Events	Injuries	Deaths	Property Damage	Crop Damage
Flooding	7	1.96	0.64	$11,955,075.76	$1,637,840.91
Flooding - Severe Storm/Thunder Storm	1	0	0	$86,206.90	$0
Flooding - Severe Storm/Thunder Storm - Wind	1	0	0	0	$11,241,379.31
Flooding - Winter Weather	2	0.00	0.00	$19,345.24	$0
Fog	2	6.87	1.17	$383,333.33	$0
Hail - Severe Storm/Thunder Storm - Wind - Winter Weather	1	0.02	0.03	$86.21	$0.00
Heat	2	1.03	0	$0.00	$14,705.88
Lightning	3	0	0	$1,250.01	$0
Lightning - Severe Storm/Thunder Storm	2	0	0	$189.93	$292.21
Lightning - Wind - Winter Weather	1	0	0	$14.71	$14,705.88
Severe Storm/Thunder Storm	9	0.3	0.8	$885,731.82	$18,189.66
Severe Storm/Thunder Storm – Wind	10	1.44	0.77	$441,966.67	$4,382.18
Severe Storm/Thunder Storm - Wind - Winter Weather	3	0	0.03	$23,768.47	$8,620.69
Severe Storm/Thunder Storm - Winter Weather	1	0	0	$1,470.59	$0.00
Tornado	2	0	0	$85,000.00	$55,000.00
Wildfire – Wind	1	9.89	0	$36,777,777.78	$0.00
Wind	27	0.23	0.2	$1,177,251.77	$36,056.07
Wind - Winter Weather	2	0	0	$2,631.73	$0.15
Winter Weather	12	0.86	0.21	$308,877.11	$147,339,833.04
Totals	**89**	**22.6**	**3.85**	**$52,149,978.03**	**$160,371,005.98**

Source: SHELDUS

*Events may have occurred over multiple counties, so damage may represent only a fraction of the total event damage and may be not specific to Sutter County

The NCDC and SHELDUS tables above summarize severe weather events that occurred in Sutter County. Only a few of the events actually resulted in state and federal disaster declarations. It is further interesting to note that different data sources capture different events during the same time period, and often 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 Sutter County's state and federal disaster declarations have been a result of severe weather and related flooding. For this plan, severe weather is discussed in the following subsections:

- Extreme Cold/Freeze
- Extreme Heat
- Fog
- Heavy Rain, Hailstorm, Lightning, Wind
- Tornado

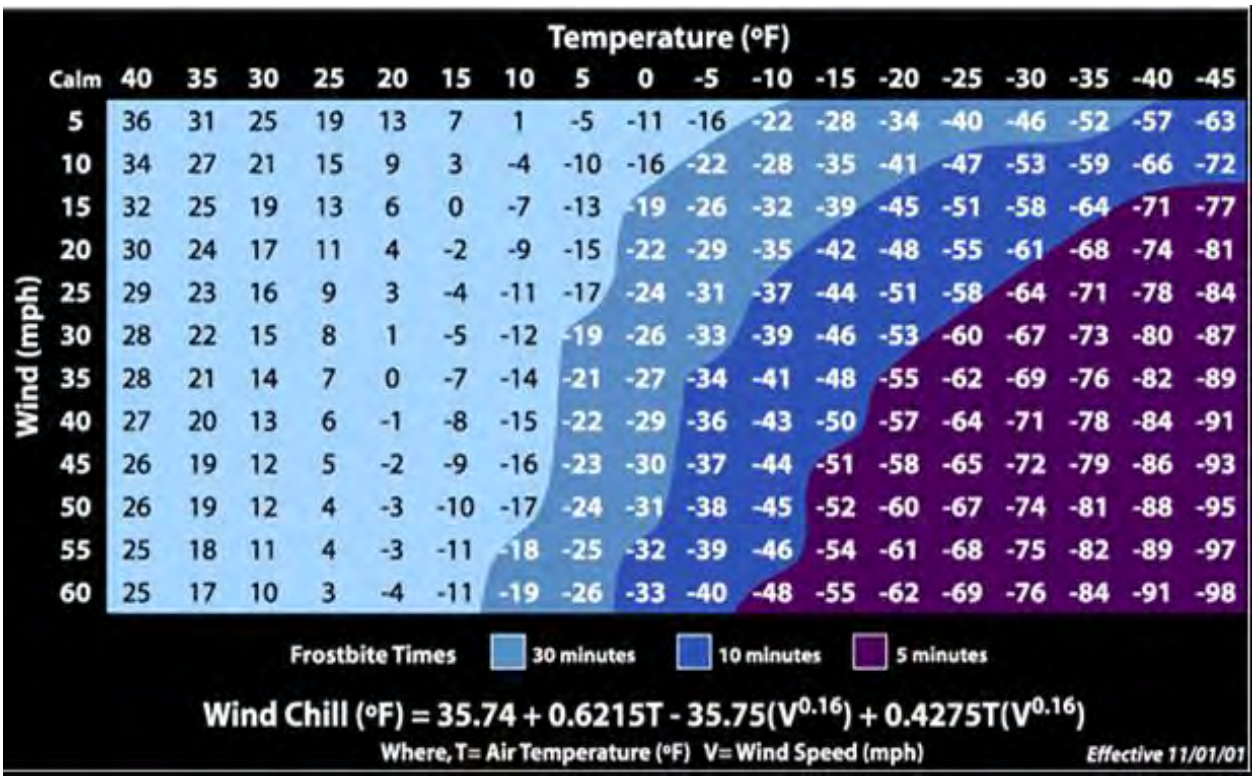
4.2.2 Severe Weather: Extreme Cold and Freeze

Hazard/Problem Description

Extreme cold and freeze often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. Prolonged exposure to the cold can cause frostbite or hypothermia and can become 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. Extreme cold can disrupt or impair communications facilities. Extreme cold can also affect the crops grown in Sutter County.

In 2001, the NWS implemented an updated Wind Chill Temperature index, 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 4.1. Wind Chill Temperature Chart



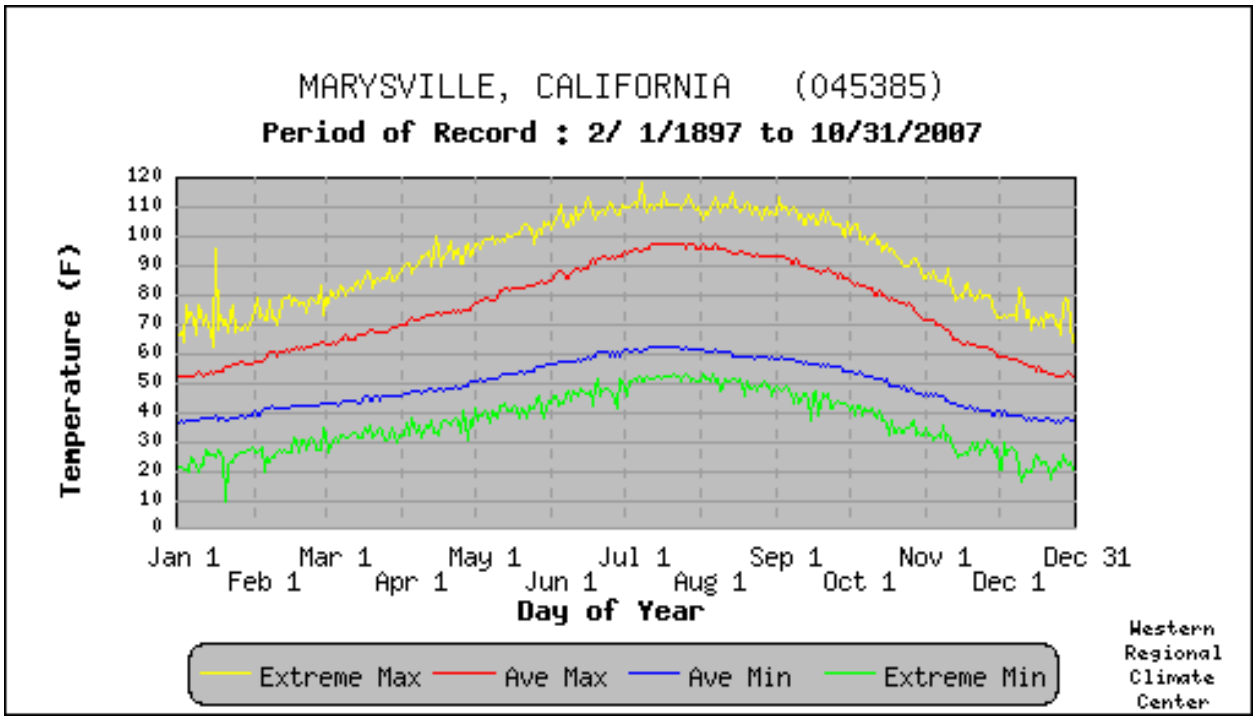
Source: National Weather Service

There are no COOP weather stations in the County. Information from the closest weather station is summarized below and in Figure 4.8.

Sutter County – Marysville Weather Station, Period of Record 1897 to 2007

In Sutter County, monthly average low temperatures in the coldest months (November through April) range from the upper 30s to the mid 40s. The lowest recorded daily extreme was 9°F on January 20, 1907. In a typical year, minimum temperatures fall below 32°F on 18.5 days and below 0°F on 0 days. Average and low temperatures are shown in Figure 4.8. Details of monthly low temps are shown in Table 4.8.

Figure 4.2. Sutter County Extreme Temperatures 1897 to 2007



Source: Western Regional Climate Center

Table 4.6. Record High Temperatures – Marysville Station

Month	Temperature	Date	Month	Temperature	Date
January	9°	1/20/1907	July	45°	7/2/1956
February	19°	2/5/1910	August	45°	8/30/1912
March	26°	3/2/1971	September	37°	9/15/1911
April	30°	4/28/1934	October	32°	10/17/1905
May	36°	5/7/1916	November	24°	11/14/1916
June	41°	6/28/1934	December	16°	12/10/1932

Source: Western Regional Climate Center

Past Occurrences

The NCDC data shows no extreme cold or freeze incidents for Sutter County since 1993. SHELDUS contains 5 events as shown in Table 4.7.

Table 4.7. Extreme Cold and Freeze Events in Sutter County 1960-2011

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
4/27/1970	0	0	$0.00	$11,627.91	Freeze
2/5/1989	0	0	$0.00	$128,205.13	Record Cold

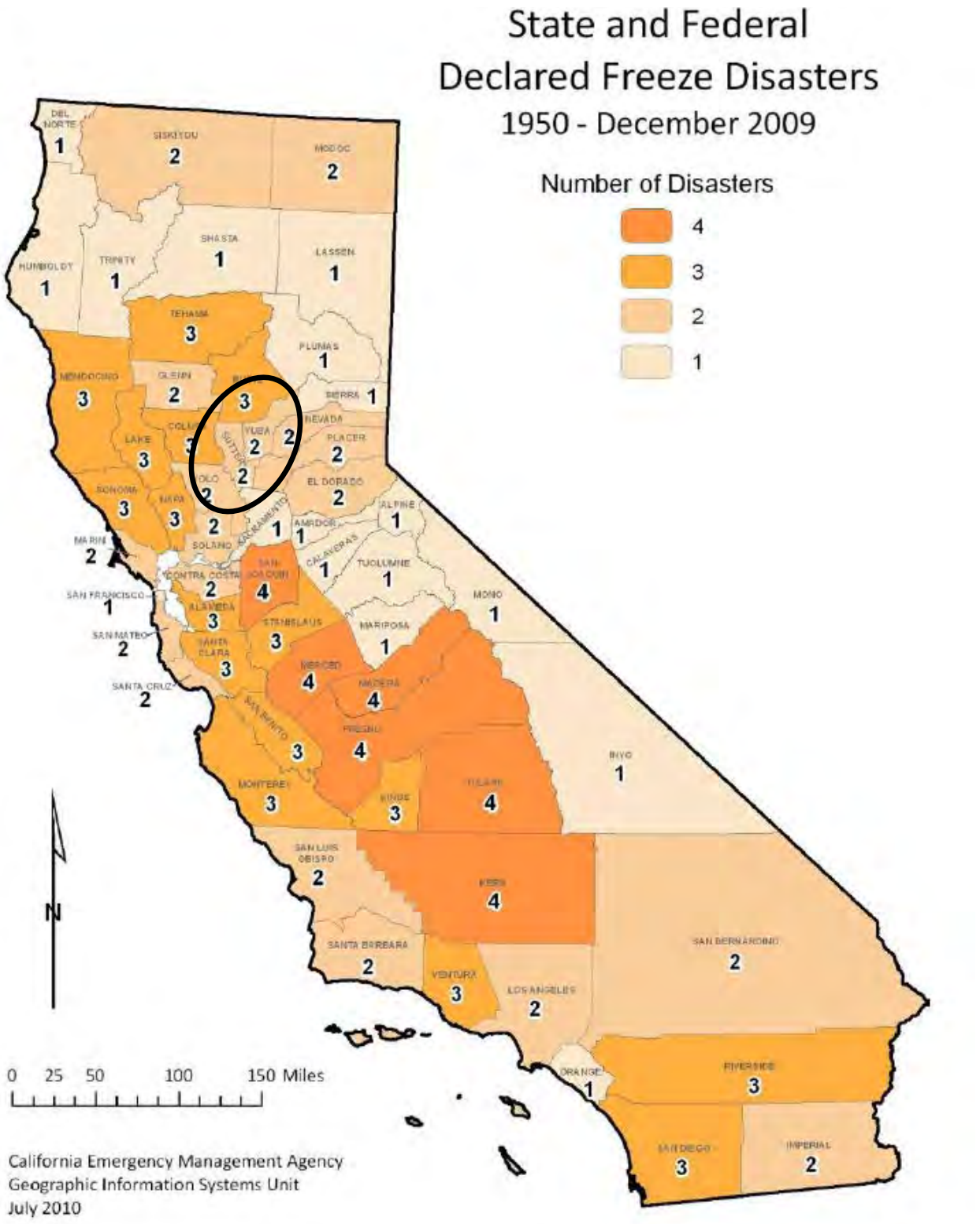
Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
12/20/1990*	0	0.09	$147,058.82	$147,058,823.53	Cold Wave
12/19/1998	0	0	$0.00	$141,176.47	Extreme Cold
1/14/2007	0	0	$57,142.86	$0.00	Frost/Freeze
Total	**0**	**0.9**	**$204,201.68**	**$147,339,833.04**	

Source: SHELDUS

*This event resulted in a state and federal disaster declaration. See Table 4.3.

Although freezes are infrequent, a freeze can severely affect agriculture in Sutter County. Figure 4.3 shows disaster declarations due to freeze in the County. The greatest concentrations are in the Central Valley of California. The disaster declarations for Sutter County were both issued in 1990 – one state and one federal disaster declaration.

Figure 4.3. State and Federal Declared Freeze Disasters from 1950 to 2009



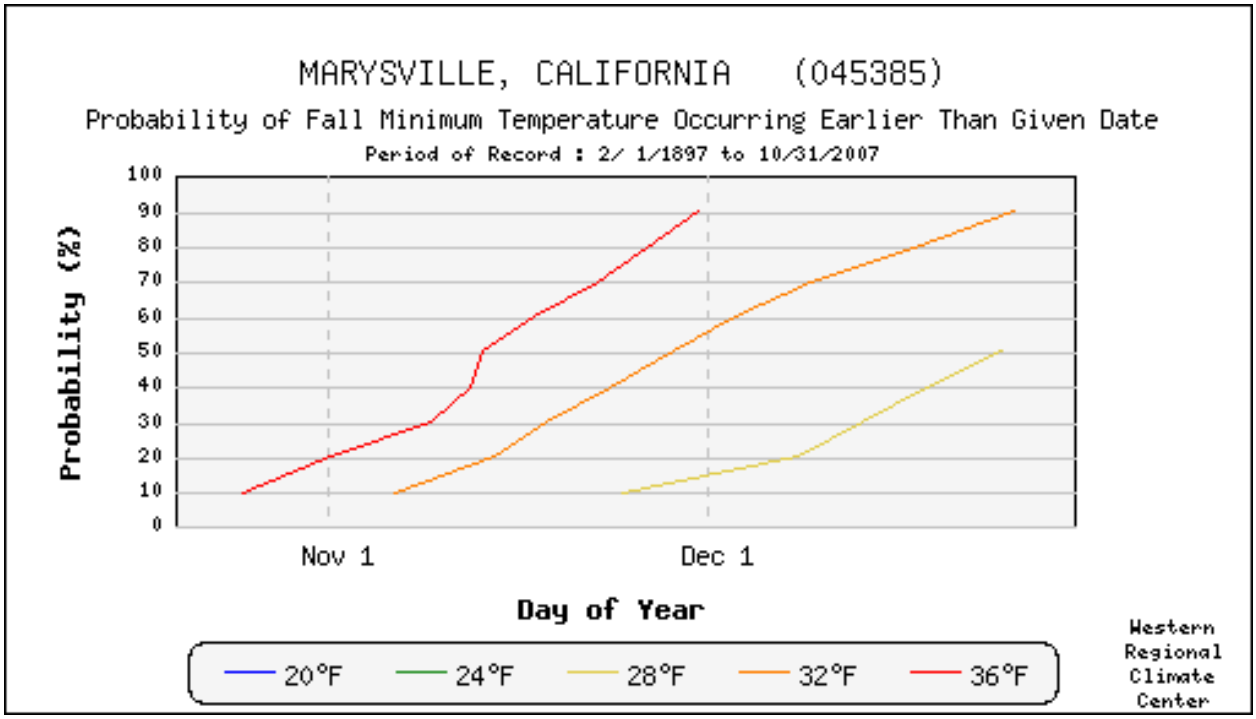
Source: Cal EMA

Likelihood of Future Occurrences

Likely—5 winter storm and freeze events occurred in Sutter County over 52 years (1960-2011) of record keeping which equates to one event every 10.4 years, on average, and a 9.6 percent chance of winter storm or extreme cold occurring in any given year.

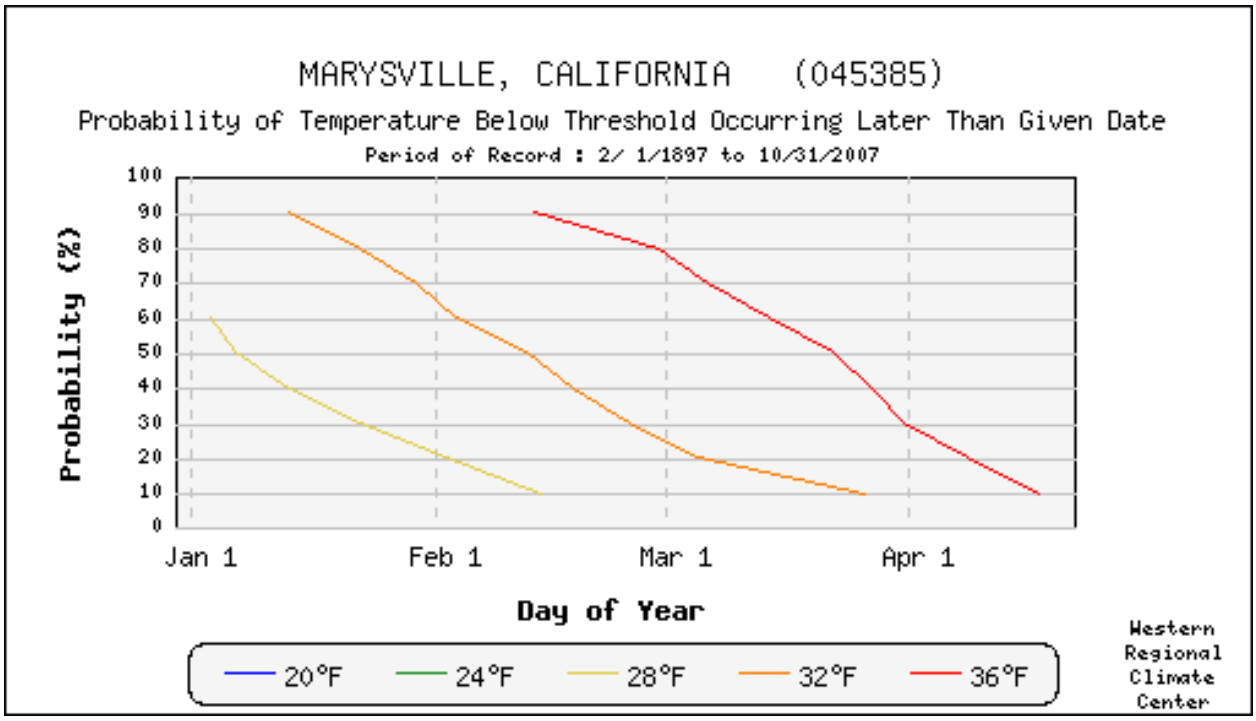
Temperature extremes are likely to continue to occur annually in the Sutter County Planning Area. Figures 4.4 and 4.5 indicate the likelihood of freezing temperatures in the County in the fall and the spring.

Figure 4.4. Marysville Station Fall Freeze Probability



Source: Western Regional Climate Center

Figure 4.5. Marysville Station Spring Freeze Probability



Source: Western Regional Climate Center

Climate Change and Freeze

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 2009, 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.

4.2.3 Severe Weather: Extreme Heat

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. According to the National Weather Service (NWS), among natural hazards, only the cold of winter—not lightning, hurricanes, tornados, floods, or earthquakes—takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat. In the heat wave of 1980, more than 1,250 people died.

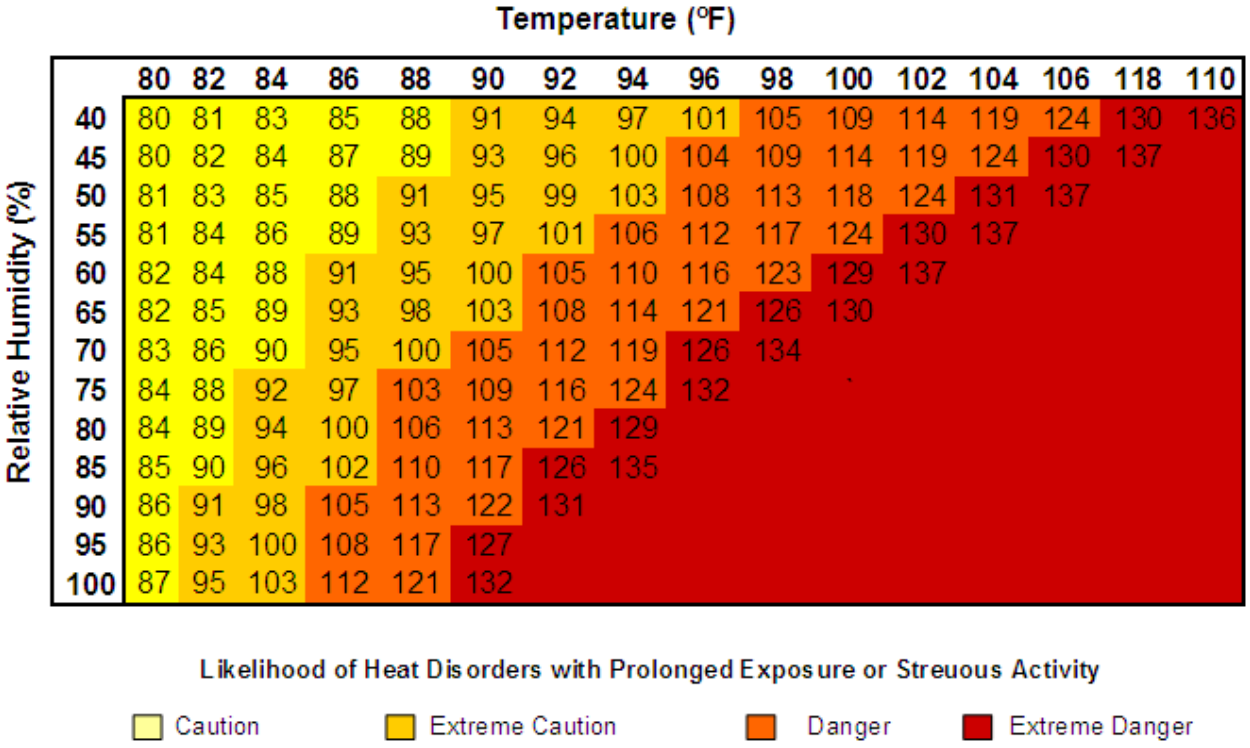
Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise and heat-related illness may develop. Elderly persons, small children, chronic invalids, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails.

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 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 more deadly. According to the 2010 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. Severe heat in California often causes rolling blackouts. These blackouts have occurred in the past (namely 2001 and 2002) and can increase the risk of injury or death.

Figure 4.6 and Figure 4.7 show the Heat Index (HI) as a function of heat and relative humidity. The Heat Index describes how hot the heat-humidity combination makes it feel. As relative humidity increases, the air seems warmer than it actually is because the body is less able to cool itself via evaporation of perspiration. As the HI rises, so do health risks.

- When the HI is 90°F, heat exhaustion is possible with prolonged exposure and/or physical activity.
- When it is 90°-105°F, heat exhaustion is probable with the possibility of sunstroke or heat cramps with prolonged exposure and/or physical activity.
- When it is 105°-129°F, sunstroke, heat cramps or heat exhaustion is likely, and heatstroke is possible with prolonged exposure and/or physical activity.
- When it is 130°F and higher, heatstroke and sunstroke are extremely likely with continued exposure. Physical activity and prolonged exposure to the heat increase the risks.

Figure 4.6. Heat Index



Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	118	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Source: National Weather Service

Note: Since HI values were devised for shady, light wind conditions, exposure to full sunshine can increase HI values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

Figure 4.7. Possible Heat Disorders by Heat Index Level

Heat Index	Category	Possible heat disorders for people in high risk groups
130°F or higher	Extreme Danger	Heatstroke risk extremely high with continued exposure.
105° - 129°F	Danger	Sunstroke, Heat Cramps and Heat Exhaustion likely, Heatstroke possible with prolonged exposure and/or physical activity.
90° - 105°F	*Extreme Caution*	*Sunstroke, Heat Cramps and Heat Exhaustion possible with prolonged exposure and or physical activity.*
80° - 90 °F	Caution	Fatigue possible with prolonged exposure and/or physical activity.

Source: National Weather Service

The NWS has in place a system to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for the issuance of excessive heat alerts is when the maximum daytime high is expected to equal or exceed 105°F and a nighttime minimum high of 80°F or above is expected for two or more consecutive days. The NWS office in Sacramento can issue the following heat-related advisory as conditions warrant.

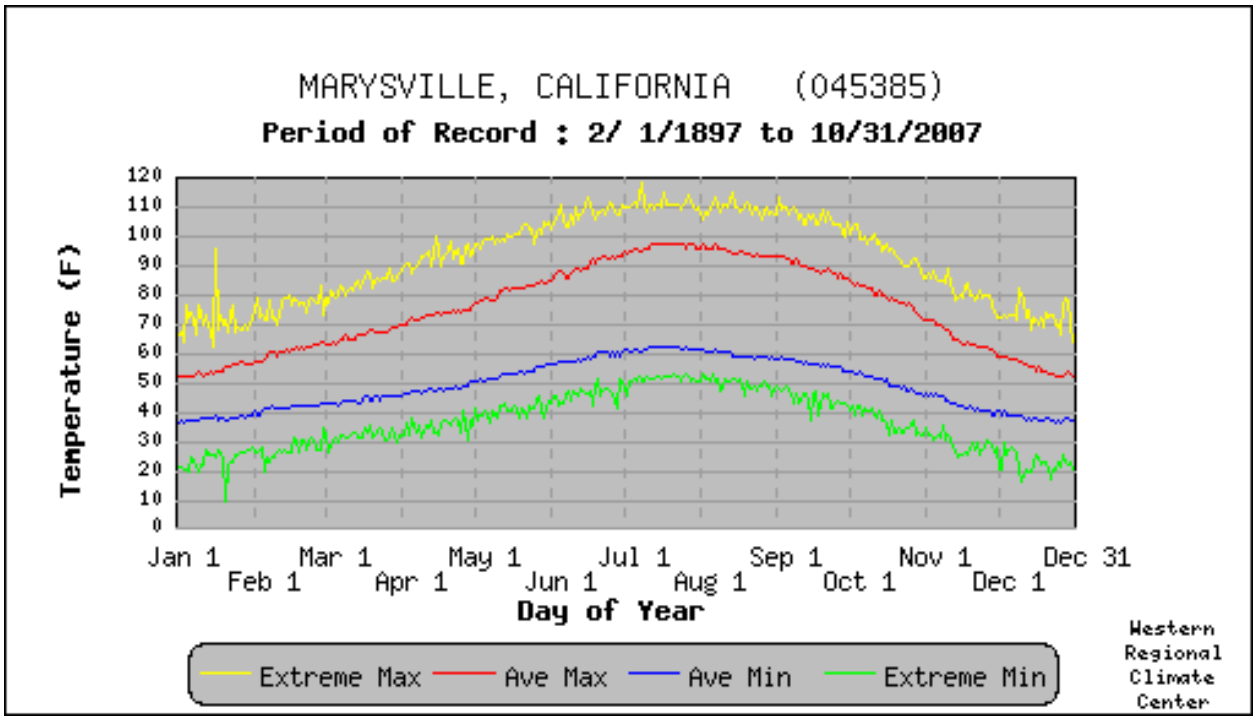
- **Excessive Heat Outlook**: are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to Heat Index forecast map for the contiguous United States those who need considerable lead time to prepare for the event, such as public utilities, emergency management and public health officials.
- **Excessive Heat Watch**: is issued when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A Watch is used when the risk of a heat wave has increased, but its occurrence and timing is still uncertain. A Watch provides enough lead time so those who need to prepare can do so, such as cities that have excessive heat event mitigation plans.
- **Excessive Heat Warning/Advisory:** are issued when an excessive heat event is expected in the next 36 hours. These products are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurring. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property.

There are no COOP weather stations in the County. Information from the closest weather station is summarized below and in Figure 4.8.

Sutter County – Marysville Weather Station, Period of Record 1897 to 2007

In Sutter County, monthly average maximum temperatures in the warmest months (May through October) range from the low 50s to the high 80s. The highest recorded daily extreme was 118°F on July 8, 1905. In a typical year, maximum temperatures exceed 90°F on 91.5 days. . Average and high temperatures are shown in Figure 4.8. Details of monthly high temps are shown in Table 4.8.

Figure 4.8. Sutter County Extreme Temperatures 1897 to 2007



Source: Western Regional Climate Center

Table 4.8. Record High Temperatures – Marysville Station

Month	Temperature	Date	Month	Temperature	Date
January	96°	1/16/1907	July	118°	7/08/1905
February	83°	2/28/1985	August	115°	8/14/1933
March	89°	3/27/1988	September	113°	9/2/1950
April	100°	4/15/1947	October	104°	10/3/2001
May	105°	5/29/1910	November	89°	11/10/1955
June	113°	6/16/1961	December	82°	12/9/1909

Source: Western Regional Climate Center

Past Occurrences

The NCDC data shows no extreme heat incidents for Sutter County since 1993, while SHELDUS reports two, which are shown in Table 4.9.

Table 4.9. SHELDUS Extreme Heat Events in Sutter County 1960 to 2011

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
6/13/1961	0	0	$0.00	$14,705.88	HEAT
8/13/1992	1.03	0	$0.00	$0.00	Heat Wave

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
Total	**1.03**	**0**	**$0.00**	**$14,705.88**	

Source: SHELDUS

These databases may not give a full and accurate depiction of extreme heat in Sutter County. Generally extreme heat events in Sutter County are short lived, thus the effects of extreme heat to area residents can be managed through public education activities and the use of area cooling centers. However, extreme heat can be a significant concern to the agricultural industry in the County.

Likelihood of Future Occurrences

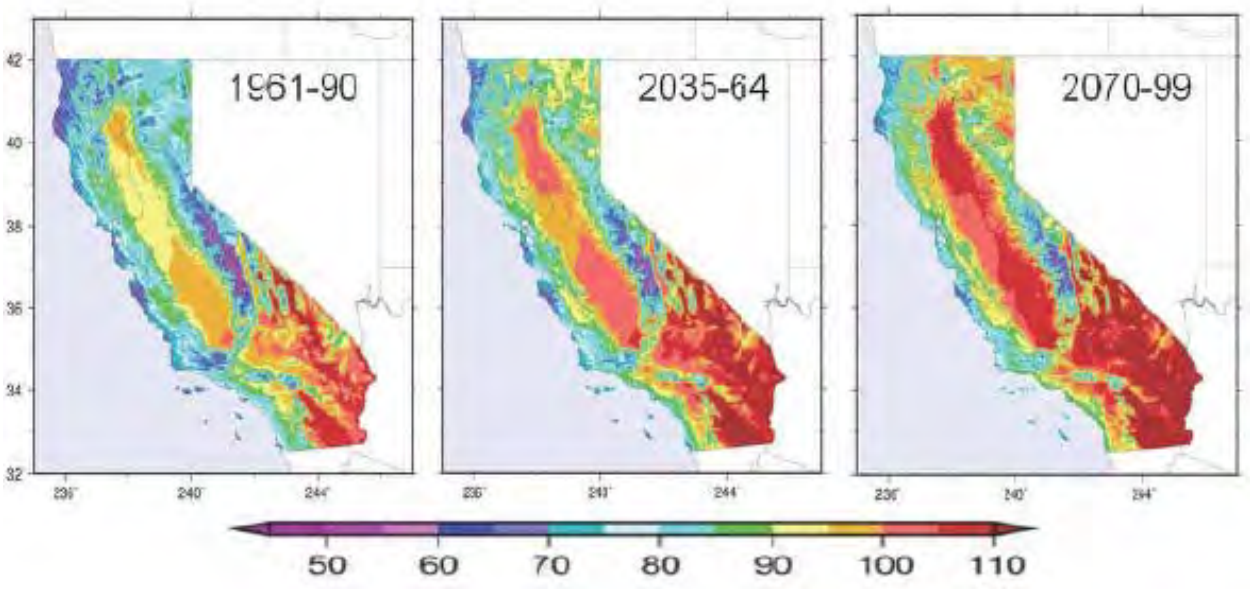
Highly Likely—Although only two past events were recorded in national databases, data from the Western Regional Climate Center indicates that high temperatures will continue to occur in the Planning Area on an annual basis; thus the likelihood of future occurrence is highly likely.

Climate Change and Extreme Heat

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."[1] 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. This is shown in Figure 4.9.

[1] California Climate Adaptation Strategy, California Natural Resources Agency, December 2009, p. 32; Messner, Steven, Sandra C. Miranda, Karen Green, Charles Phillips, Joseph Dudley, Dan Cayan, Emily Young (2009). Climate Change Related Impacts in the San Diego Region by 2050. PIER Research Report, CEC-500-2009-027-D, Sacramento, CA: California Energy Commission.

Figure 4.9. California Historical and Projected Temperature Increases - 1961 to 2099



Source: Dan Cayan; California Climate Adaptation Strategy

As temperatures increase, California and Sutter 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 CAS report and the 2010 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).

4.2.4 Severe Weather: Fog

Hazard/Problem Description

Fog is a collection of water droplets or ice crystals suspended in the air at or near the Earth's surface. Fog results from air being cooled to the point where it can no longer hold all of the water vapor it contains. Fog can form in a number of ways, depending on how the cooling that caused the condensation occurred. The most common types in Sutter County are radiation and advection fog.

Radiation Fog

This type of fog forms at night under clear skies with calm winds when heat absorbed by the earth's surface during the day is radiated into space. As the earth's surface continues to cool, provided a deep enough layer of moist air is present near the ground, the humidity will reach 100% and fog will form. Radiation fog varies in depth from 3 feet to about 1,000 feet and is always found at ground level and usually remains stationary. This type of fog can reduce visibility to near zero at times and make driving very hazardous.

One of the most dangerous types of radiation fog unique to the Planning Area is tule fog. It forms on clear nights when the ground is moist and the wind is near calm. On nights like this, the ground cools rapidly. In turn, the moist air above it cools and causes water vapor to condense. Once it has formed, the air must be heated enough to either evaporate the fog or lift it above the surface so that visibilities improve. It can cover large areas, as seen in Figure 4.10, with Sutter County's location approximated with the black oval. The fog layer in tule fog often builds to several hundred feet thick and can effectively block out incoming sunlight.

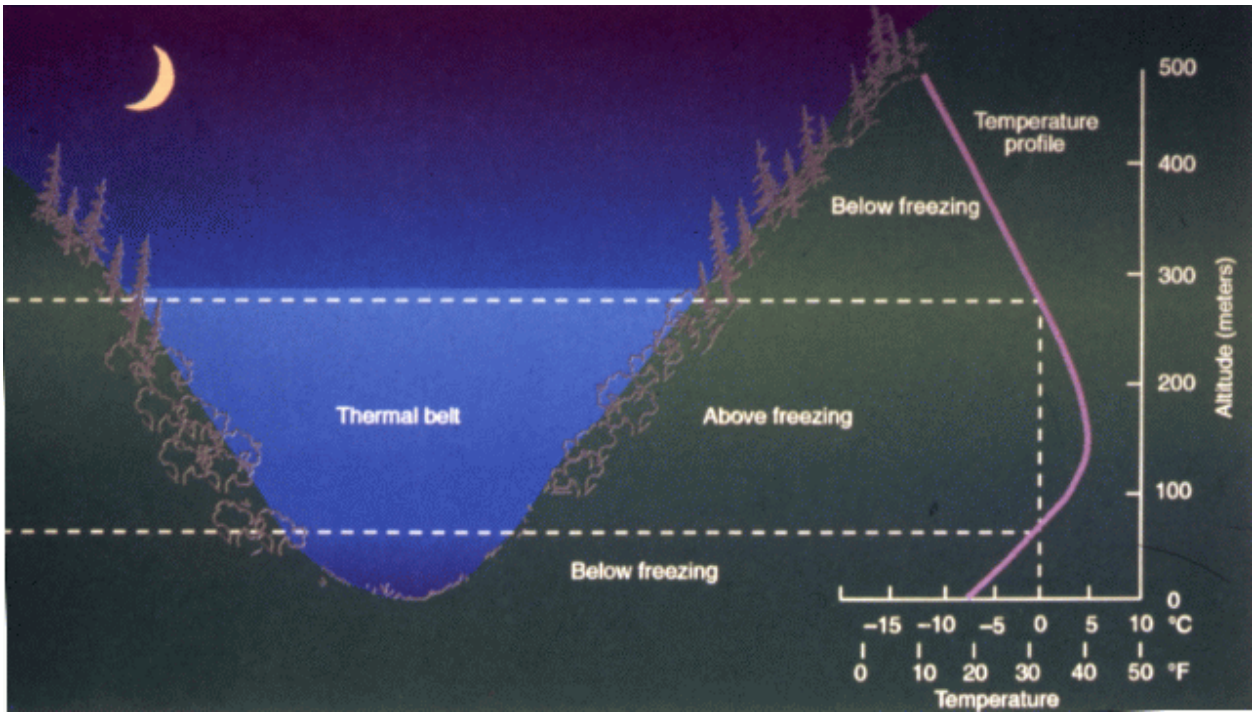
Figure 4.10. Tule Fog in the Central and San Joaquin Valley of California

Source: University of California Santa Barbara Department of Geology. http://www.geog.ucsb.edu/~joel/g110_w08/lecture_notes/california_fog/california_tulefog_sm.jpg

The Great Valley of California (the Sacramento and San Joaquin Valleys) is essentially a closed air basin. Therefore the introduction of moisture is not removed from the valley air basin unless

pushed or lifted out by atmospheric processes. By the late fall, cool season frontal passages begin to bring rain to the valley floor thereby adding low-level atmospheric moisture. High pressure building aloft behind frontal passages after a significant rain event provides moisture at low atmospheric levels, light wind, clear skies, and a temperature inversion aloft. This can be seen in Figure 4.11.

Figure 4.11. Temperature Inversion Affecting Fog in Valleys like Sacramento Valley



Source: University of California Santa Barbara Department of Geology. http://www.geog.ucsb.edu/~joel/g110_w08/lecture_notes/california_fog/fig_03_17.gif

This inversion limits vertical air movement from the valley air basin. Radiational cooling of the ground during the long nights cools the adjacent air and forms fog as temperatures reach dew points. The lack of strong sunshine during the fall and winter daytime hours does not provide sufficient incoming energy to always evaporate the overnight fog development. Thus fog can and does last several days at a time until the atmosphere provides some form of additional drying or mixing. The combination of the previous mentioned parameters and circumstances provides for a rather dense fog where visibility is often limited to mere feet. It is situations like these that often lead to multi-car accidents where one car follows another into a fog bank. Another area prone to fatal accidents is intersections across major roads or heavily traveled roads, where the cross traffic does not have to stop.

Advection Fog

Advection fog often looks like radiation fog and is also the result of condensation. However, the condensation in this case is caused not by a reduction in surface temperature, but rather by the

horizontal movement of warm moist air over a cold surface. This means that advection fog can sometimes be distinguished from radiation fog by its horizontal motion along the ground.

The fog season in Sutter County is typically in the late fall and winter (November through March). Fog typically forms rapidly in the early morning hours. Fog can have devastating effects on transportation corridors in the County. Severe fog incidents can close roads, cause accidents, and impair the effectiveness of emergency responders. These accidents can cause multiple injuries and deaths and can have serious implications for human health and the environment if a hazardous or nuclear waste shipment is involved.

Past Occurrences

The NCDC data shows no severe fog incidents for Sutter County since 1993. The SHELDUS database shows two events of fog in Sutter County. These are shown in Table 4.10.

Table 4.10. SHELDUS Fog Events for Sutter County 1960 to 2011

Begin Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
12/11/1997	5.2	1	$300,000.00	$0.00	Fog
12/18/1998	1.67	0.17	$83,333.33	$0.00	Fog
Total	**6.87**	**1.17**	**$383,333.33**	**$0.00**	

Source: SHELDUS

Likelihood of Future Occurrences

Occasional—Based on the SHELDUS data, 2 major fog incidents over a 52-year period (1960-2011) equates to a major fog event every 26 years and a 3.8 percent chance of a major fog event in any given year. However, these numbers only reflect SHELDUS data. Based on input from the HMPC, it is likely that major fog events will continue to occur annually in Sutter County; thus the future occurrence of severe fog should be highly likely.

4.2.5 Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind

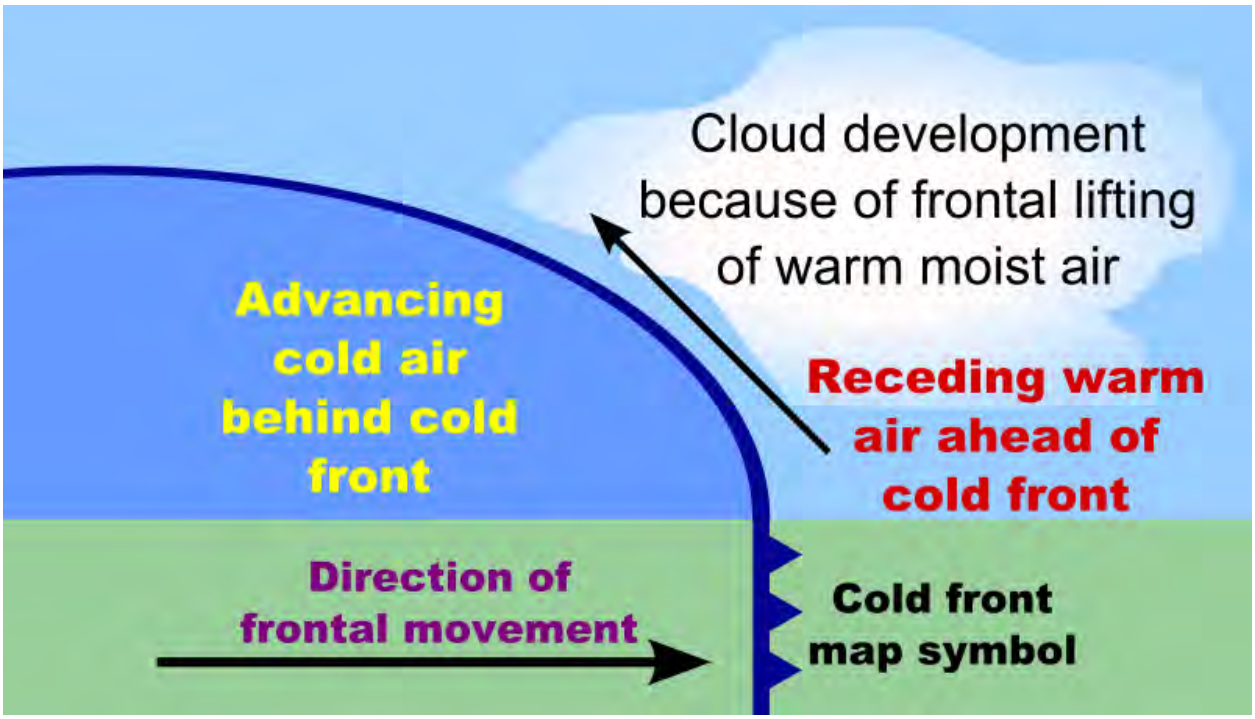
Hazard/Problem Description

Storms in the Sutter County Planning Area 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 Sutter County area falls mainly in the fall, winter, and spring months. Heavy precipitation in the Sutter County area falls mainly in the fall, winter, and spring months.

Heavy Rain and Thunderstorms

Thunderstorms result from the rapid upward movement of warm, moist air (see Figure 4.12). They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, its 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.

Figure 4.12. Formation of a Thunderstorm



Source: NASA. http://rst.gsfc.nasa.gov/Sect14/Sect14_1c.html

Hail

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 Sutter 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 4.11 indicates the hailstone measurements utilized by the National Weather Service.

Table 4.11. Hailstone Measurements

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
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

Lightning

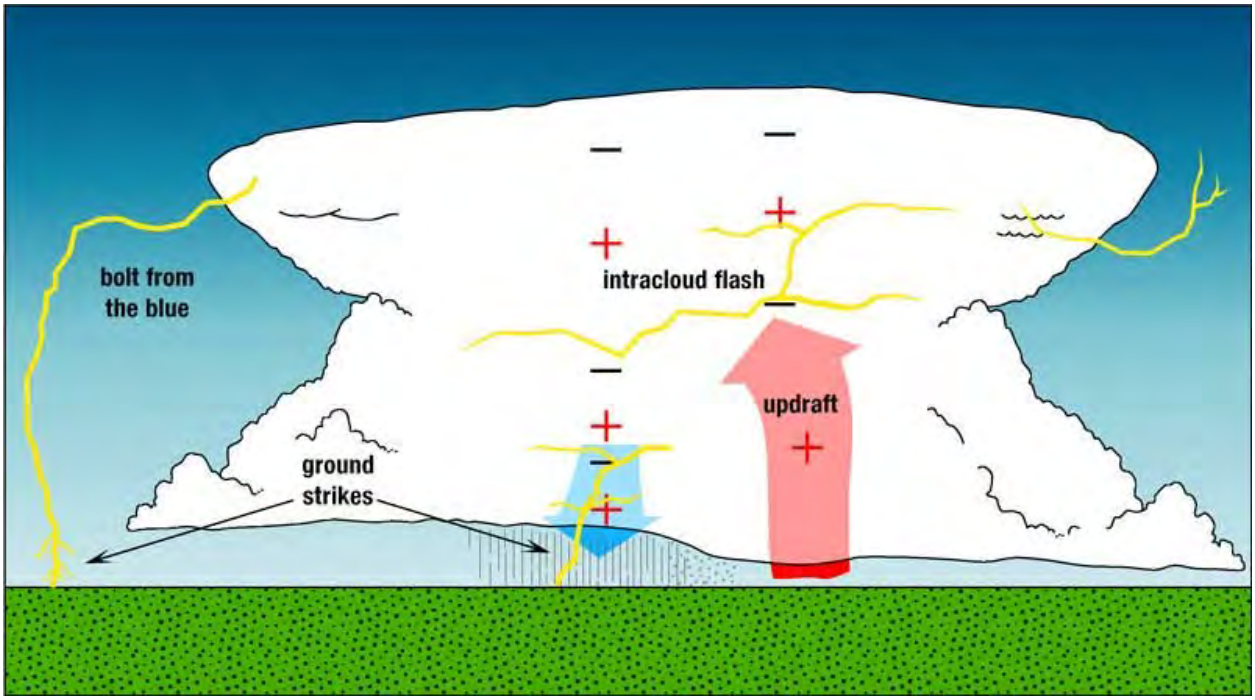
Lightning is defined as any and all of the various forms of visible electrical discharge caused by thunderstorms. Thunderstorms and lightning are usually (but not always) accompanied by rain. Cloud-to-ground lightning can kill or injure people by direct or indirect means. Objects can be struck directly, 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 4.13). 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 4.13. Cloud to Ground Lightning



Source: National Weather Service

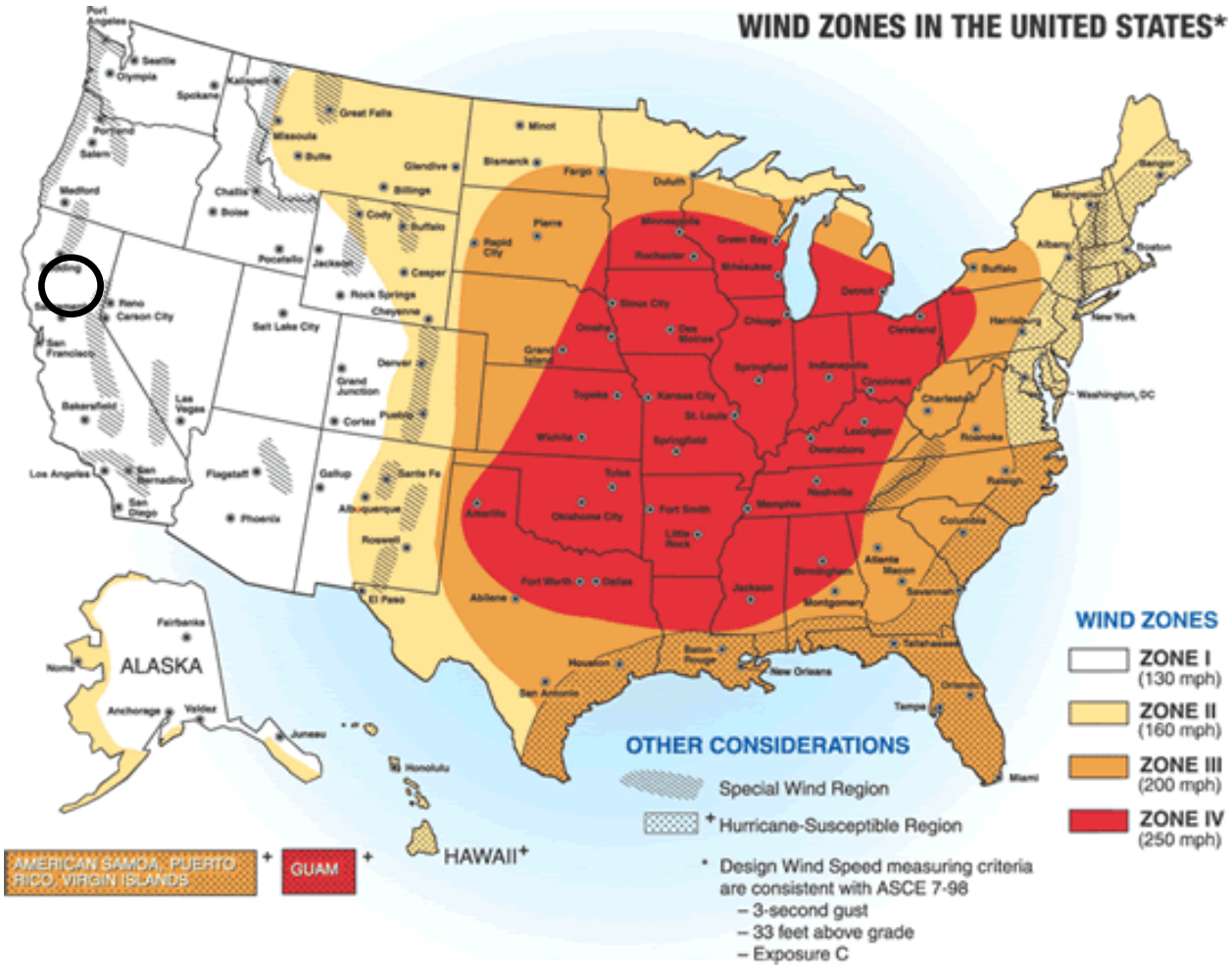
Winds

High winds, often accompanying severe thunderstorms, can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss.

The Planning Area is subject to significant, non-tornadic (straight-line), winds. 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 affect 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.

Figure 4.14 depicts wind zones for the United States. The map denotes that Sutter County falls into Zone I, which is characterized by high winds of up to 130 mph.

Figure 4.14. Wind Zones in the United States



Source: Federal Emergency Management Agency

Tornadoes (see Section 4.2.6 Tornado) and funnel clouds can also occur during these types of storms.

Past Occurrences

Heavy rains and severe storms occur in the Planning Area primarily during the late fall, winter, and spring (i.e., November through April). Damaging winds often accompany winter storm systems moving through the area.

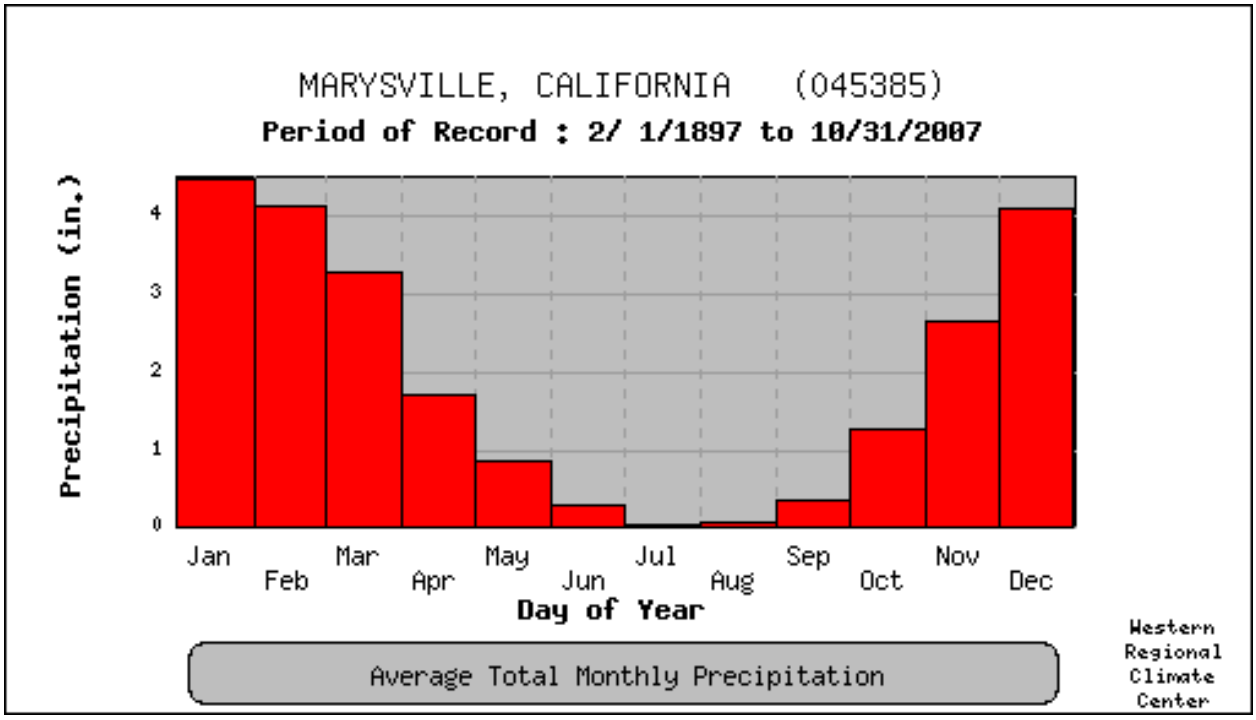
According to the HMPC, short-term, heavy storms can cause both widespread flooding as well as extensive localized drainage issues. With the increased growth of the area, the lack of adequate drainage systems has become an increasingly important issue. In addition to the flooding that often occurs during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

Information from the closest weather station is summarized below and in Figures 4.15-4.16.

Marysville Weather Station, Period of Record 1897 to 2007

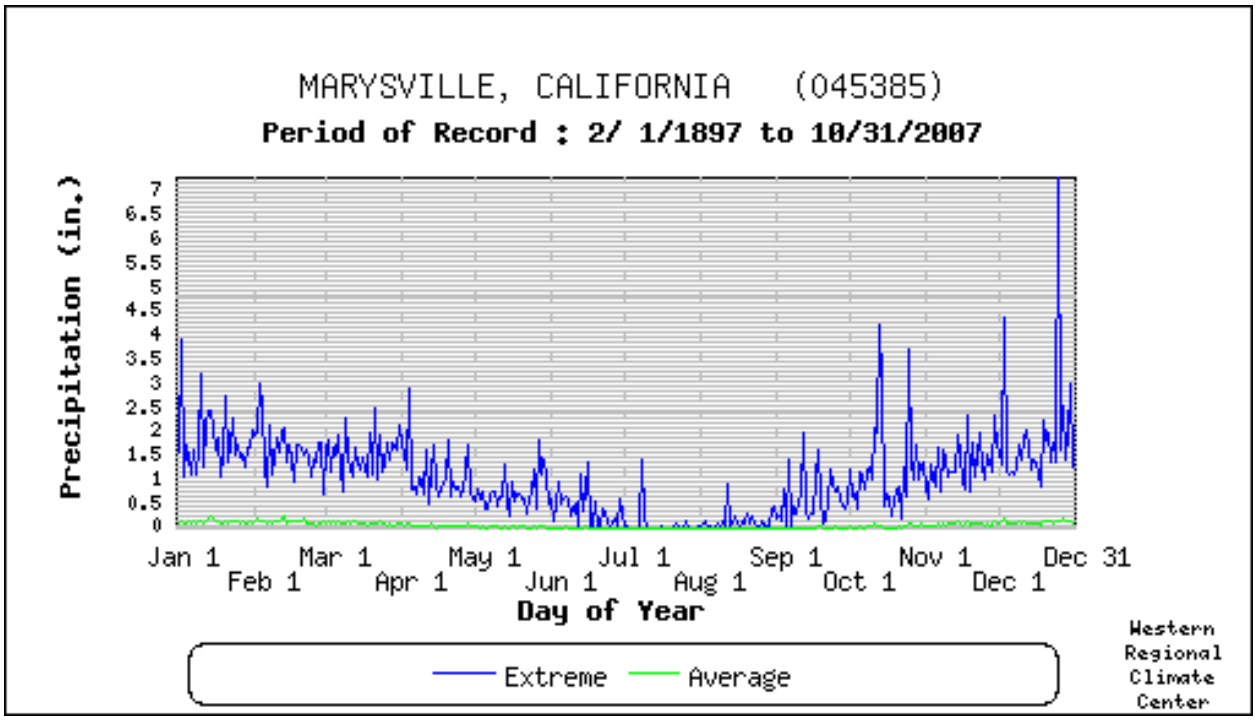
There are no coop weather stations with data in Sutter County. As such, the closes weather station was used. The closes weather station with available data is in Marysville, in Amador County. Average annual precipitation at the Marysville Station is 23.19 inches per year. The highest recorded annual precipitation is 46.26 inches in 1983. The lowest recorded annual precipitation was 7.41 inches in 1976. Average monthly precipitation totals for this station are shown in Figure 4.15. Precipitation extremes for this station are shown in Figure 4.16.

Figure 4.15. Marysville Weather Station Monthly Average Total Precipitation



Source: Western Regional Climate Center

Figure 4.16. Marysville Weather Station Daily Precipitation Average and Extremes



Source: Western Regional Climate Center

Thunderstorms, lightning, hail, and wind in Sutter County are few in number and usually occur in the late fall or in the spring. 64 specific events were detailed by HMPC members or the SHELDUS database (see Table 4.12).

Table 4.12. Incidences of Heavy Rain, Hail, Lightning, and Winds in Sutter County from 1960 – 2011

Hazard Begin Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
2/1/1960	Severe Storm/Thunder Storm - Wind	0.03	0.09	$1,470.59	$0.00	Wind, rain
2/7/1960	Severe Storm/Thunder Storm - Wind	0.06	0.06	$10,416.67	$10.42	Rain, wind
6/20/1960	Wind	0	0	$250.00	$25,000.00	Wind
9/2/1960	Severe Storm/Thunder Storm	0.03	0	$13,888.89	$0.00	Thunderstorms
9/9/1960	Severe Storm/Thunder Storm	0	0	$14.71	$0.00	Thunderstorms
10/9/1960	Wind	0.02	0.03	$86.21	$0.00	Wind
10/16/1960	Wind	0	0	$1,136.36	$0.00	Wind
3/16/1961	Wind	0	0	$862.09	$0.00	Wind
4/22/1961	Lightning - Wind - Winter Weather	0	0	$14.71	$14,705.88	Frost, wind, lightning

Hazard Begin Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
7/12/1961	Severe Storm/Thunder Storm	0.07	0	$17.86	$0.00	Thunderstorms
8/11/1961	Severe Storm/Thunder Storm	0	0	$86.21	$862.07	Thunderstorms
10/7/1961	Wind	0	0.03	$862.07	$0.00	Wind
10/28/1961	Wind	0	0	$113.64	$0.00	Wind
2/7/1962	Severe Storm/Thunder Storm - Wind	0.26	0.35	$86,206.90	$0.00	Wind and rain
3/2/1962	Hail - Severe Storm/Thunder Storm - Wind - Winter Weather	0.02	0.03	$86.21	$0.00	Wind, rain, snow, glaze, and hail
7/11/1962	Lightning	0	0	$104.17	$0.00	Lightning
8/7/1962	Lightning - Severe Storm/Thunder Storm	0	0	$178.57	$178.57	Rain and Lightning
9/12/1963	Lightning - Severe Storm/Thunder Storm	0	0	$11.36	$113.64	Rain and lightning
10/11/1963	Severe Storm/Thunder Storm - Wind	0	0	$14.71	$14.71	Rain and wind
7/16/1965	Severe Storm/Thunder Storm	0	0	$86.21	$0.00	Thundershowers
7/24/1965	Lightning	0	0	$1,041.67	$0.00	Lightning
8/10/1965	Severe Storm/Thunder Storm	0.03	0	$862.07	$8,620.69	Thundershowers
8/16/1965	Severe Storm/Thunder Storm	0	0	$86.21	$86.21	Thundershowers
9/16/1965	Wind	0	0	$14,705.88	$1,470.59	North wind
11/14/1965	Severe Storm/Thunder Storm	0	0.02	$8,620.69	$0.00	Heavy rain
12/28/1965	Severe Storm/Thunder Storm - Wind	0	0	$862.07	$0.00	Rain and wind
1/15/1966	Wind	0	0.05	$11,363.64	$113.64	High wind
1/20/1967	Severe Storm/Thunder Storm - Wind	0.07	0.02	$8,620.69	$86.21	Rain and wind
3/12/1967	Severe Storm/Thunder Storm - Wind - Winter Weather	0	0	$862.07	$0.00	Snow, wind, rain
11/18/1967	Lightning	0	0	$104.17	$0.00	Lightning
12/12/1967	Severe Storm/Thunder Storm - Wind - Winter Weather	0	0.03	$8,620.69	$8,620.69	Wind, rain, snow, and cold
1/29/1968	Severe Storm/Thunder Storm - Winter Weather	0	0	$1,470.59	$0.00	Rain and snow
1/18/1969	Severe Storm/Thunder Storm	0.17	0.78	$862,068.97	$8,620.69	Heavy rain
1/8/1970	Severe Storm/Thunder Storm - Wind	0	0	$10,416.70	$0.00	Rain and wind

Hazard Begin Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
1/16/1973	Flooding - Severe Storm/Thunder Storm	0	0	$86,206.90	$0.00	Heavy rains, floods
12/23/1979	Severe Storm/Thunder Storm - Wind - Winter Weather	0	0	$14,285.71	$0.00	Rain, snow, wind
1/9/1980	Severe Storm/Thunder Storm - Wind	0	0	$1,041.67	$1,041.67	High winds/heavy rain
12/22/1982	Wind	0.21	0.06	$1,041,666.67	$104.17	Wind
2/26/1983	Severe Storm/Thunder Storm - Wind	0.08	0	$10,416.67	$104.17	Heavy rain, wind
12/3/1983	Severe Storm/Thunder Storm - Wind	0.94	0.25	$312,500.00	$3,125.00	Wind, heavy rain
3/4/1987	Wind	0	0	$4,545.45	$4,545.45	High winds
2/17/1988	Wind	0	0.03	$8,620.69	$0.00	Wind
3/27/1988	Wind	0	0	$454.55	$0.00	Strong winds
12/14/1988	Wind	0	0	$454.55	$0.00	Strong winds
12/8/1992	Wind - Winter Weather	0	0	$2,631.58	$0.00	Winter storm, high wind
1/19/1993	Wind - Winter Weather	0	0	$0.15	$0.15	Winter storm, high wind
2/19/1993	Wind	0	0	$833.33	$0.00	High winds
3/1/1995	Flooding - Severe Storm/Thunder Storm - Wind	0	0	$0.00	$11,241,379.31	Flood, rain, winds
2/7/1998	Wind	0	0	$17,647.06	$0.00	High wind
6/16/1998	Wind	0	0	$1,000.00	$0.00	High wind
10/16/1998	Wind	0	0	$9,090.91	$0.00	High wind
11/7/1998	Wind	0	0	$41,176.47	$0.00	High wind
2/6/1999	Wind	0	0	$3,846.15	$0.00	High wind
2/9/1999	Wind	0	0	$7,000.00	$0.00	High wind
4/3/1999	Wind	0	0	$1,333.33	$2,600.00	High wind
4/22/1999	Wind	0	0	$1,538.46	$0.00	High wind
2/11/2000	Wind	0	0	$555.56	$2,222.22	High wind
10/21/2000	Wind	0	0	$1,739.13	$0.00	High wind
2/7/2001	Wind	0	0	$1,500.00	$0.00	
1/4/2008	Wind	0	0	$4,869.57	$0.00	High wind

Source: SHELDUS

Likelihood of Future Occurrences

Highly Likely – Based on SHELDUS data and HMPC input, 65 heavy rain, hail, lightning, and thunderstorm wind incidents over a 51-year period (1960-2011) equates to a severe storm event every years and a 100 percent chance of a severe storm in any given year. This database doesn't

report all heavy rain, hail, lightning, and wind events. Severe weather, is a well-documented seasonal occurrence that will continue to occur annually in the Sutter County Planning Area.

4.2.6 Severe Weather: Tornado

Hazard/Problem Description

Tornadoes are another severe weather hazard that can affect the Sutter 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 4.17 illustrates the potential impact and damage from a tornado.

Figure 4.17. Potential Impact and Damage from a Tornado

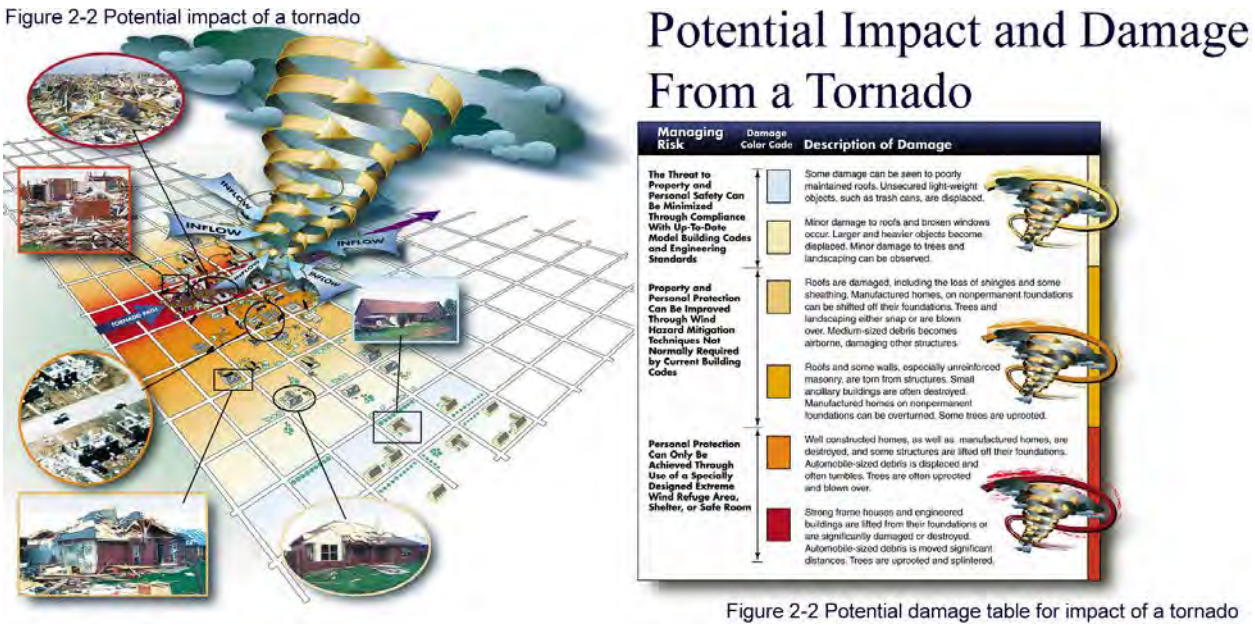


Figure 2-2 Potential damage table for impact of a tornado

Source: FEMA: Building Performance Assessment: Oklahoma and Kansas 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 takes into account the materials affected and the construction of structures damaged by a tornado. Table 4.13 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at

different levels of intensity. Table 4.14 shows the wind speeds associated with the Enhanced Fujita Scale ratings.

Table 4.13. 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.
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 4.14. Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/ef-scale.html

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, 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.

According to the National Weather Service Sacramento Office, compared to the area east of the Rocky Mountains, tornado occurrence over the western United States is much less frequent. However, climatological studies reveal certain subregions throughout the west where there is a significant increase in tornado occurrence. Two of the regions are in California: the Los Angeles

area, and the Central Valley of California comprising the Sacramento and San Joaquin Valleys. Comparative climatological studies show that most California tornadoes are relatively weak (F0 or F1 intensity) and have relatively short path lengths, with median values 0.62 miles long and 43 yards wide compared to 4 miles long and 170 yards for Iowa tornadoes. Also, the vast majority of California tornadoes occur during the cool season and primarily between 1 PM and 3 PM local time.

Past Occurrences

During the rainy season, the Sutter County Planning Area is prone to relatively strong thunderstorms, sometimes accompanied by funnel clouds and tornadoes. While tornadoes do occur occasionally, most often they are of F0 or F1 intensity. Documented incidents of both funnel clouds and tornadoes in the Sutter County Planning Area from the NCDC Storm Events Database are listed in Table 4.15 and explained in further detail in the text below the table.

Table 4.15. Sutter County Tornado Events from 1950 to December 31, 2012

Type	# of Events	Property Loss	Crop Loss	Deaths	Injuries
Funnel Cloud	4	$0	0	0	0
F0	3	$85,000	0	0	0
F1	1	$0	0	0	4
Total	**8**	**$85,000.00**	**0**	**0**	**4**

Source: NCDC

March 29, 2005 – A brief touchdown of an F0 was reported on the southwest edge of Yuba City. No injuries or deaths were reported. No property damages were reported.

May 9, 2005 – An EF0 tornado touched down near Yuba City. Damage to a commercial building and two residential out-buildings was reported. Minor damage to several residences, property fences, and surrounding trees was also reported. Several plum (prune) trees were uprooted. No injuries or deaths were reported. $85,000 in property damages was reported.

June 1, 2011 – At approximately 5:30 pm an EF0 tornado touched down north of Yuba City and moved northeast, crossing from Sutter County into Yuba County and thereby north of Marysville. There was little damage in the area that appeared to be caused by the tornado. The determining factor was the credible description and sequence of events by witnesses who saw the tornado develop and move through peach and walnut groves. There were no injuries or fatalities. No injuries or deaths were reported. No property damages were reported. $50,000 in crop damages were reported.

October 22, 2012 – Supercells developed behind the cold front along a north-south boundary in the middle of the Central Valley, where both instability and shear were large. The Sutter County Sheriff and Fire Department reported a tornado at approximately 2pm, which was the first reported tornado of the day. The NWS storm survey team determined a touchdown at Mallard

Lake Golf Center along Highway 99 just south of Yuba City. The EF1 tornado traveled northeast toward Oswald and Barry Roads and north along Railroad Ave. Estimated wind speeds were up to 100mph. The tornado snapped several trees at the golf course, damaged 30-40 small walnut and peach trees in a nearby orchard, lifted shingles on multiple homes, damaged a car port, blew down several fences, damaged several businesses, and lifted an outbuilding off its foundation and turned it upside down. No injuries or deaths were reported. No property damages were reported.

Likelihood of Future Occurrences

Likely—4 tornadoes occurred in Sutter County over 64 years (1950-2013) of record keeping which equates to one tornado every 4 years, on average, and a 25 percent chance of a tornado occurring in any given year. But of these, none were greater than an EF1. Historical tornado activity within the Planning Area indicates that the area can occasionally experience the formation of funnel clouds and low intensity tornadoes during adverse weather conditions, especially during the winter months. The actual risk and vulnerability to the County is dependent on the nature and location of any given tornado.

4.2.7 Dam Failure

Hazard/Problem Description

Dams are manmade structures built for a variety of uses including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they 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 and fail. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can also result from any one or a combination of the following causes:

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

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the

warning time and the resources available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Electric generating facilities and transmission lines could also be damaged and affect life support systems in communities outside the immediate hazard area. Associated water supply, water quality and health concerns could also be an issue. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

In general, there are three types of dams: 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. And, a concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

Dams and reservoirs have been built throughout California to supply water for agriculture and domestic use, to allow for flood control, as a source of hydroelectric power, and to serve as recreational facilities. The storage capacities of these reservoirs range from a few thousand acre feet to five million acre-feet. The water from these reservoirs eventually makes its way to the Pacific Ocean by way of several river systems.

The California Department of Water Resources Division of Safety of Dams assigns hazard ratings to large 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 three categories that identify the potential hazard to life and property:

- High hazard indicates that a failure would most probably result in the loss of life
- Significant hazard indicates that a failure could result in appreciable property damage
- Low hazard indicates that failure would result in only minimal property damage and loss of life is unlikely

According to data provided by Division of Safety of Dams, there is one dam in Sutter County constructed for flood control, storage, electrical generation, and recreational purposes. Table 4.16 identifies the dam located in the Sutter County Planning Area.

Table 4.16. Sutter County Dam Inventory

Name of Dam	Hazard Class	Stream	Nearest City Distance	Type	Capacity (acre-feet*)	Dam Height	Year Built	Owner
Steidlmayer # 3	Low	Unnamed	Sutter 6 miles	Earth	117	49	1961	Private

Source: California Department of Water Resources Division of Safety of Dams
*One Acre Foot=326,000 gallons

**Unmapped dam

In addition to this dam (which is unlikely to pose a threat to residents of the County), there are other dams outside the County with the potential to affect people and property in Sutter County. Cal EMA provides local jurisdictions with hazard information based on data from the U.S. Bureau of Reclamation and the Department of Water Resources. These dams are shown in Table 4.17.

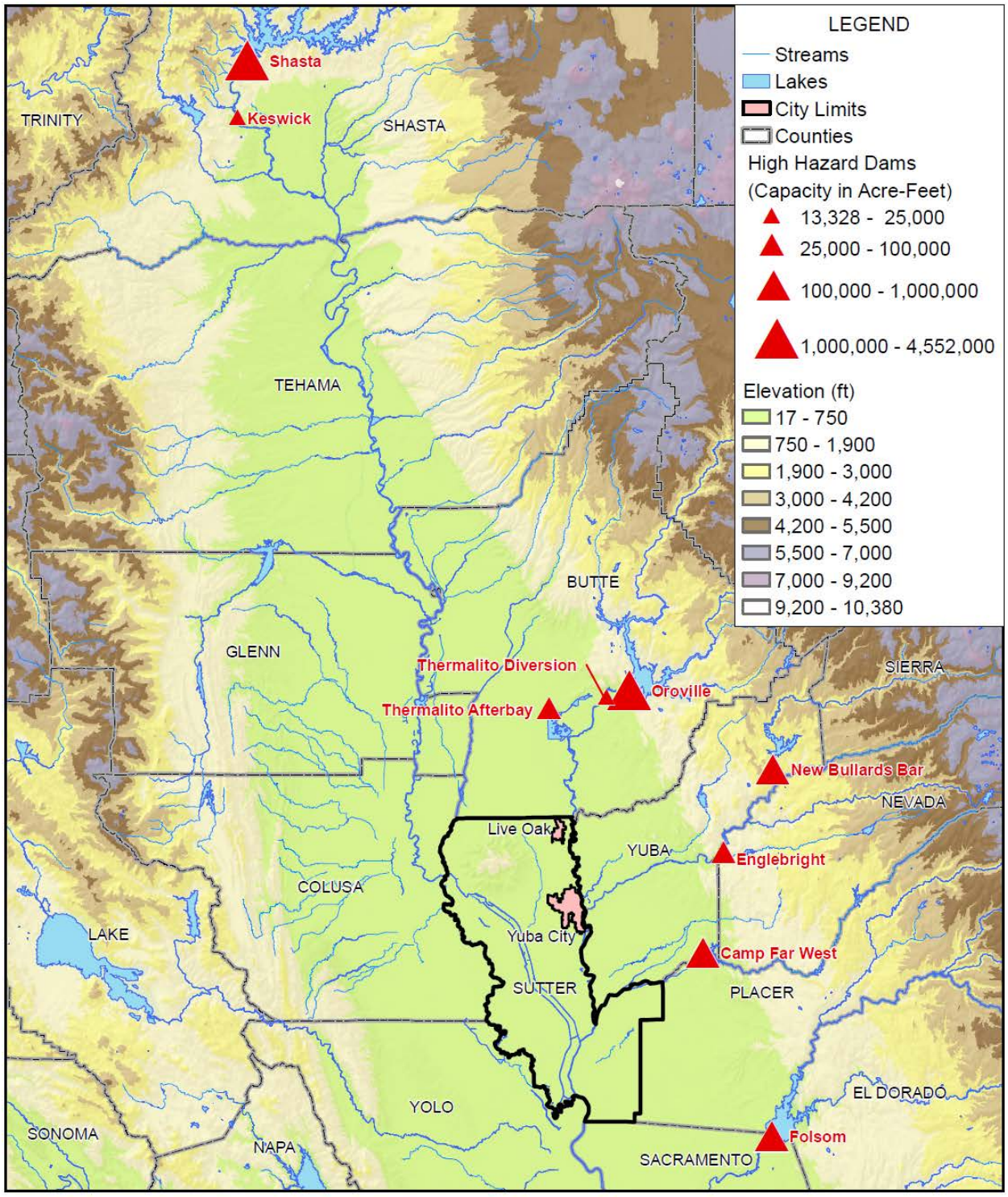
Table 4.17. Dams that may Affect Sutter County

Name of Dam	County	Stream	Hazard Classification	Type	Capacity (acre-feet)	Dam Height	Year Built	Status
Oroville	Butte	Feather River	High	Earth	3,537,577	742	1968	State certified dam since at least 10/31/1968
Thermalito Afterbay	Butte	Tributary of the Feather River	High	Earth	57,041	38	1967	State certified dam since at least 2/10/1988
Thermalito Diversion	Butte	Feather River	High	Concrete Gravity	13,328	128	1967	State certified dam since at least 11/17/1967
Folsom	Sacramento	American River	High	Concrete Gravity	975,000	275	1956	Federal Dam - data not verified
Shasta	Shasta	Sacramento River	High	Concrete Gravity	4,552,000	521	1945	Federal Dam - data not verified
Keswick	Shasta	Sacramento River	High	Concrete Gravity	23,772	118	1950	Federal Dam - data not verified
New Bullards Bar	Yuba	North Yuba River	High	Concrete Arch	969,600	635	1970	State certified dam since at least 6/28/1971
Camp Far West	Yuba	Bear River	High	Earth Rockfill	104,500	185	1963	State certified dam since at least 6/15/1966
Englebright	Yuba	Yuba River	High	Arch	70,000	280	1941	Federal Dam - data not verified

Source: Cal EMA

Figure 4.18 illustrates the locations of identified dams with the potential to affect Sutter County.

Figure 4.18. Location of Dams with Potential to Impact Sutter County



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; USGS, ESRI

Past Occurrences

The National Performance of Dams data shows no dam incidents for Sutter County since 1932. However, during the winter storms and flooding of 1996 and 1997, the Oroville Dam reportedly came very close to overtopping.

Likelihood of Future Occurrences

Unlikely—With only one low hazard dam in the County, and no dam failure incidents since 1932 have occurred, the likelihood of future dam failure in Sutter County is low. However, there remains the potential for a dam failure from a high or significant hazard dam located outside the County to fail and cause property damage within Sutter County. The distance from identified dams of concern should provide sufficient lead time to minimize resulting impacts. However, depending on the nature and location of any resulting failure, the impacts to the County could be significant.

4.2.8 Drought and Water Shortage

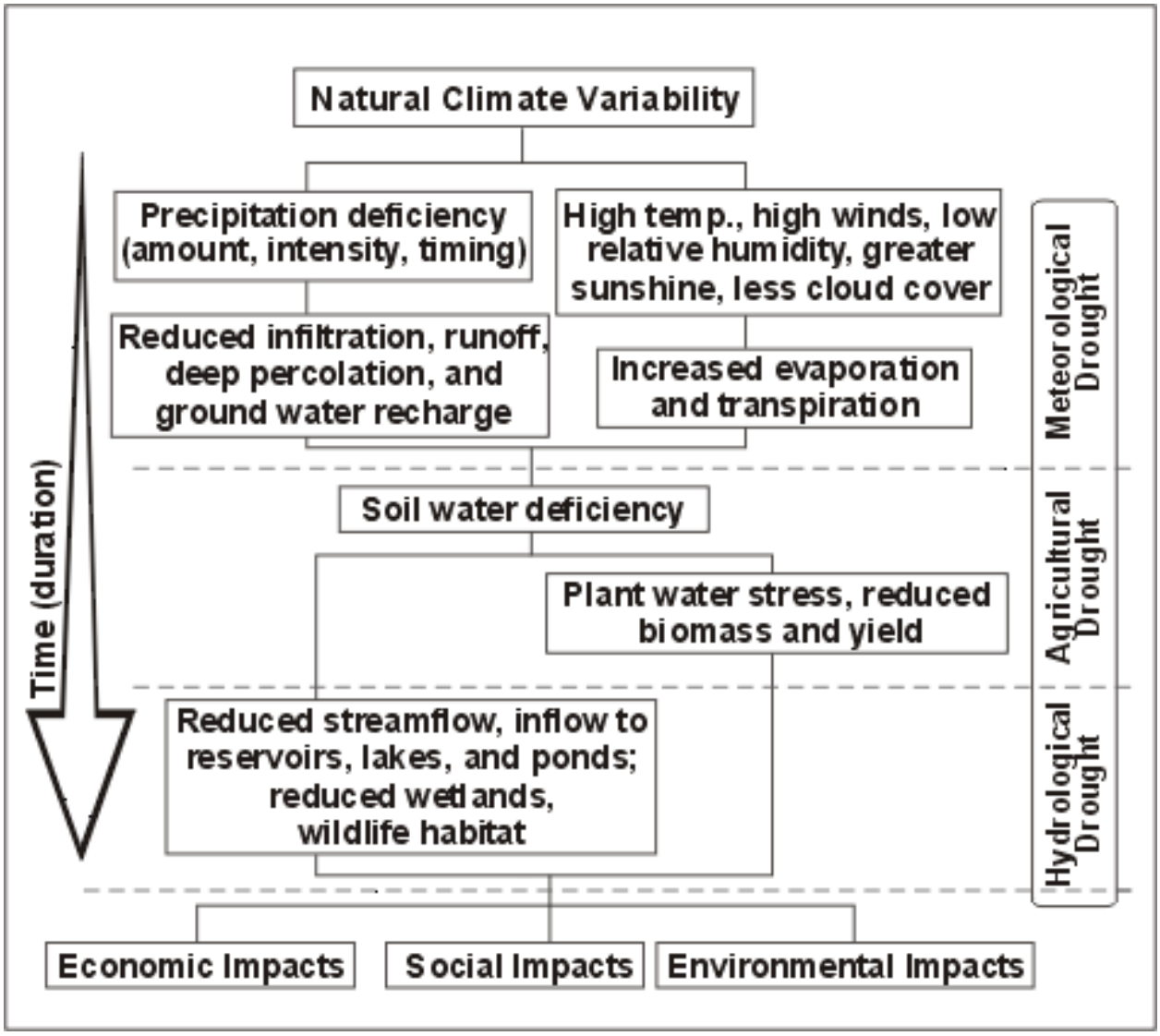
Hazard/Problem Description

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends. Water Districts normally require at least a 10 year planning horizon to implement a multiagency improvement project to mitigate the effects of a drought and water supply shortage.

Drought is a complex issue involving (see Figure 4.19) 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.

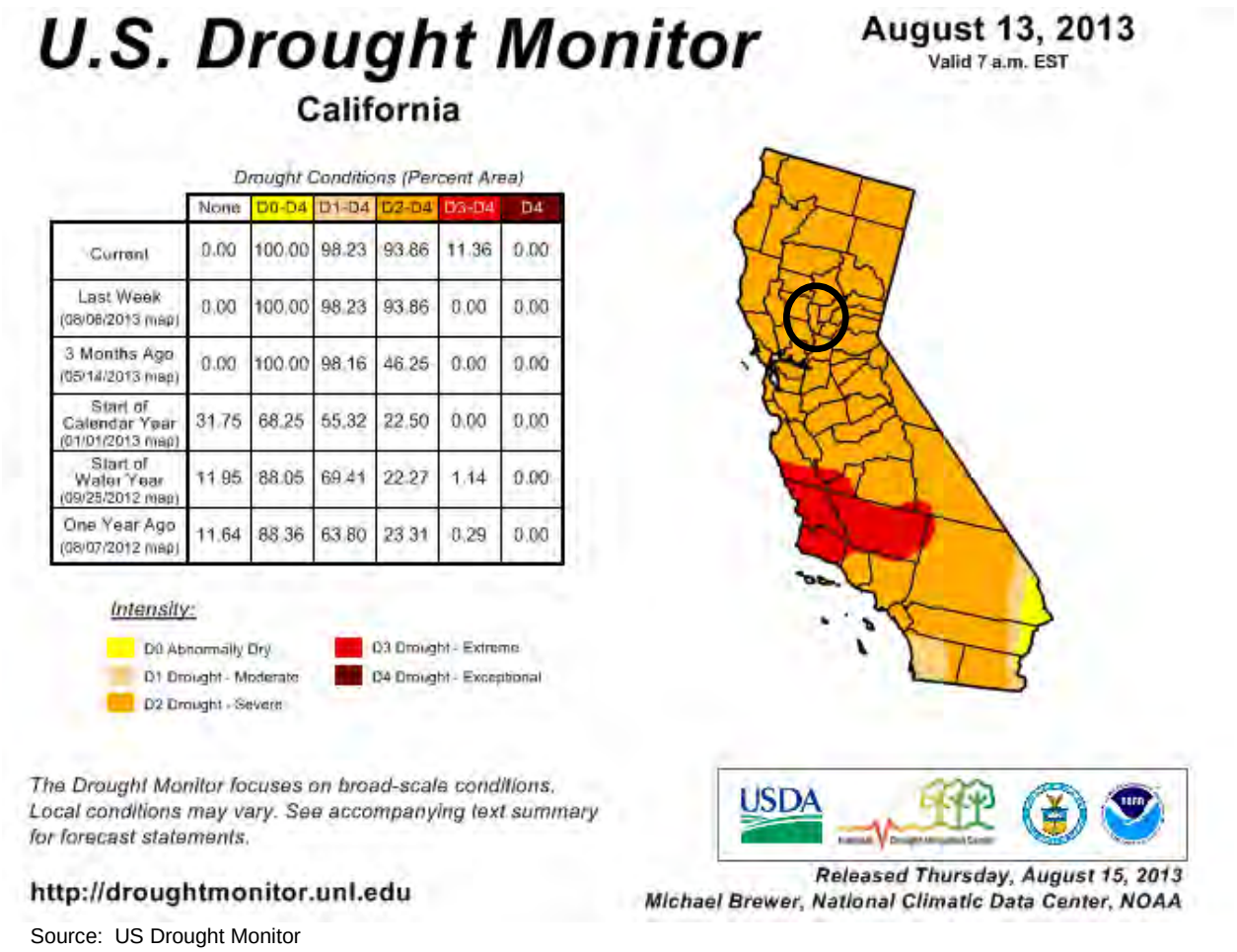
Figure 4.19. Causes and Impact of Drought



Source: National Drought Mitigation Center

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 drought conditions in California and the Planning Area can be found in Figure 4.20.

Figure 4.20. Current Drought Status in Sutter County



Source: US Drought Monitor

The California Department of Water Resources (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 farming and federally protected fish habitats in California is part of this issue

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. In most areas of California, ranchers that rely on rainfall to support forage for their livestock are the earliest and most affected by drought. Even below normal water years could affect ranchers depending on the timing and duration of precipitation events. It is difficult to quantitatively assess drought impacts to Sutter County because not many county-specific studies have been conducted. Some factors to consider include the impacts of fallowed agricultural land, habitat loss and associated effects on wildlife, and the drawdown of the groundwater table. The most direct and likely most difficult drought impact to quantify is to local economies, especially agricultural economies. The State has conducted some empirical studies on the economic effects of fallowed lands with regard to water purchased by the State's Water Bank; but these studies do not quantitatively address the situation in Sutter County. It can be assumed, however, that the loss of production in one sector of the economy would affect other sectors.

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. 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. Some communities in higher elevations with shallow bedrock do not have a significant source of groundwater.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in the Planning Area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Also, during a drought, allocations go down and water costs increase, which results in reduced water availability. Voluntary conservation measures are a normal and ongoing part of system operations and actively implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding and erosion.

Water Shortage

Northern Sacramento Valley counties, including Sutter County, generally have sufficient groundwater and surface water supplies to mitigate even the severest droughts of the past century. Many other areas of the State, however, also place demands on these water resources during severe drought. For example, Northern California agencies, including those from Sutter County, were major participants in the Governor's Drought Water Bank of 1991, 1992 and 1994.

Past Occurrences

Many people consider drought and associated water shortages to be random events; however, it is a normal, recurrent, and insidious climatic event. Although it has many different definitions, a drought usually originates from a cumulative deficiency of precipitation over a season or more. Drought is not solely a physical phenomenon; it affects society's water supply and water demand associated with agricultural, urban, and environmental uses.

Drought conditions in Sutter County have reoccurred numerous times throughout history. Table 4.18 summarizes the time and duration of droughts in northern California and Sutter County since the twentieth century.

Table 4.18. Northern California Recent Drought Years

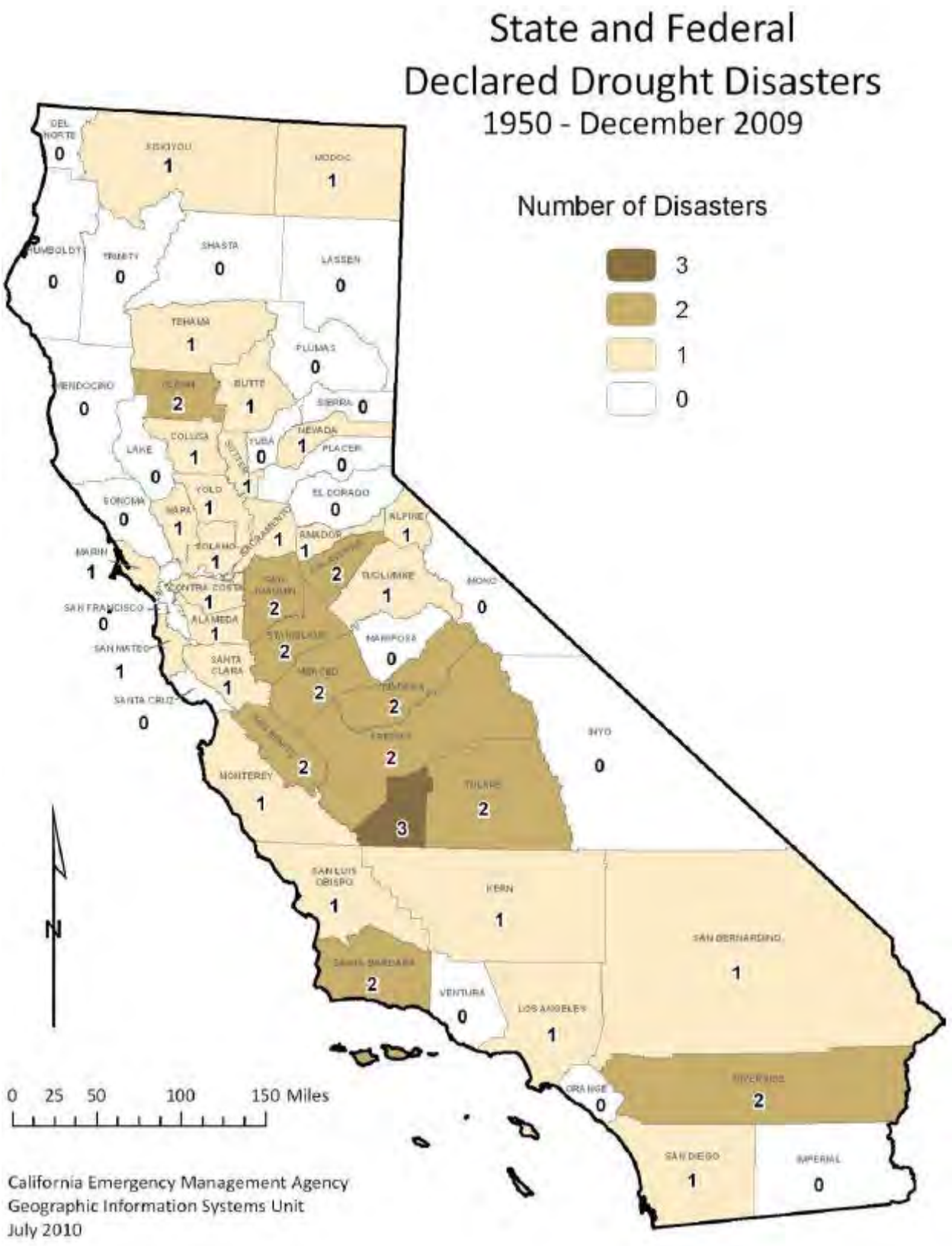
Drought Years	Duration (years)
1912-1913	1
1918-1920	2
1923-1924	1
1929-1934	5
1947-1950	3
1959-1961	3
1976-1977	1
1987-1992	5
1993-1994	1
2007-2010	4

Source: Cal EMA

Because of the minimal data available for hydrologic conditions prior to 1900, it is difficult to determine prior drought occurrences. However, scientists have used various other methods to document severe droughts in early California history. Scientific evidence shows the reoccurrence of drought throughout history and confirms the possibility for a future drought. For example, trees appear to have grown 6000 years ago in areas now submerged under Lake Tahoe, suggesting a drier climate. Other tree ring dating studies suggest a sustained drought during the mid-1500s. Another early drought indicator is the presence and disappearance of civilization. For example, the Anasazi civilization flourished (in what is called the Medieval Warm Period from 900-1300) when monsoonal rains supported its irrigations systems. In contrast, the Anasazi culture declined and disappeared during the Little Ice Age (1300-1800), which is attributed in part to drought conditions that made irrigated agriculture infeasible. Given the limited knowledge of the fairly recent past, it is difficult to understand the full ramifications of drought conditions.

According to the State of California Hazard Mitigation Plan, Sutter County has experienced one drought that resulted in a state disaster declaration in 1976/1977. This can be seen in Table 4.3 and Figure 4.21.

Figure 4.21. Declared Drought Disasters in Sutter County



Likelihood of Future Occurrences

Occasional—Historical drought data for the Sutter County Planning Area and region indicate there have been 6 significant multi-year droughts in the last 101 years. This equates to a drought every 16.8 years on average or a 5.9 percent chance of a drought in any given year. Based on this data, droughts will occasionally affect the Planning Area. Water shortages occur during these times of drought, although to varying degrees, making water shortages occasional as well. Drought and water supply have not been significant issues in Sutter County in years past due to the extensive surface and groundwater supplies in the region; the County's senior water rights; and their ability to maximize water resources through conjunctive use. However, future demands of the County and the region, including the demands of their agricultural industry, make this hazard an ongoing concern to the Sutter County Planning Area.

4.2.9 Earthquake

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. 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 4.19). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4.19. 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.

MMI	Felt Intensity
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

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.

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, 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

Groundshaking is motion that occurs as a result of energy released during faulting. The damage or collapse of buildings and other structures caused by groundshaking is among the most serious seismic hazards. Damage to structures from this vibration, or groundshaking, 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. Much of the County is located on alluvium which increases the amplitude of the earthquake wave. Ground motion lasts longer and waves are amplified on loose, water-saturated materials than on solid rock. As a result, structures located on alluvium typically suffer greater damage than those located on solid rock. Although the County has felt ground shaking from earthquakes with epicenters located elsewhere, no major earthquakes or earthquake related damage has been recorded within the County.

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) 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, which can occur in earthquakes with strong ground shaking, is mostly found in areas with sandy soil or fill and a high water table located 50 feet or less below the ground surface. Liquefaction can cause damage to property with the ground below structures liquefying making the structure unstable causing sinking or other major structural damage. Evidence of liquefaction may be observed in "sand boils," which are expulsions of sand and water from below the surface due to increased pressure below the surface.

Liquefaction during an earthquake requires strong shaking and is not likely to occur in the County due to the relatively low occurrence of seismic activity in the area; however, the clean sandy layers paralleling the Sacramento River, Feather River, and Bear River have lower soil densities and high overall water table, and are potentially a higher risk area if major seismic activity were to occur. Areas of bedrock, including the Sutter Buttes have high density compacted soils and contain no liquefaction potential, although localized areas of valley fill alluvium can have moderate to high liquefaction potential.

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.

Other Hazards

Earthquakes can also cause seiches, landslides, and dam failures. A seiche is a periodic oscillation of a body of water resulting from seismic shaking or other factors that could cause flooding. Seiches have not been recorded in the one reservoir in Sutter County that is within the jurisdiction of the California Division of Dam Safety. Earthquakes may cause landslides, particularly during the wet season, in areas of high water or saturated soils. Landslide is discussed in greater detail in Section 4.2.11. Finally, earthquakes can cause dams to fail (see Section 4.2.7 Dam Failure).

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.

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.

Active faults, as defined by the California Mining and Geology Board, are those faults which have caused soil and strata displacement with evidence of surface displacement within the Holocene epoch; that is, within the last 11,000 years. Some faults are characterized as active based on surface displacements within historic time, approximately the last 200 years, while others are characterized as active based on surface displacements in rocks or sediments which are less than 11,000 years old. Some faults may have been active in this time period, but did not result in identifiable surface displacements, while other faults may still be active although they have not been active during the Holocene. Several documented high magnitude earthquakes have occurred on faults not previously recognized as active.

Potentially active faults are also defined by the California Mining and Geology Board and are those for which there is evidence of surface displacement within the Quaternary period, that is, within the last 1.6 million years. Faults that have experienced movement in the last 11,000 to 750,000 years are conditionally active faults.

The faults identified in Sutter County include the Quaternary Faults, located in the northern section of the County within the Sutter Buttes, and the Pre Quaternary Fault, located in the southeastern corner of the Planning Area, just east of where Highway 70 enters in to the County (Figure 4.22). Both Faults are listed as non active faults, but have the potential for seismic activity. Table 4.20 provides the most recent regional seismic activity for Sutter County.

Figure 4.22. Faults in the Vicinity of Sutter County

Source: Sutter County General Plan Technical Background Report

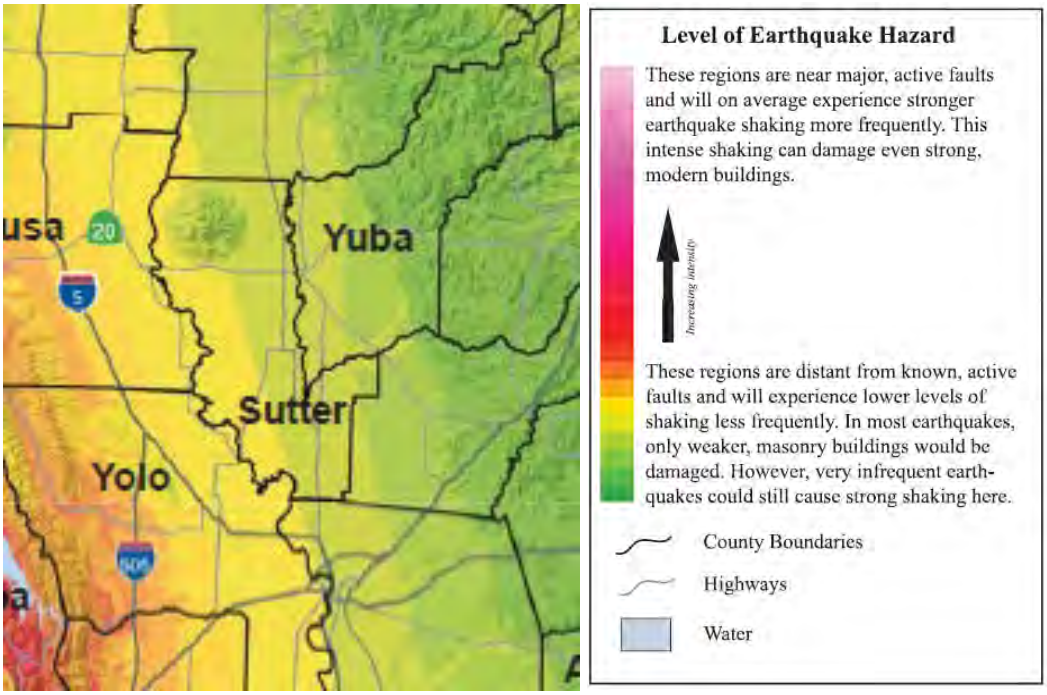
Table 4.20. Local and Regional Faults in or near Sutter County

Fault	Most Recent Significant Earthquake Year; Richter Scale Magnitude
Sutter Buttes	Quaternary
Dunnigan Hills (near Arbuckle)	Holocene
Foothills Suture Zone Cleveland Hill Swain Ravine-Spenceville	 1975; M 5.7
Midland	Quaternary
Unnamed(1892 epicenters between Vacaville and Winters	1892; M 6.7 1892; M 6.5
Green Valley-Concord-Calaveras	1984; M 6.1 1979; M 5.9
Rodgers Creek-Hayward	1968; M 6.8 1936; M 7.0
San Andreas	1989; M 7.1 (Loma Prieta) 1906; M 8.3
Eastern Sierra Nevada Sulphur Creek Stampede Valley Genoa	 1875 1966 Holocene

Source: Sutter County General Plan/Environmental Science Associates, Proposed Ash Landfill EIR, 1992

Maps indicating the maximum expectable intensity of groundshaking for the County are available through several sources. Figure 4.23, prepared 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.

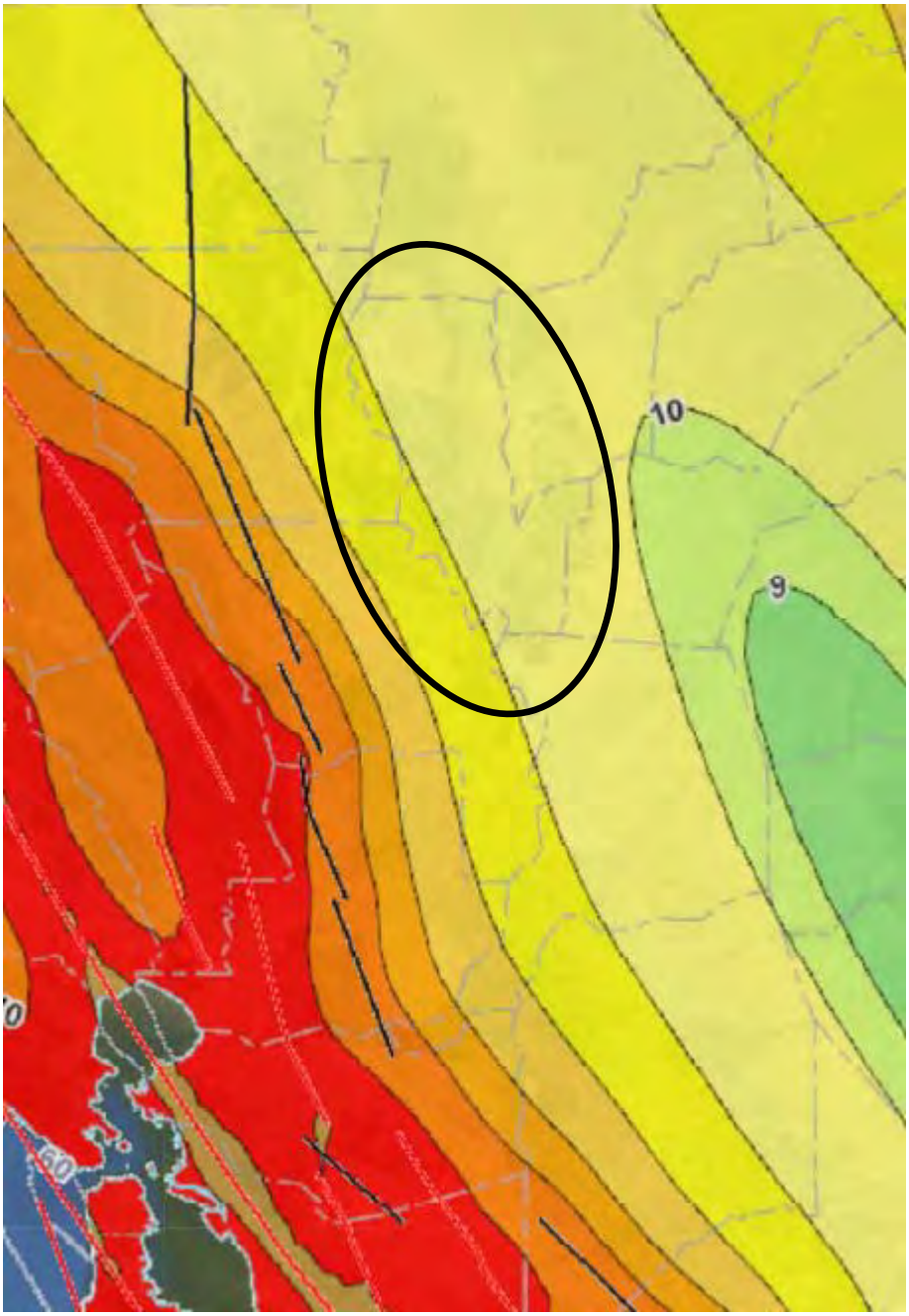
Figure 4.23. Maximum Expectable Earthquake Intensity



Source: California Division of Mines and Geology

The U.S. Geological Survey (USGS) issues National Seismic Hazard Maps as reports every few years. These maps provide various acceleration and probabilities for time periods. Figure 4.24 depicts the peak horizontal acceleration (%g) with 10% probability of exceedance in 50 years for the planning region. The figure demonstrates that the County falls in the 15%g (lighter yellow) to 20%g (darker yellow) area. This data indicates that the expected severity of earthquakes in the region is somewhat limited, as damage from earthquakes typically occurs at peak accelerations of 30%g or greater.

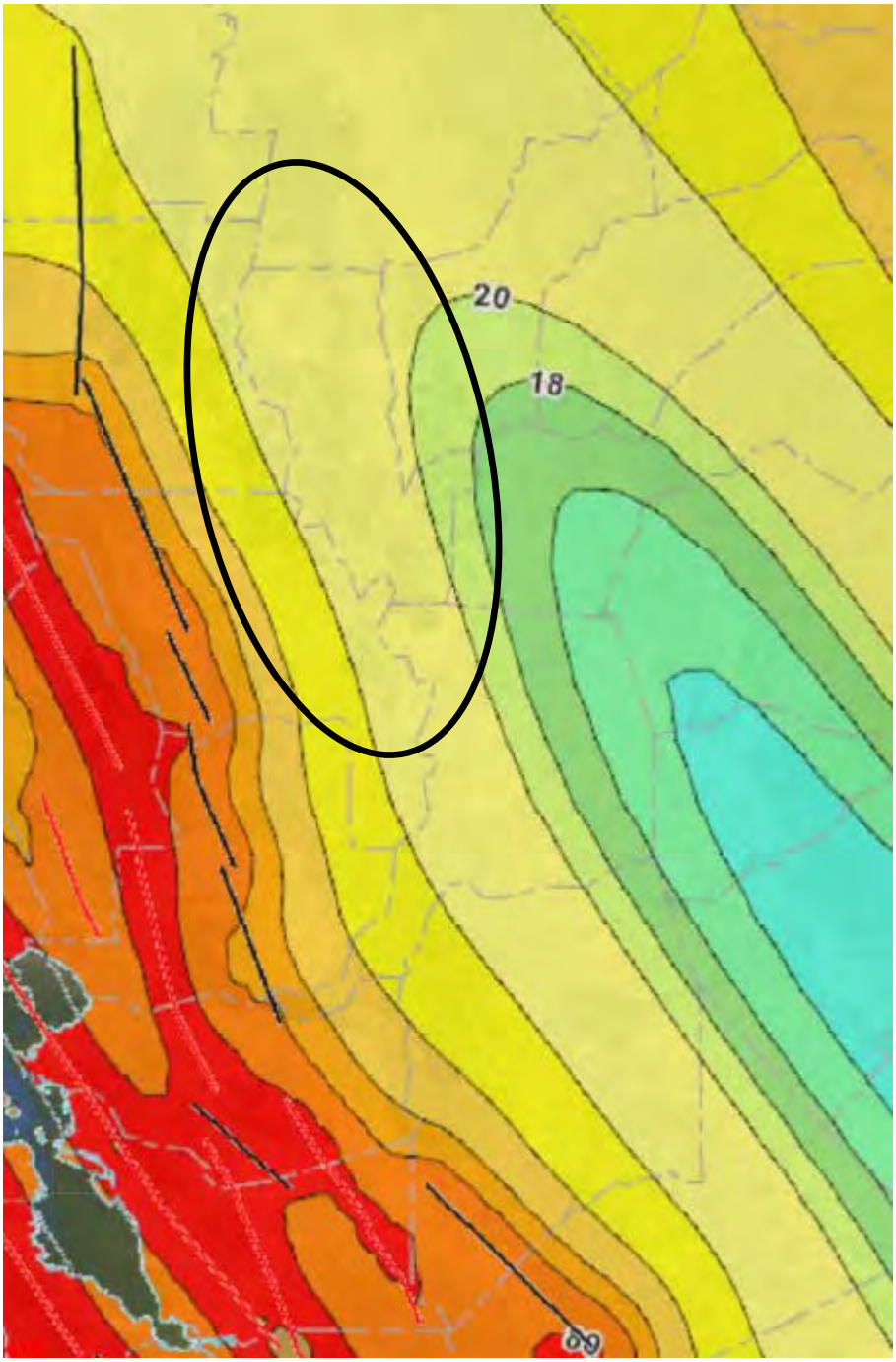
Figure 4.24. Peak Horizontal Acceleration with 10% Probability of Occurrence in 50 Years



Source: USGS National Seismic Hazard Maps - 2008 Interactive Tool. Available online at http://earthquake.usgs.gov/hazards/apps/map/

Figure 4.25 depicts the peak horizontal acceleration (%g) with 2% probability of exceedance in 50 years for the County. The figure demonstrates that the County falls in the 18%g (dark green), 20%g (light green), and 30%g (light yellow) areas. This data indicates that the expected severity of earthquakes in the region is somewhat limited, as damage from earthquakes typically occurs at peak accelerations of 30%g or greater.

Figure 4.25. Peak Horizontal Acceleration with 2% Probability of Occurrence in 50 Years



Source: USGS National Seismic Hazard Maps - 2008 Interactive Tool. Available online at http://earthquake.usgs.gov/hazards/apps/map/

Past Occurrences

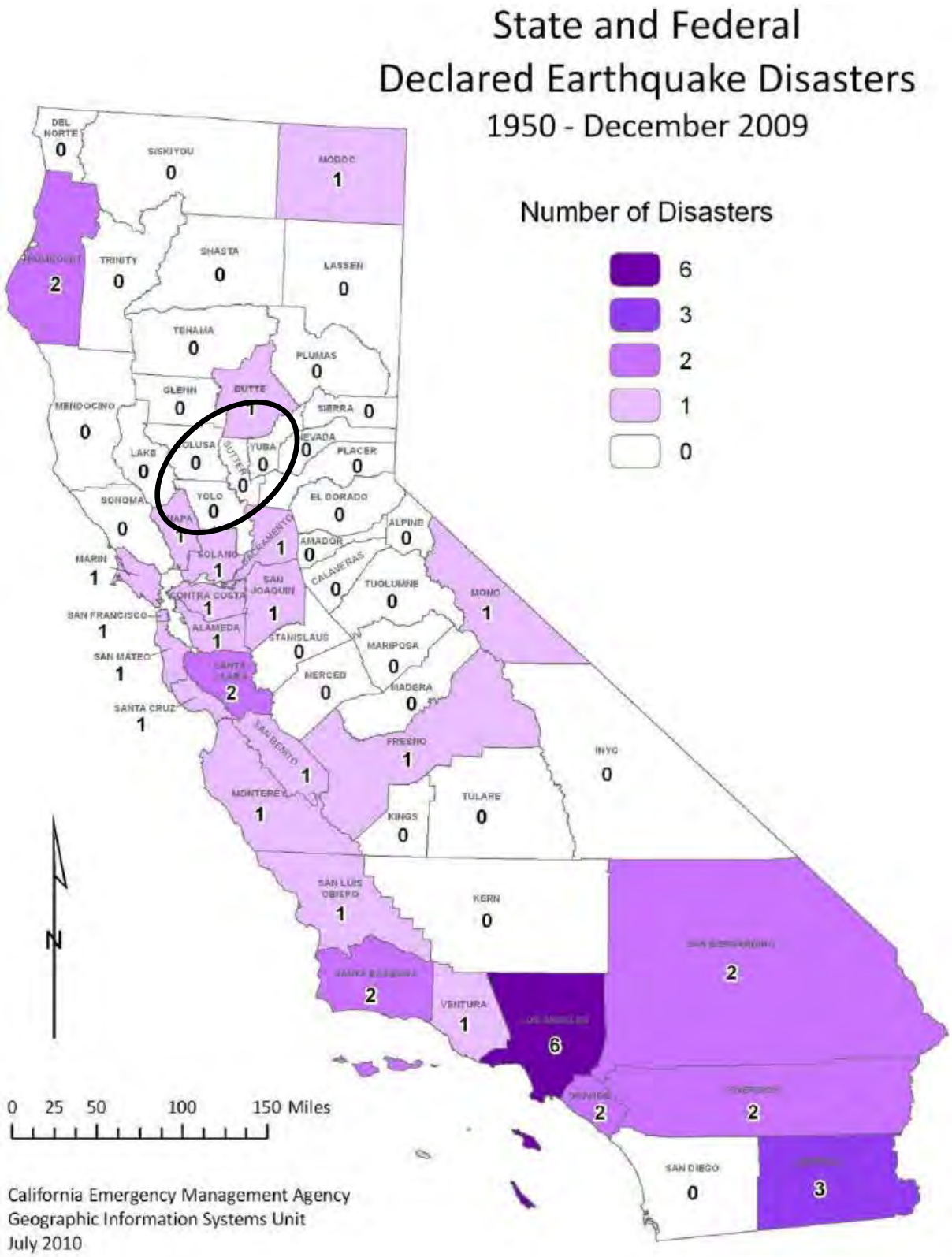
Although the County has felt ground shaking from earthquakes with epicenters located elsewhere, no major earthquakes have been recorded within the County. Notable regional earthquake events include those detailed below. It is unknown whether damages occurred within

the Sutter County Planning Area or to what extent these events were actually felt by county residents.

- A potential earthquake source is the Midland Fault Zone on the western side of Sacramento Valley, where in 1892 an earthquake centered between the cities of Vacaville and Winters caused minor damage in surrounding areas.
- An estimated 4.0+ Richter magnitude earthquake occurred between Auburn and Folsom in nearby Placer County in 1908 with an epicenter possibly associated with the Bear Mountain fault.
- To the east in Nevada, there are several faults associated with a series of earthquakes in 1954, especially the major (7.1 Richter magnitude) December 16, 1954 Fairview Peak event (about 100 miles east of Carson City). These events caused no damage in Reno, but there was some damage in Sacramento, probably because of the soft soil conditions.
- A recently active fault in the western Sierra Nevada foothills is the Cleveland Hills fault. This fault was the source of the 1975 Oroville earthquake (Richter Magnitude: 5.7), which was felt strongly in neighboring areas.
- According to the HMPC, the 1989 San Francisco earthquake was felt in the Sutter County Planning Area.
- During the creation of this plan, an earthquake was felt in Sutter County. On May 24, 2013 a 5.7 magnitude earthquake struck 80 miles northeast of Yuba City near Canyondam, California. Residents reported seismic shaking in the County but there were no reports of damage within the planning area. This earthquake was felt as far south as Stockton, California.

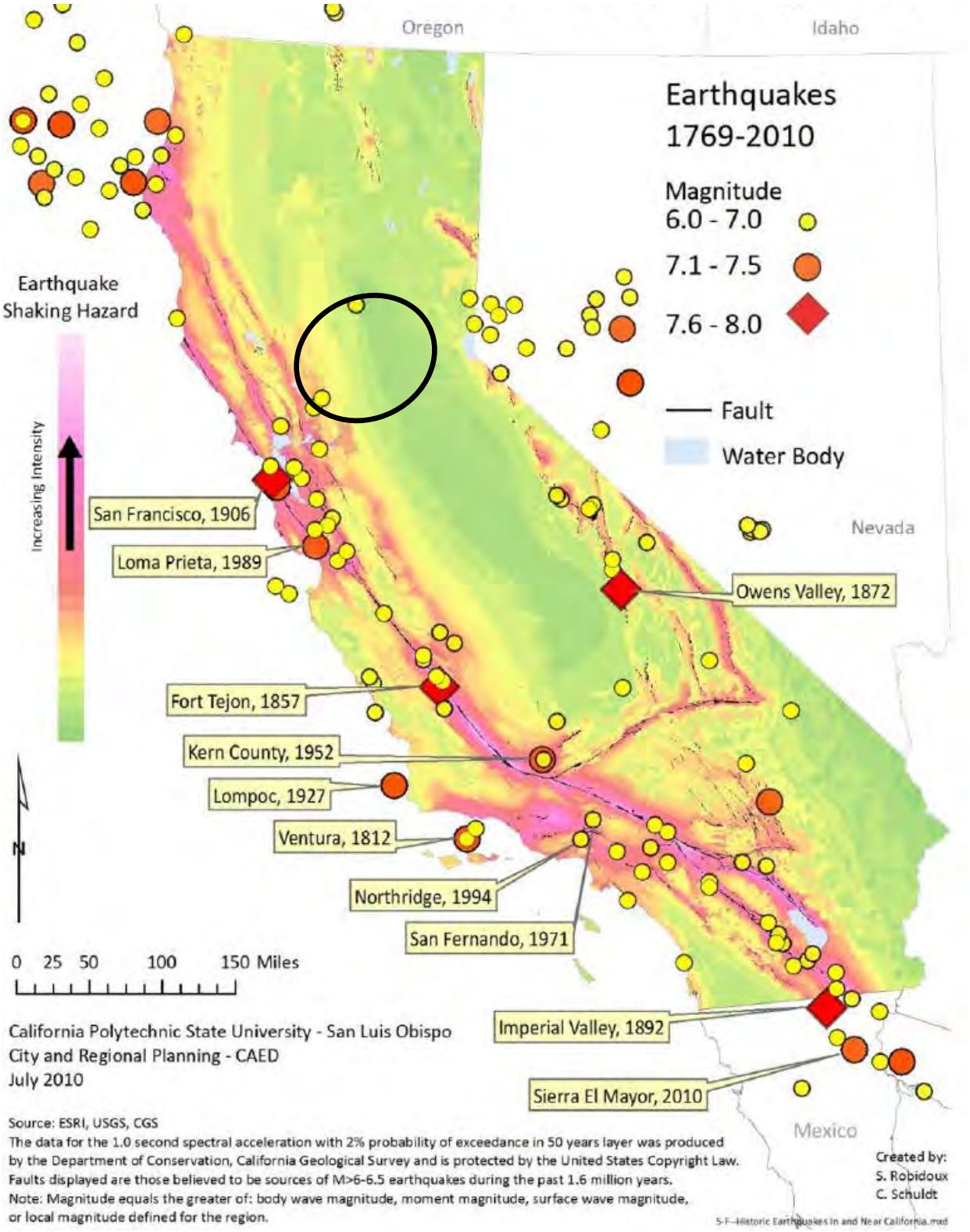
There have been no disaster declarations in the County. This is shown in Figure 4.26. Figure 4.27 shows major historical earthquakes in California.

Figure 4.26. State and Federal Declared Earthquake Disasters



Source: Cal EMA

Figure 4.27. Historic Earthquakes Near Sutter County



Source: State of California 2010 Hazard Mitigation Plan

In addition, the USGS Earthquake database contains data on earthquakes in the Sutter County area. Table 4.21 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 Sutter County. These results are shown in Table 4.22.

Table 4.21. 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: United State Geologic Survey, Earthquake Intensity Zonation and Quaternary Deposits, Miscellaneous Field Studies Map 9093, 1977.

Table 4.22. Magnitude 5.0 Earthquakes within 90 Miles of Sutter County*

Date	Magnitude
8/1/1975	5.8
9/27/1975	5.3
11/28/1980	5.2
9/3/2000	5.0
8/10/2001	5.2

Source: USGS
*Search dates 1973- May 25, 2012

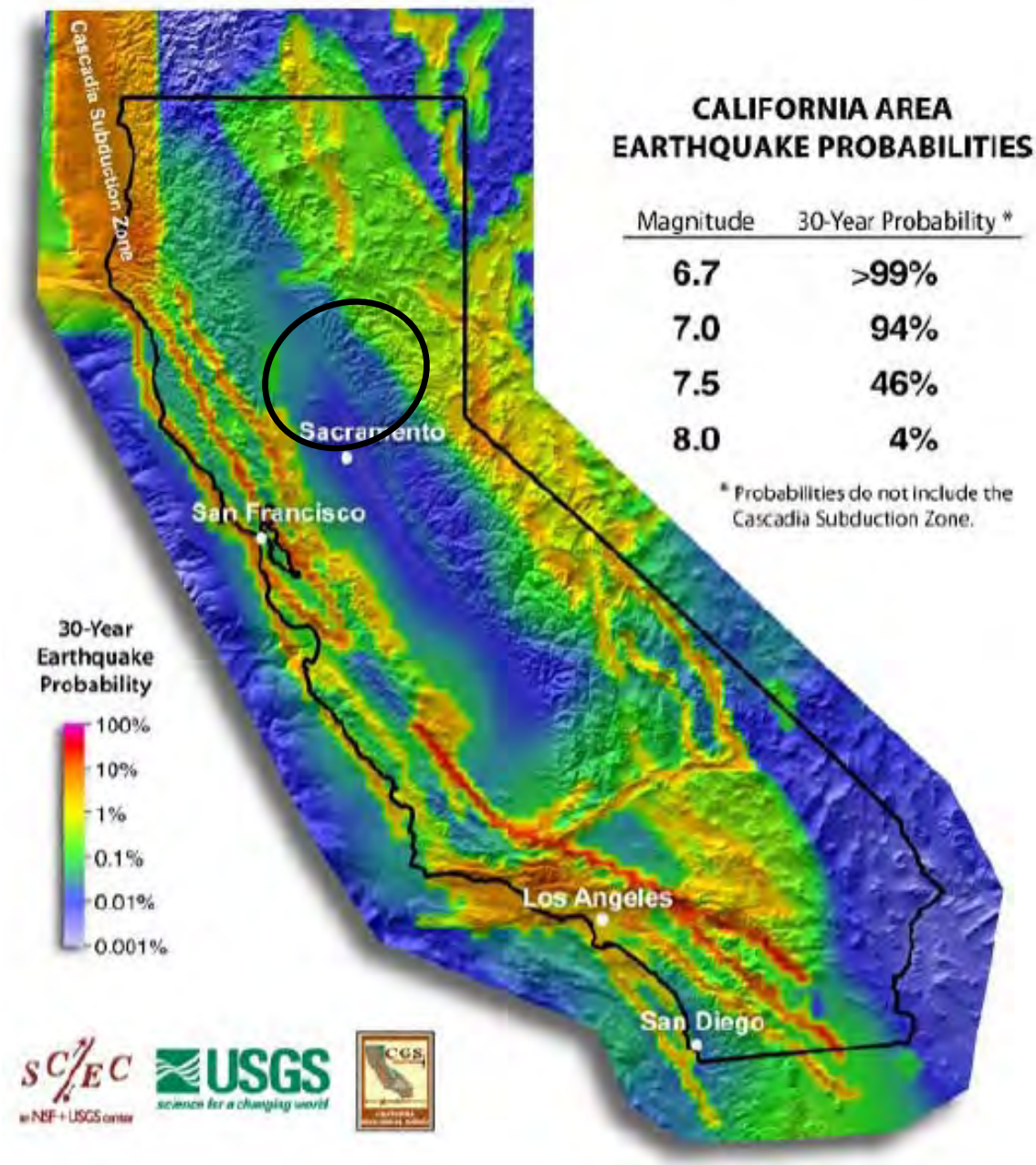
Likelihood of Future Occurrences

Unlikely – No major earthquakes have been recorded within the county; although the county has felt ground shaking from earthquakes with epicenters located elsewhere. Based on historical data and the location of the Sutter County Planning Area relative to active and potentially active faults, it is unlikely that the Planning Area will experience a significantly damaging earthquake.

In 2008, the United States Geological Survey (USGS) and the California Geological Survey (CGS) released the time-dependent version of the Uniform California Earthquake Rupture Forecast (UCERF II) model. These were the first statewide peer reviewed forecasts and Next Generation Attenuation (NGA) ground motion prediction efforts undertaken. The UCERF II 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 4.28 and indicates that Sutter

County has a low to moderate risk of earthquake occurrence, which coincides with the likelihood of future occurrence rating of occasional.

Figure 4.28. Probability of Earthquake Magnitudes Occurring in 30 Year Time Frame



Source: United States Geological Survey Open File Report 2007-1437

4.2.10 Earth Movement: Erosion

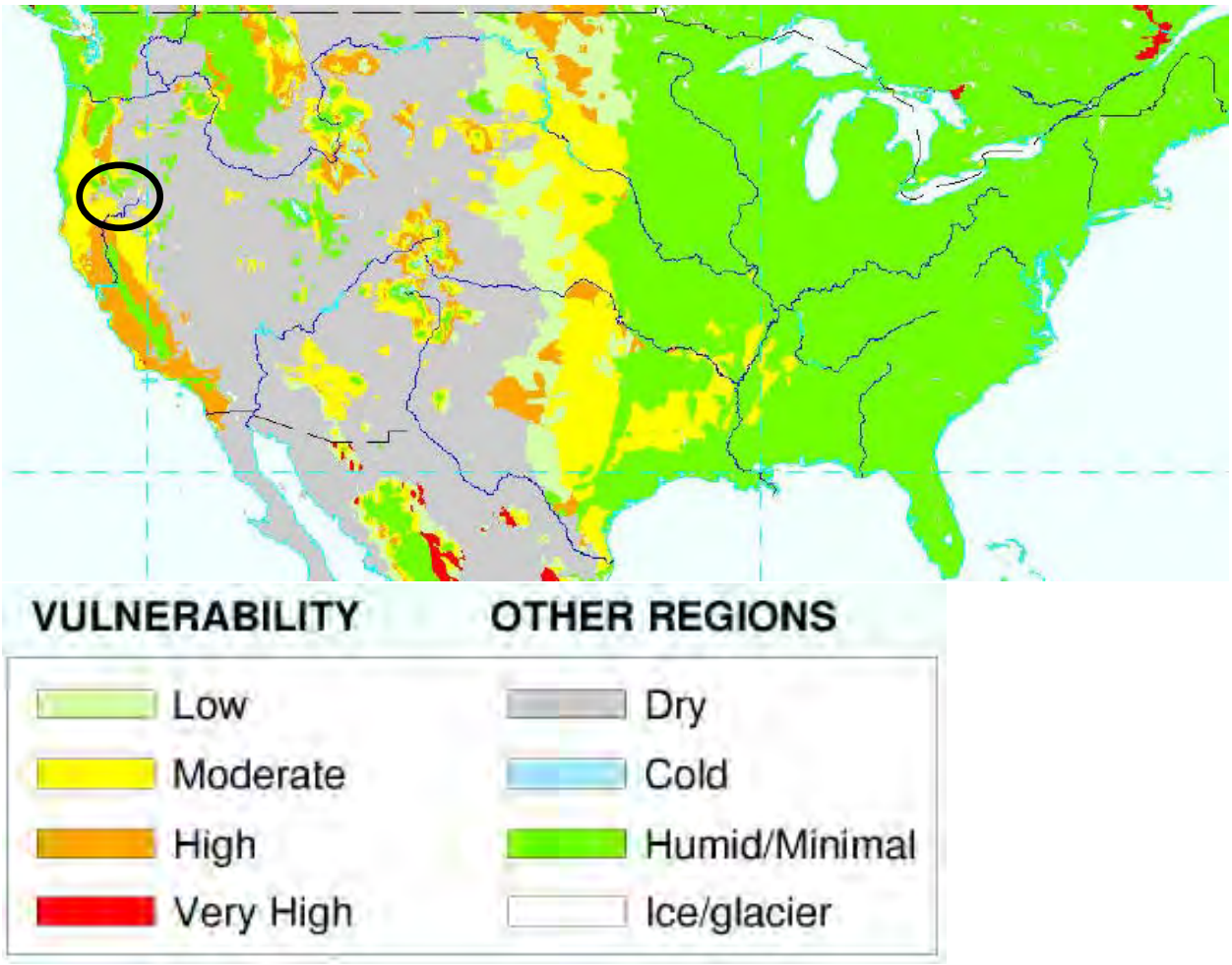
Hazard/Problem Description

Erosion is a two-step process by which soils and rocks are broken down or fragmented and then transported. Aside from natural causes of erosion, including flooding and fire, human activities such as mining, logging, farming, and cattle ranching can also facilitate erosion.

Erosion from Wind and Heavy Rain

A dust storm occurs when fine particles of soil are driven by strong winds into the air. Dust storms are often a result of wind, severe drought and poor soil conservation practices. A dust storm usually arrives suddenly in the form of an advancing wall of dust and debris that can be several miles long and thousands of feet high. Localized dust storms can also occur as a result of agricultural practices. Besides contributing to transportation problems, dust storms are a health and safety hazard to persons and animals, and can foul machinery, HVAC systems, and electronic equipment. Water ditches filled with soil can impact water quality and water carrying capacity. Dust storms can be economically damaging to the agricultural industry, since the most fertile part of the soil is removed during events, reducing productivity and threatening the long term stability of the land. Specific wind erosion areas in Sutter County and the United States as a whole are shown in Figure 4.29.

Figure 4.29. Wind Erosion Areas of the United States



Source: USDA, http://soils.usda.gov/use/worldsoils/mapindex/eroswind.html

Erosion hazard potential in Sutter County is dependent on the underlying geology and the amount of rainfall the area receives, and erosion hazard increases when protective vegetation is removed. Erosion hazard potential is highest in the Sutter Buttes area of the County.

The General Plan includes data on the vulnerability of natural soil types to erosion within Sutter County based on mapping provided by the U.S. Soil Conservation Service. The potential erosion hazard has been grouped into three generalized categories:

- **Slight**. 82.9% of Sutter County soil types have been identified in the Soil Survey as having slight erodibility and generally consist of those soil types with slopes of 0-9%.
- **Moderate**. 10.4% of Sutter County soil types have been identified in the Soil Survey as having moderate to high erodibility and generally consist of those soil types with slopes of 9-30%.
- **High**. 5.6% of Sutter County soil types have been identified in the Soil Survey as having high to very high erodibility and generally consist of those soil types with slopes of 30-75%.

The remaining 1.1% of Sutter County is water.

The moderate and high groups contain soil types found in the Sutter Buttes. According to the General Plan, the following factors make Sutter County an area of low erosion activity:

- Sutter County's annual precipitation is 21 inches
- During the winter rainy season, wind velocity is low
- Sutter County does not have slopes in excess of 9%, with the exception of the Sutter Buttes
- The naturally erodible soil types are located in the Sutter Buttes area

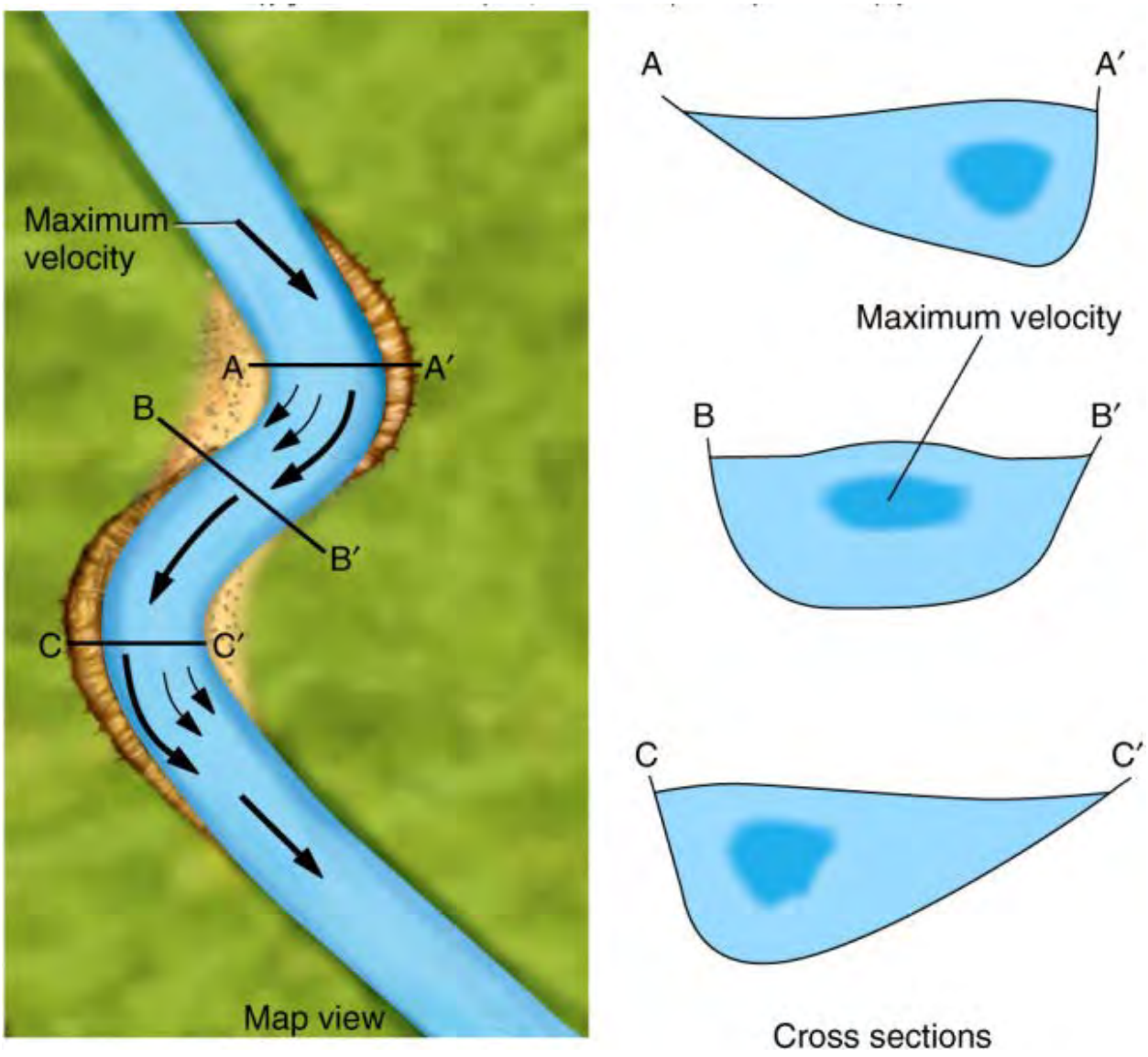
Erosion and debris flows can also occur in California in the months and years following large hot fires. Wildfires (see Section 4.2.17) greatly reduce the amount of vegetation, which in turn reduces the amount of rainwater absorption, allowing excessive water runoff that often includes large amounts of debris, dirt, and other sediments. Erosion in areas of steep slope can lead to landslides (see 4.2.11).

River/Stream/Creek Bank Erosion

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 controls include rainfall, snowmelt, and evaporation conditions. Long term controls include land use, soil, groundwater state, and rock type.

Streams erode by a combination of direct stream processes, like down cutting and lateral erosion, and indirect processes, like mass-wasting accompanied by transportation. Water tends to move downstream in slugs that extend all the way across a channel as shown in Figure 4.30. When the channel bends, water on the outside of the bend (the cut-bank) flows faster and water on the inside of the bend (the point) flows slower. This distribution of velocity results in erosion occurring on the outside of the bend (cut) and deposition occurring on the inside of the bend.

Figure 4.30. Meanders and Stream flows



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.

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.

As farmers settled the valleys, the Gold Rush drew prospectors to the hills. As mining in the Sierra Nevada turned to the more "efficient" methods of hydraulic mining, the use of environmentally destructive high-pressure water jets washed entire mountainsides into local streams and rivers. Hydraulic gold mining in the northern Sierra Nevada foothills produced 1.1 billion cubic meters of sediment. Approximately 38% of the total hydraulic-mining sediment produced was stored in piedmont deposits of the Yuba and Bear Rivers and the lower Feather River. As a result, the enormous amounts of silt deposited in the riverbeds of the Central Valley increased flood risk. These low-lying, unconsolidated deposits reside below all dams and reservoirs and are largely between modern levees.

During the 1870's and 1880's, valuable farmland in Sutter County was lost to the silting up of the rivers caused by hydraulic gold mining in the Sierras. Local farmers formed the Anti-Debris Association, and in 1884, they won a landmark suit halting the practice of hydraulic mining. As a remedy to these rising riverbeds, levees were built very close to the river channels to keep water velocity high and thereby scour away the sediment. However, the design of these narrow channels has been too successful. While the Gold Rush silt is long gone, the erosive force of the constrained river continues to eat away at the levee system.

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.

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.

Past Occurrences

Erosion from Wind and Heavy Rains

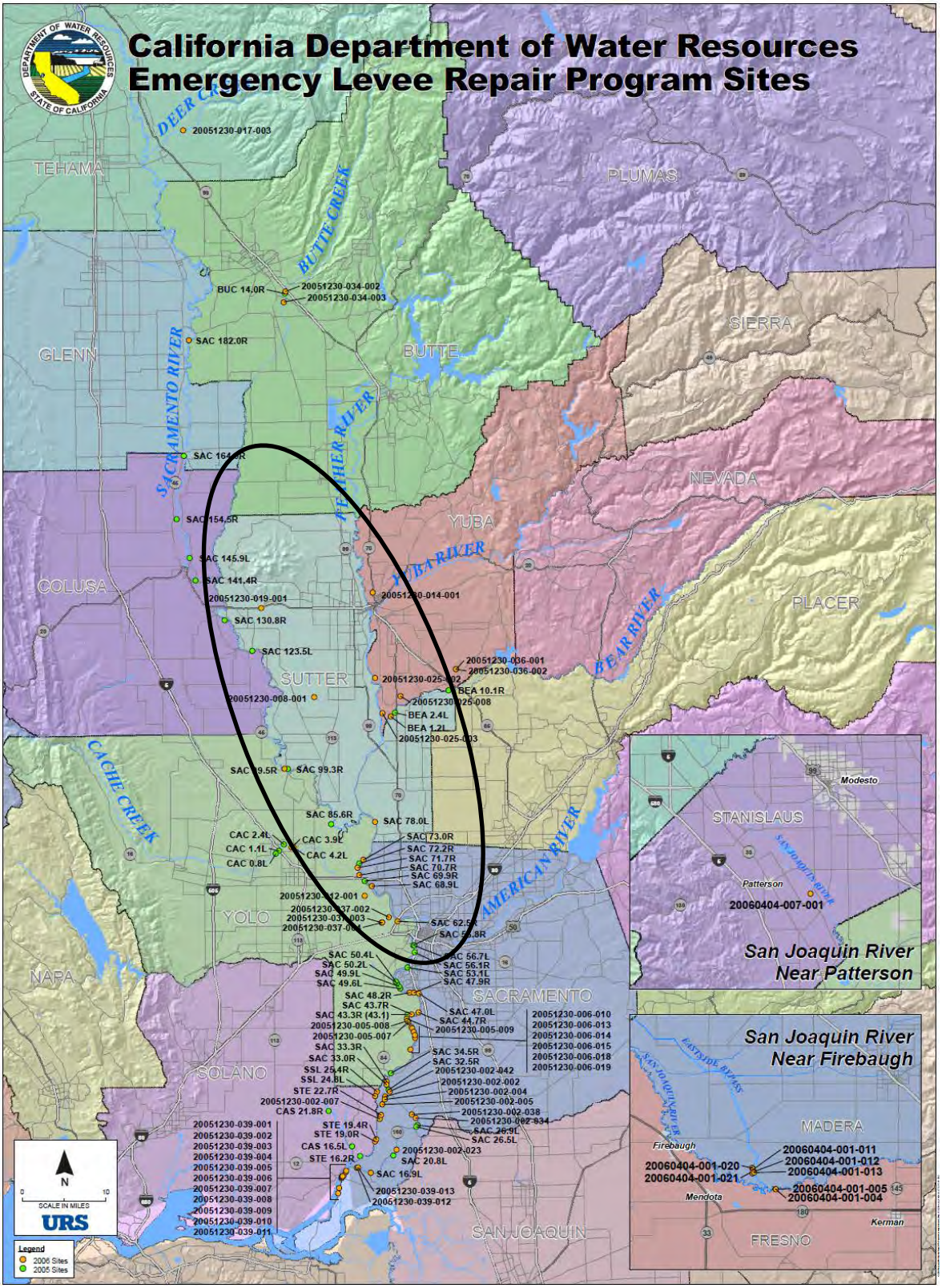
Erosion from wind and heavy rains occurs on an annual basis in the County. No database tracks this information. According to the County general plan and the HMPC, erosion potential is highest in the Sutter Buttes area of the County as well as in the agricultural areas of the county during the limited planting season.

River/Stream/Creek Bank Erosion

Erosion occurs within the Planning Area primarily in sloped areas of unincorporated Sutter County and along banks of drainage and leveed areas. Erosion along the banks is especially severe during heavy storms where high velocity waters are present. Areas with recent problems identified by the HMPC include banks along the Feather River and the Gilsizer Slough. The HMPC identified erosion issues in the unimproved river bank areas of the Feather River starting just south of Shenghei Bend to the park where the rip rap starts. Most levees in the County are setback levees so erosion in these areas are of limited concern. However erosion is an ongoing issue in the County, especially during periods of heavy runoff and will continue to occur throughout the planning area. In 2006, after the City of New Orleans was flooded from Hurricane Katrina, concern was raised for the threat of flooding to the Sacramento Valley. In February 2006, the governor of California declared a state of emergency for the Central Valley levees. Soon after, all the sites that were defined as "critical" in the 2005 inventory were repaired. Repairs have continued every year since and over 100 sites have been repaired since the declaration through the combined efforts of the US Army Corps of Engineers and the California Department of Water Resources.

While sites are currently being repaired, more sites enter the erosion inventory every year. The number of erosion sites within the system is large and even with repairs being completed every year, the number of stream bank erosion sites shows little decline year over year. With the large number of sites, a ranking system was developed to help determine which sites should be considered the highest priority for repair. Based on a 2007 field investigation, the total number of erosion sites within Sutter County was 12 sites. These are shown in Figure 4.31.

Figure 4.31. Levee Erosion Repair Sites in Sutter County



Source: California Department of Water Resources

Likelihood of Future Occurrences

Erosion from Wind and Heavy Rain

Highly Likely – Normal erosion processes are occurring all the time at various points in the County.

River/Stream/Creek bank Erosion

Highly Likely – Due to the high number of linear feet of levees and creek banks within the Sutter County Planning Area, the likelihood of future occurrences of streambank erosion in Sutter County is highly likely.

4.2.11 Earth Movement: Landslide

Hazard/Problem Description

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

A landslide is the breaking away and gravity-driven downward movement of hill slope materials, which can travel at speeds ranging from fractions of an inch per year to tens of miles per hour depending on the slope steepness and water content of the rock/soil mass. Landslides range from the size of an automobile to a mile or more in length and width and, due to their sheer weight and speed, can cause serious damage and loss of life. Their secondary effects can be far-reaching; such as catastrophic flooding due to the sudden release of river water impounded by landslide debris or slope failure of an earthen dam.

Landslide problems can be caused by land mismanagement, particularly in mountain, canyon, and coastal regions. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Land-use zoning, professional inspections, and proper design can minimize many landslide, mudflow, and debris flow problems.

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

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

Figure 4.32 was developed for the State of California Multi-Hazard Mitigation Plan. It indicates that most areas throughout Sutter County are at nil risk for landslides, with Sutter Buttes in a low risk zone.

Figure 4.32. Landslide Risk in California

Source: State of California Hazard Mitigation Plan

Landslides directly damage buildings in two general ways: 1) disruption of structural foundations caused by differential movement and deformation of the ground upon which the structure sits; and 2) physical impact of debris moving down slope against structures located in the travel path. In addition to buildings, other types of engineered structures are vulnerable to the impact and ground deformation caused by slope failures, particularly utilities and transportation structures. These belong to a category of structures called lifelines. Transmission lines such as telephone lines, electric power, gas, water, sewage, roadways, etc., are necessary for today's functioning society. They present a particular vulnerability because of their geographic extent and susceptibility to physical distress. Lifelines are generally linear structures that, because of their geographic extent, have a greater opportunity for impact by ground failure.

With the exception of the Sutter Buttes, Sutter County is located in a landslide-free zone due to the flat topography. The Sutter Buttes are considered to be in a low landslide hazard zone as shown in Bulletin 198 by the California Division of Mines and Geology.

Past Occurrences

Sutter County has a history of minor landslides, and there have been a few incidents of slope failure resulting in localized landslides occurring within the Sutter Buttes area. Much of this has occurred on private property. Neither the NCDC nor SHELDUS have any records of landslides in the County. There have been no disaster declarations related to landslide in the County.

Likelihood of Future Occurrences

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

4.2.12 Flood: 100/500-year and Localized Flooding

Hazard/Problem Description

Flooding is the rising and overflowing of a body of water onto normally dry land. History clearly highlights floods as the most frequent natural hazard impacting Sutter County. Floods are among the most costly natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even 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. This is one reason 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. Additional information on evacuation and post-disaster mitigation policies and procedures can be found in Section 4.4 of this Risk Assessment.

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 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 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.

Flooding and Floodplains

The areas adjacent to stream channels are considered the floodplain. 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 100-year flood, the flood that has a one percent chance in any given year of being equaled or exceeded in any given year. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP). The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. 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.

In addition to those 100- and 500-year floodplains regulated under the NFIP, recent California legislation resulting from Senate Bill 5 (2007) requires cities and counties within the Sacramento-San-Joaquin Valley to address new flood protection standards of the 1-in 200 year (0.5 percent chance of being equaled or exceeded in any given year) flood when considering new development in Urban or Urbanizing Areas. Urban Areas are developed areas in which there are 10,000 residents or more (California Government Code Section 650007(j)). Urbanizing Areas are developed areas or areas outside a developed area that is planned or anticipated to have 10,000 residents or more within the next 10 years (California Government Code Section 650007(k)). These standards are under development and will become effective over the next several years as ongoing technical studies are performed.

The Sutter County Planning Area is susceptible to various types of flood events: riverine and localized stormwater flooding. The area is also at risk to flooding resulting from levee and dam failures. Levee failure flooding is discussed separately in Section 4.2.14 of this document. Dam failure flooding is discussed separately in Section 4.2.7 of this document. 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.

- **Riverine flooding** – Riverine flooding, defined as when a watercourse exceeds its "bank-full" capacity, generally occurs as a result of prolonged rainfall, or rainfall that is combined with snowmelt and/or already saturated soils from previous rain events. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. The onset and duration of riverine floods may vary from a few hours to many days and is often characterized by high peak flows combined with a large volume of runoff. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface due to urbanization. In the Sutter County Planning Area, riverine flooding can occur anytime from November through April and is largely caused by heavy and continued rains, sometimes combined with

snowmelt, increased outflows from upstream dams, and heavy flow from tributary streams. These intense storms can overwhelm the local waterways as well as the integrity of flood control structures. Flooding is more severe when antecedent rainfall has resulted in saturated ground conditions. The warning time associated with slow rise riverine floods assists in life and property protection.

- **Localized flooding** – Localized, stormwater flooding problems are often caused by flash flooding, severe weather, or an unusual amount of rainfall. Flooding from these intense weather events usually occurs in areas experiencing an increase in runoff from impervious surfaces associated with development and urbanization as well as inadequate storm drainage systems.

Sutter County Hydrology

The Sutter County Planning Area sits in the Sacramento River hydrologic region. This region encompasses the northern half of the Central Valley bounded by the Sierra Nevada Mountains, the Coast Range, the Cascade Range, and the Trinity Mountains. This region is predominantly agricultural, but has experienced increased urbanization in recent years. The primary cause of flooding in the region is due to runoff from major winter storm events and/or snowmelt. Levee systems and dams built throughout the area have significantly reduced the historic flood hazards in this region. However, the area remains vulnerable to flooding hazards due to an aging levee system combined with the increased urbanization of the County.

The Sutter County Planning Area is located in the east-central part of the Sacramento Valley. The Sutter County Operational Area EOP describes the Sacramento Valley as forming the northern half of the Central Valley, which surrounded by mountains, creates a "bathtub effect, with the Sacramento Valley, San Joaquin Delta, and San Francisco Bay forming the drain to the ocean. The lowest areas of the Central Valley, which includes Sutter County, are at the bottom of the bathtub and generally receive the brunt of any flooding.

More specifically, the topography of the Sutter County Planning Area is a relatively flat alluvial plain with the exception of the Sutter Buttes and the surrounding rolling terrain. The eastern part of the county is an alluvial terrace with elevations of 35 to 80 feet. This terrace generally drains to the southwest into the lower Sutter and American Basins, which are at 10-40 feet in elevation. Flooding is a common occurrence in areas adjacent to and in the lowlands of waterways in the Sutter County Planning Area.

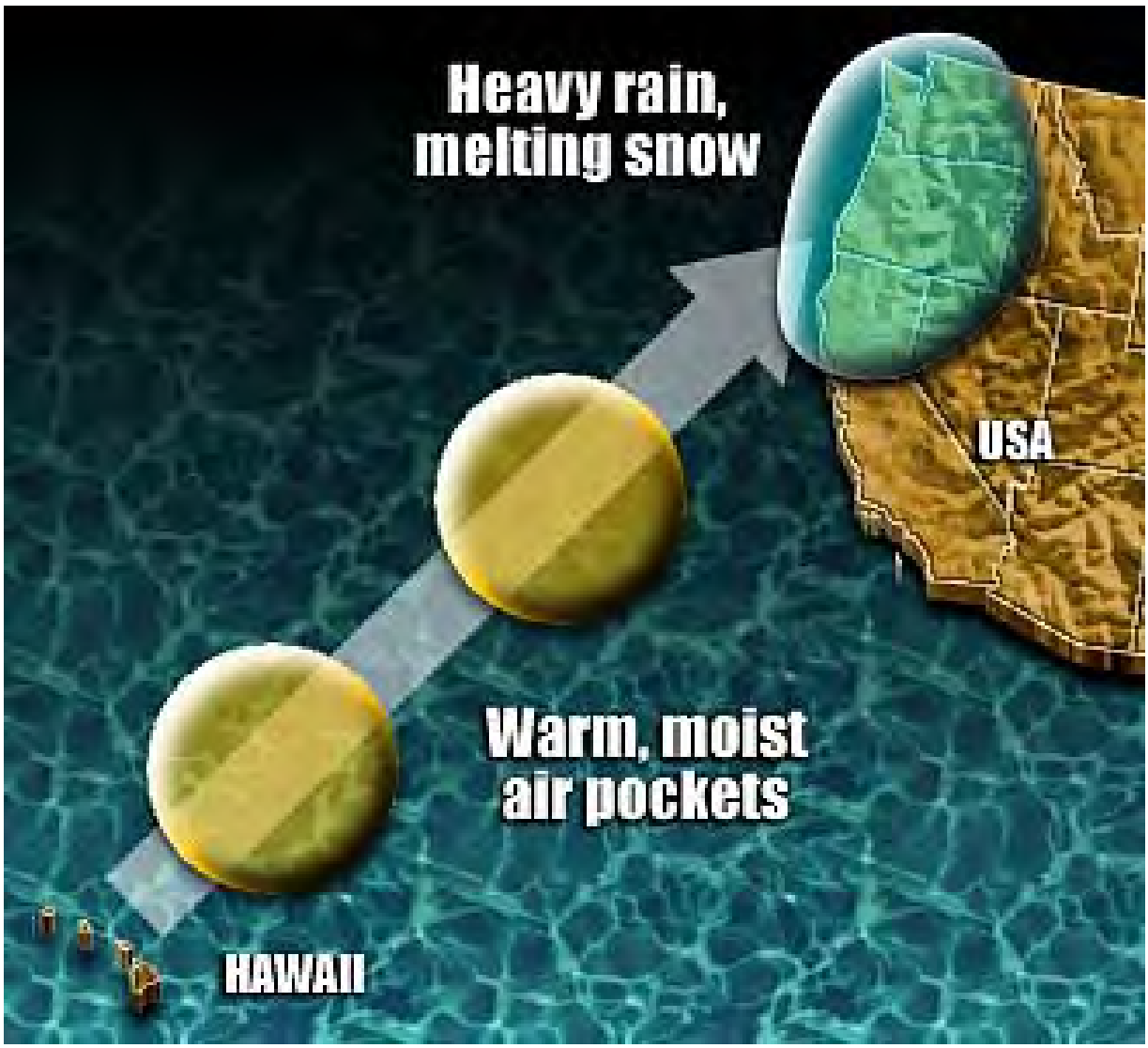
Historically, the Sutter County Planning Area has always been at risk to flooding because of its high annual percentage of rainfall, the watercourses that bound the County, and the location of development adjacent to flood-prone areas. Drainage and stormwater runoff, in addition to natural and manmade waterways, all contribute to potential flooding in the Sutter County Planning Area.

Further contributing to the flooding issue within the Planning Area, are the reduced flow capacity of many of the natural channels. Some factors contributing to this reduced flow include

the increased sedimentation from historic upstream mining operations, in addition to the presence of bridges, overgrowth, debris, reduced cross sectional areas and limited or no banks to contain the water.

Also a factor in the flooding potential of the area, a weather pattern called the "Pineapple Express" frequents the Planning Area. 'Pineapple express' brings warm air and rain to the West. A relatively common weather pattern brings southwest winds to the Pacific Northwest or California, along with warm, moist air. The moisture sometimes produces many days of heavy rain, which can cause extensive flooding. The warm air also can melt the snow pack in the mountains, which further aggravates the flooding potential. In the colder parts of the year, the warm air can be cooled enough to produce heavy, upslope snow as it rises into the higher elevations of the Sierra Nevada or Cascades. Forecasters and others on the West Coast often refer to this warm, moist air as the "Pineapple Express" because it comes from around Hawaii where pineapples are grown.

Figure 4.33. Pineapple Express Weather Pattern



Source: USA TODAY research by Chad Palmer http://www.usatoday.com/weatherwpinappl.htm

The Sutter County Waterway System

Positioned on an alluvial plain between the Sacramento River on the west and the Feather River on the east, the Sutter County Planning Area lies entirely within the Sacramento River watershed and within the Sutter and Butte Drainage basins. In the southeastern portion of the county lies another alluvial plain situated south of the Bear River and east of the Feather River. These alluvial plains were geologically formed by water running over the stream banks during naturally occurring historic floods.

The Sutter County Planning Area includes both natural and manmade waterways. In addition to the Sacramento, Feather, and Bear Rivers, natural waterways include Coon Creek, Pleasant Grove Creek, Markham and Auburn Ravines in the southeastern portion of the County, the

Snake River on the east side of the Sutter Buttes, and other smaller streams and sloughs located throughout the county. Manmade waterways form an extensive network and are used for flood control as well as to convey irrigation water and to provide drainage channels from the croplands. Manmade waterways include the Sutter and Tisdale Bypasses, the Natomas Cross Canal, the Natomas East Main Drainage Canal, Wadsworth Canal, East/West Interceptor, Yankee Slough and Gilsizer Slough. Drainage and stormwater runoff, in addition to natural and manmade waterways, all contribute to potential flooding in the Sutter County Planning Area.

The more notable of these waterways are described in further detail below.

Sacramento River

The Sacramento River, the largest river in the state, extends for approximately 70 miles along the western border of Sutter County. Historically, the river has carved out a wide floodplain outside of its existing banks. The river provides drainage for all of Sutter County and the Sacramento Valley through a system of levees and bypasses completed in the 1920s. The final outlet of the water is the Delta and eventually, the San Francisco Bay. The river supports various recreational and boating activities, agricultural irrigation and diverse wildlife habitats. No communities in Sutter County use the river as a source of domestic or municipal water supply.

The State Department of Water Resources, Division of Water Resources (DWR) established the Sacramento River Flood Control Project to implement flood protection programs for the river and its tributaries. The upper portion if the river is controlled by Shasta Dam, Whiskeytown Dam and Keswick Dam.

Feather River

The Feather River extends approximately 45 miles through Sutter County, forming part of the east Sutter County boundary. The Feather River reaches its confluence with the Sacramento River at the southern county boundary near Verona. Similar to the Sacramento River, the Feather River provides for recreational activities, agricultural irrigation and a diverse wildlife habitat. The river is listed as navigable below the City of Yuba City; however, due to siltation caused by past mining practices in the Sierra Foothills and lack of maintenance, only small boats can pass. The City of Yuba City obtains a large part of its annual water supply for municipal and domestic use from the river.

The Feather River is also part of the Sacramento River Flood Control Project managed by the State DWR. Upstream the river is controlled by the Oroville Dam in Butte County.

Bear River

The Bear River roughly parallels about 11 miles of the eastern county boundary, entering the county from Placer County and crossing the boundary at several points. The river flows in a south-southwest direction until it joins the Feather River about one mile north of the town of

Nicolaus. Although smaller than either the Sacramento or Feather Rivers, the Bear River also provides recreational opportunities, agricultural irrigation water and a diverse wildlife habitat. River flows are controlled by the Camp Far West Reservoir in Yuba County.

Sutter Bypass

The Sutter Bypass, part of the Sacramento Flood Control Project, is an artificial flood control corridor approximately 3/4 mile wide, bordered by two parallel channels. The Bypass extends from the Sacramento River in the northwest portion of the County, north of Pass Road, and proceeds west of the Sutter Buttes continuing generally in a south-southeast direction for approximately 27 miles where it intercepts the Feather River about three miles south of Nicolaus. The Sutter Bypass collects flood overflow water from the Sacramento River after passing through Butte Slough and the Butte Sink.

Figure 4.34. Sutter Bypass

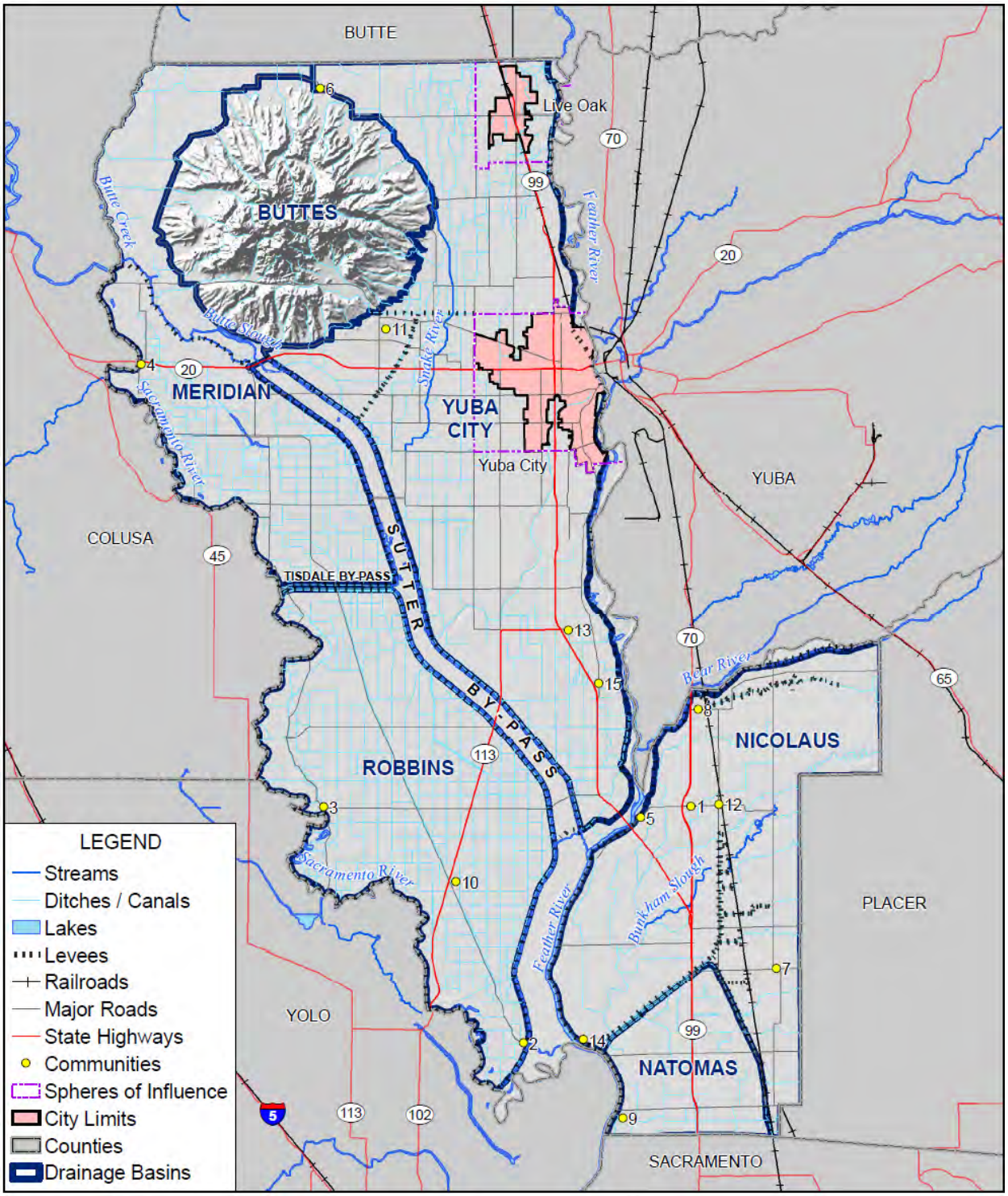
Source: AMEC

Tisdale Bypass

The Tisdale Bypass, another flood control corridor, extends for approximately four miles due west from the Sutter Bypass.

Figure 4.35 illustrates natural and manmade waterways in the Planning Area.

Figure 4.35. Sutter County Waterways and Drainage Basins



Sutter County Flood Control Structures

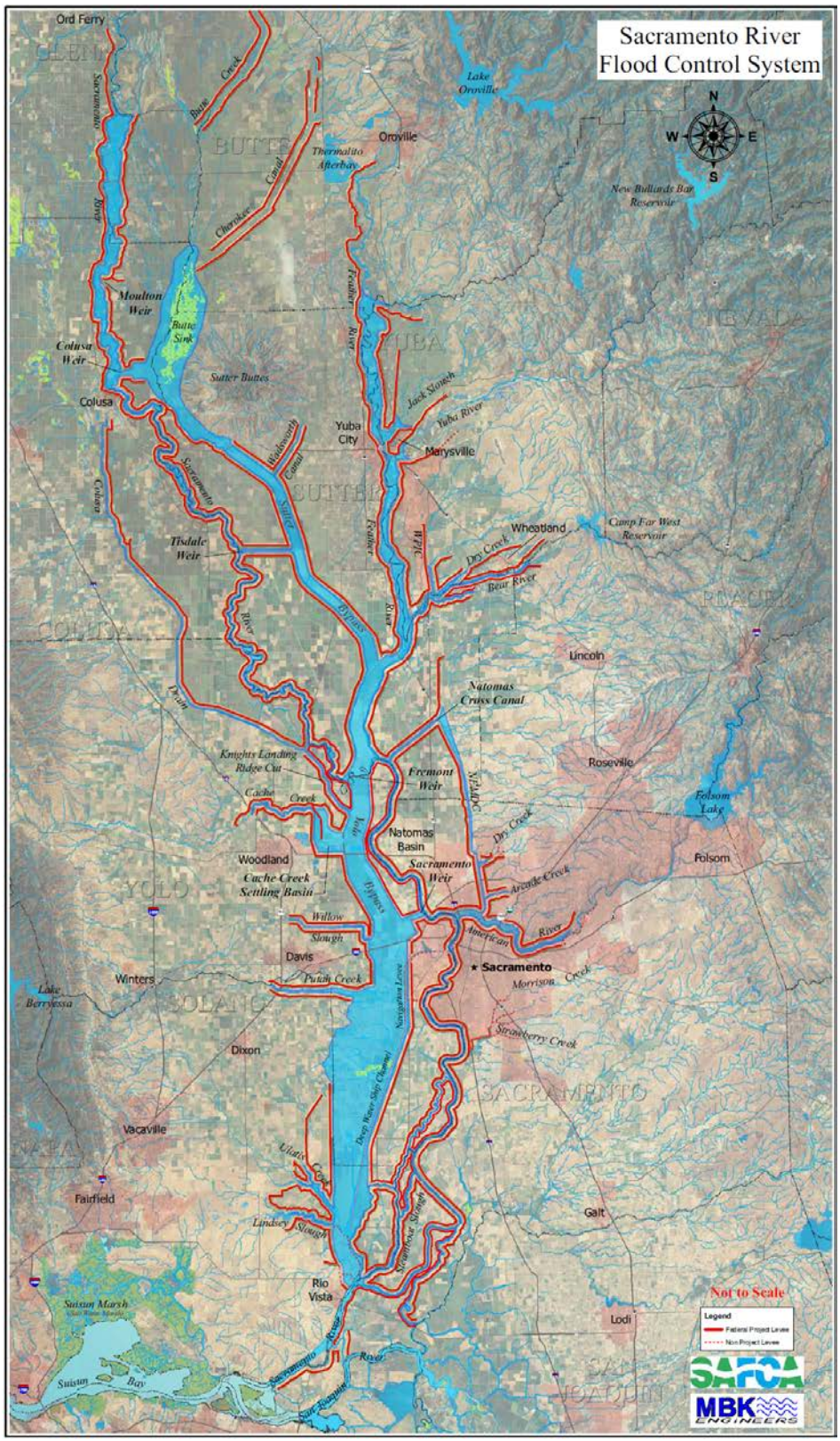
Sutter County has many flood control structures to reduce the affects of flooding. The principal method of flood protection for the Sutter County Planning Area is structural, consisting of reservoirs (dams), levees and bypasses completed between the 1920s and 1960s. Most of the levees were constructed as parts of federal flood control projects and then, on completion, were turned over to local interests for operation and maintenance. Levees along the Sacramento River, Sutter Bypass, Feather River, Yankee Slough, Wadsworth Canal, Cross Canal, and Tisdale Bypass are part of the Sacramento River Flood Control Project which was authorized by the Flood Control Act of 1917. According to the Flood Insurance Study (FIS) for unincorporated Sutter County (1998), the original project designs and later improvements to the Sacramento River Basin Flood Control System provided a 100-year level of protection. However, as discussed later in this section, more recent studies evaluating the levee system have identified several deficiencies which reduce the current level of protection of most area levees to below the 100-year level.

All of the reservoirs are located outside of the Planning Area. Within the Planning Area, the Sacramento and Feather Rivers rely primarily on a system of levees or earthen embankments to contain high river flows. Other flood control structures include bypasses. The bypasses, such as the Sutter Bypass, are auxiliary channels used to pass floodwater. Because the potential high flow of floodwaters within the Planning Area is larger than existing channel capacities, bypass systems have been developed to create additional capacity during critical peak flows. These bypass systems are needed only during major floods; as such, much of the lands reserved for this purpose can be used for agriculture, wildlife management, recreation or other compatible uses.

As the Sacramento River flows southward from Shasta Dam, natural overflow areas and two fixed weirs, Moulton and Colusa, permit floodwater to escape from the river into the Butte Basin. The Butte Basin is a natural flowage area that has not been drained and developed as have other basins in the area. Waters in the Butte Basin then flow into the upstream end of the Sutter Bypass. At the Tisdale Weir, additional water can be diverted from the Sacramento River directly into the Sutter Bypass. Draining the east side of the Sacramento Valley, flows from the Feather River enter the Sutter Bypass directly. The Sutter Bypass and the Sacramento River join just above the Fremont Weir. This weir divides the joint flow of the river-bypass system, limiting flow into the Sacramento River channel to its capacity and permitting the excess flow to cross the river and enter the Yolo Bypass. Near Sacramento, the Sacramento Weir provides the final escape route from the river to the Yolo Bypass. Also considered part of the flood control system within the Planning Area is a system of pumping plants which collect drainage waters and pumps the waters back into adjacent canals and rivers.

Flood control structures in Sutter County are shown in Figure 4.36 and discussed in greater detail in the levee failure (4.2.14) and dam failure (4.2.7) sections.

Figure 4.36. Flood Control Structures in Sutter County



Major Sources of Flooding

Floodwaters are a common occurrence for communities adjacent to and in the lowlands of rivers in Sutter County. Normally, wintertime storm floodwaters are kept within defined limits by levees, dykes, and open lowlands and cause no damage. Dams located outside Sutter County boundaries such as Oroville, Bullards Bar, and Shasta also help control floodwaters. But, occasionally, a combination of frequent storms, extended heavy rain, and melting snow results in floodwaters exceeding normal high-water boundaries and causing damage.

Given their location relative to the county, the Feather and Sacramento Rivers and associated tributaries present the greatest flood potential to the Sutter County Planning Area.

Localized Flooding

Localized, stormwater flooding also occurs throughout the County 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. Most runoff is pumped into the Sutter Bypass out of the Gilsizer Slough and Live Oak Canal. Flooding is more severe when previous rainfall has created saturated ground conditions. Urban storm drainpipes and pump station 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.

Within the county and cities, there are several areas not mapped on the DFIRM or Q3 maps where minor field, road, and street flooding occur from the relatively large storms that have occurred over the last 10 years. However, flood damage from local runoff to homes and other structures occurs very rarely within Sutter County.

Stormwater drainage throughout much of Sutter County is provided by piped storm drain conveyance systems (in the cities) and open channel systems. Stormwater flowing in these systems is either pumped or gravity drains the water into the Sacramento River, the Sutter Bypass, or the Feather River. These stormwater systems are owned and operated by a variety of agencies including reclamation districts, cities, Sutter County, and the State of California.

Stormwater drainage facilities are typically sized to address design storms with return frequencies of 2-years to 100-years. A storm with a 2-year rainfall or a larger event is statistically expected to return once every 2 years over a long term average. Alternatively, a storm with a 2-year rainfall or a larger event has a 50 percent probability of occurring in any single year. A storm with a 100-year rainfall or a larger event is statistically expected to return once every 100 years over a long term average. Alternatively, a storm with a 100-year rainfall or a larger event has a 1 percent probability of occurring in any single year. Design storm rainfall depths have been determined for Sutter County, as summarized in Table 4.23.

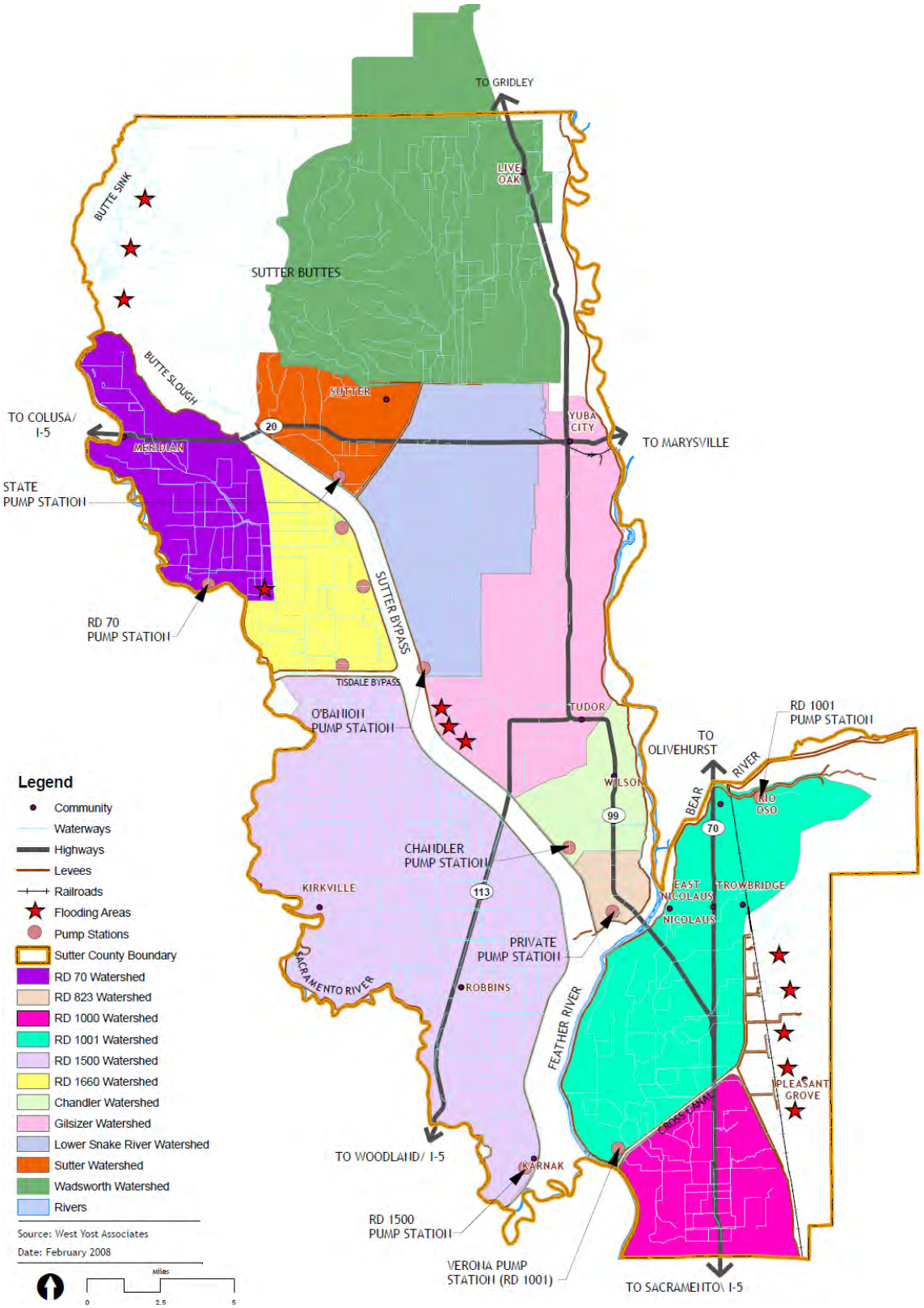
Table 4.23. Average Design Storm Rainfall Depths for Sutter County

Design Storm Return Frequency	Rainfall Depth for 1-day Duration	Rainfall Depth for 4-day Duration
2-year	1.91	2.90
10-year	2.98	4.86
100-year	4.23	7.16

Source: Goodridge, James D., Design Rainfall Study for Sutter County, prepared for Sutter County, June 11, 1998.

Most of Sutter County is protected from flooding from the Feather River and the Sutter Bypass by levees; consequently, most of the rainfall and resulting runoff must be pumped into the Feather River. This is done with the pump stations shown as red dots on Figure 4.37. However, one exception to this is the Wadsworth Basin (shown in green on Figure 4.37) which flows by gravity into the Wadsworth Canal and then into the Sutter Bypass. Another exception is the west half of the Sutter Buttes and the Butte Sink Area, which is located west of the Sutter Buttes (the unshaded area on Figure 4.37). These areas simply drain into the Sutter Bypass. As long as the levees function properly and their design capacities are not exceed, Sutter County is relatively free of flooding problems and resulting flood damage.

Figure 4.37. Location of Pump Stations in Sutter County



Source: Sutter County General Plan Technical Background Report

According to Sutter County, numerous parcels and roads throughout the County not included in the FEMA 100- and 500-year floodplains are subject to flooding in heavy rains. Several issues cause drainage problems that lead to flooding in the watershed. Ditches and storm water systems are needed to convey storm water away from developed areas; however, in some areas the topography prevents surface water from draining quickly to a ditch, stream, or storm drain during an intense rainfall event.

According to the 2008 FIS for the County, the severity of flooding is often intensified by backwater conditions between stream systems. This occurs when floodwater elevations are increased in lower portions of tributary streams due to the backwater effect from main streams reducing hydraulic gradients and flow-storage areas. The 2008 FIS identified several areas where the high flow of floodwaters cause backwater conditions on other channels:

- High flows on the Sacramento River generate backwater conditions on the lower reaches of the Cross Canal.
- The American River peak 1-percent-annual-chance flows induce backwater conditions in the lower reach of the Natomas East Main Drainage Canal.
- Coincidentally, high flows on the Natomas East Main Drainage Canal cause backwater conditions on the lower reaches of Arcade and Dry Creeks.
- High flows on Cross Canal create backwater conditions on Pleasant Grove Creek Canal.

The 2008 FIS also noted localized flooding issues on the Bear River and its tributaries:

> Upstream of the modified channel sections, the stream channels remain natural, and, in certain areas, have a limited flow capacity. Some of the factors that contribute to lower flow capacity are bridges, overgrowth, debris, reduced cross sectional area, and limited or no banks to contain the water. Floodwater escapes the natural channels and is trapped behind levees of then modified sections and cannot enter into the East Side or Pleasant Grove Creek Canal systems. Trapped floodwater is then siphoned under the two canals through corrugated metal pipe culverts varying in diameter from 20 to 42 inches. These discharge into RD 1001 drainage canals. RD 1001 then pumps this water into Cross Canal near Verona.
>
> A system of pumping plants, five discharging into the Natomas East Main Drainage Canal and two into the Cross Canal, transfers collected drainage waters from land areas adjacent to the two canals and adds to floodflows in the canals. During the occurrence of coincidental l-percent-annual-chance flood, approximately 1,640 cubic feet per second (cfs) is pumped into Natomas East Main Drainage Canal and 970 cfs into Cross Canal.

According to the Sutter County Department of Public Works, numerous roads throughout the county are subject to flooding in heavy rains. In addition to flooding, damages to these areas during heavy storms include pavement deterioration, washouts, landslides/mudslides, debris

areas, and downed trees. The amount and type of damage or flooding that occurs varies from year to year, depending on the quantity of runoff. Areas most affected in Sutter County are shown in Figure 4.38. These areas and the types of damages are presented in the Table 4.24.

Figure 4.38. Sutter County Flooded Roads

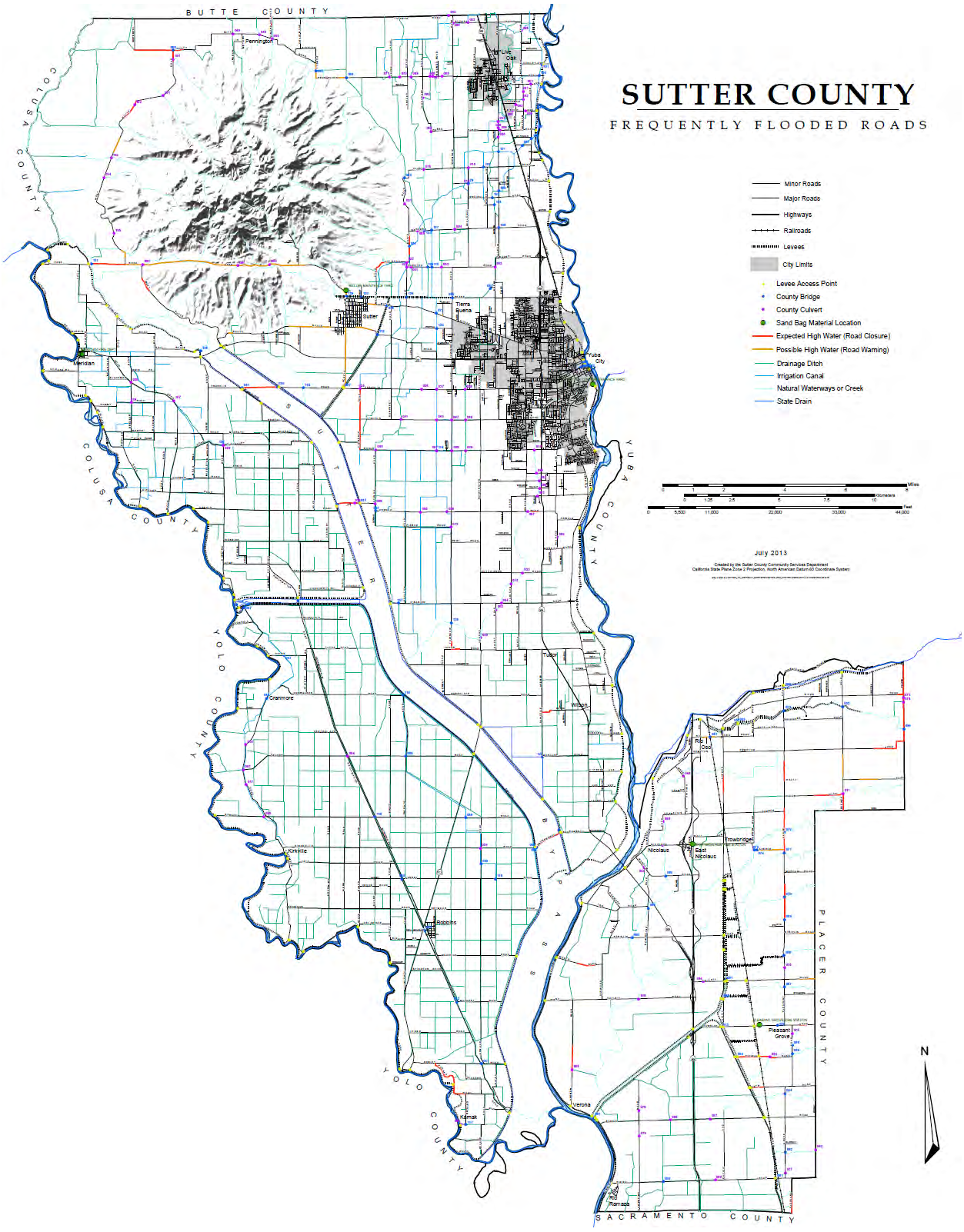


Table 4.24. Unincorporated Sutter County - Localized Flooding Areas and Related Impacts

Road Name	Flooding	Pavement Deterioration	Washouts	Landslide or Mudslide	Debris	Downed Trees
Pass Road	X	X	X	X	X	
West Butte Road	X	X	X	X	X	
North Butte Road	X	X	X	X	X	X
East Butte Road	X	X	X	X	X	X
South Butte Road	X	X	X		X	X
Powell road	X	X	X		X	X
Pennington Road	X	X	X		X	X
Butte House Road	X				X	X
Kellogg Road	X	X	X	X	X	X
Lower Pass Road	X	X	X		X	X
Almond Orchard Road	X				X	
Hagaman road	X					
Metter Road	X	X				
Fifield Road	X		X	X	X	
Keyes Road	X	X	X			
Catlett Road	X		X		X	
Howsley Road	X	X			X	
Pleasant Grove Road	X	X	X		X	
Brewer Road	X	X	X		X	X
Sacramento Avenue	X	X	X		X	X
Reclamation Road	X	X		X		
Subaco Road		X	X	X		
Hicks Road	X	X			X	X
Hughes	X	X	X		X	X
Oswald	X	X			X	X

Source: Sutter County Public Works

Flood Maps

As part of the County's ongoing efforts to identify and manage their flood prone areas, Sutter County relies on a variety of different mapping efforts. What follows is a brief description of FEMA and DWR mapping efforts covering the Sutter 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 the study. A general overview of floodplain mapping and associated products is provided in the following paragraphs. Details on the NFIP and mapping specific to participating jurisdictions are in Section 4.3 Vulnerability Assessment and in the jurisdictional annexes.

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 Sutter County FIS is dated December 2, 2008. This study covers both the unincorporated County and the incorporated jurisdictions.

Flood Insurance Rate Map (FIRM)

The FIRM is designed for flood insurance and floodplain management applications. The FIRM identifies flood zones throughout the unincorporated County. These flood zones are primarily for insurance rating purposes, but the zone differentiation is also used for other floodplain management purposes. For flood insurance, the FIRM designates flood insurance rate zones to assign premium rates for flood insurance policies. For floodplain management, the FIRM delineates 100- and 500-year floodplains, floodways, and the locations of selected cross sections used in the hydraulic analysis and local floodplain regulations. The County FIRMs were replaced by new digital flood insurance rate maps (DFIRMs) as part of FEMA's Map Modernization program, which is discussed further below. These new DFIRMS became available on December 2, 2008.

Lower Feather River Study

The Amended Draft of the Lower Feather River Floodplain Mapping Study, Revised February 17, 2005 (LFR Study), prepared by the U.S. Army Corps of Engineers (USACE) Sacramento District, was conducted, in part, to support the DFRIM mapping efforts within the Sutter County Planning Area. Generally, the LFR Study addresses flooding from the Feather River downstream of the Yuba River confluence to the mouth of the Feather River at the Sacramento River. It also addresses flooding from the Bear River downstream of Highway 65 and several tributaries to the Bear River. New hydrologic data and hydraulic models were developed as part of this study.

The LFR study was performed in compliance with current FEMA technical guidelines requiring certification of levees before crediting the levees with providing protection from the 1% annual event. According to the LFR study, at the time the study began, none of the levees in the study area were certified. And, most of the levees were "grand-fathered" as providing 100-year flood protection based on Flood Plain Information Reports performed in the 1960's by USACE. No

new flood insurance studies had been conducted on either the Yuba or Feather Rivers since the 1986 or 1997 flood events and levee failures.

FEMA 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 set and wave run-up. The LFR Study, basing its assessment on only three of these requirements (i.e., freeboard, geotechnical stability and seepage, and bank erosion), concluded that no levees within the study area could be certified in accordance with the requirements of 44 CFR 65.10. As a result of this finding, the new DFIRMs developed from this LFR study do not recognize the levees as providing 100-year flood protection.

According to the LFR Study, FEMA requires that a levee not be recognized on new maps if not certified for determination of flood insurance rate zones. New flood insurance rate zones were identified by considering: depth of flooding, nature of flow pattern, and whether the hydraulic computation method was considered detailed or approximate. Based on this Study, the following criteria were applied to the determination of flood insurance rate zones for the new DFIRMs:

Areas of deep ponding, such as behind levees, were mapped as AE zones. The 1% water surface elevation for these areas is well defined as the water is typically ponded behind a levee of know height.

- Areas of shallow (less than one foot) overland flow were mapped as X zones.
- Areas of overland flow, ranging from 1 to 3 feet deep, were mapped as AO zones.
- Areas of deeper overland flow were mapped as A zones.

The resulting DFIRMs are discussed below.

Upper Feather River Study (UFR Study)

Similar in scope to the LFR Study, the UFR Study will cover the portions of the Sutter County Planning Area, not included in the LFR Study. It is anticipated that the UFR Study will reach the same conclusions with respect the inability to certify the levees within that study area resulting in new DFIRMs that do not recognize the levees as providing a 100-year level of flood protection. The resulting DFIRMS are discussed below.

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 base maps;
- Upgrade the FIRMs to a GIS database format to set the stage for future updates and to enable

support for GIS analyses and other digital applications; and
- Solicit community participation.

DFIRMs, in conjunction with the paper FIRMs, both dated December 2008 for Sutter County were used for this plan's flood hazard analysis. The DFIRM map for the County can be seen on Figure 4.76. DFIRM maps (if available) for the cities can be seen in their respective annexes.

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.

Mapping of Levees

Also as part of FEMA's Map Modernization program, FEMA is mapping levees within communities, with a primary focus on levees determined to provide a 100-year level of flood protection.

In August of 2005, FEMA Headquarters' issued Memo 34 *Interim Guidance for Studies Including Levee*s. 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 Sutter County, similar to other locations in California, levees and flood control facilities have been built and are maintained variously by both public and private entities, including water, irrigation and flood control districts, other state and local agencies, and private interests. Some 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 100-year or greater flood. As part of the efforts to convert the Sutter County Planning Area to DFIRMS, an inventory of levees was undertaken within the Planning Area.

Levees in the County are discussed in more detail in Section 4.2.14.

Department of Water Resource (DWR) Floodplain Mapping

Also to be considered when evaluating the flood risks in Sutter County are various floodplain maps developed by the California Department of Water Resources (DWR) for areas throughout California, including the Sutter County Planning Area.

DWR Best Available Maps

The Best Available Maps were developed pursuant to Senate Bill 5 which requires DWR to develop preliminary maps for the 100- and 200-year floodplains located within the Sacramento-San Joaquin Valley watershed. These maps were developed by DWR to better reflect the most accurate information about the flooding potential in a community and were designed to provide a better understanding of the true risk of flooding to public safety and property. SB 5 requires that these preliminary maps be provided as best available information on flood protection to cities and counties in the watershed for: 1) areas protected by State-Federal project levees, and 2) areas outside the protection of project levees.

The new maps, compiled using information from state, local and federal agencies, have no current regulatory status for floodplain development and are for information only. They do not replace existing FEMA regulatory floodplain maps (i.e., FIRMs and DFIRMs) and therefore do not make any changes in federal flood insurance requirements for homes and businesses. However, city and county governments will be able to use the maps to identify areas that warrant further study and to help make informed floodplain management and land use decisions. The floodplains shown on these maps delineate areas with potential exposure to flooding for two different storm events: one with storm flows that have a 1 percent chance of being equaled or exceeded in any year (100-year) and one with storm flows that have a 0.5 percent chance of being equaled or exceeded in any year (200-year).

These advisory maps will help communities begin early planning activities to meet SB 5 requirements calling for a minimum of 200-year protection for new development in urban and urbanizing areas. These "best available" floodplain maps can be accessed online at: http://www.water.ca.gov/floodmgmt/lrafmo/fmb/fes/best_available_maps.

These maps are included in the vulnerability discussion of flood in Section 4.3.6.

DWR Awareness Floodplain Maps

The Flood Awareness Maps, developed under the Flood Awareness Mapping Project, are designed to identify all pertinent flood hazard areas by 2015 for areas that are not mapped under the FEMA NFIP and to provide the community and residents an additional tool in understanding potential flood hazards currently not mapped as a regulated floodplain. The awareness maps identify the 100-year flood hazard areas using approximate assessment procedures. The floodplains are shown on these maps simply as flood prone areas without specific depths and other flood hazard data. There are currently no studies available for Sutter County.

Levee Flood Protection Zones (LFPZ) Maps

LFPZ maps represent floodplain areas protected by Central Valley State-Federal Project Levees. Under Water Code Section 9110(b), "LFPZ" means the area, as determined by the Central Valley Flood Protection Board or DWR, that is protected by a project levee. These maps were developed based on the best available information as required by Assembly Bill 156. This Bill requires DWR to prepare LFPZ maps to identify the areas where flood levels would be more than three feet deep if a project levee were to fail. DWR delineated the LFPZs by estimating the maximum area that may be flooded if a project levee fails with flows at maximum capacity that may reasonably be conveyed. DWR is using information from several sources, including FEMA floodplain maps, FEMA Q3 data, USACE's 2002 Sacramento and San Joaquin River Basins Comprehensive Study, and local project levee studies. Using this data, DWR is implementing a multi-year program to evaluate and delineate detailed floodplains for areas protected by project levees. This effort includes new topography, hydrology, hydraulic models, and floodplain maps. This information will be used to update the initial LFPZ maps. LPFZ maps can be accessed at: http://www.water.ca.gov/floodmgmt/lrafmo/fmb/fes/levee_protection_zones/LFPZ_maps.cfm. Figure 4.83 in Section 4.3.8 is the most recent LFPZ map for the Sutter County Planning Area.

Central Valley Floodplain Evaluation and Delineation Maps (CVFED)

CVFED maps, required by Senate Bill 5, represent 100- and 200- year floodplains for urban and urbanizing areas within the Sacramento-San Joaquin Valley watershed. These maps are being developed based on more detailed hydrologic and hydraulic information, topographic data, and levee evaluations. CVFED maps are still in the development stage.

Past Occurrences

Historically, 100-/500-year and localized flooding has been an ongoing problem throughout the Planning Area. The most notable major flood events occurred in 1955, 1986, 1995, and 1997 as described in detail below. Primary damages were to property and agricultural crops. These damaging floods were generally the result of failures of the levee systems rather than the levees being overtopped. Other lesser flooding events have also occurred in other years. Table 4.25 presents a timeline of past flooding events.

Table 4.25. Historic Timeline of Past Flooding Events in Sutter County and Surrounding Areas.

Date	Description
1805	Great Flood. Information from early settlers indicated the entire valley was inundated. Many lives were lost and villages destroyed.
1846-47	More data from early settlers indicated the loss of life and villages.
1852-53	More data from early settlers indicated the loss of life and villages.
1861	Dec. 10th. Marysville Appeal Newspaper described the entire town under water. All that was seen was the "roofs of houses and floating animals"

Date	Description
1862	Jan. 11th. Water was 6" higher than 1861. Farmers lost ¾ of herds.
1867-68	Extensive property and levee damage. 1/5th of levees were washed away.
1870	Large levee constructed in Colusa county penned in water in Sutter County. Meridian and Kirksville were submerged.
1875	Jan. 19. Levees in Yuba City and Maryville broke and flooded both cities. Volume and height of water unprecedented.
1907	Three weeks of heavy rain and March snowfall led to levees breaking in District 1 & 2 in mid-March. Flood wave sustained 200 miles. Damage amounted to $1000.
1937	Levee break in E. Biggs. Water flowed over Hwy 20. Nicolaus bridge was damaged.
1940	Flood in Meridian from Sutter Bypass. After this flood the Shasta Dam was built to control the Sacramento River.
1942	Break in Sutter Bypass flooded Sutter/Robbins Basin.
1944	Break in the Bear River flooded Sutter County.
1948	Break in Bear River flooded Rio Oso/Nicolaus Basin.
1950	Nov. 19th break in Yankee Slough flooded Sutter County.
1955	Dec. All time record flow. Worst flood in Northern California history.
1986	Linda levee broke. Flooded 30 square miles. Emergency declared by Governor.
1995	Flooding caused by two direct downpours which created major surface drainage back-ups at numerous locations throughout the county. More than $850,000 in damages to county facilities.
1997	Flood in Yuba County, Plumas Lake area. 80,000 evacuated. Meridian basin floods from a break in the Sutter Bypass Levee.

Taken from the HMPC and the NCDC database the following paragraphs provide a short synopsis of the most significant past flooding disasters occurring in Sutter County.

1955 Flooding

This was the most devastating of all the floods to this area. A break in this levee south of Yuba City occurred at about midnight on December 23rd. The initial of surge water spread westerly through Gilsizer Slough to the Sutter Bypass and northerly into Yuba City. Within less than 24 hours, the heart of Sutter County was flooded from the Feather River on the east and south to the Bypass on the west and southwest. To the north, the water spread north of Colusa Avenue (Highway 20) in several areas, including some west of Walton Avenue.

Nearly 100,000 acres were flooded and resulted in 38 deaths, injuries to 3,200 people, and nearly $40 million in property damage. The bridge over the Feather River at 5th Street was washed out and telephone service was lost south of Colusa Avenue.

Figure 4.39. Downtown Yuba City December 1955 (Seepage Related Levee Break in Upper Center) View Southerly

Source: Yuba City Public Library

1962

In October of 1962 a storm caused 6 to 9 inches of rain to fall in a 3 day period. Localized flooding was reported throughout the County.

1986 Flooding

While the most severe flooding occurred in neighboring Yuba County, Sutter County did experienced flooding. The most serious problems were located in the southern area of the county which is sparsely populated. The county was fortunate not to have a break in the levee but did experience slumping in the Robbins area. In the southeast area of the county, surface flow from Placer County led to extensive ponding. This coupled with two failures of minor levees, flooded numerous rural residences and agricultural facilities.

1995 Flooding

The 1995 floods were caused by two direct downpours which created major surface drainage back-ups at numerous locations throughout the county. Most of the water simply was on the wrong side of the levees. The storms were accompanied by high winds which also contributed significantly to the damage. The two separate events occurred in January and March and resulted in more than $850,000 in damage to county facilities.

1997 Flooding

A series of storms generated by the "Pineapple Express" dumped warm, heavy rains onto a nearly double than average snow pack in the Sierra Nevada Mountains in late December. Runoff was filling the Shasta, Oroville, and New Bullards Bar Dams. Sutter County was notified by Oroville Dam that uncontrolled releases of huge proportions within the next 24 hours were possible. Sutter County declared an emergency on New Year's Day at 11 a.m. and advised residents of voluntary evacuation. As the river continued to rise, the Sutter County Board of Supervisors directed a mandatory evacuation of the Nicolaus area and of all areas east of the Sutter Bypass and south of Pease Road. A break in the levee occurred at Arboga in Yuba County and it brought inundation to southwestern Yuba County. The mandatory evacuation was extended to Pleasant Grove and Robbins was added to the list on January 4th due to dangerous levee conditions evolving on the south side of Tisdale Weir. The mandatory evacuation was lifted when the conditions stabilized and residents were allowed to return to the Yuba City area but the levee experienced a massive break in the Sutter Bypass. The town of Meridian was under a mandatory evacuation order and over the next three days earthen berms were constructed on the east and south sides of town which successfully protected it from being flooded. Meridian was the hardest hit area of Sutter County with approximately 50 square miles under water. Virtually every facility in the basin was destroyed or damaged including nearly 100 homes and a school standing in 4 feet of water. A second break in the levee was made at the south end of the basin to allow the waters to return to the Bypass. The mandatory evacuation order was lifted on January 22nd and the basin was not dry until June. Even though Sutter County did not experience loss of lives with this flood, the estimated financial losses to individuals and businesses were about $18 million and agricultural losses exceeded $5 million, not including long term damage to orchard trees. Losses sustained by public agencies within the county amounted to about $10 million.

Illustrating the extent of flooding, a before and after aerial photo of the flooding of 1997 is included on the following page.

Figure 4.40. 1997 Flood Event (Before)

Figure 4.41. 1997 Flood Event (After)

Source: Sutter County Public Works

1998 Flooding

January 12, 1998 - The NCDC reported that heavy rains from a strong Pacific storm caused widespread but minor flooding across the Sacramento and Northern San Joaquin Valleys and nearby foothills. Hundreds of traffic accidents also occurred on the highways and city streets throughout the region.

January 18, 1998 - The NCDC reported that 0.75 inches of rain in 6 hours in downtown Sacramento was one of the lighter rainfall totals as a Pacific storm brought brief but heavy rain to the Sacramento and Northern San Joaquin Valleys and surrounding foothills. 27,000 customers across the area lost power at sometime during the storm. Numerous traffic accidents also occurred.

2005 Flooding

December 17, 2005 – The NCDC reported that a series of powerful but warm winter storms brought heavy rainfall to Northern California during a five day period. Five day rainfall totals in the County amounted to 3.5 to 4.5 inches.

2005/2006

Flood Damage Assessment reports for the 2005-2006 winter storms/heavy rains illustrates the impacts of some of these localized flooding issues as well as impacts associated with riverine flooding. A listing of those areas impacted by the 2005-2006 winter storms include the following sites provided by the Sutter County Department of Public Works. More information can be found in Appendix F.

- Site No. 1: Sacramento Avenue
- Site No. 2: Keys and Natomas Road
- Site No. 3: Fifield Road
- Site No. 4: Howsely Road
- Site No. 5: East Catlett Road
- Site No. 6: Pleasant Grove Road
- Site No. 7: Pleasant Grove Road
- Site No. 8: Nicolaus Avenue
- Site No. 9: Brewer Road
- Site No. 10: Sabaco Road
- Site No. 11: Pennington Road
- Site No. 12: North Butte Road
- Site No. 13: West Butte
- Site No. 14: Kellog Road
- Site No. 15: Pass Road (Segment 1)
- Site No. 16: Pass Road (Segment 2)
- Site No. 17: Pass Road (Segment 3)
- Site No. 18: West Butte Road
- Site No. 19: Robbins Wastewater Treatment Plant
- Site No. 20: Yuba City Boat Ramp
- Site No. 21: Yuba City Boat Ramp Debris Removal

Yuba City also incurred damage as a result of high water events occurring during the 2005-2006 winter storms from December 17, 2005 through January 3, 2006. Of primary concern to the city was damage associated with two city-owned properties:

- Damage to six effluent percolation ponds on the east side of the Feather River, southeast of the City's Wastewater Treatment Facility. The ponds, composed of graded earthen fill, are an

integral part of the wastewater treatment process. Heavy rains and severe storms caused the Feather River to flood its banks, overtopping the adjacent percolation ponds and causing damage to the structure of each of the six ponds. The damages sustained include silt debris deposits, scour along the pond levee slopes and pond bottoms, tearing/displacement of the fabric lining of the ponds, washout of rip rap and fill along the pond slopes, and erosion damage and washout of fill around the concrete spillways of each pond. Similar damages occurred in previous high water events in 1986, 1995, and 1997.

- Damage to the Low Lift Station Access Road which runs along the banks of the Feather River. The roadway, shoulders and embankments are composed of graded and compacted aggregate base and backfill. Severe storms caused the Feather River to flood over its banks and resulted in major roadway flooding that washed out the roadway, roadway shoulders and integral ground of both along sections of the Low Lift Station Access Road.

2008 Flooding

On January 4, 2008, a winter storm with strong winds caused loss of power throughout Northern California. sustained wind speeds were recorded at 31 MPH (gusts to 43 MPH). Throughout the day, sustained wind speeds increased to 45 MPH with gusts to 62 MPH locally. Unofficial reports of gusts from 89-92 MPH around the Sutter Buttes were later confirmed as probable by NWS based on damage sustained and radar imagery observed. Widespread wind damage caused sustained power outages to most of the county. Sheriff, fire, and public works personnel responded to reports of downed trees, downed power lines, fires, accidents, and damaged buildings.

PG&E responded to the numerous calls of outages and downed lines/poles/fires but found their resources taxed. Because of this, (and a change instituted in the way the PG&E response was coordinated), critical facilities were not restored in a timely fashion. At approximately 7:00 am on January 4, 2008, the power was lost throughout Yuba City. This resulted in power being down to the Information Technology (IT) database center. This center controls IT for the county offices and provides the Critical Sheriff/Fire Services Dispatch and Law Enforcement Data Processing. Power to this facility was restored at 3:30 am on January 5, 2008 after approximately 20 hours of downtime. The Fire/Law dispatching system was fully restored at approximately 7:00 am on January 5, 2008. Due to a fire on a power pole, an outage occurred again to the database center at 12:30 pm on January 5, 2008. Power was restored at 2:30 pm and the dispatch system was fully restored at 4:00 pm.

During the morning of January 4, 2008, the town of Robbins lost power. With the outage the community had no fresh water or sewage treatment. This community is different from the rest of the county in how its water/sewer system is maintained. The Sutter County Public Works Department maintains approximately 92 sewage lift stations and a processing plant and is responsible for the removal/processing of sewage for the community. This system requires power to be at each station as well as the main plant in order for it to work properly. This is a critical facility for power restoration due to the health/sanitation issue posed from being down for

an extended period of time. The Emergency Services Manager, Public Works personnel, Fire personnel, and the CAO, while performing "windshield" surveys of damage, reported several locations of downed lines and poles in the general location of Robbins. Soon after the report of a downed line near the sewage treatment plant, power was restored. This facility was not restored until 2:45 pm on January 6, 2008, approximately 56 hours after the outage first occurred.

Additionally, on January 4, 2008, DWR and Reclamation District (RD) 70/1660 lost power to their pumps during the morning hours. The DWR pumps situated along the Sutter Bypass remove water from low lying areas for flood control. The RD 70 pumps along the Sacramento River and the RD 1660 pumps along the Tisdale Weir remove water from low lying areas for flood control. When power is lost these areas see flooding when there is significant rainfall. On January 5, at 4:30 pm, Gilsizer Drainage District notified Yuba City Public Works of rising water in the Gilsizer Slough. This information is passed to the Sutter County Emergency Services Manager at approximately 4:45 pm. The cause of the rising water is the outage at DWR Pump Station 2. During the conversation, DWR reports Pump Station 1 is also experiencing an outage. Reports from personnel in the field indicate a slight rise in the drainage ditches in the general vicinity of Pump Station 1.

DWR reports power is to be restored (per PG&E) to Pump Station 1 at 2000 and Pump Station 2 at approximately 2:00 am on January 6, 2008. At 7:00 am on January 6, 2008, the Emergency Services Manager arrives at the Pump Station 2 and finds the duck club flooded and both Pump Stations still without power. At this point the issue is elevated to State Operations Center and the California Utilities Emergency Association. Pump Station 1 is restored at 1:00 pm. The cause for the outage at Pump Station 2 is thought to be 5 power poles that are down. At 7:00 pm, PG&E is still working to resolve the problem.

On January 7, 2008, at 7:00 am, Pump Station 2 still has no power and due to little rain fall the slough has not changed in level. The duck club remains flooded. At 9:30 am, RD 70/1660 calls and reports they've been without power since January 4 and are seeing a back up of water due to the outage. At 2:15 pm, PG&E restores power to Pump Station 2 and as a result RD 1660 pumps also come up. At this time two of three phases of power come up at RD 70 pumps. PG&E dispatches a troubleshooter to RD70 pump house. Troubleshooter finds third phase comes from Colusa County and investigates at 1630. RD 70 contact Emergency Services Manager at 6:00 pm when power is restored. These pump stations were down for approximately three days. Had the forecast for heavy rains been correct, we would have had much worse flooding problem.

On January 6, 2008, a local emergency was declared due to the amount of storm damage, the continued power outage, and the strong possibility of flooding due to DWR pumps being out on the Sutter Bypass.

Power outages were seen throughout the county until the morning of January 11, 2008, when the last area was restored. On the night of January 4, 2008, Sutter County Human Services opened a warming center at the Veterans Hall. This location was chosen as it was the only place that had

power. Due to all, but one, radio stations being off the air, limited information of the opening was available to the public. Only one person showed up at the center. On January 5 and 6, the local chapter of the American Red Cross opened a warming center at their building. Even with increased media availability, only a handful of people sought shelter. No warming centers were opened after January 6, 2008. Sutter County Human Services evaluated those individuals requiring assistance and working with the ARC placed displaced residents into temporary housing or provided other assistance as needed.

02009 Flooding

March 3, 2009 – The NCDC reported a system that generated thunderstorms in the Central Valley, bringing heavy rain, flash flooding, and other severe effects. Numerous car accidents from wet roads were reported across the area, as well as trees falling from a combination of wet ground and wind. Minor flooding of rural county roads in the Nicolaus area of the County was reported.

2011 Flooding

Starting on March 19, 2011, a series of winter storms caused conditions of extreme peril to the safety of persons and property within this county. Disruption of electrical power at flood control pumping stations threatened homes, businesses, and roads throughout the county. Localized flooding was present in low lying areas due to the large amount of precipitation and associated drainage. The Department of Water Resources (DWR) pumping Station 3 on the Sutter Bypass lost power due to the high winds on March 19 at approximately 2000 hrs. Additionally, Reclamation Districts (RD) 1001 and 70 also lost power at their pumping stations. The DWR pumps situated along the Sutter Bypass remove water from low lying areas for flood control. The RD 70 pumps along the Sacramento River and the RD 1001 pumps along the Natomas Cross Canal also remove water from low lying areas for flood control. When power is lost these areas see flooding when there is significant rainfall.

Starting at 8:00 am on March 20th, the Emergency Operations Manager patrolled affected levees and noted all areas were within system capacity. At approximately 1300 hrs, DWR notified the Emergency Operations Manager that power had not been restored and Hwy 20 near Sutter could be affected by standing water. Contact was made within PG&E and power was restored at 1841 hrs. Pumping operations resumed and the hazardous conditions at Hwy 20 was averted.

At approximately 11:27 am on March 21, Reclamation District 1001 reported cracking and material movement on the North levee of the Natomas Cross Canal in Verona. An area of the levee had cracking approximately 160 feet long and a drop of 3 inches on the landside at the north side of the road. On the afternoon of March 21, 2011, RD1001 declared a local emergency for imminent danger of potential levee failure. It was determined that covering the cracking with Visqueen would prevent further deterioration of the levee. On March 22, 2011, the damage had extended to approximately 240 feet. DWR called in California Conservation Corps who, with the assistance of local volunteers, put Visqueen and sandbags over the cracking. Over the next five

days the damage grew to approximately 1000 feet long with vertical drops of material up to three feet in places. There was noticeable lateral bulging on the landside of the levee. During the course of this period of material movement, the river levels on the Sacramento River fluctuated between 34-36 feet. Once river levels dropped below 34 feet, the movement and cracking appeared to stop.

On March 24, 2011, Caltrans reported severe scouring of the Tenth Street Bridge (Hwy 20) and started monitoring the bridge for movement. By March 26, significant debris had piled against the Reclamation Bridge in the Tisdale Weir. This was determined not to be causing a problem for the bridge. However, there was some concern that water flow around the debris might cause scouring to the levee. Situation was monitored and would need to be evaluated as the waters receded.

On April 14, 2011, Sutter County OEM and Public Works accompanied FEMA and Cal EMA personnel to assess the damage. The initial damage estimate (IDE) for Sutter County was $22,988,000. Repairs began on the Tenth Street Bridge (Hwy 20) on June 21st. Caltrans completed the repair at a cost of $12 million in December 2011.

2012 Flooding

A severe winter storm event occurred over the County between November 30th and December 3rd, 2012. During this period, the wastewater treatment plant was nearly overwhelmed by inflow and infiltration. Since the treatment plant could not keep up with the influent (which was observed to be close to 100 gallons per minute), the entire collection system (including septic tank pumping system tanks) was back-charged. This placed the entire community of Robbins at risk of sanitary spills occurring both on their property and within their homes.

SHELDUS

The SHELDUS database contains 11 flood related events in the County. These are shown in Table 4.26

Table 4.26. SHELDUS Flood History for Sutter County from 1960 to 2012

Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
12/18/1964	Flooding	1.96	0.64	$1,785,714.29	$178.57	Floods
1/16/1973	Flooding - Severe Storm/Thunder Storm	0	0	$86,206.90	$0.00	Heavy rains, floods
2/17/1986	Flooding	0	0	$5,000,000.00	$0.00	Flash flooding
2/11/1992	Flooding - Winter Weather	0	0	$10,416.67	$0.00	Winter storm, flash flood
2/14/1992	Flooding - Winter Weather	0	0	$8,928.57	$0.00	Winter storm, flash flood

Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
3/1/1995	Flooding - Severe Storm/Thunder Storm - Wind	0	0	$0.00	$11,241,379.31	Flood, rain, winds
12/29/1996	Flooding	0	0	$2,857.14	$0.00	Floods
2/2/1998	Flooding	0	0	$3,362,337.66	$1,637,662.34	Flood
1/23/2000	Flooding	0	0	$4,166.67	$0.00	Flood
12/27/2005	Flooding	0	0	$900,000.00	$0.00	Flood
1/1/2006	Flooding	0	0	$900,000.00	$0.00	Flood
Totals		**1.96**	**0.64**	**$12,060,627.90**	**$12,879,220.22**	

Source; SHELDUS

Past Occurrences Affecting Nearby Communities

Although primarily affecting adjacent Yuba County, the 1986 and 1997 floods were the most significant flooding to occur since the completion of the Oroville Dam in 1964. This historical flood data is important to the Sutter County Planning Area as extreme flood conditions resulted in the failure of a levee that is part of the overall levee system protecting the Planning Area. Under slightly different circumstances, these same flood conditions could have resulted in a levee failure with more of a direct impact to the Sutter County Planning Area. As it was, in addition to the flooding it received, the Planning Area was also impacted through its efforts in assisting with evacuations and in providing shelter to those most affected from neighboring Yuba County. The affects of these flood events on neighboring Yuba County are described briefly below:

1986 Flooding

In February of 1896, a storm caused 6 to 9 inches of rain to fall in a 10 day period. The left levee of the Yuba River failed just upstream of the Feather River confluence (RD 784). The communities of Linda and Olivehurst were inundated, resulting in one death, 895 destroyed homes, and 150 destroyed businesses.

1997 Flooding

The left levee of the Feather River failed near Arboga (RD 784), killing one person, destroying 180 homes and businesses, and prompting evacuation of about 15,000 people from Linda and Olivehurst.

Likelihood of Future Occurrences

100-Year Flood

Occasional—The term "100-year flood" is misleading. It is not the flood that will occur once every 100 years. Rather, it is the flood that has a 1- percent chance of being equaled or exceeded

in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time.

500-Year Flood

Unlikely—The 500 year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year.

<100-Year Flood/Localized Flooding

Highly Likely—Based on historical data, flooding events less severe than a 100-year flood and those outside of the 100-year floodplain occur frequently during periods of heavy rains.

Climate Change and Flooding/Localized Flooding

Climate change may affect flooding in Sutter 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.

4.2.13 Invasive Species – Pests/Plants

Hazard/Problem Description

Invasive species and pests in Sutter County can have an impact on both agriculture and human health.

Agriculture: Invasive Species

Sutter County farmers cultivate a wide range of crops, though tree fruits, tree nuts, other fruits, vegetables and grains, especially rice, make up the majority of total production. For most fruits, the harvesting season is early to mid-summer, while harvesting of tree nuts and rice occurs from late summer to early fall. Some vegetable crops can be harvested three or more times each year. Agricultural production in Sutter County remains a significant contributor to the local economy. In addition to the almost $550 million in annual production value, there are hundreds of jobs directly tied to that production and many more that are impacted indirectly in the production, processing, transportation, and marketing of those commodities. It is estimated that there is approximately a four to one ratio for crops grown in this region, so $550 million in production value is actually a $2.2 billion impact on the local economy.

Sutter County is at risk from many insects that, under the right circumstances, can cause severe economic, environmental, or physical harm. Insect pests affecting crop production result in economic disasters. These hazards can have a major economic impact on farmers, farm workers, packers, and shippers of agricultural products. They can also cause significant increases in food prices to the consumer due to shortages.

Sutter County is at risk to noxious weeds that can affect both waterways and agricultural crops. These hazards can have major impact on farmers, farm workers, packers, and shippers of products, as well as those who use waterways for recreation or for water supply.

Sutter County Agricultural Industry

Sutter County contains fertile land tilled for agriculture use. Total 2011 crop production value of $547,187,460 represented a 4.89% increase from 2010 values. The primary increases were in fruit and nut crops, which led Sutter County production values at $244 million, followed by field crops at $211 million. Table 4.27 shows the total value of all agricultural products in Sutter County from 2005 to 2011.

Table 4.27. Gross Value ($) of Agricultural Production in Sutter County

	2005	2006	2007	2008	2009	2010	2011
Field Crops	$116,674,300	$130,626,000	$135,264,000	$261,387,700	$224,402,100	$234,261,400	$211,008,000
Fruit and Nut Crops	$123,834,400	$158,918,900	$169,438,400	$151,744,900	$159,656,400	$189,024,000	$244,284,000
Vegetable Crops	$19,788,600	$21,564,300	$29,192,500	$27,757,600	$31,426,900	$31,210,000	$23,845,000
Seed Crops	$14,368,790	$14,951,900	$15,814,100	$29,318,300	$5,332,600	$37,869,000	$31,904,000
Apiary Products	$3,497,900	$3,973,400	$2,305,900	$2,674,700	$2,562,000	$3,263,000	$5,045,000
Nursery Products	$11,058,300	$12,736,500	$9,881,600	$11,999,800	$11,234,900	$13,308,570	$16,102,000
Livestock	$15,967,900	$16,074,200	$16,044,300	$13,312,200	$11,076,200	$12,704,600	$14,999,460
Totals	**$305,190,190**	**$358,845,200**	**$377,940,800**	**$498,195,200**	**$475,691,100**	**$521,640,570**	**$547,187,460**

Source: Sutter County Agricultural Commissioner

There are many harmful insect pests and plant diseases that put Sutter County's environment and economy at risk. According to the HMPC, agricultural losses occur on an annual basis throughout the County and are usually associated with severe weather events. California is also at risk from many 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: Asian longhorn beetle, Caribbean fruit fly, Glassy-winged sharp shooter, Guava fruit fly, Gypsy moth, Japanese beetle, Mediterranean fruit fly, Melon fruit fly, Mexican fruit fly, Olive fruit fly, Oriental fruit fly, and Bark beetle.

Noxious Weeds

Also of concern to the Sutter County Planning Area is the problem of noxious weeds. Noxious weeds means any species of 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. Noxious weeds in the Planning Area have been introduced by many means

including nurseries and fish aquarium supply stores. Without natural controls, combined with the aggressive growth characteristics and unpalatability of many of these weeds, once they get a foothold, they can dominate and replace more desirable native vegetation. Negative effects of weeds include:

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

Noxious weeds within the Sutter County weed management area include the following:

- Yellow Starthistle
- Giant Reed
- Scotch Broom
- Saltcedar
- Puncturevine
- Himalaya Blackberry
- Rush Skeletonweed
- Creeping Waterprimrose
- Parrotfeather
- Purple Loosestrife
- Perennial Pepperweed
- Hydrilla

The California Invasive Plant Council tracks invasive plants in California. Management opportunities for invasive species are identified in three categories determined by the species' spatial distribution. For each type of opportunity, plant species are organized by their rating in Cal-IPC's Inventory, which uses a uniform methodology to categorize non-native plants that pose a substantial threat to the state's wildlands. The Cal-IPC rating combines information about ecological impacts, invasive potential and ecological distribution to rate species as High, Moderate, or Limited at a statewide level. Regional impacts may differ. The HMPC noted that a species that is a particular concern in Scotch Broom.

Surveillance – Surveillance entails regular surveys to detect new infestations of species not known to be present in a region. The strategic potential depends on the proximity of nearby infestations and the suitability of the area. Figure 4.42 and Figure 4.43 include species occurring within 50 miles of Sutter County.

Figure 4.42. Surveillance Opportunities in Sutter County

Plant Species: Grouped by Statewide Cal-IPC Rating	Suitable Range 2010	Suitable Range 2050
High (11 species)		
Alternanthera philoxeroides alligator weed	-	-
Brassica tournefortii Saharan mustard, African mustard	0 %	▬
Carpobrotus edulis Hottentot-fig, iceplant	0 %	▬
Centaurea stoebe ssp. micranthos (=Centaurea maculosa) spotted knapweed	0 %	▬
Cortaderia jubata jubatagrass	0 %	▬
Hydrilla verticillata hydrilla	-	-
Ludwigia peploides creeping water-primrose	-	-
Onopordum acanthium Scotch thistle	0 %	▬
Salvinia molesta giant salvinia	-	-
Tamarix ramosissima saltcedar, tamarisk	-	-
Ulex europaeus gorse	0 %	▬
Moderate (15 species)		
Acacia dealbata silver wattle	90 %	▬
Alhagi maurorum camelthorn	-	-
Arctotheca prostrata (=Arctotheca calendula infertile) sterile capeweed	-	-
Asparagus asparagoides bridal creeper	0 %	▬
Atriplex semibaccata Australian saltbush	1 %	▬
Carthamus lanatus woolly distaff thistle	0 %	▬
Cirsium arvense Canada thistle	0 %	▬
Cotoneaster pannosus silverleaf cotoneaster	2 %	▲
Ilex aquifolium English holly	0 %	▬
Linaria dalmatica ssp. dalmatica (=Linaria genistifolia ssp. dalmatica) Dalmatian toadflax	0 %	▬
Pennisetum setaceum crimson fountaingrass	0 %	▲▲
Fallopia sachalinensis (=Polygonum sachalinense) Sakhalin knotweed	-	-

Source: Cal WeedMapper Invasive Species Management Opportunities in Sutter County

Figure 4.43. Surveillance Opportunities in Sutter County (cont.)

Plant Species: Grouped by Statewide Cal-IPC Rating	Suitable Range 2010	2050
Saccharum ravennae ravennagrass	-	-
Salsola soda oppositeleaf Russian thistle	-	-
Tanacetum vulgare common tansy	-	-
Limited (13 species)		
Acacia melanoxylon black acacia, blackwood acacia	0 %	▬
Carduus acanthoides plumeless thistle	-	-
Digitalis purpurea foxglove	-	-
Euphorbia oblongata oblong spurge	92 %	▼▼
Helichrysum petiolare licoriceplant	-	-
Iris pseudacorus yellowflag iris	-	-
Myosotis latifolia common forget-me-not	0 %	▬
Pennisetum clandestinum kikuyugrass	0 %	▲
Phoenix canariensis Canary Island date palm	-	-
Ranunculus repens creeping buttercup	-	-
Saponaria officinalis bouncingbet	-	-
Schinus molle Peruvian peppertree	-	-
Tamarix aphylla athel tamarisk	-	-

Source: Cal WeedMapper Invasive Species Management Opportunities in Sutter County

Suitable Range

2010: Percent of the selected region of interest that currently meets the minimum threshold for suitability for the species, Infested: Percent of the current suitable range that is infested.

2050: Change in suitability between 2010 and 2050, with an arrow representing an increase or decrease of greater than 10%, and a double arrow indicating change of greater than 40%.

- ▲▲ Increase of 40% or more
- ▲ Increase of 10% to 39%
- ▬ No change (less than 10% change either direction)
- ▼ Decrease of 10% to 39%
- ▼▼ Decrease of 40% or more

Eradication - Eradication entails complete removal of all infestations in the area. These opportunities result from small, isolated infestations. The spatial pattern for eradication is one infested quad surrounded by at least two concentric bands of absence quads. The strategic importance of an eradication opportunity can be further assessed based on the degree of isolation

as well as the suitability of the surrounding area. Determining the feasibility of eradication requires surveying infestations in the field. Figure 4.44 shows these weeds.

Figure 4.44. Eradication Opportunities in Sutter County

	Current Species Distribution (number of quads out of 23 total)				Suitable Range		
Plant Species: Grouped by Statewide Cal-IPC Rating	Infested	Spreading	Managed	Eradicated	2010 Infested		2050
High (1 species)							
Limnobium laevigatum South American spongeplant	1	0	0	0	-	-	-
Moderate (5 species)							
Carduus nutans musk thistle	1	0	0	0	0 %	-	▬
Centaurea diffusa diffuse knapweed	1	0	0	2	97 %	4%	▼▼
Isatis tinctoria dyer's woad	1	0	0	2	23 %	10 %	▼
Kochia scoparia kochia	1	0	0	0	-	-	-
Sisymbrium irio London rocket	1	0	0	0	0 %	-	▬
Limited (4 species)							
Descurainia sophia flixweed, tansy mustard	1	0	0	0	-	-	-
Lobularia maritima sweet alyssum	1	0	0	0	-	-	-
Stipa manicata (=*Nassella manicata*) tropical needlegrass	1	0	0	0	-	-	-
Stipa miliacea var. miliacea (=*Piptatherum miliaceum*) smilograss	1	0	0	0	1 %	20 %	▲▲

Source: Cal WeedMapper Invasive Species Management Opportunities in Sutter County

Current Species Distribution

Infested: Number of quads that are infested with this species (relative to total number of quads in the selected region of interest)
Spreading: Number of quads where this species is spreading,
Managed: Number of quads where this species is under management,
Eradicated: Number of quads where this species has been eradicated,

Suitable Range

2010: Percent of the selected region of interest that currently meets the minimum threshold for suitability for the species,
Infested: Percent of the current suitable range that is infested.
2050: Change in suitability between 2010 and 2050, with an arrow representing an increase or decrease of greater than 10%, and a double arrow indicating change of greater than 40%.

- ▲▲ Increase of 40% or more
- ▲ Increase of 10% to 39%
- ▬ No change (less than 10% change either direction)
- ▼ Decrease of 10% to 39%
- ▼▼ Decrease of 40% or more

Containment – Containment entails limiting the spread from existing infestations. These opportunities result from larger groups of infested quads. The strategic importance of a containment opportunity can be further assessed based on how distinct the boundaries of the infestation are, how isolated it is, and the suitability of the surrounding area. Determining the feasibility of containment requires surveying infestations in the field. These weeds are shown in Figures 4.45 to 4.49.

Figure 4.45. Containment Opportunities in Sutter County

Plant Species: Grouped by Statewide Cal-IPC Rating	Current Species Distribution (number of quads out of 23 total)				Suitable Range		
	Infested	Spreading	Managed	Eradicated	2010 Infested		2050
High (22 species)							
Aegilops triuncialis barb goatgrass	3	3	0	0	100 %	13 %	▼▼
Arundo donax giant reed	14	3	2	0	100 %	61 %	-
Bromus madritensis ssp. rubens red brome	8	1	0	0	7 %	100 %	▲
Bromus tectorum downy brome, cheatgrass	2	0	0	0	0 %	-	-
Centaurea solstitialis yellow starthistle	23	12	17	0	83 %	100 %	▲
Cortaderia selloana pampasgrass	12	0	1	0	13 %	100 %	▼
Cytisus scoparius Scotch broom	1	0	0	0	0 %	-	-
Egeria densa Brazilian egeria	10	0	0	0	-	-	-
Eichhornia crassipes water hyacinth	3	3	3	0	-	-	-
Foeniculum vulgare fennel	9	6	0	0	86 %	41 %	▼▼
Genista monspessulana French broom	2	0	0	0	3 %	40 %	-
Hedera helix and H. canariensis English ivy, Algerian ivy	2	1	0	0	0 %	-	-
Lepidium latifolium perennial pepperweed	18	16	2	0	100 %	78 %	-
Ludwigia hexapetala and L. peploides Uruguay and creeping water-primrose	15	3	11	0	-	-	-
Lythrum salicaria purple loosestrife	8	2	5	1	-	-	-
Myriophyllum aquaticum parrotfeather	23	0	13	0	-	-	-
Myriophyllum spicatum Eurasian watermilfoil	11	1	4	0	-	-	-
Rubus armeniacus (=Rubus discolor) Himalayan blackberry	23	2	0	0	-	-	-
Sesbania punicea red sesbania, scarlet wisteria	10	3	3	0	100 %	43 %	▼▼
Spartium junceum Spanish broom	1	0	0	0	24%	8 %	▲
Elymus caput-medusae (=Taeniatherum caput-medusae) medusahead	10	3	0	0	91 %	43 %	-
Tamarix parviflora smallflower tamarisk	9	0	4	0	-	-	-
Moderate (44 species)							
Acroptilon repens Russian knapweed	5	0	1	0	100 %	22 %	▼▼

Source: Cal WeedMapper Invasive Species Management Opportunities in Sutter County

Figure 4.46. Containment Opportunities in Sutter County cont.

Plant Species: Grouped by Statewide Cal-IPC Rating	Current Species Distribution (number of quads out of 23 total)				Suitable Range		
	Infested	Spreading	Managed	Eradicated	2010 Infested		2050
Ailanthus altissima tree-of-heaven	16	9	1	0	97 %	70 %	-
Anthoxanthum odoratum sweet vernalgrass	1	0	0	0	-	-	-
Avena barbata and A. fatua (slender) wild oat	23	0	0	0	-	-	-
Brachypodium distachyon annual false-brome, false brome	2	0	0	0	85 %	9 %	▼▼
Brassica nigra black mustard	13	9	6	0	-	-	-
Bromus diandrus ripgut brome	23	0	0	0	100 %	100 %	-
Lepidium chalepense (=*Cardaria chalepensis and C. draba*) lens-podded white-top, hoary cress	11	5	7	0	-	-	-
Centaurea calcitrapa purple starthistle	5	3	3	0	100 %	22 %	-
Centaurea melitensis Malta starthistle, tocalote	4	3	0	0	39 %	21 %	▲▲
Chondrilla juncea rush skeletonweed	4	3	1	0	72 %	17 %	▼▼
Cirsium vulgare bull thistle	23	3	0	0	85 %	100 %	▼
Conium maculatum poison-hemlock	17	0	2	0	45 %	89 %	▼▼
Cynara cardunculus artichoke thistle	2	0	0	1	35 %	13 %	▼
Cynodon dactylon bermudagrass	23	0	0	0	-	-	-
Cynosurus echinatus hedgehog dogtailgrass	6	0	0	0	46 %	38 %	-
Dipsacus fullonum and D. sativus common and Fuller's teasel	13	2	0	0	36 %	87 %	▼
Dittrichia graveolens stinkwort	9	4	4	0	97 %	39 %	▼▼
Elaeagnus angustifolia Russian-olive	2	0	0	0	-	-	-
Eucalyptus globulus Tasmanian blue gum	5	0	0	0	0 %	-	-
Festuca arundinacea tall fescue	1	0	0	0	-	-	-
Ficus carica edible fig	17	5	0	0	100 %	74%	-
Geranium dissectum cutleaf geranium	23	0	0	0	-	-	-
Glyceria declinata waxy mannagrass	3	0	0	0	100 %	13 %	-
Hirschfeldia incana shortpod mustard, summer mustard	21	0	0	0	-	-	-
Holcus lanatus common velvet grass	2	0	0	0	3 %	67 %	▲▲

Source: Cal WeedMapper Invasive Species Management Opportunities in Sutter County

Figure 4.47. Containment Opportunities in Sutter County cont.

	Current Species Distribution (number of quads out of 23 total)				Suitable Range		
Plant Species:	Infested	Spreading	Managed	Eradicated	2010	Infested	2050
Grouped by Statewide Cal-IPC Rating							
Hordeum marinum Mediterranean barley	9	0	0	0	-	-	-
Hordeum murinum hare barley	10	0	0	0	-	-	-
Hypericum perforatum common St. John's wort, klamath weed	9	3	7	1	-	-	-
Hypochaeris radicata rough catsear, hairy dandelion	23	0	0	0	-	-	-
Leucanthemum vulgare ox-eye daisy	7	0	0	0	0 %	100 %	-
Festuca perennis (=Lolium multiflorum) Italian ryegrass	23	0	0	0	100 %	100 %	-
Mentha pulegium pennyroyal	5	0	1	0	-	-	-
Nicotiana glauca tree tobacco	12	0	0	0	1 %	100 %	▲▲
Oxalis pes-caprae Bermuda buttercup, buttercup oxalis	5	2	0	0	-	-	-
Phalaris aquatica hardinggrass	3	0	0	0	-	-	-
Potamogeton crispus curlyleaf pondweed	4	0	0	0	-	-	-
Rumex acetosella red sorrel, sheep sorrel	12	0	0	0	-	-	-
Triadica sebifera (=Sapium sebiferum) Chinese tallowtree	7	7	0	0	-	-	-
Torilis arvensis hedgeparsley	9	5	0	0	27 %	75 %	▲▲
Trifolium hirtum rose clover	23	0	0	0	-	-	-
Vinca major bigperiwinkle	8	4	0	0	16 %	67 %	▼
Festuca myuros (=Vulpia myuros) rattail fescue	23	0	0	0	-	-	-
Washingtonia robusta Mexican fan palm	1	0	0	0	-	-	-
Limited (35 species)							
Agrostis avenacea Pacific bentgrass	6	0	0	0	-	-	-
Agrostis stolonifera creeping bentgrass	4	0	0	0	-	-	-
Bassia hyssopifolia fivehook bassia	2	0	0	0	-	-	-
Bellardia trixago bellardia	1	0	0	0	-	-	-
Brassica rapa birdsrape mustard, field mustard	23	0	0	0	-	-	-
Briza maxima bigquakinggrass, rattlesnakegrass	7	0	0	0	48 %	44 %	▼

Source: Cal WeedMapper Invasive Species Management Opportunities in Sutter County

Figure 4.48. Containment Opportunities in Sutter County cont.

Plant Species: Grouped by Statewide Cal-IPC Rating	Current Species Distribution (number of quads out of 23 total)				Suitable Range		
	Infested	Spreading	Managed	Eradicated	2010 Infested	2050	
Bromus hordeaceus soft brome	9	0	0	0	-	-	-
Bromus japonicus Japanese brome, Japanese chess	3	0	0	0	-	-	-
Lepidium appelianum (=Cardaria pubescens) hairy whitetop	4	0	0	0	-	-	-
Carduus tenuiflorus and C. pycnocephalus slenderflower and Italian thistle	19	8	0	0	-	-	-
Cotula coronopifolia brassbuttons	3	0	0	0	-	-	-
Crataegus monogyna hawthorn	3	0	0	0	-	-	-
Dactylis glomerata orchardgrass	14	0	0	0	8 %	100 %	▲▲
Erodium cicutarium redstem filaree	23	0	0	0	-	-	-
Eucalyptus camaldulensis red gum	4	0	0	0	-	-	-
Hypochaeris glabra smooth catsear	23	0	0	0	-	-	-
Lythrum hyssopifolium hyssop loosestrife	7	0	0	0	-	-	-
Marrubium vulgare white horehound	16	0	0	0	-	-	-
Medicago polymorpha California burclover	23	0	0	0	-	-	-
Olea europaea olive	10	2	0	0	-	-	-
Parentucellia viscosa yellow glandweed, sticky parentucellia	1	0	0	0	95 %	4%	▬
Helminthotheca echioides (=Picris echioides) bristly oxtongue	9	2	0	0	83 %	39 %	▼▼
Plantago lanceolata buckhorn plantain, English plantain	23	0	0	0	-	-	-
Poa pratensis Kentucky bluegrass	23	0	0	0	-	-	-
Polypogon monspeliensis rabbitfoot polypogon	10	0	0	0	-	-	-
Prunus cerasifera cherry plum	23	0	0	0	-	-	-
Pyracantha angustifolia, crenulata, seratus, etc. pyracantha, firethorn	11	0	0	0	-	-	-
Raphanus sativus radish	23	0	0	0	-	-	-
Ricinus communis castorbean	3	0	0	0	0 %	-	▬
Robinia pseudoacacia black locust	12	0	0	0	-	-	-
Rumex crispus curly dock	23	0	0	0	-	-	-

Source: Cal WeedMapper Invasive Species Management Opportunities in Sutter County

Figure 4.49. Containment Opportunities in Sutter County cont.

Plant Species: Grouped by Statewide Cal-IPC Rating	Current Species Distribution (number of quads out of 23 total) Infested	Spreading	Managed	Eradicated	Suitable Range 2010	Infested	2050
Salsola tragus Russian-thistle	22	0	3	0	-	-	-
Silybum marianum blessed milkthistle	14	3	3	0	100 %	61 %	▬
Sinapis arvensis wild mustard, charlock	5	0	0	0	-	-	-
Verbascum thapsus common mullein, woolly mullein	23	0	0	0	-	-	-

Source: Cal WeedMapper Invasive Species Management Opportunities in Sutter County

Current Species Distribution

Infested: Number of quads that are infested with this species (relative to total number of quads in the selected region of interest)

Spreading: Number of quads where this species is spreading,

Managed: Number of quads where this species is under management,

Eradicated: Number of quads where this species has been eradicated,

Suitable Range

2010: Percent of the selected region of interest that currently meets the minimum threshold for suitability for the species,

Infested: Percent of the current suitable range that is infested.

2050: Change in suitability between 2010 and 2050, with an arrow representing an increase or decrease of greater than 10%, and a double arrow indicating change of greater than 40%.

▲▲ Increase of 40% or more

▲ Increase of 10% to 39%

▬ No change (less than 10% change either direction)

▼ Decrease of 10% to 39%

▼▼ Decrease of 40% or more

Human Health: Invasive Species/Pests

West Nile Virus

The impact to human health that insects can have on an area can be substantial. Mosquitoes transmit the potentially deadly West Nile Virus (WNV) to livestock and humans alike. WNV first struck the western hemisphere in Queens, New York, in 1999 and killed four people. Since then, the disease has spread across the United States and is well established in most states, including California. Sutter County has seen WNV activity since 2004.

Most humans infected by the virus have no symptoms. A small proportion develops mild symptoms that include fever, headache, body aches, skin rash, and swollen lymph glands. Less than 1 percent of those infected develop more severe illness such as meningitis or encephalitis, symptoms of which include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. Of the few people who develop encephalitis, fewer than 1 out of 1,000 infected die as a result.

There is no specific treatment for the infection or a vaccine to prevent it. Treatment of severe illness includes hospitalization, use of intravenous fluids and nutrition, respiratory support, prevention of secondary infections, and good nursing care. Medical care should be sought as soon as possible for persons who have symptoms suggesting severe illness. People over 50 years of age appear to be at high risk for the severe aspects of the disease.

Past Occurrences

Past Occurrences to Plants and Agriculture

There have been many instances of invasive species. The County has had past occurrences or threats of the following:

- Insects of concern
  - Africanized Honeybee
  - Asian Longhorned Beetle
  - Caribbean Fruit Fly, Diaprepes Root Weevil
  - European Grapevine Moth
  - False Codling Moth
  - Guava Fruit Fly
  - Gypsy Moth
  - Japanese Beetle
  - Light Brown Apple Moth
  - Mediterranean Fruit Fly
  - Melon Fly
  - Mexican Fruit Fly
  - Oriental Fruit Fly
  - Peach Fruit Fly
  - Red Imported Fire Ant
  - White Striped Fruit Fly

- Weeds of Concern
  - Yellow Star-Thistle
  - Giant Reed
  - Scotch Broom
  - Saltcedar
  - Puncturevine
  - Himalaya Blackberry
  - Rush Skeletonweed
  - Creeping Water Primrose
  - Parrot Feather
  - Purple Loosestrife
  - Perennial Pepperweed
  - Hydrilla
  - Winged Primrose

Past Occurrences to Human Health

Sutter County, California has seen WNV activity since 2004. Records are available from 2006 to 2012. Table 4.28 summarized human incidents of WNV in Sutter County from 2006 to 2012.

Table 4.28. Reported Incidence of West Nile Virus In Sutter County

	2006	2007	2008	2009	2010	2011	2012
Incidents	10	3	0	0	0	0	8

Source: California Department of Public Health, westnile.ca.gov

Likelihood of Future Occurrences

Likely – Due to the high number of past, recent and continuing noxious weed incidents and history of incidence of invasive pests threatening the environment, agriculture industry, and humans in the County, it is likely that future infestation of insect and other pests will occur in Sutter County. Given the diversity and high value of agricultural crops in the County, and the high population in the County, insects and weed pests can have large impacts economically and socially.

4.2.14 Levee Failure

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. To construct a man-made levee, workers place dirt or concrete along the stream banks, creating an embankment. This embankment is flat at the top, and slopes at an angle down to the water. For added strength, sandbags are sometimes placed over dirt embankments.

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. Levees reduce, not eliminate, the risk to individuals and structures located behind them.

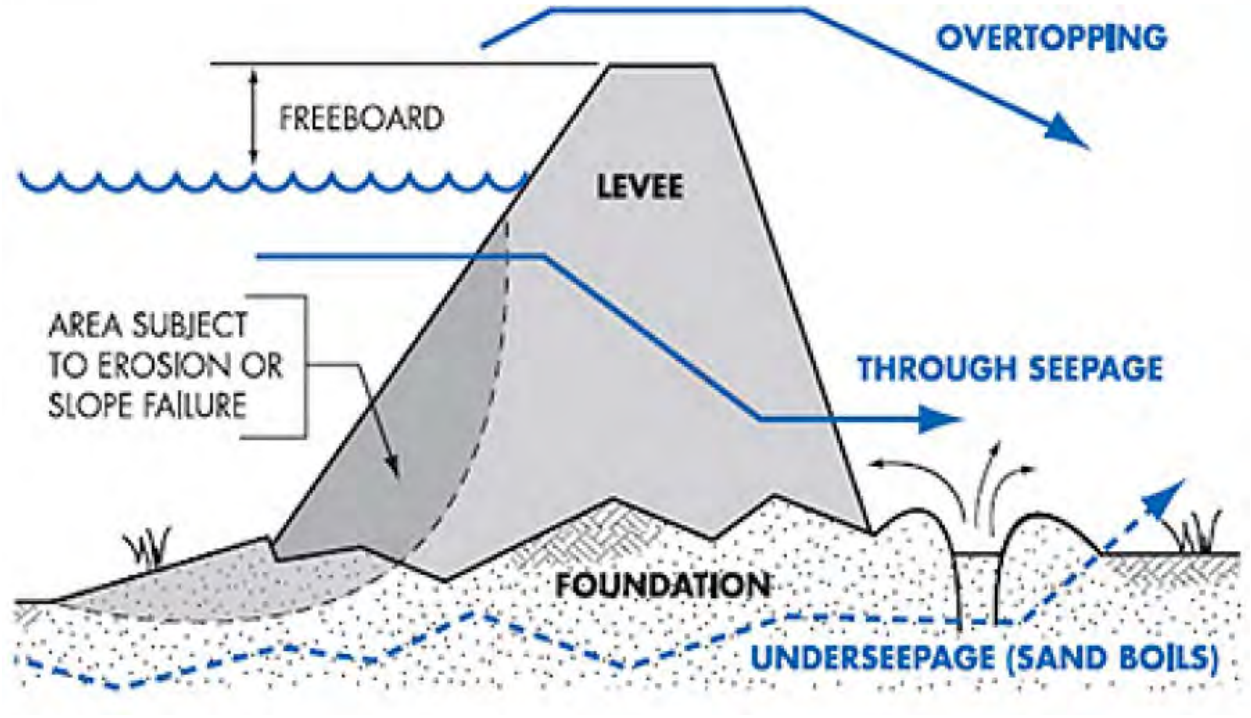
A levee system failure or overtopping can create severe flooding and high water velocities. It's important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

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 is a significant issue in the planning area. Erosion can also lead to levee failure. More information on erosion can be found in Section 4.2.10. Figure 4.50 depicts the causes of levee failure.

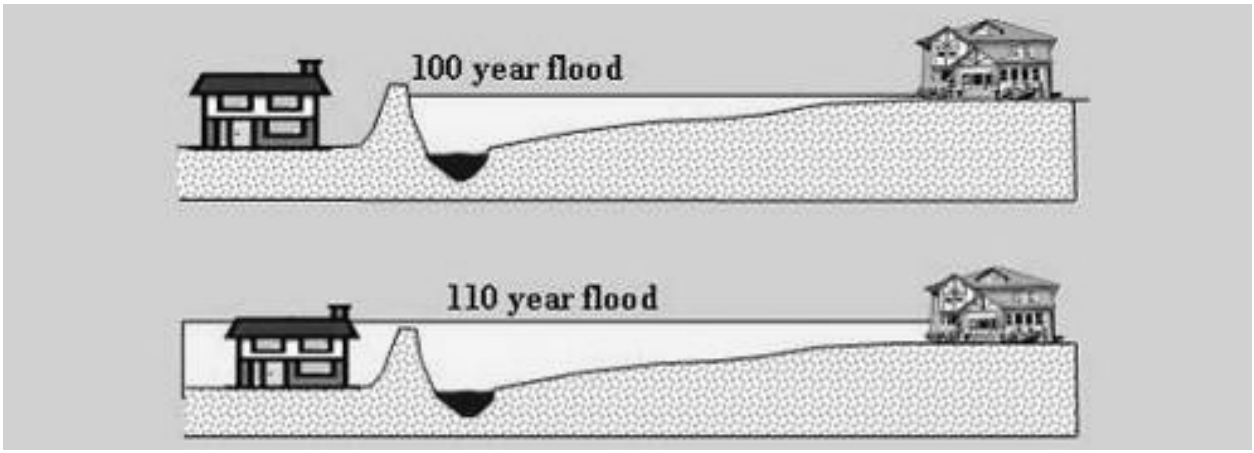
Figure 4.50. Potential Causes of Levee Failure



Source: USACE

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

Figure 4.51. 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.
http://www.floods.org/ace-files/leveesafety/lss_levee_history_galloway.ppt

The principal method of flood protection for the Sutter County Planning Area is structural, consisting of reservoirs (dams), levees and bypasses completed between the 1920s and 1960s. Most of the levees were constructed as parts of federal flood control projects and then, on completion, were turned over to local interests for operation and maintenance. Levees along the Sacramento River, Sutter Bypass, Feather River Yankee Slough, Wadsworth Canal, Cross Canal, and Tisdale Bypass are part of the Sacramento River Flood Control Project which was authorized by the Flood Control Act of 1917. According to the Flood Insurance Study (FIS) for unincorporated Sutter County (1998), the original project designs and later improvements to the Sacramento River Basin Flood Control System provided a 100-year level of protection. However, more recent studies evaluating the levee system have identified several deficiencies which reduce the current level of protection of most area levees to below the 100-year level. These levees are currently being reinforced to provide 100-year flood protection.

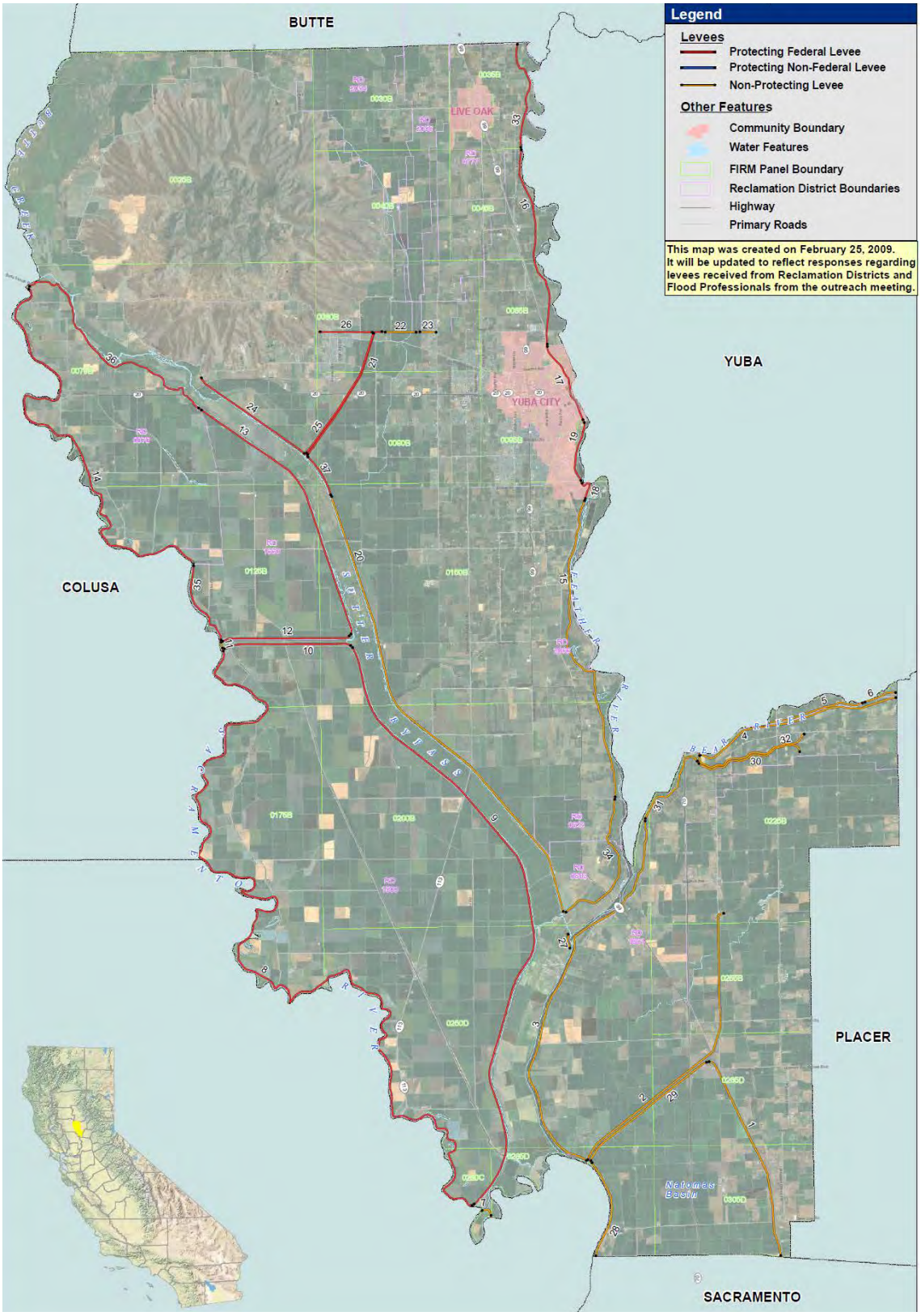
Table 4.29 and Figure 4.52 provide an inventory of the status of levees in Sutter County, separated out into 3 categories: Protecting Federal Levee, Protecting Non-Federal Levee, and Non-Protecting Levee. Figure 4.52 provides an inventory of levees as part of the SBFCA West Feather River Rehabilitation Program. This figure indicates which levees are certified to provide 100-year level of flood protection.

Table 4.29. State Plan of Flood Control - State Levees in Sutter County

	River Miles				
	From	To	River Miles	Banks w/Levees in Sutter County	Subtotal Levee Miles
Sacramento River					
Meridian to Knights Landing	143.00	90.00	53.00	East	53.00
Knights Landing to Sac County Line	90.00	78.00	12.00	East	12.00

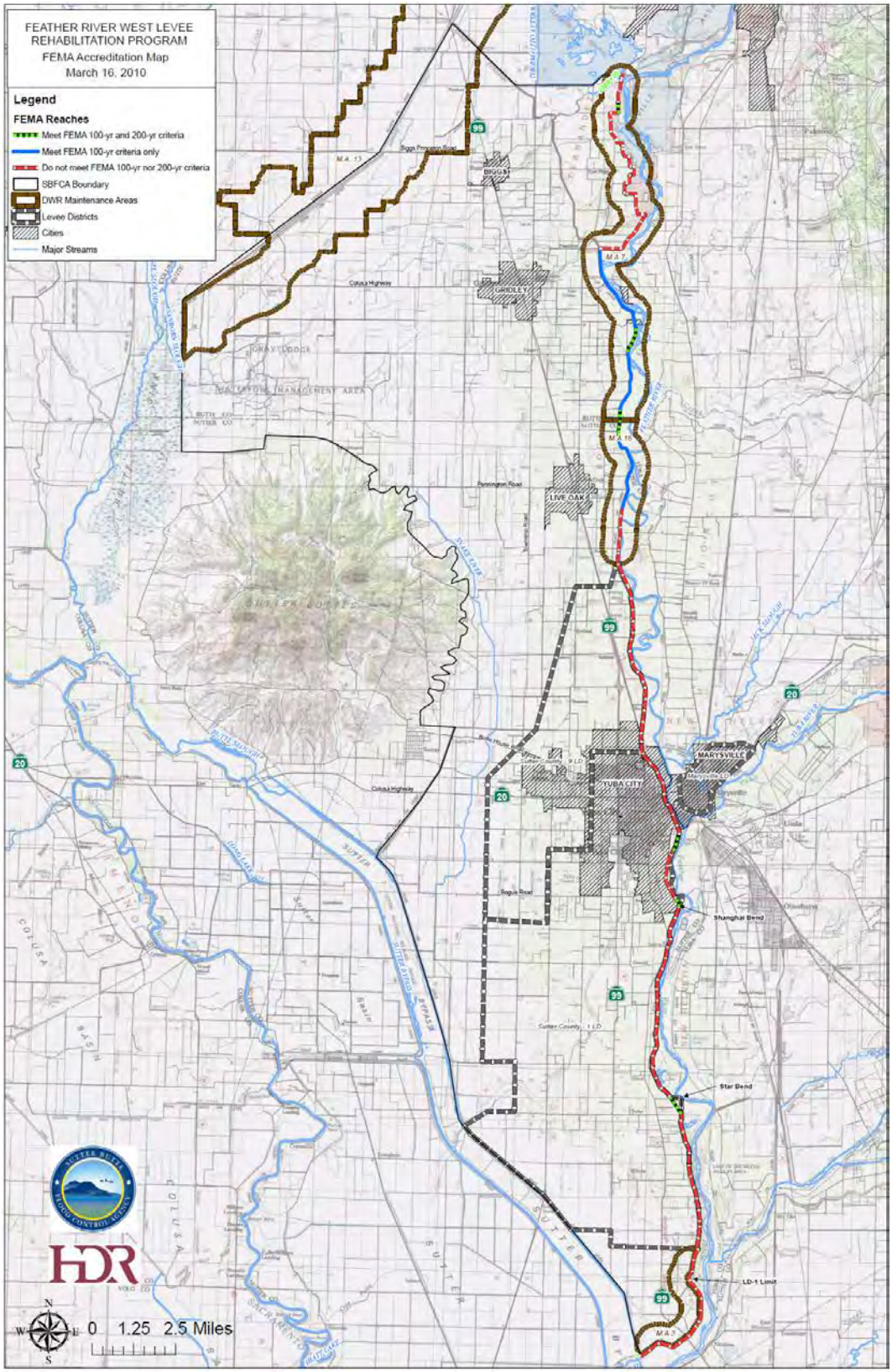
River Miles					
Sutter Bypass					
Butte Slough to Feather River	93.00	67.00	26.00	East & West	52.00
Feather River to Verona	67.00	59.00	8.00	East & West	16.00
Wadsworth Canal	5.00	0.50	4.50	East & West	9.00
Intercepter Canal	3.83	0.00	3.83	North & South	7.67
Feather River					
County line to Yuba River	45.00	27.40	17.60	West	17.60
Yuba River to Bear River	27.40	12.00	15.40	West	15.40
Bear River to Sutter Bypass	12.00	8.00	4.00	West	4.00
Natomas Cross Canal	4.70	0.00	4.70	East & West	9.40
East Side Canal					
Auburn Ravine to Natomas Cross Canal	5.95	0.00	5.95	East & West	11.90
Pleasant Grove Creek Canal					
Natomas Cross Canal to County Line	6.89	0.00	6.89	East & West	13.79
Tisdale Bypass					
Sacramento River to Sutter Bypass	4.36	0.00	4.36	East & West	8.71
Bear River	13.00	0.00	13.00	East & West	26.00
Yankee Slough	5.57	0.00	5.57	East & West	11.14

Figure 4.52. Location and Status of Levees in Sutter County



Source: FEMA

Figure 4.53. Sutter County Planning Area - Levee Locations and Status



In the previous plan it was noted:

"…the levee system contains a number of structurally deficient segments that are susceptible to seepage problems and do not provide the design levels of flood protection. Without the remedial repairs recommended in the report cited above, the levels of flood protection are well below the 100 year recurrence interval that the system was designed to provide. The U. S. Army Corps of Engineers is in the process of reconstruction efforts along the most critical areas of the levee system. Table 10.7-1 depicts the different segments of the rivers and their level of protection with and without the recommended remedial repairs." (Source: Sutter County General Plan 2015: Background Report, November 1996. Pg. 10-17.)

Table 10.7-1 is reproduced as Table 4.30 below:

Table 4.30. Sutter County Planning Area Levels of Levee Protection* With and Without Remedial Repairs

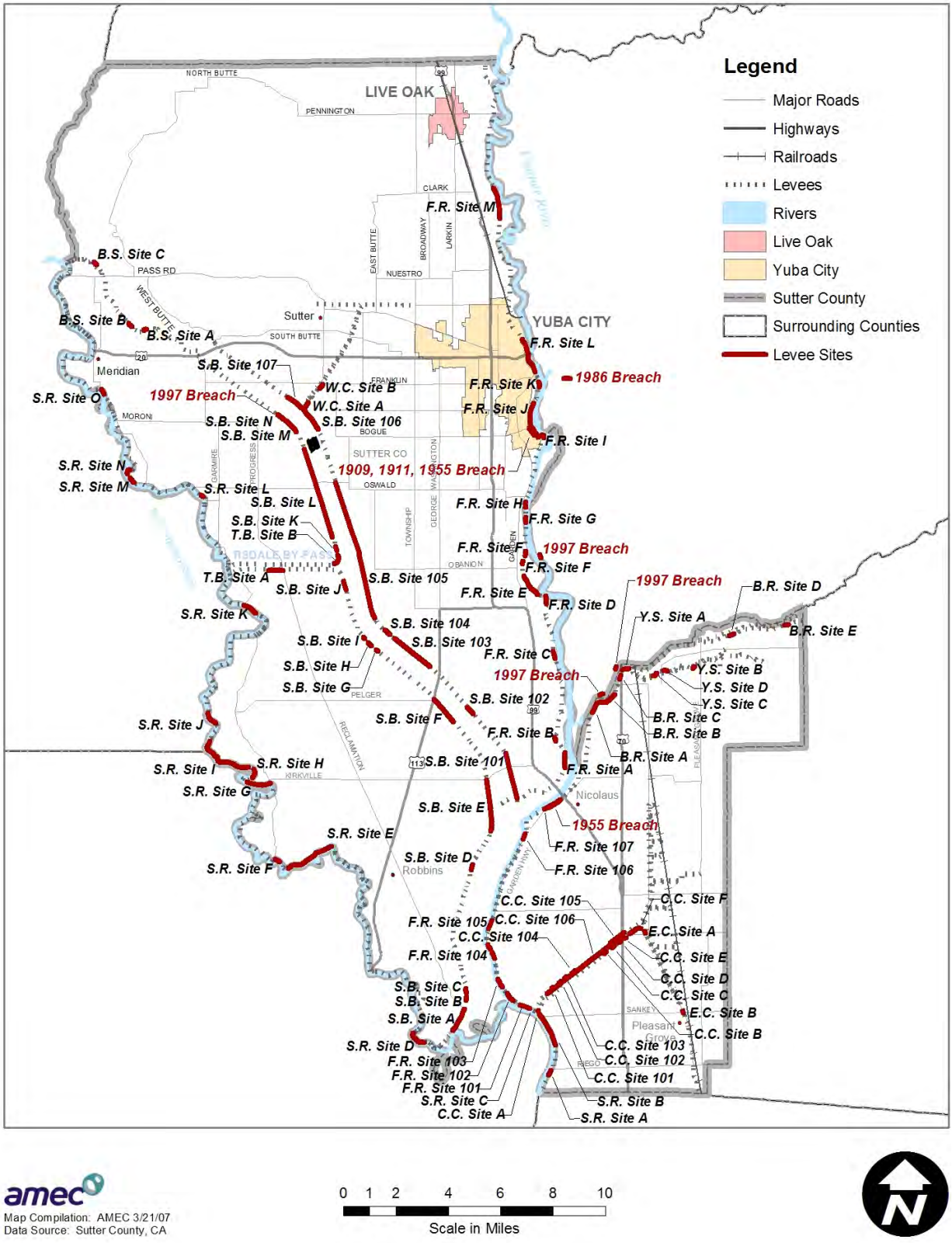
Levee Reach	Recurrence Interval Without Improvements	Recurrence Interval With** Improvements
Feather River upstream from Honcut Creek	50 years	200+ years
Feather River between Honcut Creek and Jack Slough	50 years	175+ years
Feather River between Jack Slough and Yuba River	60 years	150+ years
Feather River between Yuba River and Bear River	70 years	150+ years
Feather River between Bear River and Sutter Bypass	65 years	150+
Yuba River upstream of mouth	30 years	100 years
Bear River upstream from mouth	65 years	100+ years
Sutter Bypass between Tisdale Bypass and Feather River	20 years	150+ years

* Recurrence intervals are based on the assumption that no levee breaches occur upstream. In reality, if a levee break occurred upstream, downstream levee reaches would have a higher level of flood protection than those shown above.
** Levels of flood protection with remedial repairs are based on a minimum of 3 feet freeboard in a specified levee reach.

Past Occurrences

Sutter County has experienced significant flood events since the levees were constructed. These are shown on Figure 4.54 and in the text that follows.

Figure 4.54. Sutter County Planning Area - Past Levee Breaks



Feather River, Right (West) Levee

- F.R. Site A: This site is located between Sacramento Avenue and Laurel Avenue between approximate river miles 10.2 and 11.1 (levee mile 2.3 and 3.3). Excessive seepage occurs at this site during high water.
- F.R. Site B: This site is located near Laurel Avenue at approximate river mile 11.6 (levee mile 3.7). A landside boil occurred in a landside drainage ditch near the levee toe during the 1986 flood. During the 1997 flood, the drainage ditch was sloughing and heavy but clear seepage was entering the ditch. During the flood, an emergency stability berm was constructed of sandbags placed on a geotextile within the drainage ditch. Later that year, the ditch was converted to a pervious toe drain. In 1998, a permanent seepage/stability berm was constructed at this site under the Marysville/Yuba City Levee Reconstruction Project.
- F.R. Site C: This site is located 2.4 miles south of Star Bend at approximate river mile 14.7 (levee mile 1.5). During the 1986 flood, a crack formed in the levee. During the 1997 flood, seepage occurred at this site. A pervious toe drain and seepage/stability berm have been constructed at this site under a PL 84-99 action.
- F.R. Site D: This site is located just south of Star Bend at approximate river mile 17.8 (levee mile 3.8). During the 1986 flood, boils carrying soil formed near the landside toe of the levee in a half-mile stretch. The ground to approximately 100 feet away from landside toe was very soft and wet. The peak floodwater was 5-6 feet below the top of the levee at this location. LD 1 personnel constructed sandbag rings around three of the worst boils. Seepage also occurred during the 1997 flood. In 1998 the levee was raised 1 foot and a pervious toe drain and seepage/stability berm was installed at the landside levee toe under the Marysville/Yuba City Levee Reconstruction project.
- F.R. Site E: This site is located between Star Bend Road and Abbot Road at approximate river mile 18.1 to 19.0 (levee mile 4.1 to 5.0). During 1995, clear seepage exited the levee toe and the ground beyond the levee toe while the river level was approximately 12 to 15 feet below the top of levee. During the 1997 flood, numerous boils occurred in a 200 linear foot stretch. Sandbag rings were constructed around the boils that were moving material. The following day, the sandbagged boils were flowing clear. In 1997 the Corps of Engineers installed relief wells in this area to reduce seepage and instability of the levee under a PL 84-99 contract.
- F.R. Site G: This site is located near Messick Road at approximate river mile 21.2 (levee mile 7.3). Waterside bank erosion is encroaching on the levee section.
- F.R. Site H: This site is at the Boyd Pump Boat Ramp at levee mile 8, between Messick Road and Oswald Avenue at approximate river mile 21.7. During the 1986 flood, portions of the boat ramp parking lot and subgrade and portions of the levee toe were eroded. In 1998 the Corps raised the levee 1 foot and installed a pervious toe drain and seepage/stability berm at this site under the Marysville/Yuba City Levee Reconstruction project.
- F.R. Site J: This site is located between Shanghai Bend and the Yuba City Airport between approximate river miles 25.1 and 26.5 (levee miles 11.0 and 12.4). The levee broke in this area during 1909, 1911, and 1955. In 1957, the Corps of Engineers reconstructed the levee to

the landside of its previous location and installed a row of relief wells near the landside levee toe. Water from the relief wells is pumped to the Feather River. During the 1986 flood, volunteers sandbagged several boils in this area. In 1990 the City of Yuba City installed a seepage interceptor system in the southern part of this site. The interceptor system consists of a perforated pipeline and filter 12-18 feet below ground surface to extract shallow seepage, and relief wells placed between the 1957 relief wells to extract deeper seepage. All water collected is pumped into the Feather River separately from the water collected by the 1957 relief wells. In 1993, an inspection of the shallow drain perforated pipeline discovered unacceptable deflections over large portions of the pipeline. The deformed plastic pipeline was removed and replaced with a perforated clay pipeline. In 2000 or 2001 the Corps of Engineers rehabilitated the original 1957 relief wells under a PL 84-99 contract.

- F.R. Site K: This site is located near the Yuba City airport at approximate river mile 27.0 (levee mile 13.6). Seepage occurs at this site during high water. An impermeable cutoff wall has been constructed in this area. The cutoff wall slightly overlaps the relief wells and deep seepage interceptor system at F.R. Site J, extends through this site, and ends 800 feet upstream of the Fifth Street Bridge in F.R. Site L. The southern portion of the cutoff wall was constructed under the Marysville/Yuba City Levee Reconstruction project. The northern portion of the cutoff wall was constructed under a PL 84-99 contract.
- F.R. Site L: This site is located in Yuba City from Garden Highway north to the Drive In Cinema between approximate river miles 27.4 to 29.3 (levee miles 14.0 to 15.5). During the 1955 flood seepage was observed near the Tenth Street Bridge. During the 1986 flood the landside slope became saturated and unstable and bulged slightly in the area of the Corporation Yard. Water also flowed up through cracks in the parking lot pavement and the floor slab of an auto body shop on Teegarden Avenue. Erosion of the waterside levee toe occurred in the areas immediately upstream and downstream of the Fifth Street Bridge. Yuba City constructed a berm along the landside toe as an emergency action. A permanent seepage/stability berm was later constructed from the 5th Street Bridge extending northward to about 2500 feet beyond the 10th Street Bridge. An impermeable cutoff wall was also constructed in this area (see F.R. Site K). In 1998 rock protection was added to the waterside eroded area around the Fifth Street Bridge.
- F.R. Site M: This site is located in the area around Koch Lane between approximate river miles 35.6 and 37.6 (levee miles 3.9 and 5.3) in LD 9. During high water, seepage and boils occur near the landside levee toe. The Corps relocated an open drainage ditch away from the toe of the levee at the north end of this site under the Marysville/Yuba City Levee Reconstruction project. A consultant to L.D. 9 recommended installing a pervious toe drain over the entire site to control seepage, but no improvements have been made.

Sutter Bypass East Levee

- S.B. Site 101: This site is located between Pumping Station #1 and the confluence of the Feather River between river miles 66.2 to 68.5 (levee miles 20 to 22.37). During 1986 a 3,000 foot length of the waterside levee north of the confluence with the Feather River was

repaired under a PL 84-99 action. Wavewash and county maintenance equipment had resulted in erosion near the waterside toe and halfway up the waterside slope. Both areas were repaired using nearby materials. During the 1997 flood, the 1,000 linear foot segment immediately upstream of the Feather River exhibited seepage, boils, and a sinkhole on the landside berm. This landside berm is an abandoned railroad berm. A landside pervious toe drain was constructed at this site in 2001 under a cost-shared PL 84-99 action.

- S.B. Site 102: This site is located between Pump Station #1 and Highway 113, at approximately river mile 70.1 (levee mile 17.6). During the 1997 flood seepage occurred at this site. A seepage/stability berm with a pervious toe drain was constructed at this site in 2001 under a cost-shared PL 84-99 action.
- S.B. Sites 103 and 104: These sites are located between Highway 113 and Gilsizer Slough at approximately river miles 72.3 to 73.7 and 74.4 respectively (levee miles 14.1 to 15.5 and 13.4 respectively). Seepage occurred at these sites during high water. As part of the Mid Valley Phase III Levee Reconstruction project, seepage/stability berms have been constructed at both of these sites.
- S.B. Site 105: This site is located between Hughes Road (upstream of Tisdale Bypass) and Gilsizer Slough, between river miles 75.0 and 80.1 (levee miles 7.5 and 12.6). Part of this site is upstream of the Tisdale Bypass and part of the site is downstream of the Tisdale Bypass. Boils occur near the landside levee toe during high water events at this site. In 1958 a landside pervious toe drain was installed from McClatchey Road to Gilsizer Slough.
- S.B. Site 106: This site is located between Lincoln Road and McClatchy Road, immediately downstream of the Wadsworth Canal, between approximately river miles 82.8 and 83.7 (levee miles 4.4 and 5.4). During the 1997 flood, heavy seepage occurred in this area. During 2001 a pervious toe drain and seepage/stability berm was constructed at this site under a cost-shared PL 84-99 action.
- S.B. Site 107: This site is located between Pump House #3 and the right bank of the Wadsworth Canal between approximately river miles 83.8 and 84.4 (levee miles 3.7 and 4.3). During the 1997 flood heavy seepage and soil heaving occurred at this site. A pervious toe drain and seepage/stability berm was constructed during 2001 under a cost-shared PL 84-99 action.

Wadsworth Canal, Left (Southeast) Levee.

- W.C. Site A: This site is located where the Wadsworth Canal joins the Sutter Bypass (the Dean Property), river and levee miles 0 to 0.5. Seepage frequently occurs at this site during high flows. During 1997 and 1998 small boils were observed at the landside levee toe. In 2002 the Corps of Engineers recommended a slurry cutoff wall be constructed at this site under a cost-shared PL 84-99 action.
- W.C. Site B: This site is located just downstream of Franklin Road, river and levee miles 1.0. During the 1997 flood heavy seepage occurred at this site. The water surface was observed to be about 5 feet below the levee crest. In 2001 the Corps of Engineers constructed a pervious toe drain at the landside toe of the levee under a cost-shared PL 84-99

action.

Given their location relative to the county, the Feather and Sacramento Rivers and associated tributaries present the greatest flood potential to the Sutter County Planning Area. Table 4.31 provides a record of peak water levels at several key monitoring stations on both the Feather and Sacramento Rivers.

Table 4.31. Sutter County River/Stream Historic Levels

River/Stream	Forecast Point	Monitoring Station	Top of Levee Elevation	Peak Level of Record
Feather River	Yuba City	Feather River @ 5th Street Bridge (YUB)	83.5'	82.4' 12/24/1955
Feather River	Nicolaus	Feather River @ Nicolaus (NIC)	60.3'	51.6' 12/23/1955
Sacramento River	Colusa Weir	Sacramento River @ Colusa Weir (CLW)	74.8'	70.6' 3/1/1940
Sacramento River	Colusa	Sacramento River @ Colusa Bridge (COL)	73.0'	69.2' 2/8/1942
Sacramento River	Tisdale Weir (Robbins Basin)	Sacramento River @ Tisdale Weir (TIS)	57.0'	53.3' 3/1/1940
Sacramento River	Knight's Landing (Robbins Basin)	Sacramento River @ Knights Landing (KNL)	47.5'	41.8' 2/8/1942
Sacramento River	Below Wilkins Slough (SE County Basin)	Sacramento River @ Wilkins Slough	56.1'	52.8' 3/1/1940
Sacramento River	Fremont Weir (SE County Basin)	Sacramento River @ Fremont Weir	45.4'	39.7' 12/23/1955
Sacramento River	Verona (SE County Basin)	Sacramento River @ Verona	46.0'	41.2' 3/1/1940
Sutter By-Pass	Meridian Basin	Sutter By-Pass @ Long Bridge (LNB)	61.8'	57.7' 3/1/1940
Yuba River	Englebright Dam		527.0'*	546.1' 12/22/1964

All elevations are United States Engineering Datum (USED)
*Spillway crest elevation.
(Source: Sutter County Operational Area Emergency Operations Plan, Annex 5 – Floods and Dam Failure)

In a report from Kleinfelder to the Sutter Butte Flood Control Agency (SBFCA) regarding Feather River Levees, the following levee failures or near failures were reported:

Table 4.32. Levee Performance on Feather River Levees within SBFCA Boundaries

DWR Stations	Observed Performance Repairs
3300+80 to 3380+44	Seepage reported during storms of 1997.
3302+50 to 3319+00	Sinkholes observed and repaired in January 1966.
3409+00	Boil and piping 1955 landward half of levee.
3425+50 to 3434+00	Heavy levee saturation reported by LD 9.

DWR Stations	Observed Performance Repairs
3432+50 to 3435+10	Bank saturation.
3445+00 to 3463+25	Seepage 1997.
3455+00 to 3462+50	Pinboils 1997.
3482+50 to 3487+00	Heavy levee saturation reported by LD 9.
3487+20	Boil and piping 1955.
3495+25	Boil 1986.
3541+60 to 3556+50	Seepage noticed in 1957 by LD 9.
3541+75 to 3594+50	Seepage and sand boils.
3567+75	Boil 1986.
3584+00 to 3595+00	Landside embankment distress 1997.
3595+00 to 3595+10	Landside embankment distress 1997.
3682+00 to 3694+00	Bank erosion.
3687+10 to 3698+80	Levee erosion noticed by citizens in 1991.
3844+40 to 3888+00	Waterside seepage observed during irrigation season.
3982+40 to 3990+10	Seepage and boils 1986.
3984+50	Boil 1986.
4351+50	Boil 1986.
4469+60 to 4520+00	Levee breach and boils 1955.

Source: Kleinfelder 2009, Preliminary Problem Identification and Conceptual Alternatives Analysis Report Sutter Butte Flood Control Agency Feather River West Levee Evaluation Thermalito Afterbay to Yuba City Butte and Sutter Counties, California

Not all of the levees shown on the previous table are located in Sutter County, but the levees are all located on the Feather River. The value of the table is that all of the levee issues are indicative of the levee conditions in and near Sutter County.

Other levee failure issues/more detailed information reported by the previous plan are discussed in the flood profile in Section 4.2.12.

Likelihood of Future Occurrences

Occasional – Due to the number of past events, eroding levees, and the volume of levees in Sutter County, future levee failures should be considered likely. However, due to the amount of repair and reinforcement of the levees, future levee failure occurrences are estimated to be occasional.

4.2.15 Marine Invasive Species

Hazard/Problem Description

The introduction of nonnative species into coastal marine and estuarine waters can cause significant and enduring economic and environmental impacts. One of the most widespread mechanisms by which introductions occur is through transport of ballast water in boats. Ballast

water is taken on and released by a vessel during cargo loading and discharging operations to maintain the vessel's trim and stability.

Boats discharge ballast water that has been obtained from waters throughout the state, country, or the world. This water might include non-native organisms, untreated sewage, and other contaminants. Once introduced, invasive species are likely to become a permanent part of an ecosystem and may flourish, creating environmental imbalances and wreaking economic havoc. Examples include the zebra mussel infestation in the Great Lakes and the propagation of water hyacinth in the California Delta. Both the zebra mussel and the quagga mussel are concerns for California and Sutter County. These mussels have not affected the waters in Sutter County yet, but are still a cause for concern.

Some of California's most serious weed problems occur in waterways, lakes and streams. The aquatic plant hydrilla is considered one of the most serious aquatic weed problems in the world and the California Department of Food and Agriculture (CDFA) maintains an intensive program to survey and eradicate this aquatic weed pest. It can quickly take over lakes and streams, crowding out native animals and plants and blocking hydroelectric plants, while impeding water flow and delivery. Its rapid growth and ease of spread by boats makes it critical to detect early and eradicate.

The effects of nonnative fish on native fish are generally in the form of predation and competition for food and breeding sites. For example, many centrarchids (sunfish, crappie, and black basses) are voracious predators and are known to eat a variety of native invertebrate and fish species. Although no introduction of a nonnative fish species has unambiguously caused the extinction of a native species, it is thought that their introduction has contributed to the decline in native species. For example, smallmouth bass have been associated with the decline in the native hardhead in the plan area. Also, introductions of multiple species of centrarchids have been associated with the extirpation of Sacramento perch from the Sacramento River watershed, including the plan area.

There are also several non-fish, nonnative invasive species found in aquatic natural communities that can damage such communities. The introduced bullfrog is an important riparian invasive in the plan area. This species has been implicated as a primary driver of native ranid frog declines in Sutter County. Feral cats are also an important nonnative invasive that can impact many native bird species in wetland natural communities, for example the tricolored blackbird.

Many varieties of non-native aquatic weeds compete for the entire water column and shoreline in Sutter County, crowding out native species and degrading the aquatic and riparian habitat.

- Water Hyacinth (*Eichhornia crassipes*) a floating plant native to Brazil, is among the most serious of weed problems occurring in the California Delta. If has invaded many waterways, lakes and streams. There is no known chemical free eradication method in the world for Water Hyacinth once a water course is completely occluded. It will jam rivers and lakes

streams and ponds with uncounted thousands of tons of floating plant matter. The Sacramento-San Joaquin Delta and several of the rivers drained by this delta are heavily infested. The California Weed Mapper reports that 3 of the 23 quads in the county are infested (see Figure 4.45).

- Hydrilla (*Hydrilla verticillata*), native to Asia, Europe, Africa, highly resistant to salinity (>1-100000ppt) compared to many other freshwater aquatic plants. It is considered among the most serious aquatic weed problems in the world and California. It is the last remaining "funded" California Department of Food and Agriculture (CDFA) weed eradication program as of 2012, conducting eradication efforts in nine counties. It can quickly take over lakes and streams, crowding out native animals and plants and blocking hydroelectric plants, impeding water flow and delivery in any conveyance. Its rapid growth and ease of spread makes it critical to detect early and eradicate. Past infestations have occurred in Sutter County. All have been eradicated.
- Giant reed: By far the greatest threat to the dwindling riparian resources of California is caused by three alien invasive species of giant reed known as: *Arundo donax*, *Lythrum salicria,* and *Sesbania punicea* (A.L.S). Over the last 40 years the riparian forests and waterways of northern California have become infested. A.L.S spread by flood-fragmentation and dispersal of vegetative and seed propagules. They dramatically alter the ecological/successional processes in riparian systems and ultimately degrade the riparian habitats towards pure stands of these noxious invasive species. The drainage is systematically impeded. Unchecked, ALS fills in all open areas and banks down to the waterline exacerbating flood prone areas. According to the California Weed Mapper, giant reed is found in 14 of the 23 quads in the County (see Figure 4.45). Presently no funded mitigation/control projects are in place in Sutter County.
- South American Spongeplant (*Limnobium laevigatum*): a recently established invasive aquatic plant that has been introduced into northern and central California, having all of the negative characteristics of water hyacinth.

Past Occurrences

Once introduced, invasive species are likely to become a permanent part of an ecosystem and may flourish, creating environmental imbalances and wreaking economic havoc. Some of California's most serious weed problems occur in waterways, lakes and streams. The County has ongoing issues with giant reed, creeping water primrose, and parrotfeather in canals and waterways that traverse the County.

Likelihood of Future Occurrences

Likely – The rate of marine invasive species discoveries continues to increase. As of the December 2011 the California Department of Fish and Game survey, 257 invertebrates and algae have established populations in California. San Francisco Bay is the most invaded estuary in the United State s. Only two other regions in the world, the eastern Mediterranean and the Hawaiian Islands, have comparable numbers of reported marine invasions. Sutter County is directly

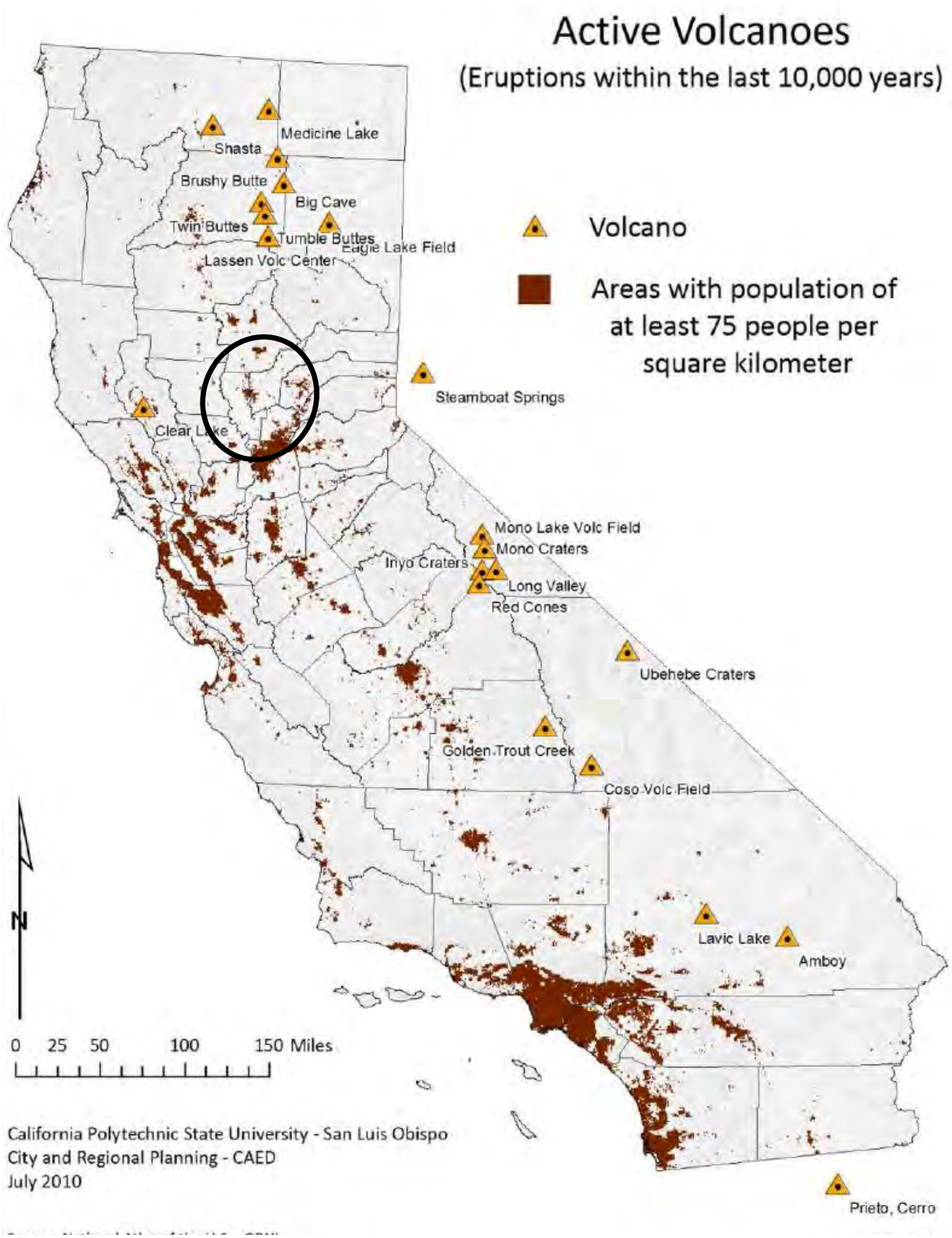
connected to the San Francisco Bay via the Sacramento and Feather River. Sutter County's rice crop is the most water dependent and most at risk to impacts from non-native aquatic invasive species, with an annual harvested acreage or around 115,000 acres equating to the 2011 crop value of $178,745,000 dollars the adjusted economic impact to the County economy could be as high as $715 million dollars/ year. Due to the high number of incidents of invasive species in the Delta and Sacramento River, it is likely that future infestation of marine pests will occur in Sutter County.

4.2.16 Volcano

Hazard/Problem Description

The California State Hazard Mitigation Plan identifies volcanoes as one of the hazards that can adversely impact the State. However, there have been few losses in California from volcanic eruptions. Of the approximately 20 volcanoes in the State, only a few are active and pose a threat. Of these, Lassen Peak is the closest to Sutter County. The Long Valley area is considered to be an active volcanic region of California and includes features such as the Mono-Inyo Craters, Long Valley Caldera, and numerous active and potential faults. Figure 4.55 shows volcanoes in or near California and the location of the Lassen Peak and the Long Valley area relative to the Sutter County Planning Area.

Figure 4.55. Active Volcanoes in California and in the Sutter County Area



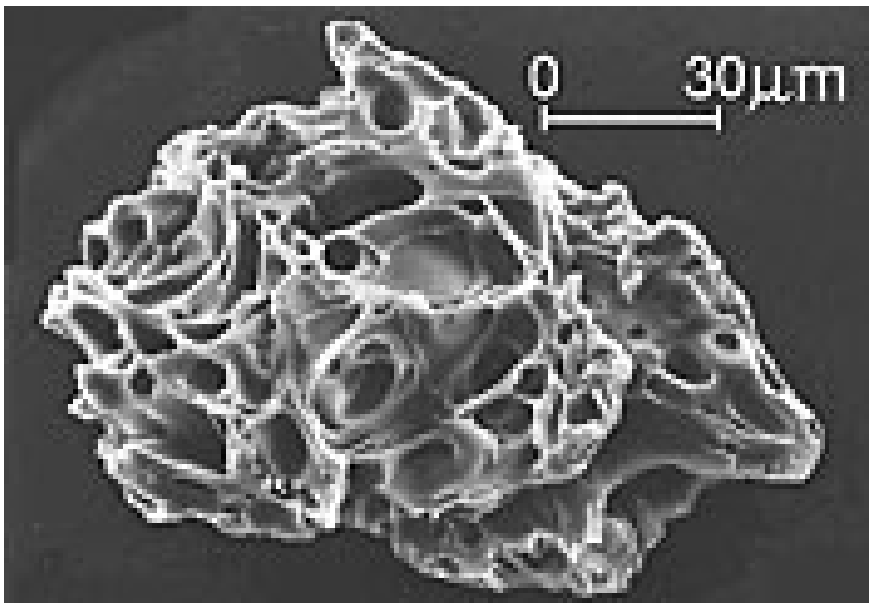
Source: 2010 State of California Hazard Mitigation Plan

The Sutter Buttes are volcanic in origin. However, neither the Sutter Buttes nor Sutter County is identified as being located in an area of potential volcanic hazards by the State. The Buttes erupted between 1.60 and 1.35 million years ago. During their eruption, melted rock, or magma pushed its way upward beneath the flat valley layers of sandstone, shale, gravel beds, and marine deposits. The magma solidified into large lava domes of the Castellated Core of the Buttes. Sediments eroded over time, leaving only tiny remnants in the Castellated Core. As the lava domes breached the surface, they released great volumes of hot, pressurized volcanic gases and steam with explosive force. When the volcanic action stopped, the long process of erosion began to carve away the softer materials of the volcano.

Steam blasts commonly produce large pits or craters. Explosive eruptions, which may create fiery flows of hot ash (pyroclastic flows), are usually followed by the pushing up of a lava dome. Some less violent eruptions only produce lava flows.

Populations living near volcanoes are most vulnerable to volcanic eruptions and lava flows, although volcanic ash can travel and affect populations many miles away and cause problems for aviation. The USGS notes specific characteristics of volcanic ash. Volcanic ash is composed of small jagged pieces of rocks, minerals, and volcanic glass the size of sand and silt, as shown in Figure 4.56. Very small ash particles can be less than 0.001 millimeters across. Volcanic ash is not the product of combustion, like the soft fluffy material created by burning wood, leaves, or paper. Volcanic ash is hard, does not dissolve in water, is extremely abrasive and mildly corrosive, and conducts electricity when wet.

Figure 4.56. Ash Particle from 1980 Mt. St Helens Eruption Magnified 200 Times



Source: US Geological Survey: Volcanic Ash: Effect & Mitigation Strategies. http://volcanoes.usgs.gov/ash/properties.html.

Volcanic ash is formed during explosive volcanic eruptions. Explosive eruptions occur when gases dissolved in molten rock (magma) expand and escape violently into the air, and also when

water is heated by magma and abruptly flashes into steam. The force of the escaping gas violently shatters solid rocks. Expanding gas also shreds magma and blasts it into the air, where it solidifies into fragments of volcanic rock and glass. Once in the air, wind can blow the tiny ash particles tens to thousands of miles away from the volcano.

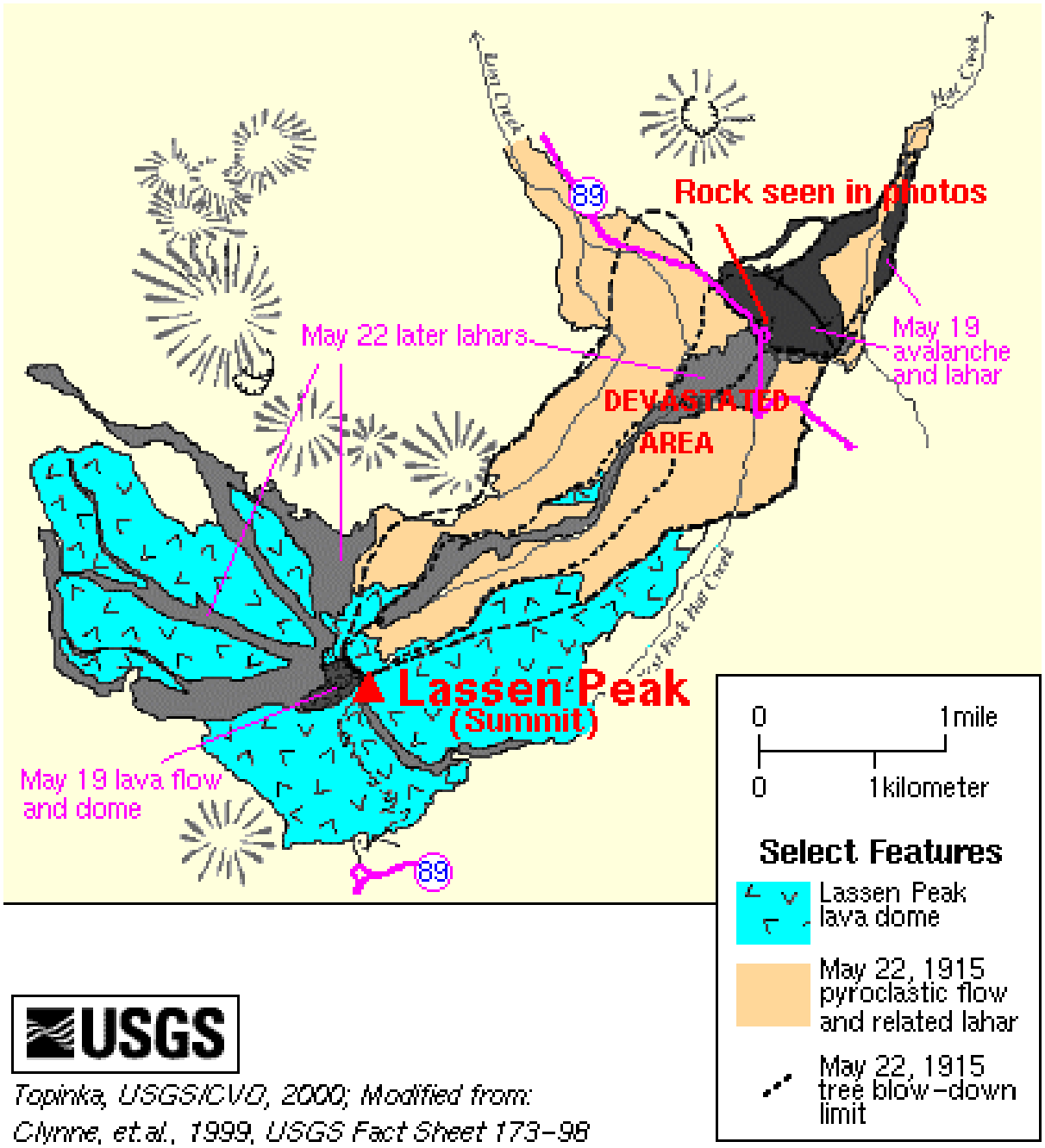
Past Occurrences

In historic times there are no records of significant ash falls, explosive effects, lava flows or mud flows in Sutter County. Further, impending volcanic eruptions generally give numerous advance warning signs and thus it is usually possible to evacuate residents in areas subject to volcanic hazards.

The Lassen region has been volcanically active for more than 3 million years. The Lassen "volcanic center" began to erupt about 600,000 years ago. From 600,000 to 400,000 years ago, eruptions built a large volcano. Later, this volcano became inactive and was mostly eroded away, leaving remnants that include Brokeoff Mountain, Mount Conard, Mount Diller, and Diamond Peak. Subsequent eruptions in the Lassen volcanic center have formed more than 30 steep-sided lava domes (the Lassen dome field). The most recently active parts of the volcanic center are Lassen Peak and other young domes formed in the past 50,000 years.

The most recent eruptive activity occurred at Lassen Peak in 1914-1917. This eruptive episode began on May 30, 1914, when a small phreatic eruption occurred at a new vent near the summit of the peak. More than 150 explosions of various sizes occurred during the following year. By mid-May 1915 (see Figure 4.57), the eruption changed in character; lava appeared in the summit crater and subsequently flowed about 100 meters over the west and probably over the east crater walls. Disruption of the sticky lava on the upper east side of Lassen Peak on May 19 resulted in an avalanche of hot rock onto a snowfield. A lahar was generated that reached more than 18 kilometers down Lost Creek. On May 22, an explosive eruption produced a pyroclastic flow that devastated an area as far as 4 miles northeast of the summit. The eruption also generated lahars that traveled more than 12 miles down Lost Creek and floods that went down Hat Creek. A vertical eruption column resulting from the pyroclastic eruption rose to an altitude of more than 5 miles above the vent and deposited a lobe of pumiceous tephra that can be traced as far as 18 miles to the east-northeast The fall of fine ash was reported as far away as Elko Nevada, more than 300 miles east of Lassen Peak. Intermittent eruptions of variable intensity continued until about the middle of 1917.

Figure 4.57. May 1915 Eruption of Lassen Peak



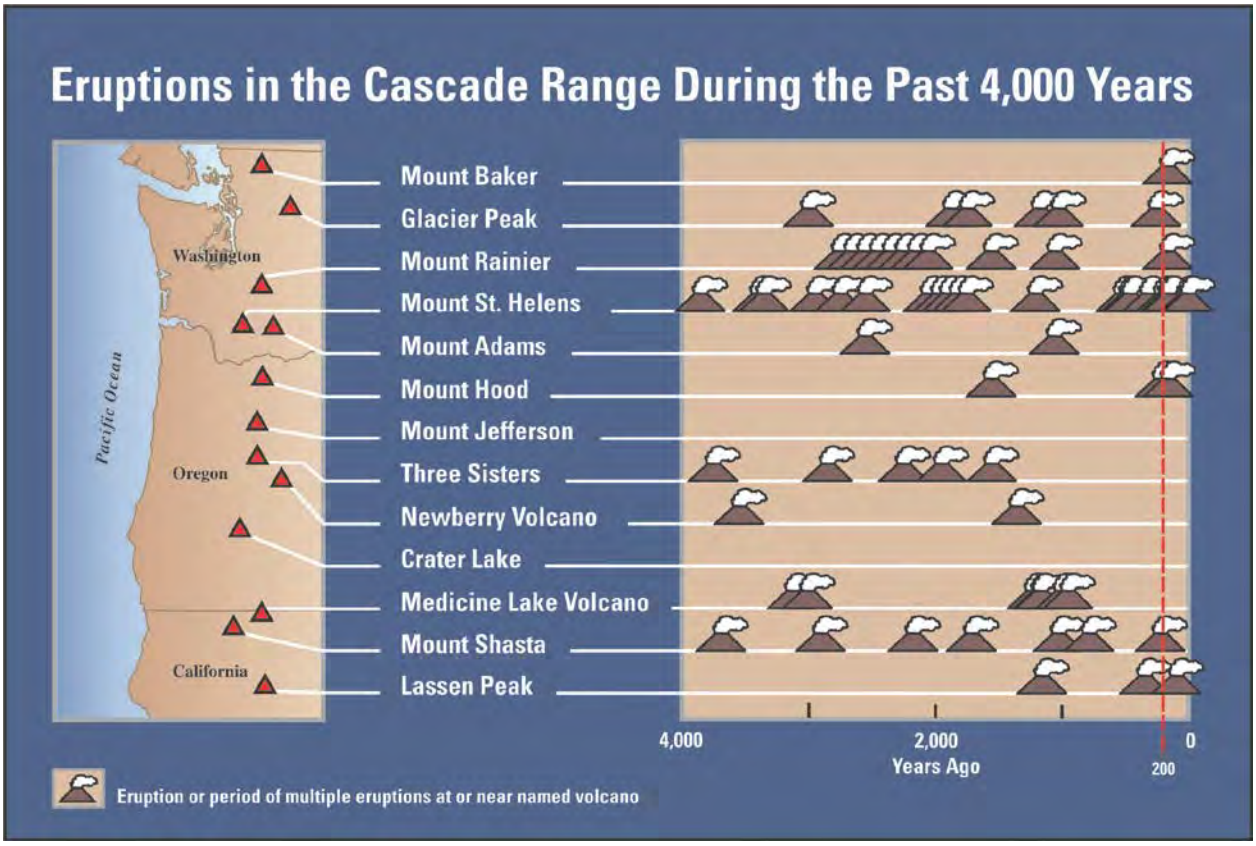
USGS

Topinka, USGS/CVO, 2000; Modified from:
Clynne, et.al., 1999, USGS Fact Sheet 173-98

Source: USGS
http://vulcan.wr.usgs.gov/Volcanoes/Lassen/Maps/map_lassen_1915.html

The Cascade Range volcanic chain has a long history of geologic activity that includes both earthquakes and volcanic eruptions. Volcanoes in the Cascade Range volcanic chain have erupted often over the past 40,000 years. As shown in Figure 4.58, over the past 4,000 years, small to moderate eruptions have occurred at various sites along the Cascade Range volcanic chain at intervals ranging from 20 to 1,000 years.

Figure 4.58. Volcanic Activity in the Cascade Range Volcano Chain in the Past 4,000 Years



Source: U.S. Geological Survey,
http://vulcan.wr.usgs.gov/Volcanoes/Cascades/EruptiveHistory/cascades_eruptions_4000yrs.html

Likelihood of Future Occurrences

Unlikely—According to the U.S. Geological Survey, because geologically recent volcanic activity in an area is the best guide to forecasting future eruptions, scientists study the lava flows, ash, and other deposits from past eruptions. Volcanoes in the Lassen area tend to erupt infrequently, and may be inactive for periods lasting centuries or even millennia. The most recent eruptions in the Lassen area were the relatively small events that occurred at Lassen Peak between 1914 and 1917. The most recent large eruption produced Chaos Crags about 1,100 years ago. Such large eruptions in the Lassen area have an average recurrence interval of about 10,000 years. However, the geologic history of the Lassen area indicates that volcanism there is episodic, having periods of relatively frequent eruptions separated by long quiet intervals. For example, the last large event before Chaos Crags eruption was the one that built Lassen Peak 27,000 years.

4.2.17 Wildfire

Hazard/Problem Description

Wildland fire is an ongoing concern for the Sutter County Planning Area. Generally, the fire season extends from June through October of each year during the hot, dry months. Fire conditions arise from a combination of high temperatures, an accumulation of vegetation, low humidity, and high winds. Within the County, the Sutter Buttes are the primary concern when considering the wildland fire hazard, with their limited access, steep terrain and remote location. In other areas, large concentrations of highly flammable brush located in flat open spaces are also quite susceptible to wildland fire. Also at risk are the "river bottoms" or those areas along the Sacramento, Feather and Bear Rivers within the levee system, since much of the area inside these levees are left in a natural state, allowing combustible fuels to accumulate over long periods of time.

The Wildland Urban Interface (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 Sutter County consists of communities at risk 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 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 pattern of increased damages is directly related to increased urban spread into historical forested areas that have wildfire as part of the natural ecosystem. Many WUI fire areas have long histories of wildland fires that burned only vegetation in the past. However, with new development, a wildland fire following a historical pattern now burns developed areas. WUI fires can occur where there is a distinct boundary between the built and natural areas or where development or infrastructure has encroached or is intermixed in the natural area. WUI fires may include fires that occur in remote areas that have critical infrastructure easements through them, including electrical transmission towers, railroads, water reservoirs, communications relay

sites or other infrastructure assets. Human impact on wildland areas has made it much more difficult to protect life and property during a wildland fire. This home construction has created a new fuel load within the wildland and shifted fire fighting tactics to life safety and structure protection.

Wildfire and urban wildfire are an ongoing concern for Sutter County. Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in the air. These conditions when combined with high winds and years of drought increase the potential for a wildfire to occur. Urban wildfires often occur in those areas where development has expanded into the rural areas. A fire along this urban/rural interface can result in major losses of property and structures. 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. Also to be considered as a fuel source are man-made 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.

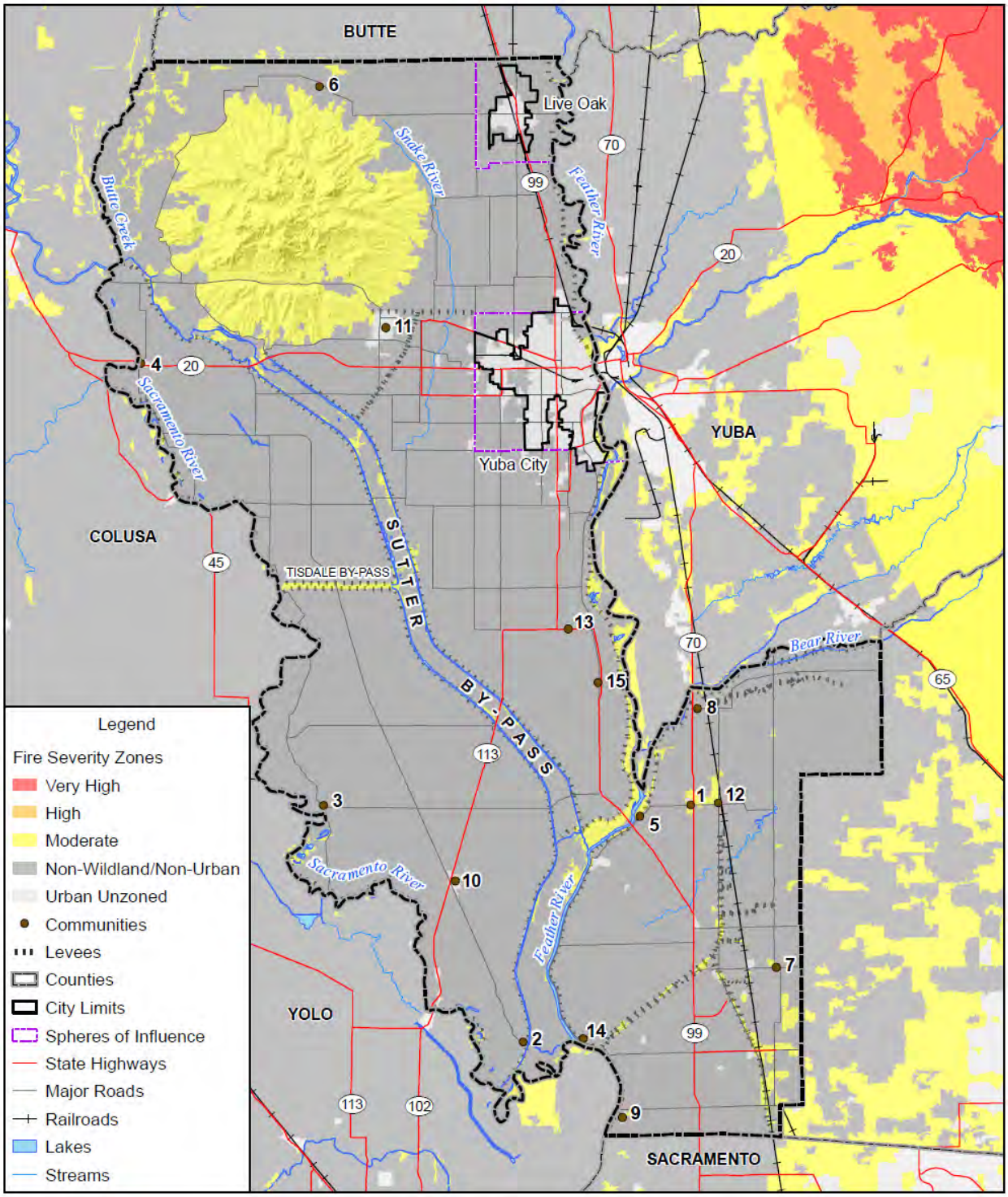
Topography – An area's terrain and land slopes affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.

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 the wildfire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most treacherous weather factor. The greater a wind, the faster a fire will spread, and the more intense it will be. Winds can be significant at times in the Sutter County Planning Area. Lightning also ignites wildfires, often in difficult-to reach terrain for firefighters. Also of concern, during periods of drought, the threat of wildfire increases.

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.

Figure 4.59 shows the fire severity zones, as defined by CAL FIRE, for Sutter County.

Figure 4.59. Sutter County Fire Severity Zones



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, CALFIRE: SRA 11/7/2007, LRA 5/2008, FRA & LRA 8/2007 DRAFT

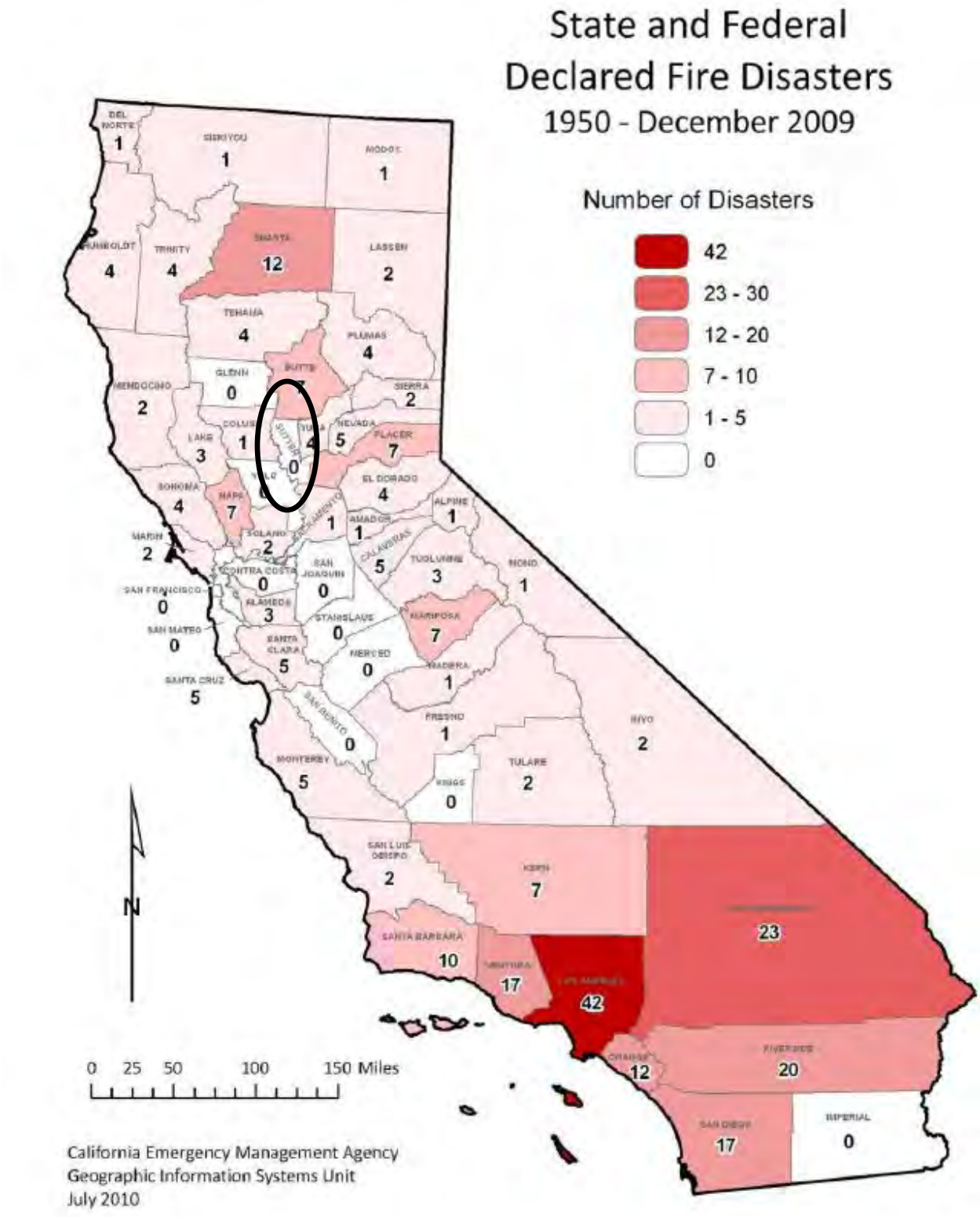
Potential losses from wildfire include human life, structures and other improvements, natural and cultural resources, quality and quantity of water supplies, cropland, timber, and recreational opportunities. Economic losses could also result. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

Consequently, wildland fires that burn in natural settings with little or no development are part of a natural ecological cycle and may actually be beneficial to the landscape. Century old policies of fire exclusion and aggressive suppression have given way to better understanding of the importance fire plays in the natural cycle of certain forest types.

Past Occurrences

Wildfires are of significant concern throughout California. According to the California Department of Forestry and Fire Protection (CAL FIRE), vegetation fires occur within their jurisdiction on a regular basis; most are controlled and contained early with limited damage. For those ignitions that are not readily contained and become wildfires, damage can be extensive. There are many causes of wildfire, from naturally caused lightning fires to human-caused fires linked to activities such as smoking, campfires, debris burning, equipment use, and arson. Recent studies conclude that the greater the population density in an area, the greater the chance of an ignition. With population (and ignition densities) continuing to grow throughout California and the Sutter County Planning Area, combined with increased fuel loads, the risk posed by wildfire also continues to grow. Fortunately, there have been no disaster declaration related to fire in Sutter County (see Figure 4.60)

Figure 4.60. State and Federal Fire Disaster Declarations



Source: Cal EMA

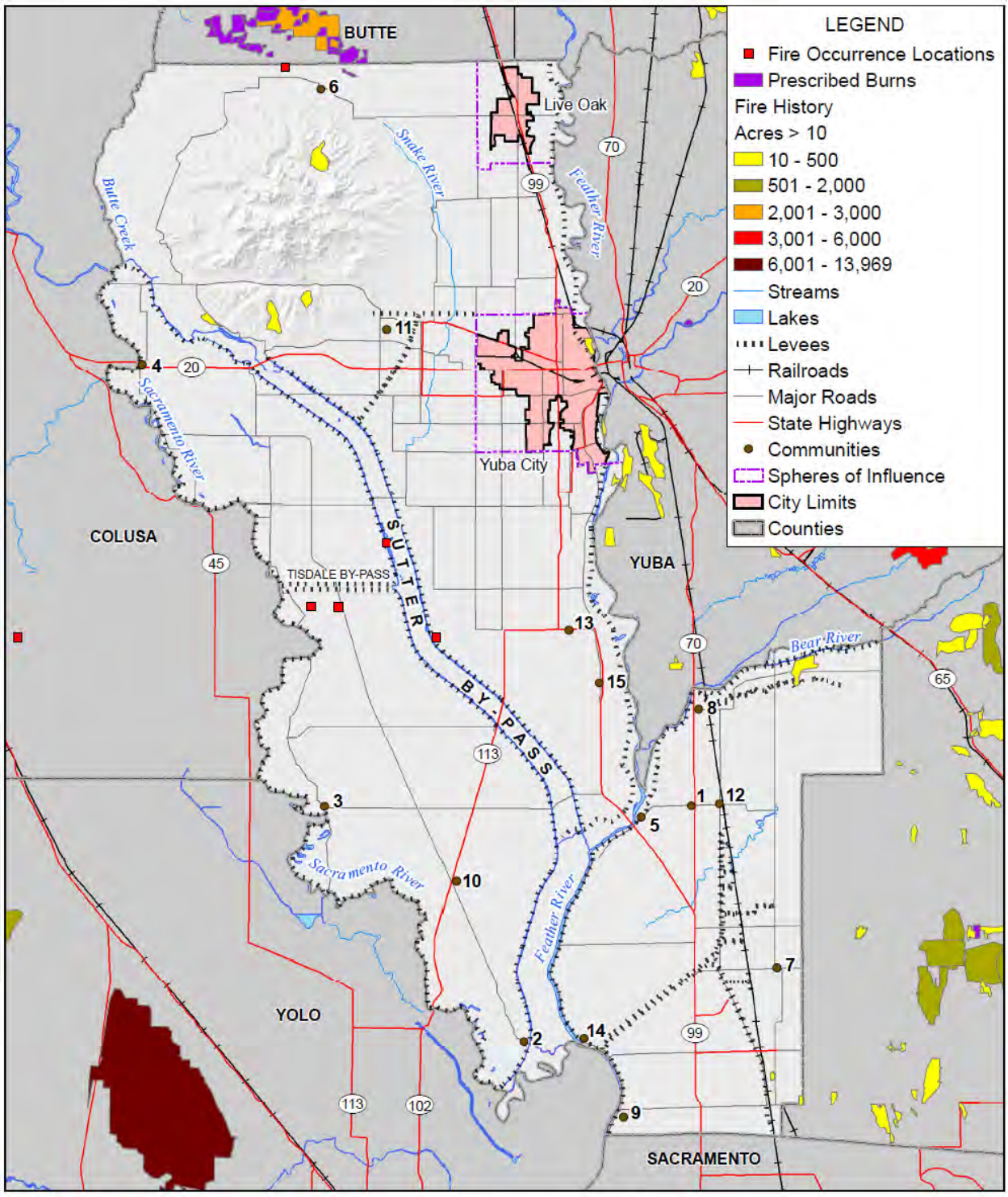
CAL FIRE, USDA Forest Service Region 5, BLM, NPS, Contract Counties and other agencies jointly maintain a comprehensive fire perimeter GIS layer for public and private lands throughout the state. The data covers fires back to 1878 (though the first recorded incident for the County was in 1911). For the 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 Sutter County were extracted and are listed in Table 4.33 and shown in Figure 4.61. There are 10 fires recorded in this database for Sutter County. Each of them was tracked by Cal Fire; Cal Fire last updated this database in 2010. Table 4.33 lists each fire's date, cause, name, and calculated acreage. Figure 4.61 shows fires, colored by the size of the acreage burned.

Additional data was obtained from the Federal Wildland Fire Occurrence database housed with the US Geological Survey. Data from this database is compiled from several federal agencies including the BIA, BLM, FWS, NPS, and USFS. The database recorded 11 wildland fires greater than 10 acres in Sutter County between 1980 and 2012. The largest recorded fire was named Daguerre and was 100 acres on September 20, 2002, there was an additional fire on October 8, 2002 with the same name and was 90 acres, both were considered to be human caused. This data is summarized in Table 4.34 and is represented by point locations on Figure 4.61. Not included in the databases, the HMPC noted a fire accruing in 1993 at Grey Lodge area north of Pennington. This fire occurred in a wildlife preserve and caused significant damage.

Figure 4.61. Sutter County Fire History 1900-2012



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; USDA NRCS, CALFIRE, BLM, FWS

Table 4.33. Sutter County Fire History 1900-2012

Year	Fire Name	Acres Burned	Start Date	Control Date	Cause
1970	Shockley	286	7/27/1970	N/A	Unknown/Unidentified
2007	West Butte	83	7/27/2007	7/27/2007	Unknown/Unidentified
2007	Peace Valley	282	8/21/2007	9/22/2007	Lightning
2008	Riego	26	9/12/2008	9/12/2008	Unknown/Unidentified
2008	Levee	41	8/18/2008	8/18/2008	Unknown/Unidentified
2008	Myrna	455	9/1/2008	9/1/2008	Unknown/Unidentified
2009	Riverbottom	83	3/29/2009	3/31/2009	Unknown/Unidentified
2011	South Ridge	110	7/27/2011	7/27/2011	Unknown/Unidentified
2011	Baseline	31	9/10/2011	9/10/2011	Unknown/Unidentified
2011	West Butte Fire	240	5/14/2011	5/14/2011	Miscellaneous

Source: CAL FIRE, BLM, FWS, NRCS

Table 4.34. Sutter County Federal Wildland Fire History 1980-2012

Year	Fire Name	Acres Burned	Start Date	Control Date	Cause
1989	Tract 18	13	5/11/1989	5/11/1989	Human
1990	Tract 18	75	9/12/1990	9/12/1990	Human
1992	Col-T18	85	6/8/1992	6/8/1992	Human
1992	Otter 1	70	8/25/1992	8/26/1992	Human
1994	Bath	25	7/19/1994	7/20/1994	Human
2002	Daguerra	100	9/20/2002	9/20/2002	Human
2002	Daguerra	90	10/8/2002	10/9/2002	Human
2002	Gold Field	55	10/9/2002	10/9/2002	Human
2003	Peoria	12	7/21/2003	7/21/2003	Human
2005	Pollit	36	10/21/2005	10/21/2005	Human
2006	Stamm Fire	11	6/13/2006	6/13/2006	Human

Source: USGS - Federal Wildland Fire Occurrence

Likelihood of Future Occurrences

Likely – From May to October of each year, Sutter County faces a wildfire threat. Fires will continue to occur on an almost annual basis in the Sutter County Planning Area. The threat of wildfire and potential losses constantly increase as human development and population increase in the wildland urban interface area in the County. This results in a likely rating of future occurrence. However; the County has little forested area, so wildfires are generally limited in size and area affected (usually grassland and vegetative fires), and are easier to contain than fires in forested or mountainous areas of California.

4.2.18 Natural Hazards Summary

Table 4.35 summarizes the results of the hazard identification and hazard profile for the Sutter County Planning Area based on the hazard identification data and input from the HMPC. For each hazard profiled in Section 4.2, this table includes the likelihood of future occurrence and whether the hazard is considered a priority hazard for the Sutter County Planning Area.

Table 4.35. Hazard Identification/Profile Summary and Determination of Priority Hazard: Sutter County Planning Area

Hazard	Likelihood of Future Occurrence	Priority Hazard
Dam Failure	Unlikely	Medium
Drought & Water shortage	Occasional	Medium
Earthquakes	Unlikely	Low
Earth Movements: Erosion	Highly Likely	Low
Earth Movements: Landslide	Occasional	Low
Floods: 100/200/500 year	Occasional	High
Floods: Localized Stormwater	Highly Likely	Medium
Invasive Species: Pests/Plants	Likely	Medium
Levee Failure	Occasional	High
Marine Invasive Species	Likely	Medium
Severe Weather: Extreme Cold/Freeze	Likely	Medium
Severe Weather: Extreme Heat	Highly Likely	Medium
Severe Weather: Fog	Occasional	Low
Severe Weather: Heavy rain, hailstorm, lightning, wind	Highly Likely	Medium
Severe Weather: Tornado	Likely	Low
Volcanoes	Unlikely	Low
Wildfires	Likely	Medium

4.3 Vulnerability Assessment

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

With Sutter County's hazards identified and profiled, the HMPC conducted a vulnerability assessment to describe the impact that each priority hazard would have on the County. The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to natural hazards and estimates potential losses. This section focuses on the risks to the County as a whole. Data from the individual participating jurisdictions was also evaluated and is integrated here and in the jurisdictional annexes, and noted where the risk differs for a particular jurisdiction within the Planning Area.

This vulnerability assessment followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses. The vulnerability assessment first describes the total vulnerability and values at risk and then discusses vulnerability by priority hazards.

Data used to support this assessment included the following:

- County GIS data (hazards, base layers, and assessor's data);
- Statewide GIS datasets compiled by the Cal EMA, California Department of Water Resources, and others to support mitigation planning;
- FEMA DFIRM and Levee datasets;
- Existing plans and studies;
- CAL FIRE GIS datasets;
- Written descriptions of inventory and risks provided by participating jurisdictions; and
- Personal interviews with planning team members and staff from the County and participating

jurisdictions.

4.3.1 Sutter County Vulnerability and Assets at Risk

As a starting point for analyzing the Planning Area's vulnerability to identified hazards, the HMPC used a variety of data to define a baseline against which all disaster impacts could be compared. If a catastrophic disaster was to occur, this section describes significant assets at risk in the Planning Area. Data used in this baseline assessment included:

- Total assets/values at risk;
- Critical facility inventory;
- Cultural, historical, and natural resources; and
- Growth and development trends.

Total Values at Risk

The following data from the Sutter County Assessor's Office is based on the 2012 Assessor's data. This data should only be used as a guideline to overall values in the County, as the information has some limitations. The most significant limitation is created by Proposition 13. Instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is most likely low and does not reflect current market value of properties within the County. 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.

Methodology

The 2012 Sutter County Assessment Roll parcel layer was used as the basis for the inventory of developed parcels. The data shows the land value and improvements value for each parcel, along with a use code. Each parcel record was attributed with its jurisdiction name (Live Oak, Yuba City, etc.) based on whether its geographic center fell in or out of those jurisdictional boundaries. For the purposes of tabulating data, the unincorporated county was considered a jurisdiction and is listed in the table as such.

Land Use Codes within the parcel layer were used to categorize the parcels into distinct property types, including Agricultural, Commercial, Industrial, Institutional, Residential, and Vacant Land. The Sutter County Assessor List of Property Use Codes document was used to translate use codes into descriptive use labels, which were grouped into the distinct categories mentioned above based on use description and the best judgment of AMEC staff. In cases where multiple categories could apply to a single parcel, a single category was assigned based on improvement values and, in a limited number of cases, photo analysis. A limited number of parcels (42) contained a temporary use code, or were missing a use code; these parcels were put into an 'Unclassified' category.

Sutter County has a total land value of $7,230,692,460. The City of Yuba City has the most structures and value of the County's jurisdictions; where there are 17,906 improved parcels with a total value of close to $4 billion. Table 4.36 shows the 2012 assessor values for the entire Sutter County Planning Area (i.e., the total values at risk) by jurisdiction. The values for unincorporated Sutter County are provided in Table 4.37 by property type showing that residential has the most structures with 2,649 and industrial has the greatest value with over $1.1 billion. Total values in the unincorporated County including improvements and land value totals $2.9 billion.

Table 4.36. Sutter County Planning Area - Total Exposure by Jurisdiction

Jurisdiction	Total Parcel Count	Improved Parcel Count	Improved Value	Total Land Value	Total Value
Live Oak	2,700	2,218	$214,138,188	$74,290,191	$288,428,379
Yuba City	18,799	17,906	$3,080,591,221	$944,897,688	$4,025,488,909
Unincorporated	12,528	8,888	$1,470,882,268	$1,445,892,904	$2,916,775,172
Total	**34,027**	**29,012**	**$4,765,611,677**	**$2,465,080,783**	**$7,230,692,460**

Source: Sutter County 2012 Assessor's Data

Table 4.37. Unincorporated Sutter County Total - Exposure by Property Type

Property Use	Total Parcel Count	Improved Parcel Count	Improved Value	Total Land	Total Value
Agriculture	2,620	1,369	$49,361,511	$472,654,172	$522,015,683
Commercial	155	123	$40,591,912	$18,989,426	$59,581,338
Industrial	195	129	$445,291,303	$24,053,676	$469,344,979
Institutional	534	92	$28,432,670	$20,424,558	$48,857,228
Residential	2,649	2,638	$395,063,028	$357,476,967	$752,539,995
Unclassified	22	0	$0	$0	$0
Vacant Land	6,353	4,537	$512,141,844	$552,294,105	$1,064,435,949
Total	**12,528**	**8,888**	**$1,470,882,268**	**$1,445,892,904**	**$2,916,775,172**

Source: Sutter County 2012 Assessor's Data

Critical Facility and Infrastructure Inventory

The Sutter County OEM worked with members of the HMPC to develop a definition of critical facilities for the Sutter County Planning Area. For purposes of this plan, a critical facility is defined as:

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

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

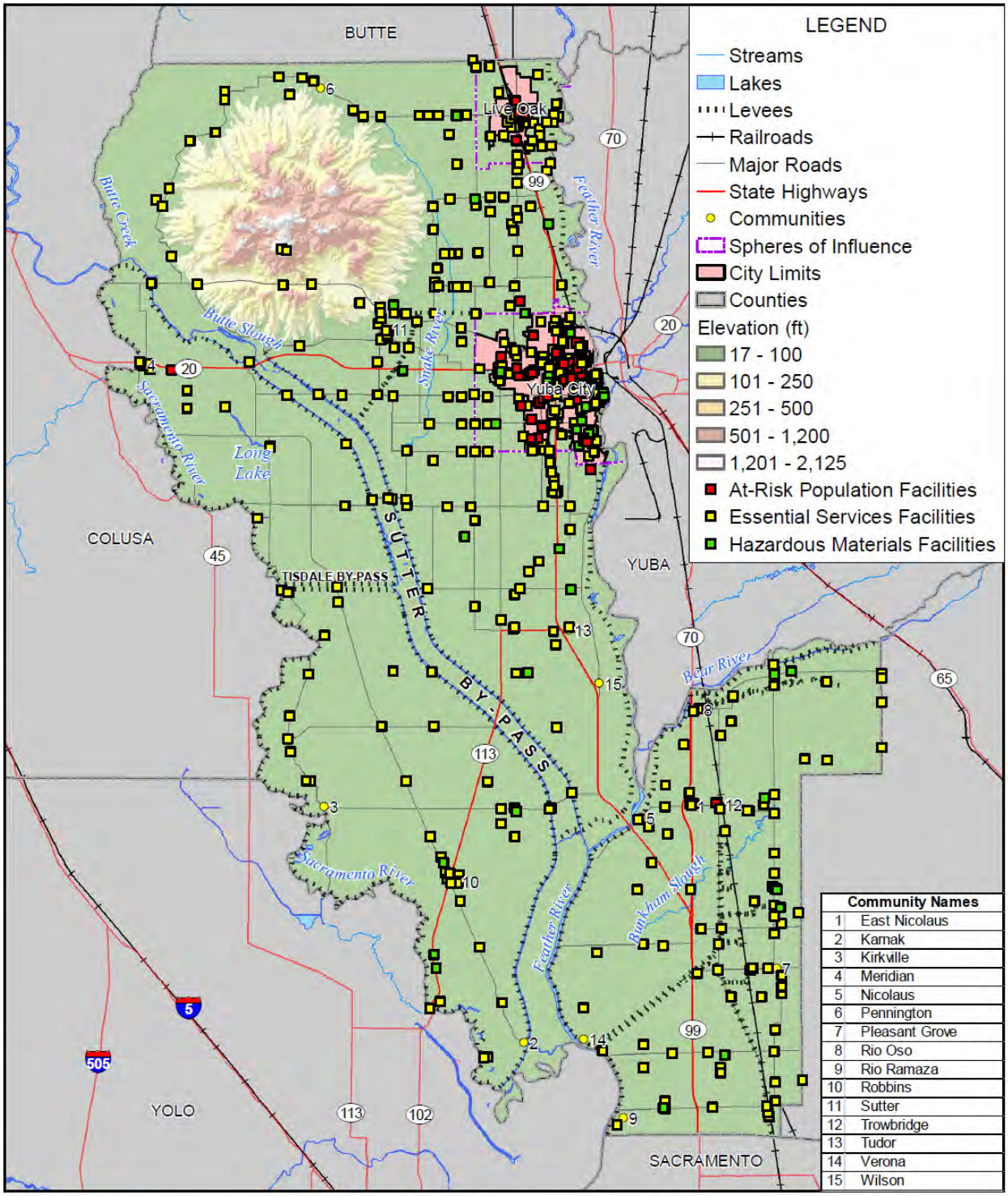
- **Essential Services Facilities** include, without limitation, public safety, emergency response, emergency medical, designated emergency shelters, communications, public utility plant facilities and equipment, and government operations. Sub-Categories:
  - Public Safety - Police stations, fire and rescue stations, emergency operations centers
  - Emergency Response - Emergency vehicle and equipment storage and essential governmental work centers for continuity of government operations.
  - Emergency Medical - Hospitals, emergency care, urgent care, ambulance services.
  - Designated Emergency Shelters.
  - Communications - Main hubs for telephone, main broadcasting equipment for television systems, radio and other emergency warning systems.
  - Public Utility Plant Facilities - including equipment for treatment, generation, storage, pumping and distribution (hubs for water, wastewater, power and gas).
  - Essential Government Operations - Public records, courts, jails, building permitting and inspection services, government administration and management, maintenance and equipment centers, and public health.
  - Transportation Lifeline Systems - Airports, helipads, and critical highways, roads, bridges and other transportation infrastructure (Note: Critical highways, roads, etc. will be determined during any hazard-specific evacuation planning and are not identified in this plan).
- **At Risk Population Facilities** include, without limitation, pre-schools, public and private primary and secondary schools, before and after school care centers with 12 or more students, daycare centers with 12 or more children, group homes, and assisted living residential or congregate care facilities with 12 or more residents.
- **Hazardous Materials Facilities** include, without limitation, any facility that could, if adversely impacted, release of hazardous material(s) in sufficient amounts during a hazard event that would create harm to people, the environment and property.

To support hazard analysis of critical facilities, Sutter County GIS developed a critical facilities layer that pulled mapped critical facilities from existing GIS layers and organized them into a new critical facilities layer. Each facility was assigned one of the three different categories (each with a different symbology.) County OEM and others added additional mapped facilities to this layer as appropriate. The final critical facilities layer used for this analysis included facilities located in both unincorporated and incorporated communities. These can be seen in Figure 4.62.

[2] Essential Service Facilities include bridges, roads, power grids, and infrastructure held by private companies (i.e. utility lines and private levees) that are not mapped for security reasons and are not under the control of the County.

A fully detailed list of all critical facilities and important infrastructure in the Planning Area can be found in Appendix E. A summary of critical facilities in the County can be found in Table 4.38. Infrastructure means all dams, levees, bridges, and power grids within Sutter County, Yuba City and Live Oak. Dams and levees are further discusses, assessed, and documented in Section 4.3.3 and 4.3.9.

Figure 4.62. Sutter County Planning Area – Critical Facilities and Infrastructure



Map compiled 5/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; USDA NRCS

Table 4.38. Sutter County Planning Area - Critical Facilities Summary Table

Category	Type	Facility Count
City of Live Oak		
At Risk Population Facilities	Congregate Care Facility	3
	School	1
Essential Services Facilities	Emergency Evacuation Shelter	1
	Fire Station	1
	Government Facility	4
	Medical Health Facility	1
	Police	1
	Storm Water Facility	3
	Waste Water Facility	5
	Waste Water Treatment	1
	Water Supply	7
Multiple Categories	School / Emergency Shelter	3
	Total City of Live Oak	**31**
City of Yuba City		
At Risk Population Facilities	Adult Day Care	5
	Assisted Living Facility	6
	Congregate Care Facility	18
	Hospice	2
	School	12
	Senior Center	1
Essential Services Facilities	Bridge (Infrastructure)	3
	Communications	3
	Corporation Yard	1
	Emergency Evacuation Shelter	4
	Fire Station	4
	Government Facility	32
	Medical Health Facility	27
	Police	2
	Storm Water Facility	5
	Waste Water Facility	14
	Waste Water Treatment	1
	Water Treatment	1
Hazardous Materials Facilities	Hazardous Materials Facilities	17
Multiple Categories	School / Emergency Shelter	10
	Total City of Live Oak	**168**

Category	Type	Facility Count
Unincorporated Sutter County		
At Risk Population Facilities	Assisted Living Facility	1
	Congregate Care Facility	2
	School	3
Essential Services Facilities	Airport	1
	Bridge (Infrastructure)	203
	Communications	43
	Emergency Operations Center	4
	Fire Station	11
	Government Facility	13
	Medical Health Facility	1
	Paved Airstrip	10
	Seepage Water Facility	1
	Waste Water Facility	2
	Waste Water Treatment	2
	Water Supply	7
Hazardous Materials Facilities	Hazardous Materials Facilities	24
Multiple Categories	School / Emergency Shelter	16
	Total Unincorporated County	**344**

Source: Sutter County GIS

Cultural, Historical, and Natural Resources

Assessing Sutter County's vulnerability to disaster also involves inventorying the historical, cultural, and natural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- In the event of a disaster, an accurate inventory of natural, historical and cultural resources allows for more prudent care in the disaster's immediate aftermath when the potential for additional impacts is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian habitat which help absorb and attenuate floodwaters and thus support overall mitigation objectives.

Cultural and Historical Resources

Sutter 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 4.39.

Table 4.39. Sutter County Planning Area - Historical Resources

Name (Landmark Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City
Bill Butler House (P395)				X	3/20/1975	Yuba City
Butte House Watering Trough (P315)				X	7/13/1973	Sutter
Campbell's House (P390)				X	3/20/1975	Yuba City
E. G. Van Arsdale House (P393)				X	3/20/1975	Yuba City

Name (Landmark Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City
East Nicolaus High School (P333)				X	5/15/1974	East Nicolaus
Eugene Boyd House (P396)				X	3/20/1975	Yuba City
Fremont Monument (P309)				X	7/13/1973	Sutter
G.W. Carpenter House (P391)				X	3/20/1975	Yuba City
H. C. Mclaughlin Law Office (P311)				X	7/13/1973	Yuba City
Hock Farm (Site Of) (346)		X			8/8/1939	Yuba City
Live Oak Historic Commercial District (N2012)	X				1/23/1998	Live Oak
Mcgruder House (P389)				X	3/20/1975	Yuba City
Mckague, Frank W., And Wife, Home (P98)				X	6/7/1968	East Nicolaus
Old Brick House Of Sumner Paine (P314)				X	7/13/1973	Meridian
S.G. Stabler And Swinson House (P394)				X	3/20/1975	Yuba City
Sanborn Law Office/Winship Hall (P312)				X	7/13/1973	Yuba City
Site Of Propagation Of The Thompson Seedless Grape (929)	X				10/15/1979	Yuba City
Sutter County Canning & Packing Company (P313)				X	7/13/1973	Yuba City
Sutter County Courthouse (P387)				X	3/20/1975	Yuba City
Sutter County Hall Of Records (P388)				X	3/20/1975	Yuba City
Sutter County Masonic Temple (P826)				X	3/3/1997	Yuba City
Thomas D. Boyd House (P392)				X	3/20/1975	Yuba City
William Harkey House (P385)				X	3/20/1975	Yuba City
William O'Banion House (P386)				X	3/20/1975	Yuba City
Wooley's Grave (P310)				X	7/13/1973	Meridian

Source: California Office of Historical Preservation

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. The Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) document America's architectural and engineering heritage. There are no HABS and HAER structures in Sutter County:

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.

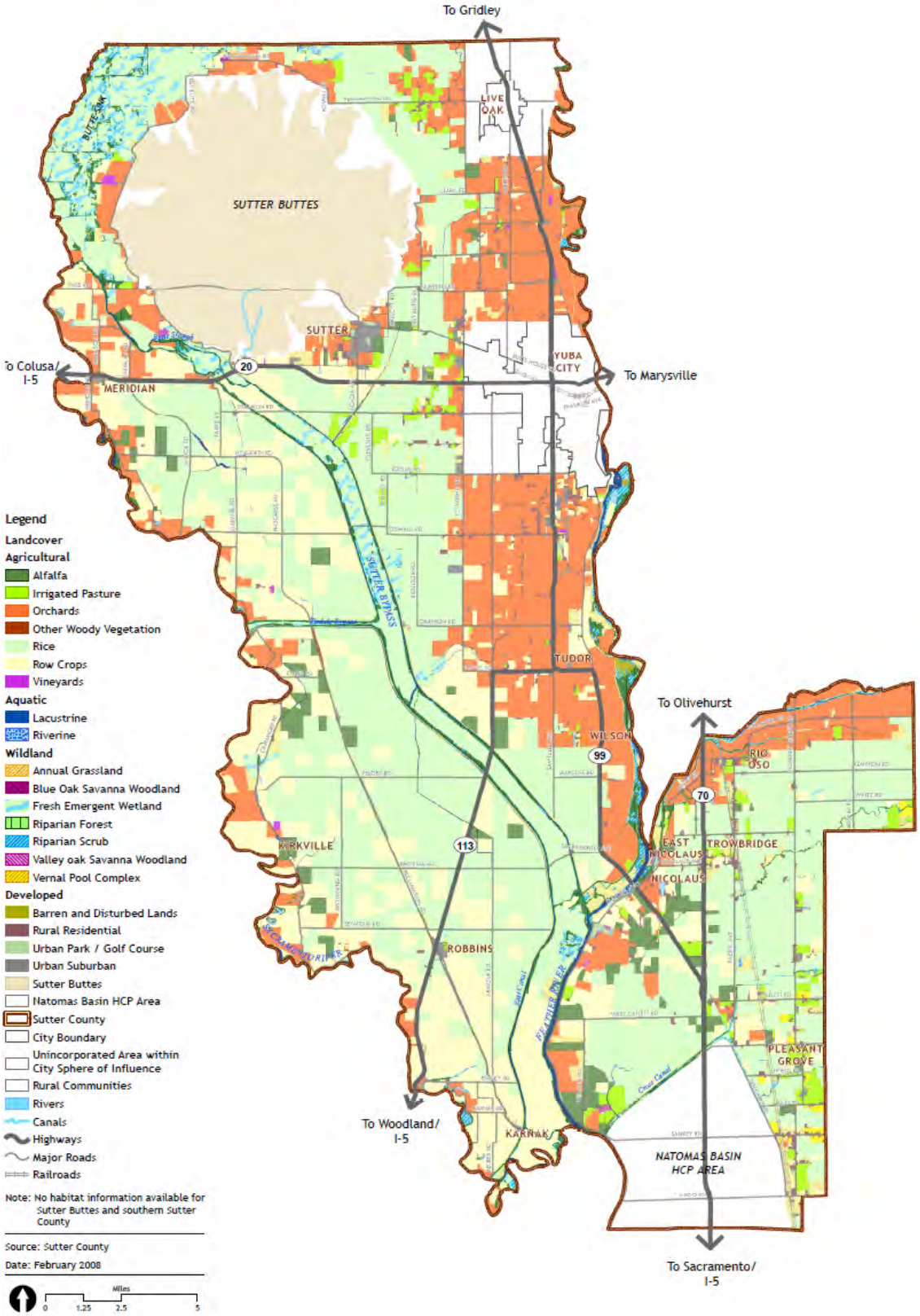
Natural Resources

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 encompasses approximately 388,358 acres. Historically, the natural habitats within the County included perennial grasslands, riparian woodlands, oak woodlands, and a variety of wetlands including vernal pools, seasonal wetlands, freshwater marshes, ponds, streams and rivers. Over the last 150 years, development for agriculture, irrigation, flood control and urbanization has resulted in the alteration or loss of much of the natural habitat within the County. One exception to this is the Sutter Buttes which contain the largest expanses of relatively undisturbed habitat in the County. The Sutter Buttes is a volcanic formation in northern central Sutter County that is over 2,000 feet in elevation, and covers approximately 40,000 acres. Although almost entirely under private ownership and used for livestock grazing, the Sutter Buttes support a high diversity of vegetation communities including oak woodland, chaparral, non-native grassland, with vernal pools and other seasonal wetlands. Plant and wildlife species found here are also diverse, and include some endemic, and/or special-status species such as the Marysville kangaroo rat, the San Francisco campion, and rose mallow.

County wide, as with most of the rest of the state, non-native annual grasses have replaced the native perennial grasslands. Many natural streams in the County have been channelized, much of the riparian and oak woodlands have been cleared, and most of the marshes have been drained and converted to agricultural or urban uses. However, due to the scarcity of urban development relative to many nearby counties, valuable plant and wildlife habitat still exists. These habitats are located primarily along the Sacramento River, Feather River, Bear River, and Sutter Bypass, but also in a number of undeveloped parcels distributed throughout the County. These habitats include annual grasslands, riparian woodlands, oak woodlands, oak savanna, riverine (rivers and streams), ponds, freshwater marshes, seasonal wetlands and vernal pools (Figure 4.63). Each habitat, their general location within the County, and special status plant and wildlife species found within each habitat type are discussed below.

Figure 4.63. Habitats in Sutter County



Source: Sutter County General Plan Technical Background Report

Agricultural Land

Agricultural land is the most abundant habitat type in the County. Several agricultural types are present, but rice fields are by far the single most common, covering approximately 92,984 acres of the County. Row and field crops (approximately 124,000 acres), and orchards (approximately 50,603 acres consisting primarily of walnut, almond and peach) are the next most common types, but alfalfa, vineyards and irrigated pasture are also found in relatively small areas distributed throughout the County. Due to the level of disturbance related to crop management, agricultural lands are of limited use to wildlife, and are typically devoid of native plant species. However, certain agricultural types do provide foraging habitat for native wildlife species, including some special-status species. Rice fields and their associated drainage canals are well known to support the federally listed as threatened giant garter snake (*Thamnophis gigas*), and provide foraging habitat for herons, egrets, cranes and other waterfowl. Alfalfa, low growing row crops, and irrigated pastures provide foraging habitat for the Swainson's hawk (*Buteo swainsoni*), State listed as threatened, white-tailed kite (*Elanus caeruleus*), northern harrier (*Circus cyaneus*), and other raptors, as well as the tricolored blackbird (*Agelaius tricolor*). Irrigated pastures and the edges of other low growing crop types may also provide nesting and foraging habitat for burrowing owl (*Athene cunicularia*).

Annual Grassland

Annual grassland habitat occurs in undeveloped portions of the County, primarily as a distinct vegetation community, but also as an understory to oak and riparian woodland habitats. Annual grassland in the County has largely been replaced by agriculture. Approximately 11,000 acres remain in the County that occurs in small patches adjacent to water courses, and the vicinity of the Sutter Buttes. Where it occurs, this habitat occupies (and has largely replaced through competition) what was once native perennial bunch grass habitat. Annual grassland species commonly observed in the County include ripgut brome (*Bromus diandrus*), soft chess (Bromus mollis), wild oat (*Avena fatua*), Italian rye (*Lolium multiflorum*), Mediterranean barley (*Hordeum marinum spp. gussoneanum*), foxtail barley (*Hordeum murinum spp. leporinum*), hairgrass (*Aira caryophylla*) and medusahead grass (*Taeniatherum caput-medusae*). Common forbs found in these annual grasslands include cranesbill (*Geranium dissectum*), red stem filaree (*Erodium botrys*), clover (*Trifolium spp.*), bur clover (*Medicago polymorpha*), fiddle-neck (*Amsinckia menziesii*), curly dock (*Rumex crispus*), wild radish (*Raphanus sativa*), wild mustard (*Brassica spp.*), star thistle (*Centaurea solstitialis*), milk thistle (*Silybum marianum*), bull thistle (*Circium vulgare*), blue dicks (*Dichelostemma capitatum*), spikeweed (*Hemizonia fitchii*), and vinegar weed (*Trichostema lanceolatum*).

Annual grasslands are important habitats to a variety of wildlife, including small rodents such as deer mice (*Peromyscus maniculatus*) and California voles (*Microtus californicus*) that feed on the abundance of grass seeds that this habitat provides. Other small mammals that use this habitat include species such as Botta's pocket gopher (*Thomomys bottae*), cottontail (*Sylvilagus audubonii*), black-tail hare (*Lepus californicus*) and California ground squirrel (*Spermophilus*

beecheyi). These small mammals in turn provide food for a variety of predators including mammals such as the coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*) and birds such as the red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (Buteo *lineatus*), barn owl (*Tyto alba*), American crow (*Corvus brachyrhyncos*) and loggerhead shrike (*Lanius ludovicianus*). Other bird species that may occur in this habitat include the prairie falcon (*Falco mexicanus*), meadowlark (*Sturnella neglecta*), scrub jay (*Aphelocoma coerulescens*) and western bluebird (*Sialia mexicana*). Frequently encountered reptile species in annual grasslands include the western yellow-bellied racer (*Coluber constrictor mormon*), northern Pacific rattlesnake (*Crotalus oreganus oreganus*), Pacific gopher snake (*Pituophis catenifer catenifer*), California kingsnake (*Lampropeltis getulua californiae*), western terrestrial garter snake (*Thamnophis elegans*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinatus*) and Gilbert's skink (*Eumeces gilberti*). Annual grasslands also frequently support seasonal wetlands and vernal pools that provide important breeding sites for the Pacific tree frog (*Pseudacris regilla*) and western toad (*Bufo boreas*).

Special-status species that use annual grasslands for foraging and/or nesting include the "state listed as threatened" Swainson's hawk and "state species of concern" burrowing owl and whitetailed kite. Where vernal pools or seasonal wetlands are a component, grasslands provide habitat for special-status species such as the federally listed as threatened vernal pool fairy shrimp (*Branchinecta lynchi*), the federally listed as endangered vernal pool tadpole shrimp (*Lepidurus packardi*) and a variety of special-status plants.

Riparian

Riparian woodland and scrub habitats are generally associated with rivers, low gradient streams, floodplains and occasionally ponds and canals. The composition of species in riparian woodland communities is highly variable and dependent on geographic location, elevation, substrate, and amount of flow in the watercourse. Approximately 9,500 acres of this habitat occurs in the County (consisting of riparian forest and riparian scrub), and can be found along many of the perennial and ephemeral drainages and other waterways. The largest expanses of riparian vegetation occur along the Sacramento, Feather and Bear Rivers, the Sutter Bypass, with smaller patches along the numerous tributaries to these waters. The vegetation of the riparian woodland habitat is variable and often structurally diverse, and species characteristics of the County include valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), California black walnut (*Juglans californica*), white alder (*Alnus rhombifolia*), willow (*Salix spp*.) and Oregon ash (*Fraxinus latifolia*). Typical understory includes box elder (Acer negundo), button willow (*Cephalanthus occidentalis*), California buckeye (*Aesculus californicus*), coyote brush (*Baccharis* pilularis), California grape (Vitis californicus), Himalayan blackberry (*Rubus* discolor), and poison oak (Toxicodendron *diversilobum*). The herbaceous species occurring in the understory includes seashore vervain (*Verbena litoralis*), bedstraw (*Galium spp*.), sedges (*Carex spp*.), umbrella sedges (*Cyperus spp*.), rushes (*Juncus spp*.), spike rush (*Eleocharis macrostachya*), and a variety of annual grasses.

Riparian habitats provide abundant food, cover, and breeding sites for wildlife in close proximity to water. These factors and the structural diversity of riparian woodland are largely responsible for the high productivity of this habitat type. Characteristic bird species in this habitat include the California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), Nuttall's woodpecker (*Picoides nuttallii*), black phoebe (Sayornis *nigricans*), western wood-pewee (*Contopus sordidulus*), California towhee (*Pipilo crissalis*), and song sparrow (*Melospiza* melodia). A number of these species nest or roost in riparian woodlands and feed in adjacent habitat types, such as annual grassland and agricultural fields. Riparian woodlands also provide important feeding, resting, and nesting habitat for neotropical migrant songbirds such as warblers, vireos, grosbeaks, and flycatchers. Mammals found within riparian habitat may include the raccoon (*Procyon lotor*), deer mouse, broad-footed mole (*Scapanus latimanus*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginianus*), and gray fox. Amphibians and reptiles likely to occur in this community include the western toad (*Bufo boreas*), Pacific tree frog, common king snake, valley garter snake (*Thamnophis sirtalis fitchii*), and Gilbert's skink. Special-status species that forage and/or nest in riparian habitats include the Swainson's hawk, Cooper's hawk (*Accipiter cooperii*), yellow warbler (*Dendroica petechia*), white-tailed kite, and yellow-breasted chat (*Icteria virens*).

Oak Woodlands

Oak woodlands, including Blue Oak Savanna Woodland and Valley Oak Savanna Woodland, are very limited in the County, covering only an approximate 270 acres. The largest concentration of oak woodland occurs around the south western base of the Sutter Buttes, and along the Sacramento, Feather and Bear Rivers, adjacent to riparian vegetation. Plant species composition in this habitat can be variable, but is typically dominated by an overstory of blue oaks (*Quercus douglasi*), valley oaks, and/or interior live oaks (*Quercus wislizenii*), with California buckeye, and California black walnut also commonly found. Understory plant species include poison oak, toyon (*Heteromeles arbutifolia*), coyote brush, Himalayan blackberries, and a variety of annual grasses such as wild oats, wild rye and foxtail barley.

Oak woodlands provide a diversity of wildlife habitat. Acorns are an essential food resource for many wildlife species including the western gray squirrel (*Sciurus griseus*), California ground squirrel, black-tailed deer (*Odocoileus hemionus*), deer mouse, dusky-footed woodrat (*Neotoma fuscipes*), acorn woodpecker (*Melanerpes formicivorus*), band-tailed pigeon (*Columba fasciata*), northern flicker (*Colaptes auratus*), and western scrub jay. The abundant insect life found in the bark and foliage of oaks provide food for bird species such as the white-breasted nuthatch (*Sitta carolinensis*), bushtit (*Psaltriparus minimus*), plain titmouse (Parus inornatus), and ash-throated flycatcher (*Myiarchus cinerascens*). Avian predators that nest and forage in oak woodland habitat include the great horned owl (*Bubo virginianus*), western screech-owl (*Otus kennicotti*), red-tailed hawk, and red-shouldered hawk (*Buteo lineatus*).

Common mammals in this habitat within the County include the raccoon, striped skunk, cottontail, and gray fox. A variety of woodpecker species nest in the cavities of oak trees, as

well as house wrens (*Troglodytes aedon*), western bluebirds (Sialia mexicana), and American kestrels (*Falco sparverius*) that use abandoned woodpecker cavities. Typical amphibian and reptile species found in this habitat include the California newt (*Taricha torosa*), ensatina (*Ensatina eschscholtzi*), California slender salamander (*Batrachoceps attenuatus*), sharp-tailed snake (*Contia tenuis*), ringneck snake (*Diadophis punctatus*), Pacific tree frog, western terrestrial garter snake (*Thamnophis elegans*), Gilbert's skink, western fence lizard, and southern alligator lizard. Special-status species using oak woodlands for foraging and/or nesting include Cooper's hawk (*Accipiter cooperii*), white-tailed kite, and loggerhead shrike.

Wetlands

Rivers, Creeks, and Canals

The County is bounded on the west by the Sacramento River, by the Feather River on the east, and is bisected on its north/south axis by the Sutter Bypass. These rivers, their tributaries (such as the Bear River and Butte Slough) and other waterways cover approximately 5,000 acres in the County, and are important to local wildlife, not only for the habitat they provide, but for the connectivity they create between otherwise isolated areas of wildlife habitat, acting as corridors through which wildlife species can migrate. Other major waterways include the Butte Slough, and the Cross Canal, but numerous tributaries and canals are present in the County as well. Special-status species that use rivers, creeks and canals in the County include Swainson's hawk, giant garter snake (*Thamnophis gigas*), herons and egrets, steelhead (*Oncorhynchus mykiss*), Chinook salmon (*Oncorhynchus tshawytscha*), Sacramento perch (*Archoplites interruptus*), and green sturgeon (*Acipenser medirostris*).

Freshwater Marsh

Freshwater marsh (or freshwater emergent wetland) habitat is typically associated with the margins of rivers, streams or ponds, but can form anywhere shallow, slow moving perennial water is present. Approximately 14,000 acres of this habitat occurs in the County, with the largest concentration occurring in the Butte Sink northwest of the Sutter Buttes. Additional extensive freshwater marsh areas occur along the Sutter Bypass, with many smaller areas along the Sacramento, Feather and Bear Rivers, and along the many canals associated with rice farming. Plant species common to freshwater marsh habitats in the County include cattails (*Typha latifolia*), tule (*Scirpus californicus*), sedges and umbrella sedges, rushes, water primrose (*Ludwigia peploides*), water smartweed (*Polygonum amphibium*), parrot feather (*Myriophyllum aquaticum*), pennyroyal (*Mentha pulegium*), verbena (*Verbena litoralis*), common yellow monkey flower (*Mimulus guttatus*) and smooth cocklebur (*Xanthium strumarium*).

Freshwater marshes provide important breeding and foraging habitat for a wide variety of local wildlife such as herons and egrets, muskrats (*Ondatra zibethicus*), raccoon, red-winged blackbirds (*Agelaius phoenicus*) and a wide variety of waterfowl. Special-status species that use freshwater marsh habitats in the County include giant garter snake, northern harrier (*Circus*

cyaneus), tricolor blackbird (Agelaius tricolor), Sanford's arrowhead (*Sagittaria sanfordii*) and rose mallow (*Hibiscus lasiocarpus*).

Vernal Pools and Seasonal Wetlands

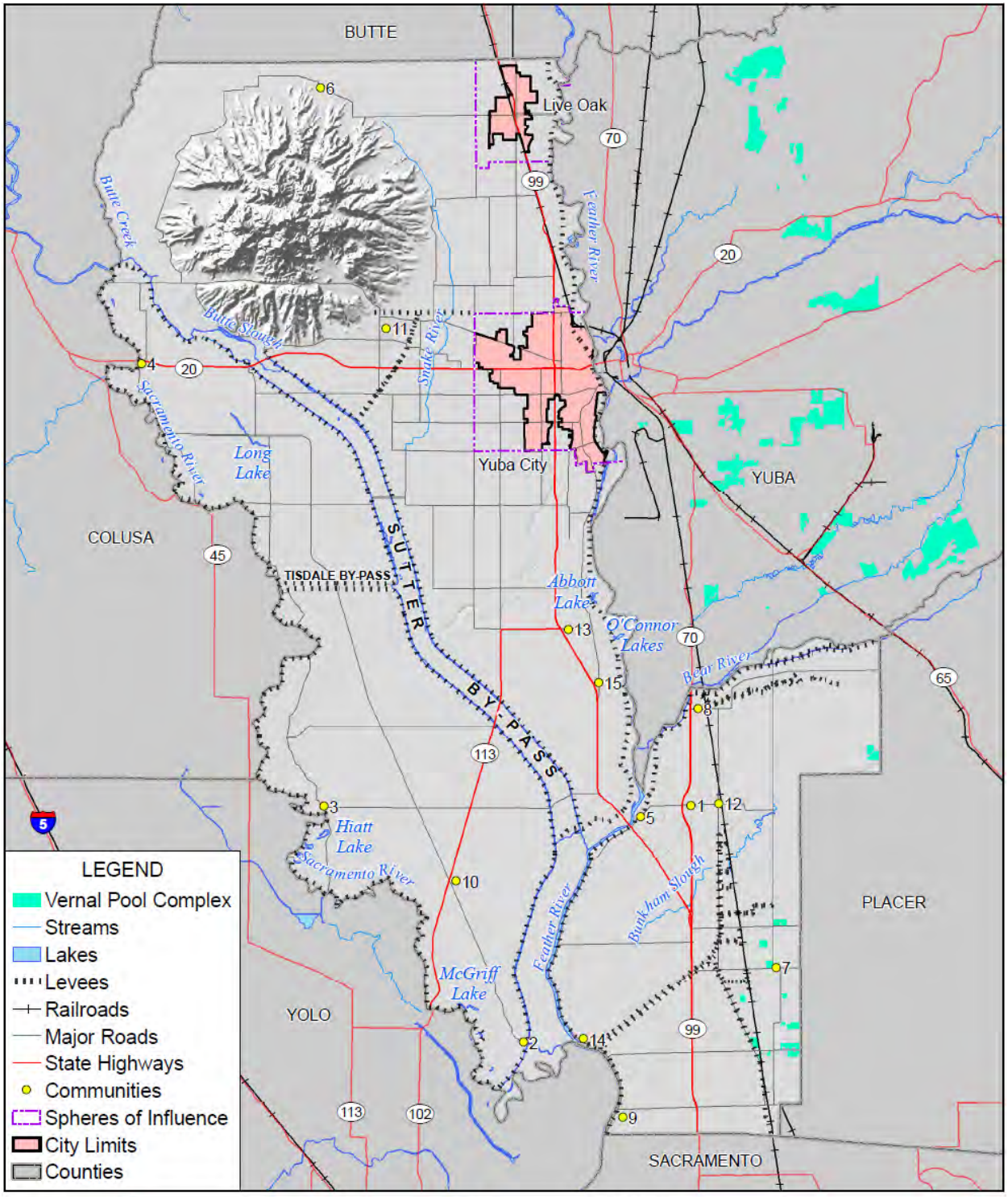
Grasslands throughout much of the County had historically supported vernal pools and seasonal wetlands. However, much of this habitat has been lost with conversion of grasslands to agriculture and urban development. Approximately 680 acres of this habitat remain in the County. The greatest remaining concentration of vernal pool and seasonal wetland habitat is in the vicinity of the Sutter Buttes, and in upland areas near the Sacramento and Feather Rivers.

Vernal pools are ephemeral wetlands that form in shallow depressions underlain by a substrate near the surface that restricts the percolation of water. These depressions fill with rainwater during the fall and winter and can remain inundated until spring or early summer, sometimes filling and emptying numerous times during the rainy season. A flowering community, dominated by characteristic wetland plants, differentiates vernal pools from other seasonal wetlands. Vernal pool plant species likely to occur within the County include the winged waterstarwort (*Callitriche marginata*), annual hairgrass (*Deschampsia danthonioides*), horned downingia (*Downingia ornatissima*), coyote thistle (*Eryngium vaseyi*), bractless hedge-hyssop (*Gratiola ebracteata*), slender popcorn flower (*Plagiobothrys stipitatus*), spine-fruit butter-cup (*Ranunculus bonariensis*), and purslane speedwell (*Veronica peregrina*).

Seasonal wetlands are distinguished from vernal pools in that they may not be inundated for as long as vernal pools and generally contain a greater abundance of facultative plant species usually found in wetlands, (but that can frequently be found in uplands) and grassy species, and few, if any vernal pool endemic species (i.e., species found only in vernal pools). The distinction between the two types is often unclear; the final determination of the type of wetland can often be dependent upon the verification of the U.S. Army Corps of Engineers (Corps). The extent to which special-status plant and animal species can use these habitats also varies, but, conservatively, any species present in vernal pools could also be present in seasonal wetlands. Both vernal pools and seasonal wetlands provide habitat for a number of plant and animal species listed as threatened or endangered, or that have other special status that requires their protection. The most well known are the vernal pool crustaceans, such as vernal pool fairy shrimp (*Branchinecta lynchi*) and vernal pool tadpole shrimp (*Lepidurus packardi*), along with a variety of plant species characteristically occurring in vernal pools.

There are 680 acres of vernal pools in the County. Vernal pools in the County are shown in Figure 4.64.

Figure 4.64. Sutter County Planning Area – Vernal Pools



Natural and Beneficial Functions

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 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 wetlands during all parts of their lifecycle for food, overwintering, and reproductive habitat. Other species use wetlands for one or two specific functions or parts of the lifecycle, most commonly for food resources. In addition, wetlands 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.

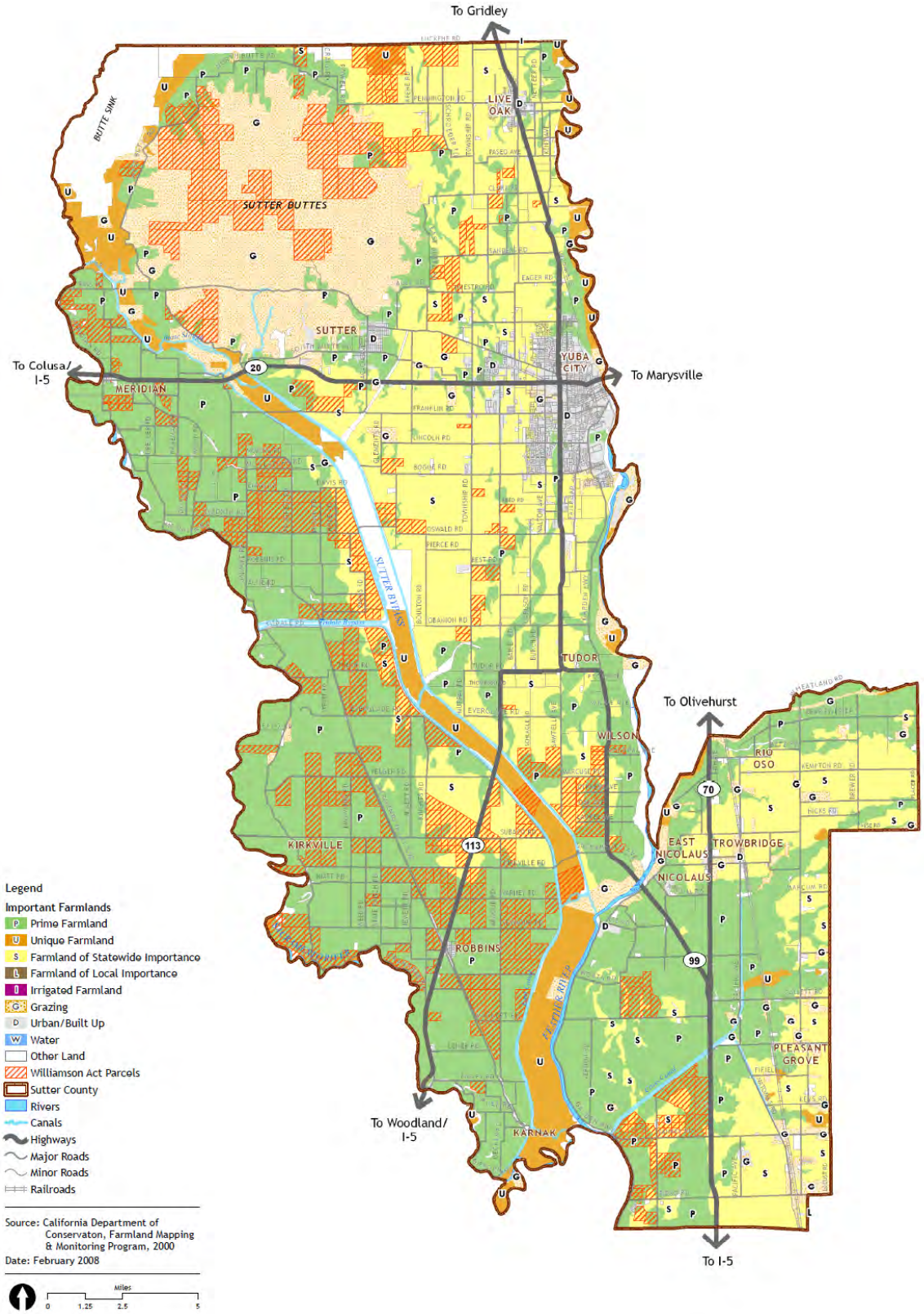
Agriculture

Sutter County is located within the northern portion of California's Central Valley in the area known as the Sacramento Valley. It contains some of the richest soils in the State. These soils, season, make the County's agricultural resources very productive. Sutter County is one of California's leading agricultural counties, with 83 percent of the County's total land acreage currently being used for agricultural purposes. The County has continued to stay predominantly agricultural, unlike other historically agricultural counties such as Fresno, Tulare, Monterey, and Kern. Agricultural use in those counties has dramatically decreased. Even though agricultural production is dependent on weather and economic market fluctuations, local agricultural market revenues continue to rise in Sutter County (See Table 4.27 in Section 4.2.13).

Approximately 13 percent of the farms in the county are 500 acres or larger; however, this small percentage of farms controls over 68 percent of the total farm acres in the county. While the total number of smaller farms up to 100 acres in size is greater than the number of the larger farms, these small farms only control approximately six percent of the farming acreage in the county.

Federal programs continue to preserve important and valuable agricultural land in Sutter County through the Williamson Act. As of December 31, 2007, the County had 64,302 acres protected as agricultural land under the Williamson Act. This program gives agricultural producers tax incentives to place the land in 10-year contracts to prevent development during the term of the contract. Sutter County also has 36 Organic Registered Producers that cover both intensive and extensive agriculture uses. See Figure 4.65 for the locations of Williamson Act lands within the County.

Figure 4.65. Important Farmlands and Williamson Tract Lands in Sutter County



Source: Sutter County General Plan Technical Background Report

Other Natural Resources

Sutter County, in collaboration with Yuba County, is in the process of developing a Habitat Conservation Plan for the region. This plan would provide an inventory of other important natural resources in the area when it is completed. Until it is completed, Sutter County, Yuba City, and the City of Live Oak identify additional assets of value within the County on their websites. These assets are described below.

Sutter Buttes –The Sutter Buttes are the remains of an extinct volcano which erupted between 1.6 and 1.3 million years ago. It is estimated that the Sutter Buttes were formed 1.5 million years ago. The highest point of the Buttes is 2,132 feet above mean sea level. The range is circular with a diameter of 10 miles and covers an area of approximately 75 square miles. The Buttes consist of a central volcanic core of andesite porphyry and tuff surrounded by a ring of sediments, and these sediments are embraced in turn by a ring of andesite tuff and braccia which extends to the Valley alluvium. The volcanic activity that created the Sutter Buttes appears to have occurred in the Early to Middle Pleistocene (between 2.4 and 1.6 million years ago) and the youngest volcanic domes were emplaced by 1.6 to 1.4 million years ago.

The Buttes played an important part in the lives of the Maidu Indians, who lived in villages within site of the Buttes. They believed that their spirits went there after death (City of Yuba City 2002).

The Sutter Buttes are currently a privately-owned natural area in the county. Public access to the Buttes is provided through guided tours and hikes provided by the Middle Mountain Foundation in coordination with the Buttes land owner.

Sutter Wildlife Reserve – Wildlife reserve located six miles southwest of Yuba City on Oswald Road off of Highway 99 (City of Yuba City 2004).

Bicentennial Living Witness Tree – A valley oak (*Quercus lobata*) located off of Highway 99 in Live Oak that has been identified as being over 200 years old. The tree was dedicated on April 28, 1989, National Arbor Day, as being a Bicentennial Living Witness Tree. It is one of 35 tree identified nationwide (City of Yuba City 2002).

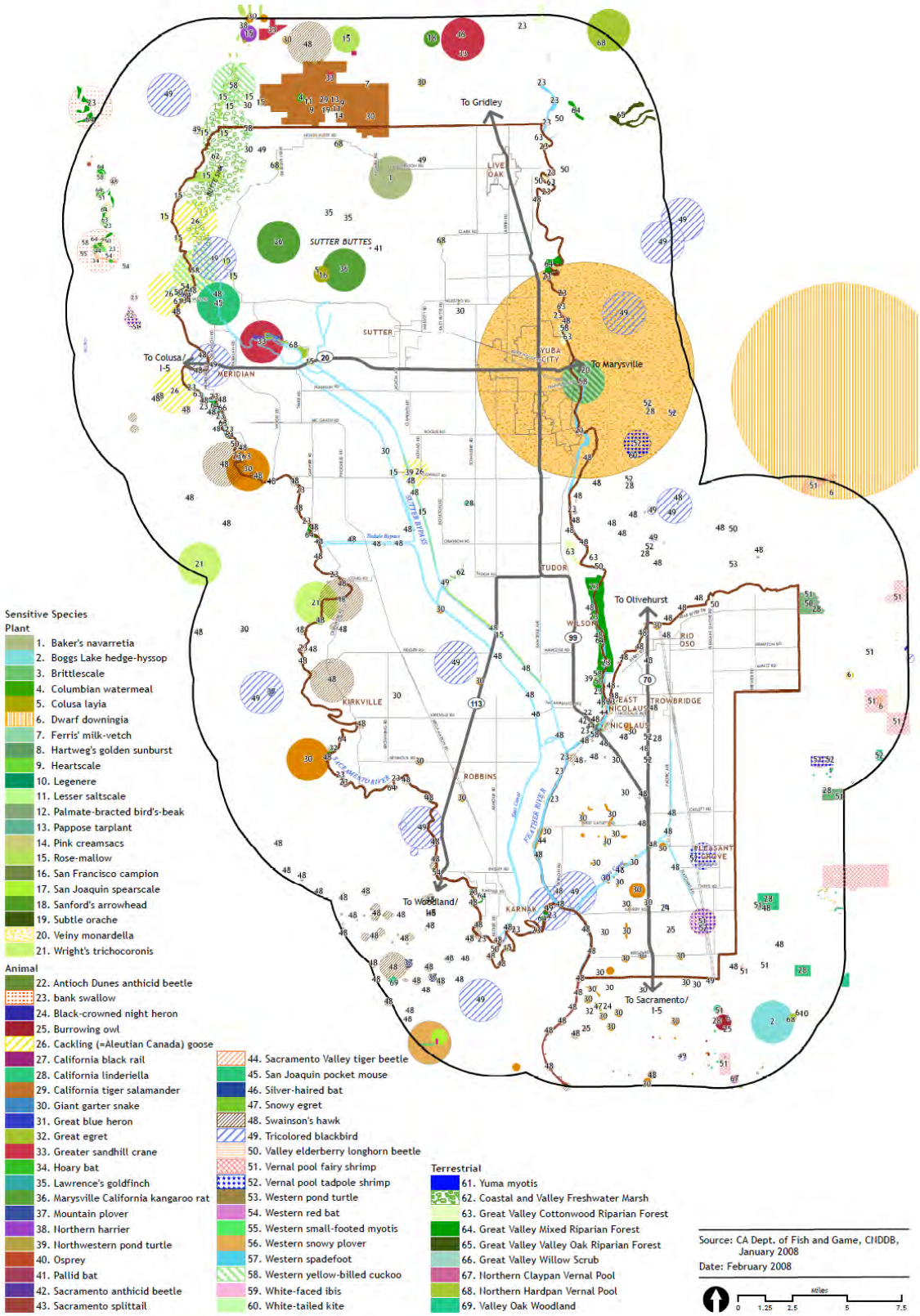
Special Status Species

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. The Fish and Game Department maintains a list of threatened and endangered species in California. State and federal laws protect the habitat of these species through the environmental review process. Several additional species are of special concern or candidates to make the protected list. The Department's classification scheme is defined as follows:

- A species is a candidate when the Fish and Game Commission has formally noticed it as being under review by the Department to determine whether listing as threatened or endangered is warranted, or when it is the subject of a proposed rulemaking by the Commission to list as threatened or endangered.
- A species is threatened when although not presently threatened with extinction, it is likely to become an endangered species in the foreseeable future in the absence of special protection and management efforts.
- A species is endangered when it is in serious danger of becoming extinct throughout all, or a significant portion of, its range due to one or more causes, including loss of habitat, change of habitat, overexploitation, predation, competition or disease.

Figure 4.66 shows the location of special status species in Sutter County. Table 4.40 summarizes Sutter's special status animal species.

Figure 4.66. Special Status Species Location in Sutter County



Source: Sutter County General Plan Technical Background Report

Table 4.40. Sutter County Planning Area - Federally and State Listed Species with Potential to Occur

Scientific Name	Common Name	Status* Fed/State/Other	Habitat
Plants			
Astragalus tener var. ferrisiae	Ferris' milk-vetch	--/--/1B	Found on subalkaline flats in vernally mesic meadows and seeps, and Valley and foothill grasslands.
Centromadia parryi ssp. rudis	Parry's red tarplant	--/--/4	Occurs in alkaline, vernally mesic, seeps and vernal pools in valley and foothill grassland Occasionally found along
Hesperevax caulescens	Hogwallow starfish	--/--/4	Shallow vernal pools in valley and foothill grassland, usually on mesic, clay soils.
Hibiscus lasiocarpus	Rose mallow	--/--/2	Freshwater marshes and swamps in the Central Valley.
Layia septentrionalis	Colusa layia	--/--/1B	Chaparral, Cismontane woodland, valley and foothill grassland, usually on sandy, serpentinite soils.
Microseris sylvatica	Sylvan microseris	--/--/4	Occurs in chaparral, cismontane woodland, Great Basin scrub, pinyon and juniper woodland, and valley and foothill grassland. Usually on serpentinite soils.
Navarretia cotulifolia	Cotula navarretia	--/--/4	Occurs in chaparral, cismontane woodland, valley and foothill grassland, frequently on adobe soils.
Navarretia leucocephala ssp. bakeri	Baker's navarretia	--/--/4	Occurs in vernal pools in cismontane woodland, lower montane coniferous forest, meadows and seeps, and mesic valley and foothill grassland.
Navarretia nigelliformis ssp. nigelliformis	Adobe navarretia	--/--/1B	Occurs in vernal pools in vernally mesic valley and foothill grasslands. Occasionally associated with either clay or serpentinite soils.
Sagittaria sanfordii	Sanford's arrowhead	--/--/1 B	Marshes and swamps (assorted shallow fresh water)
Silene verecunda ssp. verecunda	San Francisco campion	--/--/1B	On sandy soils in coastal bluff scrub, chaparral, coastal prairie, coastal scrub, and valley and foothill grasslands.
Invertebrates			
Branchinecta lynchi	Vernal pool fairy shrimp	T/--	Vernal pools and seasonal wetlands in grassland habitats.
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	T/--	Elderberry shrubs, typically in or near riparian areas.
Lepidurus packardi	Vernal pool tadpole shrimp	E/--	Vernal pools and seasonal wetlands in grassland habitats.
Linderiella occidentalis	California linderiella	FSC/--	Vernal pools and seasonal wetlands in grassland habitats.
Fish			
Acipenser medirostris	Green sturgeon	(T) (NMFS)	Pacific Ocean, and large rivers from San Francisco Bay north.

Scientific Name	Common Name	Status* Fed/State/Other	Habitat
Archoplites interruptus	Sacramento Perch	--/CSC	Remnant native populations may occur in the Sacramento, Feather and Bear Rivers. More abundant in areas where the species has been stocked in farm ponds and other water bodies free of introduced fishes.
Oncorhynchus mykiss	Central Valley steelhead Critical habitat, Central Valley steelhead	(T) (NMFS) (NMFS)	Includes all naturally spawning populations of steelhead in the Sacramento and San Joaquin Rivers and their tributaries. Spawns in relatively silt free gravel beds in upstream portions of rivers.
Oncorhynchus tshawytscha	Central Valley spring-run Chinook salmon Critical Habitat, CentralValley spring-run Chinook Winter-run Chinook salmon, Sacramento River Critical habitat, winter-run Chinook salmon	(T) (NMFS) (NMFS) (NMFS) (E) (NMFS)	Migrate to spawning habitats (relatively silt free gravel beds) in upstream portions of the Sacramento and San Joaquin rivers from October through April, with peak migration occurring in December.
Amphibians			
Ambystoma californiense	California tiger salamander, central population (T)	FT/CSC/none	Valley and foothill grasslands and adjacent oak woodlands; shelters in rodent burrows and breeds in seasonal wetlands such as vernal pools.
Rana aurora draytonii	California red-legged frog (T)	FT/CSC/none	Creeks and streams with deep pools and dense bank vegetation; presence of adjacent woodlands and grasslands important.
Spea hammondii	Western spadefoot	--/CSC	Breeds in seasonal wetlands and large vernal pools, spends most of the year underground in adjacent upland areas.
Reptiles			
Actinemys marmorata	Western pond turtle	FSC/CSC	Ponds, streams, rivers, marshes and canals with suitable basking sites and vegetative cover. Nests and aestivates (i.e., hibernate) in adjacent uplands.
Phrynosoma coronatum frontale	California horned lizard	FSC/CSC/none	Annual grassland, chaparral, saltbush scrub, alkali flats, oak woodland, riparian woodland, and coniferous forest; open habitats with loose fine (often sandy) soils

Scientific Name	Common Name	Status* Fed/State/Other	Habitat
Thamnophis gigas	Giant garter snake	T/T/--	Historically occurred in cattail and tule marshes on the Central Valley floor. Has since adapted to a variety of artificial drainages, particularly those associated with rice farming. Requires open water supporting fish and/or amphibian prey, with vegetative cover in the water and on the banks. Also requires adjacent uplands for aestivation(i.e., hibernate). Does not occur in major rivers.
Birds			
Accipiter cooperii	Cooper's hawk	--/CSC (Nesting)	Nests and forages in woodland habitats.
Accipiter striatus	Sharp-shinned hawk	--/CSC (Nesting)	Nests in forests; forages in wooded habitats.
Agelaius tricolor	Tricolor blackbird	FSC/CSC	Nests in dense stands of cattails, thickets of willows, blackberries, or tall herbs adjacent to open grasslands.
Aquila chrysaetos	*Golden eagle*	FP/CSC	Nests on cliffs and very large trees. Forages primarily in grasslands and chaparral, but also woodlands and other relatively open habitats.
Asio otus	Long-eared owl	--/CSC (Nesting)	Nests and forages in oak and riparian woodlands
Athene cunicularia	Burrowing owl	--/CSC (Nesting)	Grassland, deserts and other open habitats. Requires ground squirrel or other small mammal burrows for nesting.
Buteo regalis	Ferruginous hawk	FSC/CSC	Forages in open grasslands and chaparral. Not known to nest in California
Buteo swainsoni	Swainson's hawk	--/T	Nests in riparian trees; forages in open grasslands and agricultural fields
Circus cyaneus	Northern harrier	--/CSC	Nests in freshwater marsh and agricultural fields; forages in marshes, grasslands and agricultural fields
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	FC/CSC/none	Occurs in extensive riparian woodlands with clearings and a dense shrub layer. Often found in woodlands near streams, rivers or lakes.
Elanus leucurus	White-tailed kite	CSC (Nesting)	Nests colonially in large trees adjacent to open grasslands for foraging.
Eremophila alpestris	Horned lark	--/CSC	Forages and nests in open grasslands
Lanius ludovicianus	Loggerhead shrike	--/CSC	Nests in woodlands adjacent to grassland foraging habitat
Mammals			
Antrozous pallida	Pallid bat	FSC/CSC/ none	Roosts in crevices in caves, mines, large rock outcrops, under bridges and in abandoned buildings. Forages on or near the ground in a wide variety of open habitats.
Corynorhinus townsendii townsendii	Pacific western big eared bat	FSC/CSC/none	Roosts in the open in large caves, abandoned mines and buildings. Very sensitive to roost disturbance
Myotis ciliolabrum	Small-footed myotis bat	FSC/CSC/none	Occurs in most of California except the coastal redwood region; roosts in buildings, trees, and crevices in cliffs

Scientific Name	Common Name	Status* Fed/State/Other	Habitat
Myotis volans	Long-legged myotis bat	FSC/CSC/ none	Roosts in crevices in caves, mines, large rock outcrops, under bridges and in abandoned buildings. Forages in a wide variety of open habitats, frequently over water.
Myotis yumanensis	Yuma myotis bat	FSC/CSC/none	Common along wooded canyon bottoms throughout California; roosts in buildings, large trees with hollows, and crevices in cliffs
Perognathus inornatus	San Joaquin pocket mouse	FSC/CSC/none	Open grasslands, preferably (but not restricted to) areas with friable soils.

Source: Sutter County General Plan Technical Background Report
*Status of species relative to the Federal and California State Endangered Species Acts and Fish and Game Code of California.
California Native Plant Society (CNPS).
1B = Defined as plants that are rare, threatened or endangered in California and elsewhere.
2 = Defined as plants that are rare, threatened or endangered in California, but are more common elsewhere.
4 = Plants of Limited Distribution - A Watch List.
Fed = Federal status.
E = Federally listed as endangered.
T = Federally listed as threatened.
PE = Proposed endangered.
PT = Proposed threatened.
FC = Federal candidate for listing as threatened or endangered.
FSC = Federal species of concern.
CA = California status.
E = Endangered; Species whose continued existence in California is jeopardized.
T = Threatened; Species that although not presently threatened in California with extinction, is likely to become endangered in the foreseeable future.
CSC = California Department of Fish and Game "Species of Special Concern". Species with declining populations in California.
FP = Fully protected against take pursuant to the Fish and Game Code Section 3503.5.
-- = No California or federal status.

Growth and Development Trends

As part of the planning process, the HMPC looked at changes in growth and development, both past and future, and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability. Information from the Sutter County Housing Element and the California Department of Finance form the basis of this discussion. More specific information on growth and development for each participating jurisdiction can be found in the jurisdictional annexes.

Current Status and Past Development

The California Department of Finance estimated population of Sutter County for January 1, 2012 was 95,351, representing a five-fold increase from just under 19,000 people in 1940. Table 4.41 and Table 4.42 illustrate the pace of population growth in Sutter County dating back to 1940 along with more recent population trends for each jurisdiction.

Table 4.41. Sutter County Planning Area - Historical Population

	1940	1950	1960	1970	1980	1990	2000	2010	2012
Population	18,680	25,200	33,700	41,935	52,600	64,800	79,499	94,669	95,351

Source: California Department of Finance

Table 4.42. Sutter County Planning Area - Population Growth for Jurisdictions 2005-2013

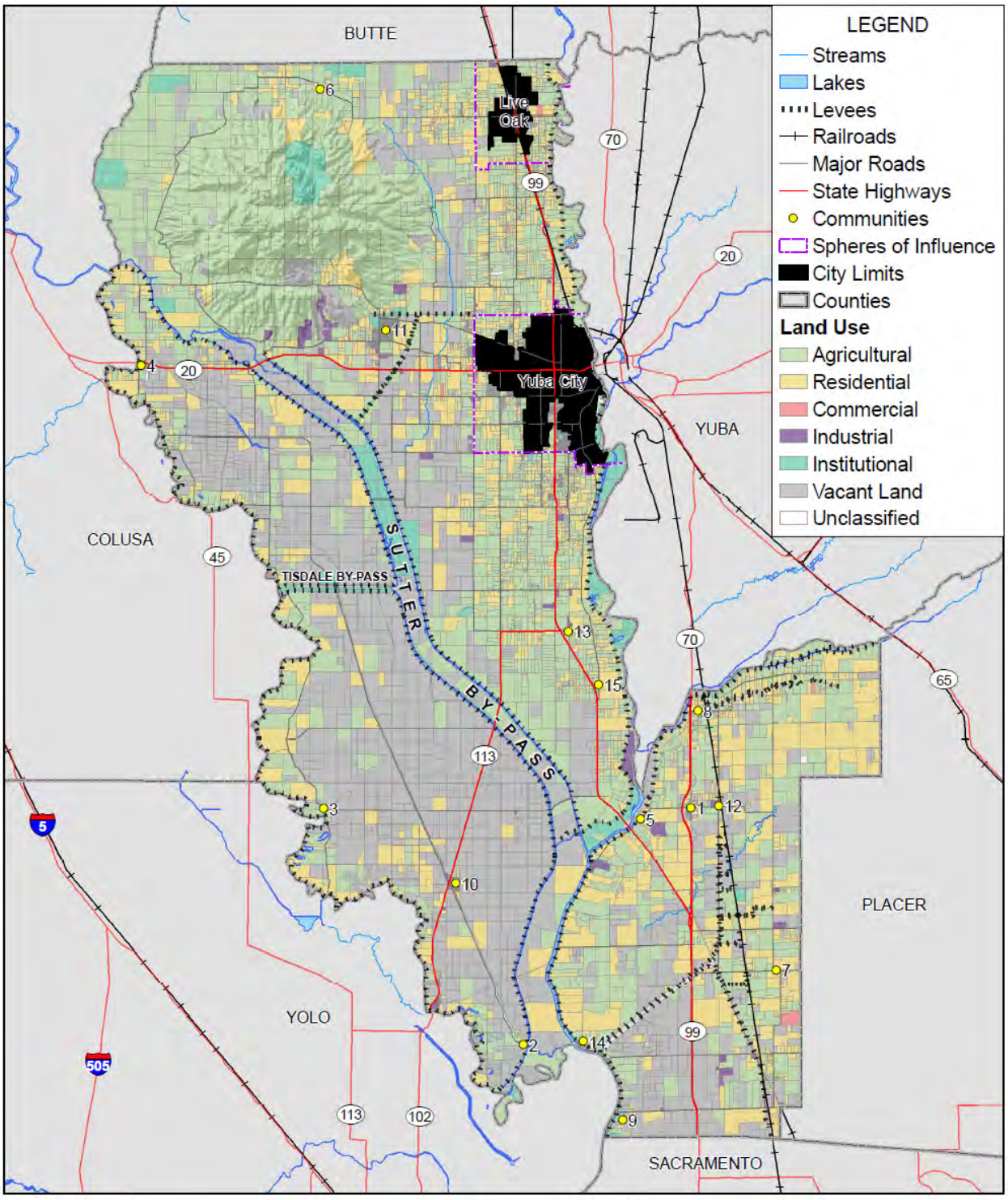
Jurisdiction	2005	2006	2007	2008	2009	2010	2011	2012	2013
Live Oak	6,603	7,266	7,890	8,255	8,355	8,422	8,446	8,252	8,341
Yuba City	57,975	60,197	61,835	62,974	64,042	64,818	64,792	65,336	65,841
Unincorporated	22,519	21,901	21,838	21,754	21,521	21,525	21,382	21,531	21,669
Total	**89,102**	**91,370**	**93,570**	**94,991**	**95,927**	**96,775**	**94,620**	**95,119**	**95,851**

Source: State of California Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State.
Note: Population reports and estimates are for January 1 of each year.

Current Land Use/Zoning

Future land use and growth management strategies in Sutter County aim to concentrate future development into and toward existing communities through various policies relating to zoning and minimum development standards and requirements. Zoning designations prescribe allowed land uses and minimum lot sizes for the purpose of supporting efficient infrastructure design, conservation of natural resources, and to avoid conflicting uses. Figure 4.67 shows current land use designations in unincorporated Sutter County.

Figure 4.67. Unincorporated Sutter County - Land Use Diagram



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS

Development since 2007 Plan

For new development within the unincorporated County's Special Flood Hazard Area (i.e. 100 year floodplain), the breakdown for the past five years is as follows:

- Residential – 23 new structures, 1 in an AE zone, 22 in A zones
- Wet Floodproofed Agricultural structures (barns) – 33 new structures, 5 in AE zones, 28 in A zones
- Commercial – 8 new structures, all in A zones
- Dry Floodproofed (Fuel Enclosure) – 1 new structure in an A zone

All residential and commercial structures were elevated. The 33 new agricultural structures were wet floodproofed, meaning that they were not elevated. Rather, they were built of flood damage resistant materials, utilities protected, anchored to withstand lateral and buoyancy forces, and equipped with flood vents (all in accordance with FEMA Technical Bulletin 7-93). Every structure within a floodplain in Sutter County is protected by a levee; however, the levees are not accredited.

Future Development

As indicated in the previous section, Sutter County has been steadily growing over the last seven decades. Long term forecasts by the California Department of Finance project population growth in Sutter County continuing through the middle of the century, effectively adding 168.5% to the 2010 county population by the year 2060. Table 4.43 shows the population projections for the County as a whole through 2060. Information on future development in the incorporated jurisdictions can found in their respective annexes to this plan.

Table 4.43. Sutter County Planning Area - Population Projections 2010-2060

2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
94,669	98,833	108,939	119,413	133,010	151,452	172,475	191,445	212,161	233,552	254,783

Source: California Department of Finance P-1 Projections - 2010 to 2060 in 5-year Increments

Future Growth Areas

New Growth Areas

There are two areas in the County that are intended for development under a Specific Plan. A "Specific Plan" is defined in the California Government Code (Section 65450 et seq) as a legal tool for detailed design and implementation of a defined portion of the area covered by a General Plan. A Specific Plan includes detailed regulations, conditions, programs, and/or proposed legislation that are needed to implement General Plan designations and policies on a particular site. These two specific plan areas are:

- Lincoln East Specific Plan

- Most of the County is of a rural, agricultural nature, so large-scale development projects are rarely outside of the Yuba City and Live Oak City limits. However, such projects are anticipated to occur within the cities' spheres of influence in the future. Until these areas are annexed into the cities, they remain under the jurisdiction of the County. The Lincoln East Specific Plan is in the process of being prepared by the City of Yuba City, which would include the annexation and development of approximately 1,160 acres of unincorporated county land located adjacent to the City's southwest boundary. The Specific Plan area is bound by Franklin Road to the north; George Washington Boulevard to the west; Bogue Road to the south; and Sanborne Road, Cherry Street, and Harding Road to the west (see Figure 4.68). The plan includes primarily single family residential uses and some medium to high density residential use, along with parks, schools, public facilities, and neighborhood-serving commercial uses (see Figure 4.69).

Figure 4.68. Lincoln East Specific Plan Location

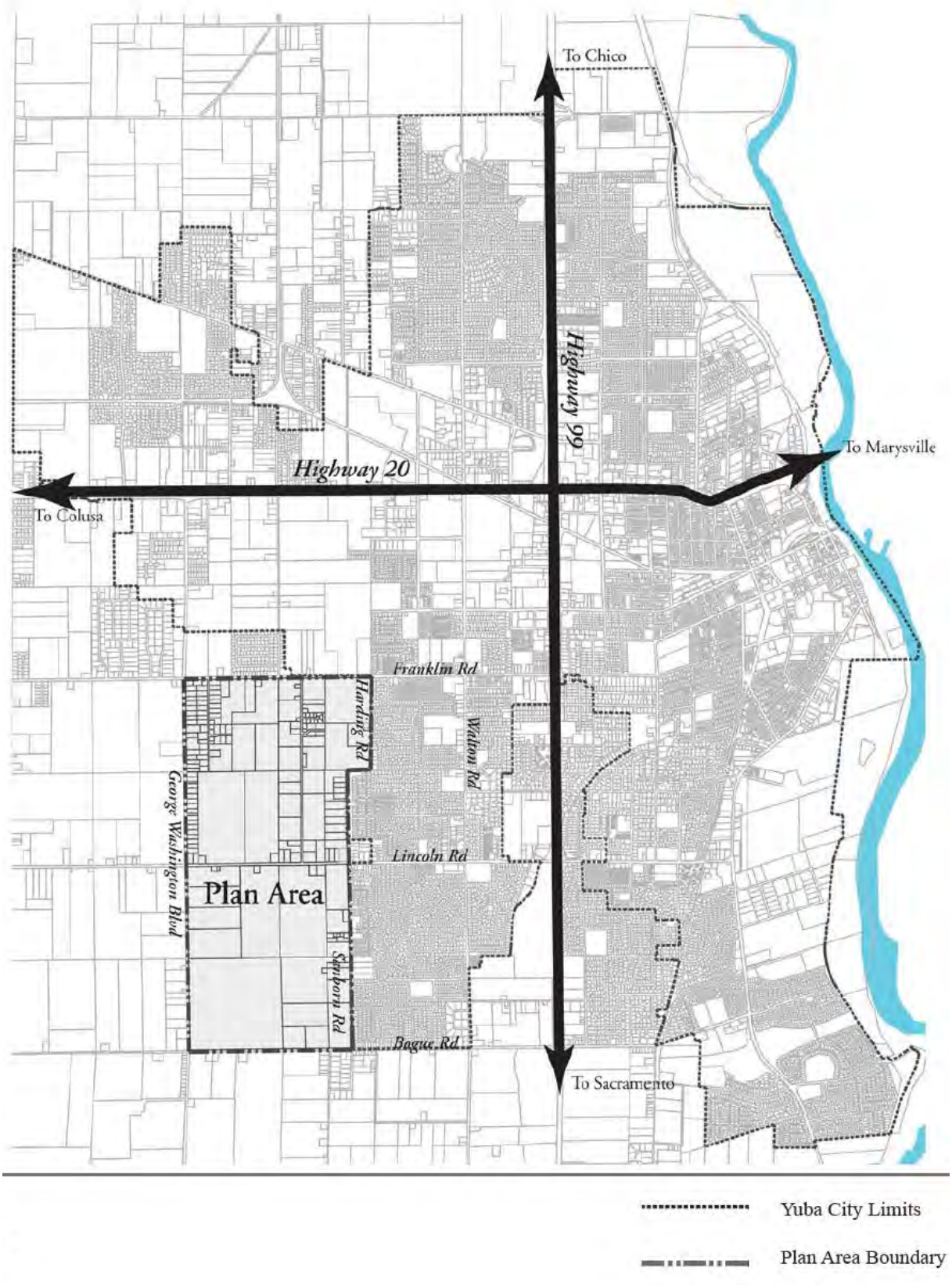
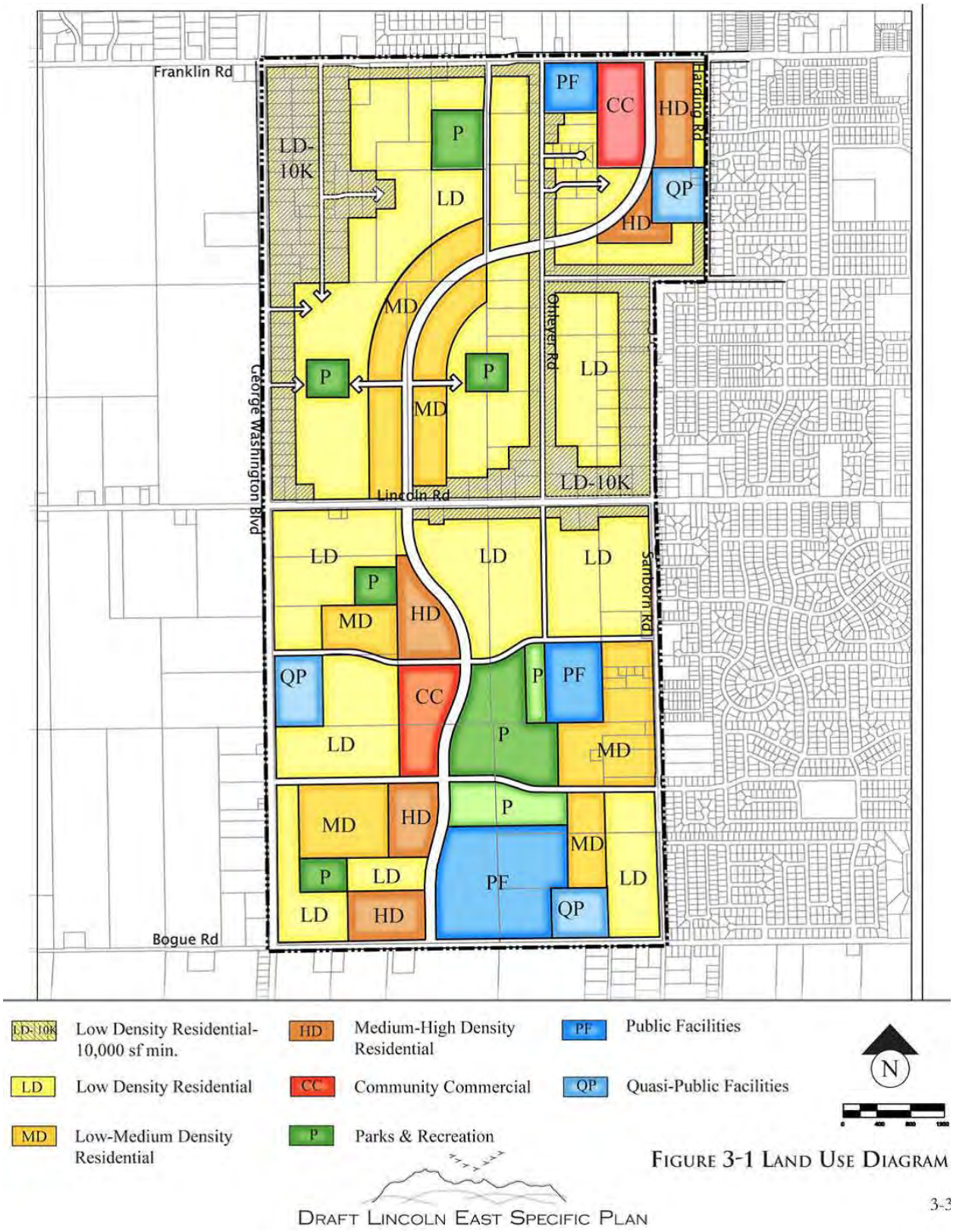
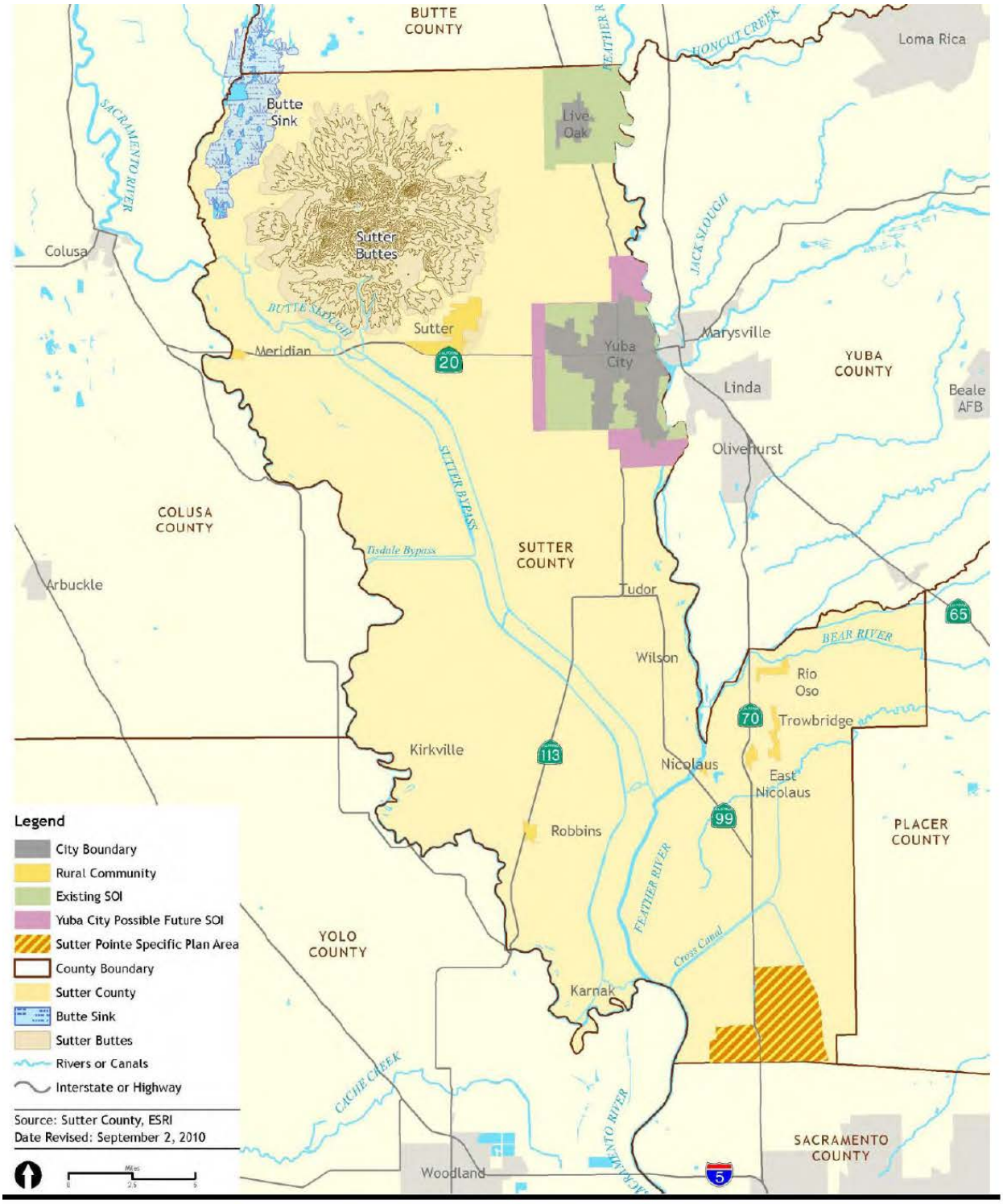


Figure 4.69. Lincoln East Specific Plan Land Use Diagram



- Sutter Pointe Specific Plan
  - The Sutter Pointe Specific Plan is a large-scale development project that is currently on file with, and being processed by, Sutter County. This plan area is located in the southernmost portion of the County adjacent to the Sacramento County line and a portion of the Placer County line (see Figure 4.69), within the Industrial/Commercial Reserve (I/C) area designated under the 1996 General Plan. The plan area includes the development of approximately 7,500 acres. This plan is the result of the approval of Measure M in 2004, an advisory ballot measure approved by Sutter County voters. In an attempt to attract new employers to the County to provide jobs, industry, commerce, education, housing, recreation, and open space are included in the proposal. The plan includes a maximum of 3,600 acres of commercial and industrial parks; a minimum of 1,000 acres for schools, parks, open space, libraries, and other community facilities; and 2,900 acres or less of residential uses, as well as all necessary infrastructure and public service facilities necessary to serve the plan area. At full buildout, the Sutter Pointe Specific Plan area is planned to contain up to 1,461 low density, 12,014 medium density, and 3,426 high density residential units. It will also contain 2,632,000 square feet of Employment 1, 6,225,000 square feet of Employment 1 Interim Flood Zone, 36,408,000 of Employment 2, 1,940,000 square feet of Commercial Retail, and 2,501,000 square of Mixed Use, along with 414.3 acres of Industrial Drainage Basin, 431.9 acres of Parks, 394.8 acres of Open Space, and 174.6 acres of Schools.

Figure 4.70. Sutter Point Specific Plan Location



Future Development GIS Analysis

Future development areas and General Plan diagrams were provided by Sutter County and the cities of Live Oak and Yuba City. Each community had unique future development areas as well as general plan land classifications. Analysis was performed by intersecting parcel centroids first with the future development areas and then with the general plan diagram land classifications to provide a parcel level analysis of future development areas for each of the three communities. Where one future development area overlaps into another, such as the Lincoln East area with the sphere of influence (SOI) area, the parcels are allocated to the Lincoln East Area and are subtracted out from the SOI total area to avoid double counting issues. See Table 4.44 for an inventory of total parcels by general plan land use classifications detailing each communities' future development areas.

Table 4.44. Sutter County Future Development Total Exposure

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Sutter County						
Employment Corridors	Employment Corridors	61	50	$5,741,329	$7,348,351	$13,089,680
	Total	**61**	**50**	**$5,741,329**	**$7,348,351**	**$13,089,680**
Rural Community of Sutter	Agriculture (40 acre min)	51	43	$19,169,146	$6,411,835	$25,580,981
	Agriculture (80 acre min)	22	13	$1,107,517	$3,168,584	$4,276,101
	Agriculture Rural Community	2	2	$4,100	$264,220	$268,320
	Commercial	29	20	$2,006,763	$1,398,693	$3,405,456
	Estate Residential	129	110	$23,842,697	$7,410,925	$31,253,622
	Food Processing, Ag & Rec Combining District	23	10	$2,787,144	$4,463,941	$7,251,085
	Industrial	15	8	$2,699,971	$1,428,004	$4,127,975
	Low Density Residential	1,054	931	$80,132,295	$26,071,865	$106,204,160
	Parking	13	3	$2,241,653	$677,549	$2,919,202
	Ranchette Parcels	5	5	$1,454,021	$660,197	$2,114,218
	Total	**1,343**	**1,145**	**$135,445,307**	**$51,955,813**	**$187,401,120**

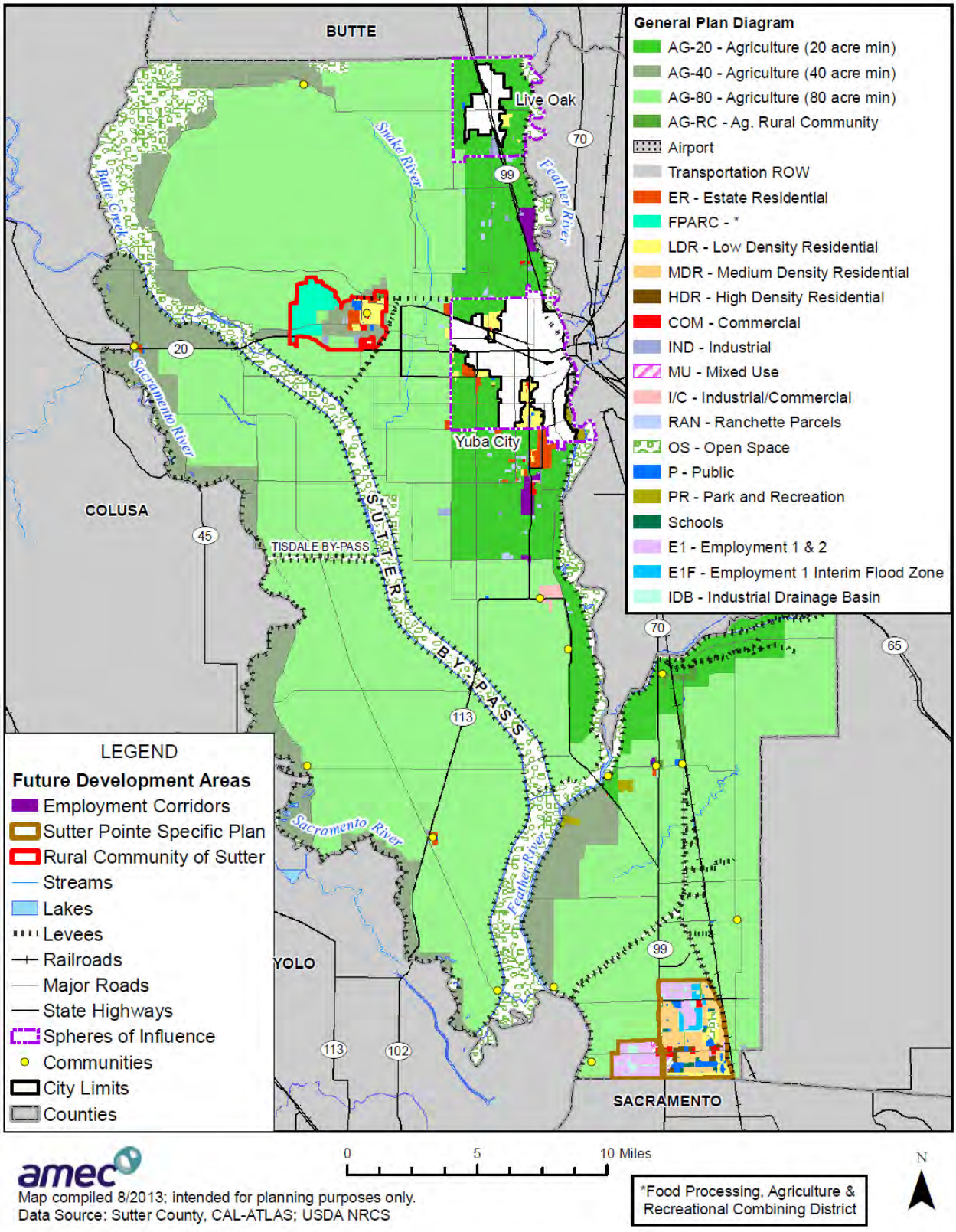
Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Sutter Pointe Specific Plan	Employment 1	1	0	$0	$189,317	$189,317
	Employment 1 Interim Flood Zone	6	4	$826,587	$778,006	$1,604,593
	Employment 2	24	10	$24,848,877	$19,311,120	$44,159,997
	Industrial Drainage Basin	5	2	$997,577	$3,803,733	$4,801,310
	Low Density Residential	5	0	$0	$2,751,273	$2,751,273
	Medium Density Residential	30	19	$1,792,530	$8,686,013	$10,478,543
	Mixed Use	2	0	$0	$1,983,063	$1,983,063
	Open Space	1	1	$33,000	$2,340,300	$2,373,300
	Parking	3	2	$59,826	$1,314,619	$1,374,445
	School	2	1	$2,264	$1,388,346	$1,390,610
	Transportation ROW	3	3	$602,807	$4,235,124	$4,837,931
	Total	**82**	**42**	**$29,163,468**	**$46,780,914**	**$75,944,382**
Sutter County Grand Total		**1,486**	**1,237**	**$170,350,104**	**$106,085,078**	**$276,435,182**
Live Oak City						
Annexations	Civic Center	1	1	$4,121	$377,238	$381,359
	Commercial Mixed Use	2	0	$0	$780,968	$780,968
	Community Commercial	1	0	$0	$798,000	$798,000
	Employment	10	5	$329,899	$1,100,096	$1,429,995
	Low-Density Residential	15	6	$415,793	$2,002,177	$2,417,970
	Medium-Density Residential	2	2	$65,000	$259,750	$324,750
	Neighborhood Center	1	0	$0	$1,099,991	$1,099,991
	Park	1	0	$0	$379,865	$379,865
	Smaller-Lot Residential	1	0	$0	$462,050	$462,050
	Total	**34**	**14**	**$814,813**	**$7,260,135**	**$8,074,948**

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Potential Rezone Sites	Commercial Mixed Use	6	2	$200,369	$403,301	$603,670
	Downtown Mixed Use	3	0	$0	$407,376	$407,376
	Higher-Density Residential	4	1	$50,961	$155,864	$206,825
	Low-Density Residential	6	1	$4,067	$841,137	$845,204
	Medium-Density Residential	4	0	$0	$327,108	$327,108
	Smaller-Lot Residential	210	1	$60,000	$3,232,883	$3,292,883
	Total	**233**	**5**	**$315,397**	**$5,367,669**	**$5,683,066**
Sphere Of Influence	Civic	28	14	$8,612,564	$1,555,999	$10,168,563
	Civic Center	4	3	$398,059	$932,603	$1,330,662
	Commercial Mixed Use	101	81	$10,240,515	$4,262,189	$14,502,704
	Community Commercial	4	3	$233,120	$290,942	$524,062
	Downtown Mixed Use	166	126	$14,726,207	$6,403,301	$21,129,508
	Employment	17	13	$1,621,657	$1,520,618	$3,142,275
	Higher-Density Residential	33	29	$9,541,618	$1,375,264	$10,916,882
	Low-Density Residential	1,002	876	$93,528,410	$29,516,781	$123,045,191
	Medium-Density Residential	102	91	$7,096,342	$2,796,734	$9,893,076
	Neighborhood Center	2	2	$82,025	$1,765,388	$1,847,413
	Park	7	2	$213,074	$1,167,912	$1,380,986
	Smaller-Lot Residential	1,135	1,102	$79,919,735	$28,081,473	$108,001,208
	Urban Reserve	292	205	$21,615,714	$21,111,088	$42,726,802
	Total	**2,893**	**2,547**	**$247,829,040**	**$100,780,292**	**$348,609,332**
Live Oak Grand Total		**3,160**	**2,566**	**$248,959,250**	**$113,408,096**	**$362,367,346**

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Yuba City						
Lincoln East Specific Plan	Low Density Residential	189	183	$32,075,183	$13,957,187	$46,032,370
	Medium/Low Density Residential	10	9	$4,019,669	$1,231,947	$5,251,616
	Neighborhood Commercial	1	1	$151,993	$52,412	$204,405
	Parks, Recreation & Open Space	4	4	$256,934	$582,585	$839,519
	Public & Semi-Public	2	2	$53,002	$254,908	$307,910
	Total	**206**	**199**	**$36,556,781**	**$16,079,039**	**$52,635,820**
Sphere Of Influence	Agricultural/Rural	1	0	$0	$7,358	$7,358
	Business, Technology & Light Industry	303	242	$76,064,042	$47,136,898	$123,200,940
	Community Commercial	453	402	$129,507,741	$73,906,289	$203,414,030
	Low Density Residential	17,307	16,851	$2,167,160,147	$597,513,435	$2,764,673,582
	Manufacturing, Processing & Warehousing	162	112	$75,094,098	$22,846,384	$97,940,482
	Medium/High Density Residential	837	795	$209,380,982	$44,596,582	$253,977,564
	Medium/Low Density Residential	1,104	1,012	$165,181,644	$46,090,434	$211,272,078
	Neighborhood Commercial	116	92	$21,209,479	$12,550,974	$33,760,453
	Office & Office Park	354	283	$229,538,926	$51,957,022	$281,495,948
	Parks, Recreation & Open Space	48	11	$1,939,868	$8,202,335	$10,142,203
	Public & Semi-Public	84	33	$58,679,106	$12,553,303	$71,232,409
	Regional Commercial	257	209	$226,802,376	$131,995,383	$358,797,759
	Total	**21,026**	**20,042**	**$3,360,558,409**	**$1,049,356,397**	**$4,409,914,806**
Yuba City Grand Total		**21,232**	**20,241**	**$3,397,115,190**	**$1,065,435,436**	**$4,462,550,626**

Source: Sutter County GIS

Figure 4.71. Sutter County Future Development



Redevelopment

There has not been a significant amount of re-development within Sutter County because of its extensive agricultural economy. All new development must follow the guidance of the Comprehensive Plan and must comply with all floodplain management regulations.

4.3.2 Sutter County Vulnerability to Specific Hazards

The Disaster Mitigation Act regulations require that the HMPC evaluate the risks associated with each of the hazards identified in the planning process. This section summarizes the possible impacts and quantifies, where data permits, the County's vulnerability to each of the hazards identified as a priority hazard in Section 4.2.18 Natural Hazards Summary. Although it is not considered a priority hazard for the Planning Area, due to its significance in the State of California as a whole, earthquakes are included in this vulnerability assessment. Where specific hazards vary across the County, additional information can be found in the jurisdictional annexes. The hazards evaluated further as part of this vulnerability assessment include:

- Dam Failure
- Drought and Water Shortage
- Earthquake
- Flood: 100/200/500-year
- Flood: Localized/Stormwater
- Levee Failure
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind
- Wildfire

An estimate of the vulnerability of the 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.

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 buildings 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 community facilities (e.g., a fire station), historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat). Together, this information conveys the impact, or vulnerability, of that area to that hazard.

The HMPC identified three hazards in the Planning Area for which specific geographical hazard areas have been defined and for which sufficient data exists to support a quantifiable vulnerability analysis. These three hazards are flood, levee failure, and wildfire. Because these hazards have discrete hazard risk areas, their risk varies by jurisdiction. For flood, levee failure, and wildfire, the HMPC inventoried the following for each community, to the extent possible, to quantify vulnerability in identified hazard areas:

- General hazard-related impacts, including impacts to life, safety, and health
- Values at risk (i.e., types, numbers, and value of land and improvements)
- Populations at risk (i.e, those residing in the hazard area base on land use and residential occupancy)
- Identification of critical facilities at risk
- Identification of cultural and natural resources at risk
- Overall Community impact
- Development trends within the identified hazard area

The HMPC used FEMA's loss estimation software, HAZUS-MH, to analyze the County's vulnerability to earthquakes.

- General hazard-related impacts, including impacts to life, safety, and health
- Values at risk (i.e., types, numbers, and value of land and improvements)
- Populations at risk (i.e, those residing in the hazard area base on land use and residential occupancy)
- Identification of critical facilities at risk

The vulnerability and potential impacts from priority hazards that do not have specific mapped areas or the data to support additional vulnerability analysis are discussed in more general terms.

4.3.3 Dam Failure Vulnerability Assessment

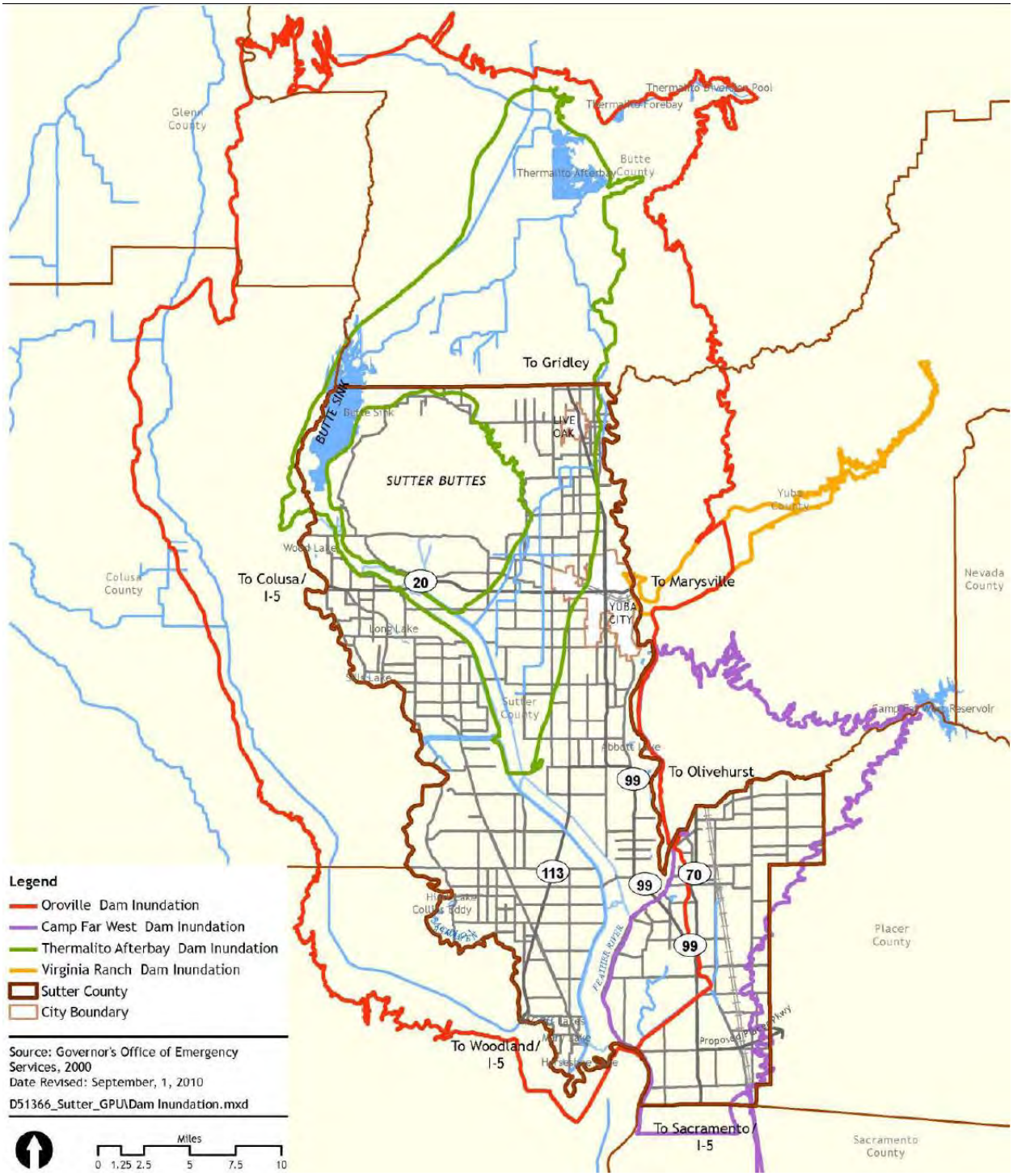
Likelihood of Future Occurrence—Unlikely
Vulnerability—Medium

Dam failure flooding can occur as the result of partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall, flooding, or earthquake. 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 confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility or critical infrastructure 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. Based on the risk assessment, it is apparent that a major dam failure could have a devastating impact on the Planning Area. Dam failure flooding presents a threat to life and property, including buildings, their contents, and their use (such as water treatment). Large flood events can affect crops and livestock as well as lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies.

According to the Sutter County EOP for floods and dam failure, of the ten dams with a potential to impact the Planning Area, four of these dams pose the greatest threat should a failure occur. These four dams are listed in Table 4.44 and their inundation areas are shown on Figure 4.71. The failure of any of these dams would flood downstream areas and would result in loss of life and property. According to the EOP, a catastrophic failure of any of these dams would have a significant impact on Sutter County. Complete devastation could occur in and along the river bottoms and up the banks several hundred feet above normal river levels at a point from the dams themselves down river to near the ocean where the rivers widen. Water levels could be many times higher than those recorded in the worst floods. The potential magnitude of a dam failure depends on the time of year and the base flow in the river when the failure occurs. During the winter months when the river flows are higher, the impact to the area would be much greater and evacuation times much less. Also included in the table is the estimated warning time from dam failure until the resulting floodwaters reach a significant area of the county.

Figure 4.72. Dam Inundation Areas in Sutter County



Source: Sutter County General Plan Public Health and Safety Element

Table 4.45. Major Dams with Potential to Significantly Impact the Sutter County Planning Area

Dam Name	River	Storage Capacity in Acre-Feet	Warning Time
Shasta	Sacramento	4,552,000	100 hours
Oroville	Feather	3,538,000	9 hours
Bullards Bar	Yuba	966,103	1 hour
Camp Far West	Bear	104,000	1 hour

Source: Sutter County Operational EOP, 2006; DWR

According to the EOP, these dams would have the greatest impact on the population of the Sutter County Planning Area should they fail. The following sections provide details of inundation areas and times in the event of a failure of these dams. This information is taken directly from the EOP as obtained from the Emergency Action Plan (EAP) on file for the respective dam facilities.

Shasta Dam Failure

Information taken from the EAP on file for Shasta Dam describes the potential impacts as a result of a failure of the Shasta Dam facilities (shown in Table 4.45). This includes Keswick and Spring Creek Dams. This information is extrapolated from inundation scenarios and maps provided by USBR.

Table 4.46. Estimated Flood Arrival Times for Shasta Dam Failure

Location	Main Channel Flood Wave	Total Inundation Time
City of Yuba City	N/A	Approx. 135 hours
Town of Meridian	Approx 100 hours	Approx. 115 hours
Town of Robbins	N/A	Approx. 147 hours

Source: Sutter County Operational EOP, 2006; DWR

Affected Areas: Sutter County, City of Yuba City, Town of Meridian, Town of Robbins

Oroville Dam Failure

The Oroville Dam facilities include Thermalito Diversion, Forebay, Afterbay and Lake Almanor Dams (shown in Table 4.46). Failures of Thermalito Diversion and Forebay Dams individually would have negligible affects due to low amounts of storage capacity (shown in Table 4.47). Thermalito Diversion Dam failure would cause increased flows to the convergence of Honcut Creek and Feather Rivers. The flow would then continue through the leveed portions of the Feather River. Thermalito Forebay Dam failure would be channeled into the Sutter Bypass and Feather River. Thermalito Afterbay Dam failure would also be channeled into the Sutter Bypass and Feather River. A breach in the southern side of the dam would result in flooding of Live Oak and Tierra Buena. A failure of the Lake Almanor Dam would possibly cause a failure at the

Oroville Dam, causing the emergency operations team to follow the EAP for the Oroville Dam and to take appropriate actions. Provided below is an estimate of the affected areas and the flood arrival times for an Oroville Dam failure as reported by DWR.

Table 4.47. Estimated Flood Arrival Times for Oroville Dam Failure

Location	Main Channel Flood Wave	Total Inundation Time
City of Live Oak	4.3 hours	11.3 hours
City of Yuba City	8.6 hours	24.8 hours
Town of Meridian	8.9 hours	28 hours
Town of Nicolaus	13.2 hours	34 hours

Source: Sutter County Operational EOP, 2006; DWR

Affected Areas: Sutter County, City of Live Oak, Town of Meridian, Town of Sutter, City of Yuba City, Town of Robbins, Town of Nicolaus

Table 4.48. Estimated Flood Arrival Times for Thermalito Afterbay Dam Failure

Location	Main Channel Flood Wave	Total Inundation Time
City of Live Oak	12.4 hours	15.5 hours
Tierra Buena	20.6 hours	25.7 hours

Source: Sutter County Operational EOP, 2006; DWR

Affected Areas: Sutter County, City of Live Oak, Tierra Buena

New Bullards Bar Dam Failure

Information taken from the EAP on file for New Bullards Bar Dam describes the potential impacts as a result of a failure of the this dam (shown in Table 4.48). According to the EAP, failure of New Bullards Bar Dam would result in the failure of Englebright Dam (shown in Table 4.49) causing failure/overtopping of all levees downstream. The only levees not overtopped would be the left levee of the Sutter Bypass and the north levee of the Natomas Cross Canal. Flooding would extend south to Fremont Weir. An individual failure of the Englebright Dam would most likely stay within the boundaries of the Feather River Levees causing minimal impact on Sutter County. Provided below is an estimate of the flood arrival times and affected areas for a New Bullards Bar Dam failure as reported by DWR.

Table 4.49. Estimated Flood Arrival Times for New Bullards Bar Dam Failure

Location	Main Channel Flood Wave	Total Inundation Time
City of Yuba City	1.25 hours	2.6 hours
East Nicolaus	2.5 hours	4 hours
Town of Pleasant Grove	3 hours	4.5 hours

Source: Sutter County Operational EOP, 2006; DWR

Affected Areas: Sutter County, City of Yuba City, Town of East Nicolaus, Town of Pleasant Grove

Table 4.50. Estimated Flood Arrival Times for Englebright Dam Failure

Location	Main Channel Flood Wave	Total Inundation Time
City of Yuba City	1 hours	N/A
East Nicolaus	2.25 hours	N/A

Source: Sutter County Operational EOP, 2006; DWR

Affected Areas: Sutter County, City of Yuba City, East Nicolaus

Camp Far West Dam Failure

Information taken from the EAP on file for the Camp Far West Dam describes the potential impacts as a result of a failure of the Camp Far West Dam facilities (shown in Table 4.50). This includes Rollins and Combie Dams located upstream. Failure of Rollins Dam would result in the failure of both the Combie and Camp Far West Dam, and flooding east of the Feather River levees downstream. An independent failure of the Combie Dam is not expected to result in a failure of the Camp Far West Dam.

Table 4.51. Estimated Flood Arrival Times for Camp Far West Dam Failure

Location	Main Channel Flood Wave	Total Inundation Time
East Nicolaus	1.5 hours	2 hours
Town of Nicolaus	2.1 hours	2.75 hours
Town of Pleasant Grove	2.75 hours	3.5 hours

Source: Sutter County Operational EOP, 2006; DWR

Dam failure flooding and their impacts will vary by community, and will depend on the nature and extent of the dam failure and associated flooding. Based on the risk assessment, it is apparent that a dam failure would have a devastating economic impact to the Planning Area. Dam failure flooding presents a threat to life and property, including buildings, their contents, and their use. Large flood events can affect crops and livestock as well as lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies. In addition to the types of community impacts described above for flood events, a dam failure flood would result in the following:

- A dam failure flood on the Feather or Sacramento Rivers could breach levees, and inundate local communities leaving tens of thousands of homes and businesses damaged;
- A dam failure flood event would have a significant impact on the overall economic health of the community; and
- A failure of the levee system in a dam failure flood could have significant damage potential including loss of critical facilities, such as, hospitals, fire/law enforcement facilities, jails,

bridges, roadways, pump stations, electricity distribution and water and sewage treatment plants.

Development Trends

Although new growth and development corridors would fall in the area flooded by a dam failure, given the small chance of total dam failure and the large area that a dam failure would affect, development in the dam inundation area will continue to occur. The General Plan contains a policy regarding developing in dam inundation areas:

- PHS 1.4 Development in Dam Inundation Areas. Require new development located in dam inundation areas to consider the risks from dam failure.

4.3.4 Drought and Water Storage Vulnerability Assessment

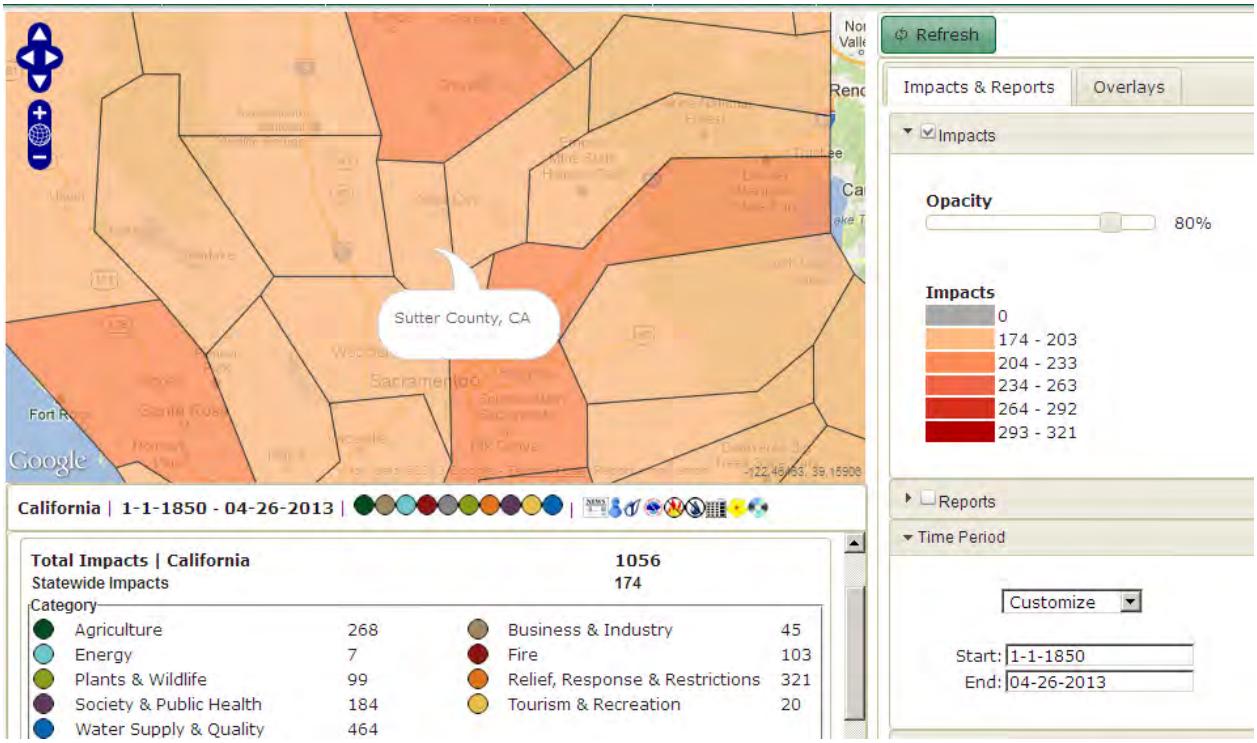
Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

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 is the most critical issue for agricultural, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so too will the demand for water.

Based on historical information, the occurrence of drought in California, including Sutter County, 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 is often 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 Sutter County to drought is countywide, but impacts may vary and include reduction in water supply, agricultural losses, and an increase in dry fuels.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult. The Drought Impact Reporter from the NDMC is a useful reference tool that compiles reported drought impacts nationwide. Figure 4.72 and Table 4.51 show drought impacts for the Sutter County Planning Area from 1850 to April 2013. The data represented is skewed, with the majority of these impacts from records within the past ten years.

Figure 4.73. Drought Impact Reporter for Sutter County Planning Area (1850 to 2013)



Source: National Drought Mitigation Center

Table 4.52. Sutter County Drought Impacts

Category	Number
Agriculture	80
Business and Industry	0
Energy	2
Fire	21
Plans & Wildlife	18
Relief, Response, and Restrictions	66
Society and Public Health	20
Tourism and recreation	2
Water Supply and Quality	62
Total	**271**

Source: National Drought Mitigation Center

The most significant qualitative impacts associated with drought in the Planning Area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Mandatory conservation measures are typically implemented during extended droughts. A reduction of electric power generation and

water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

It is difficult to quantitatively assess drought impacts to Sutter County because not many county-specific studies have been conducted. Some factors to consider include: the impacts of fallowed agricultural land, habitat loss and associated effects on wildlife, and the drawdown of the groundwater table. The most direct and likely most difficult drought impact to quantify is to local economies, especially agricultural economies. The State has conducted some empirical studies on the economic effects of fallowed lands with regard to water purchased by the State's Water Bank; but these studies do not quantitatively address the situation in Sutter County. It can be assumed, however, that the loss of production in one sector of the economy would affect other sectors. This is especially true of agriculture in Sutter County, which is highly vulnerable to drought conditions. From an agricultural perspective, the range lands (which are limited) and the Sutter Buttes area are areas most susceptible to drought. The other low lying areas are generally well irrigated.

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. 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 can also occur when the groundwater table is depleted.

Fortunately for Sutter County, the County has extensive surface water rights and plentiful groundwater aquifers to offset periods of drought.

Development Trends

As previously stated, Sutter County has access to large quantities of water through water rights and groundwater aquifers. However, 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.

4.3.5 Earthquake Vulnerability Assessment

Likelihood of Future Occurrence—Unlikely
Vulnerability—Low

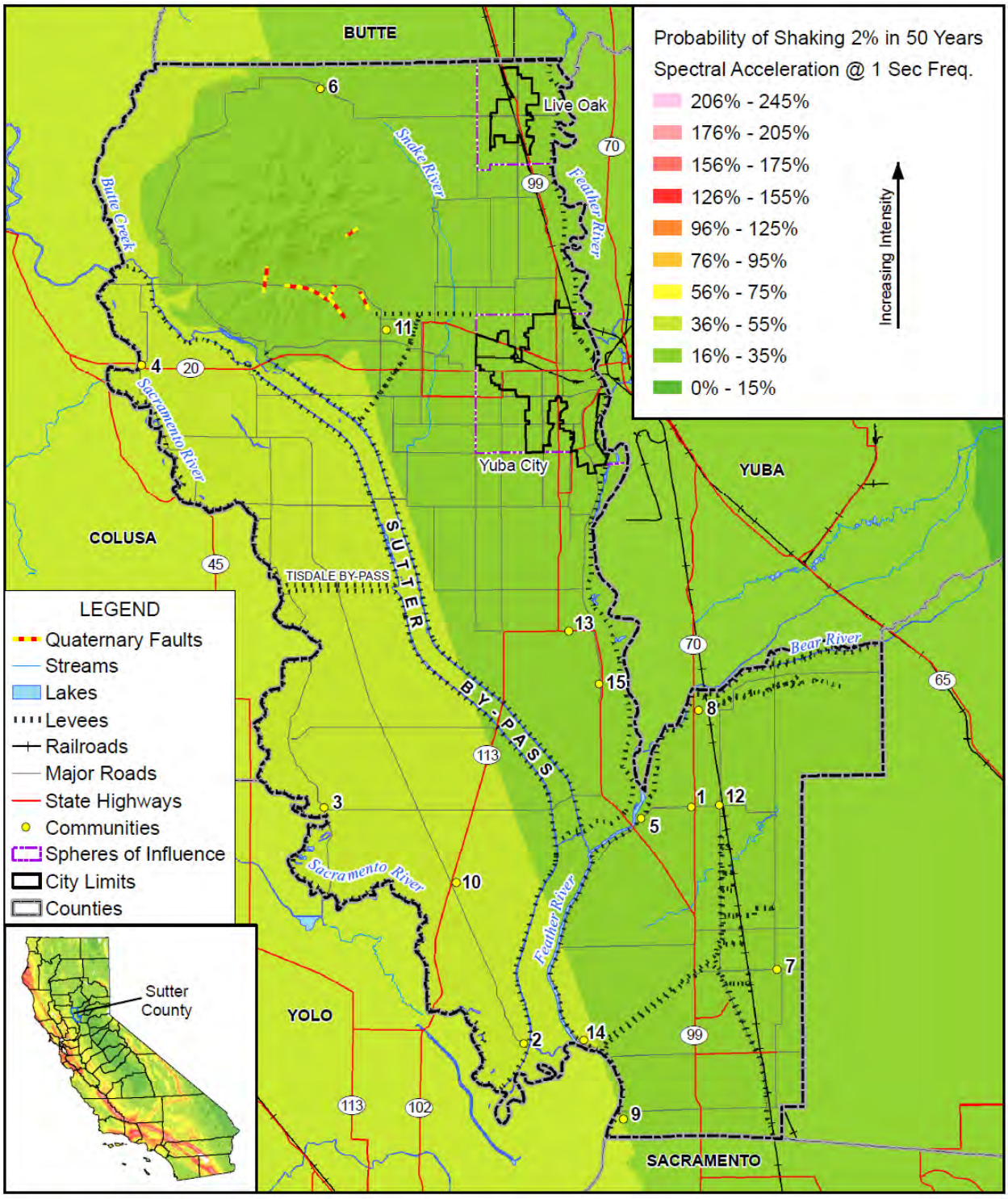
Although the HMPC feel this is a low significance hazard, due to the significance of earthquake in California, analysis of earthquake is included here.

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.

Ground shaking is the primary earthquake hazard. Many factors affect the survivability of structures and systems from earthquake-caused ground motions. These factors include proximity to the fault, direction of rupture, epicenter location and depth, magnitude, local geologic and soils conditions, types and quality of construction, building configurations and heights, and comparable factors that relate to utility, transportation, and other network systems. Ground motions become structurally damaging when average peak accelerations reach 10 to 15 percent of gravity, average peak velocities reach 8 to 12 centimeters per second, and when the Modified Mercalli Intensity Scale is about VII (18-34 percent peak ground acceleration), which is considered to be very strong (general alarm; walls crack; plaster falls).

Earthquake losses will vary across the Sutter County Planning Area depending on the source and magnitude of the event. A map showing peak ground accelerations in Sutter County is shown in Figure 4.73. Based on this map, Sutter County is located in a relatively low seismic area. The earthquake scenario run for this Sutter County LHMP provides a good estimate of loss to the Planning Area based on a realistic earthquake scenario. The methodology and results of this scenario are described below.

Figure 4.74. Sutter County Planning Area - Earthquake Shaking Map



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; USDA NRCS, California Geological Survey

2013 Earthquake Scenarios

HAZUS-MH 2.1 was utilized to model earthquake losses for Sutter County. Specifically, the probable magnitude used for Sutter County utilized a 7.0 magnitude earthquake. 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 probabilistic seismic hazard contour maps developed by the U.S. Geological Survey (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 4.52. Key losses included the following:

- Total economic loss estimated for the earthquake was $519 million, which includes building losses and lifeline losses based on the HAZUS-MH inventory.
- Building-related losses, including direct building losses and business interruption losses, totaled $444 million.
- Over 17 percent of the buildings in the County were at least moderately damaged. 147 buildings were completely destroyed.
- Over 52 percent of the building- and income-related losses were residential structures. 18 percent of the estimated losses were related to business interruptions.
- The mid-day earthquake caused the most casualties: 7.
- 10 percent of the households experienced a loss of potable water the first day after the earthquake.

Table 4.53. Sutter County Planning Area - HAZUS-MH 2,500-year Earthquake Scenario Results

Impacts/Earthquake	7.0 Magnitude Earthquake
Residential Buildings Damaged (Based upon 28,000 buildings)	Slight: 8,015 Moderate: 3,749 Extensive: 866 Complete: 147
Building Related Loss	$443,730,000
Total Economic Loss	$519,340,000

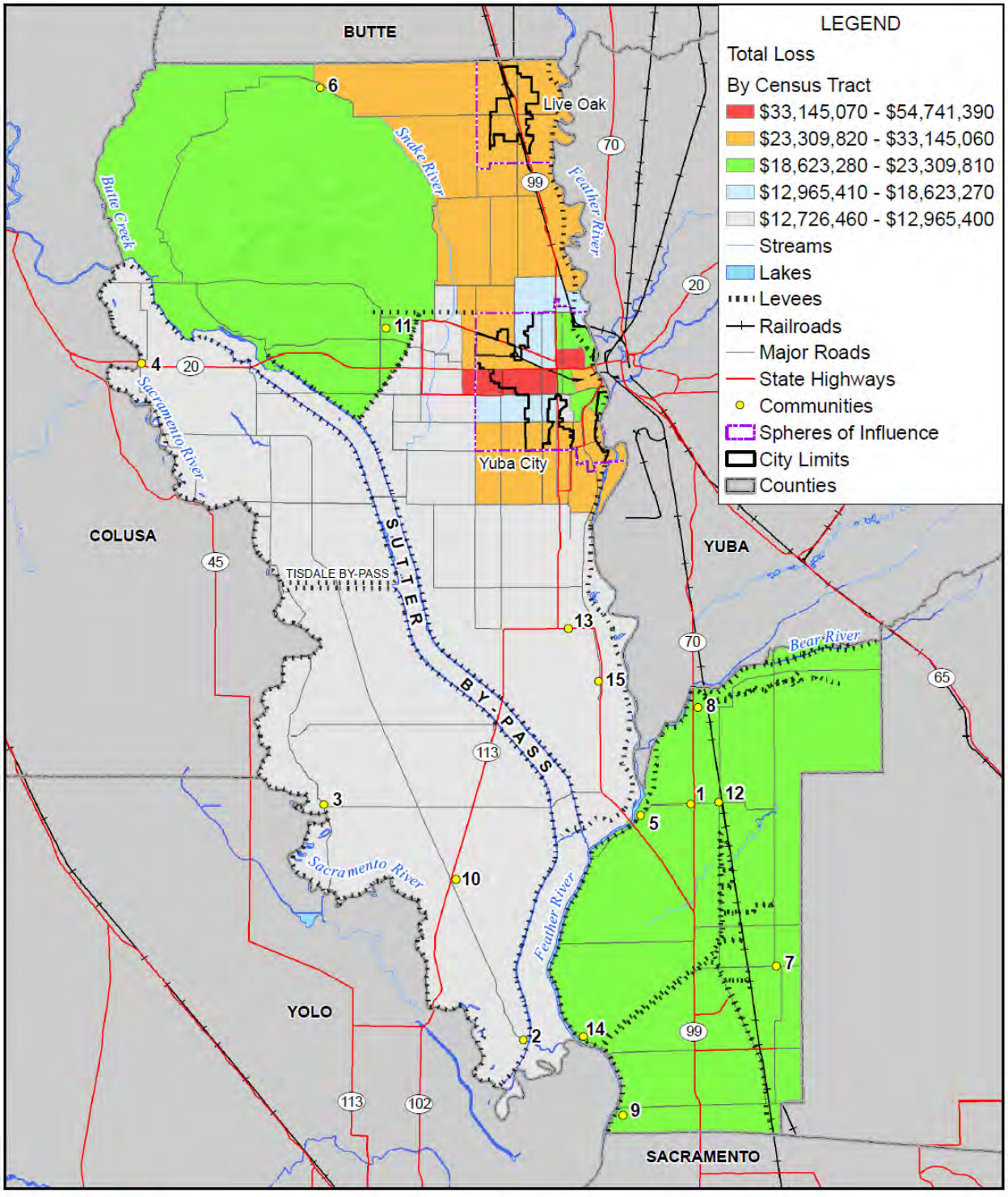
Impacts/Earthquake	7.0 Magnitude Earthquake	
Injuries (Based upon 2am time of occurrence)	Without requiring hospitalization:: 67 Requiring hospitalization: 10 Life Threatening: 1 Fatalities: 1	
Injuries (Based upon 2pm time of occurrence)	Without requiring hospitalization: 126 Requiring hospitalization: 28 Life Threatening: 4 Fatalities: 7	
Injuries (Based upon 5pm time of occurrence)	Without requiring hospitalization: 93 Requiring hospitalization: 21 Life Threatening: 7 Fatalities: 5	
Essential Facility Damage (Based upon 60 buildings)	One hospital with at least moderate damage	
Transportation and Utility Lifeline Damage	2 highways with at least moderate damage 1 power system with at least moderate damage 4 communications facilities with at least moderate damage	
Households w/out Power & Water Service (Based upon 27,000households)	Power loss @ Day 1: 0 Power loss @ Day 3: 0 Power loss @ Day 7: 0 Power loss @ Day 30: 0	Water loss @ Day 1: 2,645 Water loss @ Day 3: 359 Water loss @ Day 7: 0 Water loss @ Day 30: 0
Displaced Households	248	
Shelter Requirements	198	
Debris Generation	0.13 million tons	

Source: HAZUS-MH 2.1

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 no ignitions.

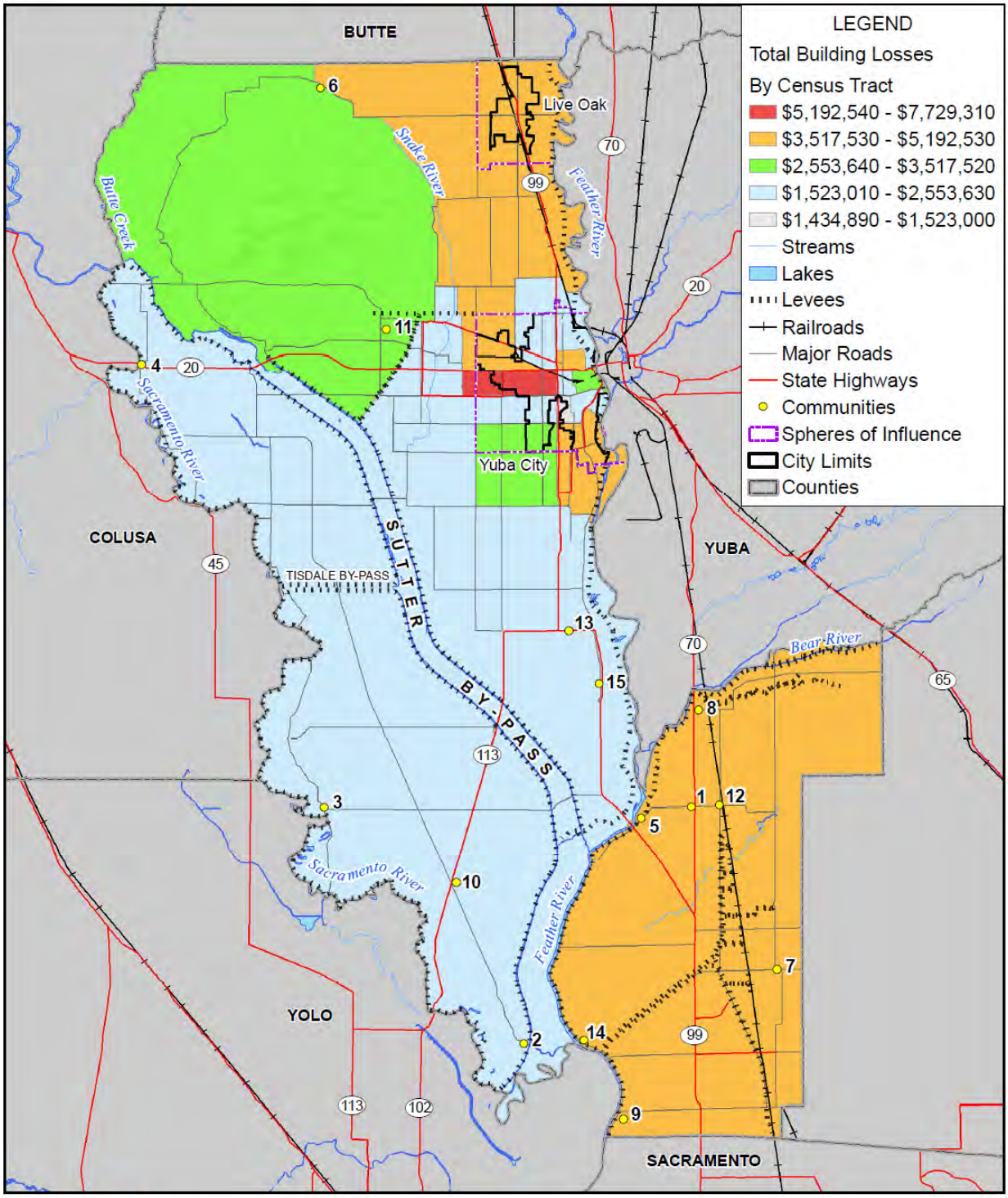
Figure 4.74 illustrates total loss within Sutter County associated with the probabilistic earthquake scenario shown in Table 4.52, while Figure 4.75 shows building losses for the probabilistic earthquake scenario shown in Table 4.52.

Figure 4.75. Sutter County Planning Area - Earthquake 2,500-year Probabilistic Scenario Total Losses



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; USDA NRCS, Hazus-MH 2.1

Figure 4.76. Sutter County Planning Area - Earthquake 2,500-year Probabilistic Scenario Building Losses



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; USDA NRCS, Hazus-MH 2.1

Cultural and Natural Resources at Risk

The Sutter County Planning Area has significant cultural and natural resources located throughout the County as previously described. With a significant earthquake, many of these resources may be at risk. Vulnerability analysis of those specific resources at risk to earthquake was not possible due to data limitations.

Development Trends

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.

4.3.6 Flood: 100-/500-year Vulnerability Assessment

Likelihood of Future Occurrence—Occasional
Vulnerability—High

Historically, the Sutter County Planning Area has always been at risk to flooding during the rainy season from November through April. Normally, wintertime storm floodwaters are kept within defined limits by levees, dykes, and open lowlands and cause no damage. But, occasionally, extended heavy rains result in floodwaters exceeding normal high-water boundaries and causing damage. The big damaging floods of 1955, 1986, 1995, and 1997, were generally the result of failures of the levee systems rather than the levees being overtopped. Other lesser flooding events have also occurred in other years.

Several areas of the County 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 County. There is significant threat of flooding in large areas of the county from several of these streams. Many of these streams are prone to rapid flooding with little notice.

The Impact of Flood Control upon Flood Vulnerability

Continued reliance upon flood control structures in the Sutter County Planning Area and the Central Valley will be without reprieve. The history of the area, beginning with hydraulic mining techniques of the gold miners, through the ongoing conversion of agricultural lands to commercial and residential developments, makes it impossible to reverse the dependence upon structural flood control protection. Levee maintenance is a continuous effort, due to erosion and scour brought on by the channelization itself.

To address this issue, the USACE is in the process of studies and reconstruction efforts along the most critical areas of the levee system. Additional improvements to strengthen the levees and make them less susceptible to seepage induced failures to reduce the risk of flooding are a priority of local and state agencies. Once these improvements have been made, certification of these levees may be possible. While these improvements may mitigate, the risk of flooding due to levee failure, the levees will remain subject to overtopping by flood events larger than their design capacity. In addition to improvements to the existing levee system, other flood control measures are also being evaluated to provide increased levels of flood protection throughout the Planning Area.

Flooding has been frequent in the Sutter County Planning Area and the vulnerability to flood damages is high. This section quantifies the vulnerability of the Planning Area to floods.

Values at Risk

Unincorporated Sutter County and its incorporated jurisdictions have mapped FEMA flood hazard areas. GIS was used to determine the possible impacts of flooding within the County and how the risk varies across the Planning Area by watershed and jurisdiction. The following methodology was followed in determining improved parcel counts and values at risk to the 1% and 0.2% annual chance flood events. Analysis on values at risk to the County is provided for two different areas in this base plan:

- Sutter County Planning Area
- Unincorporated Sutter County

The Sutter County Planning Area includes both the unincorporated County and each jurisdiction, essentially the entire geographical area of Sutter County. Summary tables for the Planning Area are presented below. Detail tables for each jurisdiction are shown in each jurisdiction's annex to this plan. For the unincorporated County, both summary and detail tables are shown and discussed below.

Methodology

Sutter County's parcel and associated April 2012 assessor data was used as the basis for the countywide inventory of developed parcels, acres, and structure value. Sutter County has a unique situation where the southern part of the county has 12/2/2008 DFIRMs effective, but the northern portion when Live Oak and Yuba City are located are still based on the 4/5/1988 FIRMs. Since there is no DFIRM for the northern portion of the County Q3 data that is based on the 4/5/1988 FIRMs was used to cover the northern portion of the County. The electronic Q3 data was matched to the effective FIRMs for accuracy before the flood analysis was performed.

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.

The model assumes that every parcel with a structure value greater than zero is improved in some way. Specifically, an improved parcel assumes there is a building on it. This approach was used to support the parcel layer analysis as there was no associated building layer available for this analysis. Once completed the parcel boundary layer was joined to the centroid layer and values were transferred based on APN. In addition to the centroid analysis, parcel boundary analysis was performed to get total acres and flooded acres by flood zone for each parcel. The parcel layer was intersected with the FEMA DFIRM and Q3 data to obtain the acres flooded.

It is important to note that there could be more than one structure or building on an improved parcel (i.e. condo complex occupies one parcel but might have several structures). Only improved parcels and the value of their improvements were analyzed. The end result is an inventory of the number and types of parcels and buildings subject to the flood hazard. Results are presented by the Sutter County Planning Area, unincorporated county, and incorporated jurisdictions (in their respective annexes). Detailed tables show counts of parcels and land use type (Agriculture, Commercial, Industrial, Residential and Unclassified) within each flood zone.

Content values estimations are based on FEMA Hazus methodologies, which estimates value as a percent of improved structure values by property type. Table 4.53 shows the breakdown of the different property types in Sutter County and their estimated content replacement value percentages.

Table 4.54. Content Replacement Factors

Property Type	Content Replacement Values
Residential	50%
Agricultural	100%
Commercial	100%
Institutional	100%
Unclassified	100%
Industrial	150%
Vacant Land	0%

Source: Hazus 2.1

Each of the DFIRM flood zones that begins with the letter ‘A’ depict the Special Flood Hazard Area, or the 1% annual chance flood event (commonly referred to as the 100-year flood). Table 4.54 explains the difference between DFIRM mapped flood zones. These zones are shown on Figure 4.76.

Table 4.55. Sutter County Planning Area – DFIRM Flood Hazard Zones

Flood Zone	Description
1% Annual Chance	100-year Flood: Also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year.
A	100-year Flood: No base flood elevations provided
AE	100-year Flood: Base flood elevations provided
AH	100-year Flood: Shallow flooding, base flood elevations provided
AO	100-year Flood: Sheet flow areas, base flood depths provided
0.2% Annual Chance	500 Year Flood: Is the flood that has a 0.2% annual chance of being exceeded in any given year.
X Protected By Levee	500-year Flood: Areas protected by levees from 1% annual chance flood event. Levee protection places these areas in the 0.2% annual chance flood zone.
X	No flood hazard

Source: FEMA

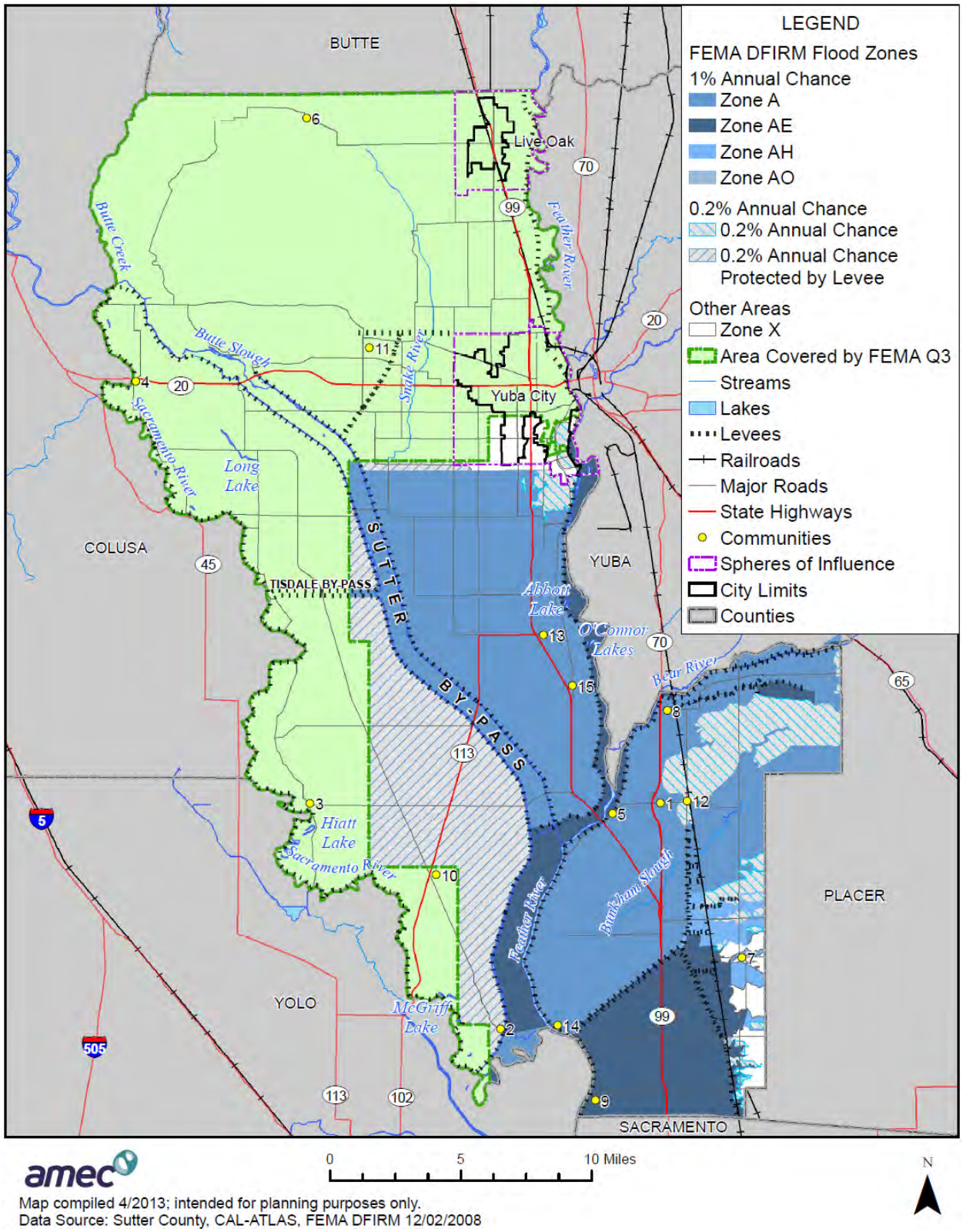
Each of the Q3 zones that begin with the letter 'A' depicts the Special Flood Hazard Area, commonly referred to as the 100-year flood. Table 4.55 explains the difference between DFIRM mapped flood zones based on the 1984 FIRM/Q3 mapping. These zones are shown on Figure 4.77.

Table 4.56. Sutter County Planning Area – Q3 Flood Hazard Zones

Flood Zone	Description
100-year flood	The flood that has a 1% chance of being equaled or exceeded in any given year.
A	100-year Flood: No base flood elevations provided
AE	100-year Flood: Base flood elevations provided
AH	100-year Flood: Shallow flooding, base flood depths provided
AO	100-year Flood: Sheet flow areas, base flood depths provided
A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined. (for consistency in the analysis, it is shown as the X Protected by Levee Zone on Figure 4.77).
X (shaded)	500-year Flood: Areas protected by levees from 1% annual chance
X (unshaded)	No flood hazard
Zone C	Areas of minimal flood hazard (from old paper maps). No base flood elevations provided.

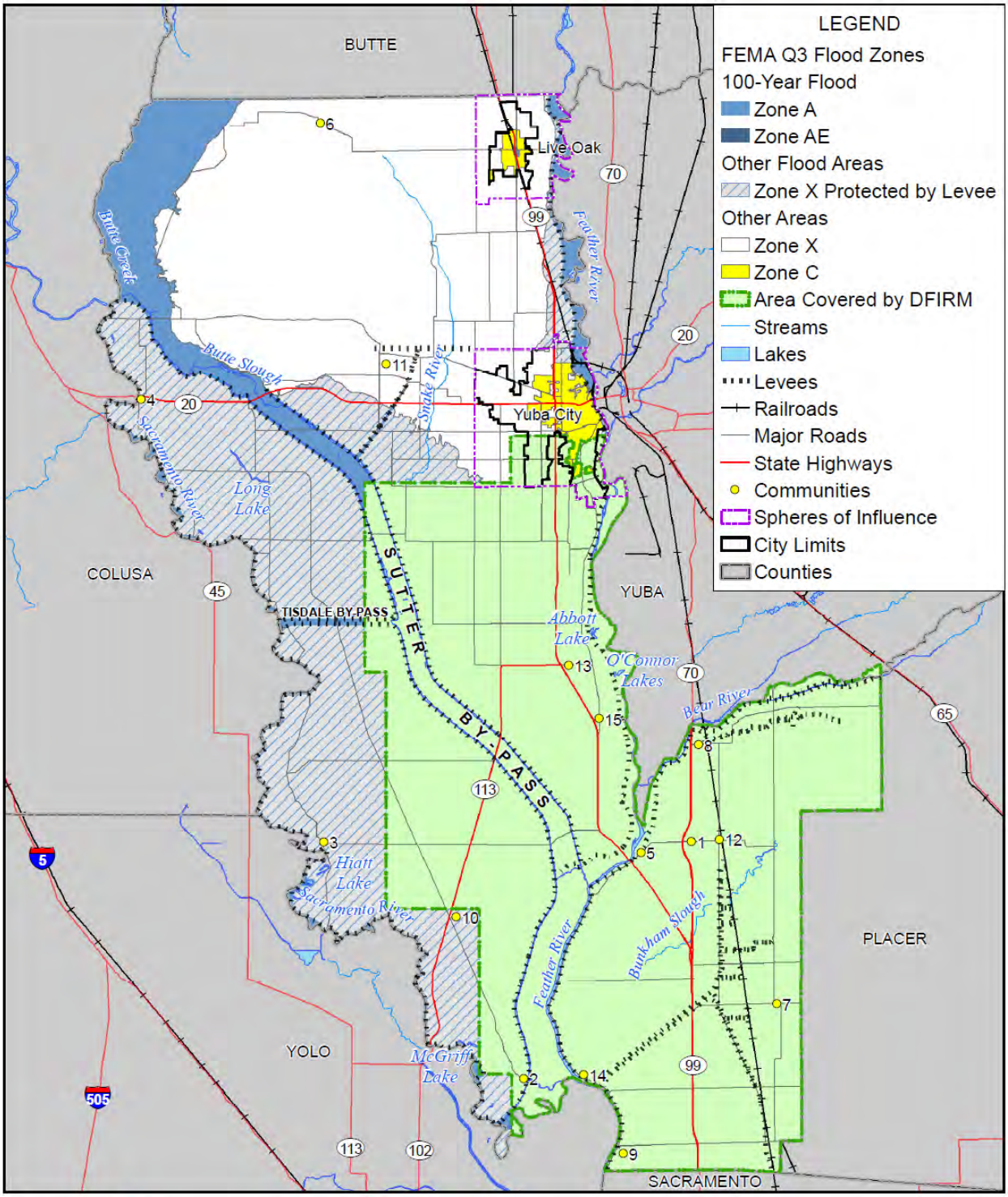
Source: FEMA

Figure 4.77. Sutter County Planning Area - DFIRM Flood Zones



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, FEMA DFIRM 12/02/2008

Figure 4.78. Sutter County Planning Area – FEMA Q3 Flood Zones



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, FEMA Q3 07/06/1988

Sutter County Planning Area

Tables 4.56 through 4.58 contain flood analysis results for the entire Sutter County Planning Area. This includes unincorporated Sutter County and two incorporated communities. These tables show the number of parcels and values at risk to the 1% annual chance and 0.2% annual chance flood events for the entire Sutter County Planning Area. Table 4.56 shows the value of improved parcels in each jurisdiction. Table 4.57 shows the land use category in each flood zone in the Planning Area. Information specific to each individual jurisdictions land use categories in the flood zone are shown in each jurisdiction's respective annex. Table 4.58 shows potential losses summarized by 1% annual chance and 0.2% annual chance flood events with loss estimate and loss ratios for the Planning Area. Summarized losses for each jurisdiction are shown in each jurisdiction's respective annex.

Table 4.57. Sutter County Planning Area – Count and Improved Value of Parcels in Floodplain by Jurisdiction

Jurisdiction	Improved Parcel Count	Total Value	Improved Parcels in the 1% Flood Zone	Improved Value in the 1% Flood Zone	Improved Parcels in the 0.2% Flood Zone	Improved Value in the 0.2% Flood Zone
Live Oak	2,218	$258,273,904	84	$7,263,843	0	$0
Yuba City	17,906	$4,158,247,499	1	$11,098	645	$112,054,632
Unincorporated	8,888	$2,454,736,830	2,371	$632,416,579	398	$60,899,907
Total	**29,012**	**$6,871,258,232**	**2,456**	**$639,691,520**	**1,043**	**$172,954,539**

Source; FEMA DFIRM, FEMA Q3, Sutter County Assessor's 2012 Data

Table 4.58. Sutter County Planning Area – Count and Improved Value by Detailed Flood Zone*

	1% Annual Chance			0.2 % Annual Chance		
Property Use	Total Parcel Count	Improved Parcel Count	Improved Value	Total Parcel Count	Improved Parcel Count	Improved Value
Agricultural	1,233	706	$24,357,895	93	50	$689,392
Commercial	58	45	$18,673,022	3	3	$2,123,329
Industrial	70	43	$376,836,706	57	41	$28,178,953
Institutional	372	34	$1,952,727	14	6	$8,220,400
Residential	997	995	$153,556,513	187	186	$35,821,836
Unclassified	9	0	$0	1	0	$0
Vacant Land	1,196	633	$64,314,657	815	757	$97,920,629
Total	**3,935**	**2,456**	**$639,691,520**	**1,170**	**1,043**	**$172,954,539**

Source; FEMA DFIRM, FEMA Q3, Sutter County Assessor's 2012 Data

*All public buildings in the floodplain that are owned by the community are included in this table.

Table 4.59. Sutter County Planning Area – Flood Loss Estimates

Flood Zone	Improved Parcel Count	Improved Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
0.2% Annual Chance	1,043	$172,954,539	$71,212,469	$244,167,008	$61,041,752	0.89%
1% Annual Chance	2,456	$639,691,520	$687,016,960	$1,326,708,480	$331,677,120	4.83%
Total	**3,499**	**$812,646,059**	**$758,229,429**	**$1,570,875,488**	**$392,718,872**	**5.72%**

Source; FEMA DFIRM, FEMA Q3, Sutter County Assessor's 2012 Data

According to the information in Tables 4.56 through 4.58, the Planning Area has 2,456 improved parcels and roughly $1.3 billion of structure and contents value in the 1% annual chance floodplain. An additional 1,043 improved parcels and roughly $244 million of structure and contents value are at risk to the 0.2% annual chance flood event for a combined total of $1.57 billion in FEMA floodplains.

Unincorporated Sutter County

Tables 4.59 and 4.60 contain information for unincorporated Sutter County only. Table 4.59 shows the number of improved parcels and associated structure and contents values at risk to the each of the FEMA flood zones using the combined DFIRM and Q3 data in the unincorporated areas and Table 4.60 shows potential losses summarized by 1% annual chance and 0.2% annual chance flood events with loss estimate and loss ratios.

Table 4.60. Unincorporated Sutter County– Count and Improved Value by Property Use and Flood Zone

FEMA Type	Flood Zone	Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value
DFIRM	0.2% Chance	Agricultural	93	50	$17,986,743	$689,392	$18,676,135
DFIRM	0.2% Chance	Commercial	1	1	$47,786	$1,593	$49,379
DFIRM	0.2% Chance	Industrial	9	8	$962,788	$8,002,889	$8,965,677
DFIRM	0.2% Chance	Institutional	7	5	$133,347	$506,600	$639,947
DFIRM	0.2% Chance	Residential	187	186	$25,970,722	$35,821,836	$61,792,558
DFIRM	0.2% Chance	Unclassified	1	0	$0	$0	$0
DFIRM	0.2% Chance	Vacant Land	204	148	$10,498,514	$15,877,597	$26,376,111
DFIRM	Zone A	Agricultural	921	581	$182,557,604	$19,709,516	$202,267,120
DFIRM	Zone A	Commercial	32	27	$4,592,657	$12,262,614	$16,855,271
DFIRM	Zone A	Industrial	36	29	$7,860,219	$349,208,294	$357,068,513

FEMA Type	Flood Zone	Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value
DFIRM	Zone A	Institutional	118	21	$1,259,394	$1,313,879	$2,573,273
DFIRM	Zone A	Residential	862	861	$132,975,697	$135,516,796	$268,492,493
DFIRM	Zone A	Unclassified	3	0	$0	$0	$0
DFIRM	Zone A	Vacant Land	817	515	$81,201,759	$53,744,223	$134,945,982
DFIRM	Zone AE	Agricultural	102	65	$28,560,855	$911,170	$29,472,025
DFIRM	Zone AE	Commercial	6	5	$885,914	$2,504,864	$3,390,778
DFIRM	Zone AE	Industrial	23	11	$3,488,741	$26,680,649	$30,169,390
DFIRM	Zone AE	Institutional	189	6	$6,325,840	$199,656	$6,525,496
DFIRM	Zone AE	Residential	88	87	$16,978,845	$11,485,222	$28,464,067
DFIRM	Zone AE	Unclassified	1	0	$0	$0	$0
DFIRM	Zone AE	Vacant Land	221	38	$63,803,048	$6,781,231	$70,584,279
DFIRM	Zone AH	Agricultural	16	10	$3,348,486	$255,155	$3,603,641
DFIRM	Zone AH	Commercial	1	1	$4,659	$42,609	$47,268
DFIRM	Zone AH	Institutional	1	0	$0	$0	$0
DFIRM	Zone AH	Residential	25	25	$4,937,025	$3,501,045	$8,438,070
DFIRM	Zone AH	Vacant Land	13	4	$1,668,915	$525,910	$2,194,825
DFIRM	Zone AO	Agricultural	1	1	$118,517	$4,618	$123,135
DFIRM	Zone AO	Residential	2	2	$113,404	$131,809	$245,213
DFIRM	Zone AO	Vacant Land	1	0	$0	$0	$0
DFIRM	Zone X	Agricultural	53	30	$11,236,782	$1,297,282	$12,534,064
DFIRM	Zone X	Commercial	36	30	$7,363,823	$15,033,181	$22,397,004
DFIRM	Zone X	Industrial	10	10	$685,233	$2,539,031	$3,224,264
DFIRM	Zone X	Institutional	20	11	$1,196,692	$5,083,556	$6,280,248
DFIRM	Zone X	Residential	242	239	$16,429,303	$26,640,265	$43,069,568
DFIRM	Zone X	Unclassified	2	0	$0	$0	$0
DFIRM	Zone X	Vacant Land	1299	1263	$54,283,358	$151,946,519	$206,229,877
DFIRM	Zone X by Levee	Agricultural	46	16	$4,478,340	$150,199	$4,628,539
DFIRM	Zone X by Levee	Commercial	1	1	$146,404	$376,466	$522,870
DFIRM	Zone X by Levee	Industrial	7	5	$554,368	$2,425,945	$2,980,313
DFIRM	Zone X by Levee	Institutional	6	0	$88,720	$0	$88,720
DFIRM	Zone X by Levee	Residential	25	25	$4,433,879	$1,745,330	$6,179,209
DFIRM	Zone X by Levee	Vacant Land	269	18	$85,487,246	$2,028,854	$87,516,100
Q3	Zone A	Agricultural	191	48	$36,577,093	$3,466,338	$40,043,431
Q3	Zone A	Commercial	4	2	$297,551	$240,402	$537,953

FEMA Type	Flood Zone	Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value
Q3	Zone A	Industrial	10	2	$162,192	$916,551	$1,078,743
Q3	Zone A	Institutional	54	3	$4,783,386	$73,831	$4,857,217
Q3	Zone A	Residential	13	13	$2,121,621	$2,396,509	$4,518,130
Q3	Zone A	Unclassified	1	0	$0	$0	$0
Q3	Zone A	Vacant Land	74	14	$8,360,223	$543,688	$8,903,911
Q3	Zone X	Agricultural	881	393	$124,152,463	$19,498,429	$143,650,892
Q3	Zone X	Commercial	50	37	$4,439,918	$8,098,065	$12,537,983
Q3	Zone X	Industrial	51	34	$6,199,326	$22,020,273	$28,219,599
Q3	Zone X	Institutional	91	34	$5,965,086	$13,527,087	$19,492,173
Q3	Zone X	Residential	907	904	$99,353,680	$136,731,707	$236,085,387
Q3	Zone X	Unclassified	5	0	$0	$0	$0
Q3	Zone X	Vacant Land	2585	2261	$115,862,711	$257,848,291	$373,711,002
Q3	Zone X by Levee	Agricultural	316	175	$63,637,289	$3,379,412	$67,016,701
Q3	Zone X by Levee	Commercial	24	19	$1,210,714	$2,032,118	$3,242,832
Q3	Zone X by Levee	Industrial	49	30	$4,140,809	$33,497,671	$37,638,480
Q3	Zone X by Levee	Institutional	48	12	$672,093	$7,728,061	$8,400,154
Q3	Zone X by Levee	Residential	298	296	$54,162,791	$41,092,509	$95,255,300
Q3	Zone X by Levee	Unclassified	9	0	$0	$0	$0
Q3	Zone X by Levee	Vacant Land	870	276	$131,128,331	$22,845,531	$153,973,862

Source; FEMA DFIRM, FEMA Q3, Sutter County Assessor's 2012 Data

Table 4.61. Unincorporated Sutter County – Flood Loss Estimates

Flood Zone	Improved Parcel Count	Improved Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
0.2% Annual Chance	398	$60,899,907	$31,112,837	$92,012,744	$23,003,186	0.9%
1% Annual Chance	2,371	$632,416,579	$682,708,584	$1,315,125,163	$328,781,291	13.4%
Total	**2,769**	**$693,316,486**	**$713,821,420**	**$1,407,137,906**	**$351,784,477**	**14.3%**

Source; FEMA DFIRM, FEMA Q3, Sutter County Assessor's 2012 Data

According to Tables 4.59 and 4.60, unincorporated Sutter County has 2,371 improved parcels and roughly $1.3 billion of structure and contents value in the 1% annual chance floodplain. An additional 398 improved parcels and roughly $92 million of structure and contents value in the

0.2% annual chance floodplain, for a combined total of 2,769 improved parcels and $1.4 billion of total value in FEMA floodplains.

These values can be refined a step further. When a flood occurs seldom does the event cause total destruction of an area. Potential losses from flooding are related to a variety of factors including flood depth, flood velocity, building type, and construction. The percent 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 following tables were further refined assuming 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 average flood depth of 4 feet for two-story buildings with no basement.

Applying the 25 percent damage factor as previously described, there is a 1 percent chance in any given year of a flood event causing roughly $328,781,291 in damage in the unincorporated areas of Sutter County and a 0.2% chance in any given year of a flood event causing $23,003,186 in damages. While there are several limitations to this model, it does present a methodology to estimate potential damages. Note, this model may include structures located within the 100-year floodplain that are elevated at or above the level of the base flood elevation, according to local floodplain development requirements. Also, it is important to keep in mind that these assessed values are well below the actual market value of improved parcels located within the 100-year floodplain. As such, the actual value of assets at risk is significantly above those included in the above calculation and tables.

Flooded Acres

Also of interest is the land area affected by the various flood zones. The following is an analysis of flooded acres in the County in comparison to total area within the unincorporated county and city limits of each jurisdiction.

Methodology

GIS was used to calculate acres flooded by FEMA flood zones and land use categories. The Sutter County parcel layer and effective DFIRM and Q3 data were intersected, and each segment divided by the intersection of flood zone and parcels was calculated for acres. This process was conducted for 1% flood chance areas, with each segment being defined by zone type (A, AE, AH, AO) and acres, and the process repeated for 0.2% flood chance areas. The resulting data tables with flooded acreages were then imported into a database and linked back to the original parcels, including total acres and land/improvement values, by parcel number. Once this was completed, each parcel contained acreage values for flooded acre by zone type within the parcel. In some cases, a single parcel had multiple flooded acres values (e.g. parcels overlapping a 1%-0.2% flood chance boundary). In the tables below each flood zone is represented and then split out by land use, their total flooded acres, total improved acres, and percent of improved acres that are flooded.

Limitations

One limitation of this analysis is that the parcel layer does not contain right-of-ways. Due to this there are voids of land that are not calculated; thus the analysis only represents total parcel acres. The other limitation created by this type of analysis is that improvements are uniformly found throughout the parcel, while in reality, only portions of the parcel are improved, and improvements may or may not fall within the flood zone portion of a parcel; thus, areas of improvements flooded calculated through this method may be higher or lower than those actually seen in a similar real world event.

Tables 4.61 and 4.62 represent a detailed and summary analysis of total acres for each FEMA DFIRM flood zone. Table 4.61 gives summary information for the Planning Area. Table 4.62 gives detailed information by land use for the unincorporated County. This information is available for each jurisdiction in their respective annexes.

Table 4.62. Sutter County Planning Area – Flooded Acres

Jurisdiction	Flood Zone	Total Flooded Acres	Improved Flooded Acres	% of Improved Flooded Acres
Unincorporated County	1% Annual Chance	134,742	74,570	55%
	0.2% Annual Chance	12,815	10,979	86%
Live Oak	1% Annual Chance	21	18	86%
	0.2% Annual Chance	0	0	-
Yuba City	1% Annual Chance	26	6.9	26%
	0.2% Annual Chance	419	258	62%

Source: FEMA DFIRM, Q3

Table 4.63. Unincorporated County Flooded Acres

Flood Zone	Property Use	Total Flooded Acres	Improved Flooded Acres	% of Improved Flooded Acres
A	Agricultural	49,835	37,721	76%
	Commercial	132	99	74%
	Industrial	527	439	83%
	Institutional	6,189	782	13%
	Residential	22,062	22,054	100%
	Unclassified	4	0	0%
	Vacant Land	26,003	829	3%
AE	Agricultural	5,366	4,729	88%
	Commercial	82	77	94%
	Industrial	566	205	36%
	Institutional	2,628	123	5%
	Residential	5,352	5,352	100%

Flood Zone	Property Use	Total Flooded Acres	Improved Flooded Acres	% of Improved Flooded Acres
	Unclassified	1	0	0%
	Vacant Land	13,644	110	1%
AH	Agricultural	862	821	95%
	Commercial	3	3	100%
	Industrial	15	15	100%
	Institutional	0	0	0%
	Residential	1,153	1,153	100%
	Vacant Land	284	32	11%
AO	Residential	28	28	100%
	Vacant Land	7	0	0%
Total 1%	**---**	**134,742**	**74,570**	**55%**
0.2% Chance	Agricultural	4,668	4,401	94%
	Commercial	17	17	100%
	Industrial	132	103	79%
	Institutional	37	20	53%
	Residential	6,216	6,211	100%
	Unclassified	42	0	0%
	Vacant Land	1,702	227	13%
Total 0.2%	**---**	**12,815**	**10,979**	**86%**

Source: FEMA DFIRM, Q3

NFIP Insurance Coverage Details

Unincorporated Sutter County joined the NFIP on April 5, 1988. The County joined the Community Rating System on October 1, 2008 and is a Class 6 community. This rating gives a 20 percent discount to NFIP policy holders in the special flood hazard area and a 10 percent discount to policy holders outside the special flood hazard area. NFIP insurance data provided by DWR indicates that as of February 28, 2013, there were 4,875 policies in force in the unincorporated County, resulting in $1,518,728,700 of insurance in force. There have been 89 closed paid losses totaling $2,323,418. Of these losses, 23 were parcels in A zones, 47 parcels were in X zone, and 19 were parcels were in unknown zones. Of the 89 claims, 64 claims were associated with pre-FIRM structures and 7 with post-FIRM structures. 18 losses were associated with unknown zones.

Based on this analysis of insurance coverage, unincorporated Sutter County has significant assets at risk to the 100-year and greater floods. Of the 1,055 improved residential parcels within the 100-year floodplain, only 271 (25.7 percent) of those parcels maintain flood insurance.

Sutter County Planning Area Flood Insurance Analysis

Utilizing the February 28, 2013 NFIP data provided by DWR, Table 4.63 shows the number of flood policy holders, the number of inundated improved parcels in the 1% annual chance event, and the percentages of policy holders to those inundated parcels, by jurisdiction.

Table 4.64. Sutter County Planning Area – Percentages of Policy Holders to Inundated Parcels

Jurisdiction	Improved Parcels in 1% Annual Chance Floodplain	Insurance Policies in the A (1% Annual Chance) Zone	Percentage of 1% Annual Chance Floodplain Parcels Currently Insured
Unincorporated County	988	271	25.7%
Live Oak	7	16	100%
Yuba City	0	2	100%
Total	**995**	**289**	**29.0%**

Source: California Department of Water Resources, FEMA

Repetitive Loss Data

Two analyses were done of repetitive loss in the County based on different data sets for the RL data (from DWR and ISO) providing slightly different perspectives on the RL issue within the County.

DWR Data and Analysis

In addition, unincorporated Sutter County's vulnerability to flooding is highlighted by its number of Repetitive Losses. According to the February 28, 2013 data from the state on NFIP communities, there are 9 repetitive loss (RL) buildings in the unincorporated County with 21 paid losses totaling $269,959.89. Of these RL buildings, 3 are in the A zones and 4 are in the B, C, or X zone. 1 of these structures has incurred four or more losses.

ISO Data and Analysis

A separate analysis from information from ISO (the agency that administers the NFIP CRS program) was performed for the unincorporated County. Instead of summary information, ISO data included Excel spreadsheets of RL data used as the basis for this GIS analysis. According to the 2012 NFIP records detailed in Table 4.64, there are a total of 8 RL properties in unincorporated Sutter County for which losses totaling more than $235,000 dollars have been paid. Of the 8 RL properties, 7 are residential properties and 1 is used for non-residential purposes. There are no SRL properties in Sutter County. According to Table 4.65, none of these properties have been mitigated.

Table 4.65. Unincorporated Sutter County - Repetitive Loss and Severe Repetitive Loss Properties Summary Table

Insured	Repetitive Severity	Occupancy	Building Count	Current Flood Zone	Content Payments	Building Payments	Total Payments
Yes	Repetitive Loss	Single Family	1	A	$0	$27,599	$27,599
		Single Family	1	X	$8,403	$44,109	$52,513
		Insured Total	**2**		**$8,403**	**$71,709**	**$80,112**
No	Repetitive Loss	Single Family	3	X	$9,768	$46,956	$56,724
		Assumed Condo	1	A	$1,202	$56,031	$57,233
		Assumed Condo	1	EMG	$5,472	$15,024	$20,497
		Non Residential	1	EMG	$4,021	$17,108	$21,130
		Uninsured Total	**6**		**$20,463**	**$135,120**	**$155,584**
		Grand Total	**8**		**$28,867**	**$206,829**	**$235,696**

Source: NFIP Repetitive Loss Data 2012

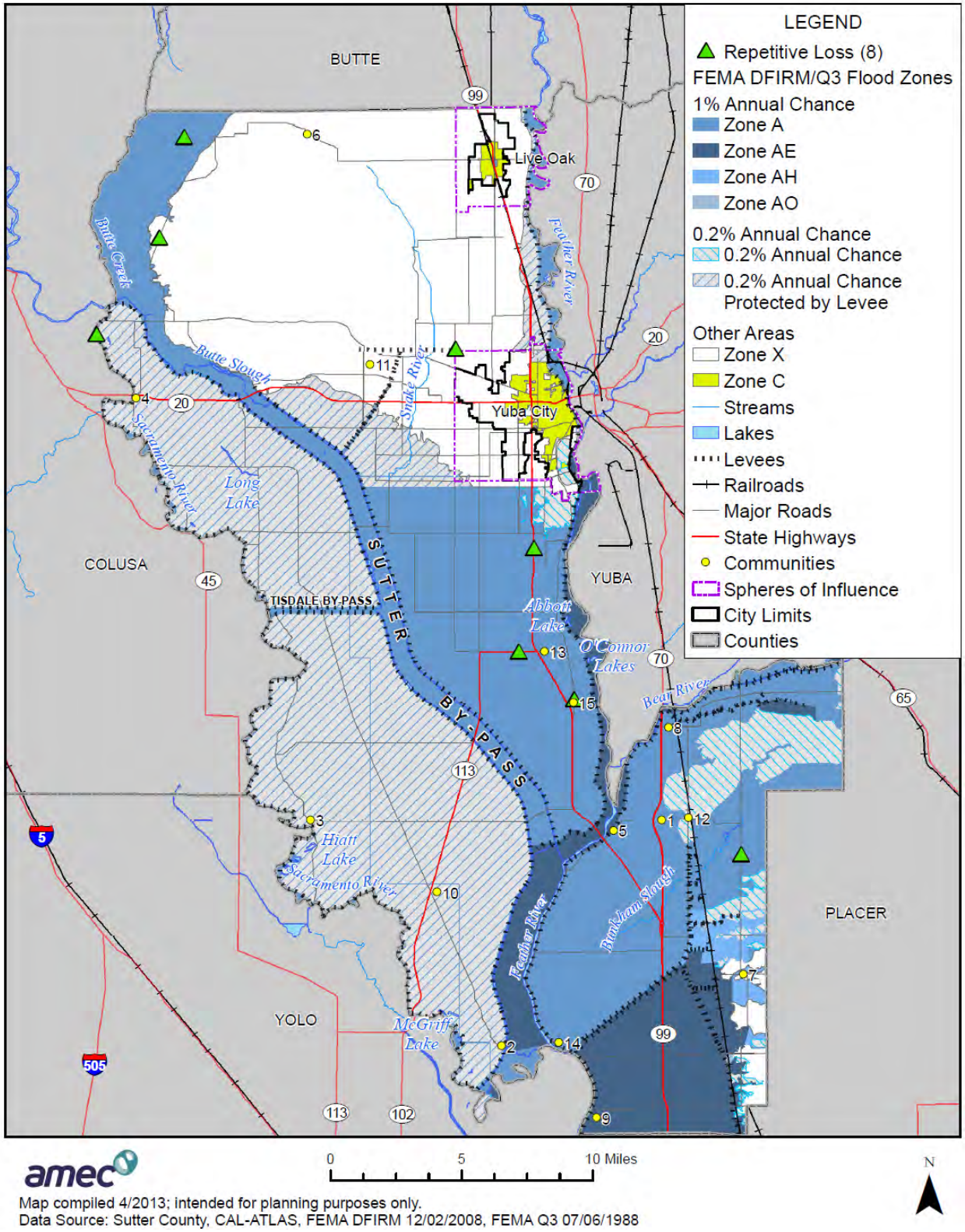
Table 4.66. Unincorporated Sutter County - Mitigated Repetitive Loss Properties

Mitigated	Repetitive Severity	Occupancy	Building Count	Current Flood Zone	Content Payments	Building Payments	Total Payments
No	Repetitive Loss	Single Family	1	A	$0	$27,599	$27,599
		Single Family	4	X	$18,171	$91,066	$109,237
		Assumed Condo	1	A	$1,202	$56,031	$57,233
		Assumed Condo	1	EMG	$5,472	$15,024	$20,497
		Non Residential	1	EMG	$4,021	$17,108	$21,130
		Total	**8**		**$28,867**	**$206,829**	**$235,696**

Source: NFIP Repetitive Loss Data 2012

A digital copy of the FEMA DFIRM and Q3 data for Sutter County was used to develop a base for mapping the RL and SRL properties. Using the effective maps, the RL properties and SRL properties from the list furnished by Cal DWR and the NFIP were geo-coded and mapped. The resulting map in Figure 4.78 illustrates the location of these properties separated out by the classification of mitigated or unmitigated in relation to the known flood hazard areas within Sutter County.

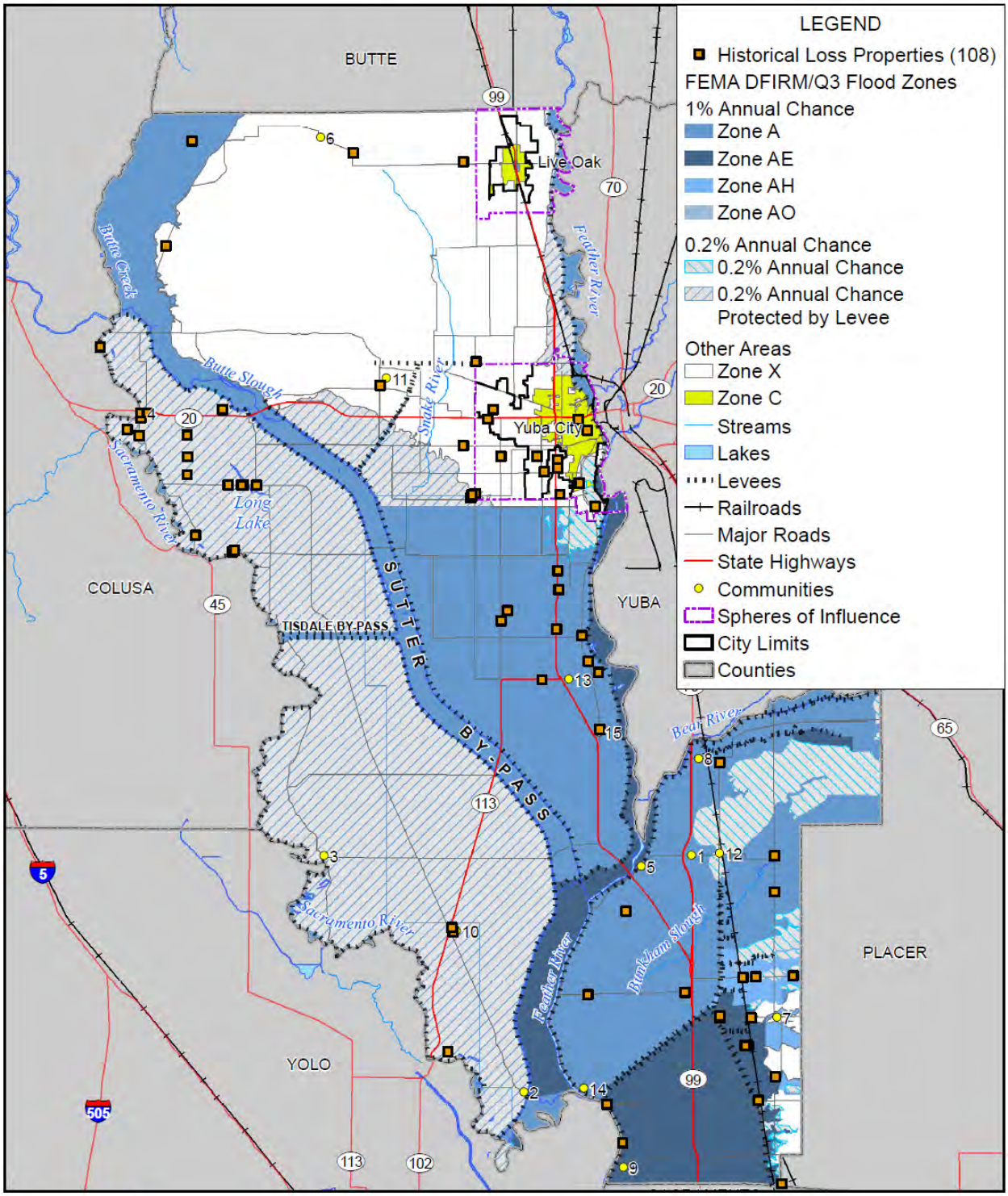
Figure 4.79. Unincorporated Sutter County Repetitive Loss Properties



ISO Historical Loss Properties

Historical loss properties for the years through 2011 amounts to 108 properties with a total paid amount of $2,159,888.73 million based on the NFIP repetitive loss database for 2012. This list of addresses was geocoded into GIS and mapped in Figure 4.79. Analyzing the historical loss properties is important in understanding the next potential RL and SRL areas in the County.

Figure 4.80. Unincorporated Sutter County DFIRM/Q3 with Historical Loss Properties



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, FEMA DFIRM 12/02/2008, FEMA Q3 07/06/1988

Populations at Risk

A separate analysis was performed to determine population in flood zones. Using GIS, the Sutter County DFIRM layer was overlaid on the improved residential parcel data. Those parcel centroids that intersect the flood zones were counted and multiplied by the 2010 Census Bureau average household factors for each jurisdiction and unincorporated area (see Table 4.66). According to this analysis, there is a total population of 2,968 in the 1% annual chance floodplain and 544 in the 0.2% annual chance floodplain. The unincorporated County has the greatest population at risk to both the 1% and 0.2% annual chance event.

Table 4.67. Sutter County Planning Area - Populations at Risk to the 1% and 0.2% Annual Chance Floods*

	1% Annual Chance		0.2% Annual Chance	
Jurisdiction	**Improved Residential Parcels**	**Population****	**Improved Residential Parcels**	**Population****
Unincorporated	988	2,944	186	544
Live Oak	7	24	0	0
Yuba City	0	0	0	0
Total	**995**	**2,968**	**186**	**544**

Source: DFIRM, US Census Bureau 2010 Household Population Estimate, Sutter County 2012 Assessor's Data

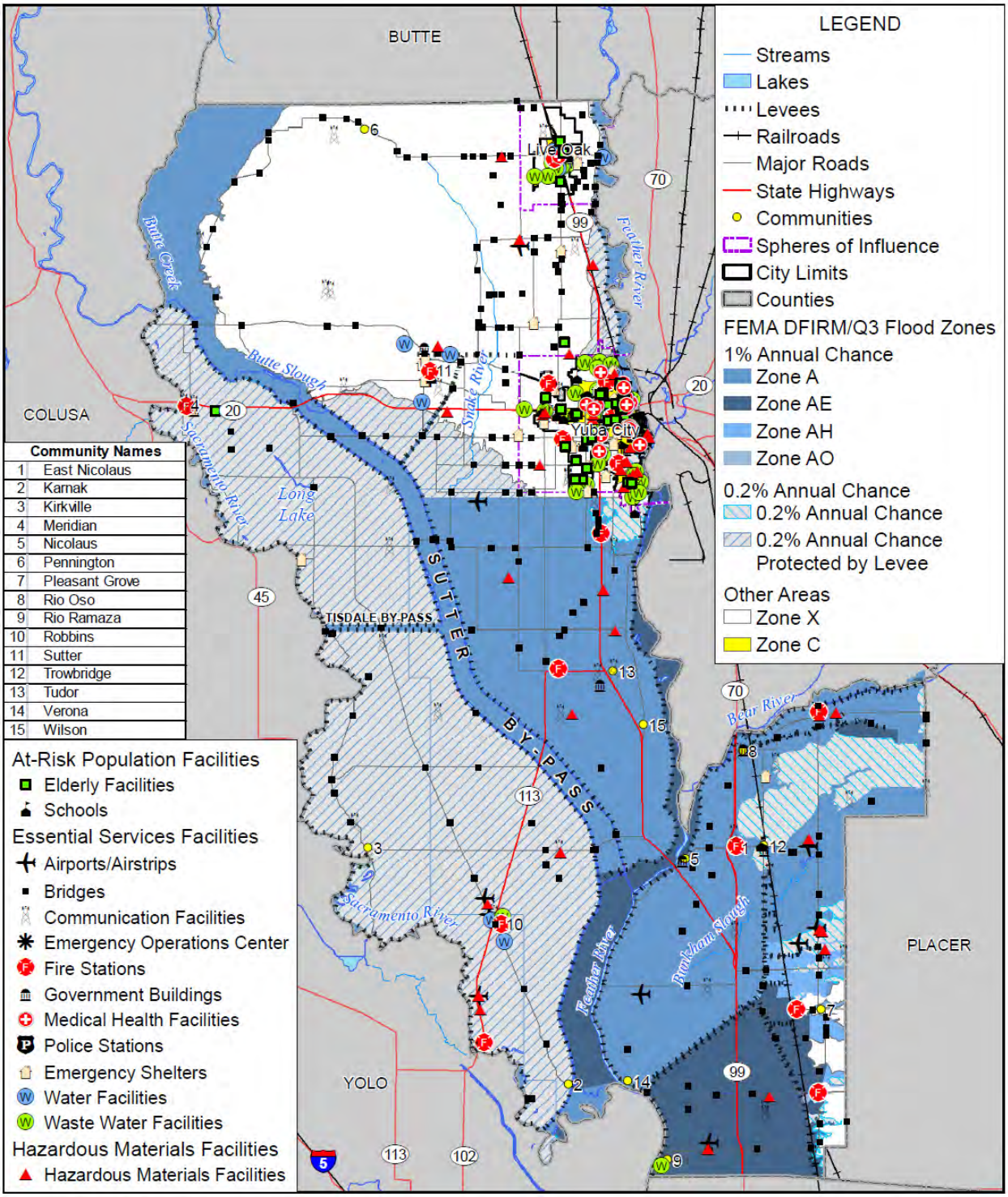
*This parcel count only includes those parcels in the 0.2% annual chance floodplain. The 0.2% annual chance flood also includes all parcels in the 1% annual chance floodplain.

** Average household populations from the 2010 US Census were used: Sutter County – 2.98; Live Oak – 3.42; Yuba City – 2.99

Critical Facilities at Risk

A separate analysis was performed on the critical facility inventory in Sutter County and all jurisdictions to determine critical facilities in the 1% and 0.2 annual chance floodplains. Using GIS, the DFIRM and Q3flood zones were overlayed on the critical facility location data. Figure 4.80 shows critical facilities, as well as the DFIRM and Q3 flood zones. Table 4.67 details critical facilities by facility type and count. Details of the critical facilities in levee protected zones can be found in the critical facility discussion in Section 4.3.8. Details of critical facility definition, type, name and address and jurisdiction by flood zone are listed in Appendix E.

Figure 4.81. Sutter County Planning Area – Critical Facilities in the Flood Zones



Map compiled 5/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, FEMA DFIRM 12/02/2008, FEMA Q3 07/06/1988

Table 4.68. Sutter County Planning Area – Critical Facilities in the Flood Zones

Flood	Category	Type	Facility Count
City of Live Oak			
None			
		Total Flood	**0**
City of Yuba City			
0.2% Annual Chance	At Risk Population Facilities	Assisted Living Facility	1
	Essential Services Facilities	Storm Water Facility	2
		Waste Water Facility	1
	Hazardous Materials Facilities	Hazardous Materials Facilities	2
		Total 0.2% Annual Chance	**6**
Unincorporated Sutter County			
0.2% Annual Chance	At Risk Population Facilities	School	2
	Essential Services Facilities	Bridge	2
		Communications	6
		Fire Station	1
		Government Facility	1
		Paved Airstrip	1
		Seepage Water Facility	1
	Hazardous Materials Facilities	Hazardous Materials Facilities	3
	Multiple Categories	School / Emergency Shelter	1
		Total 0.2% Annual Chance	**18**
1% Annual Chance	Essential Services Facilities	Bridge	83
		Communications	16
		Fire Station	4
		Government Facility	4
		Paved Airstrip	5
		Waste Water Treatment	1
		Water Supply	2
	Hazardous Materials Facilities	Hazardous Materials Facilities	9
	Multiple Categories	School / Emergency Shelter	4
		Total 1% Annual Chance	**128**

Source: Sutter County GIS, FEMA DFIRM, Q3

Cultural and Natural Resources at Risk

The Sutter County Planning Area has significant cultural and natural resources located throughout the County as previously described. Risk analysis of these resources was not possible due to data limitations. However, natural areas within the floodplain often benefit from periodic flooding as a naturally recurring phenomenon. These natural areas often reduce flood impacts by allowing absorption and infiltration of floodwaters.

Development Trends

To determine potential development constraints based on the location of future development areas relative to the FEMA flood zones, additional analysis was performed using GIS. For each community, the future development areas, overlain with the General Plan land use diagrams, were intersected with the FEMA flood zones to identify future areas of development by 1% and 0.2% annual chance flood zones as well as Zone X. Table 4.69 provides a parcel level analysis of the future development areas by flood zone shown in Figure 4.82. Note that all areas within the Zone X flood zone are outside of the flood hazard areas.

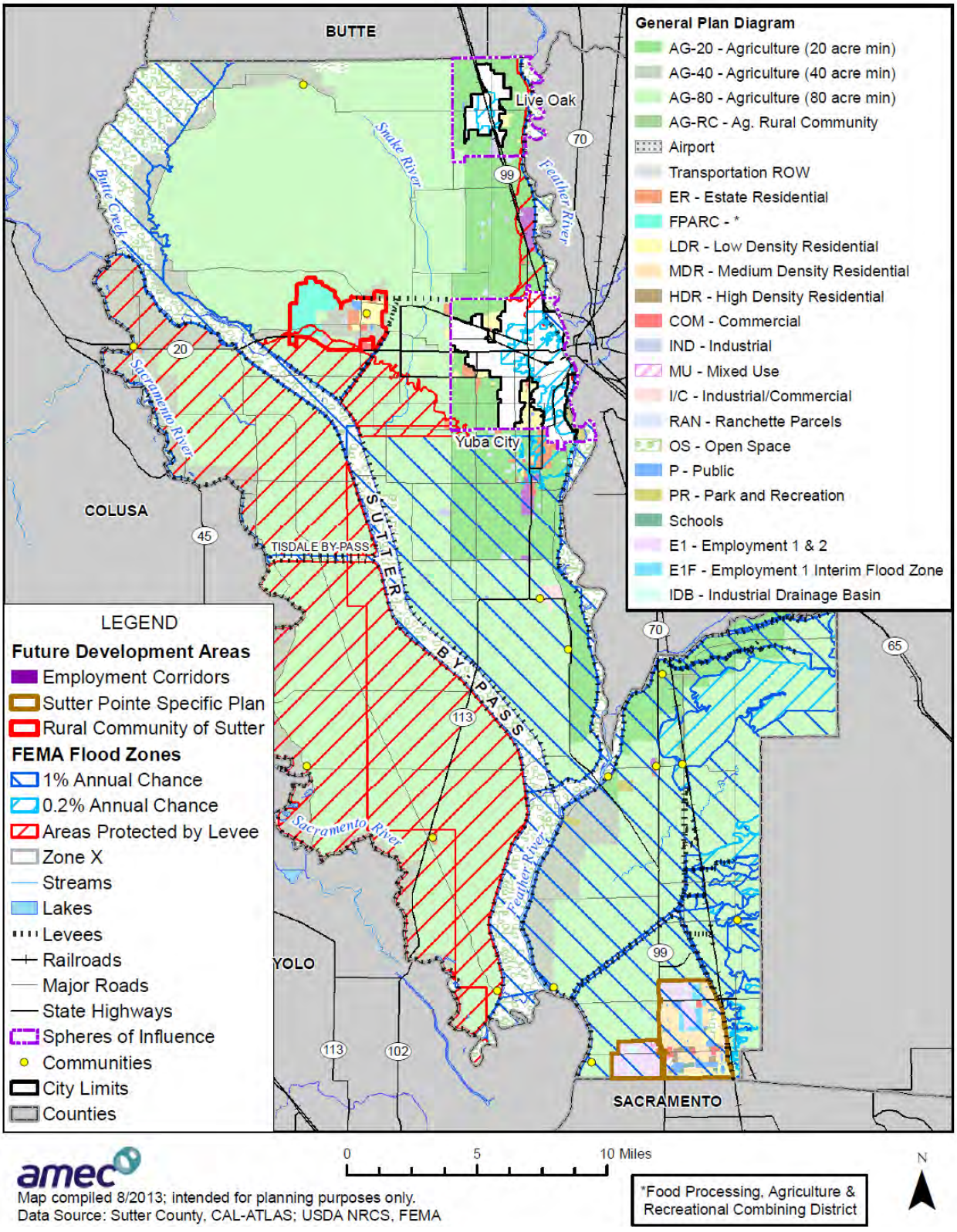
Table 4.69. Future Development in Sutter County by Flood Zone

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
1% Annual Chance Flood Zone						
Employment Corridors	Employment Corridors	43	36	$3,496,320	$4,297,150	$7,793,470
	Total	**43**	**36**	**$3,496,320**	**$4,297,150**	**$7,793,470**
Sutter Pointe Specific Plan	Employment 1	1	0	$0	$189,317	$189,317
	Employment 1 Interim Flood Zone	6	4	$826,587	$778,006	$1,604,593
	Employment 2	24	10	$24,848,877	$19,311,120	$44,159,997
	Industrial Drainage Basin	5	2	$997,577	$3,803,733	$4,801,310
	Low Density Residential	5	0	$0	$2,751,273	$2,751,273
	Medium Density Residential	30	19	$1,792,530	$8,686,013	$10,478,543
	Mixed Use	2	0	$0	$1,983,063	$1,983,063
	Open Space	1	1	$33,000	$2,340,300	$2,373,300
	Parking	3	2	$59,826	$1,314,619	$1,374,445
	School	2	1	$2,264	$1,388,346	$1,390,610
	Transportation ROW	3	3	$602,807	$4,235,124	$4,837,931
	Total	**82**	**42**	**$29,163,468**	**$46,780,914**	**$75,944,382**
0.2% Annual Chance Flood Zone						
-	-	0	0	$0	$0	$0

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Zone X Flood Zone						
Rural Community of Sutter	Agriculture (40 acre min)	49	42	$18,891,146	$6,241,121	$25,132,267
	Agriculture (80 acre min)	9	3	$179,000	$1,782,940	$1,961,940
	Agriculture Rural Community	2	2	$4,100	$264,220	$268,320
	Commercial	29	20	$2,006,763	$1,398,693	$3,405,456
	Estate Residential	129	110	$23,842,697	$7,410,925	$31,253,622
	Food Processing, Ag & Rec Combining District	12	3	$969,707	$1,686,244	$2,655,951
	Industrial	14	7	$1,936,221	$1,318,843	$3,255,064
	Low Density Residential	1,054	931	$80,132,295	$26,071,865	$106,204,160
	Parking	13	3	$2,241,653	$677,549	$2,919,202
	Ranchette Parcels	5	5	$1,454,021	$660,197	$2,114,218
	Total	**1,316**	**1,126**	**$131,657,603**	**$47,512,597**	**$179,170,200**

Source: Sutter County GIS, FEMA DFIRM, Q3

Figure 4.82. Sutter County Future Development Areas in Flood Zones



Where and how to build is generally addressed in local floodplain ordinances. These ordinances should be reviewed and updated as development in new areas is considered. Master planning will 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. These developments can bring the revenue needed to solve existing flooding problems by constructing ecologically sensitive water conveyance areas with peak flow detention.

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. California's 2007 flood legislation (Senate Bill 5) directly linked system-wide flood management planning to local land use planning, requiring local jurisdictions to demonstrate an urban level of flood protection before approving new development in urban and urbanizing areas. "Urban level of flood protection" means the level of protection necessary to withstand flooding that has a 1-in-200 chance of occurring in any given year (California Government Code Section 65007). DWR is developing criteria to guide local jurisdiction compliance with the new requirements. In addition to developing criteria to help local jurisdictions in their land use planning, DWR is preparing criteria for use in the design of levees protecting urban and urbanizing areas. DWR is also working with local partners to develop guidance related to nonurban flood protection levels.

These standards are under development and will become effective over the next several years as ongoing technical studies are performed. Once these standards become effective, cities and counties within the Sacramento-San Joaquin Valley cannot enter into development agreements or issue a permit to construct a new structure in areas located within a flood hazard zone unless the following is established:

- Find that existing facilities protect urban and urbanizing areas to a 1-in 200 chance of flooding in any given year or the FEMA standard of flood protection in non-urbanized areas, or
- Find that the local flood management agency has made adequate progress on the construction of the flood protection system to provide the required level of protection, or
- Impose conditions on the development agreement that will provide the required level of protection.

California Department of Water Resources (DWR) is currently developing technical information to assist cities and counties with their compliance with these new requirements.

In addition, another way to reduce flooding issues in areas of existing and future development is to clear vegetation from natural and man-made drains that are critical to flood protection. Both native and invasive species can clog drains, and reduce flows of floodwaters, which slow that natural drainage process and can exacerbate flooding.

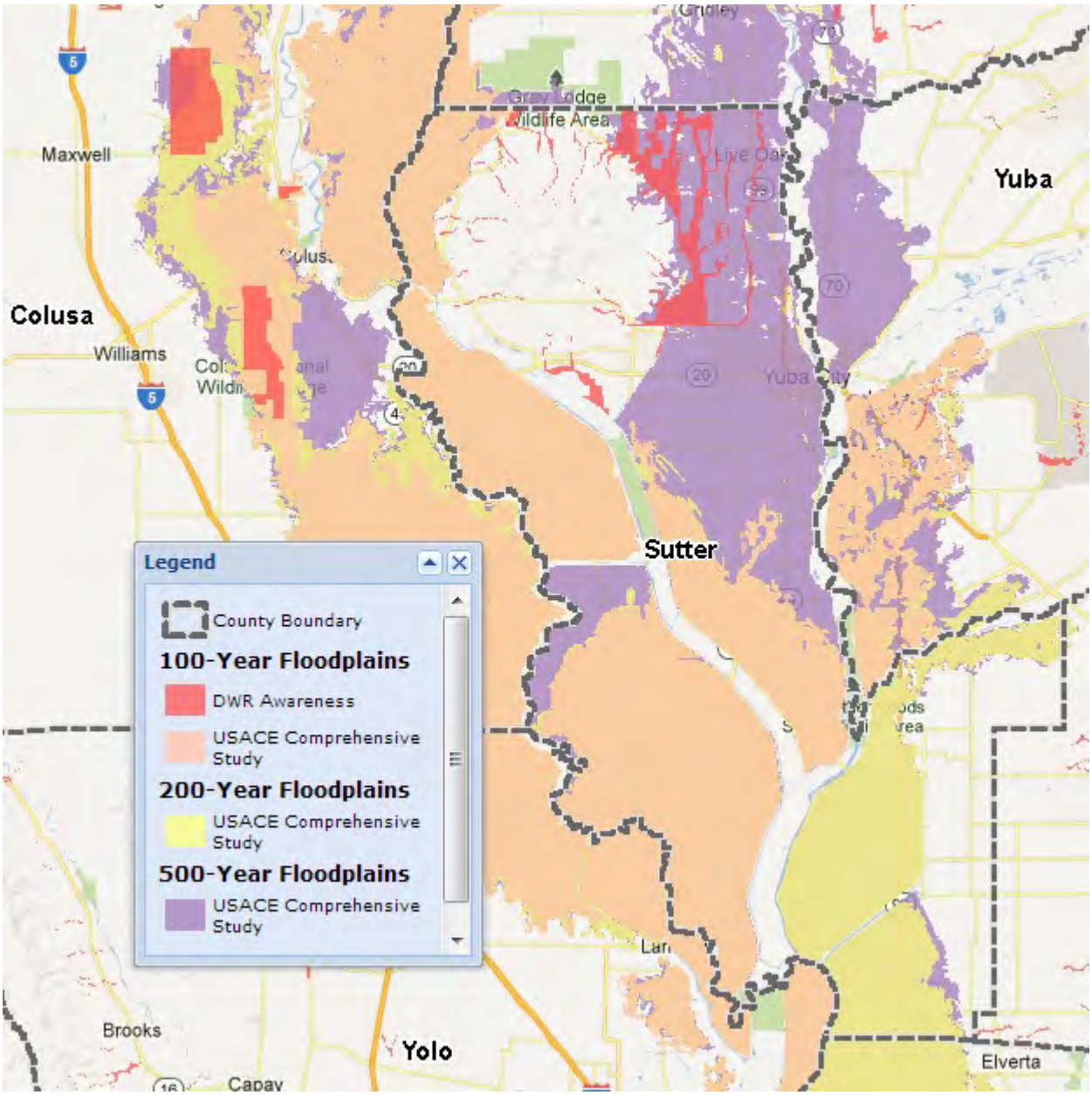
California Department of Water Resources Best Available Maps (BAM)

The FEMA regulatory maps provide just one perspective on flood risks in Sutter County. 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 Sacramento-San Joaquin (SAC-SJ) Valley watershed. SB 5 requires that these maps contain the best available information on flood hazards and be provided to cities and counties in the 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-, 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. They are for the same flood frequency, however, they 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 Sutter County Planning Area 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 100-year floodplain, it also supports identification of the need and requirement for flood insurance. Figure 4.81 shows the BAM for the Sutter County Planning Area. BAM maps for each jurisdiction are included in their respective annexes.

Figure 4.83. Sutter County Planning Area – Flood Awareness (Best Available) Map



Source: California DWR

Overall Community Impact

Floods and their impacts vary by location and severity of any given flood event and will likely only affect certain areas of the County during specific times. Based on the risk assessment, it is evident that floods will continue to have potentially devastating economic impacts to certain areas of the County. However, many of the floods in the County are minor, localized flood events that are more of a nuisance than a disaster. Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural damage;
- Disruption of and damage to public infrastructure;
- Health hazards associated with mold and mildew;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community;
- Negative impact on commercial and residential property values; and
- Significant disruption to students and teachers as temporary facilities and relocations would likely be needed.

4.3.7 Flood: Localized/Stormwater Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

Historically, the Planning Area has been at risk to flooding primarily during the spring months when stream systems in the County swell with heavy rainfall. Localized flooding also occurs throughout the Planning Area at various times throughout the year with several areas of primary concern unique to each City. Sutter County Public Works tracks localized flooding areas as shown in Figure 4.38 in Section 4.2.12.

Development Trends

The risk of stormwater/localized flooding to future development can be minimized by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the localized stormwater 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.

The potential for flooding may increase as storm water is channelized due to land development. Such changes can create localized flooding problems in and outside of natural floodplains by altering or confining natural drainage channels. Floodplain modeling and master planning should be based on the ultimate built-out land use in order to assure that all new development remains safe from future hydrologic conditions. 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 result in floodplain impacts regardless.

Additional growth in or around the cities of Yuba City and Live Oak could contribute to increased flooding in the county upstream or downstream of these cities. However, Yuba City has developed a flood control project to address this potential for increased flooding. Similarly, RD 777 is developing a Master Drainage Study to address the potential for increased flooding from growth in the City of Live Oak.

4.3.8 Invasive Species: Plants/Pests Vulnerability Assessment

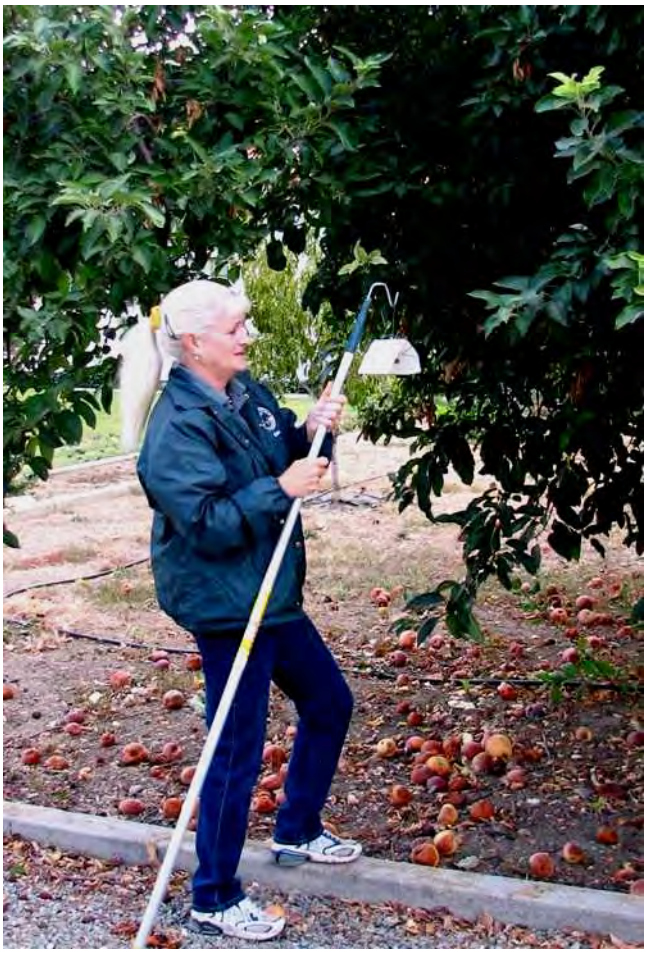
Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

In an effort to protect Sutter County's $2.5 billion agriculture industry from invasive species, the Agricultural Commissioner, working in conjunction with the United States Department of Agriculture (USDA) and the California Department of Food and Agriculture (CDFA) has implemented defensive programs targeting invasive species.

The first line of defense is an extensive program to prevent the introduction of plant, animal, insect and disease pests that may be introduced through the movement of legal and illegal trade. This program includes State/Federal inspections at shipping ports, airports and highway border stations. On the local level, the Agricultural Commissioner performs inspections at high risk shipping and receiving locations.

The second line of defense includes early detection of invasive insect species through surveillance programs conducted by the Agricultural Commissioner (see Figure 4.82). Early detection and the ability to respond rapidly are critical for preventing wide-scale invasion of many organisms. As a new invasive species spreads, the cost of control rises, the feasibility of eradication falls, and the potential for economic and environmental impacts increases.

Figure 4.84. Invasive Pest Trapping and Monitoring in Sutter County



Source: Sutter County Agriculture Commissioner

Establishment of an invasive species would be detrimental to the agricultural industry of Sutter County because of product losses, stringent quarantine regulations, loss of exporting opportunities and increased treatment costs. The introduction of exotic plants influences wildlife by displacing forage species, modifying habitat structure—such as changing grassland to a forb-dominated community—or changing species interactions within the ecosystem. In addition, invasive plants:

- Increase wildfire potential
- Reduce water resources
- Accelerate erosion and flooding
- Threaten wildlife
- Degrade rangeland, cropland, and timberland
- Diminish outdoor recreation opportunities.

Invasive Pests

A 1980-81 infestation was ultimately eliminated at great expense — reported to be over $100 million ($284M in 2013 dollars) — to the state of California and the federal government. Since then, significant public funds have been spent on eradication efforts for subsequent infestations. In 1989-90 another medfly infestation occurred (similar to the 1980-81 infestation).

The total impact of a medfly infestation on the industries involved should also take into account the costs of controlling the pest. When these costs are added to the embargo estimates, they indicate even higher losses to the industry. The total (1992) impact on the commodities would range from a low of $1.057 billion to a high of $1.44 billion ($2.4B in 2013 dollars). Included in these costs are expenses for postharvest treatment since USDA protocol calls for treatment of commodities shipped from infested areas. These figures represent losses to all segments of the industries involved — from pesticide application costs to control the medfly to losses in revenues due to lost export markets and price decreases in domestic markets.

The impact on production costs for light brown apple moth (LBAM) hosts could top $100 million. It was estimated for Australia that LBAM causes AU$21.1 million annually in lost production and control costs, or about 1.3% of gross fruit value: for apples, pears, oranges and grapes. Applying this percentage to the 2005 gross value of these same crops in California of $5.4 billion (USDA NASS 2006), the estimated annual production costs would be $70.2 million. This estimate does not include economic costs to the nursery industry nor to other significant host crops in California, such as apricots, avocados, kiwifruit, peaches and strawberries. If the same level of costs were incurred by these as for the previous four crops, the additional costs would be $63.1 million, based on their 2005 gross value of $4.8 billion. Therefore, the total lost production and control costs in California could be $133 million for all of the crops mentioned above.

Exact economic impacts on international and domestic exports are uncertain at this time. California is the nation's leader in agricultural exports and in 2003 shipped more than $7.2 billion in both food and agricultural commodities around the world (CASS 2004). Some countries have specific regulations against this pest and many others consider it a regulated pest that would not be knowingly allowed to enter. Additional measures, such as pre-harvest treatments and postharvest disinfestation, would likely have to be taken to ensure that shipments to these countries are free from LBAM. In addition, LBAM is an exotic pest; i.e., it is not established in the continental United States and, therefore, other states within the U.S. would likely impose restrictions on the movement of potentially infested fruits, vegetables and nursery stock. These restrictions could severely impact the domestic marketing of California agricultural products.

Impact

Establishment of this moth could cause direct environmental damage via increased pesticide use statewide by commercial and residential growers and via adverse feeding impacts on native

plants. Populations of threatened and endangered plant species could be severely threatened or extirpated should this moth adapt to feeding on them.

Invasive Plans

Invasive plants cost California $82 million every year (2008 Cal-EPC). Estimates on exact yearly losses in Sutter County varies and was not available for Sutter County. Due to the high economic value of crops in the County, invasive species have the ability to cause immense financial harm.

Future Development

Future development in the County is not likely to have an impact on invasive plants and pest in Sutter County.

4.3.9 Levee Failure Vulnerability Assessment

Likelihood of Future Occurrence—Occasional
Vulnerability—High to Extremely High

Levee failure flooding can occur as the result of partial or complete collapse of an impoundment, and often results from prolonged rainfall and flooding. The primary danger associated with dam or levee failure is the high velocity flooding of those properties downstream of the breach. Section 4.2.14 Levee Failure describes the levee inventory in the Sutter County Planning Area.

A levee failure can range from a small, uncontrolled release to a 0catastrophic failure. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility and associated revenues that accompany those functions.

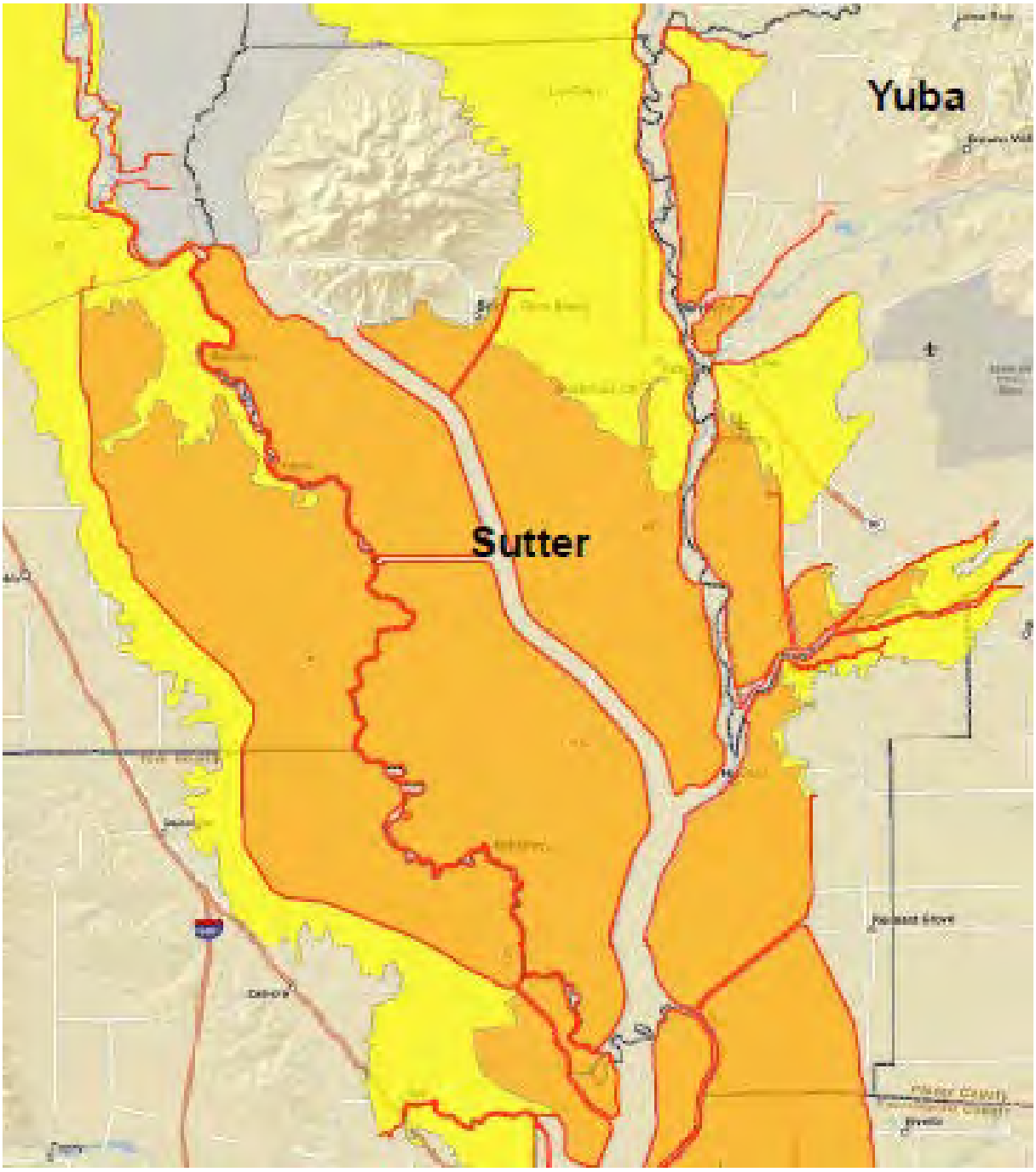
Levee failure flooding would vary in the Planning Area depending on which structure fails and the nature and extent of the failure and associated flooding. This flooding presents a threat to life and property, including buildings, their contents, and their use. Large flood events can affect lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, agricultural industry, and the local and regional economies.

Levee Flood Protection Zones

Levee Flood Protection Zones, previously discussed in Section 4.2.12, estimate the maximum area that may be inundated if a project levee fails when water surface elevation is at the top of a project levee. Zones depicted on Figure 4.83 do not necessarily depict areas likely to be protected from flow events for which project levees were designed. Figure 4.83 illustrates the depths of flooding should a levee that protects that area fail.

Lands within the Levee Flood Protection Zones may be subject to flooding due to various factors, including the failure or overtopping of project or non-project levees, flows that exceed the design capacity of project or non-project levees, and flows from water sources not specifically protected against by project levees. Lands not mapped within a Levee Flood Protection Zone are not invulnerable to flood risk, and some may also experience flooding from these or other related events.

Figure 4.85. Sutter County Planning Area - Expected Flood Depths from Levee Failure based on LFPZs



Levee Flood Protection Zones

- Estimated Depth Greater Than 3' (Numbers shown indicate approximate inundation depths)
- Depth Unknown
- Butte Basin: Not an LFPZ - area is designed to flood. Area shown is based on historical limits of flooding.

- State Federal Project Levee
- County Boundary

Source: DWR, USGS

Values at Risk

Two separate methods of quantifying risk to Sutter County were performed for levee failure:

- Using DFIRM and Q3 data, areas protected by levee were analyzed and the total values at risk to levee failure are shown. The analysis is based on FEMA data and Sutter County Assessor's data.
- Using a Sutter Butte Flood Control Agency levee break study, an analysis of damages due to levee break was performed. The analysis is based on the levee break scenario, base flood elevations, flood depths, and HAZUS.

DFIRM and Q3

Using FEMA flood maps, areas protected by levee were analyzed.

Methodology (DFIRM and Q3)

Levee analysis was completed through the use of the effective FEMA DFIRMs (Figure 4.76), Q3 (Figure 4.77) maps, and levee layers and tables obtained through FEMA and the County. It is important to note the differences in Q3 levee data and DFIRM levee data. Q3 levee data assumes that all levees provide a measure of protection from flood, while DFIRM data only includes levees that provide 100-year flood protection. Parcel analysis was performed in these areas using the converted centroids that intersected the levee areas. The following tables show the break out of parcel centroids for the areas protected by levee as reflected in the FEMA flood mapping data by jurisdiction for the Sutter County Planning Area, and by land use for the unincorporated County. Detailed levee data and analysis is also included for the incorporated communities by land use and is included in their respective annexes. These areas are anticipated to be updated to reflect current levee status based on in progress levee flood control projects at the next DFIRM update for the Sutter County Planning Area.

Based on the DFIRM and Q3 data, there are 1,213 parcels with a value of $286 million in the areas protected by levees in Sutter County Planning Area, as shown in Table 4.68. The extent and depth of actual flooding and associated damage will vary depending on the nature of a levee break or failure. Figure 4.53 shows levee protected areas by land use type in the unincorporated County.

Table 4.70. Sutter County Planning Area – Count and Improved Values in the Area Protected by Levee by Jurisdiction

Jurisdiction/ FEMA Type	Zone	Property Use	Improved Parcel Count	Improved Value	Estimated Contents Value	Total Value
City of Live Oak						
DFIRM/Q3	Zone X By Levee	–	–	–	–	–
City of Yuba City						
Q3	Zone X by Levee	Agricultural	1	$40,430	$40,430	$80,860
Q3	Zone X by Levee	Commercial	6	$3,986,782	$3,986,782	$7,973,564
Q3	Zone X by Levee	Industrial	8	$2,555,535	$3,833,303	$6,388,838
Q3	Zone X by Levee	Institutional	4	$822,588	$822,588	$1,645,176
Q3	Zone X by Levee	Residential	4	$488,401	$244,201	$732,602
Q3	Zone X by Levee	Vacant Land	335	$63,645,895	$0	$63,645,895
Total Yuba City			**358**	**$71,539,631**	**$8,927,303**	**$80,466,934**
Unincorporated County						
DFIRM	Zone X by Levee	Agricultural	16	$150,199	$150,199	$300,398
Q3	Zone X by Levee	Agricultural	175	$3,379,412	$3,379,412	$6,758,824
DFIRM	Zone X by Levee	Commercial	1	$376,466	$376,466	$752,932
Q3	Zone X by Levee	Commercial	19	$2,032,118	$2,032,118	$4,064,236
DFIRM	Zone X by Levee	Industrial	5	$2,425,945	$3,638,918	$6,064,863
Q3	Zone X by Levee	Industrial	30	$33,497,671	$50,246,507	$83,744,178
Q3	Zone X by Levee	Institutional	12	$7,728,061	$7,728,061	$15,456,122
DFIRM	Zone X by Levee	Residential	25	$1,745,330	$872,665	$2,617,995
Q3	Zone X by Levee	Residential	296	$41,092,509	$20,546,255	$61,638,764
DFIRM	Zone X by Levee	Vacant Land	18	$2,028,854	$0	$2,028,854
Q3	Zone X by Levee	Vacant Land	276	$22,845,531	$0	$22,845,531
Total Unincorporated County			**873**	**$117,302,096**	**$88,970,600**	**$206,272,696**
Grand Total			**1,231**	**$188,841,727**	**$97,897,903**	**$286,739,630**

Source: FEMA DFIRM, FEMA Q3, Sutter County 2012 Assessor's Data

Table 4.71. Unincorporated Sutter County – Count and Improved Values in the Area Protected by Levee

FEMA Zone	Property Use	Improved Parcel Count	Improved Value	Estimated Contents Value	Total Value
Zone X by Levee	Agricultural	191	$3,529,611	$3,529,611	$7,059,222
Zone X by Levee	Commercial	20	$2,408,584	$2,408,584	$4,817,168
Zone X by Levee	Industrial	35	$35,923,616	$53,885,424	$89,809,040
Zone X by Levee	Institutional	12	$7,728,061	$7,728,061	$15,456,122
Zone X by Levee	Residential	321	$42,837,839	$21,418,920	$64,256,759
Zone X by Levee	Vacant Land	294	$24,874,385	$0	$24,874,385

FEMA Zone	Property Use	Improved Parcel Count	Improved Value	Estimated Contents Value	Total Value
Total		**873**	**$117,302,096**	**$88,970,600**	**$206,272,696**

Source: FEMA DFIRM, FEMA Q3, Sutter County 2012 Assessor's Data

Sutter County/PBI Levee Break Study

The Sutter Butte Flood Control Agency (SBFCA) and their consultant Peterson Brustad, Inc. (PBI) conducted a composite levee break analysis base flood elevation (BFE) study for areas within the jurisdictional boundaries of SBFCA.

This analysis was completed in order to better understand the flood risk in this area for floodplain management purposes. Updated BFE data for the Sutter County Planning Area developed from the SBFCA/PBI studies are provided in Figures 4.84 and 4.85 for the north and south portions of the County. The BFEs were developed based on a composite levee break analysis. Figure 4.86 shows the levee break locations used for the composite analysis. This figure also indicates flood depths associated with the composite levee break analysis. Utilizing this flood depth data, AMEC was able to develop a potential values at risk and a loss estimate resulting from the composite levee break scenario.

Methodology (PBI Levee Break Study)

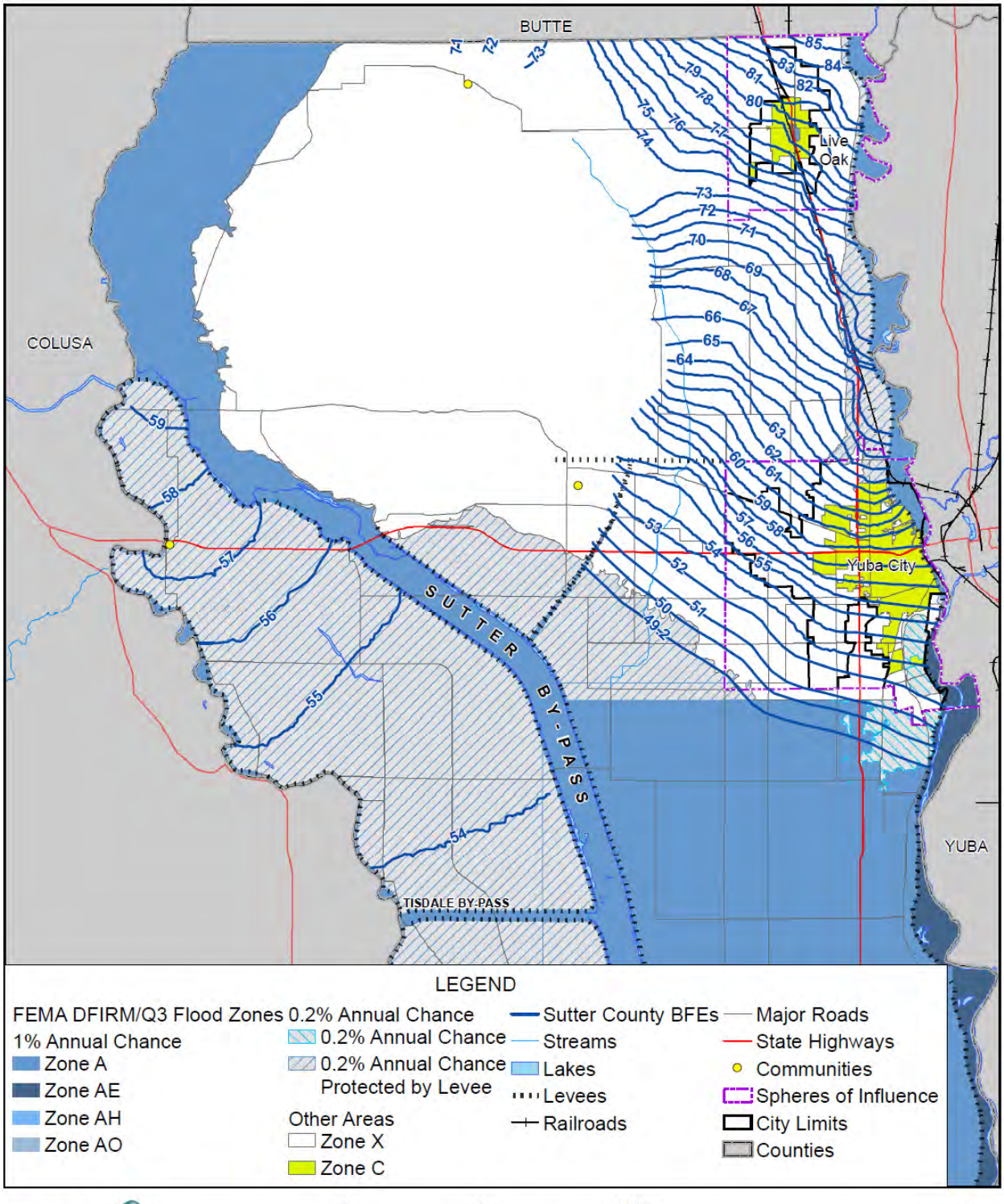
As previously discussed, Sutter County provided a flood depth layer generated from the composite levee break analysis that was converted into a raster and imported into Hazus-MH 2.1 for a Level II flood analysis for the affected areas. In this scenario the flood depth layer will represent a 100-year floodplain. The 100-year floodplain represents a flood that has a 1% chance of being equaled or exceeded in any single year. Hazus-MH generated damage estimates are directly related to depth of flooding and are based on FEMA's depth-damage functions. For example, a two-foot flood generally results in about 25 percent damage to the structure (which translates to 25% of the structure's replacement value). The Hazus-MH flood analysis results provide number of buildings impacted, estimates of the building repair costs, and the associated loss of building contents and business inventory. Building damage can cause additional losses to a community as a whole by restricting the building's ability to function properly. Income loss data accounts for losses such as business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses.

Limitations

Potential losses derived from Hazus-MH use default national databases for buildings and infrastructure and may contain inaccuracies; loss estimates should be used for planning level applications only. The damaged building counts generated are susceptible to rounding errors and are likely the weakest output of the model due to the use of census blocks for analysis. Hazus-MH assumes population and building inventory to be evenly distributed over a census block; flooding may occur in a small section of the census block where there are not actually any

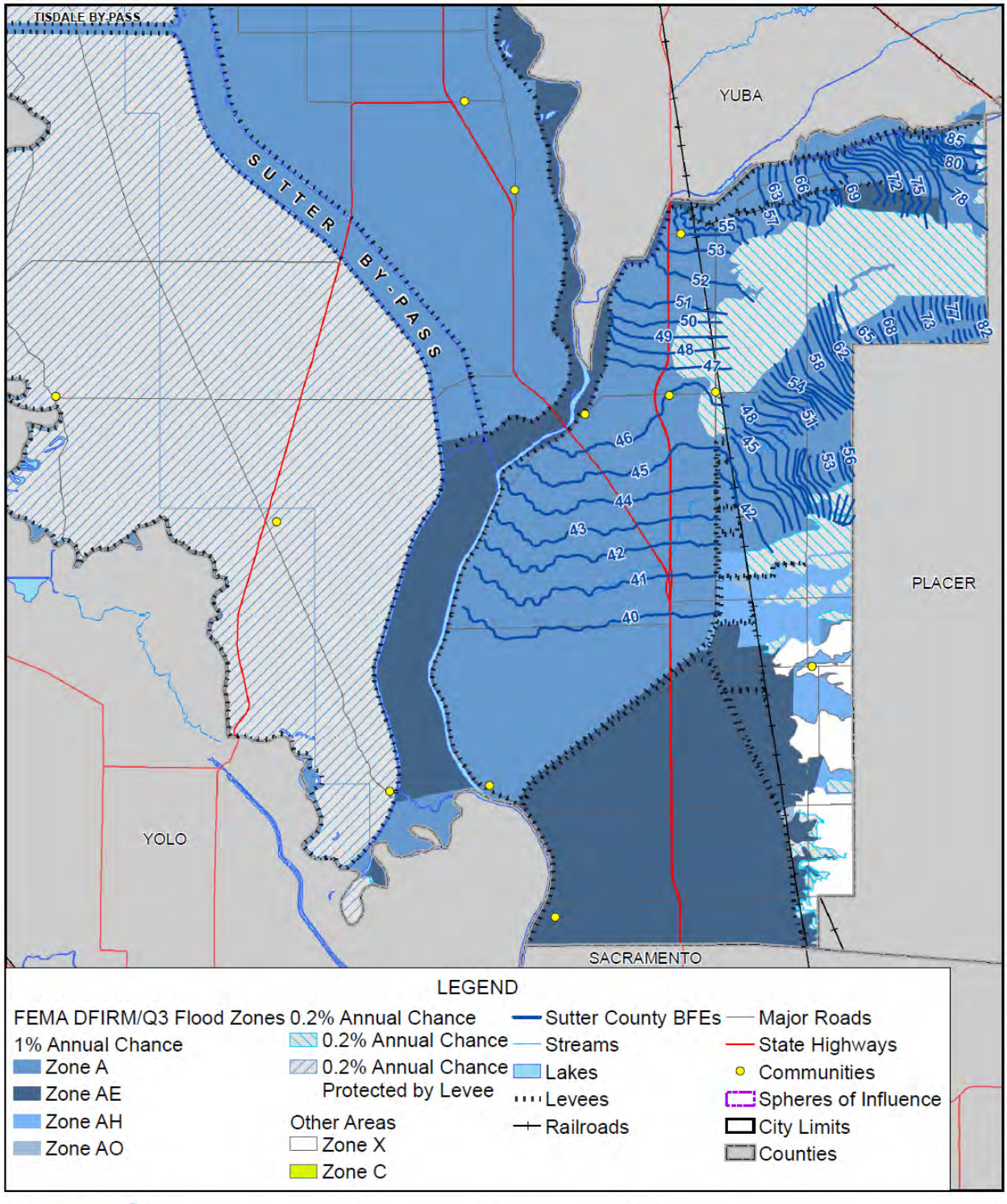
buildings or people, but the model assumes that there is damage to that block. Additional HAZUS-MH Level II analyses based on local building inventory and higher resolution flood depth models could be used in the future to refine and improve the accuracy of the results.

Figure 4.86. Sutter County North Base Flood Elevation



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, FEMA DFIRM 12/02/2008

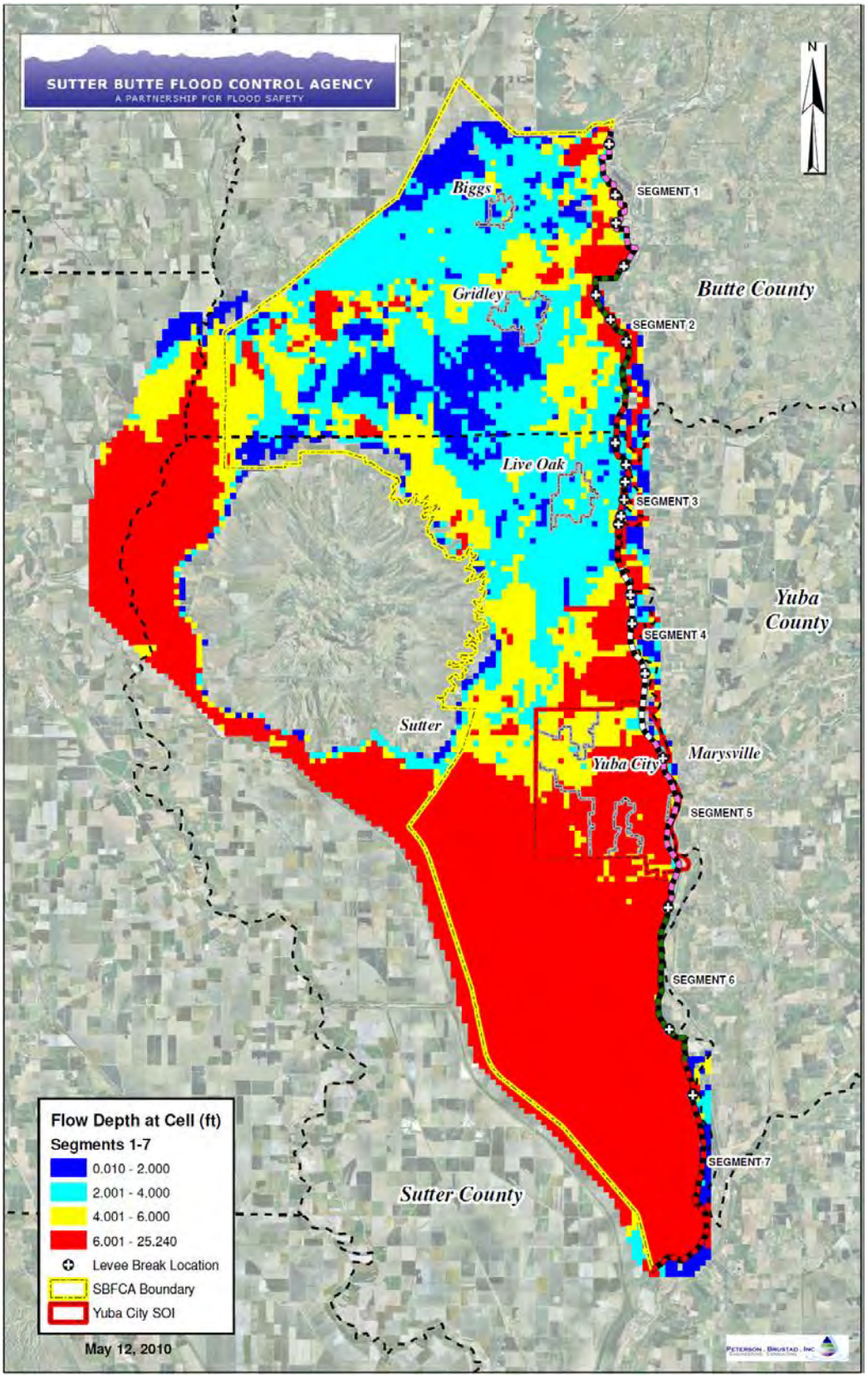
Figure 4.87. Sutter County South Base Flood Elevations



Values at Risk

HAZUS-MH 2.1 was utilized to model levee break scenario losses for Sutter County. The flood depths and levee breaks were from a 2010 levee break scenario done by the Sutter Butte Flood Control Agency and PBI (see Figure 4.86). 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.

Figure 4.88. Sutter County Levee Break Scenario with Flood Depths



The results of the levee break scenario as previously described are captured in Table 4.70. Key losses included the following:

- Total economic loss estimated for the levee break scenario was $2.667 billion, which includes building losses and lifeline losses based on the HAZUS-MH inventory. This is 48.6% of the total replacement value of the buildings in the County.
- Building-related losses, including direct building losses and business interruption losses, totaled $2.659 billion.
- Over 96 percent of the buildings in the County were at least moderately damaged. 1,120 buildings were completely destroyed.

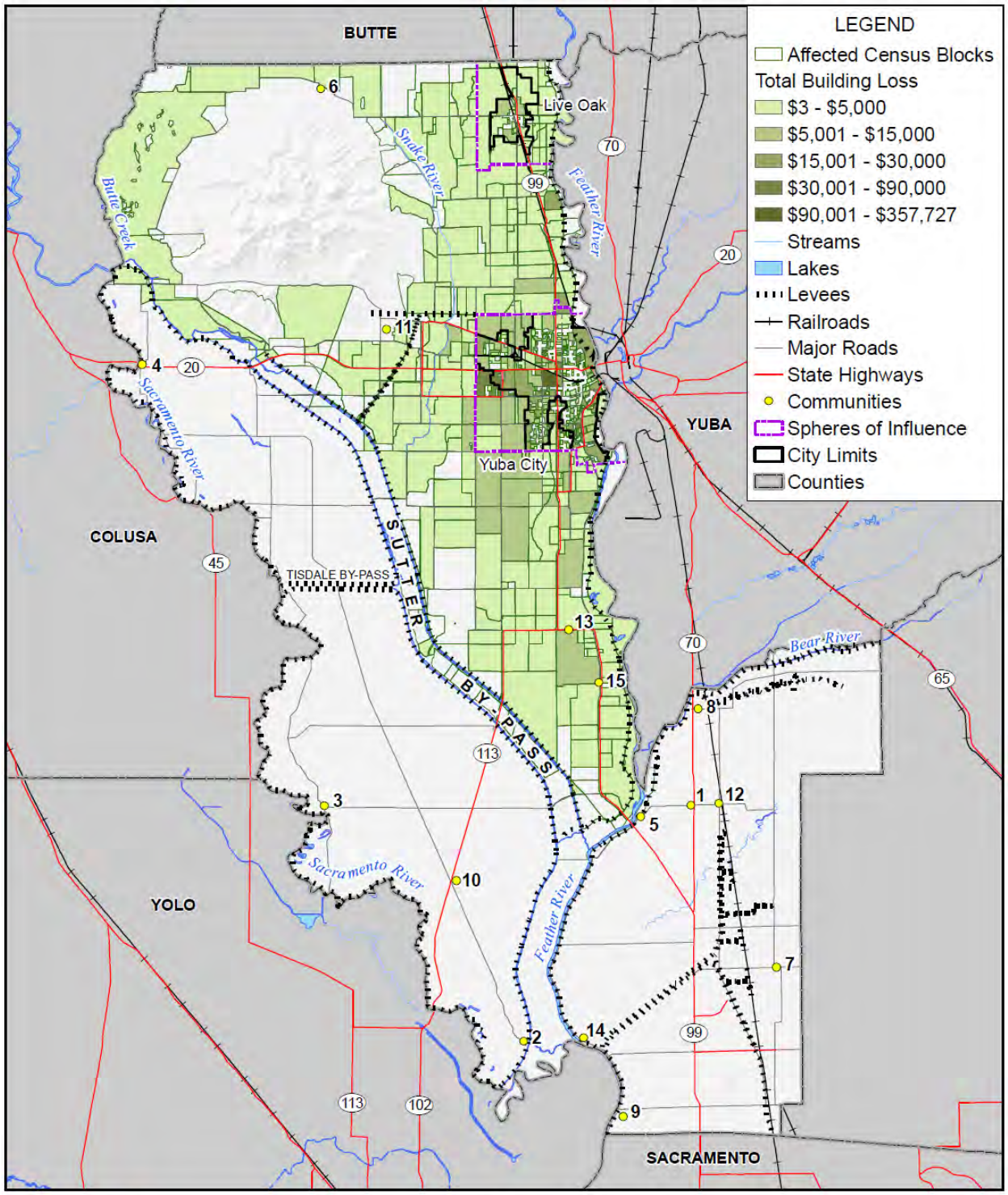
Table 4.72. Sutter County Planning Area - HAZUS-MH Levee Break Scenario Results

Impacts/Levee Break	Levee Break
Residential Buildings Damaged (Based upon 28,000 buildings)	10,055 buildings will be at least moderately damaged. 1,120 buildings will be completely destroyed
Building Related Loss	$2,659,270,000
Total Economic Loss	$2,667,510,000
Essential Facility Damage (Based upon 60 buildings)	38 with at least moderate damage
Displaced Households	23,791
Shelter Requirements	68,545
Debris Generation	180,883 million tons

Source: HAZUS-MH 2.1

Figure 4.87 shows building losses for the levee break scenario shown in Table 4.70.

Figure 4.89. Sutter County Planning Area – Levee Scenario Building Losses



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; USDA NRCS, Hazus-MH 2.1

Flooded Acres

Also of interest is the land area affected by the various flood zones or protected by levee. The following is an analysis of flooded levee protected acres in the County in comparison to total area within the unincorporated county and city limits of each jurisdiction.

Methodology

GIS was used to calculate acres in levee protected areas by FEMA flood zones and land use categories. The Sutter County parcel layer and effective DFIRM and Q3 data were intersected, and each segment divided by the intersection of flood zone and parcels was calculated for acres. This process was conducted for Zone X Protected by Levee areas. The resulting data tables with flooded acreages were then imported into a database and linked back to the original parcels, including total acres and land/improvement values, by parcel number. Once this was completed, each parcel contained acreage values for flooded acre by zone type within the parcel. In some cases, a single parcel had multiple flooded acres values (e.g. parcels overlapping a 1%-0.2% flood chance boundary). In the tables below each flood zone is represented and then split out by land use, their total flooded acres, total improved acres, and percent of improved acres that are levee protected.

Limitations

One limitation of this analysis is that the parcel layer does not contain right-of-ways. Due to this there are voids of land that are not calculated; thus the analysis only represents total parcel acres. The other limitation created by this type of analysis is that improvements are uniformly found throughout the parcel, while in reality, only portions of the parcel are improved, and improvements may or may not fall within the flood zone portion of a parcel; thus, areas of improvements flooded calculated through this method may be higher than those actually seen in a similar real world event.

Tables 4.71 and 4.72 represent a detailed and summary analysis of total acres for each FEMA DFIRM flood zone. Table 4.71 gives summary information for the Planning Area. Table 4.72 gives detailed information by land use for the unincorporated County. This information is available for each jurisdiction in their respective annexes.

Table 4.73. Sutter County Planning Area – Flooded Acres

Jurisdiction	Flood Zone	Total Flooded Acres	Improved Flooded Acres	% of Improved Flooded Acres
Unincorporated County	Zone X by Levee	102,466	32,623	32%
Live Oak	Zone X by Levee	0	0	-
Yuba City	Zone X by Levee	279	220	79%

Source: FEMA DFIRM, Q3

Table 4.74. Unincorporated County – Flooded Acres

Flood Zone	Property Use	Total Flooded Acres	Improved Flooded Acres	% of Improved Flooded Acres
Zone X by Levee	Agricultural	19,058	16,125	85%
	Commercial	54	45	84%
	Industrial	354	271	77%
	Institutional	539	49	9%
	Residential	15,762	15,722	100%
	Unclassified	31	0	0%
	Vacant Land	66,668	410	1%
Total by Levee	**---**	**102,466**	**32,623**	**32%**

Source: FEMA DFIRM, Q3

Population at Risk

A separate analysis was performed to determine population in the levee protected area of the DFIRMs and Q3 maps. Using GIS, the levee protected areas were overlaid on the improved residential parcel data. Those parcel centroids that intersect the levee protected area were counted and multiplied by the 2010 Census Bureau average household factors for each jurisdiction and unincorporated area. Results were tabulated by jurisdiction (see Table 4.73). According to this analysis, there is a total population of 969 people residing in the levee protected areas.

Table 4.75. Sutter County Planning Area - Area Protected by Levee – Improved Residential Parcels and Population

Jurisdiction	Improved Residential Parcels	Population*
Unincorporated	321	957
Live Oak	0	0
Yuba City	4	12
Total	**325**	**969**

Source: DFIRM, US Census Bureau, Sutter County 2012 Assessor's Data

* Average household populations from the 2010 US Census were used: Sutter County – 2.98; Live Oak – 3.42; Yuba City – 2.99

Critical Facilities at Risk

A separate analysis was performed on the critical facility inventory in Sutter County and all jurisdictions to determine critical facilities in the levee protected areas. Using GIS, the DFIRM and Q3 flood zones were overlayed on the critical facility location data. Figure 4.80 in Section 4.3.6 shows critical facilities, as well as the DFIRM and Q3 levee protected areas. Table 4.74 details critical facilities by facility type and count. Details of critical facility definition, type, name and address and jurisdiction by flood zone are listed in Appendix E.

Table 4.76. Sutter County Planning Area – Critical Facilities in Levee Protected Areas

Flood	Category	Type	Facility Count
City of Live Oak			
None			
		Total X by Levee	**0**
City of Yuba City			
X by Levee	Essential Services Facilities	Communications	1
		Storm Water Facility	1
		Total X by Levee	**2**
Unincorporated Sutter County			
X by Levee	At Risk Population Facilities	Assisted Living Facility	1
	Essential Services Facilities	Bridge	38
		Communications	10
		Fire Station	3
		Government Facility	4
		Paved Airstrip	3
		Waste Water Treatment	1
		Water Supply	2
	Hazardous Materials Facilities	Hazardous Materials Facilities	6
	Multiple Categories	School / Emergency Shelter	3
		Total X by Levee	**71**

Source: Sutter County GIS, FEMA DFIRM, Q3

Cultural and Natural Resources at Risk

The Sutter County Planning Area has significant cultural and natural resources located throughout the County as previously described. Vulnerability analysis of these resources was not possible due to data limitations.

Development Trends

To determine potential development constraints based on the location of future development areas relative to the FEMA flood zones, additional analysis was performed using GIS. For each community, the future development areas, overlain with the General Plan land use diagrams, were intersected with the FEMA flood zones to identify future areas of development in levee protected areas. Table 4.77 provides a parcel level analysis of the future development areas by flood zone. These are shown in Figure 4.82 in the flood vulnerability section.

Table 4.77. Future Development in Sutter County by Flood Zone

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Areas Protected by Levee Flood Zone						
Employment Corridors	Employment Corridors	18	14	$2,245,009	$3,051,201	$5,296,210
	Total	**18**	**14**	**$2,245,009**	**$3,051,201**	**$5,296,210**
Rural Community of Sutter	Agriculture (40 acre min)	2	1	$278,000	$170,714	$448,714
	Agriculture (80 acre min)	13	10	$928,517	$1,385,644	$2,314,161
	Food Processing, Ag & Rec Combining District	11	7	$1,817,437	$2,777,697	$4,595,134
	Industrial	1	1	$763,750	$109,161	$872,911
	Total	**27**	**19**	**$3,787,704**	**$4,443,216**	**$8,230,920**
	Grand Total	45	33	$6,032,713	$7,494,417	$13,527,130

Source: Sutter County GIS, FEMA DFIRM, Q3

New development in Sutter County's Special Flood Hazard Areas (i.e. within 100-year floodplains) is limited to wet-floodproofed agricultural structures and to structures that are elevated above the Base Flood Elevation. In both cases, these new structures should be protected against damage from future floods.

Overall Community Impact

The overall impact to the community from levee breach or failure includes:

- Injury and loss of life;
- Commercial and residential structural damage;
- Disruption of and damage to public infrastructure;
- Health hazards associated with mold and mildew;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community;
- Negative impact on commercial and residential property values;
- Long dewatering periods; and
- Significant disruption to students and teachers as temporary facilities and relocations would likely be needed.

4.3.10 Marine Invasive Species Vulnerability Assessment

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

Past occurrences of marine invasive species in the County are limited. There are small measurable past impacts to the County. However, the risk of marine invasive species exists and if a breakout occurs, there may be potentially large economic impacts. Thus there are always active weed management areas and aquatic weed control.

Future Development

Future development in the County is not likely to have an impact on marine invasive species in Sutter County.

4.3.11 Severe Weather: Extreme Cold and Freeze Vulnerability Assessment

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

Extreme cold and freeze can occasionally be 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. The ability for the County to continue to operate during periods of winter storm and freeze is paramount. Although freeze can burst pipes, freeze normally does not impact structures, but is a life safety issue. Vulnerable populations to freeze include:

- Homeless
- Infants and children under age five
- Elderly (65 and older)
- Individuals with disabilities
- Individuals dependant on medical equipment
- Individuals with impaired mobility

Areas prone to excessively cold temperatures are identified normally on a nation-wide assessment scale, which doesn‘t allow detailed results on specific structures. 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.

In addition to vulnerable populations, pets and livestock are at risk to freeze and cold. However many residents of Sutter County are self sufficient and accustomed to rural living and the climate

extremes that are part of the territory. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme cold.

Freeze can also affect farmers. Extended periods of cold/freeze can prevent trees from pollinating properly. However, during the winter/freeze months, many of the crops aren't even in the ground to be affected. High value crops, such as almond and citrus trees, can be severely damaged by freeze, causing large economic issues for farmers and the businesses they support.

Development Trends

Future development built to code should be able to withstand freeze. Pipes at risk of freezing should be mitigated by either burying or insulating them from freeze as new facilities are improved or added. Vulnerability to extreme cold will increase as the average age of the population in the County shifts. Greater numbers of future senior citizens will result from the large number of baby boomers in the Planning Area. As identified in the existing development discussion above, many of the residents of Sutter County are self sufficient and accustomed to rural living.

4.3.12 Severe Weather: Extreme Heat Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

Heat waves do not cause damage or elicit the immediate response that floods, fires, earthquakes, and other disasters do. They have, however, claimed many lives in comparison with other disasters. For example, the 1989 Loma Prieta Earthquake resulted in 63 deaths while the 1992 Northridge Earthquake was responsible for the loss of 55 lives. The catastrophic 2003 Southern California Firestorms resulted in 24 deaths. However, the worst single heat wave event in California occurred in Southern California in 1955, when an eight-day heat wave is said to have resulted in 946 deaths. 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. Heat events illustrate how seemingly unrelated phenomena combine to create disaster. For example, the increased use of air conditioners during heat waves can lead to power outages, which makes the events even more deadly.

Situational and physical characteristics help to identify vulnerable populations that may not comfortably or safely access and use disaster resources. Specifically, when discussing heat-related emergency preparedness, the following groups could be considered vulnerable or at greater risk in a heat emergency:

- Infants and small children under age three
- Women who are pregnant

- Elderly people (age 65 and older)
- The obese
- The bedridden
- Mentally ill
- Those with cognitive disorders
- Those with medical conditions (e.g., heart disease, diabetes, high blood pressure)
- Those requiring life-saving medications (e.g., for high blood pressure, depression, insomnia)
- Individuals with drug or alcohol addictions
- Those with mobility constraints
- People who are non-ambulatory
- Those under extreme working conditions
- The poor
- People who are socially isolated
- Non-English speakers who may not have access to information

Animals, including domestic pets, livestock, and poultry are also susceptible to extreme heat. For example, dogs and cats are in danger of heat stroke in temperatures of 110°F. The heat wave of 2006 resulted in 15 reported pet deaths and more than 25,000 cattle, and 700,000 fowl heat-related deaths in the State of California. With extended periods of high heat, crop yield can be reduced; plants are just trying to sustain themselves instead of growing/flourishing.

Development Trends

As the County continues to grow and population age shifts occur, more people may be at risk to the affects of extreme heat. Locating cooling shelters and educating the citizens of Sutter County on the dangers of extreme heat will help reduce loss of life from extreme heat.

4.3.13 Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely
Vulnerability—High

According to historical hazard data, severe weather is an annual occurrence in Sutter County. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrences in the County. Wind, hail, and lightning often accompany these storms and have caused damage in the past. However, actual damage associated with the primary effects of severe weather has been limited. It is the secondary hazards caused by weather, such as floods, fire, and agricultural losses that have had the greatest impact on the County. The risk and vulnerability associated with these secondary hazards are discussed in other sections of this plan

(Section 4.3.6 Flood: 100/200/500-year, Section 4.3.7 Flood: Localized, Section 4.3.8 Levee Failure, and Section 4.2.17 Wildfire).

Development Trends

New critical facilities such as communications towers should be built to withstand hail damage, lightning, and thunderstorm winds. It is difficult to quantify future deaths and injuries due to lightning. Future losses to new development should be minimal.

4.3.14 Wildfire Vulnerability Assessment

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

Risk and vulnerability to the Sutter County Planning Area from wildfire is of concern, with some areas of the Planning Area being at greater risk than others as described further in this section. High fuel loads in the Planning Area, along with geographical and topographical features, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and sometimes catastrophic fires. During the May to October fire season, the dry vegetation and hot and sometimes windy weather, combined with continued growth in the WUI areas, results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire. As development continues throughout the Planning Area, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

The National Fire Plan is a cooperative, long-term effort between various government agency partners with the intent of actively responding to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future. For purposes of the National Fire Plan, the California Department of Forestry and Fire Protection (CAL FIRE) generated a list of California communities at risk for wildfire. The intent of this assessment was to evaluate the risk to a given area from fire escaping off federal lands. Three main factors were used to determine the wildfire threat in the wildland-urban interface areas of California: fuel hazards, probability of fire, and areas of suitable housing density that could create wildland urban interface fire protection strategy situations. The preliminary criteria and methodology for evaluating wildfire risk to communities is published in the Federal Register, January 4, 2001. The National Fire Plan identifies the following 2 “Communities at Risk” in Sutter County in Table 4.75.

Table 4.78. Communities at Risk in Sutter County

Community	Federal Threat	Federally Regulated	Year
Live Oak	N	N	2001
Yuba City	N	N	2001

Source: California Fire Alliance

Methodology

State Responsibility Area

CAL FIRE has a legal responsibility to provide fire protection on all State Responsibility Area (SRA) lands, which are defined based on land ownership, population density and land use. CAL FIRE is now responsible for determining parcels subject to the SRA Fire Prevention Fee under AB X1 29. This dataset (sra11_2) represents SRA status as of 7/1/12 and was used for the final determination of which parcels were potentially eligible for the fee. CAL FIRE's State Responsibility Area layer was used in this analysis to show Sutter County's values, inventory and population by Local Responsibility Area (LRA), State Responsibility Area (SRA) and Federal Responsibility Area (FRA). There is no SRA in the County. The FRA is a very small area which includes no residential housing and only one improved parcel. The LRA has 33,944 parcels with 29,011 having an improved value of $7.2 billion for Sutter County. Fire does not just affect structural values it can also affect land values so the Assessor's land values were accounted for in this analysis and all parcels were used in the analysis to represent total county values at risk; however, the whole county will never be on fire at once. Results can be seen in Table 4.76. Locations of each responsibility area are shown in Figure 4.88.

Figure 4.90. Sutter County LRA, SRA, and FRA Wildfire Areas

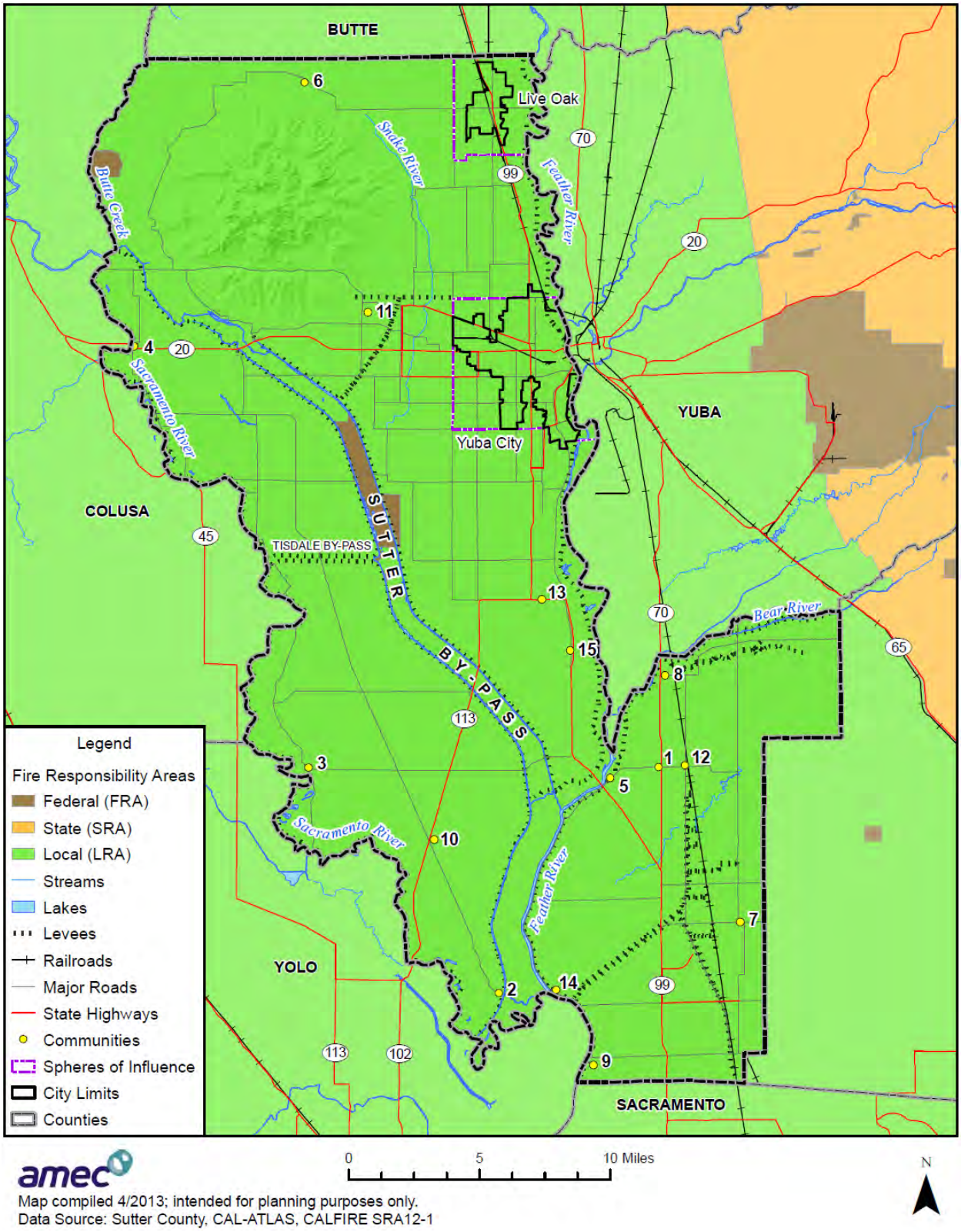


Table 4.79. Sutter County Planning Area - Assets in Local, State, and Federal Responsibility Areas by Land Use

Land Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value
Local Responsibility Area					
Agriculture	2,693	1,386	$487,657,955	$49,630,227	$537,288,182
Commercial	1,229	1,045	$301,323,207	$701,360,806	$1,002,684,013
Industrial	602	450	$81,243,685	$566,699,829	$647,943,514
Residential	826	226	$47,397,863	$149,168,810	$196,566,673
Unclassified	4,374	4,362	$429,355,269	$710,855,937	$1,140,211,206
Vacant Land	42	0	$6,000	$0	$6,000
Total	**24,228**	**21,542**	**$1,114,146,824**	**$2,587,887,068**	**$3,702,033,892**
Federal Responsibility Area					
Institutional	33	1	$3,949,980	$9,000	$3,958,980
Total	**33**	**1**	**$3,949,980**	**$9,000**	**$3,958,980**
Grand Total	**34,027**	**29,012**	**$2,465,080,783**	**$4,765,611,677**	**$7,230,692,460**

Source: Cal FIRE, Sutter County Assessor's 2012 Data

Fire Hazard Severity

CAL FIRE mapped the SRA Fire Hazard Severity Zones (FHSZs), or areas of significant fire hazard, based on fuels, terrain, weather, and other relevant factors. Zones are designated with Very High, High, Moderate, Non-Wildland/Urban and Urban Unzoned hazard classes. The goal of this mapping effort is to create more accurate fire hazard zone designations such that mitigation strategies are implemented in areas where hazards warrant these investments. The fire hazard zones will provide specific designation for application of defensible space and building standards consistent with known mechanisms of fire risk to people, property, and natural resources.

CAL FIRE also mapped the LRA Very High Fire Hazard Severity Zones (VHFHSZ). Mapping of these areas is based on data and models of potential fuels over a 30-50 year time horizon and their associated expected fire behavior, and expected burn probabilities to quantify the likelihood and nature of vegetation fire exposure (including firebrands) to buildings. The California Building Commission adopted California Building Code Chapter 7A requiring new buildings in VHFHSZs to use ignition resistant construction methods and materials. These new codes include provisions to improve the ignition resistance of buildings, especially from firebrands. The updated very high fire hazard severity zones will be used by building officials for new building permits in LRA. The updated zones will also be used to identify property whose owners must comply with natural hazards disclosure requirements at time of property sale and 100 foot defensible space clearance. It is likely that the fire hazard severity zones will be used for updates to the safety element of general plans.

The combination of the "Recommended" FHSZ and VHFHSZ layers yielded gaps in data for Sutter County so the draft FHSZ map was used to supplement these areas to get a complete coverage of Fire Hazards.

Analysis was performed using these three datasets. Using GIS, the parcel layer were overlaid on the FHSZ, VHFHSZ and the Draft FHSZ layers. For the purposes of this analysis, if the parcel centroid intersects the zone's area, it will be assumed that the entire parcel is in that area. This analysis illustrates the Fire Hazard Severity Zones specific to the Planning Area.

Values at Risk

Results are presented by total Planning Area, unincorporated county, and by jurisdiction (in their respective annexes), and detailed tables show improved parcel counts and their structure values by property use (residential, industrial, etc.) within each severity zone. According to the information in Table 4.78, there are no very high or high fire severity zones within Sutter County. The highest fire severity ranking is moderate. Unincorporated Sutter County and Yuba City are the two jurisdictions with assets in this zone. The rest of the County is in non-wildland/non-urban or urban unzoned severity areas.

Analysis results for the entire Sutter County Planning Area are summarized in Table 4.77, which summarizes total parcel counts, improved parcel counts and their structure values by property use as well as the percents of parcels affected by each fire severity zone. Table 4.78 breaks out the details of fire severity class and property use type for the unincorporated County. Fire severity was shown in Figure 4.59 in Section 4.2.17

Table 4.80. Sutter County Planning Area - Count and Value of Improved Parcels by Fire Severity Class

Fire Severity/ Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value	% of Affected Parcels to Total
Moderate Fire Severity						
Yuba City	171	166	$6,094,240	$24,119,429	$30,213,669	1%
Unincorporated	672	327	$60,942,943	$39,123,788	$100,066,731	2%
Total	**843**	**493**	**$67,037,183**	**$63,243,217**	**$130,280,400**	**2%**
Non-Wildland/Non-Urban Fire Severity						
Live Oak	157	32	$13,301,407	$3,542,862	$16,844,269	0.5%
Yuba City	106	72	$54,662,113	$68,755,747	$123,417,860	0.3%
Unincorporated	7,233	4,436	$1,213,087,311	$933,003,731	$2,146,091,042	21%
Total	**7,496**	**4,540**	**$1,281,050,831**	**$1,005,302,340**	**$2,286,353,171**	**22%**
Urban Unzoned Fire Severity						

Fire Severity/ Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value	% of Affected Parcels to Total
Live Oak	2,543	2,186	$60,988,784	$210,595,326	$271,584,110	7%
Yuba City	18,522	17,668	$884,141,335	$2,987,716,045	$3,871,857,380	54%
Unincorporated	4,623	4,125	$171,862,650	$498,754,749	$670,617,399	14%
Total	**25,688**	**23,979**	**$1,116,992,769**	**$3,697,066,120**	**$4,814,058,889**	**75%**
Grand Total	**34,027**	**29,012**	**$2,465,080,783**	**$4,765,611,677**	**$7,230,692,460**	**100%**

Source: Sutter County Assessor's 2012 Data; CAL FIRE

Table 4.81. Unincorporated Sutter County - Count and Structure Value of Improved Parcels by Fire Severity Class and Property Use

Fire Threat Class	Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value	% of Affected Parcels to Total
Moderate	Agricultural	256	72	$28,349,452	$7,292,477	$35,641,929	2%
	Commercial	7	6	$1,228,636	$735,922	$1,964,558	0.06%
	Industrial	27	8	$2,090,321	$1,835,766	$3,926,087	0.2%
	Institutional	71	8	$5,232,708	$408,985	$5,641,693	0.6%
	Residential	125	125	$13,929,715	$15,573,653	$29,503,368	1%
	Unclassified	1	0	$0	$0	$0	0.01%
	Vacant Land	185	108	$10,112,111	$13,276,985	$23,389,096	1.5%
	Total	**672**	**327**	**$60,942,943**	**$39,123,788**	**$100,066,731**	**5.4%**
Non-Wildland/Non-Urban	Agricultural	2,323	1,289	$441,121,924	$41,965,233	$483,087,157	19%
	Commercial	60	47	$8,410,025	$18,274,733	$26,684,758	0.5%
	Industrial	110	77	$16,222,554	$425,351,966	$441,574,520	0.9%
	Institutional	273	45	$10,957,123	$18,972,738	$29,929,861	2%
	Residential	2,147	2,139	$326,521,532	$338,899,438	$665,420,970	17%
	Unclassified	14	0	$0	$0	$0	0.1%
	Vacant Land	2,306	839	$409,854,153	$89,539,623	$499,393,776	18%
	Total	**7,233**	**4,436**	**$1,213,087,311**	**$933,003,731**	**$2,146,091,042**	**58%**

Fire Threat Class	Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value	% of Affected Parcels to Total
Urban Unzoned	Agricultural	41	8	$3,182,796	$103,801	$3,286,597	0.3%
	Commercial	88	70	$9,350,765	$21,581,257	$30,932,022	0.7%
	Industrial	58	44	$5,740,801	$18,103,571	$23,844,372	0.5%
	Institutional	190	39	$4,234,727	$9,050,947	$13,285,674	1.5%
	Residential	377	374	$17,025,720	$40,589,937	$57,615,657	3%
	Unclassified	7	0	$0	$0	$0	0.06%
	Vacant Land	3,862	3,590	$132,327,841	$409,325,236	$541,653,077	31%
	Total	**4,623**	**4,125**	**$171,862,650**	**$498,754,749**	**$670,617,399**	**37%**
	Grand Total	**12,528**	**8,888**	**$1,445,892,904**	**$1,470,882,268**	**$2,916,775,172**	**100.00%**

Source: Sutter County Assessor's 2012 Data; CAL FIRE

Population at Risk

The Fire Severity dataset was overlayed on the residential population data. Those parcel centroids that intersect the severity zones were counted and multiplied by the 2010 Census Bureau average household factors for each jurisdiction and unincorporated area. Results were tabulated by jurisdiction. According to this analysis, there is a total population of 13,097 residents of Sutter County Planning Area at risk to wildfire. This is shown in Table 4.79. Individual jurisdiction numbers are shown in their respective annexes.

Table 4.82. Sutter County Planning Area - Count of Improved Residential Parcels and Population in Fire Severity Zone

Fire Threat Class	Improved Residential Parcels	Population*
Very High	–	–
High	–	–
Moderate	125	373
Non-Wildland/Urban	2,167	6,465
Urban Unzoned	2,070	6,229
Total	**4,362**	**13,067**

Source: Sutter County 2012 Assessor's Data; CAL FIRE

* Average household populations from the 2010 US Census were used: Sutter County – 2.98; Live Oak – 3.42; Yuba City – 2.99

Table 4.83. Unincorporated Sutter County - Count of Improved Residential Parcels and Population in Fire Severity Zone

Fire Severity Class	Improved Residential Parcels	Population*
Very High	–	–
High	–	–
Moderate	125	373
Non-Wildland/Urban	2,139	6,374
Urban Unzoned	374	1,115
Total	**2,513**	**7,489**

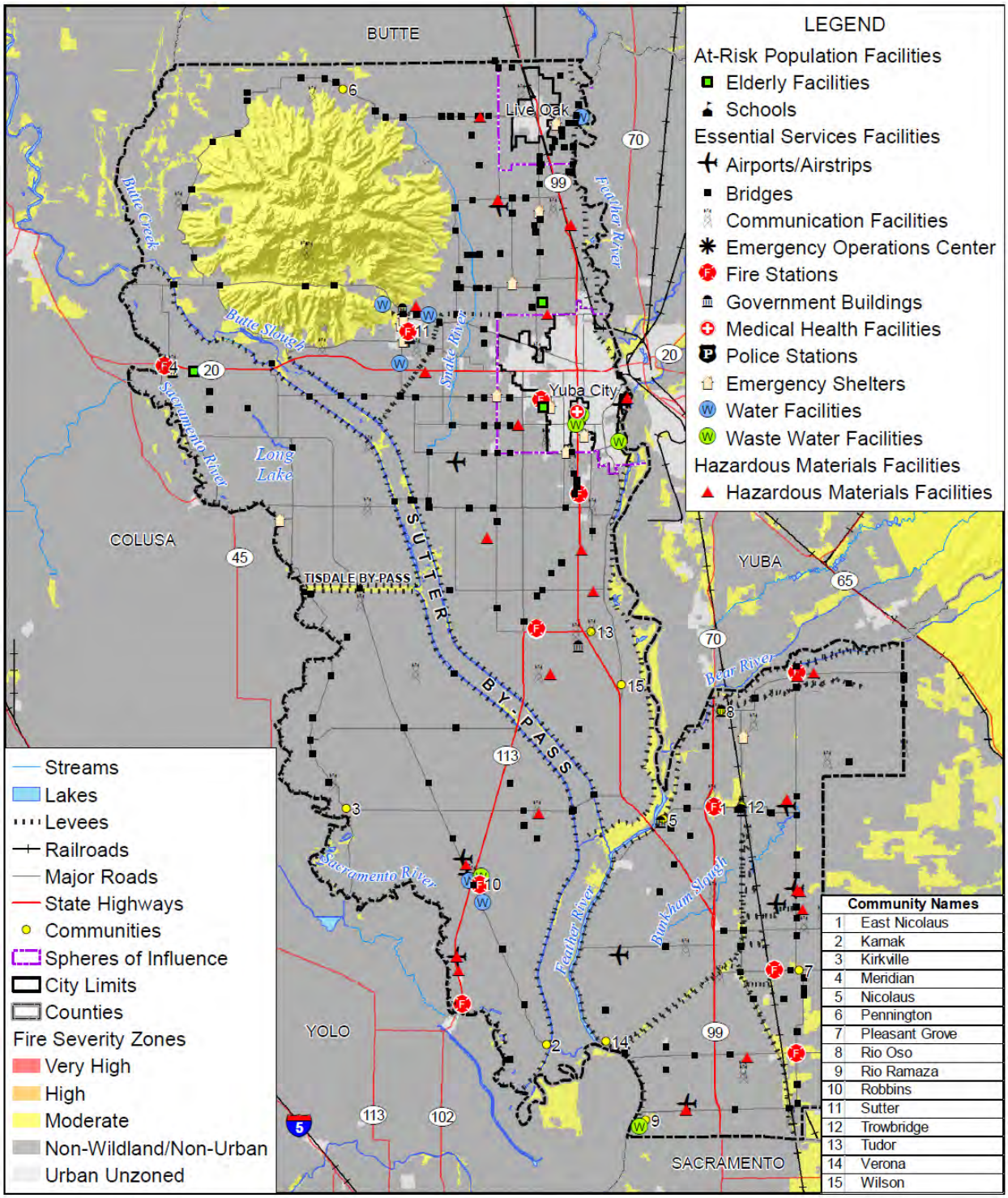
Source: Sutter County 2012 Assessor's Data; CAL FIRE

* Average household populations from the 2010 US Census were used: Sutter County – 2.98; Live Oak – 3.42; Yuba City – 2.99

Critical Facilities at Risk

Wildfire analysis was performed on the critical facility inventory in Sutter County and all jurisdictions. GIS was used to determine whether the facility locations intersect a wildfire hazard areas provided by CAL FIRE, and if so, which zone it intersects. This is shown on Figure 4.89. There are no facilities in the very high fire or high fire severity zone, and 23 facilities in the moderate fire severity zone, as shown in Table 4.81. All of the facilities in the moderate fire severity zone are located in the unincorporated County. Details of critical facility definition, type, name, address, and jurisdiction by fire severity zone are listed in Appendix E.

Figure 4.91. Sutter County Planning Area – Critical Facilities in the Fire Severity Zones



Map compiled 5/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, CALFIRE: SRA 11/7/2007, LRA 5/2008, FRA & LRA 8/2007 DRAFT

Table 4.84. Sutter County Planning Area – Critical Facilities in the Fire Severity Zones

Fire	Category	Type	Facility Count
City of Live Oak			
None			
		Total Fire	**0**
City of Yuba City			
None			
		Total Fire	**0**
Unincorporated Sutter County			
Moderate	Essential Services Facilities	Bridge	11
		Communications	7
		Fire Station	2
		Government Facility	1
		Seepage Water Facility	1
		Water Supply	1
		Total Moderate	**23**

Source: Sutter County GIS; CAL FIRE

Cultural and Natural Resources at Risk

Sutter County has substantial cultural and natural resources located throughout the County as previously described. In addition, there are other natural resources at risk when wildland-urban interface fires occur. One is the watershed and ecosystem losses that occur from wildland fires. This includes impacts to water supplies and water quality as well as air quality. Another is the aesthetic value of the area. Major fires that result in visible damage detract from that value. Other assets at risk include wildland recreation areas, wildlife and habitat areas, and rangeland resources. The loss to these natural resources can be significant.

Development Trends

Population growth and development in Sutter County is on the rise. Additional growth and development within the area of the Sutter Buttes and other non-urban areas would place additional assets at risk to wildfire.

Overall Community Impact

The overall impact to the community from a severe wildfire includes:

- Injury and loss of life;
- Commercial and residential structural damage;
- Decreased water quality in area watersheds;
- Increase in post-fire hazards such as flooding, sedimentation, and mudslides;

- Damage to natural resource habitats and other resources, such as timber and rangeland;
- Loss of water, power, roads, phones, and transportation, which could impact, strand, and/or impair mobility for emergency responders and/or area residents;
- Economic losses (jobs, sales, tax revenue) associated with loss of commercial structures;
- Negative impact on commercial and residential property values;
- Loss of churches, which could severely impact the social fabric of the community;
- Loss of schools, which could severely impact the entire school system and disrupt families and teachers, as temporary facilities and relocations would likely be needed; and
- Impact on the overall mental health of the community.

4.4 Sutter County's Mitigation Capabilities

Thus far, the planning process has identified the natural hazards posing a threat to the 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 mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the County's net vulnerability to disasters, and more accurately focuses the goals, objectives, and proposed actions of this plan.

The HMPC used a two-step approach to conduct this assessment for the County. First, an inventory of common mitigation activities was made through the use of a matrix. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken if deemed appropriate. Second, the HMPC conducted an inventory and review of existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This section presents Sutter County's mitigation capabilities and discusses select state and federal mitigation capabilities that are applicable to the Sutter County Planning Area. Information about capabilities specific to the other participating jurisdictions can be found in the annexes.

Similar to the HMPC's effort to describe hazards, risks, and vulnerability of Sutter County, this mitigation capability assessment describes the County's existing capabilities, programs, and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. 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 outreach and partnerships are discussed in Section 4.4.4. A discussion of other mitigation efforts follows in Section 4.4.5.

4.4.1 Sutter County's Regulatory Mitigation Capabilities

Table 4.82 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities, and indicates those that are in place in Sutter County. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 4.85. Sutter County Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan	Y	3/2011	
Zoning ordinance	Y	3/2013	

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
Subdivision ordinance	Y	3/2013	
Growth management ordinance	N		
Floodplain ordinance	Y		
Other special purpose ordinance (stormwater, steep slope, wildfire)	N		
Building code	Y	2009	State of California Building Code
BCEGS Rating	Y		3/3
Fire department ISO rating	N		Rating:
Erosion or sediment control program	Y		
Stormwater management program	Y		
Site plan review requirements			
Capital improvements plan	Y		
Economic development plan	Y		
Local emergency operations plan	Y	2011	
Community Wildfire Protection Plans			
Flood insurance study or other engineering study for streams	Y	12/2/2008	
Elevation certificates			
Other			

Source: AMEC Data Collection Guide

As indicated in the table above, Sutter County has several plans and programs that guide the County's mitigation of development of hazard-prone areas. Starting with the Sutter 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.

Sutter County General Plan (2010)

The Sutter County General Plan is a comprehensive, long-term framework for the protection of the County's agricultural, natural, and cultural resources and for development in the County. Designed to meet state general plan requirements, it outlines policies, standards, and programs and sets out plan proposals to guide day-to-day decisions concerning Sutter County's future. It is a legal document that serves as the County's blueprint for land use and development. It is broken into the following sections:

- Land Use Element
- Agriculture Element
- Economic Development Element
- Mobility Element
- Infrastructure Element
- Public Services Element

- Environmental Resources Element
- Public Health and Safety Element
- Noise Element

Goals and policies related to mitigation of natural hazards can be found in the discussion below. Not all elements in the General Plan have related goals and policies for the mitigation of natural hazards. Only those elements that do are discussed below.

Land Use Element

The Land Use Element of the General Plan establishes guidance for the ultimate pattern of conservation and growth in unincorporated Sutter County. It provides direction regarding how lands are to be used, what areas will be conserved, where growth will occur, the density/intensity and physical form of that growth, and key design considerations.

Goals

The related mitigation goals and policies of the Land Use element are:

GOAL:	**Goal LU-1 Promote the efficient and sensitive use of lands to protect and enhance Sutter County's quality of life and meet the needs of existing and future residents and businesses.**
Objective:	Identification of Floodplains. Identify the unincorporated areas of Sutter County that are subject to flooding, and evaluate and regulate development within these areas according to state and federal regulations to minimize the loss of life and damage to property caused by potential flood events.
Objective:	Climate Action Plan. Require new development to demonstrate consistency with the County's Climate Action Plan to reduce greenhouse gas emissions.

GOAL:	**GOAL LU 4 Facilitate orderly, well-planned, sustainable, and efficient growth that balances aesthetic, functional, resource, and economic considerations.**
Objective:	Growth Areas. Direct future growth and development to the growth areas identified on the land use map.

Specific Plans

There are two areas in the County that is intended for development under a Specific Plan. A "Specific Plan" is defined in the California Government Code (Section 65450 et seq) as a legal tool for detailed design and implementation of a defined portion of the area covered by a General Plan. A Specific Plan includes detailed regulations, conditions, programs, and/or proposed legislation that are needed to implement General Plan designations and policies on a particular site. The underlying designations for these areas shall remain in effect until and unless the Specific Plan is adopted, at which point the land use designations in that Plan will replace the designations in this General Plan. The specific plans in the County are:

- Lincoln East Specific Plan

- Sutter Point Specific Plan

Rural Planned Communities

Two potential Rural Planned Communities, one in the community of Sutter and the other overlapping the communities of East Nicolaus and Trowbridge. These areas are subject to future comprehensive planning processes to establish new mixed-use communities, provide a full level of public services, and consider possible incorporation as new cities.

Agriculture Element

Sutter County agriculture benefits from rich soils, water availability, climate favorable to a variety of crops, transportation infrastructure, proximity to centers of research, adjacency to other agricultural counties, and a history of generational family farming. At the same time, agriculture in the County faces growing pressures from urbanization, higher production costs, lower commodity prices, and increasing regulations. Careful land use decision-making and economic development strategies are essential to minimize the conversion of productive agricultural land, maximize new commodity and processing opportunities, and reinforce the agricultural economy. This element of the General Plan provides direction regarding: the preservation of agricultural lands; minimizing conflicts between agricultural operations and other uses; preservation of natural resources for agriculture; expansion and diversification of agricultural industries; and promotion of agriculturally related visitor services and attractions.

Goals

The related mitigation goals and policies of the Agriculture Element are:

GOAL:	**Goal AG 1 Preserve and protect high-quality agricultural lands for long-term agricultural production.**
Objective:	Interrelationship with Habitat Conservation. Permit agriculturally designated lands to be used for habitat conservation and/or mitigation with approval of a development agreement, provided such use does not interfere or adversely affect existing or planned agricultural uses or impact County flood control operations.
Objective:	Land Mitigation Program. Explore, and if determined feasible, create an Agricultural Land Mitigation Program.

GOAL:	**GOAL AG 3 Protect the natural resources needed to ensure that agriculture remains an essential and sustainable part of Sutter County's future.**
Objective:	Efficient Water Management. Support the efficient management and use of agricultural water resources where economically feasible to support agriculture.
Objective:	Water Conservation and Recycling. Support the efforts of the multiple water agencies operating in Sutter County to adopt water conservation practices and explore the feasibility of water recycling for agriculture.
Objective:	Water Quality and Quantity. Support efforts to maintain water resource quality and quantity for the irrigation of productive farmland.

GOAL:	GOAL AG 3 Protect the natural resources needed to ensure that agriculture remains an essential and sustainable part of Sutter County's future.
Objective:	Water Use Reduction. Implement, as appropriate, reduction measures in the Climate Action Plan targeted to manage agricultural water use. Such measures may include encouraging agricultural water users to conserve water, and providing information on technologies that reduce agricultural water use.
Objective:	Groundwater Resources. Support the efforts of the local water agencies to promote groundwater recharge, conjunctive use, conservation of significant recharge areas, and other activities to protect and manage Sutter County's groundwater resources.

Infrastructure Element

The provision of adequate and efficient infrastructure including water, wastewater, stormwater, solid waste, energy, and telecommunication systems helps to ensure a high quality of life for residents and provide for the needs of businesses. In Sutter County, infrastructure services are supplied by a combination of County and other agencies. Infrastructure service providers for the unincorporated County

Goals

The related mitigation goals and policies of the Infrastructure Element are:

GOAL:	GOAL I 1 Ensure the availability of an adequate, reliable, and safe potable water supply for current and future County residents, businesses, and other water users.
Objective:	Improve Water Availability. Support the creation of new water projects in appropriate locations that improve water availability for urban, rural, and agricultural water uses in Sutter County, including recycled water projects.
Objective:	Water Conservation. Support water conservation programs that increase water use efficiency, and provide incentives for adoption of water-efficiency measures.

GOAL:	GOAL I 3 Ensure stormwater runoff is collected and conveyed safely and efficiently.
Objective:	Availability. Require new development to study, coordinate, and plan the provision of stormwater services to support the new development and demonstrate the availability of long-term, safe, and reliable stormwater collection, and conveyance.
Objective:	Infrastructure Planning. Establish stormwater collection master plans for areas served, or to be served, by County-owned or County-operated stormwater systems. Ensure that the required infrastructure is successfully planned and designed.
Objective:	New Development. Require new development to provide stormwater systems supporting the development based on the following guidelines for stormwater collection and conveyance
Objective:	Mitigation of Stormwater Flows. Require new development to adequately mitigate increases in stormwater flow rates and volume.

Public Services Element

Quality public services contribute to livability and to the attraction of residents and businesses to Sutter County. While the County directly provides some services such as law enforcement and library, in general, the County does not have the resources and is not structured to provide the

varied and high level of services needed to support more intensive urban development. As a result, many services in the unincorporated County, such as fire protection for certain areas, are provided by independent districts.

Goals

The related mitigation goals and policies of the Public Services Element are:

GOAL:	GOAL PS 2 Protect life and property from the risk of fire, and provide for coordinated emergency medical services.
Objective:	Coordinated Operations. Coordinate operations between County Service Areas, independent Fire Protection Districts, and neighboring fire service agencies to ensure optimum fire protection and efficient use of all fire suppression resources.
Objective:	New Fire Stations. Ensure that new fire stations are located strategically throughout the County to provide optimal response times to all areas.
Objective:	Adequate Fire Flows. Incorporate fire flow requirements into new development design consistent with the California Fire Code and other applicable requirements based on County fire prevention standards.

GOAL:	GOAL PS 3 Minimize risk to life and property resulting from wildland fire hazards.
Objective:	Development Limitation. Limit development in areas of extreme, very high, and high wildfire risk.
Objective:	Defensible Space. Require new and/or existing development to establish adequate defensible space by providing clearance around structures, and using fire-resistant landscaping and roofing materials.
Objective:	Private Properties. Require private property owners to remove excessive/overgrown vegetation and rubbish to prevent and minimize fire risks.
Objective:	Wildfire Management Plan. Require new large-scale development projects (i.e., Specific Plans, Rural Planned Communities) to prepare and implement a County approved wildfire management plan incorporating fire protection measures for developing properties adjacent to undeveloped lands. The wildfire management plan shall be consistent with any adopted Countywide plan and/or regulations in effect at the time of the project's approval.

Environmental Resources Element

Sutter County values its environmental resources and is committed to the protection of its wildlife and habitat, minerals, water, scenic amenities, cultural resources, and air quality. Preservation of these resources and their quality is not only beneficial to current residents but is crucial to the sustainability of future generations.

Approximately seven percent of unincorporated Sutter County is used for open space and remains in its natural state. The County's unique natural open space and water resources include the Sutter Buttes, the Sutter Bypass, the Butte Sink, and the Sacramento, Feather, and Bear River corridors. Important biological resources present include several special status species, as well as annual grasslands, oak woodlands, wetlands, and riparian habitat, with the largest expanse of relatively undisturbed habitat located in the Sutter Buttes.

Goals

The related mitigation goals and policies of the Environmental Resources Element are:

GOAL:	**GOAL ER 1 Support a comprehensive approach for the conservation, enhancement, and regulation of Sutter County's significant habitat and natural open space resources.**
Objective:	Natomas Basin HCP. Ensure compliance with the adopted Natomas Basin Habitat Conservation Plan to promote biological conservation within the Natomas Basin portion of Sutter County.
Objective:	Yuba-Sutter NCCP/HCP. Participate in the preparation and implementation of the Yuba-Sutter Natural Community Conservation Plan/Habitat Conservation Plan to promote biological conservation within the Plan boundary area in Sutter County.
Objective:	Mitigation. Mitigate biological and open space effects that cannot be avoided in accordance with an applicable Habitat Conservation Plan and federal, state, and local regulations.

GOAL:	**GOAL ER 2 Conserve, protect, and enhance Sutter County's significant natural wetland and riparian habitats.**
Objective:	No Net Loss. Require new development to ensure no net loss of state and federally regulated wetlands, other waters of the United States (including creeks, rivers, ponds, marshes, vernal pools, and other seasonal wetlands), and associated functions and values through a combination of avoidance, restoration, and compensation.
Objective:	Resource Conservation District. Encourage and support the Sutter County Resource Conservation District's programs that facilitate preservation and restoration of natural wetland environments as long as these programs do not significantly affect Sutter County agricultural lands and flood control operations.
Objective:	Minimize Surface Runoff. Minimize direct discharge of surface runoff into wetland areas and design new development in such a manner that pollutants and siltation will not significantly affect jurisdictional wetlands.
Objective:	Wetland Mitigation Banks. Encourage the creation and use of regional wetland mitigation banks to the extent that they do not conflict with Sutter County agricultural lands and flood control operations.

GOAL:	**GOAL ER 6 Preserve and protect the County's surface water and groundwater resources.**
Objective:	Integrated Water Management Programs. Integrate water management programs that emphasize multiple benefits and balance the needs of agricultural, rural, and urban users.
Objective:	Surface Water Resources. Protect the surface water resources in the County including the Sacramento, Feather and Bear Rivers and their significant tributaries.
Objective:	Groundwater Sustainability. Protect the sustainability of groundwater resources.
Objective:	Groundwater Recharge Areas. Require new development to preserve areas that provide important groundwater recharge, stormwater management, and water quality benefits such as undeveloped open spaces, natural habitat, riparian corridors, wetlands, and natural drainage areas.
Objective:	Water Use Reduction. Implement, as appropriate, the reduction measures in the Climate Action Plan targeted to reduce water use. Such measures may include: adopting a per capita water use reduction goal; implementing a water conservation and efficiency program; providing incentives for new development to reduce potable water use; installing water meters for uses not using wells; encouraging water suppliers to adopt a water conservation pricing schedule; encouraging upgrades in water efficiency; providing training and education on water efficiency; and increasing recycled water use.

Public Health and Safety Element

Sutter County is committed to sustaining the health and safety of its residents, employees, and visitors. Protection from the risks of natural and man-made hazards is essential in establishing a sense of wellbeing for residents and is an important consideration in attracting new businesses to the County. Potential hazards that could affect Sutter County include flooding, geologic and seismic risks, and exposure to hazardous materials

Goals

The related mitigation goals and policies of the Public Health and Safety Element are:

GOAL:	**GOAL PHS 1 Minimize the potential for loss of life, personal injury, and property damage associated with floods.**
Objective:	NFIP. Continue to participate in the National Flood Insurance Program and the Community Rating System.
Objective:	Minimize Risk of Flood Damage. Require a minimum of 100- year flood protection and regulate development in accordance with local, state, and federal requirements to avoid or minimize the risk of flood damage.
Objective:	Flood Protection for New Development. Require new development in urban and/or urbanizing areas to provide 200-year flood protection within 3 years of adoption of the Central Valley Flood Protection Plan in accordance with state regulations, and require new development outside urban or urbanizing areas to provide 100-year flood protection in accordance with federal regulations.
Objective:	Development in Dam Inundation Areas. Require new development located in dam inundation areas to consider the risks from dam failure.
Objective:	Essential Facilities. Require that new essential public facilities (e.g., hospitals, health care facilities, emergency shelters, fire stations, etc.) be located, when feasible, outside of flood hazard zones, as defined by FEMA, or designed to maintain the structural and operational integrity of the facility during flooding events.

GOAL:	**GOAL PHS 2 Minimize the risk of personal injury and property damage due to geologic and seismic hazards and adverse soil conditions.**
Objective:	Review Standards. Review and enforce seismic and geologic safety standards and require the use of best management practices in site design and building construction methods.
Objective:	Minimize Exposure to Geologic Hazards. Minimize development in areas where geologic hazards exist from landslides and erosion.
Objective:	Site-Specific Geotechnical Analysis. Require the preparation of a County approved site-specific geotechnical analysis prior to approval of development in areas where the potential for geologic or seismic hazards exists (e.g., ground shaking, landslides, liquefaction, expansive soils, steep slopes, subsidence, and erosion) and incorporate recommended project features to avoid or minimize the identified hazards.
Objective:	Essential Facilities. Promote the upgrade, retrofitting, and/or relocation of existing essential facilities (e.g., hospitals, schools, law enforcement and fire stations, etc.) that do not meet current building code standards and are within areas susceptible to seismic or geologic hazards.

GOAL:	GOAL PHS 4 Respond appropriately, effectively, and efficiently to natural and human-made emergencies and disasters.
Objective:	Emergency Operation Plans. Continue to implement and regularly update countywide emergency operation plans to reduce or eliminate long-term risk to life and property from natural or human-made emergencies and disasters.
Objective:	Evacuation Routes. Regularly review established evacuation routes to ensure emergency access to and from all parts of the County.
Objective:	Emergency Access. Require minimum road and driveway widths and clearances around structures consistent with established requirements in order to ensure emergency access.
Objective:	Emergency and Disaster Preparedness Training. Coordinate with local and regional agencies to regularly conduct emergency and disaster preparedness training to test operational and emergency plans.
Objective:	StormReady Program. Continue to be a member of the StormReady Program ensuring a higher level of community awareness to minimize the loss of life and property from severe weather.
Objective:	Coordination. Continue to be responsible for planning, preparedness, emergency response, and recovery activities associated with natural and human-made disasters. Provide communication and coordination between local and federal agencies, medical facilities, schools, local radio stations, and special needs service providers.
Objective:	Public Education. Support public education and awareness regarding emergency response and disaster preparedness.

Sutter County Ordinances

The Sutter County General Plan provides policy direction for land use, development, open space protection, and environmental quality; however, this policy direction must be carried out through numerous ordinances, programs, and agreements. The following ordinances are among the most important tools for implementing the General Plan and/or are critical to the mitigation of hazards identified in this plan.

Emergency Organization (Chapter 500)

The purpose of this chapter is to provide for the county's preparation for, response to, and recovery from emergencies pursuant to the California Emergency Services Act. There is hereby created the Office of Emergency Management. The Office of Emergency Management shall have responsibilities which include: development and maintenance of county/operational area emergency plans; supervision and maintenance of the county/operational area emergency operations center; coordination of county/operational area disaster mitigation/prevention, preparedness, response, and recovery; serving as the coordination link between the local government level and the regional, state and federal level, as well as liaison between the operational area jurisdictions/agencies, the California Emergency Management Agency (Cal EMA), and the Federal Emergency Management Agency (FEMA); providing training, exercises, and educational outreach to agencies within the operational area; and coordination of resource and information management, public information/warning systems, mutual aid, and damage assessment information.

The Emergency Operations Manager shall be responsible for the development of the Emergency operations plan (EOP) for the County. The Emergency Operations Manager shall have the authority to request documents, training, or information from County departments, special districts, or other entities in the county/operational area necessary to develop and maintain the EOP.

Building Code (Chapter 1300)

The Board of Supervisors expressly finds that the provisions of this chapter hereby constitute minimum standards for the protection of the public health, public safety, and public welfare.

- Adoption of the International Building Code, 2009 Edition, as approved by the Building Standards Commission with State Amendments, known as the 2010 California Building Code
- Adoption of the Uniform Mechanical Code, 2009 Edition, as approved by the Building Standards Commission with State Amendments, known as the 2010 California Mechanical Code
- Adoption of the Uniform Plumbing Code, 2009 Edition, as approved by the Building Standards Commission with State Amendments, known as the 2010 California Plumbing Code
- Adoption of the National Electrical Code, 2008 Edition, as approved by the Building Standards Commission with State Amendments, known as the 2010 California Electrical Code
- Adoption of the Uniform Housing Code, 1997 Edition adoption of the International Residential Code, 2009 Edition, as approved by the California Building Standards Commission with State amendments, known as the California Residential Code, 2010-Edition
- Adoption of the California Energy Code, 2008 Edition Adoption of the California Green Building Code, 2010 Edition, as approved by the California Building Standards Commission

Sutter County Land Grading Ordinance (Chapter 1770)

The purpose of this Chapter is to:

- Minimize damage to surrounding properties and public rights-of-way;
- Minimize the degradation of the water quality of watercourses
- Minimize the disruption of natural or County-authorized drainage flows caused by the activities of clearing and grubbing, grading, filling and excavating land;
- Minimize sediment and pollutant runoff from other construction related activities; and,
- (e) Comply with the provisions of National Pollutant Discharge Elimination System (NPDES) permits covering the activities of the County issued by the California Regional Water Quality Control Board

This Chapter shall apply to all persons within the unincorporated area of the County of Sutter and those areas in County drainage districts

Fire Prevention and Regulation (Chapter 600)

The International Fire Code, 2009 Edition as approved by the Building Standards Commission with State Amendments, known as the 2010 California Fire Code, including Appendix Chapter 4 and Appendix A, B, BB, C, CC, D, E, F, G, H, I, and J , as amended by this Chapter is hereby adopted for the purpose of prescribing regulations governing conditions hazardous to life and property from fire, hazardous materials or explosion, the California Fire Code, as amended by this chapter, and all the provisions thereof are hereby adopted and incorporated as fully as if setout at length herein, and the provisions of such California Fire Code, as amended by this Chapter, shall be in effect in the unincorporated territory of the County.

Zoning Ordinance (Section 1500)

The Zoning Code is adopted to provide for the promotion and protection of the public health, safety' peace, morals, comfort, convenience, and general welfare of the residents of Sutter County; and:

- To implement the Sutter County General Plan, its goals, policies and objectives and to guide the future growth of the County in accordance with said plan.
- To protect the character and the social and economic stability of agricultural, residential, commercial, industrial, recreational, and other areas within the County, and to assure the orderly and beneficial development of such areas.

The Board of Supervisors hereby finds that agriculture is a major industry in the County, and declares that the provisions of this Chapter shall be interpreted liberally as they affect valid agricultural uses and that this chapter shall serve as a means of preventing undesirable encroachments of other land uses upon agricultural lands. Other reasonable and desirable land uses shall receive due consideration.

Subdivision Ordinance (Section 1400)

The purpose of this Chapter is to regulate and control the design and improvement of land for all purposes within the County of Sutter in order to preserve and enhance the health, safety, welfare and amenities of the community. The Sutter County General Plan shall guide the use of all land within the unincorporated area of the County. The size and design of lots, the nature of utilities, the design and improvement of streets, the type and intensity of land use, and the provisions for any special facilities shall conform to the standards established in the General Plan, the zoning ordinance of the County of Sutter, and any applicable specific plan, master plan, community plan, precise plans, and the like.

Floodplain Management Ordinance (Chapter 1780)

The flood hazard areas of the County of Suffer 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 hazard increase flood heights and velocities also contribute to flood losses.

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 legally enforceable regulations applied uniformly throughout the community to all publicly and privately owned land within flood prone, mudslide [i.e. mudflow] or flood related erosion areas. These regulations are designed to:

- Protect human life and health;
- Minimize the 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.

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.

All new construction or substantial improvements of residential structures shall have the lowest floor, including basement:

- In AE, AH, A1-30 Zones, elevated at least one foot above the BFE.
- In an AO Zone, elevated above the highest adjacent grade to a height exceeding the depth number specified in feet on the FIRM by at least one foot, or elevated at least three feet above the highest adjacent grade if no depth number is specified.
- In an A Zone, without BFE's specified on the FIRM [unnumbered A zone], elevated at least one foot above the base flood elevation as determined under Section I780-420(c).
- In all other Zones (including Zone X and Zone X500) and in local flood hazard areas,

elevated at least one foot above the base flood elevation shown on the flood insurance rate map or one foot above the locally-determined base flood elevation if that elevation is higher. In Zone X and/or Zone X500, a condition of granting any building permit for construction outside a subdivision shall be that the lowest floor shall be placed at an elevation, as determined by a registered engineer, which will protect the structure from inundation as a result of a storm with a 100-year recurrence interval. If the Floodplain Administrator determines that developing data to establish the 100-year storm inundation elevation would be excessively expensive, the Floodplain Administrator may alternatively approve a lowest floor elevation which is one foot above the centerline of the closest county road at a point closest to the building site.

All new construction or substantial improvements of nonresidential structures shall either be elevated to conform with Section 1780-530(a) or:

- Be floodproofed, together with attendant utility and sanitary facilities, below the elevation recommended under Section 1780-530(a), so that the structure is watertight with walls substantially impermeable to the passage of water;
- Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and
- Be certified by a registered civil engineer or architect that the standards of Section 1780-520 & Section 1780-525 are satisfied. Such certification shall be provided to the Floodplain Administrator. Certification and verification of floodproofing design shall be in the form of a National Flood Insurance Program - Floodproofing Certificate.
- In Zone X and/or Zone X500, the requirement to elevate the lowest floor of detached garages, accessory buildings and/or agricultural shops to one foot above the 100-year storm inundation elevation or one foot above the centerline of the nearest County road may be waived by the Floodplain Administrator, provided that the owner executes a structure use and indemnity agreement with the County. The Floodplain Administrator may record a copy of the agreement in the Office of the Sutter County Recorder.

Stormwater Management and Discharge Control Ordinance (Chapter 1760)

The purpose of this Chapter is to prescribe and regulate the connection of stormwater drainage runoff to the public stormwater system. This Chapter shall apply to all County owned and/or maintained drainage and stormwater facilities. This Chapter does not apply to drainage or stormwater facilities owned and operated by Reclamation Districts or Drainage Districts. No person may connect to or otherwise redirect the flow of water so as to cause additional drainage to enter roadside ditches except in those situations where an exception has been granted by the Director.

Sutter County Plans/Studies

Sutter County Emergency Operations Plan

The Sutter County Emergency Operations Plan (EOP) addresses the planned response to emergency situations associated with natural disasters, technological incidents, and national security emergencies in or affecting Sutter County. The EOP has been developed to provide a comprehensive (multi-use) emergency management program for Sutter County. It is designed to establish the framework for implementation of the California Standardized Emergency Management System (SEMS) for Sutter County, a political subdivision of the State of California, located within Mutual Aid Region III (as designated by the Governor's Office of Emergency Services). Further, the EOP and its associated annexes meet those conditions of emergency management and the basic tenets of Incident Command System (ICS) required by the National Incident Management System (NIMS). The annexes to the plan are:

- Annex 1 - Emergency Support Function (ESF) Handbook and Checklists
- Annex 2 - Emergency Operations Center Handbook and Checklists
- Annex 3 - Incident Command System (ICS) Forms
- Annex 4 - Communication Operations (Comm OPS) Plan
- Annex 5 - Floods and Dam Failure
- Annex 6 - Wildland Fire Plan
- Annex 7 - Extreme Weather and Seismic Events Plan
- Annex 8 - Transportation Emergency and Haz Mat Event Plan
- Annex 9 - Evacuation and Mass Care/Shelter
- Annex 10 - Domestic Pets/Livestock Care Plan
- Annex 11 - Volunteer and Donations Management
- Annex 12 - Terrorism
- Annex 13 - Public Health Emergency/Bioterrorism

The EOP is intended to facilitate multi-agency and multi-jurisdictional coordination, particularly between Sutter County and local governments, including special districts and state agencies, in emergency operations. It seeks 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 County and the cities/towns to their normal state of affairs.

The EOP is operational in design, but serves a secondary use as a planning reference. Departments within the County of Sutter and local governments that have roles and responsibilities identified in this EOP are encouraged to develop emergency operations plans, detailed Standard Operating Procedures (SOP), and emergency response checklists based on the provisions of this plan. This plan will be used in conjunction with the State Emergency Plan.

Sutter County Evacuation Plan

As an annex to the Sutter County EOP mentioned above, the Sutter County Evacuation and Mass Care Annex (Annex 9) deals with evacuations due to natural hazards and other events. In the past, Sutter County has evacuated its residents when threatened by flood. Most notably, the 1997 flood where a majority of the residents were evacuated due to threatening floodwaters. Fortunately, planning and preparedness resulted in minimal problems and the evacuation was successful.

Emergency evacuation planning involves several governmental agencies and private organizations performing such functions as warning, evacuation decision making, communications, traffic control, and shelter management. These agencies and organizations also have an indispensable role in emergency preparedness planning.

The Sutter County Operational Area makes use of two types of evacuations; Advisory and Mandatory Evacuations.

An Advisory Evacuation Notice is issued when conditions exist which indicate a Mandatory Evacuation order may be given in the near future. The threat to lives is not yet imminent, but due to the potential for rapidly changing conditions to develop into a serious threat, the public is advised to prepare for the issue of a Mandatory Evacuation order. Residents are advised to leave the area. Businesses are advised to take whatever precautions they deem necessary for protecting equipment and/or inventory. Access to the area under an Advisory Evacuation is unrestricted.

A Mandatory Evacuation is ordered when conditions exist that seriously imperil or endanger the lives of those in a defined area. The danger is imminent. All non-essential persons are ordered to immediately leave the area via the described evacuation routes. Generally, residents will not be forcibly removed from their own property; however, those found to be on the property of another, or on a public roadway, may be subject to arrest or removal from the area. Once out of the area, people (including residents) will not be permitted to return until conditions permit. Any non-essential persons found by officials traveling through, or loitering in, the area will be escorted out and not permitted to re-enter the area. Those interfering with the disaster response are subject to arrest. Figure 4.90 shows the major highways in Sutter County. In the case of an actual evacuation, notification would be made as to which highway(s) to use.

Figure 4.92. Emergency Evacuation Routes

Source: Sutter County Emergency Operations Plan, Annex 9

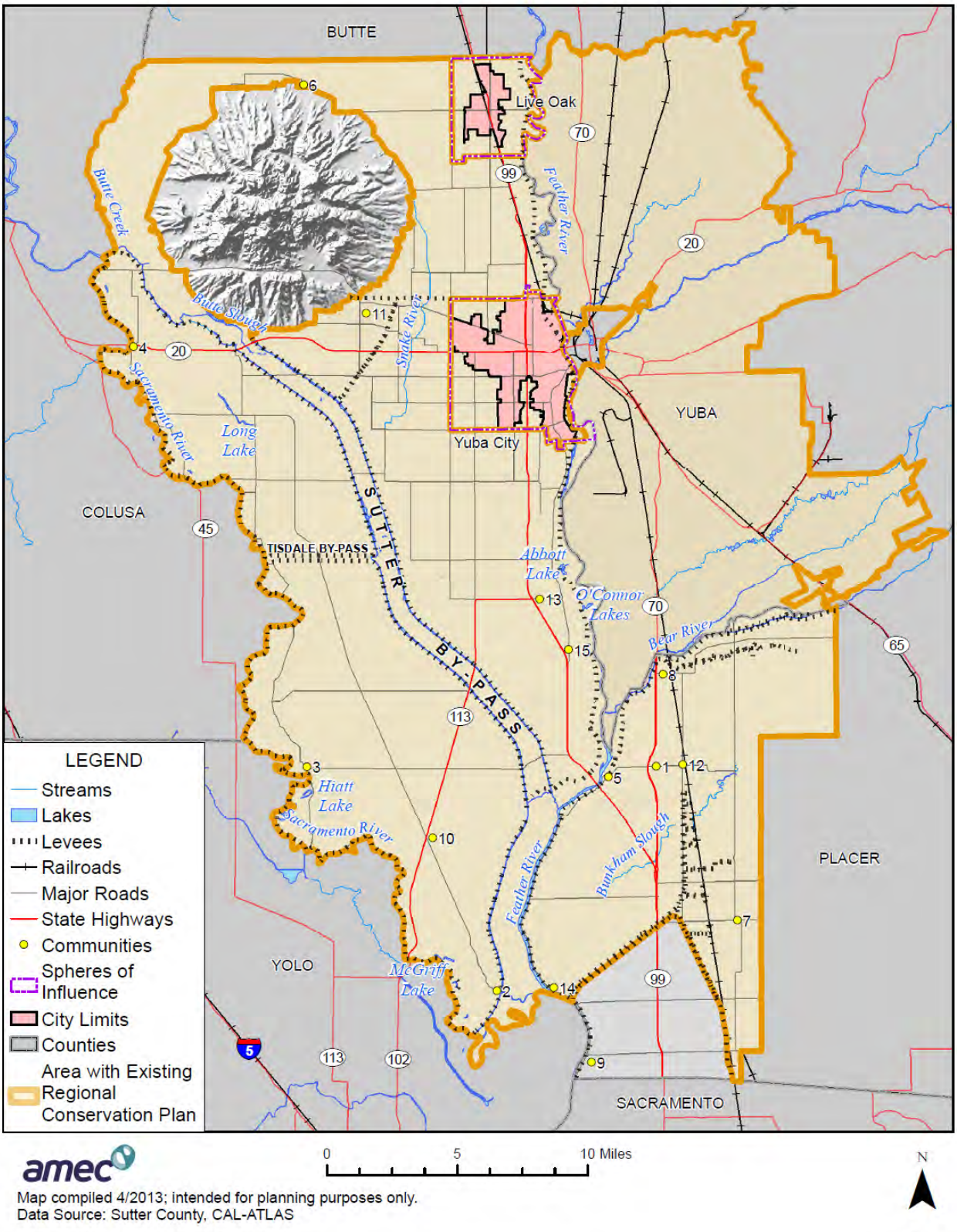
Yuba-Sutter NCCP/HCP

Portions of the County are within the boundaries of the proposed Yuba-Sutter NCCP/HCP (Natural Community Conservation Plan/Habitat Conservation Plan). The Yuba-Sutter NCCP/HCP is a cooperative planning effort initiated by Yuba and Sutter counties in connection with improvements to Highways 99 and 70 and future development in the area surrounding those highways. The NCCP/HCP is being developed to facilitate ways to:

- continue economic growth and community development;
- retain the economic vitality of the agricultural community;
- maintain recreation, hunting, fishing, and other public uses of open space in the NCCP/HCP area;
- simplify and expedite land use and conservation planning in the NCCP/HCP area; and
- protect threatened and endangered species; and preserve plant and wildlife communities.

Preparation and approval of the NCCP/HCP is expected to take between 3 and 5 years, depending on the complexity of the planning process. Until the NCCP/HCP is approved, there is no requirement for compliance. However, it is prudent for longer term projects, or recently initiated smaller projects within the NCCP/HCP boundaries (see Figure 4.91) to give consideration to this planning document.

Figure 4.93. NCCP/HCP Boundaries



Natomas Basin Habitat Conservation Plan (NBHCP)

Portions of the County are within the Natomas Basin - a low-lying portion of the County east of the Sacramento River and north of the American River. The Natomas Basin contains incorporated and unincorporated areas within the jurisdictions of Sutter County and Sacramento County. Historically the basin was primarily in agricultural production. The existing water conveyance systems within the Natomas Basin were created for water conveyance and drainage. They provide nesting, feeding, and migration corridor habitat for a variety of species in the basin.

The Natomas Basin contains a variety of habitat types, open water aquatic habitat (including ditches and drains), emergent marsh, riparian forest, riparian scrub-shrub, grassland, vernal pools, and agriculture. A number of special-status species (wildlife and plant), as determined by the California Department of Fish and Game (CDFG) or the U.S. Fish and Wildlife Service (USFWS), inhabit or forage within the Natomas Basin.

The 1994 North Natomas Community Plan required the development and implementation of a Habitat Conservation Plan as mitigation for development in North Natomas. The NBHCP is a conservation plan supporting application for incidental take permits (ITPs) under Section 10(a)(1)(B) of the Endangered Species Act and under Section 2081 of the California Fish and Game Code. The purpose of the NBHCP is to promote biological conservation in conjunction with economic and urban development within the Permit Areas of the Natomas Basin. The NBHCP establishes a multi-species conservation program to minimize and mitigate the expected loss of habitat values and incidental take of Covered Species that would result from urban development, operation of irrigation and drainage systems, and certain activities associated with The Natomas Basin Conservancy's (TNBC) management of its system of the Covered Species in the Permit Areas and to provide mitigation for the impacts of Covered

Activities on the Covered Species and their habitat

The NBHCP applies to the 53,537-acre area interior to the toe of the levees surrounding the Natomas Basin. In 1997, the NBHCP was approved by Sutter County and ITPs were issued to the City of Sacramento, by USFWS and CDFG. Subsequently, the 1997 NBHCP was challenged and on August 15, 2000, the U.S. District Court, Eastern District, ruled that the USFWS ITP was invalid and an EIS was required. On May 15, 2001, in a federal court ruling, a Settlement Agreement was attained which granted a motion modifying the Order to allow incidental take protection for limited development within Sutter County with the provision of mitigation land in specific areas of the Natomas Basin. Development of 1,068 acres of land in both North and South Natomas would be allowed to proceed if it is in compliance with mitigation requirements of the Settlement Agreement.

Sutter County, Sacramento County, and the USFWS prepared a revised NBHCP and an EIR/EIS that were approved on May 13, 2003 by Sacramento County Board of Supervisors. On June 27, 2003, the USFWS issued ITPs to Sutter County, Sacramento County and The Natomas Basin

Conservancy. CDFG issued an amended ITP on July 10, 2003. The NBHCP mitigation requirements include:

- Payment of HCP fees or dedication of land at a ratio of 0.5 to 1.
- Reconnaissance-level surveys to determine what habitats are present on a proposed development site. (Reconnaissance surveys are submitted with the developer's application.)
- Pre-construction surveys for potential special status species not less than 30 days or more than 6 months prior to construction activities.
- Species-specific mitigation, as required, per USFWS and CDFG protocol.
- Grading permit issued and habitat removed.

Yuba Sutter Regional Conservation Plan

The purpose of the Yuba Sutter Regional Conservation Plan (Plan) is to protect and enhance ecological diversity and function within the rapidly urbanizing region of Yuba County and the more slowly urbanizing region of Sutter County. Yuba and Sutter Counties encompass 405,582 and 389,443 acres, respectively. The Plan Area encompasses a total of 469,271 acres: 141,644 acres in Yuba County and 327,627 in Sutter County. The Plan Area includes the cities of Wheatland, Yuba City, and Live Oak and the spheres of influence of each jurisdiction. The Plan describes how to avoid, minimize, and mitigate, to the maximum extent practicable, impacts on covered species and their habitats while allowing for the growth of selected areas within these counties and the expansion and ongoing maintenance of urban infrastructure. The Plan also describes the responsibilities associated with operating and maintaining the reserves that will be created to mitigate anticipated future impacts. Natural communities that will be included within the conservation plan include flooded herbaceous cropland and woody cropland; wildland communities including river and stream systems, vernal pool complexes, grasslands and oak savanna-woodland; developed communities. Agricultural land, including rice land will also be included.

The draft Plan document is currently being prepared and is anticipated to be completed by the end of 2014

County Departments/Agencies

Sutter County has structured its governmental organization to mitigate and respond to natural hazards. The discussion below highlights offices that have either direct or indirect responsibility for planning for or responding to natural hazards.

- Office of Emergency Management
- Agriculture Commissioner
- Development Services
  - Engineering
  - Planning Services

  - Building Inspection
  - Water Resources
  - Public Works
- Sherriff's Office

Drought Capabilities

Groundwater Management Plan

In February of 201, Sutter County prepared a Groundwater Management Plan (GMP) with input and direction from County stakeholders, and with financial and technical assistance from the California Department of Water Resources (DWR). Preparing this GMP is one step Sutter County is taking to promote and encourage groundwater users in the County to be responsible stewards of the water resources. Sutter County's purposes for preparing the GMP were to:

- Summarize the current understanding of the groundwater underlying Sutter County and its role in the County's overall water supply, and make that information publicly available.
- Formulate goals and objectives that can be used as guidelines to help manage groundwater resources to meet current and future demands in Sutter County.
- Establish a plan for the County's involvement in ongoing monitoring and management of groundwater to promote those goals and objectives.
- Maintain eligibility for grant funding administered by the California Department of Water Resources to increase the understanding of the groundwater basins underlying Sutter County.

Sutter County's intended role in groundwater management, as discussed in this GMP, is to help coordinate the various groundwater users in the County, and encourage them to be responsible stewards of the water resources.

Flood Capabilities

FloodSAFE California

FloodSAFE is a multifaceted and collaborative statewide initiative to improve public safety through integrated flood management. A long-term initiative, FloodSAFE is focused on the following goals: 1) Reduce the chance of flooding, 2) Reduce the consequences of flooding, 3) Sustain economic growth, 4) Protect and enhance the ecosystems, and 5) Promote sustainability. FloodSAFE will accomplish these goals through four types of activities: 1) improving emergency response, improving flood management systems, improving operations and maintenance, and informing and assisting the public.

Central Valley Flood Protection Plan (CVFPP)

The Central Valley Flood Management (CVFMP) Program is one of several programs managed by DWR under FloodSAFE California (FloodSAFE), a multifaceted initiative launched in 2006

to improve integrated flood management in the State of California. The CVFMP Program addresses flood management planning activities within the Central Valley that require State leadership and participation.

The Central Valley of California has experienced some of the State's largest and most damaging floods. The existing flood management system, consisting of a number of projects (e.g., dams, reservoirs, weirs, levees, channels, bypasses and other features) individually constructed over the last 150 years, provides varying levels of flood protection. However, this legacy system is now characterized by aging infrastructure constructed using outdated techniques. This system is now relied on to provide benefits and levels of protection that were not envisioned when its elements were first constructed. As currently configured, the system is prone to erosive river forces, is easily distressed from high water, and does not support healthy ecosystem functions and natural floodplain habitats. Further, funding and other constraints have made it difficult to carry out adequate maintenance programs. At the same time, escalating development in the Central Valley floodplains has increased the population at risk and the potential for flood damages to homes, businesses, communities and critical statewide infrastructure. This increased vulnerability of the Central Valley to catastrophic floods threatens the life safety, property and the financial stability of the State. As a result, in 2008, the DWR embarked on the CVFMP Program, a long-term planning effort to improve integrated flood management within the Central Valley.

The 2012 CVFPP (adopted on June 28, 2012) will have three primary elements: vision for flood management in the Central Valley, a framework for implementing future projects to achieve this vision, and initial recommendations for improvements.

Sutter Basin Floodplain Management Plan (2013)

This Floodplain Management Plan (FMP) has been developed for the Sutter Butte Flood Control Agency (SBFCA) as an in-kind contribution to the US Army Corps of Engineers (USACE) Sutter Basin Pilot Feasibility Study (SBFS). The primary focus of this FMP is to identify potential measures, practices, and policies which will reduce the impact of future residual flooding, help preserve levels of protection provided by the SBFS project, and preserve and enhance natural floodplain values.

The study area is located in north-central California and encompasses a portion of Sutter County and Butte County. The study area is comprised of a region that is bordered by the Feather River, Sutter Bypass, Wadsworth Canal, Sutter Buttes, and Cherokee Canal. The study area has a population of approximately 95,000 and includes the communities of Yuba City, Live Oak, Gridley, Biggs, and numerous rural properties in the unincorporated areas of Sutter and Butte County. Flood waters with the potential to impact the study area originate from the Feather River watershed, the Sacramento River watershed, the Butte Basin, Cherokee Canal, Wadsworth Canal, and local interior drainage.

Integrated Regional Water Management Plan (late 2013)

The six counties of the Northern Sacramento Valley have been working together for over 10 years to lay the foundation for an integrated regional plan to address water-related issues such as economic health and vitality; water supply reliability; flood, stormwater and flood management; water quality improvements; and ecosystem protection and enhancement. The counties have committed to developing a valley-wide Integrated Regional Water Management Plan by September 2013.

The Integrated Regional Water Management (IRWM) is a collaborative effort to enhance coordination of the water resources in a region. IRWM involves multiple agencies, stakeholders, tribes, individuals and groups to address water-related issues and offer solutions which can provide multiple benefits to the region. Representatives of the six counties are working in partnership with community stakeholders, tribes and the public to identify the water-related needs of the region. This information was used to develop goals and objectives of the IRWM Plan, and the identification of projects and programs to be included in the Plan. When it is adopted in September 2013, the Plan will better position the region and local partners to receive funding for high-priority projects.

Northern California Catastrophic Flood Response Plan (In process)

The California Emergency Management Agency (Cal EMA), in collaboration with the Department of Water Resources, is developing a Northern California Catastrophic Flood Response Plan (NCCFRP). This project is in process and is in the early stages of the planning process.

Invasive Species Capabilities

The Pest Exclusion Program

Administered by The California Department of Food and Agriculture (CDFA), executed and enforced by The County Agricultural Departments, the mission of Pest Exclusion is to protect agricultural and the environment by keeping exotic pests out of California and to prevent or limit the spread of newly discovered pests within the state. The program has three main components:

- **Detection**: The primary responsibilities of the Pest Detection/Emergency Projects Branch (PD/EP) are the early detection of serious agricultural pests. This is accomplished through the operation of a statewide detection trapping program, special detection surveys, and the maintenance of emergency projects response teams. The Branch administers the statewide detection trapping program through trapping contracts with 46 county departments of agriculture.
- **Eradication**: The primary objective of the emergency project response component is to quickly and efficiently eradicate incipient infestations of serious agricultural pests, thereby preventing permanent establishment and subsequent spread in California.

- **Management**: When a pest population cannot be eradicated in a timely manner and becomes established, a management program is instituted to addressing the adverse health, environmental and economic issues related to an uncontrolled invasive pest. Quarantine areas may be required. Management procedures and activities are developed based on the biology of the invading pest and often include components of both detection and eradication strategies. The under pinning idea is damage control by systematically and eventually eradicate the invader or bring it into balance with the environment. A combination of mechanical, chemical (pesticide application) and bio-control agents are the standard tools of management. The Management stage of Pest Exclusion is usually the most expensive solution because it may take a very long period of time to resolve the environmental and economic effects of the infestation. The best hazard mitigation is a robust invasive species Detection and Eradication program.

Levee and Streambank Erosion Capabilities

Throughout the Central Valley, levees provide essential protection for both urban and rural lands, preventing possible catastrophic flooding and loss of life. On February 24, 2006, following sustained heavy rainfall and runoff, Governor Arnold Schwarzenegger declared a State of Emergency for California's levee system, commissioning up to $500 million of state funds (AB142) to repair and evaluate State/federal project levees. This declaration was a necessary step in preventing possible catastrophic consequences of hurricane Katrina-like proportion.

Following the emergency declaration, Governor Schwarzenegger directed the California Department of Water Resources (DWR) to secure the necessary means to fast-track repairs of critical erosion sites. In addition, California's lengthy environmental permitting process was streamlined without compromising the protection of the important aquatic and terrestrial species inhabiting the river's ecosystem.

Repairs to State/Federal project levees are being conducted under the Levee Repairs Program funded by Section 821 of the Disaster Preparedness and Flood Prevention Bond Act of 2006 (Proposition 1E).

To date, nearly 300 levee repair sites, some of which are in Butte County, have been identified, with more than 100 of the most critical sites having already been completed with AB142 funds. Repairs to others are either in progress or scheduled to be completed in the near future, and still more repair sites are in the process of being identified, planned, and prioritized.

Feather River West Levee Project

The Sutter Butte Flood Control Agency is planning to improve 44 miles of levees from Thermalito Afterbay south to the Sutter Bypass (see Figure 4.92). The goal of the project is to reduce flood risk and remove more than 34,000 properties from FEMA Special Flood Hazard Areas. Levee repairs will be completed in two separate phases (see Timeline below).

Levees along the west bank of the Feather River do not provide 100-year flood protection (protection against a flood that has a one percent chance of occurring in any given year), because they suffer from potential underseepage and through-seepage. Similar problems caused major levee failures in Yuba City in 1955, and Yuba County in 1986 and 1997.

Levees can be made stronger by building deeper cutoff walls (also known as slurry walls), stability berms and seepage berms. These levee improvements block or slow the flow of water through and underneath the levees. Not all 44 miles of levees will need each of these improvements. More than 80 percent of the needed levee repairs will involve the construction of slurry walls, some as deep as 110 feet. In a few select areas, seepage berms constructed on the land side of the levee were determined to be the best fix.

The levee improvement program is expected to:

- Increase public safety by providing 200-year flood protection to Biggs, Gridley, Live Oak, and Yuba City, and improve flood protection for the less populated areas south of Yuba City.
- Save property owners tens of millions each year in mandatory flood insurance costs by delaying, preventing, or cutting short FEMA floodplain mapping.
- Allow cities and counties the freedom to implement general plans, which will soon be severely restricted for any urban or urbanizing community without 200-year flood protection. This would not apply to rural communities (areas with fewer than 10,000 residents).
- Maintain the rights of property owners to make substantial improvements to property without new state or federal land use restrictions.
- Sustain and grow the local economy by creating construction jobs, protecting property values, and allowing for responsible residential, commercial and industrial development.

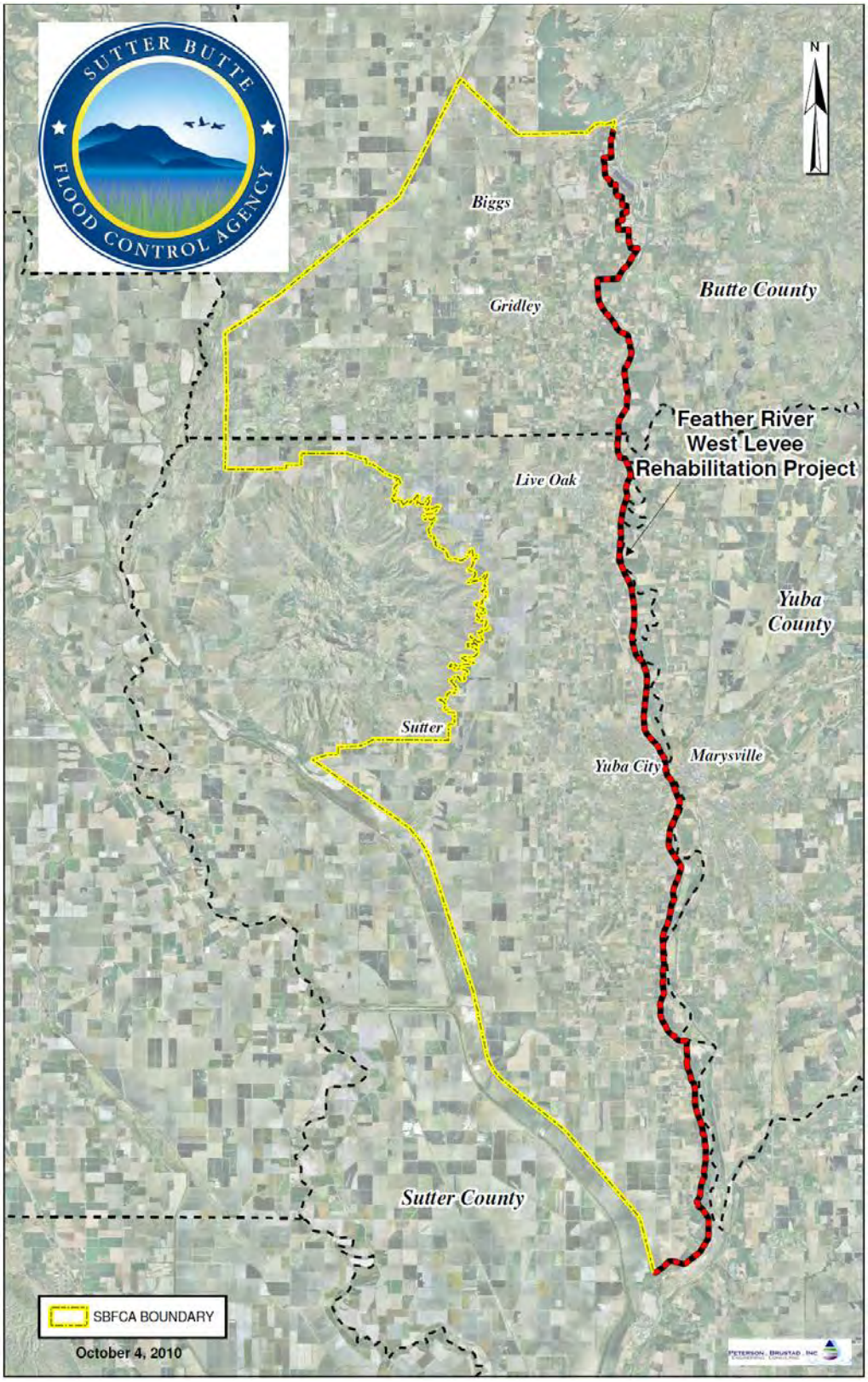
Project Timeline

Levee repairs will be completed in two separate phases:

- Phase I, the Feather River West Levee Project, will include work from Thermalito Afterbay to Star Bend, just south of Yuba City.
- Phase II will include the area south of Star Bend to the confluence of the Feather River and the Sutter Bypass. Phase II work includes repairs to the Sutter Bypass, and is in the planning stages.

The Feather River West Levee Project is on schedule and within budget. Agency engineers are working on the levee project design and preparing requests for necessary permits from state and federal agencies. Environmental specialists are also collecting information that is needed for environmental permit approvals. Design and environmental work is expected to be completed in 2012. Early stages of construction are expected to start in mid-2013, with project completion slated for late 2015. Anticipated costs are $312 million, with the State paying as much as 77% of the costs.

Figure 4.94. Feather West Levee Project Map



Source: Sutter Butte Flood Control District

California Levee Database

California has over 13,000 miles of levees that protect residential and agricultural lands. The levee failures resulting from hurricane Katrina prompted the State and the Department of Water Resources (DWR) to initiate development of a state-of-the-art California Levee Database (CLD) for the purpose of better understanding and managing levees in California. The CLD is an efficient tool for assessing levee reliability risk factors using a GIS-enabled geospatial database.

Starting in 2005, partnering with the Federal Emergency Management Agency (FEMA) under the auspices of FEMA's Map Modernization Management Support program, the Department has started assembling critically needed levee information on ownership, location, and risk assessment factors for all the levees in California. Recognizing that other agencies are engaged in similar efforts, DWR is actively participating on national committees organized by FEMA and the U.S. Army Corps of Engineers (USACE) to ensure compatibility and coordination with other national efforts.

Currently, the California Levee Database has location information for more than 10,000 miles of levees and flood control structures throughout California. Major features of the CLD include

- Levee centerlines for both State-Federal project levees and non-project levees. The project levees use surveyed levee centerlines from USACE's National Levee Database.
- Boundaries, such as those of levee districts, state levee maintenance area, cities, federal congressional districts, state assembly districts, and hydrologic sub-basins.
- Feature locations, such as those of boreholes, burrow sites, cross sections, encroachments, high water marks, levee stress, levee failures, and levee relief wells.

These features are continuously refined and populated for all identified levees in California. Additionally, web-based levee profile viewer, levee information viewer, and technical resources viewer will be developed and released to the public in the near future.

4.4.2 Sutter County's Administrative/Technical Mitigation Capabilities

Table 4.83 identifies the County personnel responsible for activities related to mitigation and loss prevention in Sutter County.

Table 4.86. Sutter County Administrative/Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	Y	Planning	
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	Y	Development Services	
Planner/Engineer/Scientist with an understanding of natural hazards	Y	Planning	

Personnel Resources	Yes/No	Department/Position	Comments
Personnel skilled in GIS	Y	Planning – GIS Analyst	
Full time building official	Y	Development Services	
Floodplain Manager	Y	Development Services	
Emergency Manager	Y	Emergency Management	
Grant writer	N		
Other personnel	N		
GIS Data – Hazard areas	Y	Planning	
GIS Data - Critical facilities			
GIS Data – Building footprints	Y	Planning	Aerials
GIS Data – Land use	Y	Planning	
GIS Data – Links to Assessor's data	Y	Planning	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	Emergency Management	NIXLE
Other			

Source: AMEC Data Collection Guide

4.4.3 Sutter County's Fiscal Mitigation Capabilities

Table 4.84 identifies financial tools or resources that the County could potentially use to help fund mitigation activities.

Table 4.87. Sutter County Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	Y	
Capital improvements project funding	Y	Funds are applicable to levee construction/reconstruction.
Authority to levy taxes for specific purposes	Y	
Fees for water, sewer, gas, or electric services	Y	
Impact fees for new development	Y	
Incur debt through general obligation bonds	N	
Incur debt through special tax bonds	N	
Incur debt through private activities	N	
Withhold spending in hazard prone areas	N	
Other	N	

Source: AMEC Data Collection Guide

4.4.4 Mitigation Outreach and Partnerships

The County has many mitigation partners. The County has worked with, is working with, or will work in the future with the following entities:

- Sutter Butte Flood Control Agency
- North Sacramento Valley Integrated Regional Water Management Board
- Sacramento Area Flood Control Agency

Sutter County's Floodplain Website

As a public service, the County of Sutter provides a dedicated website providing a plethora of information concerning flood issues. The website address is:

http://www.suttercounty.org/doc/government/depts/pw/wr/fp/fphome

The following information can be found at the website:

- Sutter County goals to improve flood protection;
- Sutter County's Multi-Hazard Mitigation Plan;
- Information on Elevation Certificates on record for structures located in Sutter County;
- Information concerning flood insurance and the Community Rating System;
- Current Flood Insurance Rate Maps and Flood Insurance Studies for Sutter County;
- A flood protection fact sheet;
- Information on Floodplain Development Permits (when required, how to apply);
- A glossary of terms;
- Sandbag locations in Sutter County;
- Sutter County's Floodplain Management Ordinance;
- The application form and instructions for a Wet-Floodproofing Variance;
- Information regarding levee maintenance in Sutter County;
- Various web links such as:
  - Current river and reservoir status;
  - Sutter-Butte Flood Control Agency;
  - Sacramento Area Flood Control Agency;
  - Central Valley Flood Protection Board;
  - FEMA's National Flood Insurance Program;
  - FEMA Online Publications; and
  - Links to various FEMA documents.
- Contact information for Sutter County - Office of Water Resources.

The County's website is periodically updated as conditions change or as new information becomes available.

4.4.5 Other Mitigation Efforts/Projects

The County is pursuing multiple other mitigation efforts not captured in this plan. These include:

- Improvements to wastewater treatment plants, including ways to reduce risk to flooding.
- Installing a backup power supply at the Robbins wastewater treatment plant
- Improving the Robbins Trailer Park septic and wastewater facilities
- The community of Robbins uses nearly four times the national "per capita" average in water consumption, which is not sustainable during periods of drought. The County and the community are also pursuing a project to replace aging water mains that are subject to leaks and breaks when groundwater levels shift.
- The County was certified as a StormReady County by the National Weather Service in January of 2012.
- The County has established a web link (www.bepreparedsutter.org) to allow the public to more readily access the Office of Emergency Management (OEM) webpage. Additionally, the County has been successful with our Facebook webpage for the public at www.facebook.com/suttercountyoem to provide updates on the storm, river levels, and the status of the levee. The OEM alert system, which provides alerts across the County internet/intranet, has been successfully tested.
- The EOP contains actions related to mitigation in the County. These actions are as follows:
  - Maintenance of mobile/portable equipment located in the Mobile Command Post by the Sutter County - Sheriff's Department
  - Training will be coordinated as necessary to ensure safe, secure, and effective operations of equipment and procedures
  - Distribution of information to the public in the form of FEMA's Flood Insurance Rate Maps (FIRMs) for Sutter County, flood inundation maps, and information concerning the elevating, floodproofing, or relocation of structures
  - Maintaining records of peak water surface elevations at several key monitoring stations throughout the County
  - Maintaining and sharing information regarding Flood Hazard Analysis and Assessment
  - Development and maintenance of pre-disaster response plans for various scenarios
- In 2011, Sutter County staff and the Sutter-Butte Flood Control Agency continued an aggressive public outreach campaign to raise awareness of the flood hazards facing Sutter County, the flood safety and property protection measures appropriate for these flood hazards, flood-related public information activities implemented within the community, and the anticipated revision of the Flood Insurance Rate Maps (FIRMs) covering all of Sutter County. This annual report evaluates the projects implemented under this public outreach strategy. Overall, the outreach is considered to have been extremely effective, and was comprised of the following elements:
  - Letters mailed directly to owners of over 3,600 properties located within Special Flood Hazard Areas;
  - Special workshops held for local government officials; engineers, builders & developers; real estate agents, insurance agents and lenders;
  - Newspaper interviews and articles published in the local "Appeal Democrat";
  - Appearances before the Sutter County - Board of Supervisors (all broadcasted on public

access channel);
  - Internal training for County staff;
  - Public Awareness Month (October); and
  - Various public outreach letters required under the Community Rating System.
- County staff from the Water Resources Branch responded to over 460 phone inquiries, mostly regarding the flood zone, Base Flood Elevation (BFE), mandatory flood insurance requirements, and construction requirements for local properties

5 MITIGATION STRATEGY

Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section describes the mitigation strategy process and mitigation action plan for the Sutter County Local Hazard Mitigation Plan. It describes how the County and 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 plan update process, a comprehensive review and update of the mitigation strategy portion of the plan was conducted by the HMPC. Some of the initial goals and objectives from the 2007 plan were refined and reaffirmed, some goals were deleted, and others were added. The end result was a new set of goals, reorganized to reflect the completion of 2007 actions, the updated risk assessment and the new priorities of this plan update. To support the new LHMP goals, the mitigation actions from 2007 were reviewed and assessed for their value in reducing risk and vulnerability to the planning area from identified hazards and evaluated for their inclusion in this plan update (See Section 2.0 What's New). Section 5.2 below identifies the new goals and objectives of this plan update and Section 5.4 details the new mitigation action plan.

Taking all of the above into consideration, the HMPC developed the following mitigation strategy for this LHMP update:

- **Communicate** the hazard information collected and analyzed through this planning process as well as HMPC success stories so that the community better understands what can happen where and what they themselves can do to be better prepared.
- **Implement** the action plan recommendations of this plan.
- **Use** existing rules, regulations, policies, and procedures already in existence.
- **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 flood hazard in the planning area, an emphasis will be placed on continued compliance with the National Flood Insurance Program (NFIP) and participation by Sutter County and the Cities of Live Oak and Yuba City in the Community Rating System. 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 numerous 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. A summary of the flood management programs and continued compliance with the NFIP for the Cities of Live Oak and Yuba City are detailed in their jurisdictional annexes.

Sutter County's Flood Management Program

Sutter County has participated in the NFIP since 1988. 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.

Sutter County has participated in CRS since 2008. The CRS program is designed to recognize floodplain management activities that go above and beyond the NFIP's minimum requirements. CRS is designed to reward a community for implementing public information, mapping, regulatory, loss reduction and/or flood preparedness activities. On a scale of 10 to 1, Sutter County is currently ranked Class 6 community, which gives a 20% premium discount to individuals in the Sutter County Special Flood Hazard Area (SFHA), and a 10% discount to policyholders outside the SFHA.

The activities credited by the CRS provide direct benefits to Sutter County and its residents, including:

- Enhanced public safety;
- A reduction in damage to property and public infrastructure;
- Avoidance of economic disruption and losses;
- Reduction of human suffering; and
- Protection of the environment.

The activities that Sutter County implements and receives CRS credits for include:

- **Activity 310 – Elevation Certificates**: The Water Resources Department maintains elevation certificates for new and substantially improved buildings. Copies of elevation certificates are made available upon request. Elevation Certificates are also kept for post-FIRM and pre-FIRM buildings and maintained in computer format. Elevation Certificates,

plans, regulations and other records are maintained in a secure location away from the permit office.

- **Activity 320 – Map Information Service**: Credit is provided for furnishing inquirers with flood zone information from the community's latest Flood Insurance Rate Map (FIRM), publicizing the service annually and maintaining records.
- **Activity 330 – Outreach Projects**: An annual floodplain management update is mailed to all properties in the community on an annual basis. An outreach brochure is mailed annually to all properties in the community's Special Flood Hazard Area (SFHA). The community also provides flood information through displays at public buildings and community events, as well as on their website.
- **Activity 340 – Hazard Disclosure**: Credit is provided for state and community regulations requiring disclosure of flood hazards. Sutter County has historically claimed credit for Activity 340, as it is a State requirement that buyers are notified when properties fall within SFHAs. It is uncertain if the County will continue to receive under new CRS manual.
- **Activity 350 – Flood Protection Information**: Documents relating to floodplain management are available in the reference section of the Sutter Public Library. Credit is also provided for floodplain information displayed on the community's website.
- **Activity 360 – Flood Protection Assistance**: The community provides technical advice and assistance to interested property owners and annually publicizes the service. The County has historically received no credit. Sutter County will be requesting credit for 2013, as we improved how we publicize our service.
- **Activity 410 – Additional Map Data**: Credit is provided for the higher mapping standards which go above the requirements of the FIRM provided by FEMA.
- **Activity 420 – Open Space Preservation**: Park land and other such uses located in the floodplain are credited as open space preservation.
- **Activity 430 – Higher Regulatory Standards**: Credit is provided for enforcing regulations that require freeboard for new and substantial improvement construction, protection of floodplain storage capacity, natural and beneficial functions, enclosure limits, other higher regulatory standards, land development criteria and state mandated regulatory standards. Credit is also provided for a Building Code Effectiveness Grading Schedule (BCEGS) Classification of 3/3, for certification as a floodplain manager and the adoption of the International Building Codes.
- **Activity 440 – Flood Data Maintenance**: Credit is provided for maintaining and using digitized maps in the day to day management of the floodplain. Credit is also provided for maintaining copies of all previous FIRMs and Flood Insurance Study Reports. Sutter County receives credit for AMD, FM, and BMM.
- **Activity 450 – Stormwater Management**: The community enforces regulations for stormwater management, freeboard in non-SFHA zones, soil and erosion control, and water quality. Credit is also provided for watershed management master planning. Sutter County receives credit for SMR, ESC, and WQ
- **Activity 502** – Based on the updates made to the ISO Report of Repetitive Losses for 2012, Unincorporated Sutter County has 8 repetitive loss properties. All requirements for RL

properties have been or are being met. The community also sends letters to owners of repetitive loss structures.

- **Activity 510 – Floodplain Management Planning**: Credit is provided for the adoption and implementation of the County's current Floodplain Management Plan. In addition, as detailed in the Section 3.0, Planning Process, this LHMP Update is being developed to maximize CRS credits for Activity 510.
- **Activity 540 – Drainage System Maintenance**: Portions of the community's drainage system are inspected regularly throughout the year and maintenance is performed as needed by the Department of Water Resources. Records are being maintained for both inspections and required maintenance. Credit is also provided for an ongoing Capital Improvements Program. The community also enforces a regulation prohibiting dumping in the drainage system.
- **Activity 610 – Flood Warning Program**: Credit is provided for a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities.
- **Activity 630 – Dam Safety**: All California communities currently receive CRS credit for the state's dam safety program.

5.2 Goals and Objectives

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Up to this point in the planning process, the HMPC has organized resources, assessed hazards and risks, and documented mitigation capabilities. The resulting goals, objectives, and mitigation actions were developed based on these tasks. 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 LHMP Update Steering Committee and HMPC working group.

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 updated planning goals and objectives and to develop the mitigation strategy for the Sutter 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 2007 plan as well as a list of other sample goals to consider. They were told that they could use, combine, or revise the statements provided or develop new ones, keeping the risk assessment in mind. Each member was given three index cards and asked to write a goal statement on each. Goal statements were collected and grouped into similar themes and displayed on the wall of the meeting room. The goal statements were then grouped into similar topics. New goals from the HMPC were discussed until the team came to consensus. 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.

Based on the risk assessment review and goal setting process, the HMPC identified the following mission statement, goals, and objectives, which provide the direction for reducing future hazard-related losses within the Sutter County Planning Area.

Master Goal/Mission Statement

To develop sustainable communities to preserve life, protect property, the environment, and the economy from natural hazards by improving the communities' capabilities to prevent losses.

Goal 1: Minimize risk and vulnerability of the community to hazards and reduce damages and protect lives, properties, and public health in Sutter County

- Minimize economic and resource impact
- Minimize impact to both existing and future development
- Prevent and reduce flood-related losses
- Improve integrity of levees
- Prevent and reduce agricultural losses

Goal 2: Provide protection for critical facilities, infrastructure, utilities and services from hazard impacts.

- Update and maintain list of critical facilities: Essential Services, At-Risk Populations, Hazardous Materials Facilities
- Protect evacuation routes

Goal 3: Improve community awareness, education, and preparedness for hazards that threaten our communities

- Enhance public outreach, education and preparedness program to include all hazards of concern
- Increase public knowledge about the risk and vulnerability to identified hazards and recommended responses to disaster events
- Increase public communications to keep the public well informed prior to, during and after a disaster event, including information regarding evacuation and sheltering options
- Provide planning and coordination for "At-Risk" populations
- Increase public's awareness and involvement in communities' mitigation projects

Goal 4: Increase communities' ability to be prepared for, respond to, and recover from a disaster event

- Improve interagency (local, state, federal) emergency coordination and communication to ensure effective community preparedness, response and recovery
- Enhance the use of shared resources/Develop a strong mutual aid support system
- Create and maintain a fully functional, interoperable radio and communication system
- Improve interoperable communication with non-public safety and private partners

Goal 5: Enhance collaboration and coordination of disaster-related plans with local, state, and federal agencies and private partners

- Protect and maintain continuity of operations

Goal 6: Maintain FEMA Eligibility/Position the communities for grant funding.

5.3 Identification and Analysis of Mitigation Actions

Requirement §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 Identifying Hazards: Natural Hazards was evaluated. Only those hazards that were determined to be a priority hazard were considered further in the development of hazard-specific mitigation actions.

These priority hazards (in alphabetical order) are:

- Dam Failure
- Drought & Water shortage

- Floods: 100/200/500 year
- Floods: Localized Stormwater
- Invasive Species: Pests/Plants
- Levee Failure
- Marine Invasive Species
- Severe Weather: Extreme Cold/Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy rain, hailstorm, lightning, wind
- Wildfire

The HMPC eliminated the hazards identified below from further consideration in the development of mitigation actions because the risk of a hazard event in the County is unlikely or nonexistent, the vulnerability of the County is low, or capabilities are already in place to mitigate negative impacts. The eliminated hazards are:

- Earthquakes
- Earth Movements: Erosion
- Earth Movements: Landslide
- Severe Weather: Fog
- Severe Weather: Tornado
- Volcano

It is important to note, however, that all the hazards addressed in this plan are included in the countywide multi-hazard public awareness mitigation action as well as in other multi-hazard, emergency management actions.

Once it was determined which hazards warranted the development of specific mitigation actions, the 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 (required to be evaluated)
- Property protection
- Structural projects
- Natural resource protection
- Emergency services
- Public information

The HMPC was also provided with examples of potential mitigation action alternatives for each of the above categories. The HMPC was also instructed to consider both future and existing buildings in considering possible mitigation actions. A facilitated discussion then took place to examine and analyze the options. Appendix C provides a detailed review and discussion of the

six mitigation categories to assist in the review and identification of possible mitigation activities or projects. Also utilized in the review of possible mitigation measures is FEMA's publication on Mitigation Ideas, by hazard type. Prevention type mitigation alternatives were discussed for each of the priority hazards. This was followed by a brainstorming session that generated a list of preferred mitigation actions by hazard.

5.3.1 Prioritization Process

Once the mitigation actions were identified, the HMPC was provided with several decision-making tools, including FEMA's recommended prioritization criteria, STAPLEE sustainable disaster recovery criteria; Smart Growth principles; and others, to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. STAPLEE stands for the following:

- Social: Does the measure treat people fairly? (e.g., different groups, different generations)
- Technical: Is the action technically feasible? Does it solve the problem?
- Administrative: Are there adequate staffing, funding, and other capabilities to implement the project?
- Political: Who are the stakeholders? Will there be adequate political and public support for the project?
- Legal: Does the jurisdiction have the legal authority to implement the action? Is it legal?
- Economic: Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- Environmental: Does the action comply with environmental regulations? Will there be negative environmental consequences from the action?

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority. Other criteria used to assist in evaluating the benefit-cost of a mitigation action includes:

- Contribution of the action to save life or property
- Availability of funding and perceived cost-effectiveness
- Available resources for implementation
- Ability of the action to address the problem

In addition to reviewing and incorporating the actions from the 2007 plan, the committee also considered and defined several new actions. A comprehensive review of mitigation measures was performed using the criteria (alternatives and selection criteria) in Appendix C.

With these criteria in mind, HMPC members were each given a set of nine colored dots, three each of red, blue, and yellow. The dots were assigned red for high priority (worth five points), blue for medium priority (worth three points), and yellow for low priority (worth one point). The team 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 considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

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 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 action plan for the Sutter County Planning Area.

5.4 Mitigation Action Plan

Requirement §201.6(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 action plan was developed to present the recommendations developed by the HMPC for how the Sutter County Planning Area can reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Emphasis was placed on both future and existing development. The 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 5.1 identifies the mitigation actions and lead jurisdiction for each action. Only those actions where the County is the lead jurisdiction are detailed further in this section. Actions specific to other participating jurisdictions, or where other jurisdictions are taking the lead, are detailed in each respective jurisdictional annex to this plan.

The action plan detailed below contains both new action items developed for this plan update as well as old actions that were yet to be completed from the 2007 plan. Table 5.1 indicates whether the action is new or from the 2007 plan and Section 2.0 contains the details for each 2007 mitigation action item indicating whether a given action item has been completed, deleted, or deferred.

It is important to note that Sutter County and the participating jurisdictions have numerous existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents, such as watershed plans, stormwater plans, and capital improvement budgets and reports. These actions are considered to be part of this plan, 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 plan.

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 communities are not obligated by this document to implement any or all of these projects. Rather this mitigation strategy represents the desires of the community 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 CRS mitigation categories and criteria contained in Appendix C.

It should be noted that the projects submitted by each jurisdiction in Table 5.1 benefit all jurisdictions whether or not they are the lead agency. Specifically, the first several projects noted at the beginning of the table apply to and benefit the three CRS communities – Sutter County, Live Oak, and Yuba City. It is also important to note that the public outreach action, in addition to many of the emergency services actions, apply to all hazards regardless of hazard priority.

Table 5.1. Sutter County Planning Area's Mitigation Actions

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Multi-jurisdictional Actions						
Enhance Public Awareness of the Affects of Natural Hazards and Public Understanding of Disaster Preparedness	Sutter County, Live Oak, Yuba City	New Action and Ongoing	X	X	X	Public Information
Planned Multi-Hazard CRS Outreach Projects	Sutter County, Live Oak, Yuba City	New Action	X	X	X	Public Information
Implementation of CRS Activities	Sutter County, Yuba City and Live Oak	New Action and Ongoing	X	X	X	Prevention Emergency Services Property Protection Natural Resource Protection Structural Public Information
Review and Amend Flood Damage Prevention Ordinance, as Appropriate	Sutter County, Yuba City and Live Oak	New Action		X	X	Prevention Property Protection
Evaluate the Development and Implementation of County-Wide Stormwater Management Ordinance	Sutter County, Yuba City and Live Oak	New Action		X	X	Natural Resource Protection Prevention Property Protection
Prepare Post-Disaster Guidance Materials	Sutter County, Yuba City and Live Oak	New Action	X	X		Public Information
Feather River Regional Flood Management Plan	Sutter County, Yuba City and Live Oak	New Action	X	X	X	Structural Natural Resource Protection
Feather River West Levee Rehabilitation Project	Sutter County, Yuba City and Live Oak	New Action	X	X	X	Structural Natural Resource Protection
River Level Gauge System	Sutter County, Yuba City and Live Oak	New Action	X	X		Structural
Sutter Basin Feasibility Study	Sutter County, Yuba City and Live Oak	2007 Action	X	X	X	Structural Natural Resource Protection

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Sutter County Actions						
Flood System Repair Program	Sutter County	New Action	X	X	X	Structural Natural Resource Protection
Robbins Wastewater Plant - Backup Power Source	Sutter County	New Action	X		X	Property Protection
Live Oak Canal - Improvement Project	Sutter County	New Action	X	X	X	Structural
Gilsizer Slough - Master Drainage Study	Sutter County	New Action	X	X	X	Property Protection Structural Natural Resource Protection
Robbins Wastewater Plant - Water Meters & Mains	Sutter County	New Action	X			Structural
NIXLE Text Notification System	Sutter County	New Action	X	X		Emergency Services Property Protection
Robbins Wastewater Plant - Water Treatment Plant	Sutter County	New Action	X			Structural
Eliminate Local Flooding Areas at the Six Locations Identified in the Master Drainage Study	City of Live Oak	New Action	X	X	X	Property Protection Structural Natural Resource Protection
Hwy 99 Improvements	City of Live Oak	New Action	X	X		Structural
EOC Equipment and Supplies	City of Live Oak	New Action	X	X		Emergency Services
Blackboard Connect Upgrades and Maintenance	City of Live Oak	New Action	X	X		Emergency Services
Backup Power to Critical Facilities	City of Live Oak	New Action	X	X		Property Protection Structural
Well, Holding Tank, Water Treatment Equipment with Associated Water lines and Water Main Upgrade	City of Live Oak	New Action	X	X		Structural

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Project Improvements to Decrease Localized Flooding	City of Yuba City	New Action	X	X	X	Prevention Property Protection Structural Natural Resource Protection
Enhance Current Rapid Notify System to Include Cell Phone Enhancements	City of Yuba City	New Action	X	X	X	Emergency Services
Feather River Habitat Restoration	City of Yuba City	New Action	X	X	X	Natural Resource Protection
Fifth Street Bridge Replacement	City of Yuba City	New Action	X	X	X	Prevention Emergency Services Structural
Gilsizer Slough Weir at Bogue Road	City of Yuba City	New Action	X	X	X	Structural Property Protection
Interactive Critical Facility Data Management	City of Yuba City	New Action	X	X	X	Emergency Services Property Protection
Low Lift Pump Station Security Improvements	City of Yuba City	New Action	X	X	X	Emergency Services Property Protection
Hazard Preparedness Public Outreach	City of Yuba City	New Action	X	X	X	Public Information
Relocation of Treated Wastewater Effluent Diffuser Line	City of Yuba City	New Action	X	X	X	Property Protection Emergency Services
Response Logistics Planning	City of Yuba City	New Action	X	X	X	Prevention Emergency Services Public Information
200-Year Flood Protection for Sphere of Influence Area	City of Yuba City	New Action	X	X	X	Structural Property Protection
Alternative Methods to Dispose of Treated Wastewater Effluent	City of Yuba City	New Action	X	X	X	Property Protection Emergency Services
Establish Backup Power Sources for Critical Facilities within Yuba City	City of Yuba City	New Action	X	X	X	Property Protection Emergency Services

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Yuba City Urban Area Emergency Operations Center	City of Yuba City	New Action	X	X	X	Emergency Services Structural
Master Drainage Study and Improvements to Meet 200-YR Flood Protection	Gilsizer County Drainage District	New Action	X	X	X	Property Protection Structural Natural Resource Protection
Revetment of Slough Channel	Gilsizer County Drainage District	2007 Action	X	X	X	Property Protection Structural Natural Resource Protection
Bank Erosion Repairs	Levee District 1	2007 Action	X	X		Property Protection Structural Natural Resource Protection
Alternative Power Source at Pumping Station	RD 70	New Action	X	X	X	Emergency Services Property Protection
Levee/Erosion Repair	RD 70	New Action	X	X		Property Protection Natural Resource Protection Structural
Coordination with State DWR Flood Emergency Response Project	RD 70	New Action	X	X	X	Prevention Emergency Services
Flood System Repair Project #1	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #2	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Flood System Repair Project #3	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Flood System Repair Project #4	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #5	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #6	RD 1001	New Action	X	X		Property Protection Natural Resource Protection

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Flood System Repair Project #7	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #8	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Alternative Power Source at Pump House	RD 1001	New Action	X	X		Property Protection Structural
Flood Emergency Response Project	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Alternative Power Source at Karnak Pump Station	RD 1500	New Action	X	X		Emergency Services Property Protection
Levee Repair	RD 1660	New Action	X	X		Property Protection Natural Resource Protection Structural
Alternative Power Source at Pump Station	RD 1660	New Action	X	X		Emergency Services Property Protection
Coordination with State DWR Flood Emergency Response Project	RD 1660	New Action	X	X		Prevention Emergency Services

Multi-Jurisdictional Mitigation Actions

1. Enhance Public Awareness of the Affects of Natural Hazards and Public Understanding of Disaster Preparedness

Hazards Addressed: All (priority and non-priority) hazards

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: There are a total of 9 jurisdictions participating in the Sutter County Local Hazard Mitigation Plan. Each jurisdiction is responsible for their own outreach/education program for hazards in their community.

Project Description: The level of effort varies by jurisdiction. All jurisdictions contend with limited resources; some must sacrifice educational outreach campaigns to direct their limited resources to the most critical projects. A single unified outreach program will ascertain both broad and targeted educational needs. Resources will be leveraged by consolidating messaging where appropriate and reaching across jurisdictional lines.

Other Alternatives: Status quo.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing outreach programs will be reviewed for effectiveness. Successful components will be expanded across the broader region.

Responsible Office: Sutter County, Yuba City, Live Oak, all other districts

Priority (H, M, L): High

Cost Estimate: To be determined

Benefits (Losses Avoided): Increase residents' knowledge of potential hazards and activities required to mitigate hazards.

Potential Funding: HMGP Grant

Schedule: Ongoing

2. Planned Multi-Hazard CRS Outreach Projects

Hazards Addressed: Multi-hazard

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: Sutter County Water Resources, the City of Live Oak, and Yuba City Public Works perform many types of outreach each year to make citizens in the County aware of flooding and other hazards. Each entity handles CRS related projects as appropriate.

Project Description:

For Sutter County 11 projects yearly projects are planned.

- OP1: (October, 2013) Presentation on the National Flood Insurance Program at the National Weather Service – Town Hall meeting in Yuba City.
- OP2: (October, 2013) Presentation on County's flood issues at Sutter County - Board of Supervisors meeting.
- OP3: Presentation to local engineers and designers regarding construction requirements for SFHA, flood openings.
- OP4: Presentation to local realtors concerning flood risk & floodplain management. Advertise one-on-one assistance regarding Property Protection Advice.
- OP5: Post informational material on Facebook. Advertise one-on-one assistance regarding Property Protection Advice.
- OP6: Include annual postcard with tax bill. Advertise one on one assistance regarding Property Protection Advice.
- OP7: Include an article in the Recology (waste collection provider's) newsletter.
- OP8: Host an informational booth at the Yuba-Sutter Home & Garden Show.
- OP9: A brochure "Building in a High Risk, Special Flood Hazard Area - Do I Need to Elevate?"
- OP10: A brochure for Southeast Sutter Basin - "Important Information in the Event of Flood"
- OP11: A brochure for Robbins Basin - "Important Information in the Event of Flood"

For Live Oak, the City plans to continue to implement and improve the City's CRS Program

For Yuba City, the City plans to continue to implement and improve the City's CRS Program

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CRS Program

Priority (H, M, L): High for Sutter County, medium for Live Oak and Yuba City

Responsible Office: CRS Coordinator/Sutter County Water Resources, Live Oak, Yuba City Public Works

Cost Estimate: Staff time and printing costs.

Benefits (Losses Avoided): Increased awareness for citizens of flood risk and other natural disaster that can affect the County. This also gives points for CRS, which helps to keep costs for flood insurance holders in the County down.

Potential Funding: Existing budget

Schedule: 2013-2014 schedules are in place. This project is ongoing and will continue until the next update of this Plan.

3. Implementation of CRS Activities

Hazards Addressed: Multi-Hazard

Goals Addressed: 1, 2, 3, 4, 5 and 6

Issue/Background: The CRS Program brings several mitigation concepts under one umbrella to help communities develop solid floodplain management programs by reducing flood losses, protecting properties from flood damage, and helping to strengthen the insurance aspects of the NFIP. The CRS is one of FEMA's premier mitigation programs which also help's to mitigate damage from other natural hazards. Communities who implement CRS activities receive a rating which results in the reduction of flood insurance premiums for policy holders in that community. Sutter County, Yuba City and Live Oak all participate in the CRS Program and will be verified under the 2013 CRS Coordinators Manual. This also provides continued compliance with the NFIP.

Project Description: Continue to implement CRS Activities and look for additional CRS credits under the 2013 CRS Coordinator's Manual to better protect residence from flood damage and other natural hazards.

Other Alternatives: None

Priority (H, M, L): High

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: Staff time

Benefits (Losses Avoided): Increased flood protection and reduction in the cost of flood insurance

Potential Funding: Existing Budget

Schedule: Ongoing

4. Review and Amend Flood Damage Prevention Ordinance, as Appropriate

Hazards Addressed: Flood, Levee Failure

Issues/Background: A community's flood damage prevention ordinance sets minimum rules, regulations, and standards for development in the SFHA. Since these standards are minimum protection standards, higher regulatory may be necessary to better protect properties from potential flood damage. This is certainly true when FIRM maps are updated, when floor control projects are completed or when a community has experienced a recent flood. Since only part of Sutter County has been mapped by the NFIP, an evaluation of current regulations is necessary for the county, Yuba City and Live Oak. Each community should evaluate their current higher regulatory standards and make decisions if additional higher standards may be necessary to protect both current and future development. Evaluation of higher regulatory standards is also important because of changes in the 2013 CRS Coordinator's Manual. This also provides continued compliance with the NFIP.

Project Description: Review current flood damage prevention higher regulatory standards and assess the need for additional higher regulations in terms of protecting both current and future development from potential flood damage.

Other Alternatives: None

Priority (H, M, L): Medium

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: Staff time

Benefits (Losses Avoided): Increased flood protection and reduction in the cost of flood insurance

Potential Funding: Existing Budget

Schedule: Next 2 years

Goals Addressed: 1, 2, and 4

5. Implement County-Wide Stormwater Management Ordinance

Hazards Addressed: Flood, Severe Storm (Heavy Rainfall)

Goals Addressed: 1, 2, and 4

Issues/Background: Continuity of stormwater standards is important for everyone in a watershed or in watersheds throughout a county. Common stormwater regulations mean that no one is ignoring a problem and passing it on to someone else downstream. Therefore is critical that Sutter County, Yuba City and Live Oak work together to create a unifies stormwater management ordinance that provides for retention and detention when necessary so there is no adverse impact on adjoining properties or communities downstream. Controlling stormwater (runoff from impervious surfaces) is essential as communities develop. A unified county-wide stormwater management ordinance will also help all CRS communities in the county achieve more credit for Activity 450 - Stormwater Management because they will all be regulating to the same standards.

Project Description: Sutter County, Yuba City and Live Oak will work together to implement a county-wide stormwater management ordinance so that uniform regulations are in place throughout the county and that protections are in place to prevent increased runoff from creating adverse impacts downstream even outside of Sutter County.

Other Alternatives: Leave current fragmented regulations in place

Priority (H, M, L): Medium

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: $40,000

Benefits (Losses Avoided): Increased flood protection and reduction in the cost of flood insurance

Potential Funding: Existing Budget and possible CBGD or state funding

Schedule: Within 5 years

6. Prepare Post-Disaster Guidance Materials

Hazards Addressed: Multi-Hazard

Goals Addressed: 1, 2, 3, 4, 5 and 6

Issue/Background: After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- Patrolling evacuated areas to prevent looting,
- Providing safe drinking water,
- Monitoring for diseases,

- Vaccinating residents for tetanus and other diseases,
- Clearing streets, and
- Cleaning up debris and garbage.

Throughout the recovery phase, everyone wants to get "back to normal." The problem is that "normal" means the way they were before the disaster, exposed to repeated damage from future disasters. There should be an effort to help prepare people and property for the next disaster. Such an effort would include:

- Public information activities to advise residents about mitigation measures they can incorporate into their reconstruction work,
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs,
- Identifying other mitigation measures that can lessen the impact of the next disaster,
- Acquiring substantially or repeatedly damaged properties from willing sellers,
- Planning for long-term mitigation activities, and
- Applying for post-disaster mitigation funds.

Making sure the general public understands the requirements for post-disaster cleanup and reconstruction is vital to ensuring that a community recovers quickly and safely from a disaster. Preparing public information materials to distribute to the public will help educate citizens on the correct procedures for both cleanup and post-disaster reconstruction and development.

Project Description: Sutter County, Yuba City and Live Oak will work together to prepare outreach educational materials which identify correct procedures for both cleanup and redevelopment after a disaster to better educate residents of the requirements for rebuilding, etc..

Other Alternatives: None

Priority (H, M, L): Medium

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: Staff time

Benefits (Losses Avoided): Educating the public on the requirements for post-disaster redevelopment will ensure safer conditions during and after a disaster through timely information on how and when structures can be rebuilt, etc.

Potential Funding: Existing Budget

Schedule: Within 5 years

7. Feather River Regional Flood Management Plan

Hazards Addressed:

- Description of the current flood management conditions
- Opportunities for improved flood management while achieving multiple objectives (flood protection, agricultural conservation and habitat restoration, for example)
- Needed projects based upon priority
- Preliminary financing plans

Goals Addressed: 1, 2, 3, 4, 6

Issue/Background: The regional planning process will partner local governments and stakeholders with DWR to identify and prioritize projects in the Feather River Region that will accomplish the goals established in the Central Valley Flood Protection Plan. The region's goals are to build on the successes of recent flood management efforts and to position the region to implement actions by maximizing remaining Prop 1E and 84 bond funds. The end result will be actions to reduce flood risk in urban, rural and small communities through a combination of improvements to the levee system, as well as updated emergency response and recovery plans.

Project Description: The Yuba County Water Agency (YCWA), Three Rivers Levee Improvement Authority (TRLIA), Marysville Levee Commission (MLC) and Sutter Butte Flood Control Agency (SBFCA) are partnering to develop the Feather River Flood Management Plan. Flood Management projects included in the plan will be eligible for future state and federal funding.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: Sutter Butte Flood Control Agency

Cost Estimate: $1,200,000

Benefits (Losses Avoided):

- Flood management challenges and deficiencies at the regional levee identified
- Potential solutions/projects identified and prioritized
- Financial strategies that identify benefits and sources of funding for project implementation identified

Potential Funding: The planning process is being funded in full by the Department of Water Resources with bond funding approved by California voters in 2006. The completed plan will be

considered by the State for a 2017 update to the Central Valley Flood Protection Plan, which was originally approved by the Central Valley Flood Protection Board in 2012.

Schedule: Completed in fall 2014

8. Feather River West Levee Rehabilitation Project

Hazards Addressed: Flood, Levee Failure

Goals Addressed: 1, 2, 6

Issue/Background: Under and through seepage problems have resulted in major levee failures in Yuba City in 1955 and 1997. As a result, the levee does not provide 100-year flood protection as required by the Federal Emergency Management Agency (FEMA), or the state's requirement for 200-year flood for areas with more than 10,000 residents.

Project Description: Rehabilitation of 44 miles of levees along the west bank of the Feather River, from Thermalito Afterbay south to the Sutter Bypass, will address underseepage and through-seepage which is caused by water pressure and velocity both under and through the levees.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: Sutter Butte Flood Control Agency

Cost Estimate: $312 million for Project 1 and Project 2

Benefits (Losses Avoided): Provide 200-year level of flood protection for urban areas in the Sutter Basin, and provide 100-year flood protection for non-urban areas in the southern portion of the Basin.

Potential Funding: SBFCA has received an initial design grant from DWR for $9 million and expects to receive multiple construction/implementation grants to fund approximately 76 percent of the total cost. The local funding is generated from an assessment district passed by Sutter and Butte County property owners in 2010.

Schedule: Construction on the first portion of the work – near Shanghai Bend, south of Yuba City – began on July 22, 2013. Work is scheduled to continue through the 2015 construction season.

9. River Level Gauge System

Hazards Addressed: Flood

Goals Addressed: 1, 2, 6

Issue/Background: Sutter County maintains (5) five river gauges to monitor river levels and aid in the evacuation of affected areas on all stream reaches in the County, Live Oak, and Yuba City. These systems have been in use since 1998 and were upgraded in 2010 with Homeland Security grant funds.

Project Description: Sutter County has relied on this system for real time localized alert and warning regarding high water events on river levees. As with any system it requires funds and equipment to maintain and sustain this system.

Other Alternatives: To use the Department of Water Resources river gauges. These gauges are not in prime locations to provide accurate and timely alert and warning.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project is a continuation of efforts currently in place.

Priority (H, M, L): High

Responsible Office: Sutter County Office of Emergency Management, City of Live Oak, Yuba City

Cost Estimate: Varies. Last upgrade in 2010 cost $21,000. Occasional vandalism has cost between $1,500 and $2,500. Currently, there is a need for replacement of equipment at location at the cost of $2,000.

Benefits (Losses Avoided): With this system in place and maintained it provides effective warning and notification to Sutter County OEM for emergency response.

Potential Funding: Funding would be from grants or the general fund.

Schedule: Project is in place. Maintenance and sustainment are ongoing

10. Sutter Basin Feasibility Study

Hazards Addressed: Flood, Levee Failure

Goals Addressed: 1, 2, 6

Issue/Background: The Sutter Basin Feasibility Study was initiated in 2000 and a Feasibility Scoping Meeting was held in January 2005. However the study remained essentially inactive

until the formation of the Sutter Butte Flood Control Agency (SBFCA), which agreed to serve as the local partner along with the Central Valley Flood Protection Board (CVFPB) in 2007.

Project Description: The purpose of the Study is to document the planning process leading up to the recommendation of the tentatively selected plan (TSP) and in doing so reaffirm Federal interest, identify the national economic development (NED) plan, identify the locally preferred plan (LPP), and evaluate residual risk. Plans were evaluated at a suitable level of detail for the identification of the NED and LPP plans. Refined analysis, including total project costs, will be presented in the Final Report which is issued as a Chief of Engineers Report.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: Sutter Butte Flood Control Agency along with U.S. Army Corps of Engineers

Cost Estimate: $18 million

Benefits (Losses Avoided): Provide 200-year level of flood protection for urban areas in the Sutter Basin, and provide 100-year flood protection for non-urban areas in the southern portion of the Basin. Achieve Federal financial interest in levee improvements to protect the Butte/Sutter basin.

Potential Funding: The Study is cost shared 50-50 by Federal (USACE) and Non-Federal (State of California and SBFCA) partners.

Schedule: The Study is projected to be completed by the end of 2013.

Sutter County Mitigation Actions

11. Flood System Repair Program

Hazards Addressed: Flood, Levee Failure and Erosion

Goals Addressed: 1, 2, 6

Issue/Background: The Sutter Bypass is a man-made conveyance structure designed to reduce the flow within the Sacramento River during high-flow events. The levees for the Sutter Bypass were not constructed to current design standards, and create a high risk of flooding for lands on either side. The east levee of the Sutter Bypass protects a large portion of the City of Yuba City plus all the lands south of Yuba City that are between the Sutter Bypass and the Feather River.

Failure of the Sutter Bypass - East Levee would place over 30,000 people in harm's way, along with approximately 10,000 structures.

Project Description: The project includes a new slurry wall to address seepage at 60 locations and also addresses erosion in multiple areas.

Other Alternatives: Setback levees are a viable alternative. However, setback levees are higher in cost, would remove thousands of acres from agricultural production, and result in more environmental impacts.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project would be a State Department of Water Resources project. Coordination and assistance would be provided by the City of Yuba City and the County of Sutter.

Priority (H, M, L): High

Responsible Office: California Department of Water Resources and Sutter County

Cost Estimate: $250 million

Benefits (Losses Avoided): As a result of this proposed project, the east bank of the Sutter Bypass would be retrofitted to meet current design standards and to provide the urban level of flood protection (200-year for urban / urbanizing areas). This would reduce the threat of flooding for over 30,000 residents and for over 10,000 structures.

Potential Funding: Funding would be anticipated from a combination of State and Federal funds.

Schedule: Planning and initial design could start by 2014 if funding available.

12. Live Oak Canal – Improvement Project

Hazards Addressed: Flood and Erosion

Goals Addressed: 1, 2, 6

Issue/Background: Development in the West Yuba City Area could cause increased runoff rates and increased flooding above that which occurs under existing conditions. Improvements to the existing drainage system will be needed because of the increased runoff and the need for a higher level of flood protection. Future development results in the construction of homes, buildings, and other high value infrastructure in areas that are currently agricultural lands. Consequently, several sets of improvements have been developed to provide flood protection throughout the Live Oak Canal (LOC) watershed.

Project Description: The project includes two detention basins, one located at the north end of the LOC and one located south of Yuba City. There would also be a new pump station associated with each detention basin. To help convey peak flows northward, the LOC would be enlarged in various areas, the channel bottom would be leveled to eliminate areas where water permanently pools, and undersized road crossings (i.e. culverts) would be enlarged.

Other Alternatives: Multiple alternatives were evaluated in the West Yuba City Master Drainage Plan (WYCMDP). The preferred alternative was selected due to multiple factors including cost, limited environmental impact, and limited impact to adjacent property owners.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project would be a joint project between the City of Yuba City and the County of Sutter.

Priority (H, M, L): High

Responsible Office: Sutter County Department of Development Services and the Yuba City Department of Public Works.

Cost Estimate: $38.8 million

Benefits (Losses Avoided): As a result of this proposed project, the Live Oak Canal (LOC) would be enlarged to provide sufficient conveyance capacity, with 1 foot of freeboard, for a 100-year, 4-day storm. The existing canal conveyance capacity is insufficient for a 50-year, 4-day storm, and places several thousand homes and businesses at risk of flooding. Furthermore, the City of Yuba City anticipates up to 19,220 new homes will be built within the LOC watershed by 2025. This both places more structures at risk and increases the peak flows within the LOC.

Potential Funding: Funding would be from a combination of grants, development fees and assessments.

Schedule: Planning level design complete, could begin construction by 2015 if funding available.

13. Robbins Wastewater Plant – Backup Power Source

Hazards Addressed: Multi-Hazard (Wastewater Containment)

Goals Addressed: 1, 2, 6

Issue/Background: The existing wastewater treatment plant at the community of Robbins does not have a backup power supply. In the event of a power outage, there is a potential for loss of control or containment of untreated wastewater. It is desired to have a backup power supply to prevent sewer spills. The County proposes to address this problem by implementing a project

that would install a backup generator and fuel tank at the wastewater treatment plant to prevent a loss of control or containment as a result of power outages.

Project Description: The project includes the installation of a propane generator (50 kW, single-phase, 240V), propane tank, and appurtenant electrical service and piping. A sound-attenuating enclosure would also be provided for the generator and tank.

Other Alternatives: Alternatives include the "Do Nothing" alternative and the installation of solar power battery backup system. The "Do Nothing" alternative would result in the continued threat of a wastewater spill. A solar power battery backup system is feasible, but would have a higher initial capital cost, higher maintenance costs, and a shorter service life.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Sutter County – Water Works District No. 1 has completed the design for a new generator, tank and enclosure, and has applied for grant funding from the California Clean Water State Revolving Fund.

Priority (H, M, L): High

Responsible Office: Sutter County Water Works District No. 1.

Cost Estimate: $150,000

Benefits (Losses Avoided): As a result of this proposed project, the Robbins wastewater treatment plant would be able to function during a power outage without the threat of a sewage spill.

Potential Funding: Grant funding from the California Clean Water State Revolving Fund.

Schedule: Construction could start by September 2013 if grant funding is available.

14. Gilsizer Slough - Master Drainage Study

Hazards Addressed: Flood

Goals Addressed: 1, 2, 6

Issue/Background: Development in the urbanized Yuba City area could cause increased runoff rates and increased flooding above that which occurs under existing conditions. Improvements to the existing drainage system will be needed because of the increased runoff and the need for a higher level of flood protection. Future development results in the construction of homes, buildings, and other high value infrastructure in areas that are currently agricultural lands. Minor flooding of agricultural lands from relatively small storms has been acceptable because it has not caused significant damage. However, flooding of these areas is no longer acceptable, as there is a need to protect the significant infrastructure associated with agriculture in the southern portion of

the Gilsizer Slough drainage area. Consequently, a study is proposed to determine existing conveyance capacity and to plan for future improvements to the system to provide 100-year conveyance capacity.

Project Description: The project includes the following components:

- Data collection and review;
- ArcGIS mapping;
- Preparation of alternatives to accommodate 100-year flows;
- Preparation of cost estimates;
- Drainage improvement prioritizations;
- Preparation of Master Drainage Study for Gilsizer Slough.

Other Alternatives: Alternatives include the "Do Nothing" alternative, which would result in the continued problems with minor flooding, and the risk of severe flooding during a larger storm event.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Sutter County - Department of Development Services would implement the Request for Qualifications process to select a consultant to prepare the study.

Priority (H, M, L): High

Responsible Office: Sutter County Department of Development Services.

Cost Estimate: $150,000

Benefits (Losses Avoided): As a result of this proposed project, the lands within the southern portion of the Gilsizer Slough watershed would be studied and a plan developed to provide adequate conveyance for a 100-year event.

Potential Funding: Grant funding from the FEMA's Hazard Mitigation Grant Program.

Schedule: The study could begin by September 2013 if grant funding is available.

15. Robbins Wastewater Plant - Water Meters & Mains

Hazards Addressed: Drought and Water Supply

Goals Addressed: 1, 2, 6

Issue/Background: The existing water distribution system for the community of Robbins is comprised of again water mains and delivery laterals that do not have water meters installed. Portions of the WWD#1 service area are served by 30-year old Galvanized Iron Pipe (GIP)

laterals and water mains (some mains may be up to 50-years old). The degrading water mains are a frequent source of leaks and require several emergency repairs every year. The community uses approximately four times the national average of water per capita, in combination because of frequent water main breaks and because of a lack of understanding by the customers concerning the need for water conservation. The County proposes to address these issues by implementing a project to replace the aging water mains and to install water meters at every connection.

Project Description: The project includes the following components:

- Install approximately 105 water meters and appurtenances;
- Replace and relocate aging Galvanized Water Pipe (GIP) and Asbestos Concrete Pipe (ACP). New / replacement water main sections would be as follow:
  - 1,600 linear feet of 12" C900 pipe;
  - 3,400 linear feet of 10" C900 pipe;
  - 2,000 linear feet of 8" C900 pipe;
  - 3,500 linear feet of 6" C900 pipe;
  - 46 new valves; and
  - 12 new fire hydrants.

Other Alternatives: Alternatives include the "Do Nothing" alternative and the installation of larger water main sizes to fully accommodate full fire flows. The "Do Nothing" alternative would result in the continued high water use, which both incurs unnecessary expenses and could eventually deplete the local groundwater reservoir. It is feasible to install larger water mains to fully accommodate fire flows, but doing so would require a much higher initial capital cost which would not be covered by current grant programs. Additional sections of existing water mains would also have to be replaced in order to achieve fire flows throughout the community.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Sutter County - Water Works District No. 1 has completed the design for replacement for portions of the water distribution system and installation of water meters, and has applied for grant funding from the California Safe Drinking Water State Revolving Fund.

Priority (H, M, L): High

Responsible Office: Sutter County Water Works District No. 1.

Cost Estimate: $3,060,000

Benefits (Losses Avoided): As a result of this proposed project, the community of Robbins would have a much more reliable water supply, would have sufficient water flows available to fight most fires that could occur in the community, and it is anticipated water usage would drop by half.

Potential Funding: Grant funding from the California Safe Drinking Water State Revolving Fund.

Schedule: Construction could start by September 2013 if grant funding is available.

16. Robbins Wastewater Plant - Water Treatment Plant

Hazards Addressed: Drought and Water Supply

Goals Addressed: 1, 2, 6

Issue/Background: The existing water well and water treatment plant serving the community of Robbins contains arsenic concentrations in the range of 17 to 19 ppm. While these arsenic concentrations were within regulatory limits at the time the treatment facility was constructed, both state and Federal arsenic limits have subsequently been reduced to 10 ppm, resulting in the system being out of compliance. As a result, the District is subject to an outstanding compliance order from the California Department of Public Health (CDPH) to treat water to bring the concentration of arsenic down to new arsenic level of 10 ppm.

The existing primary well and treatment plant are located within a 50 foot by 60 foot parcel leased from an adjacent crop duster operation. Adding additional treatment technologies would require either expanding the existing primary well/water treatment plant or constructing a new treatment plant at a larger site. The County currently owns a 0.67 acre parcel adjacent to the 12" water main that could be used as a site for a new well and new treatment plant. The County proposes to address these issues by implementing a project to replace the existing well and treatment plant, plus construct a new backup well.

Project Description: The eventual construction project will entail two new water wells, an entirely new water treatment plant that incorporates a new arsenic removal treatment component, and elimination of the following:

- The existing Sacramento Avenue backup well;
- The existing Wagner Well; and
- The existing treatment plant at the Wagner Well site.

Other Alternatives: Alternatives include the "Do Nothing" alternative and expanding the existing Wagner Well treatment plant. The "Do Nothing" alternative would result in the continued supply of drinking water that fails to meet State and Federal drinking water standards, and would not satisfy the State's compliance order.

Expanding the Wagner Well treatment plant is not considered feasible, as the property owner does not want further encroachment into the existing crop dusting operation and airfield. There would also be logistical issues, in that the existing plant would need to remain operational during the expansion project.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The Sutter County - Water Works District No. 1 is in the process of designing a new water treatment plant with two new wells, and intends to apply for grant funding from the California Safe Drinking Water State Revolving Fund in 2014.

Priority (H, M, L): High

Responsible Office: Sutter County Water Works District No. 1.

Cost Estimate: $4,000,000

Benefits (Losses Avoided): As a result of this proposed project, the community of Robbins would have a much more reliable water supply, and drinking water provided to the citizens would meet Federal and State standards for arsenic.

Potential Funding: Grant funding from the California Safe Drinking Water State Revolving Fund.

Schedule: Construction could start by September 2014 if grant funding is available.

17. NIXLE Text Notification System

Hazards Addressed: All Hazards Emergency Services

Goals Addressed: 1, 2, 3, 4, 6

Issue/Background: The current public alert/notification system for emergencies is a "reverse" 9-11 system maintained by the City of Yuba City. The city has the phone numbers of all residents/businesses in Sutter County and can alert based on geographic locations. With the advancement of "smart phones" and social media it has become necessary to expand the notification process to more than voice alerting and notification.

Project Description: Sutter County has recently implemented NIXLE; a text based alerting and notification system. This will augment the city's notification system. The County will maintain and sustain this system. Additionally, we will continue to expand our efforts to incorporate social media into the alerting process.

Other Alternatives: None.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project will be promoted in public outreach and education efforts

Priority (H, M, L): High

Responsible Office: Sutter County Office of Emergency Management

Cost Estimate: Negligible (system is free and system updates are seen as "normal" duties for the Public Information Officer).

Benefits (Losses Avoided): As a result of this proposed project, the public alert and warning system for Sutter County will now be able to reach people through emails and text messages.

Potential Funding: If needed, funding would be from grants or the general fund.

Schedule: Project is in place. Maintenance, sustainment, and education are ongoing

6 PLAN ADOPTION

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

7 PLAN IMPLEMENTATION

Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process. 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.

Section 3.0 Planning Process includes information on the implementation and maintenance process since the 2007 plan was adopted. This section includes information on the implementation and maintenance process for this plan update.

7.1 Implementation

Once adopted, the plan faces the truest test of its worth: implementation. While this plan contains many worthwhile actions, the participating jurisdictions will need to decide which action(s) to undertake first. Two factors will help with making that decision: the priority assigned the actions in the planning process and funding availability. Low or no-cost actions most easily demonstrate progress toward successful plan implementation.

An important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other plans and mechanisms, such as the general plans and watershed plans for Sutter County and participating jurisdictions. The County and participating jurisdictions already implement policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms.

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

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions.

This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the participating jurisdictions will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

Responsibility for Implementation of Goals and Activities

The elected officials and officials appointed to head each department within the City are charged with implementation of various activities in the plan. During the quarterly reviews as described later in this section, an assessment of progress on each of the goals and activities in the plan will be determined and noted. At that time, recommendations were made to modify timeframes for completion of activities, funding resources, and responsible entities. On a quarterly basis, the priority standing of various activities may also be changed. Some activities that are found not to be doable may be deleted from the plan entirely and activities addressing problems unforeseen during plan development may be added,

7.1.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance

With adoption of this plan, the participating jurisdictions will be responsible for the plan implementation and maintenance. The HMPC Steering Committee identified in Appendix B (or a similar committee) will reconvene quarterly each year to ensure mitigation strategies are being implemented and the City continues to maintain compliance with the NFIP. As such, Sutter County and participating jurisdictions agree to continue its relationship with the HMPC Steering Committee and:

- 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 implementation and update of this plan;
- Report on plan progress and recommended changes to the various governing boards or councils of all participating jurisdictions; and
- Inform and solicit input from the public.

The primary duty of the participating jurisdictions is to see the plan successfully carried out and to report to their community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County website (and others as appropriate).

7.2 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized.

7.2.1 Maintenance Schedule

The Sutter County OEM is responsible for initiating plan reviews and consulting with the other participating jurisdictions. In order to monitor progress and update the mitigation strategies identified in the action plan, Sutter County OEM and the standing HMPC will revisit this plan annually and following a hazard event. The HMPC will meet quarterly to review progress on plan implementation and will provide annual evaluation reports for each participating CRS community. The HMPC 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 plan update anticipated to be fully approved and adopted in early 2014, the next plan update for the Sutter County Planning Area will occur in 2019.

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; and/or
- Increased vulnerability as a result of new development (and/or annexation).

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 the 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 as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as the HMPC deems appropriate and necessary, and as approved by the appropriate governing boards or councils of the other participating jurisdictions. In keeping with the five-year update process, the HMPC will convene public meetings to solicit public input on the plan and its routine maintenance and the final product will be adopted by the governing boards or councils.

Quarterly Plan Review Process

For the 2013 hazard mitigation plan update review process, the Sutter County OEM will be responsible for facilitating, coordinating, and scheduling reviews and maintenance of the plan. The review of the Hazard Mitigation Plan will normally occur on a quarterly basis each year and will be conducted by the HMPC as follows:

- The Sutter County OEM will place an advertisement in the local newspaper advising the public of the date, time, and place for each quarterly review of the plan and will be responsible for leading the meeting to review the plan.
- Notices will be mailed to the members of the Steering Committee, 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 officials will be noticed by email and telephone or personal visit and urged to participate.
- Members of the Communities' Planning Commission 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 plan will be available for public comment at Sutter County and the Cities of Yuba City and Live Oak.
- After the review meeting, minutes of the meeting and a quarterly report will be prepared by the Steering Committee/HMPC and forwarded to the news media (public) and the ISO/CRS specialist for the CRS program. The report will also be presented to the County/City/participating jurisdictions' governing boards for review, and a request will be made that the Board take action to recognize and adopt any changes resulting from the review.

Criteria for Quarterly Reviews

The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating the plan. More specifically, the quarterly reviews will include the following information:

- Community growth or change in the past quarter.
- 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 (EOC) and whether or not the event resulted in a presidential 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 descriptions
- Documented damages due to the event
- 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 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 Hazard Mitigation Plan. 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.

7.2.3 Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other county and city plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. As previously stated in Section 7.1 of this plan, mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. The point is re-emphasized here. As described in this plan's capability assessment, the County and participating jurisdictions already implement policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. These existing mechanisms include:

- County and City general and master plans
- County and City Emergency Operations Plans
- County and City ordinances
- Flood/stormwater management/master plans
- Capital improvement plans and budgets
- Other plans and policies outlined in the capability assessments in the jurisdictional annexes
- Other plans, regulations, and practices with a mitigation focus

HMPC members involved in these other planning mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, programs, etc, as appropriate. As described in Section 7.1, 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 Local Hazard Mitigation Plan into existing planning mechanisms include:

1) As recommended by Assembly Bill 2140, each community should adopt (by reference or incorporation) this LHMP into the Safety Element of their General Plan(s). Evidence of such adoption (by formal, certified resolution) shall be provided to CAL EMA and FEMA.
2) Integration of flood actions identified in this mitigation strategy with the actions and implementation priorities established in existing Watershed and Stormwater Drainage Plans.
3) Using the risk assessment information to update the hazard analysis in the Sutter County Emergency Operations Plan.

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

7.2.4 Continued Public Involvement

Continued public involvement is imperative to the overall success of the plan's implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stores from the plan 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 Quarterly Reviews

The public will be noticed by placing an advertisement in the newspaper specifying the date and time for the review and inviting public participation. The HMPC, Steering Committee, local, state, and regional agencies will be notified and invited to attend and participate.

Public Involvement for Five-year Update

When the HMPC reconvenes for the 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 Steering Committee and HMPC plan to 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 plan update process. As part of this effort, public meetings will be held and public comments will be solicited on the plan update draft. The subcommittee will also coordinate this public outreach process with the public information program established pursuant to the 2013 guidelines from the Community Rating System (CRS).

Annex A CITY OF LIVE OAK

A.1 Introduction

This Annex details the hazard mitigation planning elements specific to the City of Live Oak, a participating jurisdiction to the Sutter County 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 Live Oak, with a focus on providing additional details on the risk assessment and mitigation strategy for this community.

A.2 Planning Process

As described above, the City of Live Oak followed the planning process detailed in Section 3.0 of the base plan. In addition to providing representation on the Sutter County Hazard Mitigation Planning Committee (HMPC), the City formulated their own internal planning team to support the broader planning process requirements. Internal planning participants included staff from the following City departments:

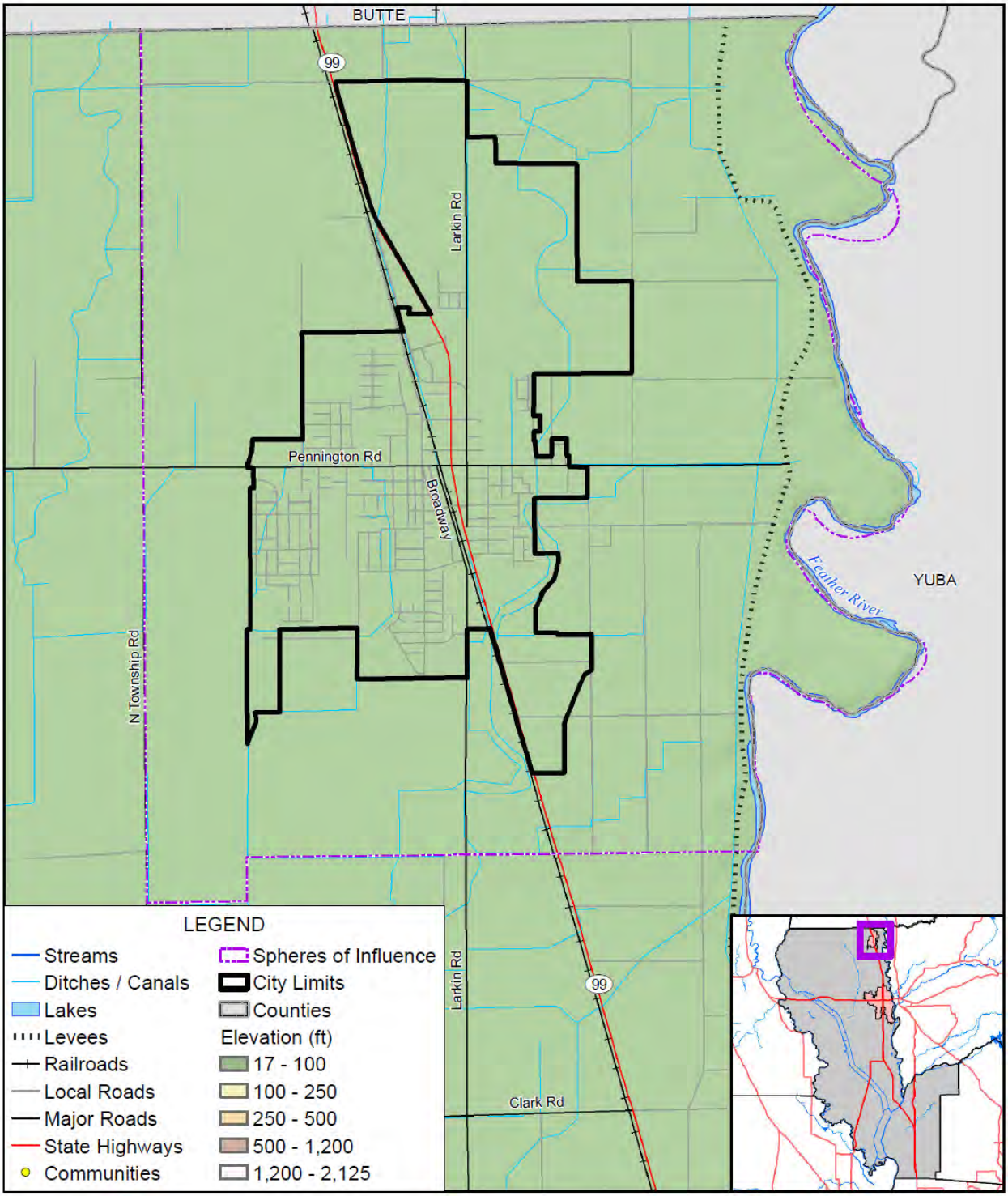
- Jim Goodwin, City Manager
- Jim Little, Chief Building Official
- Scott Rolls, City Engineer
- Ron Walker, Chief Plant Operator
- Kathleen Caldwell, Senior Admin Assistant
- Alison Schmidt, Building Inspector/ Grant Administrator
- Jan Meyer, Recreation Director
- Rick Martin, Fire Chief
- Butah Uppal, Sheriff Lt
- Satwant Takhar, Finance Director, Assistant City Manager
- Andrea Redamonti, Community Services, Contract Planner

Additional details on plan participation and City representatives are included in Appendix A.

A.3 Community Profile

The community profile for the City of Live Oak is detailed in the following sections. Figure A.1 displays a map and the location of the City of Live Oak within Sutter County.

Figure A.1. City of Live Oak Base Map



Map compiled 4/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; USDA NRCS

A.3.1 Geography and Location

Located in Sutter County, Live Oak is a small but growing city located along State Highway 99 and a mainline Union Pacific railroad line in a mostly agricultural area of the Sacramento Valley. Named for the beautiful groves of live oak trees, the town was first settled in 1866 by A.M. McGrew. The town is located within a portion of the Rancho Boga Mexican land grant on the west side of the Feather River. The City has a range of residential, commercial, industrial, civic, and other land uses. Most commercial properties are located along Highway 99, which divides the eastern portion and western portions of the community. The City is surrounded by orchards and other agricultural-related land uses.

Topography in the City of Live Oak is very flat due to its location in the Sacramento Valley, near the Feather River. Soils in most of the City of Live Oak consist of the Conejo-Tisdale soil classification, which is deep to very deep, level to very level well-drained loam and clay loam typically found on terraces. These soils are classified as soils of statewide importance. The remaining areas of the city are comprised of Live Oak sandy clay loam and Marcum-Gridley clay loam soil complex.

A.3.2 History

The Town of Live Oak was first settled in 1866 and named for the beautiful groves of oak trees. The Town grew with the advent of the California-Oregon Railroad in the 1870's and became the main point in Sutter County for shipping agricultural produce. With the construction of the Butte County Canal, agricultural practices flourished around Live Oak. Live Oak was the second city to be established in Sutter County and was incorporated in 1947. Live Oak's population has increased dramatically since 1950 (1,770 population) and was one of the fastest growing cities in the area between 1990 and 2000. Throughout its history, the northern Sacramento Valley has been a primarily agricultural area, as it still is. However, urban growth is changing the metropolitan centers of the valley, particularly in areas near Sacramento, which is the closest metropolitan area to Live Oak.

A.3.3 Economy

US Census estimates show economic characteristics for the City of Live Oak. These are shown in Table A.1.

Table A.1. Live Oak Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	357	12.1%
Construction	223	87.5%
Manufacturing	287	9.7%
Wholesale trade	83	2.8%

Industry	Estimated Employment	Percent
Retail trade	446	15.1%
Transportation and warehousing, and utilities	169	5.7%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	127	4.3%
Professional, scientific, and management, and administrative and waste management services	245	8.3%
Educational services, and health care and social assistance	517	17.5%
Arts, entertainment, and recreation, and accommodation and food services	172	5.8%
Other services, except public administration	270	9.1%
Public administration	58	2.0%

Source: US Census Bureau American Community Survey 2009-2011 Estimates

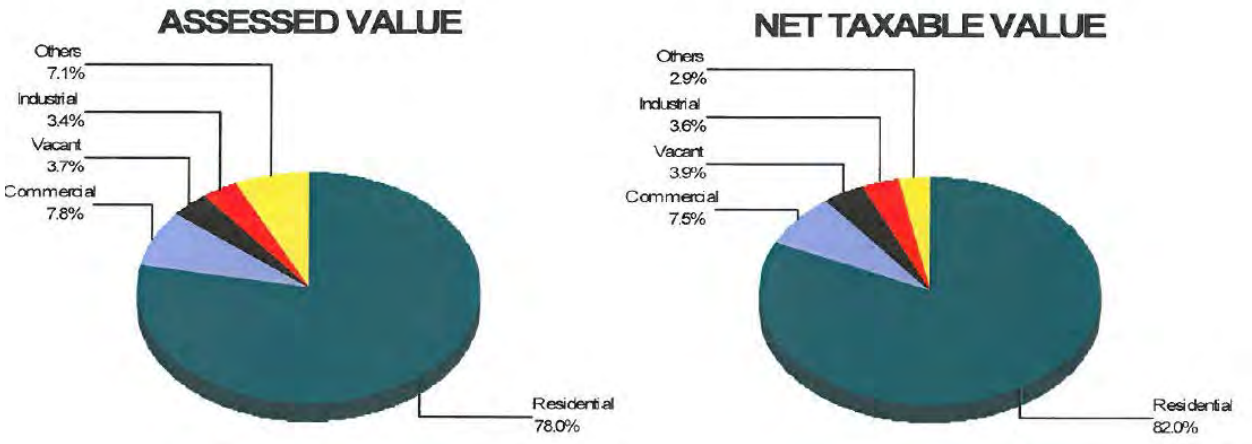
The City has a wide and varied tax base. Table A.2 shows the breakdown of Live Oak's property tax base. Figure A.2 graphically represents those numbers displayed in Table A.2.

Table A.2. City of Live Oak Tax Use Category Summary 2011/2012

Category	Parcels	Assessed Value	Net Taxable Value
Residential	2,095	$231,355,440	$229,783,402
Commercial	57	$23,167,769	$21,062,130
industrial	8	$10,065,364	$10,065,364
Institutional	19	$4,596,907	$72,041
Dry Farm	27	$3,055,348	$2,983,014
Vacant	410	$11,010,949	$10,975,362
Exempt	71	$7,369,475	$0
SBE Nonunitary	[2]	$66,680	$66,680
Cross Reference	[2]	$20,838	$20,838
Unsecured	[165]	$5,976,848	$5,101,648
TOTALS	**2,687**	**$296,685,618**	**$280,130,479**

Source: Sutter County Combined Tax Rolls

Figure A.2. City of Live Oak Tax Use Category Summary 2011/2012



Source: Sutter County Combined Tax Rolls

Top ten employers in the City are shown in Table A.3.

Table A.3. Ten Largest Employers in Live Oak

Employer	Number of Employees
Live Oak Unified School District	192
Live Oak Manor	85
City of Live Oak	29
E-Center Head Start	25
Sunsweet Dryers	25
Tower Supermarket	25
USPS	12
Live Oak Medical Clinic	9
Live Oak Pharmacy	7
Gold Country Bank	4

Source: City of Live Oak Employment Development Department

A.3.4 Population

The California Department of Finance estimated the population of the City of Live Oak to be 8,341 in January of 2013. The HMPC noted that a large population of seasonal migrant farm workers adds to the population during peak farming seasons. Of special note, 59 percent of the population of the City is considered low income.

A.4 Hazard Identification and Summary

This section details how the risk varies across the Sutter County planning area. The City's planning team identified the hazards that affect the City and summarized their frequency of

occurrence, spatial extent, potential magnitude, and significance specific to Live Oak (see Table A.4). In the context of the plan's planning area, there are no hazards that are unique to Live Oak.

Information on past occurrences and the likelihood of future occurrences is detailed in Section 4, Risk Assessment, of the base plan. Additional information for high and medium significant hazards for the City is included in the Vulnerability Assessment section of this Annex.

Table A.4. City of Live Oak Hazard ID Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure	Extensive	Unlikely	Catastrophic	Medium
Drought & Water shortage	Extensive	Likely	Critical	Medium
Earthquakes	Extensive	Unlikely	Negligible	Low
Earth Movements: Erosion	Limited	Unlikely	Negligible	Low
Earth Movements: Landslide	Limited	Unlikely	Negligible	Low
Floods: 100/200/500 year	Significant	Unlikely	Limited	Medium
Floods: Localized Stormwater	Limited	Likely	Limited	Medium
Invasive Species: Pests/Plants	Extensive	Unlikely	Limited	Low
Levee Failure	Extensive	Unlikely	Critical	High
Marine Invasive Species	Extensive	Unlikely	Negligible	Low
Severe Weather: Extreme Cold/ Freeze	Extensive	Occasional	Negligible	Low
Severe Weather: Extreme Heat	Extensive	Occasional	Negligible	Low
Severe Weather: Fog	Extensive	Unlikely	Negligible	Low
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Extensive	Occasional	Limited	Medium
Severe Weather: Tornado	Extensive	Unlikely	Negligible	Low
Volcanoes	Extensive	Unlikely	Negligible	Low
Wildfires	Extensive	Unlikely	Negligible	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

A.5 Vulnerability Assessment

The intent of this section is to assess Live Oak's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment of the base plan. This vulnerability assessment provides an inventory of the population, property, and other assets located within the City and further analyzes those assets at risk to identified hazards ranked of medium or high significance (as listed in Table A.4) to the community. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the main plan.

A.5.1 Total Assets at Risk

This section identifies Live Oak's total assets at risk, including values at risk, critical facilities and infrastructure, natural resources, and historic and cultural resources. Growth and development trends are also presented for the community. This data is not hazard specific, but is representative of total assets at risk within a community.

Values at Risk

The following data from the Sutter County Assessor's Office is based on the 2012 Assessor's data. This data should only be used as a guideline to overall values in the County, as the information has some limitations. The most significant limitation is created by Proposition 13. Instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is most likely low and does not reflect current market value of properties within the County. 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. Table A.5 shows the 2012 Assessor's values (e.g., the values at risk) broken down by property type for the City of Live Oak.

Table A.5. City of Live Oak Total Exposure

Property Type	Total Parcel Count	Improved Parcel Count	Improved Value	Total Land Value	Total Value
Agriculture	45	3	$49,154	$8,114,886	$8,164,040
Commercial	88	63	$18,435,619	$6,810,233	$25,245,852
Industrial	10	10	$7,491,690	$1,719,219	$9,210,909
Institutional	80	29	$7,545,941	$2,552,759	$10,098,700
Residential	119	118	$13,734,933	$5,006,460	$18,741,393
Unclassified	6	0	$0	$6,000	$6,000
Vacant Land	2,352	1,995	$166,880,851	$50,080,634	$216,961,485
Total	**2,700**	**2,218**	**$214,138,188**	**$74,290,191**	**$288,428,379**

Source: Sutter County 2012 Assessor's Data

Critical Facilities and Infrastructure

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

> Any facility, including without limitation, a structure, infrastructure[1], 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.

This definition was refined by separating out three categories of critical facilities as further described in Section 4.3.1 of the base plan. These categories include At-Risk Populations, Essential Services, and Hazardous Materials Facilities.

An inventory of critical facilities in the City of Live Oak from Sutter County GIS is provided in Table A.6. Details of critical facility definition, type, name and address and jurisdiction by hazard zone are listed in Appendix E.

Table A.6. City of Live Oak Critical Facilities: Summary Table

Category	Type	Facility Count
At Risk Population Facilities	Congregate Care Facility	3
	School	1
Essential Services Facilities	Emergency Evacuation Shelter	1
	Fire Station	1
	Government Facility	4
	Medical Health Facility	1
	Police	1
	Storm Water Facility	3
	Waste Water Facility	5
	Waste Water Treatment	1
	Water Supply	7
Multiple Categories	School / Emergency Shelter	3
	Total City of Live Oak	**31**

Source: Sutter County GIS

[1] Essential Service Facilities include bridges, roads, power grids, and infrastructure held by private companies (i.e. utility lines and private levees) that are not mapped for security reasons and are not under the control of the County.

Natural Resources

The City of Live Oak and the areas surrounding it include a rich and diverse range of biological resources. The majority of the land within the City has either been converted to agricultural use or disturbed in some way. Most of the vegetation within this area is dominated by non-native species. The remaining riparian vegetation is found in narrow patches along the west bank of the Feather River and contains most of the native plant species within the City. Due to its location in the Sacramento Valley, Live Oak is located in an area with high levels of waterfowl activity.

Table A.7 lists the four special-status plant species for which potential habitat occurs within the City Planning Area, as well as information about required habitat, elevation range, and blooming periods.

Table A.7. Special-Status Plant Species Potentially Occurring within the Planning Area

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Fox sedge	Carex vulpinoidea	CNPS: 2	Marshes and swamps (freshwater), riparian woodland; from 30 to3600 feet in elevation. Blooms May to June	Could occur; suitable habitat exists along sloughs and irrigation channels within the Planning Area
Rose-mallow	Hibiscus lasiocarpus	CNPS: 2	Marshes and swamps (freshwater); from 0 to 320 feet in elevation. Blooms June to September	Could occur; suitable habitat exists along sloughs and irrigation channels within the Planning Area
Sanford' s arrowhead	Sagittaria sanfordii	CNPS: 1B	Marshes and swamps (assorted shallow freshwater); from 0 to 2,000 feet in elevation. Blooms May to October	Could occur; suitable habitat exists along sloughs and irrigation channels within the Planning Area
Columbian watermeal	Wolffia brasiliensis	CNPS: 2	Marshes and swamps (assorted shallow freshwater); from 90 to 300 feet in elevation. April to December.	Could occur; suitable habitat exists along sloughs and irrigation channels within the Planning Area

Notes: CA = California; CNPS = California Native Plant Society; CNPS 1B = Rare, threatened or endangered in California and elsewhere; CNPS 2 = Rare, threatened or endangered in California, but more common elsewhere
Sources: CNDDB 2008, Data compiled by EDAW in 2008

Based on the known locations of special-status species, nearby occurrences of special-status species and availability of suitable habitat, 23 special-status wildlife species have potential to occur in the Planning Area.

Table A.8. Special-Status Wildlife Species Potentially Occurring in the Planning Area

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Invertebrates				
Valley elderberry longhorn beetle	Desmocerus californicus dimorphus	FT	Associated exclusively with elderberry shrubs in the Central Valley and foothills for its entire life cycle	Could occur — Suitable habitat present; elderberry shrubs occur within the Planning Area

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Vernal pool fairy shrimp	Branchinecta lynchi	FT	Vernal pools in valley and foothill grasslands.	Could occur — Suitable habitat may be present; in the Planning Area.
Vernal pool tadpole shrimp	Lepidurus packardi	FE	Vernal pools in valley and foothill grasslands.	Could occur — suitable habitat may be present in the Planning Area.
Amphibians				
Western Spadefoot	Spea hammondii	CSC	Vernal pools in valley and foothill grasslands	Unlikely to occur — potentially suitable breeding habitat is limited and fragmented; upland habitat has largely been modified for agriculture in the Planning Area
Reptiles				
Northwestern pond turtle	Actinemys marmorata marmorata	CSC	Permanent freshwater habitats with vegetation and basking sites.	Likely to occur — suitable habitat may be present along the Feather River and on sloughs, ditches and other permanent water bodies within the Planning Area.
Giant garter snake	Thamnophis gigas	FT, CT	Vegetated freshwater habitats with slow or still water.	Could occur — suitable habitat is present in irrigation channels and especially in rice fields in the western portion of the Planning Area.
Birds				
Tricolored blackbird	Agelaius tricolor (breeding)	CSC	Nests colonially in dense stands of cattails and bulrushes, or in upland sites with blackberries, nettles thistles, and some crops.	Could occur — suitable nesting and foraging habitat is present within the Planning Area.
Grasshopper sparrow	Ammodramus savannarum (breeding)	CSC	Prefers to nest in short to middle height, moderately open grasslands with scattered shrubs.	Low likelihood to occur — Potential suitable nesting limited to narrow field margins; not generally compatible with crops.
Short-eared owl	Asio flammeus (breeding)	CSC	Nests in marshes, irrigated alfalfa or grain fields, and grasslands and pastures. Requires open country that supports concentrations of small rodents and relatively high herbaceous cover.	Unlikely to occur — Limited suitable nesting and foraging habitat may be present within the Planning Area. Planning Area is outside of breeding range.
Long-eared owl	Asio otus (breeding)	CSC	Nest in conifer, oak, riparian, pinyon-juniper and desert woodlands that are either open or are adjacent to grasslands, meadows, or shrublands.	Could occur — suitable nesting and foraging habitat is present within the Planning Area
Western burrowing owl	Athene cunicularia	CSC	Nest in grasslands and agricultural fields with low-growing vegetation and the presence of small rodent burrows.	Could occur – suitable nesting and foraging habitat is present within the Planning Area.
Loggerhead shrike	Lanius Ludovidianus (breeding)	CSC	Shrubs and small trees for nesting grasslands for foraging.	Could occur – suitable nesting and foraging habitat is present within the Planning Area.

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Northern harrier	Circus cyaneus (breeding)	CSC	Forage and nest in grasslands and freshwater marsh.	Could occur – suitable nesting and foraging habitat is present within the Planning Area.
Swainson's hawk	Buteo swainsoni	CT	Nests on edges of riparian forest and in scattered trees; forages in grasslands and agricultural fields.	Occurs – has been documented nesting along the Feather river in the Study Area; nearby foraging habitat in Planning Area
Western yellow-billed cuckoo	Coccyzus americanus occidentalis	FC, CE	Nests in large blocks of riparian forest with dense understory.	Low likelihood to occur – riparian habitat in the Planning Area is limited to relatively small, open stands.
Lesser sandhill crane	Grus canadensis canadensis	CSC	Winter in the Central Valley in croplands (especially grain and irrigated crops) and wetlands.	Could occur – suitable habitat is be present within the Planning Area; winter range includes Planning Area.
Greater sandhill crane	Grus canadensis tabida	CT, CFP	Winter in the Central Valley in croplands (especially grain and irrigated crops) and wetlands.	Could occur – suitable habitat is be present within the Planning Area; winter range includes Planning Area.
White-tailed kite	Elanus leucurus	CFP	Forage in grasslands and agricultural fields; nest in isolated trees or small woodland patches.	Likely to occur – suitable nesting and foraging habitat is present within the Planning Area.
Song Sparrow "Modesto population"	Melospiza melodia	CSC	Nests and forage in freshwater marshes with emergent vegetation, riparian willow thickets, and riparian oak forests with a sufficient understory.	Likely to occur – suitable nesting and foraging habitat is present within the Planning Area.
Bank swallow	Riparia riparia	CT	Colonial nester, nests primarily in vertical banks with fine-textured, sandy soil near rivers, streams, and lakes.	Occurs – has been documented nesting along the Feather river in the Planning Area.
Yellow-headed blackbird	Xanthocephalus xanthocephalus (breeding)	CSC	Nests in marshes with tall emergent vegetation, generally in open areas and edges over relatively deep water.	Unlikely to occur due to shallow depths of open water in irrigation canals/drainage channels within the Planning Area.
Mammals				
Pallid bat	Antrozous pallidus	CSC	Occurs in a wide variety of habitats. Roost in rock crevices, caves, under bridges, in buildings, and tree hollows.	Could occur – potential roosting habitat is present in the Planning Area.
Ringtail	Bassariscus astutus	CFP	Mixture of forest and shrubland in close association with rocky areas or riparian habitats.	Could occur – Potentially suitable habitat is present in Feather River riparian woodland corridor.

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Silver-haired bat	Lasionycteris noctivagans	G5 S3S4	Prefers to forested areas near water. Roosts in hollow trees, snags, buildings, rock crevices, caves, and under bark.	Could occur – potential roosting and foraging habitat is present in the Planning Area.
Western red bat	Lasiurus Blossevillii	CSC	Strongly associated with wide, mature riparian habitats; may use orchards as alternative habitat.	Could occur. Potentially suitable habitat is present in riparian woodland and orchards in the Planning Area.
American badger	Taxidea taxus	CSC	Occurs in a variety of habitats. The primary requirements are sufficient food, friable soils, and relatively open, uncultivated ground in grassland and savanna habitats.	Could occur. Unlikely in most of the Planning Area due to extensive conversion to agriculture and regular disturbance, but may occur in drier riparian woodland along the Feather River.
Fish				
Spring-run Chinook salmon	Oncorhynchus tshawytscha	FT, CT	Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta.	Occurs – the Feather River adjacent to the Planning Area is critical habitat for this species; principal spawning areas in Feather river are upstream of Honcut Creek.
Steelhead	Oncorhynchus mykiss	FT, CT	Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta.	Occurs – the Feather River adjacent to the Planning Area is critical habitat for this species; principal spawning areas in Feather river are upstream of Honcut Creek.

Notes: CA = California
Sources: CNDDB 2008, Data compiled by EDAW in 2008 'Status Definitions
Federal
FE - Listed as endangered under the federal Endangered Species Act; FT - Listed as threatened under the federal Endangered Species Act; FD - Delisted from endangered or threatened status; FPT Proposed for listing as threatened under the federal Endangered Species Act FPD Federally proposed for delisting; FSC Federal special concern species; -- No designation
State
CE Listed as endangered under the California Endangered Species Act CT Listed as threatened under the California Endangered Species Act CSC California Species of Special Concern CFP Fully protected species — may not be taken or possessed without a permit from the Fish and Game Commission
No designation
CNDDB Conservation Status Ranks (shown only for species without legal status but which are tracked by the CNDDB) Global Rank:
G5 Secure—Common; widespread and abundant
State Rank:
S3 Vulnerable—Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors

Historic and Cultural Resources

The City of Live Oak has a 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. These requirements are detailed in Section 4.3.1 of the base plan. Historical resources included in the programs above are identified in shown in Figure A.3 and Table A.9.

Figure A.3. City of Live Oak Historic District

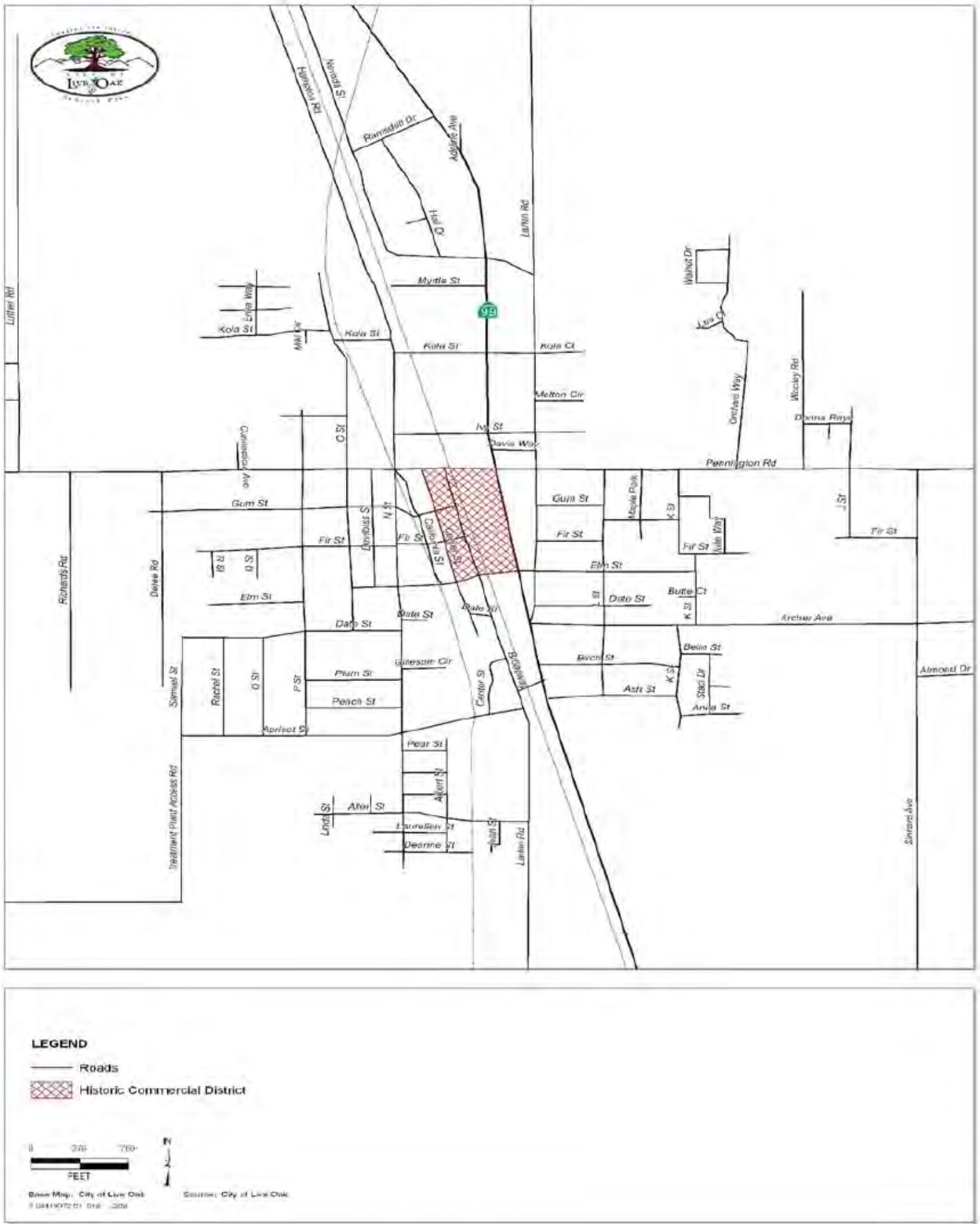


Table A.9. City of Live Oak - Historical Resources

Name (Landmark Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City
Live Oak Historic Commercial District (N2012)	X				1/23/1998	Live Oak

Source: California Office of Historical Preservation

The historic district represents the development of local commerce in the City of Live Oak between 1875 and 1930. It comprises 12 structures, as well as a row of palm trees planted along Broadway circa 1900. This district also includes a three block long parcel currently owned by the Union Pacific Railroad, with an 1882 depot.

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. The Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) document America's architectural and engineering heritage. There are no HABS and HAER structures in the City of Live Oak.

Growth and Development Trends

Past Growth

Table A.10 shows the population growth in Live Oak since 1950. Growth rates for the City have been in the double digits since 1950.

Table A.10. Past Population Trends in the City of Live Oak

Year	Population	Change	% Change
1950	1,770	-	-
1960	2,276	506	28.6%
1970	2,645	369	16.2%
1980	3,103	458	17.3%
1990	4,320	1,217	39.2%
2000	6,229	1,909	44.2%
2008	8,539	2.310	37.1%

Source: City of Live Oak General Plan Update

Development since 2007 Plan

New development in Live Oak since 2007 consists of the following:

- One 9,000 sq ft Commercial building (gas station/ minimart) wood frame

- One 20,000 sq ft Commercial building (Dollar General Market) currently under construction (masonry block construction).
- 1 rehabilitation project (Old railroad depot building - moved to different location on the property and rehab'ed) wood frame
- 65 SFD's
- 1 City of Live Oak Waste Water Treatment Plant

The 9,000 sq ft commercial building is ½ in a special flood hazard area (meaning the floodplain partially cuts across their property). The building itself is out of the floodplain.

Future Development

The HMPC noted that future development will be slow and gradual (estimated to be 2% per year). 2013-2014 development will be primarily commercial on the Highway 99 corridor. No residential changes are planned for this time period. Future population estimates were unavailable as of the writing of this plan.

Future Development GIS Analysis

Future development areas and General Plan diagrams were provided by Sutter County and the cities of Live Oak and Yuba City. Each community had unique future development areas as well as general plan land classifications. Analysis was performed by intersecting parcel centroids first with the future development areas and then with the general plan diagram land classifications to provide a parcel level analysis of future development areas for each of the three communities. Where one future development area overlaps into another, such as the Lincoln East area with the sphere of influence (SOI) area, the parcels are allocated to the Lincoln East Area and are subtracted out from the SOI total area to avoid double counting issues. See Table A.11 for an inventory of total parcels by general plan land use classifications detailing Live Oak's future development areas.

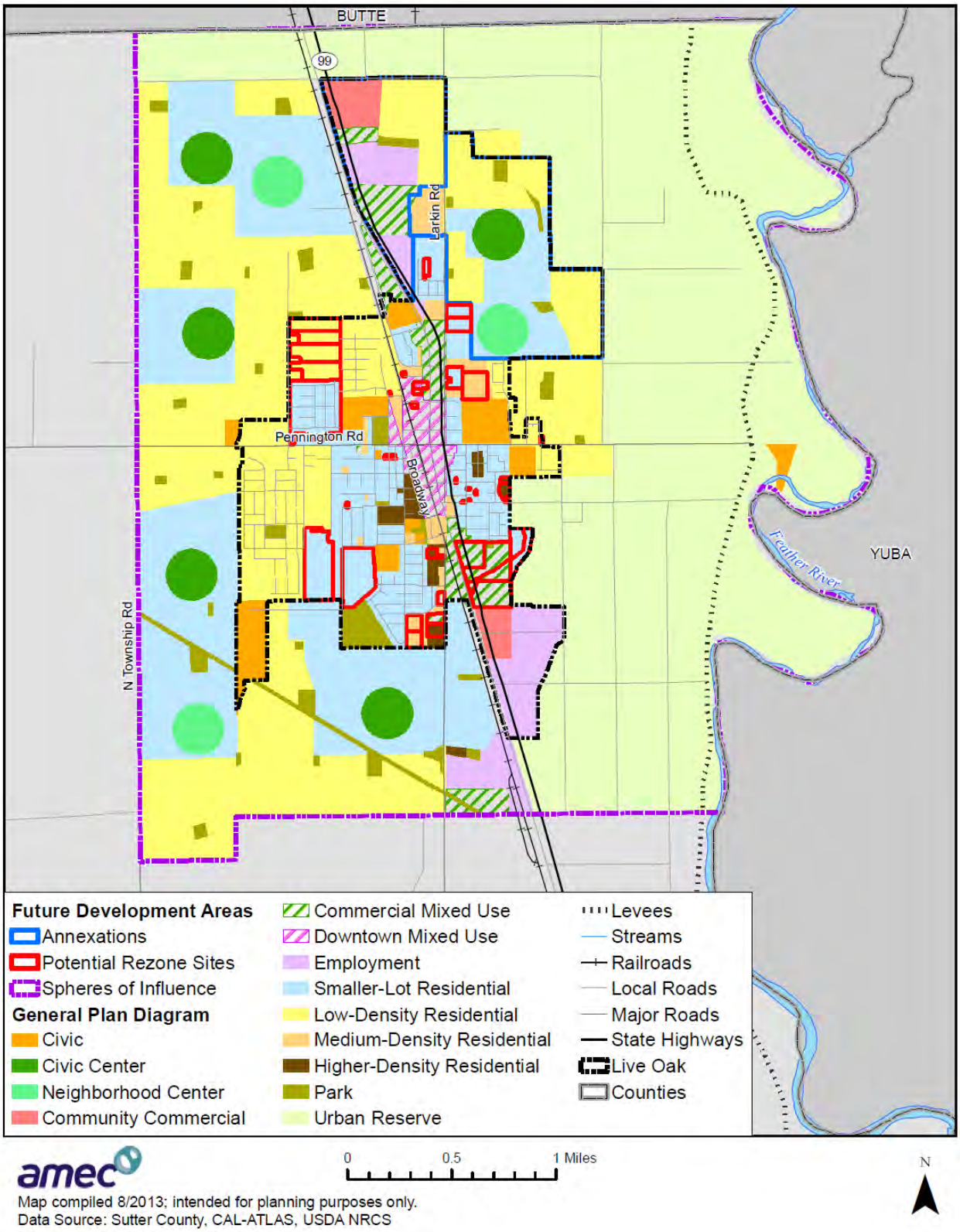
Table A.11. Live Oak Future Development Total Exposure

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Annexations	Civic Center	1	1	$4,121	$377,238	$381,359
	Commercial Mixed Use	2	0	$0	$780,968	$780,968
	Community Commercial	1	0	$0	$798,000	$798,000
	Employment	10	5	$329,899	$1,100,096	$1,429,995
	Low-Density Residential	15	6	$415,793	$2,002,177	$2,417,970
	Medium-Density Residential	2	2	$65,000	$259,750	$324,750

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
	Neighborhood Center	1	0	$0	$1,099,991	$1,099,991
	Park	1	0	$0	$379,865	$379,865
	Smaller-Lot Residential	1	0	$0	$462,050	$462,050
	Total	**34**	**14**	**$814,813**	**$7,260,135**	**$8,074,948**
Potential Rezone Sites	Commercial Mixed Use	6	2	$200,369	$403,301	$603,670
	Downtown Mixed Use	3	0	$0	$407,376	$407,376
	Higher-Density Residential	4	1	$50,961	$155,864	$206,825
	Low-Density Residential	6	1	$4,067	$841,137	$845,204
	Medium-Density Residential	4	0	$0	$327,108	$327,108
	Smaller-Lot Residential	210	1	$60,000	$3,232,883	$3,292,883
	Total	**233**	**5**	**$315,397**	**$5,367,669**	**$5,683,066**
Sphere Of Influence	Civic	28	14	$8,612,564	$1,555,999	$10,168,563
	Civic Center	4	3	$398,059	$932,603	$1,330,662
	Commercial Mixed Use	101	81	$10,240,515	$4,262,189	$14,502,704
	Community Commercial	4	3	$233,120	$290,942	$524,062
	Downtown Mixed Use	166	126	$14,726,207	$6,403,301	$21,129,508
	Employment	17	13	$1,621,657	$1,520,618	$3,142,275
	Higher-Density Residential	33	29	$9,541,618	$1,375,264	$10,916,882
	Low-Density Residential	1,002	876	$93,528,410	$29,516,781	$123,045,191
	Medium-Density Residential	102	91	$7,096,342	$2,796,734	$9,893,076
	Neighborhood Center	2	2	$82,025	$1,765,388	$1,847,413
	Park	7	2	$213,074	$1,167,912	$1,380,986
	Smaller-Lot Residential	1,135	1,102	$79,919,735	$28,081,473	$108,001,208
	Urban Reserve	292	205	$21,615,714	$21,111,088	$42,726,802
	Total	**2,893**	**2,547**	**$247,829,040**	**$100,780,292**	**$348,609,332**
Live Oak Grand Total		**3,160**	**2,566**	**$248,959,250**	**$113,408,096**	**$362,367,346**

Source: Sutter County GIS

Figure A.4. Live Oak Future Development



Map compiled 8/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, USDA NRCS

Redevelopment

The City currently has infill and redevelopment opportunities within its existing City Limits and Sphere of Influence (SOI). The 2030 City of Live Oak General Plan Housing Element, listed a total of 741 vacant residential parcels within the City boundary, totaling 46.29 acres. Infill sites are shown on Figure A.5.

Figure A.5. Planning Boundaries for the City of Live Oak

Source: 2030 City of Live Oak General Plan Update

A.5.2 Priority Hazards: Vulnerability Assessment

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table A.4 as high or medium significance hazards. Impacts of past events and vulnerability of the City to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the base plan for more detailed information about these hazards and their impacts on the Sutter County planning area). Methodologies for calculating loss estimates are the same as those described in Section 4.3 of the base plan. In general, the most vulnerable structures are those located within the floodplain or within levee and dam inundation areas, unreinforced masonry buildings, and buildings built prior to the introduction of modern building codes.

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.

Dam Failure

Vulnerability to Dam Failure

Likelihood of Future Occurrence—Unlikely
Vulnerability—High

Dam failure occurs when a dam is not structurally sound or is unable to withstand damages resulting from seismic activity. The degree and speed of dam failure depends on the dam's structural characteristics. The Planning Area is susceptible to a variety of dam failure hazards. Sutter County has identified that a catastrophic failure of the Shasta, Oroville, Bullards Bar, and Camp Far West dams would have a significant impact on Sutter County. Failures of the Oroville and Shasta dams would be expected to have the most severe consequences on Live Oak. Due to

the relatively flat topography surrounding the City, dam failure would result in sheet flow. This is opposed to the "bowl effect" of the southern portions of the County, which can be seen on Figure 4.81 in Section 4.3.8 of the base plan. The City should also have ample warning time to prepare evacuations.

Future Development

Limited development is happening in the City. While future development may place more structures in the dam inundation areas, due to the low risk of dam failure, development will be allowed in these areas.

Drought and Water Shortage

Vulnerability to Drought and Water Shortage

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

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 is the most critical issue and is critical for manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Based on historical information, the occurrence of drought in California, including the City of Live Oak, 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 is often 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 Live Oak to drought is City-wide, but impacts may vary and include reduction in water supply and an increase in dry fuels.

The most significant qualitative impacts associated with drought in the planning area are those related to water intensive activities such as wildfire protection, municipal usage, commerce, tourism, and recreation. Voluntary conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

Future Development

As the population in the area continues to grow, so will the demand for water. Water shortages in the future may be worsened by drought, as the City relies on groundwater for its water source.

Increased planning will be needed to account for population growth and increased water demands.

Earthquakes

Vulnerability to Earthquakes

Likelihood of Future Occurrence—Unlikely
Vulnerability—Low

Although considered a low significance hazard by the HMPC, due to the significance of earthquake in the State of California, earthquake vulnerability for the City of Live Oak is detailed here.

Live Oak's geologic context and geographic location increase the risk of certain seismic hazards and reduce the risk of others. Earthquakes can result in direct hazards or in indirect hazards. Direct hazards include surface ruptures, fault displacement, and ground shaking. The nearest active fault to Live Oak is the Cleveland Hills Fault, located at Lake Oroville more than 15 miles away. The lack of active faults in the Planning Area means that the community faces little to no threat of surface rupture and fault displacement. On the other hand, the alluvium soils found within the Sacramento Valley and the City are capable of effectively conducting seismic waves. Ground shaking can occur at some distance from the epicenter of an earthquake and has historically been the dominant form of seismic activity affecting the City.

Geologists use the Modified Mercalli Scale to measure the intensity of ground motion during a seismic event. The Live Oak vicinity has not experienced ground shaking at a Modified Mercalli Scale level of VII or above, the level at which damage to unreinforced masonry buildings would be expected, during the period of 1800 through 1996.

The HMPC noted that there is one three story brick apartment building in the City that is constructed of unreinforced masonry that may be at risk to earthquake. This building is of special note as it is a senior citizen housing complex.

Indirect seismic hazards include ground failure, tsunamis, seiches, and dam failure. Ground failure occurs when the stresses in the ground exceed the resistance of earth materials to deformation or rupture. Instability comes about when stresses are increased by natural or human-made causes, such as by earthquakes, fills, and ground water withdrawal. Various types of ground failure can occur including liquefaction, lateral spreading, landslides, differential settlement, subsidence, and erosion. The liquefaction potential of soils in the Live Oak area is generally moderate, though areas of higher potential exist in areas parallel to the Feather River. Landslide risks are low because of the low level of topographical relief in the area. Other hazards related to ground failure, such as differential settlement, subsidence, and erosion, can be addressed through appropriate soil investigation before construction, as specified in the City's goals and policies.

Live Oak is not at risk for tsunamis or seiches based on its inland location and the absence of nearby large bodies of water. Risks associated with dam failure are addressed in the dam failure vulnerability assessment above.

Future Development

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.

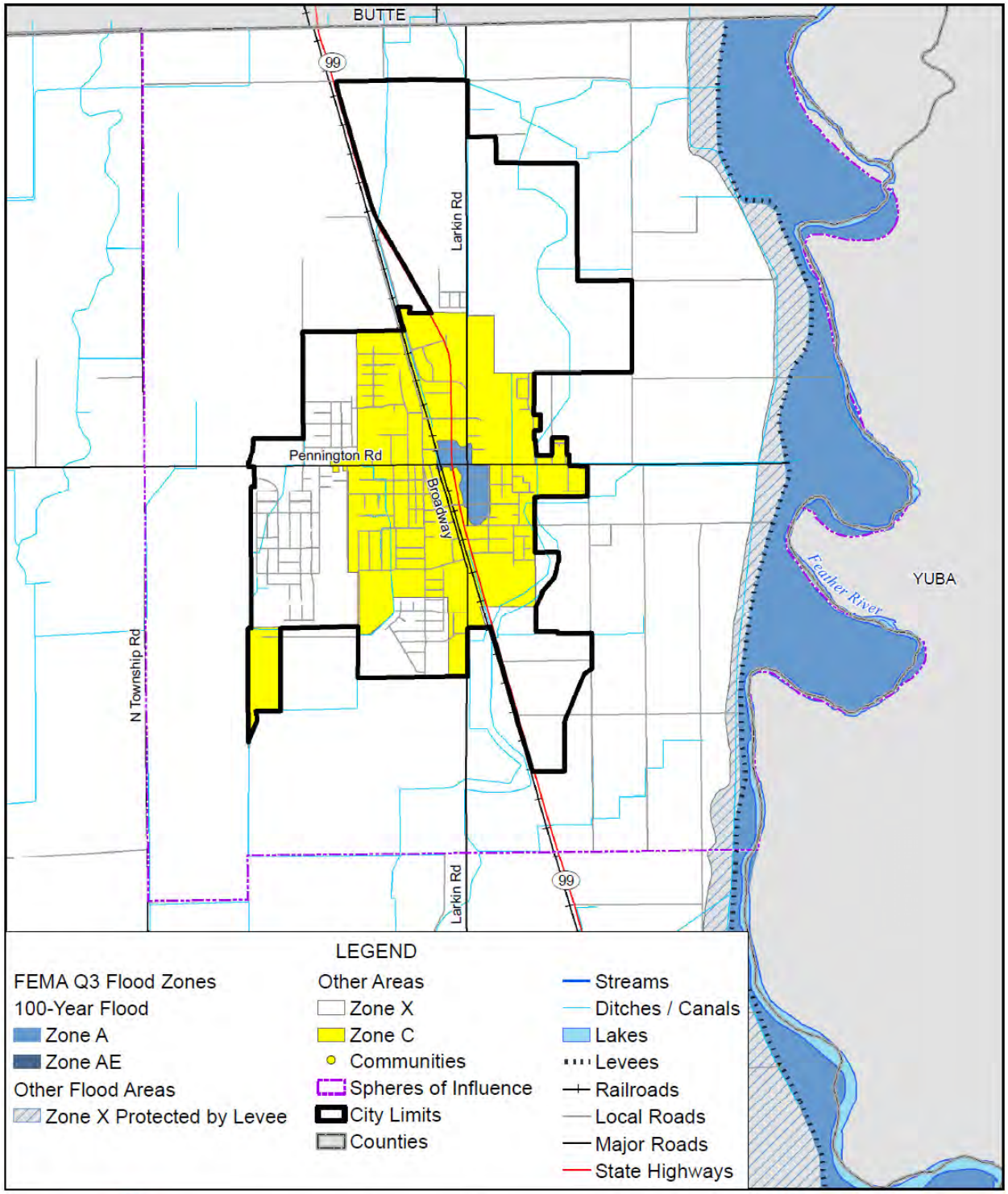
Floods: 100/500 year

Vulnerability to Floods: 100/500 year

Likelihood of Future Occurrence—Occasional/Unlikely
Vulnerability—High

A small portion of the City of Live Oak is located inside of the 100 year flood zone as defined by the Federal Emergency Management Agency (FEMA). This is seen in Figure A.6. There have been areas not shown on Figure A.6 that have flooded in the past. These areas are discussed in the localized flooding section that follows.

Figure A.6. City of Live Oak DFIRM



Values at Risk

GIS was used to determine the possible impacts of flooding within the City of Live Oak. The methodology described in Section 4.3.6 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.12 shows the property use, improved parcel count, improved values, estimated contents, total values and estimated loss of parcels that fall in a floodplain in the City of Live Oak.

Table A.12. City of Live Oak – Count and Structure Value of Improved Parcels by Land Use in Floodplain Zones

Flood Zone	Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value
Zone A (1% Annual Chance)	Commercial	14	10	$1,892,390	$3,622,533	$5,514,923
	Industrial	1	1	$68,666	$31,212	$99,878
	Institutional	7	4	$101,760	$365,361	$467,121
	Residential	7	7	$221,743	$525,132	$746,875
	Unclassified	4	0	$6,000	$0	$6,000
	Vacant Land	67	62	$1,385,577	$2,719,605	$4,105,182
Zone C	Agricultural	10	0	$751,614	$0	$751,614
	Commercial	73	52	$4,865,551	$14,775,734	$19,641,285
	Industrial	8	8	$1,616,704	$7,440,567	$9,057,271
	Institutional	60	25	$1,173,767	$7,180,580	$8,354,347
	Residential	82	82	$2,850,201	$10,473,325	$13,323,526
	Unclassified	2	0	$0	$0	$0
	Vacant Land	1,227	1,177	$28,418,595	$76,555,677	$104,974,272
Zone X	Agricultural	35	3	$7,363,272	$49,154	$7,412,426
	Commercial	1	1	$52,292	$37,352	$89,644
	Industrial	1	1	$33,849	$19,911	$53,760
	Institutional	13	0	$1,277,232	$0	$1,277,232
	Residential	30	29	$1,934,516	$2,736,476	$4,670,992
	Vacant Land	1,058	756	$20,276,462	$87,605,569	$107,882,031
		2,700	**2,218**	**$74,290,191**	**$214,138,188**	**$288,428,379**

Source: Sutter County 2012 Assessor's Data; Sutter County DFIRM and Q3 data

Table A.13 summarizes Table A.12 above and shows City of Live Oak loss estimates and shows improved values at risk by FEMA 1% and 0.2% annual chance flood zones. As shown in this table, there is no 500-year flood risk in the City.

Table A.13. City of Live Oak – 1% and 0.2% Annual Chance Flood Loss

Flood Zone	Improved Parcel Count	Improved Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance	84	$7,263,843	$4,297,278	$11,561,121	$2,890,280	1.1%
0.2% Annual Chance	0	$0	$0	$0	$0	0.0%

Source: FEMA DFIRM and Q3, Sutter County 2012 Assessor's Data
Contents replacement value is estimated as a percent of structure replacement value: Agriculture – 100%; Commercial – 100%; Industrial – 150%; Residential – 50%; Unclassified – 50%

Flooded Acres

Also of interest is the land area affected by the various flood zones or protected by levee. The following is an analysis of flooded acres in the City in comparison to total area within city limits. The methodology for this analysis is the same as that in Section 4.3.6 of the base plan. Table A.14 represent a detailed analysis of total acres for the FEMA Q3 flood zones in the City of Live Oak. It is important to note that there is no 0.2% annual flood chance in the City.

Table A.14. City of Live Oak – Flooded Acres

Flood Zone	Property Use	Total Flooded Acres	Improved Flooded Acres	% of Improved Flooded Acres
Zone A (1% Annual Chance)	Commercial	4.3	3.5	80%
	Industrial	1.2	1.2	100%
	Institutional	2.0	1.4	69%
	Residential	1.1	1.1	100%
	Unclassified	0.69	0.00	0%
	Vacant Land	12	11	93%
Total 1%	**---**	**21**	**18**	**86%**

Source: FEMA DFIRM, Q3

Population at Risk

A separate analysis was performed to determine population in flood zones. GIS analysis was performed to determine population in the flood zones. Using GIS, the Sutter County Q3 layer was overlaid on the improved residential parcel data. Those parcel centroids that intersect the flood zones were counted and multiplied by the 2010 Census Bureau average household factors for the City of Live Oak of 3.42 (see Table A.15). According to this analysis, there is a total population of 24 in the 1% annual chance floodplain and 0 in the 0.2% annual chance floodplain.

Table A.15. City of Live Oak – Population at Risk to the 1% and 0.2% Annual Chance Floods

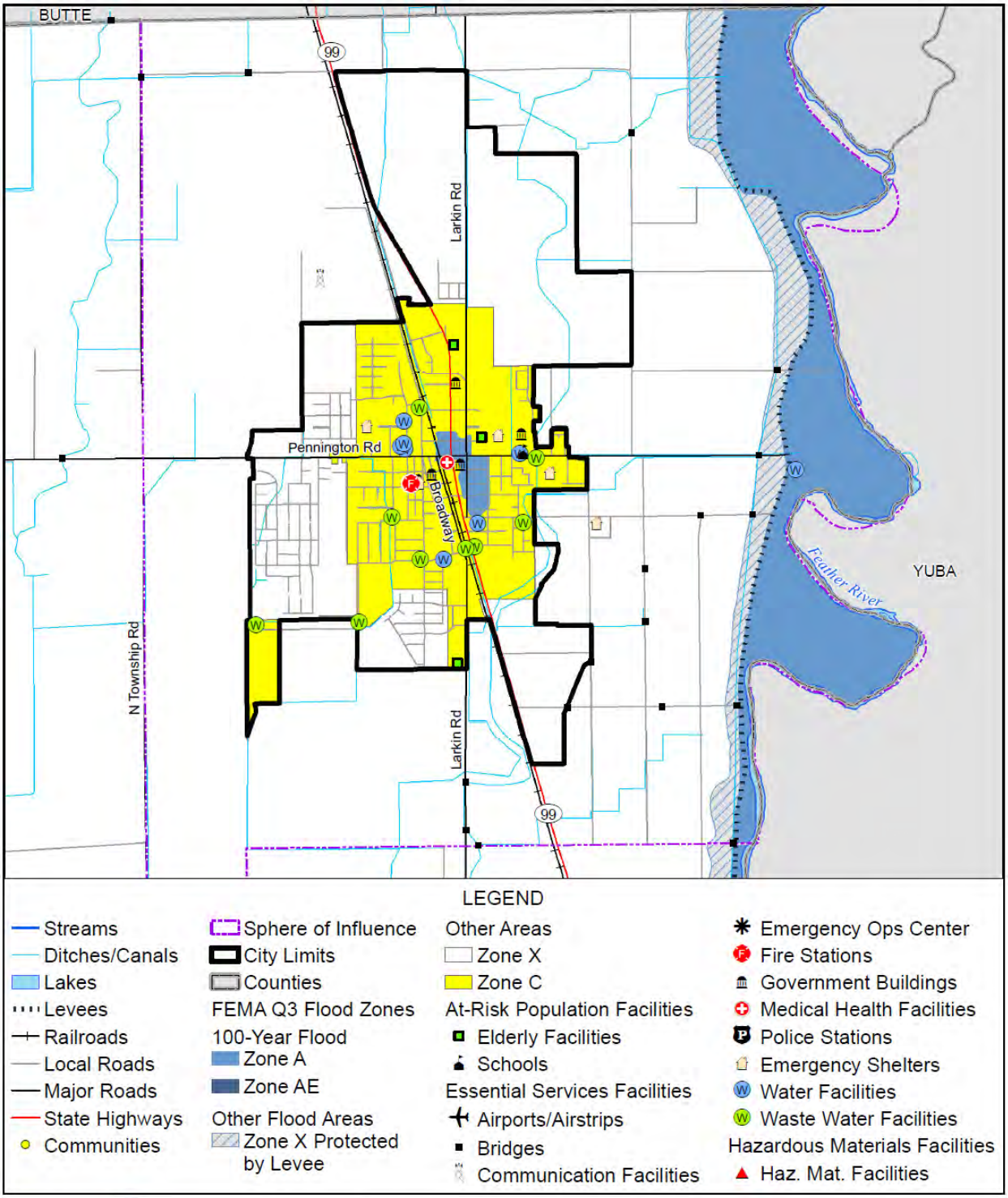
Flood Type	Improved Residential Parcels	Population
1% Chance	7	24
0.2% Chance	-	-
Total	**7**	**24**

Source: DFIRM, Q3, US Census Bureau, Sutter County 2012 Assessor's Data

Critical Facilities at Risk

A separate analysis was performed on the critical facility inventory in Sutter County and all jurisdictions by flood zone. GIS was used to determine whether the facility locations intersect a DFIRM and Q3 flood hazard areas, and if so, which zone it intersects. As shown in Figure A.7, there are no critical facilities in the City Live Oak in the 1% and 0.2% annual chance floodplain. Details of critical facility definition, type, name and address and jurisdiction by flood zone are listed in Appendix E.

Figure A.7. City of Live Oak – Critical Facilities in the Floodplain



Future Development

To determine potential development constraints based on the location of future development areas relative to the FEMA flood zones, additional analysis was performed using GIS. For each community, the future development areas, overlain with the General Plan land use diagrams, were intersected with the FEMA flood zones to identify future areas of development by 1% and 0.2% annual chance flood zones as well as Zone X. Table A.16 provides a parcel level analysis of the future development areas by flood zone shown in Figure A.8. Note that all areas within the Zone X flood zone are outside of the flood hazard areas.

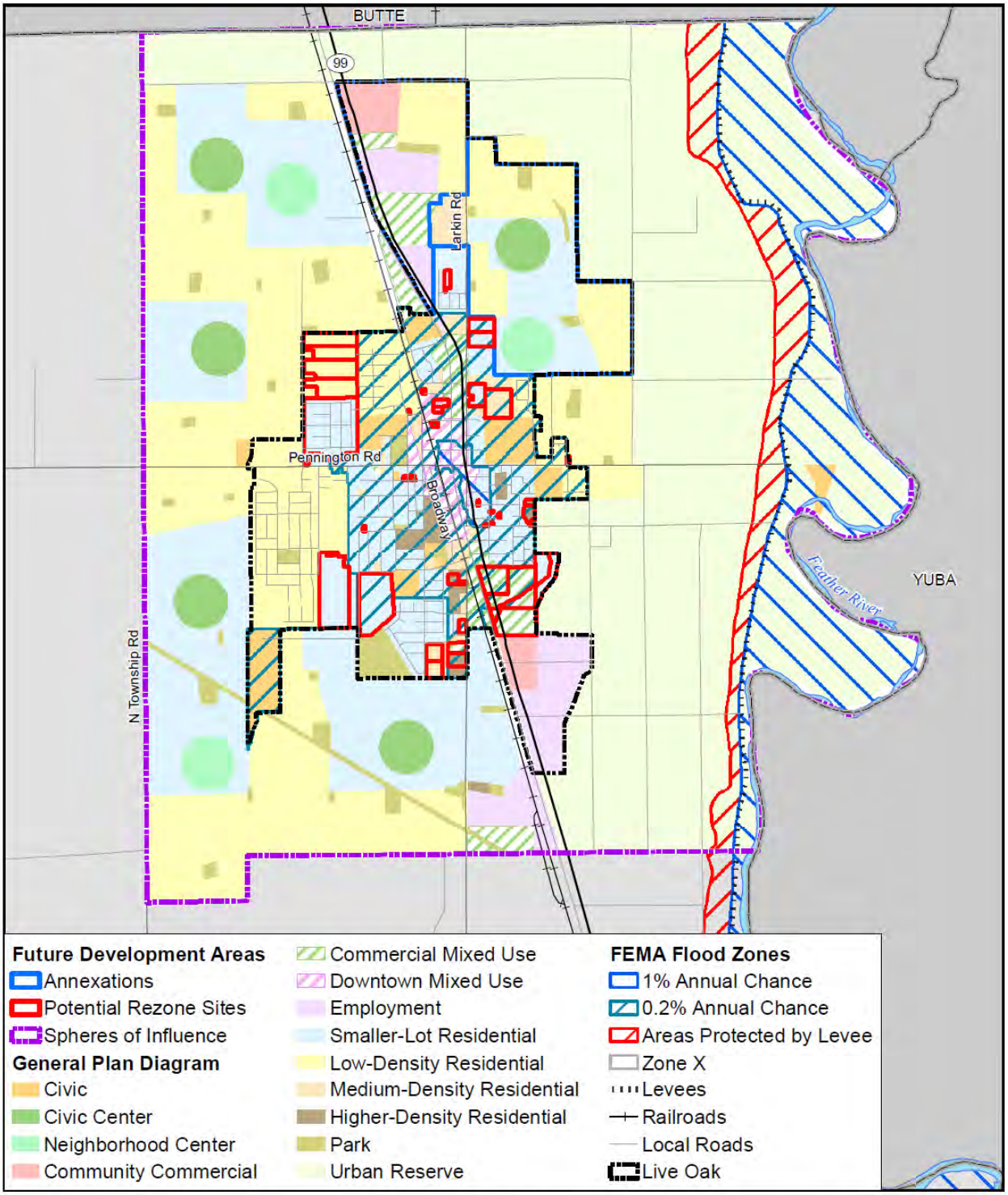
Table A.16. Future Development in Live Oak by Flood Zone

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
1% Annual Chance Flood Zone						
Potential Rezone Sites	Smaller-Lot Residential	1	0	$0	$20,400	$20,400
	Total	**1**	**0**	**$0**	**$20,400**	**$20,400**
Sphere Of Influence	Civic	1	0	$0	$29,618	$29,618
	Downtown Mixed Use	40	27	$4,626,679	$2,416,723	$7,043,402
	Medium-Density Residential	5	5	$210,656	$85,757	$296,413
	Smaller-Lot Residential	54	52	$2,426,508	$1,153,256	$3,579,764
	Urban Reserve	35	12	$704,017	$2,499,683	$3,203,700
	Total	**135**	**96**	**$7,967,860**	**$6,185,037**	**$14,152,897**
0.2% Annual Chance Flood Zone						
-	-	0	0	$0	$0	$0
Zone X Flood Zone						
Annexations	Civic Center	1	1	$4,121	$377,238	$381,359
	Commercial Mixed Use	2	0	$0	$780,968	$780,968
	Community Commercial	1	0	$0	$798,000	$798,000
	Employment	10	5	$329,899	$1,100,096	$1,429,995
	Low-Density Residential	15	6	$415,793	$2,002,177	$2,417,970
	Medium-Density Residential	2	2	$65,000	$259,750	$324,750
	Neighborhood Center	1	0	$0	$1,099,991	$1,099,991
	Park	1	0	$0	$379,865	$379,865
	Smaller-Lot Residential	1	0	$0	$462,050	$462,050
	Total	**34**	**14**	**$814,813**	**$7,260,135**	**$8,074,948**

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Potential Rezone Sites	Commercial Mixed Use	6	2	$200,369	$403,301	$603,670
	Downtown Mixed Use	3	0	$0	$407,376	$407,376
	Higher-Density Residential	4	1	$50,961	$155,864	$206,825
	Low-Density Residential	6	1	$4,067	$841,137	$845,204
	Medium-Density Residential	4	0	$0	$327,108	$327,108
	Smaller-Lot Residential	209	1	$60,000	$3,212,483	$3,272,483
	Total	**232**	**5**	**$315,397**	**$5,347,269**	**$5,662,666**
Sphere Of Influence	Civic	27	14	$8,612,564	$1,526,381	$10,138,945
	Civic Center	4	3	$398,059	$932,603	$1,330,662
	Commercial Mixed Use	101	81	$10,240,515	$4,262,189	$14,502,704
	Community Commercial	4	3	$233,120	$290,942	$524,062
	Downtown Mixed Use	126	99	$10,099,528	$3,986,578	$14,086,106
	Employment	17	13	$1,621,657	$1,520,618	$3,142,275
	Higher-Density Residential	33	29	$9,541,618	$1,375,264	$10,916,882
	Low-Density Residential	1,002	876	$93,528,410	$29,516,781	$123,045,191
	Medium-Density Residential	97	86	$6,885,686	$2,710,977	$9,596,663
	Neighborhood Center	2	2	$82,025	$1,765,388	$1,847,413
	Park	7	2	$213,074	$1,167,912	$1,380,986
	Smaller-Lot Residential	1,081	1,050	$77,493,227	$26,928,217	$104,421,444
	Urban Reserve	246	188	$20,404,987	$17,911,489	$38,316,476
	Total	**2,747**	**2,446**	**$239,354,470**	**$93,895,339**	**$333,249,809**

Source: Sutter County GIS, FEMA DFIRM, Q3

Figure A.8. Live Oak Future Development Areas in Flood Zones



amec

Map compiled 8/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, USDA NRCS, FEMA

The City's floodplain ordinance prohibits development in the floodplain unless stringent guidelines are met. No development is expected in the floodplain in the future.

Insurance Coverage, Claims Paid, and Repetitive Losses

The City of Live Oak joined the National Flood Insurance Program (NFIP) on March 23, 1984. The City joined the CRS program on May 1, of 2010. The City is currently a CRS Class 7 community, which gives a 15% discount to flood insurance policies in the Special Flood Hazard Area (SFHA), and a 5% discount to those outside of the SFHA. NFIP data indicates that as of February 28, 2013, there were 101 flood insurance policies in force in the City with $28,919,400 of coverage. There have been 7 historical claims for flood losses totaling $66,660. These were for pre-FIRM structures. NFIP data further indicates that there are no repetitive loss (RL) buildings in the City.

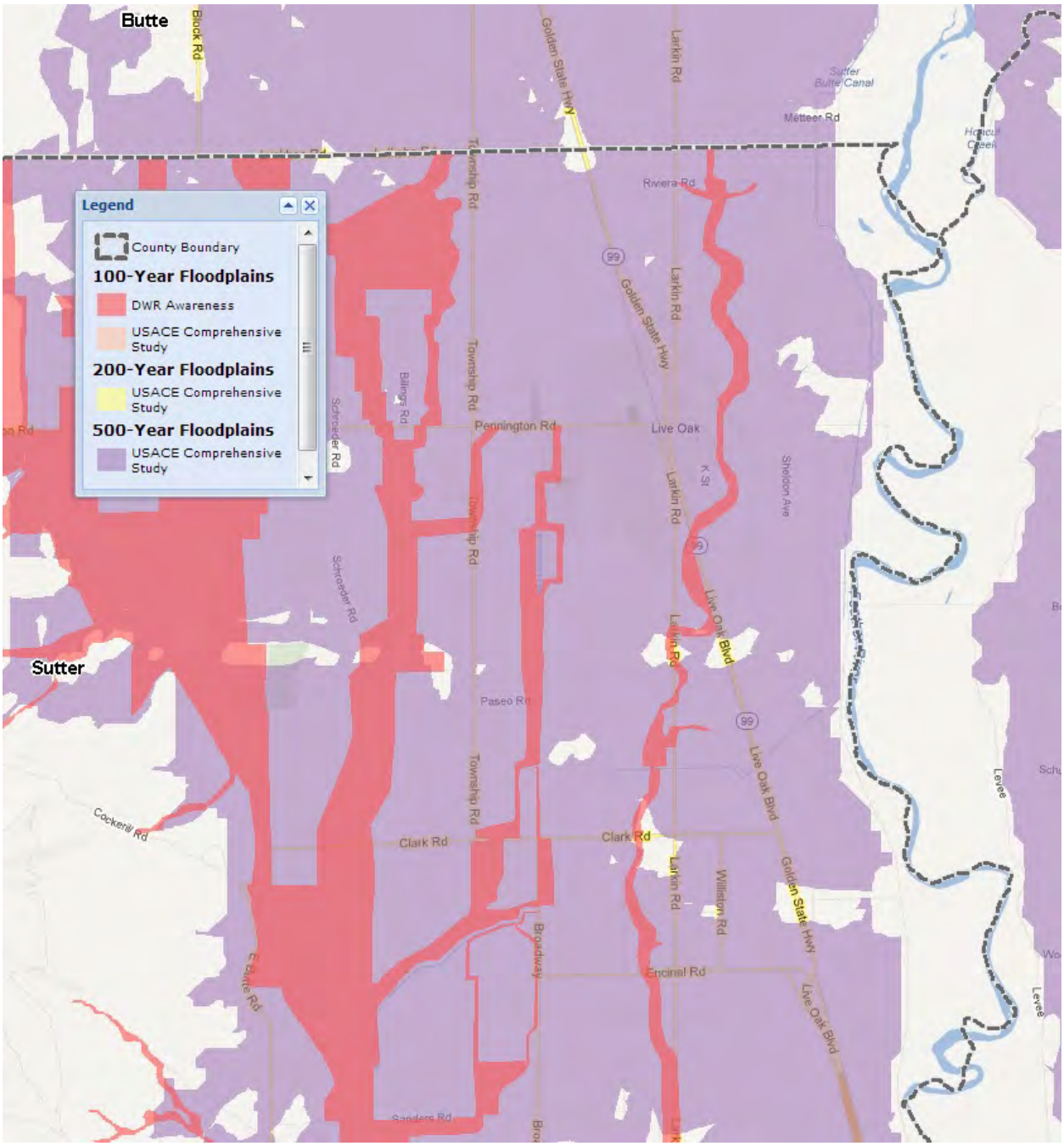
California Department of Water Resources Best Available Maps (BAM)

The FEMA regulatory maps provide just one perspective on flood risks in Sutter County. 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 Sacramento-San Joaquin (SAC-SJ) Valley watershed. SB 5 requires that these maps contain the best available information on flood hazards and be provided to cities and counties in the 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 and DFIRMs which have been prepared to support the NFIP for flood insurance purposes and reflect only the 100- and 500-year event risk, the BAMs are provided for informational purposes and are intended to reflect current 100-, 200-, 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. They are for the same flood frequency, however, they 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. 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 100-year floodplain, it also supports identification of the need and requirement for flood insurance. Figure A.9 shows the BAM for the City of Live Oak.

Figure A.9. City of Live Oak Best Available Map



Source: California DWR

Floods: Localized Stormwater

Vulnerability to Floods: Localized Stormwater

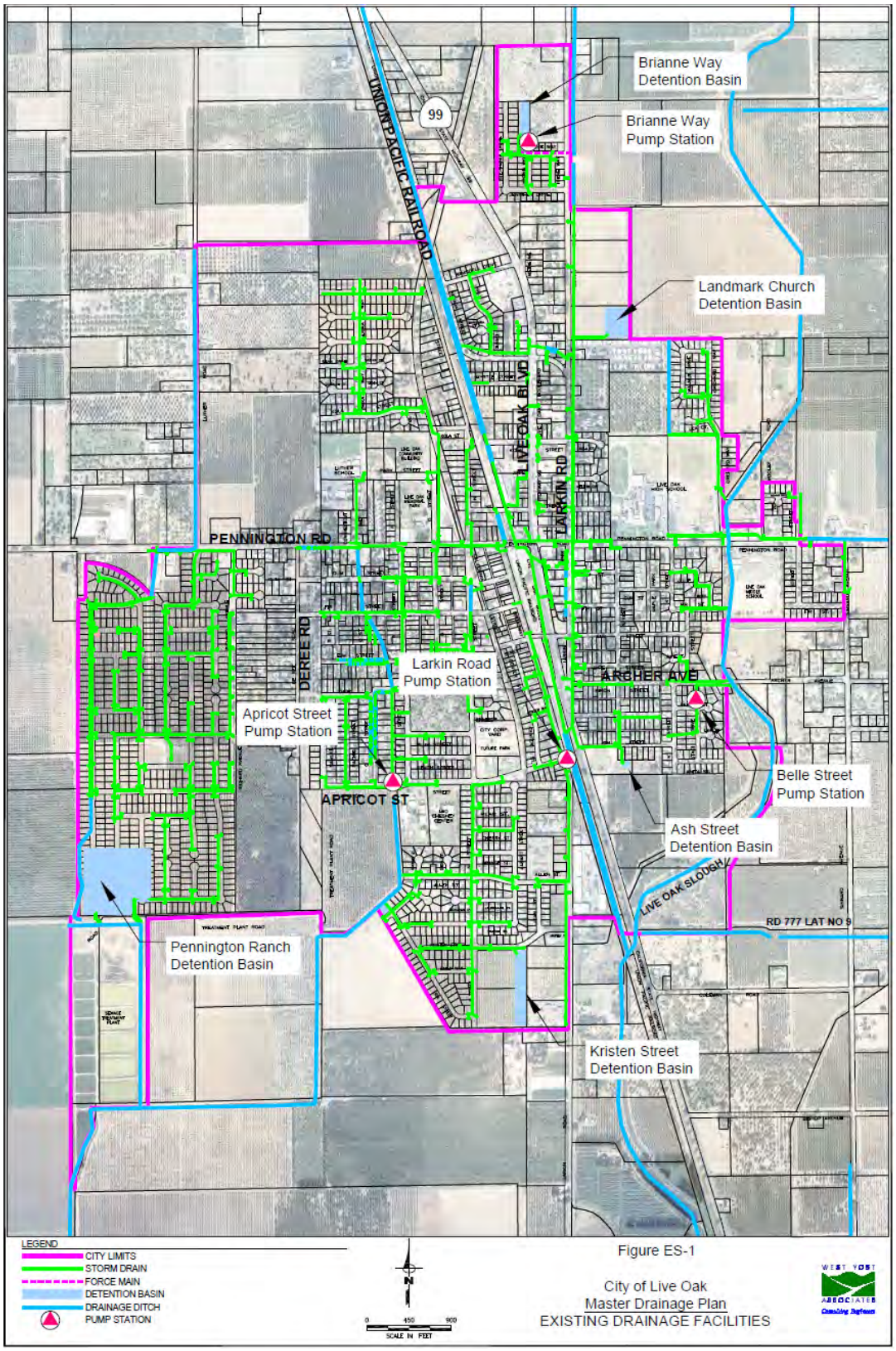
Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

There are two primary sources of stormwater runoff that are of concern to the City: regional runoff, which originates outside the City, and runoff from properties located inside the City. The City owns and maintains storm drain pipe systems, detention basins, and pump stations to provide drainage and prevent flooding within the City and convey runoff to the Reclamation District 777 (RD 777) open channel drainage system. The existing drainage facilities are shown in Figure A.10. The existing City and most of the City at buildout of the 2030 General Plan are within the RD 777 service area. RD 777's facilities consist of a series of drainage channels along with culverts and some piping. RD 777's system conveys flows to the south and west to the East Interceptor Canal and then to the Wadsworth Canal. The Wadsworth Canal flows to the Sutter Bypass, which in turn flows to the Sacramento River.

Minor street flooding occurs, although infrequently, in the City of Live Oak. Some of these locations include De Ree Road, Luther School, L Street (between Date Street and Pennington Road), and at several Highway 99 cross culverts that do not have connections to the City's storm drain systems. Many of the road and streets within the City of Live Oak were constructed without curbs and gutters, which contributes to minor nuisance ponding of storm water.

At buildout of the City of Live Oak 2030 General Plan, the northwest corner of the City will be within RD 2056 service area. This area drains to the west into Morrison Slough. Morrison Slough also drains to the south and west into the East Interceptor Canal and then to Wadsworth Canal, the Sutter Bypass, and ultimately to the Sacramento River.

Figure A.10. City of Live Oak Drainage Facilities



Source: 2011 Live Oak Drainage Study

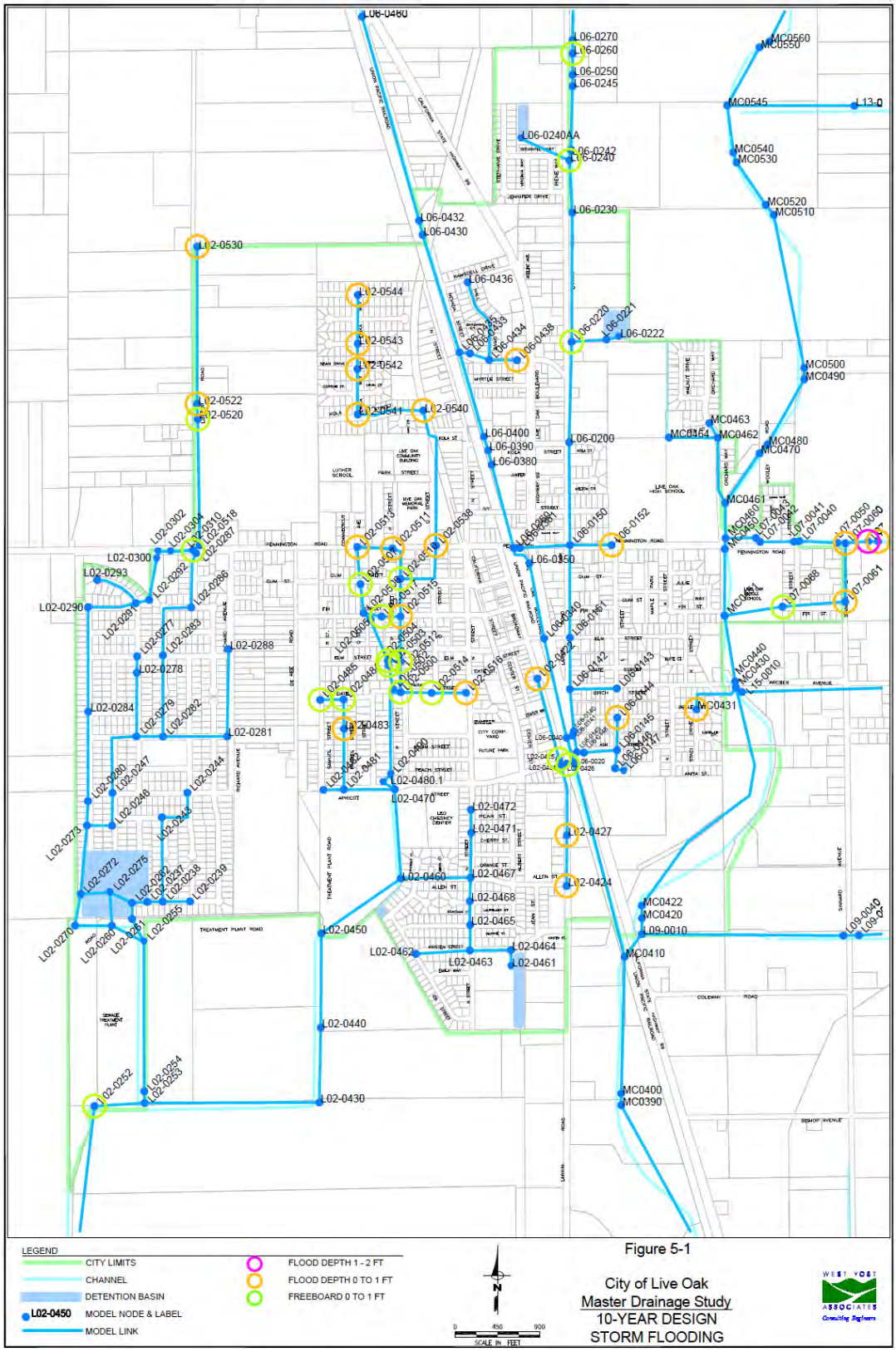
In the 2011 Live Oak Drainage Study, an analysis of existing drainage infrastructure was performed. The drainage criteria used in this evaluation are the following:

- 10-Year Storm: Pipeline conveyance systems shall maintain the hydraulic grade line a minimum of 1-foot below the gutter line.
- 100-Year Storm; Flow shall be conveyed or detained in the street section while maintaining a water surface at least 1-foot below the adjacent building pad elevations.

A schematic of the 10-year flooding is shown in Figure A.11. The following flooding problems appear to occur during the 10-year storm:

- Apricot Street Pump Station and tributary storm drains: Model results indicate that in the 10-year storm much of this pump station-storm drain system would flood up to a depth of 1-foot.
- Larkin Street Pump Station and tributary storm drains: Model results indicate that in the 10-year storm much of this pump station-storm drain system would have less than 1-foot of freeboard with flooding at drain inlets.
- J Street and Fir Street: Model results indicate that in the 10-year storm flooding along J Street, Fir Street, and Sinnard Avenue will occur at depths of up to 1-foot.

Figure A.11. City of Live Oak 10 year Localized Flooding Areas and Depths



Source: 2011 Live Oak Drainage Study

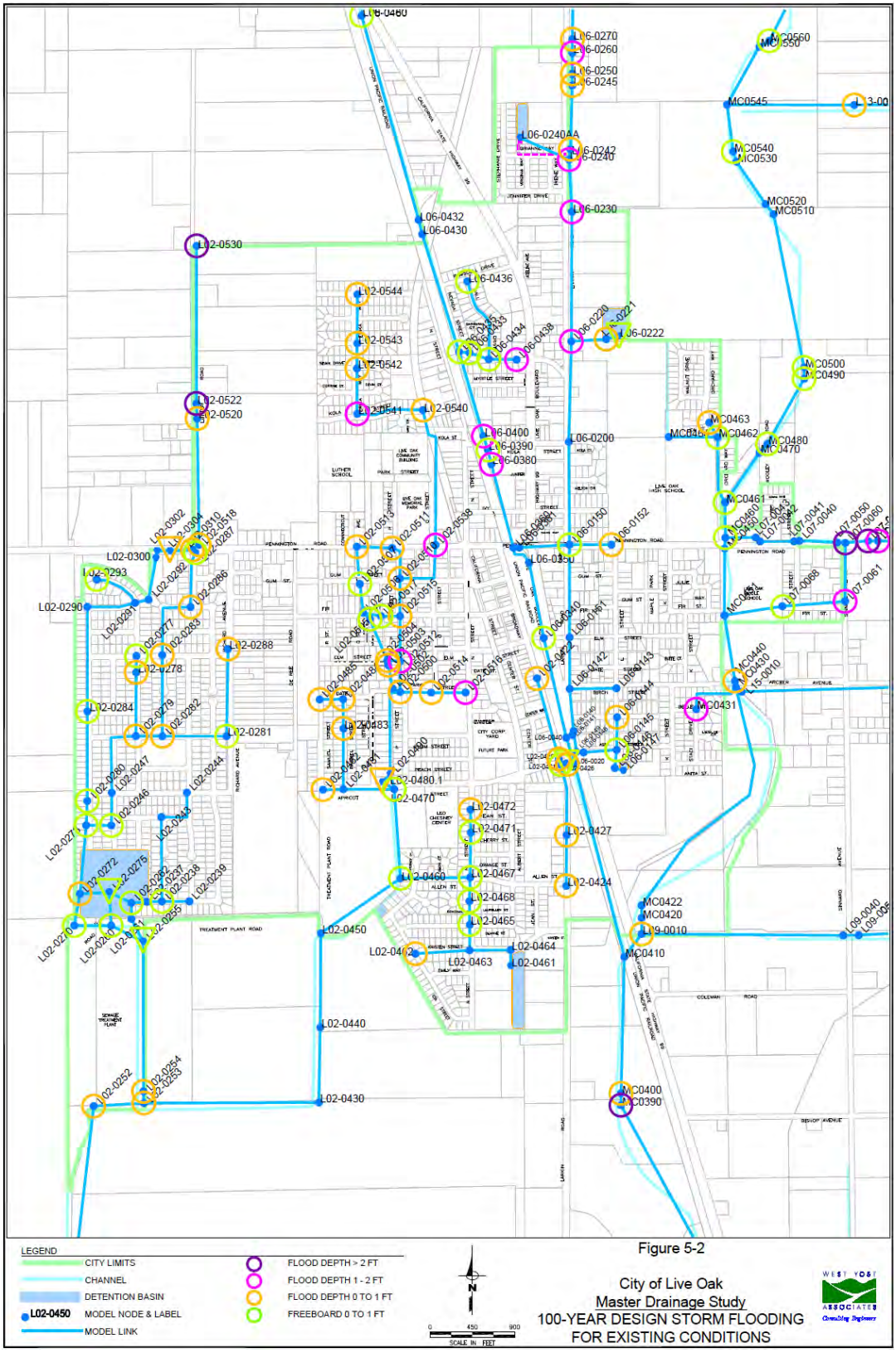
A comparison of the modeled 100-year storm water surface elevation, ground elevation, invert elevation, and freeboard for each model node is shown in Figure A.12 using the same color scheme as for the 10-year storm. The elevations of the building pads were not available as part of the drainage study. As determined through field observation, the elevations of the homes along many of the flooded storm drain systems are not significantly above the ground surface at the drain inlets. However, many houses are built on raised foundations, so flooding depths of less than 1-foot may not actually enter the houses. Modeled flooding depths of over 2 feet would likely cause actual flood damage at the node where the flooding is reported or at nearby locations. Model results indicate that during the 100-year storm, much of the City would experience flooding problems with flooding depths of up to 1 foot being common. The following is a summary of areas where flooding has previously occurred and the model results indicate flooding would occur.

- De Ree Road – The observed flooding along De Ree Road occurs because the area does not have a storm drain system. This flooding may be exacerbated by flooding from the storm drain systems on Apricot and Date Streets. As shown in Figure A.12, the Apricot and Date Street storm drains near the De Ree Road area would flood up to 1-foot deep for the 100-year storm.
- Luther School - The Luther School area drains to the storm drain along Pennington Road at Connecticut Street. The model shows that this storm drain system would be flooded up to 1-foot deep during the 10-year and 100-year storms.
- L Street between Birch Street and Pennington Road – The observed flooding along much of L Street (between Date Street and Pennington Road) occurs because this area does not have a storm drain system. The model shows up to 1-foot of flooding during the 10-year storm at L Street and Pennington Road, and at Birch Street. Thus, inadequate capacity in the storm drains in this area would contribute the flooding between Pennington Road and Date Street. The model results show up to 1-foot of flooding in this area during the 100-year storm.
- J Street south of Pennington Road – This area lacks storm drains, which causes the observed flooding. The model results show that this area and the adjacent drains/roadside ditches would experience flooding up to 1-foot deep during the 10-year storm and over 2 feet deep during the 100-year storm. This area drains to a roadside ditch along Pennington Road that will be flooded during the 10-year and 100-year storms. This ditch's limited capacity will cause the Sinnard Street storm drain system to back up.
- Highway 99 - The observed flooding along Highway 99 occurs because there are only bubble-up systems crossing Highway 99 and several intersecting roads. No full storm drain systems serve the Highway 99 area. The model shows that the drain inlet at Nevada Street and Highway 99 would flood up to a depth of 1-foot for the 10- and 100-year storms. Lateral 6, located west of Highway 99, mostly has over 1-foot of freeboard in the 10-year storm. In the 100-year storm, the model results indicate that the Lateral 6 water levels range from under 1-foot of freeboard to flooding depths of over 1-foot.
- West of P Street from Pennington Road to Date, Gum, Fir, and Elm Streets – The observed flooding in this area is partially due to the use of a small ditch to drain storm water. The

model shows that the Apricot Street Pump Station - tributary storm drain system (in this area) would experience less than 1-foot of flooding during the 10-year storm and over 1-foot of flooding in the 100-year storm at a few locations.

- Larkin Road Storm Drain – The City and RD 777 have expressed concern that the Larkin Road storm drain does not have adequate capacity from the City limits to the open ditch between Ash and Birch Street. The model shows that the Larkin Road storm drain system appears to convey 10-year storm flows. However, the 1-foot minimum freeboard requirement would not be met along the northern portion of the storm drain system in the 10-year storm. For the 100-year storm, the model shows that there would be up to 2 feet of flooding along the Larkin Street storm drain. Many of the culverts serving the Larkin Road roadside ditches are partially to fully plugged with sediment. These plugged culverts reduce the flow reaching the Larkin Road storm drain. If the culverts were cleared, the model results would likely indicate significant flooding along the Larkin Road storm drain even in the 10-year storm.

Figure A.12. City of Live Oak 100 year Localized Flooding Areas and Depths



Source: 2011 Live Oak Drainage Study

Future Development

Future development in the City will add more impervious surfaces and need to drain those waters. The City has a track record of addressing localized flooding in the past, and will continue those efforts in the future.

Levee Failure

Vulnerability to Levee Failure

Likelihood of Future Occurrence—Unlikely
Vulnerability—High

Overtopping of the Feather River levees is considered to be a significant local concern due to the general topography of the region. The Feather River, which forms the eastern border of the General Plan Study Area, consists of a large watershed that stretches to the Sierra Crest. The city's location in the lower portions of the watershed exposes the community to substantial risk from riverine flooding. Additionally riverine flooding can overwhelm the integrity of the local or regional levee system. Levee failure can result if water overtops a levee, if high river levels saturate the levee banks, or if the levee itself is structurally defective. Levee failure can occur very rapidly with little warning. Once a levee is breached, floodwaters can inundate large low-lying areas. Levee overtopping or failure could cause catastrophic flooding in the City.

In the analysis on levee failure, the Q3 data showed no levee protected areas in the City of Live Oak. Because of this, no analysis was performed for levee failure in the City. This is not to suggest that no risk exists. An effort is in place to certify the levees that protect the City of Live Oak. Live Oak is a participant in with the Sutter Butte Flood Control Agency's Feather River West Levee Project. Although the Q3 maps show no X Protected by Levee Zones for the City, Figure 4.88 in Section 4.3.9 of the base plan shows that in the Sutter Butte Flood Control Agency/PBI levee break scenario, the City would be inundated with two to four feet of water. It is important for these residents, as well as businesses that may fall in these areas, to have evacuation plan.

Future Development

GIS Analysis

To determine potential development constraints based on the location of future development areas relative to the FEMA flood zones, additional analysis was performed using GIS. For each community, the future development areas, overlain with the General Plan land use diagrams, were intersected with the FEMA flood zones to identify future areas of development in levee protected areas. Table A.17 provides a parcel level analysis of the future development areas by flood zone. These are shown in Figure A.8 in the flood vulnerability section.

Table A.17. Future Development in Live Oak by Flood Zone

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Areas Protected by Levee						
Sphere Of Influence	Urban Reserve	11	5	$506,710	$699,916	$1,206,626

Source: Sutter County GIS, FEMA DFIRM, Q3

Limited development is happening in the City. While future development may place more structures in the levee protected areas, due to the low risk of levee failure and the work currently being done to certify the levees, development will be allowed in these areas.

Severe Weather & Storms: Heavy rain, hailstorm, lightning, and wind

Vulnerability to Severe Weather & Storms: Heavy rain, hailstorm, lightning, and wind

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

According to historical hazard data, severe weather is an annual occurrence in the City of Live Oak. Damage related to severe weather has occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrence in the area. Wind and lightning often accompany these storms and have caused damage in the past. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered. In January of 2007, excessive winds in the City of Live Oak damaged roofs and fences. Damage estimates were unavailable.

Problems associated with the primary effects of severe weather include flooding, pavement deterioration, washouts, high water crossings, landslide/mudslides, debris flows, and downed trees. Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Livestock that may be contained in these structures may be injured or killed, causing economic harm to the rancher who owns both the structure and the livestock. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents.

Future Development

The City enforces the state building code and other ordinances, which regulate construction techniques that minimize damage from heavy storms and rain. Future development in the City is

subject to these building codes. New critical facilities such as communications towers should be built to withstand hail damage, lightning, heavy rains, and wind.

Wildfires

Vulnerability to Wildfires

Likelihood of Future Occurrence—Unlikely
Vulnerability—Low

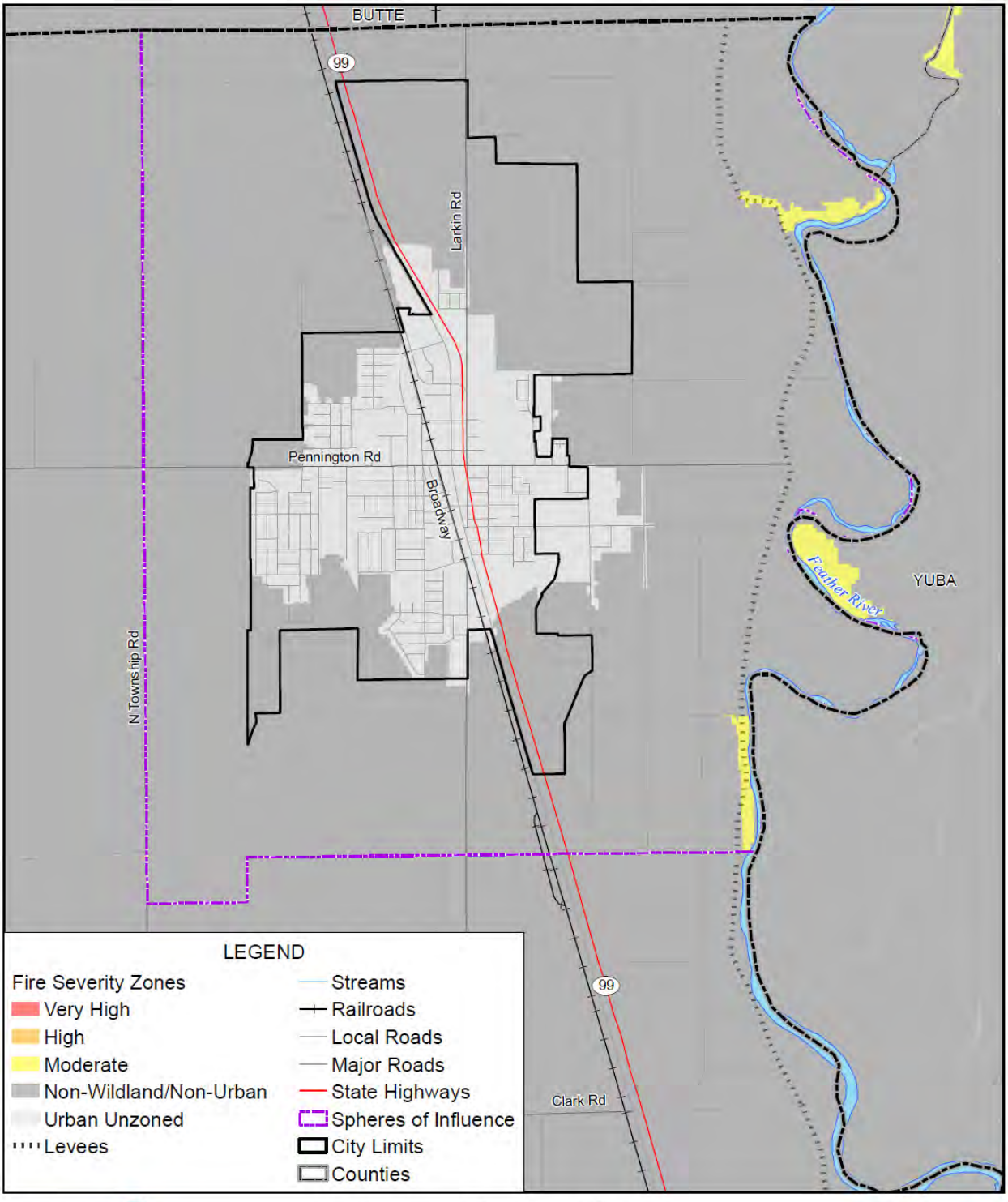
Although the HMPC feel this is a low significance hazard, due to the significance of wildfire in California, analysis of wildfire is included here. Major fires are generally categorized as either a conflagration or wildland/forestland. A conflagration may involve residential or commercial areas and spreads across both natural and constructed barriers. Wildland is associated with open range grasslands and into the foothills of a particular area. Because of development in rural areas adjacent to and within unincorporated Sutter County, a third classification has emerged, the Urban Interface wildfire. The urban interface wildfire is one that burns along the urban/rural interface and can result in major losses of property and structures.

A number of factors affect the behavior of wildland and interface fires, including terrain, weather, wind, fuels and seasons. It is well known that fire travels faster uphill than down and is more difficult to fight on steep slopes than on level ground. When weather is hot and the humidity is low, wildland fires can explode with intensity of rapid combustion. Even in the absence of strong winds, a fast-moving fire can generate its own updrafts, particularly in canyons, causing burning brands to be carried high in the air and drop a long distance ahead. This results in spot fires over a wide radius as the wind changes its direction.

Live Oak is not immune to numerous types of grass and brush fires and any one of them may accelerate into an urban interface wildfire. Such a situation could lead to evacuation of large portions of the population and the potential for significant loss of personal property, structures, and rangeland. The natural fuels available in or near the City vary greatly in the rate and intensity of burning. Fires in heavy brush and stands of trees burn with great intensity but more slowly than in dry grass and leaves. Dense fuels will propagate fire better than sparse fuels. The local fire season generally extends from June through early October.

Figure A.13 shows wildfire risk in the City of Live Oak. Wildfire threat within the City is low.

Figure A.13. City of Live Oak Fire Severity Zones



Map compiled 5/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS, CALFIRE: SRA 11/7/2007, LRA 5/2008, FRA & LRA 8/2007 DRAFT

Assets at Risk

Analysis of assets at risk for the City of Live Oak was performed. There are no buildings in the moderate or higher wildfire threat categories, as shown on Figure A.13.

Population at Risk

The Fire Severity dataset was overlayed on the residential population data. Those parcel centroids that intersect the severity zones were counted and multiplied by the 2012 Census Bureau average household factors for each jurisdiction and unincorporated area. Results were tabulated by jurisdiction. According to this analysis, there is no population in the City at moderate or higher risk to wildfire. This is shown in Table A.17.

Table A.18. City of Live Oak - Count of Improved Residential Parcels and Population in Fire Severity Zone

Fire Threat Class	Improved Residential Parcels	Population
Very High	–	–
High	–	–
Moderate	–	–
Non-Wildland/Urban	16	55
Urban Unzoned	102	349
Total	**118**	**404**

Source: Sutter County 2012 Assessor's Data; CAL FIRE

Critical Facilities at Risk

Wildfire analysis was performed on the critical facility inventory in Sutter County and all jurisdictions. GIS was used to determine whether the facility locations intersect a wildfire hazard areas provided by CAL FIRE, and if so, which zone it intersects. There are no facilities in the moderate or higher fire severity zone in the City. Details of critical facility definition, type, name and address and jurisdiction by fire zone are listed in Appendix E.

Future Development

Since there are no areas near the City in the moderate or higher wildfire areas, future development in the City will most likely not be at risk to wildfire.

A.6 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 capability assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

A.6.1 Regulatory Mitigation Capabilities

Table A.18 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 Live Oak.

Table A.19. City of Live Oak Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan	Y	3/24/2010	In rewrite
Zoning ordinance	Y	8/18/2010	
Subdivision ordinance	Y		
Growth management ordinance	N		
Floodplain ordinance	Y	1/6/2010	
Other special purpose ordinance (stormwater, steep slope, wildfire)	N		
Building code	Y		Version: 2010 California
BCEGS Rating	N		
Fire department ISO rating	Y		Rating:
Erosion or sediment control program	N		
Stormwater management program	N		
Site plan review requirements	Y		
Capital improvements plan	Y		
Economic development plan	Y		
Local emergency operations plan	Y		Currently being worked on
Community Wildfire Protection Plans	N		
Flood insurance study or other engineering study for streams	Y		Sutter Butte Flood Control Agency
Elevation certificates	Y		
Other			

Source: AMEC Data Collection Guide

General Plan (2010)

California Law requires that every City and County in the state have a General Plan. The 2030 City of Live Oak General Plan, adopted in 2010, included an extensive public review process. The General Plan is the most important policy and planning document in the city, and is used by virtually every department. The General Plan is the City's statement of its vision for the future. The General Plan contains policies covering every aspect of the City: land use (how land can be developed), circulation, noise, air quality, housing, open space and conservation, and health and safety.

Goals and policies related to mitigation of natural hazards are as follows:

Goal	Design buildings to prevent property damage and injury from hazards.
Policy	All new buildings in the City shall be built under the seismic requirements of the California Building Code.
Policy	The City will encourage the retrofitting of older buildings to current safety standards, as specified in locally applicable fire and building codes.
Policy	New development shall ensure adequate water flow for fire suppression as required by City Public Works Improvement Standards.

Goal	Minimize the loss of life and damage to property caused by flood events.
Policy	The City will coordinate with the Sutter Butte Flood Control Agency to ensure that flood control facilities protecting Live Oak's Planning Area from flood risks to the City are well maintained and capable of protecting existing and proposed structures from flooding, in accordance with state law.
Policy	The City will regulate development within floodplains according to state and federal requirements to minimize human and environmental risks and maintain the City's eligibility under the National Flood Insurance Program.
Policy	The City will require evaluation of potential flood hazards before approving development projects.
Policy	The City will require applicants for development to submit drainage studies that adhere to City stormwater design requirements and incorporate measures from the City's master drainage plan to prevent on- or off-site flooding.
Policy	New development shall be required to be consistent with regional flood control improvement efforts. New development shall contribute on a fair-share basis to regional solutions to improve flood protection to meet state and federal standards.
Policy	The City will use the most current flood hazard and floodplain information from state and federal agencies (such as the State Department of Water Resources, the Federal Emergency Management Agency, and the Army Corps of Engineers) as a basis for project review and to guide development in accordance with federal and state regulations.
Policy	As feasible, new development should incorporate stormwater treatment practices that allow percolation to the underlying aquifer and minimize off-site surface runoff (and therefore flooding).

Master Drainage Study (2011)

Significant development has occurred within the City over the last few years, and additional growth of the City is anticipated in the City's revised General Plan, particularly in/around the southwest, northwest, and northeast quadrants of the City. A critical element in planning for the City's new growth is determining infrastructure needs and funding mechanisms to pay for the required infrastructure. Development of agricultural lands results in constructing buildings and pavement, which greatly increases the runoff rate and total volume of runoff. Consequently, new drainage facilities, including storm drain collection systems, open channels, detention basins, and pump stations, are needed to manage the increased runoff and to prevent flooding. The purposes of the MDS are to:

- Identify the drainage/flood control improvements needed to address existing drainage problems,

- Recommend drainage/flood control facilities needed to allow build out of the City's revised General Plan without causing drainage/flooding impacts within the City or to the existing agricultural areas upstream or downstream of the City, and
- Identify the capital and operations and maintenance (O&M) costs of the recommended drainage/flood control facilities.

Ordinances

The City of Live Oak has many ordinances related to mitigation.

Zoning (Title 17)

The City of Live Oak Zoning Code is the primary implementing mechanism of the General Plan. Unlike the General Plan, which provides long-range, comprehensive general policies for the general direction of land use in the City, the Zoning Code provides more specific descriptions of the types of uses that are allowed in certain areas, development standards (e.g., setbacks, building heights, lot coverage) and other detailed guidance for property development. The Zoning Code is required to be consistent with the General Plan.

The city council is authorized by the Planning and Zoning Laws of the California State Government Code, Title 7, Planning and Land Use, Division 1, Planning and Zoning, Chapter 4, Zoning Regulations, to regulate the following:

1) Use of land and buildings;
2) Height, bulk and size of buildings and structures;
3) Construction and use of signs and billboards;
4) Intensity of land use;
5) Establishment and maintenance of building setback lines.

This includes the regulation of development in the floodplain, as discussed in the flood ordinance below.

The purpose of the Zoning Code for the City is as follows:

- To implement the goals and policies of the Live Oak General Plan through the designation of compatible land uses, residential densities and intensity of uses.
- To promote and protect the public's health, safety, peace, comfort, convenience and general welfare.
- To provide open space, light and air, privacy, convenience of access, aesthetic values and protection of public and private improvements.
- To protect the social and economic stability of residential, commercial and industrial uses and activities through orderly and planned use of land.
- To minimize the process necessary to obtain rights to develop property while fulfilling the objectives provided above.

Subdivision (Title 16)

The City of Live Oak regulates the locations and development of subdivisions within the City. The regulations contained in this Title are determined to be necessary to:

- Health and safety: Preserve the public's health, safety and general welfare.
- Growth and open space: Promote orderly growth and development and to promote open space, conservation and proper use of land.
- Traffic, other services: Ensure provisions for adequate traffic circulation and other City services.

Building Code Section (Chapter 15.01)

In order to provide minimum standards for the proper regulations of building construction, the following publications are hereby adopted by reference and incorporated in this Code, except as expressly amended or superseded by the provisions of this Code.

- 2010 California Administrative Code, Title 24 Part 1 California Code of Regulations, Title 24, Part 1
- 2010 California Building Code, Title 24 Part 2, based on the 2009 International Building Code including the Appendices, as published by the International Code Council (ICC) as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- 2010 California Residential Code, Title 24 Part 2.5, based on the building provisions of the 2009 International Residential Code (chapters 2-10), and as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- 2010 California Electrical Code, Title 24 Part 3, based on the 2008 Edition National Electrical Code, as published by the National Fire Protection Association, and as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- 2010 California Mechanical Code, Title 24 Part 4, based on the 2009 Uniform Mechanical Code as published by the International Association of Plumbing and Mechanical Officials, and as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- 2010 California Plumbing Code, Title 24 Part 5, based on the 2009 Uniform Plumbing Code as published by the International Association of Plumbing and Mechanical Officials, and as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- 2010 California Energy Code, Title 24 Part 6, Adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.

- 2010 California Fire Code, Title 24 Part 9, based on the 2009 International Fire Code as published by the International Code Council (ICC) and as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- 2010 California Green Building Standards Code, Title 24 Part 11, The California Green Building Code (CGBSC) also referred to as CalGreen is the nation's first mandatory green building code and as adopted by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- 2010 California Referenced Standard Code, Title 24 Part 12, The California Reference Standards Code (CRSC) contains minimum test and reference standards required by the California Building Standards Code.
- 2006 Uniform Swimming Pool, Spa & Hot Tube Code, as published by the International Association of Plumbing and Mechanical Officials.

Flood Ordinance (Chapter 15.21)

It is the purpose of this chapter to promote the public health, safety and general welfare, and to minimize public and private losses due to flood conditions in specific areas by legally enforceable regulations applied uniformly throughout the community to all publicly and privately owned land within flood prone, mudslide [i.e. mudflow] or flood related erosion areas. These regulations are designed to:

- Protect human life and health;
- Minimize the 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.

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.

All new construction or substantial improvements of residential structures shall have the lowest floor, including basement:

- In AE, AH, A1-30 Zones, elevated at least one foot above the BFE.
- In an AO Zone, elevated above the highest adjacent grade to a height exceeding the depth number specified in feet on the FIRM by at least one foot, or elevated at least three feet above the highest adjacent grade if no depth number is specified.
- In an A Zone, without BFE's specified on the FIRM [unnumbered A zone], elevated at least one foot above the base flood elevation as determined by methods comparable to those in a Flood Insurance Study or by using the detailed methods as described in the most current edition of FEMA publication, FEMA 265, "Managing Floodplain Development in Approximate Zone A Areas – A Guide for Obtaining and Developing Base (100-year) Flood Elevations" or any successor FEMA document.
- In all other Zones and in local flood hazard areas, elevated at least one foot above the base flood elevation shown on the flood insurance rate map or one foot above the locally-determined base flood elevation if that elevation is higher. In Zone X, a condition of granting any building permit for construction outside a subdivision shall be that the lowest floor shall be placed at an elevation, as determined by a registered engineer, which will protect the structure from inundation as a result of a storm with a 100-year recurrence interval. If the Floodplain Administrator determines that developing data to establish the 100-year storm inundation elevation would be excessively expensive, the Floodplain Administrator may alternatively approve a lowest floor elevation which is one foot above the centerline of the closest city street at a point closest to the building site. This requirement shall exclude detached garages, accessory buildings and agricultural shops, provided that the owner signs an indemnity agreement for any future damages by flooding.

A.6.2 Administrative/Technical Mitigation Capabilities

Table A.19 identifies the City department(s) responsible for activities related to mitigation and loss prevention in Live Oak.

Table A.20. City of Live Oak Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	Yes	Planning/GIS	Both positions are consultants
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	No		
Planner/Engineer/Scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		
Full time building official	Yes	Building	
Floodplain Manager	Yes	Building	

Personnel Resources	Yes/No	Department/Position	Comments
Emergency Manager	Yes	City Manager	
Grant writer	Yes	Building/Finance	
Other personnel	No		
GIS Data – Hazard areas	No		
GIS Data - Critical facilities	No		
GIS Data – Building footprints	No		
GIS Data – Land use	No		
GIS Data – Links to Assessor's data	No		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Yes		
Other			

Source: AMEC Data Collection Guide

A.6.3 Fiscal Mitigation Capabilities

Table A.20 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table A.21. City of Live Oak Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	Y	
Capital improvements project funding	N	
Authority to levy taxes for specific purposes	Y	
Fees for water, sewer, gas, or electric services	Y	Sewer and Water Only
Impact fees for new development	Y	
Incur debt through general obligation bonds	N	
Incur debt through special tax bonds	N	
Incur debt through private activities	N	
Withhold spending in hazard prone areas	N	
Other		

Source: AMEC Data Collection Guide

A.6.4 Mitigation Outreach and Partnerships

The City partners with Sutter County, Yuba City, SBFCA, the Red Cross, and other organizations for mitigation outreach.

A.7 Mitigation Strategy

This section describes the mitigation strategy process and mitigation action plan for the City of Live Oak's inclusion with the Sutter County Local Hazard Mitigation Plan update.

A.7.1 Mitigation Goals and Objectives

The City of Live Oak adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy of the base plan.

A.7.2 Continued Compliance with the NFIP

As a participant of the National Flood Insurance Program (NFIP), the City of Live Oak 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 Live Oak 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 maintaining drainage systems. The goal of the program is to enhance public safety, and reduce impacts and losses while protecting the environment.

The City of Live Oak Planning and Engineering Department provides public outreach activities which include map information services, public awareness, public hazard disclosure, and flood protection information. This information is readily available to the public and consists of current and accurate flood mapping. In addition, the Planning and Engineering Department provides information about our stormwater management program and up-to-date information related to the maintenance of our drainage system.

The National Flood Insurance Program's (NFIP) 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 Live Oak is currently a participating community in the CRS as a Class 7 community, which gives a 15% discount to flood insurance policies in the Special Flood Hazard Area (SFHA), and a 5% discount to those outside of the SFHA.

The activities that the City implements and receives CRS credits for include:

- **Activity 310 – Elevation Certificates**: The Building Department maintains elevation certificates for new and substantially improved buildings. Copies of elevation certificates are made available upon request.

- **Activity 320 – Map Information Service**: Credit is provided for furnishing inquirers with flood zone information from the community's latest Flood Insurance Rate Map (FIRM), publicizing the service annually and maintaining records.
- **Activity 330 – Outreach Projects**: A community brochure is mailed to all properties in the community on an annual basis. An outreach brochure is mailed annually to all properties in the community's Special Flood Hazard Area (SFHA). The community also provides flood information through displays at public buildings (Library) and community events.
- **Activity 340 – Hazard Disclosure**: Credit is provided for state and community regulations requiring disclosure of flood hazards.
- **Activity 350 – Flood Protection Information**: Documents relating to floodplain management are available in the Building Department and on the City website. Credit is also provided for floodplain information displayed on the community's website.
- **Activity 360 – Flood Protection Assistance**: The community provides technical advice and assistance to interested property owners and annually publicizes the service.
- **Activity 430 – Higher Regulatory Standards**: Credit is provided for enforcing regulations that require freeboard for new and substantial improvement construction, protection of floodplain storage capacity, natural and beneficial functions, enclosure limits, other higher regulatory standards, land development criteria and state mandated regulatory standards. Credit is also provided for certification as a floodplain manager and the adoption of the International Building Codes.
- **Activity 440 – Flood Data Maintenance**: Credit is provided for maintaining and using digitized maps in the day to day management of the floodplain. Credit is also provided for maintaining copies of all previous FIRMs and Flood Insurance Study Reports.
- **Activity 510 – Floodplain Management Planning**: Credit is provided for the adoption and implementation of the Floodplain Management Plan. Since Live Oak is a community with an approved Floodplain Management Plan, a progress report must be submitted on an annual basis. In addition, as detailed in the Section 3.0, Planning Process, this LHMP is being developed to maximize CRS credits for Activity 510.
- **Activity 610 – Flood Warning Program**: Credit is provided for a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities.
- **Activity 630 – Dam Safety**: All California communities currently receive CRS credit for the state's dam safety program.

A.7.3 Mitigation Actions

The planning team for the City of Live Oak identified and prioritized the following mitigation actions based on the risk assessment and in accordance with the process outline in Section 5, Mitigation Strategy, of the base plan. 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. General processes and

information on plan implementation and maintenance of this LHMP by all participating jurisdictions is included in Section 7, Plan Implementation and Maintenance, of the base plan.

1. Eliminate Local Flooding Areas at the Six Locations Identified in the Master Drainage Study

Hazards Addressed: Localized Flooding

Goals Addressed: 1, 2, 6

Issue/Background: In the Master Drainage Study, six drainage problems were specifically identified by City staff for development of drainage improvements. Q Street

Project Description: Elimination of these drainage problems is not intended to eliminate all flooding in the City or in RD 777.

- J Street south of Pennington Road
- L Street between Birch Street and Pennington Road
- Several Highway 99 cross culverts (bubble up systems) that do not have connections to District or City drains
- De Ree Road and Luther School
- West of P Street from Pennington Road to Date Street, Gum, Fir, and Elm Streets. Currently drainage flows in ditches between houses. The ditches have been blocked by overgrown vegetation and fences and are difficult to maintain.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Master Drainage Study.

Priority: Medium.

Responsible Office: Live Oak Public Works

Cost Estimate: $535,000 for J Street, $632,000 for L Street, $893,000 for Highway 99, $2,270,000 for Luther School and De Ree Road, $815,000 for P Street, and $337,000 for Q street.

Benefits (Losses Avoided): The proposed improvements result in improved drainage and decreased flooding at the existing problem areas. This results in decreased risk to property in the City of Live Oak to localized flooding.

Potential Funding: To be determined.

Schedule: Within 5 years.

2. Backup Power to Critical Facilities

Hazard Addressed: Provides the ability to maintain critical city services such as water, sewer, storm water management and communications during times of adverse conditions.

Goals Addressed: 1, 2, 4, 6

Issue/Background: There is a definite need for backup power at several critical facilities throughout the City. Backup power is an essential element to maintaining services during an event. Updating the cities multiple sites has been a challenge. Partial upgrades have been accomplished over the years, but not all critical facilities have backup power.

Project Description: Ten critical services locations require backup power upgrades to include: generators and associated wiring to bring them on line, training for staff members operating the units and weather tight protective covers to protect them in inclement weather.

Other Alternatives: Continue to seek funding for the upgrades as it becomes available

Existing Planning Mechanisms through which Action will be implemented: Ongoing planning sessions with the City Staff and the City Council

Priority (H, M, L): High

Responsible Office: Public Works

Cost Estimate: $1.5 million

Benefit (Loss Avoided): To provide critical services without interruption during times of adverse weather conditions and ensure proper drainage during high water events.

Potential Funding: Various state and federal funding sources

Schedule: 2013

3. Blackboard Connect Upgrades and Maintenance

Hazard Addressed: Addresses mass communication needs between city staff and residents throughout the City, provides standardized notification prior, during and after a disaster. Also can be used as an outreach tool as well

Goals Addressed: 1, 2, 3, 4, 6

Issue/Background: The City has a diverse population regarding ethnicity, many have little or no electronic communication and at least three languages are spoken therefore, it is a huge challenge to be able to notify all the residents in the event of a disaster.

Project Description: Black board connects is the cities ongoing communication device, it was selected primarily because of its adaptability to new technology as it becomes available. Upgrading and maintenance is critical and the City is making every effort to stay abreast of technology as it pertains to this system. Promoting use within community is essential for success.

Other Alternatives: There are numerous communication systems on the market.

Existing Planning Mechanisms through which Action will be implemented: Ongoing planning sessions with the City Staff and the City Council

Priority (H, M, L): High

Responsible Office: City Manager's Office

Cost Estimate: $10,000

Benefit (Loss Avoided): Communication is a key element of any disaster plan

Potential Funding: Various State and Federal funding sources

Schedule: 2013

4. EOC Equipment and Supplies

Hazard Addressed: Ensures City is prepared to activate a local EOC if required

Goals Addressed: 1, 2, 4, 6

Issue/Background: The issue of always having what you need in the event of a disaster is a major concern. The City is very limited on space especially elevated space and to have a dedicated space for an EOC would be a real challenge. The City wants to prepare EOC in a Box to provide flexibility as to where an EOC could ultimately be set up within Live Oak.

Project Description: Assemble all items necessary to fully stock an EOC, items included but not limited to:

- Computers (Laptops)
- Router
- Battery Backup
- Printer
- Projector
- Fax Machine
- Flipcharts
- Analog telephone

- Extra Cell Phones
- EOC Activation Guide/ Checklists
- Procedures
- Contact information
- General Office Supplies
- Weather tight and Shock Proof Containers

Other Alternatives: Find another location somewhere in the City of a more permanent nature to assign as the EOC.

Existing Planning Mechanisms through which Action will be implemented: Ongoing planning sessions with the City Staff and the City Council

Priority (H, M, L): High

Responsible Office: City Manager's Office

Cost Estimate: $25,000

Benefit (Loss Avoided): The benefit of the EOC in a Box is always being fully prepared when a disaster strikes. The elements included in the EOC in a Box are solely used for disaster response only and only used when an EOC is activated.

Potential Funding: Various state and federal funding sources

Schedule: 2013

5. Hwy 99 Improvements

Hazard Addressed: Provide traffic congestion relief

Goals Addressed: 1, 2, 4, 6

Issue/Background: Due to the existing configuration of Hwy 99 through the City, traffic congestion is a common occurrence. The City is attempting to address this situation by developing and completing all necessary design & engineering analysis to support a project to widen SR99 to 4 lanes through the City.

Project Description: In conjunction with Caltrans, complete the four lane Streetscape plan/Hwy 99 improvements from Paseo Rd to Rivera Rd.

Other Alternatives: Continue to seek funding for the upgrades as it becomes available

Existing Planning Mechanisms through which Action will be implemented: Ongoing planning sessions with the City Staff and the City Council. Existing cooperative agreement with Caltrans to complete initial project study.

Priority (H, M, L): High

Responsible Office: Engineering

Cost Estimate: $30 million

Benefit (Loss Avoided): Provide better traffic flows and reduce traffic congestion at peak commute hours.

Potential Funding: Various State and Federal funding sources

Schedule: 2014/2015

6. Well, Holding Tank, Water Treatment Equipment with Associated Water lines and Water Main Upgrade.

Hazard Addressed: Inadequate Fire Flows, Water Pressure and Water Distribution on the east side of the City.

Goals Addressed: 1, 2, 4, 6

Issue/Background: For some time now the City has been without a well on the east side. The well was deemed contaminated and taken off line. The City has made every effort to continue to service the east side with any means possible but has proven to be a real challenge especially when the summer water usage runs high.

Project Description: Drill a well capable of producing 2000 gpm, construct a holding tank sized to handle adequate storage for the area served, provide water treatment equipment capable of treating the water to meet the County standard, install water distribution piping and electrical sufficient to bring the facility on line. Also included in this project is water main upgrades in several locations from an undersized 6" to 8" and 10" in a few cases. This process will involve boring under Hwy 99.

Other Alternatives: Continue to seek funding for the upgrades as it becomes available

Existing Planning Mechanisms through which Action will be implemented: Ongoing planning sessions with the City Staff and the City Council

Priority (H, M, L): High

Responsible Office: Public Works and Engineering

Cost Estimate: $5 million

Benefit (Loss Avoided): Upgrade inadequate fire flows and water pressure.

Potential Funding: Various state and federal funding sources

Schedule: 2014/2015

Multi-Jurisdictional Mitigation Actions

7. Enhance Public Awareness of the Affects of Natural Hazards and Public Understanding of Disaster Preparedness

Hazards Addressed: All (priority and non-priority) hazards

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: There are a total of 9 jurisdictions participating in the Sutter County Local Hazard Mitigation Plan. Each jurisdiction is responsible for their own outreach/education program for hazards in their community.

Project Description: The level of effort varies by jurisdiction. All jurisdictions contend with limited resources; some must sacrifice educational outreach campaigns to direct their limited resources to the most critical projects. A single unified outreach program will ascertain both broad and targeted educational needs. Resources will be leveraged by consolidating messaging where appropriate and reaching across jurisdictional lines.

Other Alternatives: Status quo.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing outreach programs will be reviewed for effectiveness. Successful components will be expanded across the broader region.

Responsible Office: Sutter County, Yuba City, Live Oak, all other districts

Priority (H, M, L): High

Cost Estimate: To be determined

Benefits (Losses Avoided): Increase residents' knowledge of potential hazards and activities required to mitigate hazards.

Potential Funding: HMGP Grant

Schedule: Ongoing

8. Planned Multi-Hazard CRS Outreach Projects

Hazards Addressed: Multi-hazard

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: Sutter County Water Resources, the City of Live Oak, and Yuba City Public Works perform many types of outreach each year to make citizens in the County aware of flooding and other hazards. Each entity handles CRS related projects as appropriate.

Project Description:

For Sutter County 11 projects yearly projects are planned.

- OP1: (October, 2013) Presentation on the National Flood Insurance Program at the National Weather Service – Town Hall meeting in Yuba City.
- OP2: (October, 2013) Presentation on County's flood issues at Sutter County - Board of Supervisors meeting.
- OP3: Presentation to local engineers and designers regarding construction requirements for SFHA, flood openings.
- OP4: Presentation to local realtors concerning flood risk & floodplain management. Advertise one-on-one assistance regarding Property Protection Advice.
- OP5: Post informational material on Facebook. Advertise one-on-one assistance regarding Property Protection Advice.
- OP6: Include annual postcard with tax bill. Advertise one on one assistance regarding Property Protection Advice.
- OP7: Include an article in the Recology (waste collection provider's) newsletter.
- OP8: Host an informational booth at the Yuba-Sutter Home & Garden Show.
- OP9: A brochure "Building in a High Risk, Special Flood Hazard Area - Do I Need to Elevate?"
- OP10: A brochure for Southeast Sutter Basin - "Important Information in the Event of Flood"
- OP11: A brochure for Robbins Basin - "Important Information in the Event of Flood"

For Live Oak, the City plans to continue to implement and improve the City's CRS Program

For Yuba City, the City plans to continue to implement and improve the City's CRS Program

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CRS Program

Priority (H, M, L): High for Sutter County, medium for Live Oak and Yuba City

Responsible Office: CRS Coordinator/Sutter County Water Resources, Live Oak, Yuba City Public Works

Cost Estimate: Staff time and printing costs.

Benefits (Losses Avoided): Increased awareness for citizens of flood risk and other natural disaster that can affect the County. This also gives points for CRS, which helps to keep costs for flood insurance holders in the County down.

Potential Funding: Existing budget

Schedule: 2013-2014 schedules are in place. This project is ongoing and will continue until the next update of this Plan.

9. Implementation of CRS Activities

Hazards Addressed: Multi-Hazard

Goals Addressed: 1, 2, 3, 4, 5 and 6

Issue/Background: The CRS Program brings several mitigation concepts under one umbrella to help communities develop solid floodplain management programs by reducing flood losses, protecting properties from flood damage, and helping to strengthen the insurance aspects of the NFIP. The CRS is one of FEMA's premier mitigation programs which also help's to mitigate damage from other natural hazards. Communities who implement CRS activities receive a rating which results in the reduction of flood insurance premiums for policy holders in that community. Sutter County, Yuba City and Live Oak all participate in the CRS Program and will be verified under the 2013 CRS Coordinators Manual. This also provides continued compliance with the NFIP.

Project Description: Continue to implement CRS Activities and look for additional CRS credits under the 2013 CRS Coordinator's Manual to better protect residence from flood damage and other natural hazards.

Other Alternatives: None

Priority (H, M, L): High

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: Staff time

Benefits (Losses Avoided): Increased flood protection and reduction in the cost of flood insurance

Potential Funding: Existing Budget

Schedule: Ongoing

10. Review and Amend Flood Damage Prevention Ordinance, as Appropriate

Hazards Addressed: Flood, Levee Failure

Issues/Background: A community's flood damage prevention ordinance sets minimum rules, regulations, and standards for development in the SFHA. Since these standards are minimum protection standards, higher regulatory may be necessary to better protect properties from potential flood damage. This is certainly true when FIRM maps are updated, when floor control projects are completed or when a community has experienced a recent flood. Since only part of Sutter County has been mapped by the NFIP, an evaluation of current regulations is necessary for the county, Yuba City and Live Oak. Each community should evaluate their current higher regulatory standards and make decisions if additional higher standards may be necessary to protect both current and future development. Evaluation of higher regulatory standards is also important because of changes in the 2013 CRS Coordinator's Manual. This also provides continued compliance with the NFIP.

Project Description: Review current flood damage prevention higher regulatory standards and assess the need for additional higher regulations in terms of protecting both current and future development from potential flood damage.

Other Alternatives: None

Priority (H, M, L): Medium

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: Staff time

Benefits (Losses Avoided): Increased flood protection and reduction in the cost of flood insurance

Potential Funding: Existing Budget

Schedule: Next 2 years

Goals Addressed: 1, 2, and 4

11. Implement County-Wide Stormwater Management Ordinance

Hazards Addressed: Flood, Severe Storm (Heavy Rainfall)

Goals Addressed: 1, 2, and 4

Issues/Background: Continuity of stormwater standards is important for everyone in a watershed or in watersheds throughout a county. Common stormwater regulations mean that no one is ignoring a problem and passing it on to someone else downstream. Therefore is critical that Sutter County, Yuba City and Live Oak work together to create a unifies stormwater management ordinance that provides for retention and detention when necessary so there is no adverse impact on adjoining properties or communities downstream. Controlling stormwater (runoff from impervious surfaces) is essential as communities develop. A unified county-wide stormwater management ordinance will also help all CRS communities in the county achieve more credit for Activity 450 - Stormwater Management because they will all be regulating to the same standards.

Project Description: Sutter County, Yuba City and Live Oak will work together to implement a county-wide stormwater management ordinance so that uniform regulations are in place throughout the county and that protections are in place to prevent increased runoff from creating adverse impacts downstream even outside of Sutter County.

Other Alternatives: Leave current fragmented regulations in place

Priority (H, M, L): Medium

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: $40,000

Benefits (Losses Avoided): Increased flood protection and reduction in the cost of flood insurance

Potential Funding: Existing Budget and possible CBGD or state funding

Schedule: Within 5 years

12. Prepare Post-Disaster Guidance Materials

Hazards Addressed: Multi-Hazard

Goals Addressed: 1, 2, 3, 4, 5 and 6

Issue/Background: After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- Patrolling evacuated areas to prevent looting,
- Providing safe drinking water,

- Monitoring for diseases,
- Vaccinating residents for tetanus and other diseases,
- Clearing streets, and
- Cleaning up debris and garbage.

Throughout the recovery phase, everyone wants to get "back to normal." The problem is that "normal" means the way they were before the disaster, exposed to repeated damage from future disasters. There should be an effort to help prepare people and property for the next disaster. Such an effort would include:

- Public information activities to advise residents about mitigation measures they can incorporate into their reconstruction work,
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs,
- Identifying other mitigation measures that can lessen the impact of the next disaster,
- Acquiring substantially or repeatedly damaged properties from willing sellers,
- Planning for long-term mitigation activities, and
- Applying for post-disaster mitigation funds.

Making sure the general public understands the requirements for post-disaster cleanup and reconstruction is vital to ensuring that a community recovers quickly and safely from a disaster. Preparing public information materials to distribute to the public will help educate citizens on the correct procedures for both cleanup and post-disaster reconstruction and development.

Project Description: Sutter County, Yuba City and Live Oak will work together to prepare outreach educational materials which identify correct procedures for both cleanup and redevelopment after a disaster to better educate residents of the requirements for rebuilding, etc..

Other Alternatives: None

Priority (H, M, L): Medium

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: Staff time

Benefits (Losses Avoided): Educating the public on the requirements for post-disaster redevelopment will ensure safer conditions during and after a disaster through timely information on how and when structures can be rebuilt, etc.

Potential Funding: Existing Budget

Schedule: Within 5 years

13. Feather River Regional Flood Management Plan

Hazards Addressed:

- Description of the current flood management conditions
- Opportunities for improved flood management while achieving multiple objectives (flood protection, agricultural conservation and habitat restoration, for example)
- Needed projects based upon priority
- Preliminary financing plans

Goals Addressed: 1, 2, 3, 4, 6

Issue/Background: The regional planning process will partner local governments and stakeholders with DWR to identify and prioritize projects in the Feather River Region that will accomplish the goals established in the Central Valley Flood Protection Plan. The region's goals are to build on the successes of recent flood management efforts and to position the region to implement actions by maximizing remaining Prop 1E and 84 bond funds. The end result will be actions to reduce flood risk in urban, rural and small communities through a combination of improvements to the levee system, as well as updated emergency response and recovery plans.

Project Description: The Yuba County Water Agency (YCWA), Three Rivers Levee Improvement Authority (TRLIA), Marysville Levee Commission (MLC) and Sutter Butte Flood Control Agency (SBFCA) are partnering to develop the Feather River Flood Management Plan. Flood Management projects included in the plan will be eligible for future state and federal funding.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: Sutter Butte Flood Control Agency

Cost Estimate: $1,200,000

Benefits (Losses Avoided):

- Flood management challenges and deficiencies at the regional levee identified
- Potential solutions/projects identified and prioritized
- Financial strategies that identify benefits and sources of funding for project implementation identified

Potential Funding: The planning process is being funded in full by the Department of Water Resources with bond funding approved by California voters in 2006. The completed plan will be

considered by the State for a 2017 update to the Central Valley Flood Protection Plan, which was originally approved by the Central Valley Flood Protection Board in 2012.

Schedule: Completed in fall 2014

14. Feather River West Levee Rehabilitation Project

Hazards Addressed: Flood, Levee Failure

Goals Addressed: 1, 2, 6

Issue/Background: Under and through seepage problems have resulted in major levee failures in Yuba City in 1955 and 1997. As a result, the levee does not provide 100-year flood protection as required by the Federal Emergency Management Agency (FEMA), or the state's requirement for 200-year flood for areas with more than 10,000 residents.

Project Description: Rehabilitation of 44 miles of levees along the west bank of the Feather River, from Thermalito Afterbay south to the Sutter Bypass, will address underseepage and through-seepage which is caused by water pressure and velocity both under and through the levees.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: Sutter Butte Flood Control Agency

Cost Estimate: $312 million for Project 1 and Project 2

Benefits (Losses Avoided): Provide 200-year level of flood protection for urban areas in the Sutter Basin, and provide 100-year flood protection for non-urban areas in the southern portion of the Basin.

Potential Funding: SBFCA has received an initial design grant from DWR for $9 million and expects to receive multiple construction/implementation grants to fund approximately 76 percent of the total cost. The local funding is generated from an assessment district passed by Sutter and Butte County property owners in 2010.

Schedule: Construction on the first portion of the work – near Shanghai Bend, south of Yuba City – began on July 22, 2013. Work is scheduled to continue through the 2015 construction season.

15. River Level Gauge System

Hazards Addressed: Flood

Goals Addressed: 1, 2, 6

Issue/Background: Sutter County maintains (5) five river gauges to monitor river levels and aid in the evacuation of affected areas on all stream reaches in the County, Live Oak, and Yuba City. These systems have been in use since 1998 and were upgraded in 2010 with Homeland Security grant funds.

Project Description: Sutter County has relied on this system for real time localized alert and warning regarding high water events on river levees. As with any system it requires funds and equipment to maintain and sustain this system.

Other Alternatives: To use the Department of Water Resources river gauges. These gauges are not in prime locations to provide accurate and timely alert and warning.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project is a continuation of efforts currently in place.

Priority (H, M, L): High

Responsible Office: Sutter County Office of Emergency Management, City of Live Oak, Yuba City

Cost Estimate: Varies. Last upgrade in 2010 cost $21,000. Occasional vandalism has cost between $1,500 and $2,500. Currently, there is a need for replacement of equipment at location at the cost of $2,000.

Benefits (Losses Avoided): With this system in place and maintained it provides effective warning and notification to Sutter County OEM for emergency response.

Potential Funding: Funding would be from grants or the general fund.

Schedule: Project is in place. Maintenance and sustainment are ongoing

16. Sutter Basin Feasibility Study

Hazards Addressed: Flood, Levee Failure

Goals Addressed: 1, 2, 6

Issue/Background: The Sutter Basin Feasibility Study was initiated in 2000 and a Feasibility Scoping Meeting was held in January 2005. However the study remained essentially inactive

until the formation of the Sutter Butte Flood Control Agency (SBFCA), which agreed to serve as the local partner along with the Central Valley Flood Protection Board (CVFPB) in 2007.

Project Description: The purpose of the Study is to document the planning process leading up to the recommendation of the tentatively selected plan (TSP) and in doing so reaffirm Federal interest, identify the national economic development (NED) plan, identify the locally preferred plan (LPP), and evaluate residual risk. Plans were evaluated at a suitable level of detail for the identification of the NED and LPP plans. Refined analysis, including total project costs, will be presented in the Final Report which is issued as a Chief of Engineers Report.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: Sutter Butte Flood Control Agency along with U.S. Army Corps of Engineers

Cost Estimate: $18 million

Benefits (Losses Avoided): Provide 200-year level of flood protection for urban areas in the Sutter Basin, and provide 100-year flood protection for non-urban areas in the southern portion of the Basin. Achieve Federal financial interest in levee improvements to protect the Butte/Sutter basin.

Potential Funding: The Study is cost shared 50-50 by Federal (USACE) and Non-Federal (State of California and SBFCA) partners.

Schedule: The Study is projected to be completed by the end of 2013.

Annex B CITY OF YUBA CITY

B.1 Introduction

This Annex details the hazard mitigation planning elements specific to the City of Yuba City, a participating jurisdiction to the Sutter County 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 Yuba City, with a focus on providing additional details on the risk assessment and mitigation strategy for this community.

B.2 Planning Process

As described above, the City of Yuba City followed the planning process detailed in Section 3.0 of the base plan. In addition to providing representation on the Sutter County Hazard Mitigation Planning Committee (HMPC), the City formulated their own internal planning team to support the broader planning process requirements. Internal planning participants included staff from the following City departments:

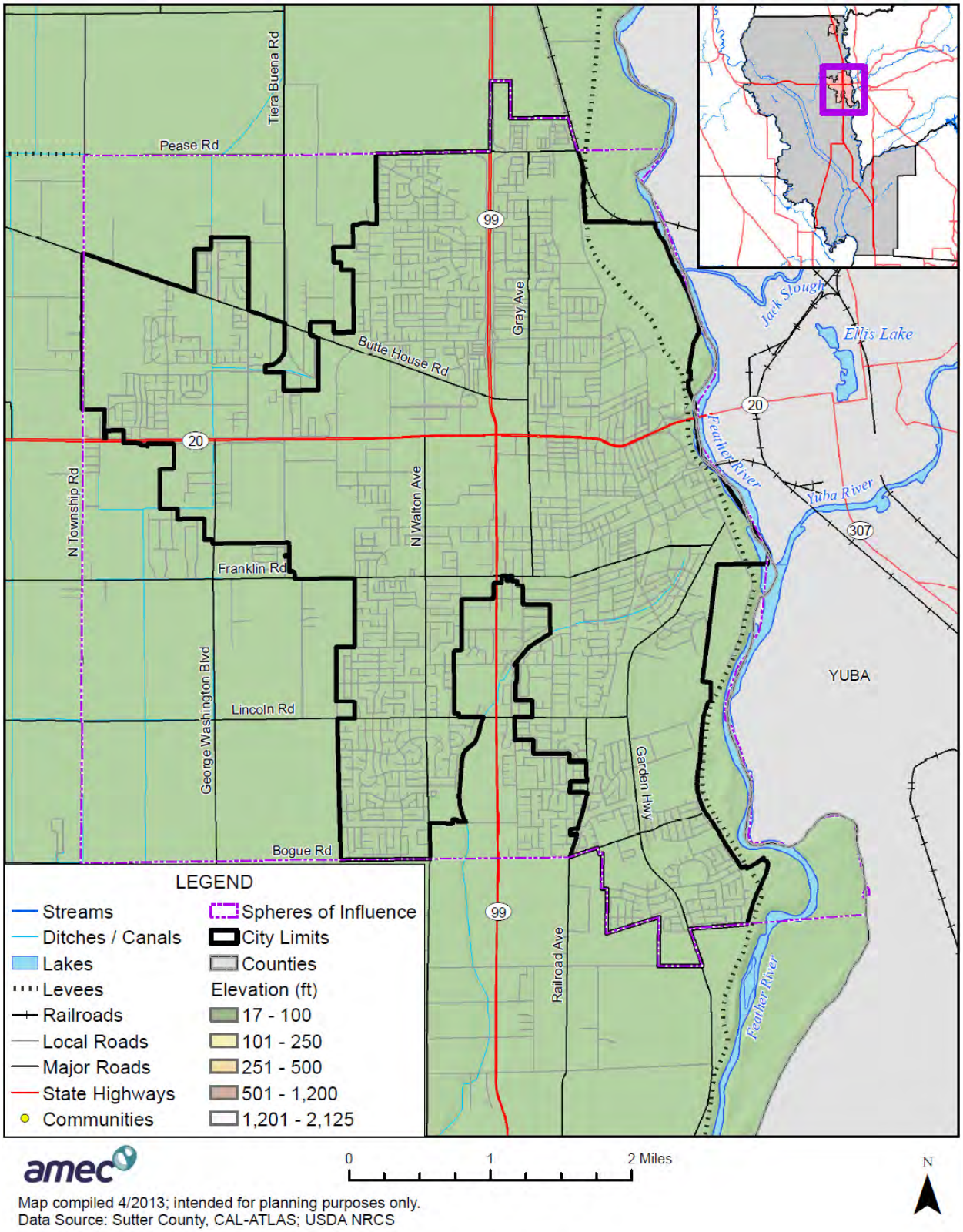
- Diana Langley, Deputy Public Works Director
- Bill Fuller, Administrative Analyst III - Fire Department
- Aaron Busch, Community Development Director

Additional details on plan participation and City representatives are included in Appendix A.

B.3 Community Profile

The community profile for the City of Yuba City is detailed in the following sections. Figure B.1 displays a map and the location of the City of Yuba City within Sutter County.

Figure B.1. City of Yuba City Base Map



B.3.1 Geography and Location

Yuba City lies in the northern portion of California's Central Valley, situated in eastern Sutter County on the western bank of the Feather River. Primarily undeveloped agricultural land exists to the north, west, and south of the city. The Sutter Buttes are located to the northwest of the city. The primary transportation corridors are Routes 99 and Route 20. Route 99 leads due south to Sacramento and north to Oroville and Chico; Route 20 links Yuba City to Colusa and I-5 to the west and Grass Valley and the Sierra Nevada range to the east. State Routes 70 and 65 lead south from Marysville, connecting the region to Sacramento and to Sacramento's northern suburbs – Roseville and Rocklin.

B.3.2 History

Before its founding, the land on which Yuba City is now located was a part of Rancho Nuevo Helvetia (the New Switzerland Ranch), a land grant owned by Swiss emigrant and Mexican citizen John Sutter. Samuel Brannan, Pierson Reading, and Henry Cheever purchased land from Sutter in 1849 to found a town primarily as a distribution center for Gold Rush supplies. Brannan, the Senior Partner, had the town laid out and lots sold. He is honored today as one of the town's founders and has a park named for him.

Yuba City was established as county seat in 1856. The early town was centered at Second Street and the Garden Highway, near the waterfront. The commercial district ran along Bridge Street, south of the present-day Downtown commercial corridor on Plumas Street. Apart from mining-oriented services, the City's industry also focused on agricultural production, with wheat, grains, and cattle being the dominant goods.

Incorporated on January 23, 1908, the City soon found ethnic diversity taking root. Mexican immigration to the Yuba-Sutter region began in the early Twentieth Century, followed by the arrival of traditionally agrarian Sikh Indian immigrants who have come in a small but steady flow since 1924. More than a quarter of City residents and 30 percent of people in the County now claim either Mexican or Indian heritage.

After World War II, Yuba City's population began to grow more quickly, owing to returning veterans, improved access from highway construction, and the constraints placed on development in its sister city across the river, Marysville, which is surrounded by flood-control levees. Growth has continued to be strong, with the population nearly doubling every twenty years since 1940. Pressure toward further expansion is most acute in agricultural areas to the west and south of the City, especially along highway corridors.

B.3.3 Economy

US Census estimates show economic characteristics for the County. These are shown in Table B.1.

Table B.1. Yuba City Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	1,731	6.7%
Construction	2,182	8.4%
Manufacturing	1,709	6.6%
Wholesale trade	734	2.8%
Retail trade	4,039	15.5%
Transportation and warehousing, and utilities	1,636	6.3%
Information	310	1.2%
Finance and insurance, and real estate and rental and leasing	1,273	4.9%
Professional, scientific, and management, and administrative and waste management services	1,864	7.2%
Educational services, and health care and social assistance	5,341	20.6%
Arts, entertainment, and recreation, and accommodation and food services	2,054	7.9%
Other services, except public administration	1,157	4.5%
Public administration	1,956	7.5%

Source: US Census Bureau American Community Survey 2009-2011 Estimates

The County has a wide and varied tax base. Table B.2 shows the breakdown of Yuba City's property tax base

Table B.2. Yuba City Tax Use Category Summary 2012/2013

Category	Parcels	Net Taxable Value
Residential	17,083	$2,732,080,730 (65.0%)
Commercial	799	$781,647,987 (18.6%)
Industrial	289	$199,254,005 (4.7%)
Dry Farm	34	$7,095,824 (0.2%)
Govt. Owned	4	$0 (0.0%)
Institutional	56	$2,535,814 (0.1%)
Irrigated	17	$7,245,234 (0.2%)
Miscellaneous	14	$1,340,123 (0.0%)
Recreational	1	$35,000 (0.0%)
Vacant	757	$90,855,711 (2.2%)
Exempt	265	$0 (0.0%)
SBE Nonunitary	[26]	$4,807,072 (0.1%)
Cross Reference	[6]	$83,438 (0.0%)
Unsecured	[2,429]	$366,518,780 (8.7%)
Unknown	19	$8,670,722 (0.2%)
Totals	**19,338**	**$4,202,170,440**

Source: Sutter County Combined Tax Rolls

Top ten employers in the City are shown in Table B.3.

Table B.3. Ten Largest Employers in Yuba City

Employer	Number of Employees
Fremont Rideout Medical	1,827
Yuba City Unified	1,326
County of Sutter	950
Sunsweet Growers	710
Wal-Mart	535
Sutter North Medical	450
City of Yuba City	292
Sam's Club	197
Bel Air/Raley's	182
Target	150

Source: Yuba City Comprehensive Annual Financial Report, 2012

B.3.4 Population

The California Department of Finance estimated the population of the City of Yuba City to be 65,841 in January of 2013. .

B.4 Hazard Identification and Summary

This section details how the risk varies across the Sutter County planning area. The City's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Yuba City (see Table B.4). In the context of the plan's planning area, there are no hazards that are unique to Yuba City.

Information on past occurrences and the likelihood of future occurrences is detailed in Section 4, Risk Assessment, of the base plan. Additional information for high and medium significant hazards for the City is included in the Vulnerability Assessment section of this Annex.

Table B.4. City of Yuba City Hazard ID Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure	Extensive	Unlikely	Catastrophic	High
Drought & Water shortage	Extensive	Likely	Catastrophic	Medium
Earthquakes	Extensive	Occasional	Critical	Low
Earth Movements: Erosion	Limited	Likely	Negligible	Low
Earth Movements: Landslide	Limited	Likely	Negligible	Low
Floods: 100/500 year	Extensive	Occasional	Catastrophic	High
Floods: Localized Stormwater	Limited	Likely	Negligible	Medium
Invasive Species: Pests/Plants	Significant	Highly Likely	Negligible	Low
Levee Failure	Extensive	Occasional	Catastrophic	High
Marine Invasive Species	–	–	–	–
Severe Weather: Extreme Cold/ Freeze	Extensive	Likely	Negligible	Low
Severe Weather: Extreme Heat	Extensive	Likely	Negligible	Low
Severe Weather: Fog	Significant	Likely	Limited	Low
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Extensive	Likely	Negligible	Low
Severe Weather: Tornado	Limited	Likely	Limited	Low
Volcanoes	–	–	–	–
Wildfires	Limited	Likely	Negligible	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

B.5 Vulnerability Assessment

The intent of this section is to assess Yuba City's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment of the base plan. This vulnerability assessment provides an inventory of the population, property, and other assets located within the City and further analyzes those assets at risk to identified hazards ranked of medium or high significance (as listed in Table B.4) to the community. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the main plan.

B.5.1 Total Assets at Risk

This section identifies Yuba City's total assets at risk, including values at risk, critical facilities and infrastructure, natural resources, and historic and cultural resources. Growth and development trends are also presented for the community. This data is not hazard specific, but is representative of total assets at risk within a community.

Values at Risk

The following data from the Sutter County Assessor's Office is based on the 2012 Assessor's data. This data should only be used as a guideline to overall values in the County, as the information has some limitations. The most significant limitation is created by Proposition 13. Instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is most likely low and does not reflect current market value of properties within the County. 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. Table B.5 shows the 2012 Assessor's values (e.g., the values at risk) broken down by property type for the City of Yuba City.

Table B.5. City of Yuba City Total Exposure

Property Type	Total Parcel Count	Improved Parcel Count	Improved Value	Total Land Value	Total Value
Agriculture	28	14	$219,562	$6,888,897	$7,108,459
Commercial	986	859	$642,333,275	$275,523,548	$917,856,823
Industrial	397	311	$113,916,836	$55,470,790	$169,387,626
Institutional	245	106	$113,199,199	$28,370,526	$141,569,725
Residential	1,606	1,606	$302,057,976	$66,871,842	$368,929,818
Unclassified	14	0	$0	$0	$0
Vacant Land	15,523	15,010	$1,908,864,373	$511,772,085	$2,420,636,458
Total	**18,799**	**17,906**	**$3,080,591,221**	**$944,897,688**	**$4,025,488,909**

Source: Sutter County 2012 Assessor's Data

Critical Facilities and Infrastructure

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

> Any facility, including without limitation, a structure, infrastructure[1], 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.

This definition was refined by separating out three categories of critical facilities as further described in Section 4.3.1 of the base plan. These categories include At-Risk Populations, Essential Services, and Hazardous Materials Facilities.

An inventory of critical facilities in the City of Yuba City from Sutter County GIS is provided in Table B.6. Details of critical facility definition, type, name and address and jurisdiction by hazard zone are listed in Appendix E.

Table B.6. City of Yuba City Critical Facilities: Summary Table

Category	Type	Facility Count
At Risk Population Facilities	Adult Day Care	5
	Assisted Living Facility	6
	Congregate Care Facility	18
	Hospice	2
	School	12
	Senior Center	1
Essential Services Facilities	Bridge (Infrastructure)	3
	Communications	3
	Corporation Yard	1
	Emergency Evacuation Shelter	4
	Fire Station	4
	Government Facility	32
	Medical Health Facility	27
	Police	2
	Storm Water Facility	5
	Waste Water Facility	14
	Waste Water Treatment	1
	Water Treatment	7*

[1] Essential Service Facilities include bridges, roads, power grids, and infrastructure held by private companies (i.e. utility lines and private levees) that are not mapped for security reasons and are not under the control of the County.

Category	Type	Facility Count
Hazardous Materials Facilities	Hazardous Materials Facilities	17
Multiple Categories	School / Emergency Shelter	10
	Total City of Yuba City	**174**

Source: Sutter County GIS

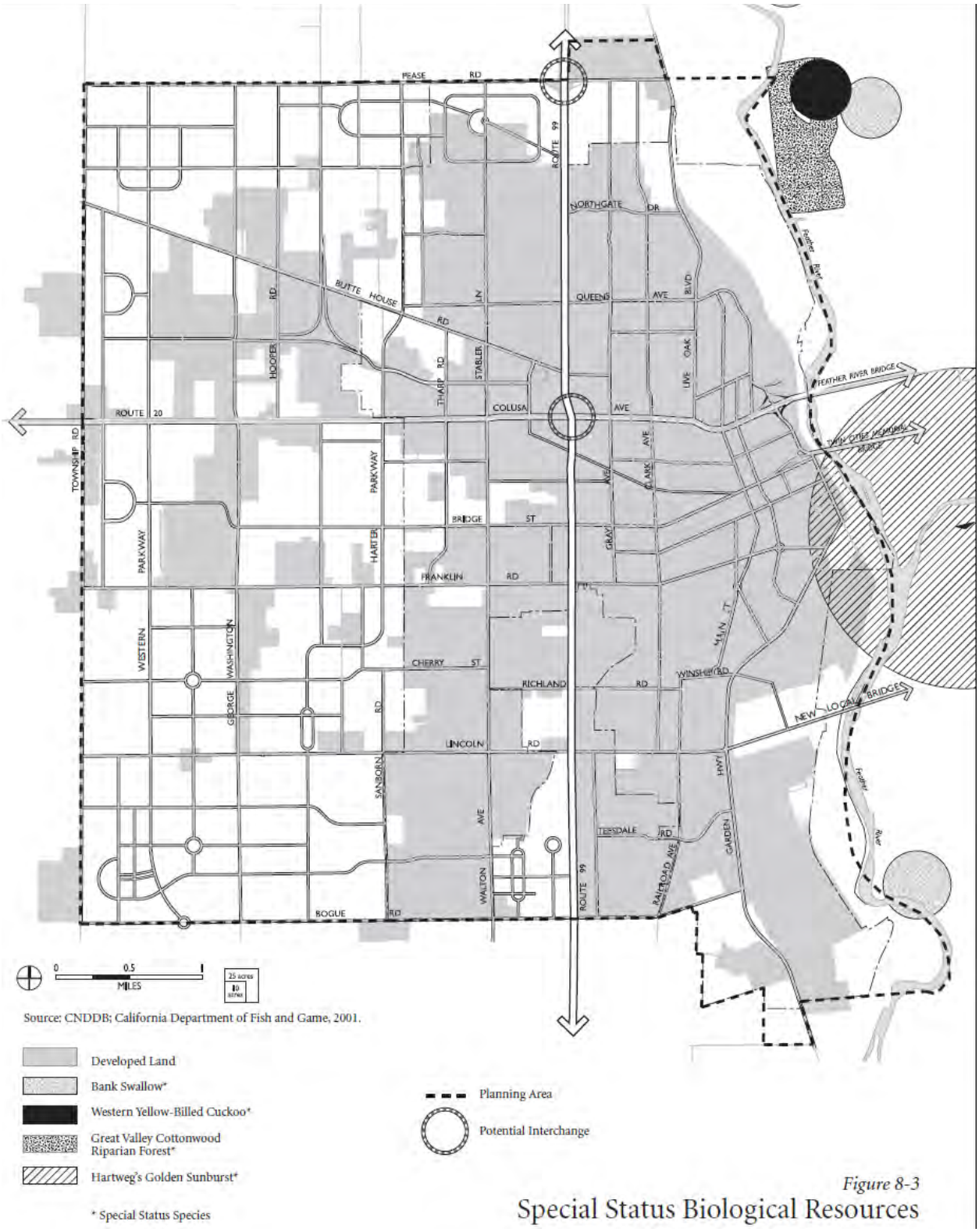
*GIS analysis showed only one water treatment facility. Yuba City noted that there are six storage tanks attached to these facilities that can be considered critical facilities. Although not mapped, they will be included in the vulnerability discussions below.

Natural Resources

The City of Yuba City and the areas surrounding it include a rich and diverse range of biological resources. Yuba City's setting – within an agricultural county and on the banks of the Feather River—includes natural resources that are important, not only for aesthetic value, but also for environmental quality, habitat protection, recreation, water resources, and agriculture.

A very small portion of the land area in the Planning Area is considered natural, and therefore provides little suitable habitat for special status species. The only designated special-status vegetation species in the SOI is the Hartweg's Golden Sunburst, a flowering plant that occurs primarily in nonnative grasslands and is threatened mostly by the conversion of habitat to urban uses. The habitat area for this species occurs at the extreme eastern boundary of the Planning Area at the confluence of the Feather and Yuba Rivers (see Figure B.2).

Figure B.2. Yuba City Biological Resources



Source: 2004 Yuba City General Plan

One other special-status habitat exists in the immediate vicinity of the Yuba City Planning Area: Great Valley Cottonwood Riparian Forest. Located just across the Feather River from the northeast corner of the urban growth boundary, this habitat includes such tree species as the Goodding's black willow, box elder, sycamore, walnut, and Fremont's cottonwood. This habitat supports a lush understory of tree saplings, shrubs, and vines, and provides a sheltered area for wildlife with an abundant food and water supply. Although no special status wildlife species exist within the Planning Area, the nearby Cottonwood Riparian Forest provides habitat for the special status Bank swallow and the Western yellow-billed cuckoo. About 90 percent of the Western yellow-billed cuckoo's riparian habitat throughout the west has been modified. Several other special-status wildlife species are known to occur or have the potential to occur in such habitats, including the Cooper's hawk, tricolored blackbird, great blue heron, great egret, bald eagle, double-crested cormorant, among others.

Feather River Riparian Habitat

Although the CNDDB does not list any riparian-related special status vegetation species in the Yuba City Planning Area, the Feather River provides important fish and riparian habitat areas. As such, the City recently began the preparation of a strategic master plan for the 750 acre Feather River corridor, the purpose of which is to create a vision for the River, one that would make the most of the River as a recreational resource, while providing habitat for a variety of wildlife.

The City is working with the California Department of Fish and Game and Sutter County to determine ways to protect the Feather River bottom while possibly incorporating passive recreational uses. Not only would such area provide much needed parkland for City residents but also it would help to preserve and enhance the most important natural feature in the City. The City just completed construction of Phase I of the Feather River Parkway Project which did some restoration of habitat.

Historic and Cultural Resources

The City of Yuba City has a 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. These requirements are detailed in Section 4.3.1 of the base plan. Historical resources included in the programs above are identified in shown in Table B.7.

Table B.7. Yuba City- Historical Resources

Name (Landmark Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City
Bill Butler House (P395)				X	3/20/1975	Yuba City
Campbell's House (P390)				X	3/20/1975	Yuba City
E. G. Van Arsdale House (P393)				X	3/20/1975	Yuba City
Eugene Boyd House (P396)				X	3/20/1975	Yuba City
G.W. Carpenter House (P391)				X	3/20/1975	Yuba City
H. C. Mclaughlin Law Office (P311)				X	7/13/1973	Yuba City
Hock Farm (Site Of) (346)		X			8/8/1939	Yuba City
Mcgruder House (P389)				X	3/20/1975	Yuba City
S.G. Stabler And Swinson House (P394)				X	3/20/1975	Yuba City
Sanborn Law Office/Winship Hall (P312)				X	7/13/1973	Yuba City
Site Of Propagation Of The Thompson Seedless Grape (929)	X				10/15/1979	Yuba City
Sutter County Canning & Packing Company (P313)				X	7/13/1973	Yuba City
Sutter County Courthouse (P387)				X	3/20/1975	Yuba City
Sutter County Hall Of Records (P388)				X	3/20/1975	Yuba City
Sutter County Masonic Temple (P826)				X	3/3/1997	Yuba City
Thomas D. Boyd House (P392)				X	3/20/1975	Yuba City
William Harkey House (P385)				X	3/20/1975	Yuba City
William O'Banion House (P386)				X	3/20/1975	Yuba City

Source: California Office of Historical Preservation

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. The Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) document America's architectural and engineering heritage. There are no HABS and HAER structures in the City of Yuba City.

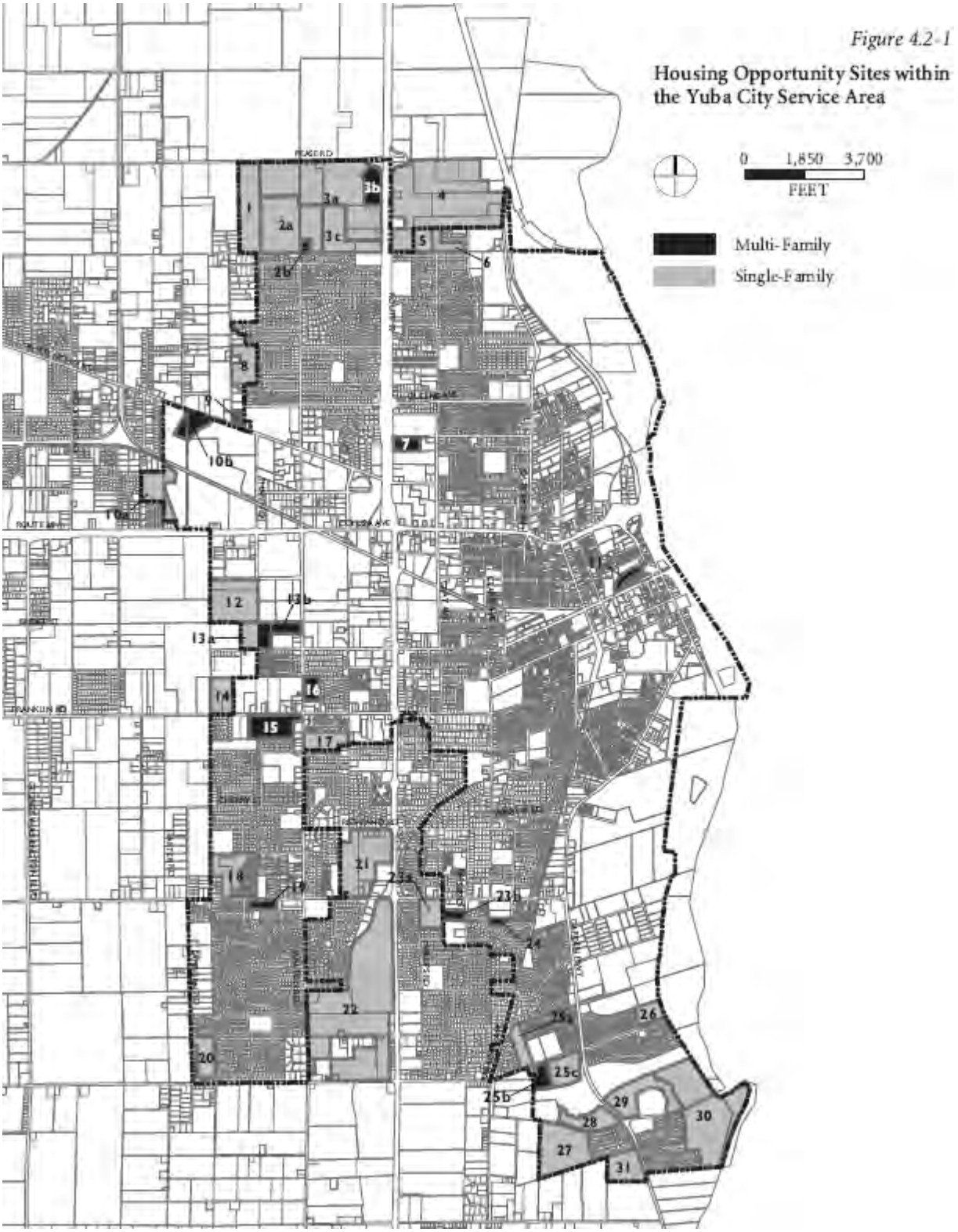
Growth and Development Trends

Past Growth

According to the 2003 Housing Element of the City of Yuba City General Plan, growth in the city is increasing rapidly. Between 2000 and 2006, the population of the city increased from 36,760 to 60,507. New development areas identified in the Yuba City General Plan include the

Harter area on the north side of Highway 20, west of Tharp Road and the Lincoln East area on the north side of Lincoln Road, east of Sanborn Road. Figure B.3 shows these areas.

Figure B.3. Yuba City Growth Sites



Source; 2004 Yuba City General Plan

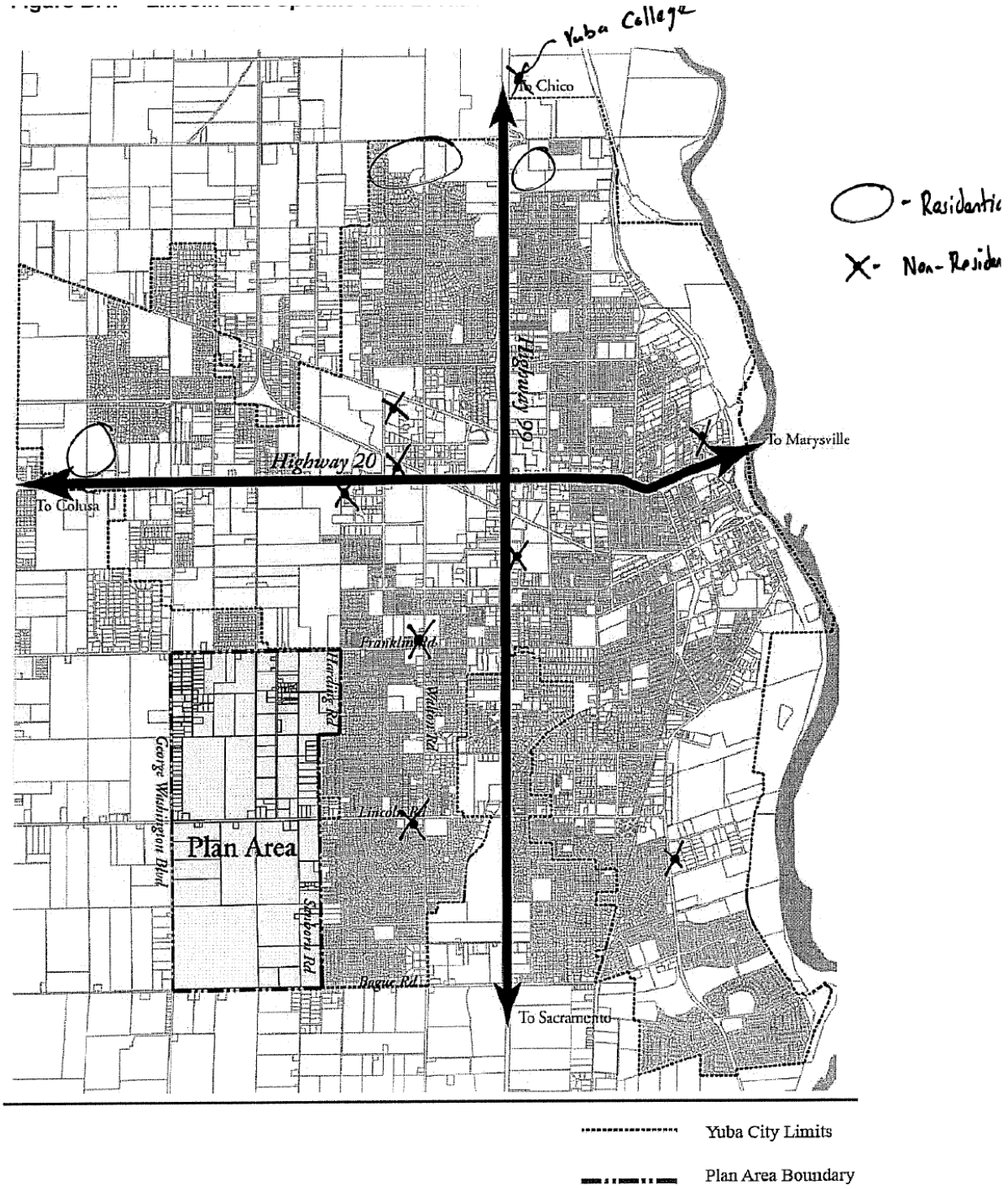
Development since 2007 Plan

The new development areas generally include:

- Residential Lots:
  - Generally north of SR 20. Most are in Zone C. There is a small section of homes located east of SR 99 and south of Pease Road that are located in Zone X. The FIRM defines the Zone X as areas of 500-yr flood, areas of 100-yr flood with average depths of less than 1 foot, and areas protected by levees from 100-yr flood.
- Non-Residential Development:
  - These are located throughout town. Many of the developments are adjacent to SR 99 and SR 20 and are in Zone C or Zone X (areas determined to be outside of 500-yr floodplain). A new Yuba College Campus was constructed on the east side of SR 99, north of Pease Road that is in the Zone X with the description listed above for the residential lots.

Figure B.4 is a map showing general locations.

Figure B.4. Development Areas since 2007 Plan



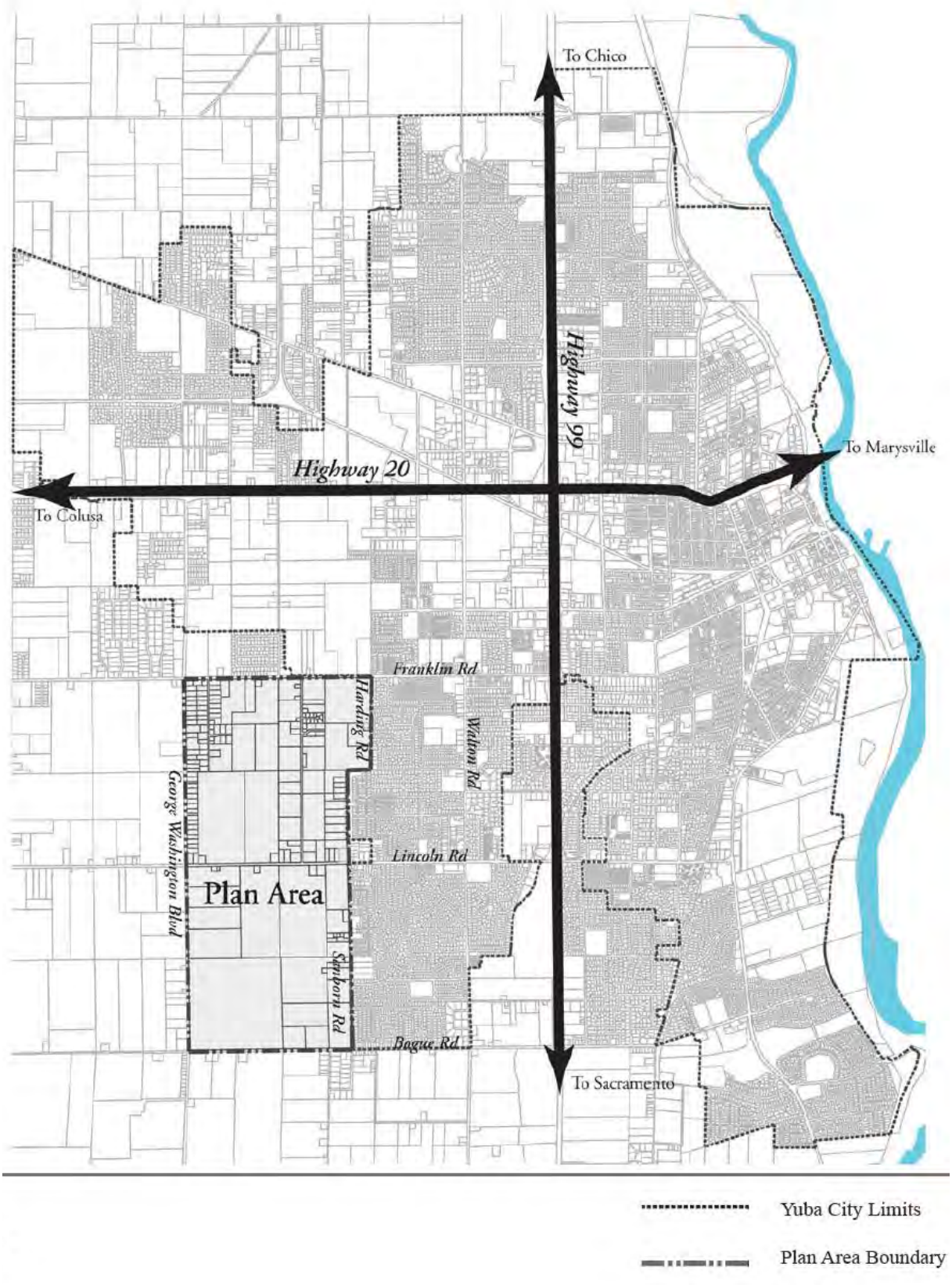
Source: Yuba City

Future Development

There is an area next to the City that is intended for development under a Specific Plan. A "Specific Plan" is defined in the California Government Code (Section 65450 et seq) as a legal tool for detailed design and implementation of a defined portion of the area covered by a General Plan. The area next to Yuba City is the Lincoln East Specific Plan Area

Most of the County is of a rural, agricultural nature, so large-scale development projects are rarely outside of the Yuba City and Live Oak City limits. However, such projects are anticipated to occur within the cities' spheres of influence in the future. Until these areas are annexed into the cities, they remain under the jurisdiction of the County. The Lincoln East Specific Plan was completed in 2010, and will include the annexation and development of approximately 1,160 acres of unincorporated county land located adjacent to the City's southwest boundary. The Specific Plan area is bound by Franklin Road to the north; George Washington Boulevard to the west; Bogue Road to the south; and Sanborne Road, Cherry Street, and Harding Road to the east (see Figure B.5). The plan includes primarily single family residential uses and some medium to high density residential use, along with parks, schools, public facilities, and neighborhood-serving commercial uses.

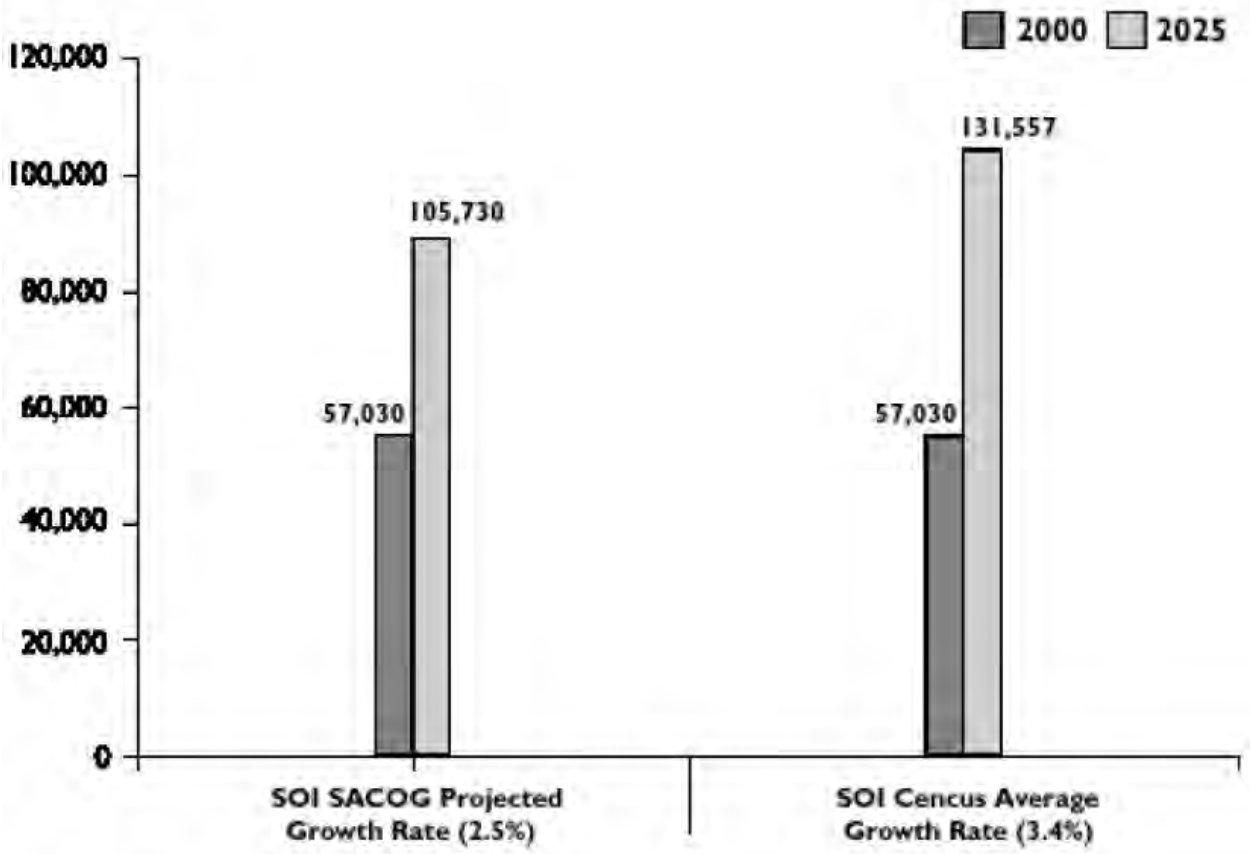
Figure B.5. Lincoln East Specific Plan Location



The Sacramento Area Council of Governments (SACOG) projects that Yuba City's population could reach 68,150 in the year 2025, an increase of 85 percent increase over the 2001 estimated population of 36,760.3 This represents an average annual growth rate of 2.5 percent. Assuming the population of the unincorporated areas of the Planning Area will grow at a rate similar to that of the incorporated city, the Planning Area population will be 105,730 in 2025.

Using the 3.4 percent average annual growth rate reflected in the Census data between 1980 and 2000, the population of Yuba City Planning Area could reach 131,557 in the year 2025, an increase of 130 percent over the current estimated population. Figure B.6 shows relative growth within the City and the Sphere of Influence (SOI) – the urban growth area within the Planning Area, assuming some annexation mirroring historic trends and also some development within the unincorporated area.

Figure B.6. Growth Rates in Yuba City



2004 Yuba City General Plan

Future Development GIS Analysis

Future development areas and General Plan diagrams were provided by Sutter County and the cities of Live Oak and Yuba City. Each community had unique future development areas as well as general plan land classifications. Analysis was performed by intersecting parcel centroids first

with the future development areas and then with the general plan diagram land classifications to provide a parcel level analysis of future development areas for each of the three communities. Where one future development area overlaps into another, such as the Lincoln East area with the sphere of influence (SOI) area, the parcels are allocated to the Lincoln East Area and are subtracted out from the SOI total area to avoid double counting issues. See Table B.8 for an inventory of total parcels by general plan land use classifications detailing Yuba City's future development areas.

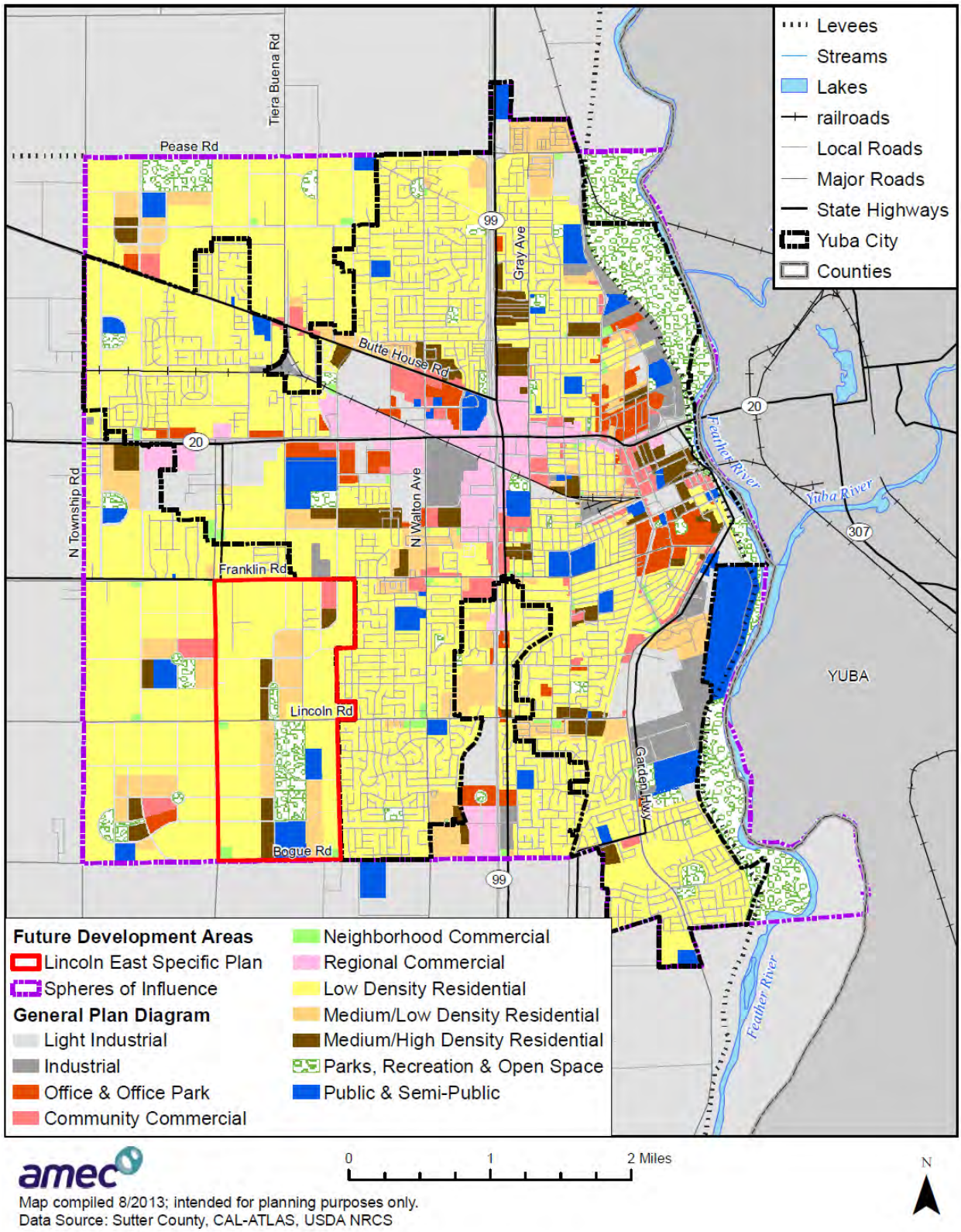
Table B.8. Yuba City Future Development Total Exposure

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Lincoln East Specific Plan	Low Density Residential	189	183	$32,075,183	$13,957,187	$46,032,370
	Medium/Low Density Residential	10	9	$4,019,669	$1,231,947	$5,251,616
	Neighborhood Commercial	1	1	$151,993	$52,412	$204,405
	Parks, Recreation & Open Space	4	4	$256,934	$582,585	$839,519
	Public & Semi-Public	2	2	$53,002	$254,908	$307,910
	Total	**206**	**199**	**$36,556,781**	**$16,079,039**	**$52,635,820**
Sphere Of Influence	Agricultural/Rural	1	0	$0	$7,358	$7,358
	Business, Technology & Light Industry	303	242	$76,064,042	$47,136,898	$123,200,940
	Community Commercial	453	402	$129,507,741	$73,906,289	$203,414,030
	Low Density Residential	17,307	16,851	$2,167,160,147	$597,513,435	$2,764,673,582
	Manufacturing, Processing & Warehousing	162	112	$75,094,098	$22,846,384	$97,940,482
	Medium/High Density Residential	837	795	$209,380,982	$44,596,582	$253,977,564
	Medium/Low Density Residential	1,104	1,012	$165,181,644	$46,090,434	$211,272,078
	Neighborhood Commercial	116	92	$21,209,479	$12,550,974	$33,760,453
	Office & Office Park	354	283	$229,538,926	$51,957,022	$281,495,948

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
	Parks, Recreation & Open Space	48	11	$1,939,868	$8,202,335	$10,142,203
	Public & Semi-Public	84	33	$58,679,106	$12,553,303	$71,232,409
	Regional Commercial	257	209	$226,802,376	$131,995,383	$358,797,759
	Total	**21,026**	**20,042**	**$3,360,558,409**	**$1,049,356,397**	**$4,409,914,806**
Yuba City Grand Total		**21,232**	**20,241**	**$3,397,115,190**	**$1,065,435,436**	**$4,462,550,626**

Source: Sutter County GIS

Figure B.7. Yuba City Future Development



Redevelopment

There has not been a significant amount of re-development within the City due to the recent economic downturn. All new development must follow the guidance of the Comprehensive Plan and must comply with all floodplain management regulations

B.5.2 Priority Hazards: Vulnerability Assessment

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table B.4 as high or medium significance hazards. Impacts of past events and vulnerability of the City to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the base plan for more detailed information about these hazards and their impacts on the Sutter County planning area). Methodologies for calculating loss estimates are the same as those described in Section 4.3 of the base plan. In general, the most vulnerable structures are those located within the floodplain or within levee and dam inundation areas, unreinforced masonry buildings, and buildings built prior to the introduction of modern building codes.

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.

Dam Failure

Vulnerability to Dam Failure

Likelihood of Future Occurrence—Unlikely
Vulnerability—High

The most significant risk from flooding in the Yuba City Planning Area results from the potential for dam or levee failure. Dam failure occurs when a dam is not structurally sound or is unable to withstand damages resulting from seismic activity. The degree and speed of dam failure depends on the dam's structural characteristics. There are 10 dams located outside Sutter County that could cause significant flooding should failure occur. Table B.9 lists six dams that are located on the Feather River and Yuba Rivers. Failure of any one of these dams could cause significant flooding in Yuba City. These dams are under the jurisdiction of the California Department of Water Resources (DWR), Yuba County Water Agency, Pacific Gas & Electric, and the Corps of Engineers.

Table B.9. Dams Upstream of Yuba City

Dam	Owner	Stream	Type	Main Channel Wave	Total Inundation Time
Oroville Dam	State Department of Water Resources	Feather River	Earth	8.6 hours	11.3 hours
New Bullards Bar	Yuba County Water Agency	Yuba River	Radius arch	1.25 hours	2.6 hours
Lake Almanor	Pacific Gas & Electric	Feather River (North Fork)	Earth and rock	8.6 hours	11.3 hours
Thermalito Afterbay Dam	State Department of Water Resources	Feather River	Earth	8.6 hours	11.3 hours
Thermalito Forebay Dam	State Department of Water Resources	Feather River	Earth	8.6 hours	11.3 hours
Englebright Dam	Corps of Engineers	Yuba River	Radius arch	1 hour	N/A

Source; 2004 Yuba City General Plan Update

Due to the topography surrounding the City, dam failure would result in water of significant depth in Yuba City (should the levees breach). This is due to the "bowl effect" of the southern portions of the County, which can be seen on Figure 4.88 in Section 4.3.9 of the base plan. The City should also have ample warning time to prepare evacuations.

Future Development

The City continues to grow and expand within the dam inundation zones. The Lincoln East Specific Plan noted that the most significant risk from flooding is due to a failure from a nearby levee or dam. Due to the fact that dam failure is unlikely, development will continue to occur in the dam inundation zones.

Drought and Water Shortage

Vulnerability to Drought and Water Shortage

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

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 is the most critical issue and is critical for manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Based on historical information, the occurrence of drought in California, including the City of Yuba 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 is often 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 Yuba City to drought is City-wide, but impacts may vary and include reduction in water supply and an increase in dry fuels.

The most significant qualitative impacts associated with drought in the planning area are those related to water intensive activities such as wildfire protection, municipal usage, commerce, tourism, and recreation. Voluntary conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

The City's 2010 Urban Water Management Plan addresses drought conditions and the Municipal Code has a section on emergency water restrictions. These items help the City address drought conditions and mitigate its effects.

Future Development

As the population in the area continues to grow, so will the demand for water. Water shortages in the future may be worsened by drought, as the City relies on surface water for its water source. Increased planning will be needed to account for population growth and increased water demands.

Earthquakes

Vulnerability to Earthquakes

Likelihood of Future Occurrence—Unlikely
Vulnerability—Medium

The California Mining and Geology Board defines active faults as those for which there is evidence of surface displacement within the last 11,000 years.9 Faults may also be considered active based on surface displacements within the last 200 years. However, a fault with no evidence of surface displacement does not mean that the fault is inactive. Potentially active faults are those for which there is evidence of surface displacement within the last 1.6 million years, and not within the last 11,000 years. Such faults are considered potentially active since this period of time is short in geologic terms. Finally, there may be seismic risk associated with faults that have not yet been identified. Small and moderately large earthquakes may result from such faults and are considered background seismicity or floating earthquakes, activity in which the expected sources and locations are unknown.

No active earthquake faults are known to exist in Sutter County, although active faults in the region could produce ground motion in Yuba City. Earthquakes of M5.0 or greater have occurred on fault systems in the region, including the San Andreas. Approximately 15 miles west of Sutter County, the Central Valley Blind-Thrust Fault is known to have caused an estimated M6.5 earthquake in 1892. In addition, two earthquakes of M4.0 and M4.9 occurred between 1900 and 1974 with epicenters near Williams. The Foothills Suture Zone along the western slope of the Sierra Nevada is also considered active, with a M5.7 earthquake occurring in 1975 in the northern portion of the Zone in Butte County. Potentially active faults do exist in Sutter County in the area of the Sutter Buttes. These faults are small and have exhibited activity in the last 1.6 million years, but not in recent history (200 years).

Potential hazards related to major earthquakes include ground shaking, surface rupture along the fault zone, and related secondary ground failures. Typical seismically-induced ground failures include liquefaction, lateral spreading, ground lurching, seiches, and landslides. Liquefaction is the temporary loss of cohesion in saturated, granular soils . Lateral spreading is the horizontal movement of loose, unconsolidated sedimentary deposits and imported fill material. Lurching is the horizontal movement of soil, sediments or fill found on steep slopes and embankments. A seiche is the periodic oscillation of a body of water resulting from seismic shaking. All of these secondary ground failures could cause major structural damage to existing buildings, including tilting or settlement of foundations, twisting and breaking of structural building components, debris shedding, and potentially even collapse of buildings. In the case of seiches, damage to levees and dams could be significant. However, since the potential for ground shaking in Sutter County is low to moderate, it is unlikely that subsequent ground failure would occur in Yuba City. Furthermore, landslides are unlikely due to the relatively flat topography within the City.

Future Development

Existing structures in the City could be affected by the types of earthquake-induced effects listed above, but to varying degrees based on length, intensity, and distance of the earthquake from a given building. New structures are required to adhere to current California Uniform Building Code (CUBC) standards, providing adequate design, construction and maintenance of structures to prevent exposure of people and structures to major geologic hazards. In particular, any critical facilities such as hospitals, fire and police stations, and emergency communications and operations centers must be adequately designed, constructed and maintained with the goal of remaining functional after a large seismic event. The use of flexible utility connections, building anchors, and adequately reinforced concrete can reduce the loss of life and damage to buildings for human occupancy.

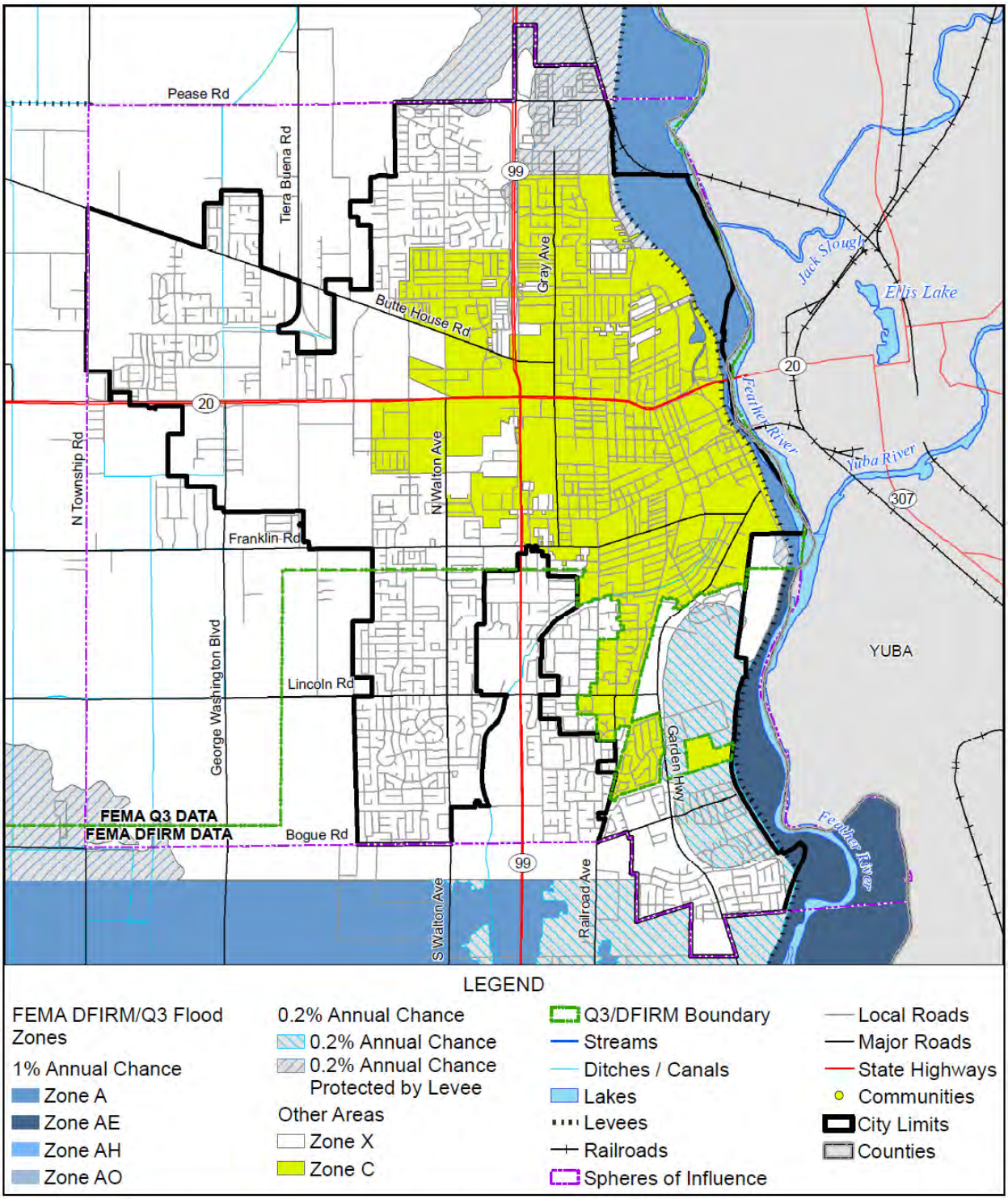
Floods: 100/500 year

Vulnerability to Floods: 100/500 year

Likelihood of Future Occurrence—Occasional/Unlikely
Vulnerability—High

A small portion of the City of Yuba City is located inside of the 100 year flood zone as defined by the Federal Emergency Management Agency (FEMA) Q3 maps. This is seen in Figure B.8. There have been areas not shown on Figure B.8 that have flooded in the past. These areas are discussed in the localized flooding section that follows.

Figure B.8. City of Yuba City DFIRM



Values at Risk

GIS was used to determine the possible impacts of flooding within the City of Yuba City. The methodology described in Section 4.3.6 of the base plan was followed in determining structures and values at risk to the 1% and 0.2% annual chance flood event. Table B.10 shows the property use, improved parcel count, improved values, estimated contents, total values and estimated loss of parcels that fall in a floodplain in the City of Yuba City.

Table B.10. City of Yuba City – Count and Structure Value of Improved Parcels by Land Use in Floodplain Zones*

FEMA Type	Flood Zone	Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value
DFIRM	Zone AE (1% Chance)	Vacant Land	1	0	$0	$0	$0
Q3	Zone A (1% Chance)	Agricultural	2	1	$402,284	$11,098	$413,382
Q3	Zone A (1% Chance)	Commercial	1	0	$20,886	$0	$20,886
Q3	Zone A (1% Chance)	Institutional	3	0	$82,065	$0	$82,065
Q3	Zone A (1% Chance)	Vacant Land	2	0	$0	$0	$0
DFIRM	0.2% Chance	Commercial	2	2	$682,928	$2,121,736	$2,804,664
DFIRM	0.2% Chance	Industrial	48	33	$11,058,004	$20,176,064	$31,234,068
DFIRM	0.2% Chance	Institutional	7	1	$4,304,193	$7,713,800	$12,017,993
DFIRM	0.2% Chance	Vacant Land	611	609	$20,161,731	$82,043,032	$102,204,763
Q3	Zone C	Commercial	767	698	$171,970,428	$485,784,880	$657,755,308
Q3	Zone C	Industrial	182	132	$23,712,414	$63,121,321	$86,833,735
Q3	Zone C	Institutional	163	74	$9,635,887	$69,929,143	$79,565,030
Q3	Zone C	Residential	1,200	1,200	$49,300,465	$216,934,895	$266,235,360
Q3	Zone C	Unclassified	11	0	$0	$0	$0
Q3	Zone C	Vacant Land	5,100	4,983	$140,592,394	$446,872,047	$587,464,441
DFIRM	Zone X	Agricultural	2	0	$793,276	$0	$793,276
DFIRM	Zone X	Commercial	42	36	$9,903,023	$19,733,451	$29,636,474
DFIRM	Zone X	Industrial	54	48	$2,569,939	$4,386,968	$6,956,907
DFIRM	Zone X	Institutional	12	4	$3,900,574	$1,650,947	$5,551,521

FEMA Type	Flood Zone	Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value
DFIRM	Zone X	Residential	190	190	$7,021,670	$38,256,977	$45,278,647
DFIRM	Zone X	Vacant Land	4,878	4,818	$159,357,822	$630,100,512	$789,458,334
Q3	Zone X	Agricultural	22	12	$5,480,225	$168,034	$5,648,259
Q3	Zone X	Commercial	167	117	$90,692,269	$130,706,426	$221,398,695
Q3	Zone X	Industrial	103	90	$17,571,368	$23,676,948	$41,248,316
Q3	Zone X	Institutional	54	23	$6,609,390	$33,082,721	$39,692,111
Q3	Zone X	Residential	212	212	$10,338,764	$46,377,703	$56,716,467
Q3	Zone X	Unclassified	3	0	$0	$0	$0
Q3	Zone X	Vacant Land	4,437	4,265	$177,492,457	$686,202,887	$863,695,344
Q3	Zone X by Levee	Agricultural	2	1	$213,112	$40,430	$253,542
Q3	Zone X by Levee	Commercial	7	6	$2,254,014	$3,986,782	$6,240,796
Q3	Zone X by Levee	Industrial	10	8	$559,065	$2,555,535	$3,114,600
Q3	Zone X by Levee	Institutional	6	4	$3,838,417	$822,588	$4,661,005
Q3	Zone X by Levee	Residential	4	4	$210,943	$488,401	$699,344
Q3	Zone X by Levee	Vacant Land	494	335	$14,167,681	$63,645,895	$77,813,576
Total			**18,799**	**17,906**	**$944,897,688**	**$3,080,591,221**	**$4,025,488,909**

Source: Sutter County 2012 Assessor's Data; Sutter County DFIRM and Q3 data
*All buildings owned by the community are included in this data.

Table B.11 summarizes Table B.10 above and shows City of Yuba City loss estimates and shows improved values at risk by FEMA 1% and 0.2% annual chance flood zones.

Table B.11. City of Yuba City – 1% and 0.2% Annual Chance Flood Loss

Flood Zone	Improved Parcel Count	Improved Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance	645	$112,054,632	$40,099,632	$152,154,264	$38,038,566	0.9%
0.2% Annual Chance	1	$11,098	$11,098	$22,196	$5,549	0.0%
Total	**646**	**$112,065,730**	**$40,110,730**	**$152,176,460**	**$38,044,115**	**0.9%**

Source: FEMA DFIRM and Q3, Sutter County 2012 Assessor's Data
Contents replacement value is estimated as a percent of structure replacement value: Agriculture – 100%; Commercial – 100%; Industrial – 150%; Residential – 50%; Unclassified – 50%

Flooded Acres

Also of interest is the land area affected by the various flood zones or protected by levee. The following is an analysis of flooded acres in the City in comparison to total area within city limits. The methodology for this analysis is the same as that in Section 4.3.6 of the base plan. Table

B.12 represent a detailed analysis of total acres for each FEMA DFIRM and Q3 flood zone in the City of Yuba City.

Table B.12. City of Yuba City – Flooded Acres

Flood Zone	Property Use	Total Flooded Acres	Improved Flooded Acres	% of Improved Flooded Acres
A	Agricultural	0.00	0.00	93%
	Commercial	0.39	0.11	28%
	Industrial	1.5	0.43	28%
	Institutional	13	6.3	48%
	Vacant Land	1.5	0.00	0%
AE	Industrial	0.03	0.00	0%
	Vacant Land	9.6	0.00	0%
Total 1%	**---**	**26**	**6.9**	**26%**
0.2% Chance	Commercial	2.2	2.2	100%
	Industrial	225	122	54%
	Institutional	74	33	45%
	Residential	0.02	0.02	100%
	Vacant Land	119	101	85%
Total 0.2%	**---**	**419**	**258**	**62%**

Source: FEMA DFIRM, Q3

Population at Risk

A separate analysis was performed to determine population in flood zones. GIS analysis was performed to determine population in the flood zones. Using GIS, the Sutter County DFIRM and Q3 layers were overlaid on the improved residential parcel data. Those parcel centroids that intersect the flood zones were counted and multiplied by the 2010 Census Bureau average household factors for Yuba City of 2.99 (see Table B.13). According to this analysis, there is a total population of 0 in the 1% annual chance floodplain and 0 in the 0.2% annual chance floodplain.

Table B.13. City of Yuba City – Population at Risk to the 1% and 0.2% Annual Chance Floods

Flood Type	Improved Residential Parcels	Population
1% Annual Chance	0	0
0.2% Annual Chance	0	0
Total	**0**	**0**

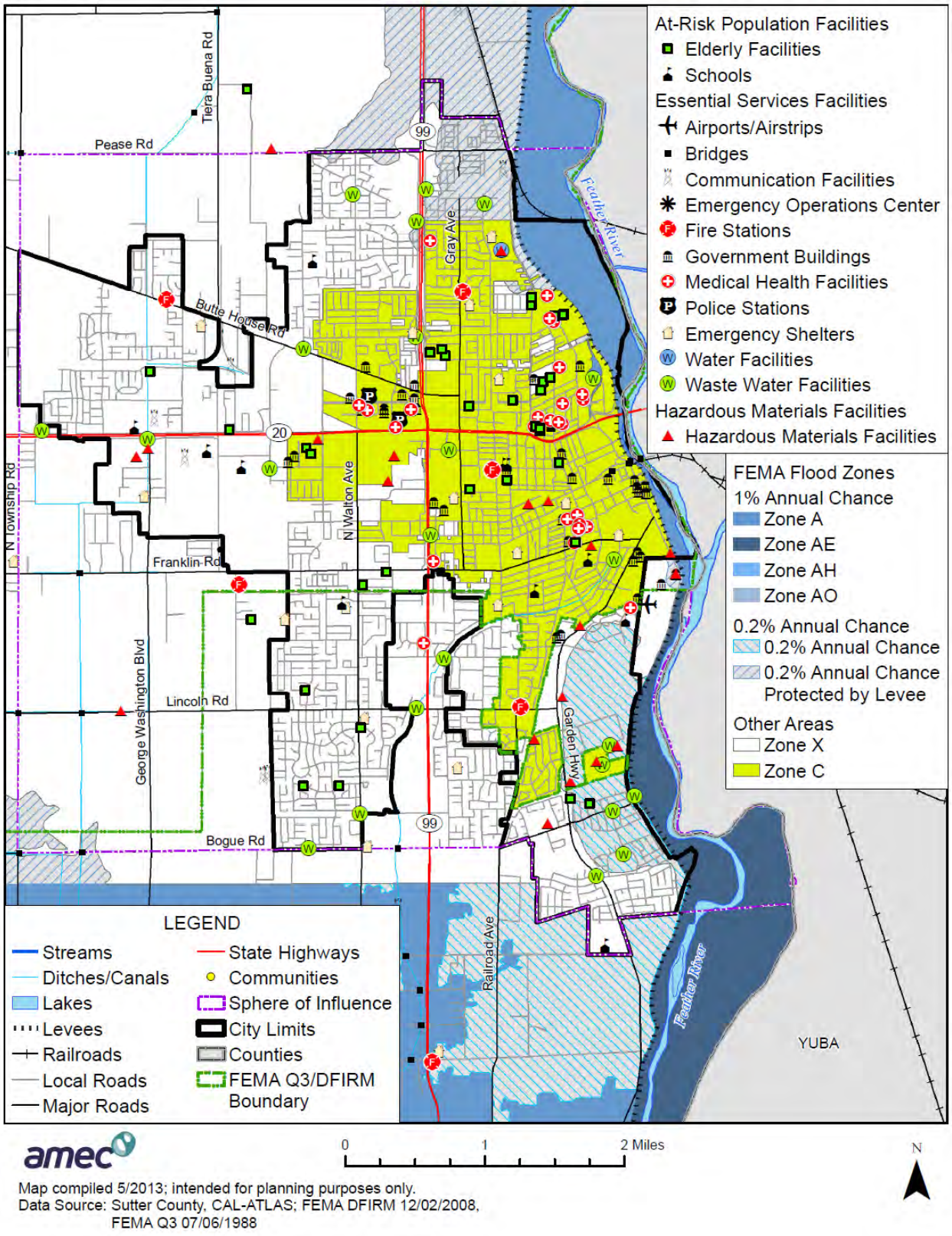
Source: DFIRM, Q3, US Census Bureau, Sutter County 2012 Assessor's Data

Critical Facilities at Risk

A separate analysis was performed on the critical facility inventory in Sutter County and all jurisdictions by flood zone. GIS was used to determine whether the facility locations intersects a DFIRM or Q3 flood hazard area, and if so, which zone it intersects. As shown in Figure B.9, there are no critical facilities in the 1% chance floodplain in the City. As discussed in the footnote to Table B.6, there are unmapped facilities in the flood zone. The City's Low Lift Pump Station (raw water intake) is located in Zone A. It is located on the west bank of the Feather River east of the City's Water Treatment Plant. There is 1 water tank in the 0.2% chance floodplain – the Burns Tank located at the Wastewater Treatment Plant.

Table B.14 shows the facilities in the City in the 0.2% annual chance floodplain. Details of critical facility definition, type, name and address and jurisdiction by flood zone are listed in Appendix E.

Figure B.9. City of Yuba City – Critical Facilities in the Floodplain



Map compiled 5/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; FEMA DFIRM 12/02/2008, FEMA Q3 07/06/1988

Table B.14. City of Yuba City – Critical Facilities in the Floodplain

Flood	Category	Type	Facility Count
0.2% Annual Chance	At Risk Population Facilities	Assisted Living Facility	1
	Essential Services Facilities	Storm Water Facility	2
		Waste Water Facility	1
	Hazardous Materials Facilities	Hazardous Materials Facilities	2
		Total 0.2% Annual Chance	**6**

Source: Sutter County GIS, FEMA DFIRM, Q3

Future Development

To determine potential development constraints based on the location of future development areas relative to the FEMA flood zones, additional analysis was performed using GIS. For each community, the future development areas, overlain with the General Plan land use diagrams, were intersected with the FEMA flood zones to identify future areas of development by 1% and 0.2% annual chance flood zones as well as Zone X. Table B.15 provides a parcel level analysis of the future development areas by flood zone for Yuba City shown in Figure B.10. Note that all areas within the Zone X flood zone are outside of the flood hazard areas.

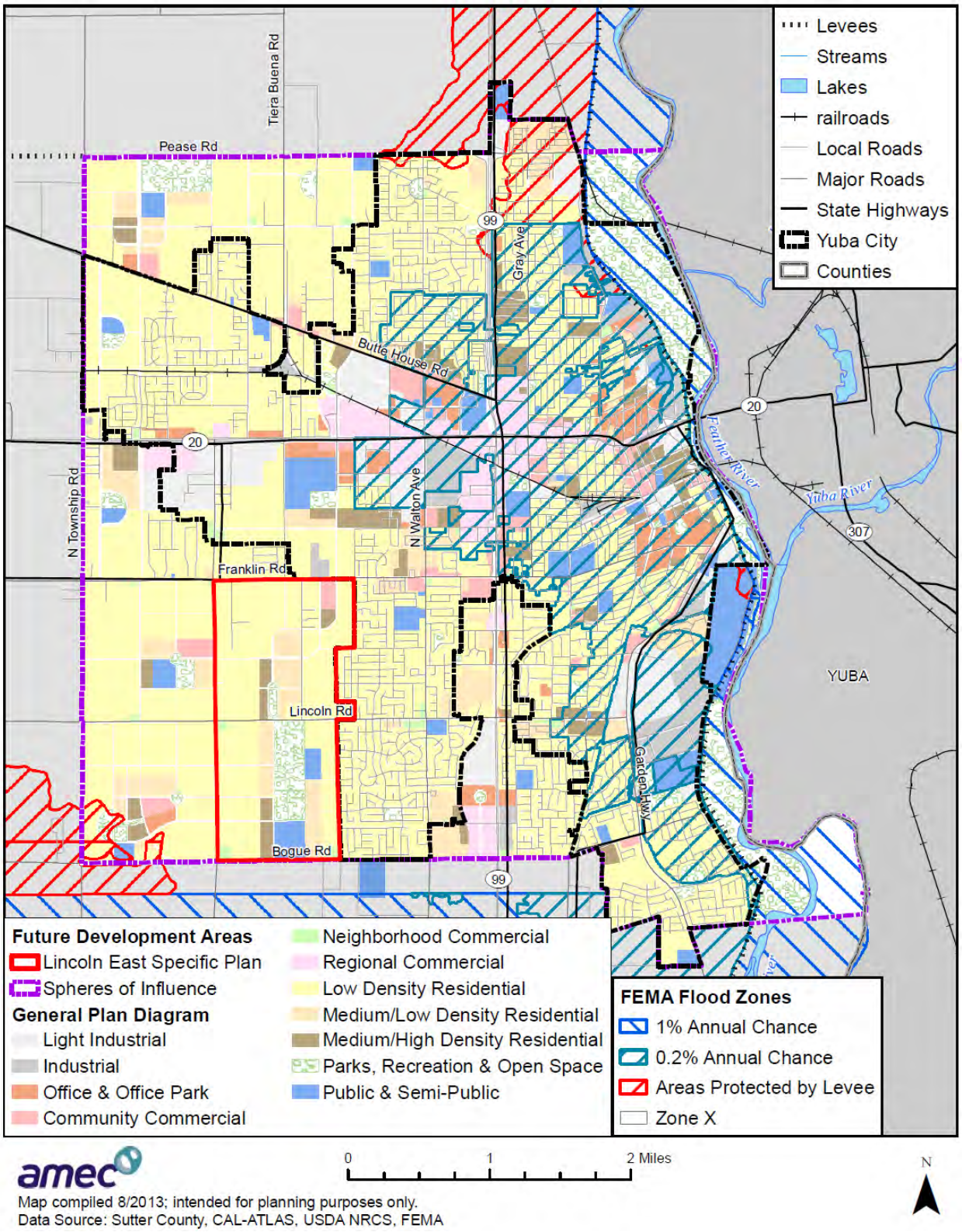
Table B.15. Future Development in Yuba City by Flood Zone

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
1% Annual Chance Flood Zone						
Sphere Of Influence	Manufacturing, Processing & Warehousing	1	0	$0	$0	$0
	Parks, Recreation & Open Space	15	2	$16,279	$979,587	$995,866
	Public & Semi-Public	1	0	$0	$175,050	$175,050
	Total	**17**	**2**	**$16,279**	**$1,154,637**	**$1,170,916**
0.2% Annual Chance Flood Zone						
Sphere Of Influence	Business, Technology & Light Industry	7	1	$18,355	$2,122,825	$2,141,180
	Low Density Residential	611	609	$82,043,032	$20,923,375	$102,966,407
	Manufacturing, Processing & Warehousing	44	34	$22,279,445	$9,681,463	$31,960,908
	Medium/Low Density Residential	1	1	$7,713,800	$1,070,000	$8,783,800
	Parks, Recreation & Open Space	5	0	$0	$2,036,957	$2,036,957
	Public & Semi-Public	1	0	$0	$372,236	$372,236
	Total	**669**	**645**	**$112,054,632**	**$36,206,856**	**$148,261,488**

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Zone X Flood Zone						
Sphere Of Influence	Business, Technology & Light Industry	290	236	$73,980,643	$44,771,845	$118,752,488
	Community Commercial	453	402	$129,507,741	$73,906,289	$203,414,030
	Low Density Residential	16,333	15,977	$2,031,610,445	$565,704,191	$2,597,314,636
	Manufacturing, Processing & Warehousing	102	66	$51,111,412	$12,136,540	$63,247,952
	Medium/High Density Residential	837	795	$209,380,982	$44,596,582	$253,977,564
	Medium/Low Density Residential	965	935	$143,072,047	$39,633,814	$182,705,861
	Neighborhood Commercial	116	92	$21,209,479	$12,550,974	$33,760,453
	Office & Office Park	354	283	$229,538,926	$51,957,022	$281,495,948
	Parks, Recreation & Open Space	28	9	$1,923,589	$5,185,791	$7,109,380
	Public & Semi-Public	76	31	$58,661,868	$8,398,673	$67,060,541
	Regional Commercial	257	209	$226,802,376	$131,995,383	$358,797,759
	Total	**19,811**	**19,035**	**$3,176,799,508**	**$990,837,104**	**$4,167,636,612**
Lincoln East Specific Plan	Low Density Residential	189	183	32075183	13957187	$46,032,370
	Medium/Low Density Residential	10	9	4019669	1231947	$5,251,616
	Neighborhood Commercial	1	1	151993	52412	$204,405
	Parks, Recreation & Open Space	4	4	256934	582585	$839,519
	Public & Semi-Public	2	2	53002	254908	$307,910
	Total	**206**	**199**	**$36,556,781**	**$16,079,039**	**$52,635,820**

Source: Sutter County GIS, FEMA DFIRM, Q3

Figure B.10. Yuba City Future Development Areas in Flood Zones



The City's floodplain ordinance prohibits development in the floodplain unless stringent guidelines are met. No development is expected in the floodplain in the future.

Insurance Coverage, Claims Paid, and Repetitive Losses

The City of Yuba City joined the National Flood Insurance Program (NFIP) on March 23, 1984. The City joined the CRS program on October 1, of 2007. The City is currently a CRS Class 6 community, which gives a 20% discount to flood insurance policies in the Special Flood Hazard Area (SFHA), and a 10% discount to those outside of the SFHA. NFIP data indicates that as of February 28, 2013, there were 2,018 flood insurance policies in force in the City with $617,188,800 of coverage. There have been 4 historical claims for flood losses totaling $15,570.82. 3 were for pre-FIRM structures. 1 of these pre-FIRM losses was in the A zone, while the other 2 were in B, C, or X zones. 1 was for a post-FIRM structure in the B, C, or X zone. NFIP data further indicates that there are no repetitive loss (RL) buildings in the City.

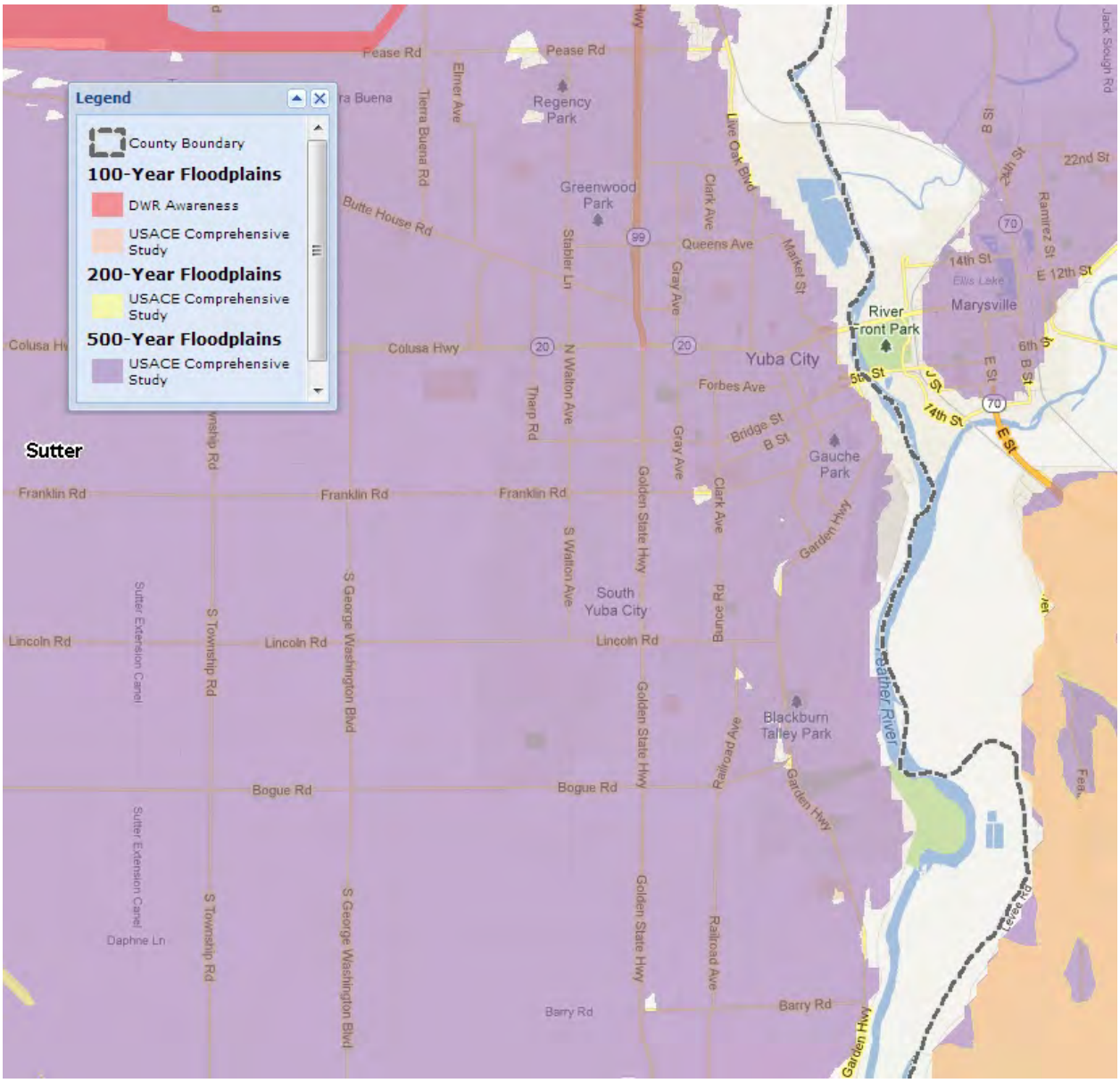
California Department of Water Resources Best Available Maps (BAM)

The FEMA regulatory maps provide just one perspective on flood risks in Sutter County. 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 Sacramento-San Joaquin (SAC-SJ) Valley watershed. SB 5 requires that these maps contain the best available information on flood hazards and be provided to cities and counties in the 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-, 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. They are for the same flood frequency, however, they 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. 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 100-year floodplain, it also supports identification of the need and requirement for flood insurance. Figure B.11 show the BAM for the City of Yuba City

Figure B.11. City of Yuba City – Best Available Map



Source: California DWR

Cal DWR 200-year Maps

SB 1278, chaptered September 25, 2012, amended Section 9610 (d) (1) of the Water Code to read that:

> "On or before July 2, 2013, and for the purposes of providing information to cities and counties necessary for their determinations relating to level of flood protection, the department shall release floodplain maps that identify at a minimum the facilities of the State Plan of Flood Control [SPFC] and the available data as to the water surface elevation of flooding in urban areas in the

> event of the failure of the facilities of the State Plan of Flood Control during flooding that has a 1-in-200 chance of occurring in any given year."

Within the 2012 Central Valley Flood Protection Plan (CVFPP), the State Systemwide Investment Approach (SSIA) provides that DWR will evaluate and participate in projects that contribute to achieving an urban level of flood protection through reconstructing, rehabilitating, or improving SPFC facilities for the following urban areas in the Central Valley:

- City of Chico
- Yuba City and City of Marysville
- Sacramento Metropolitan Area
- (Sacramento & West Sacramento)
- Cities of Woodland and Davis
- City of Merced
- Stockton Metropolitan Area (Stockton & Lathrop)

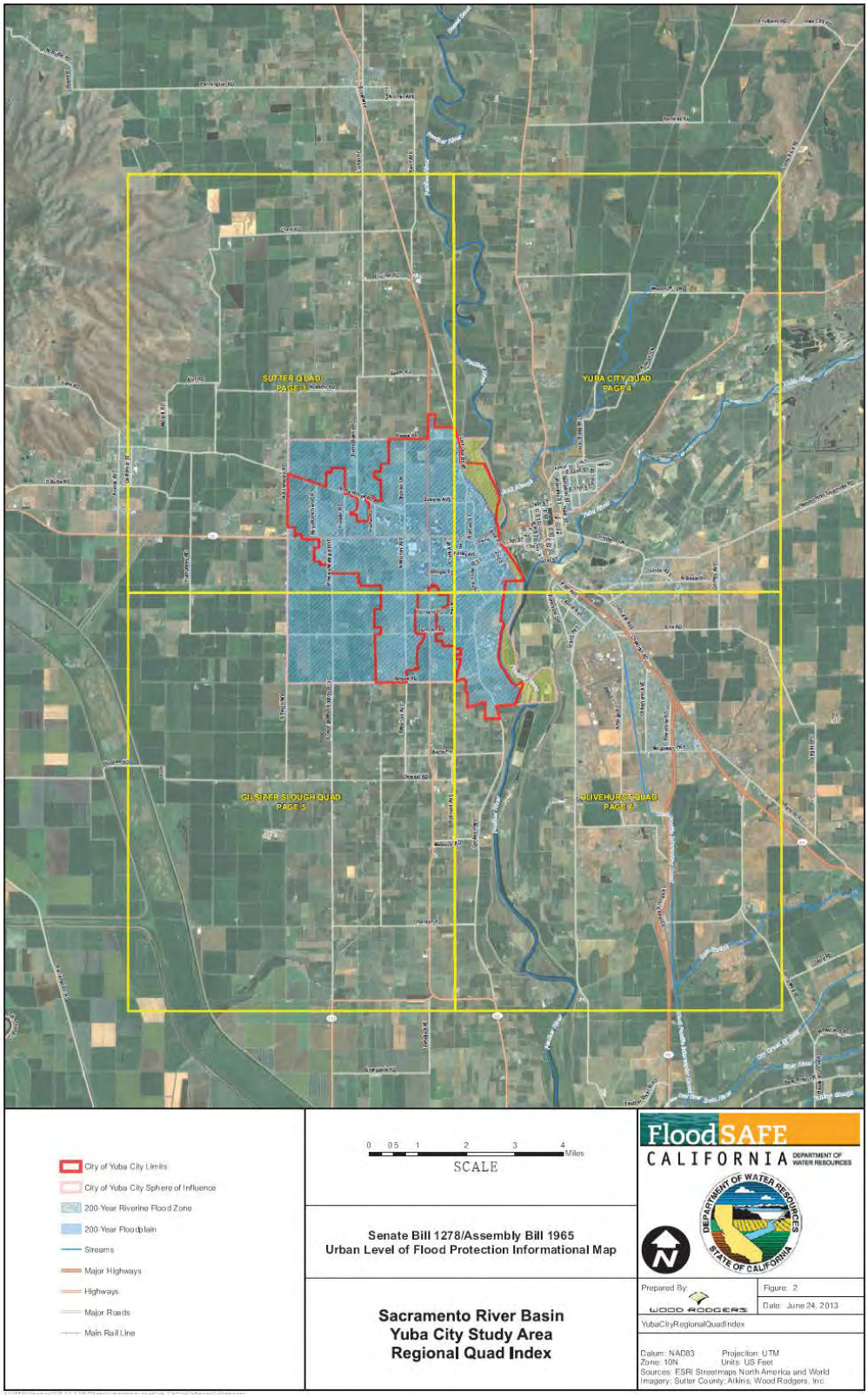
The Informational Maps provided by DWR identify facilities of the SPFC and provide information that assists these urban areas in determining their level of flood protection. The Informational Maps were developed using DWR hydrologic and hydraulic models and inputs configured and adapted to the *Draft Urban Level of Flood Protection* (ULOP) Criteria and ULDC criteria. Levee geotechnical information will be derived in part from the SPFC Descriptive Document and Urban Levee and Non Urban Levee Evaluation program.

California Government Code §65007(1) as amended by Senate Bill (SB 5, 2007) defines "Urban level of flood protection" as:

> '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 DWR 200 year map for the City of Yuba City is shown in Figure B.12. This map shows all of Yuba City within the 200-yr floodplain.

Figure B.12. Yuba City 200 Year Flood Zones



Source: California Department of Water Resources

Flood: Localized/Stormwater Flooding

Vulnerability to Localized/Stormwater Flooding

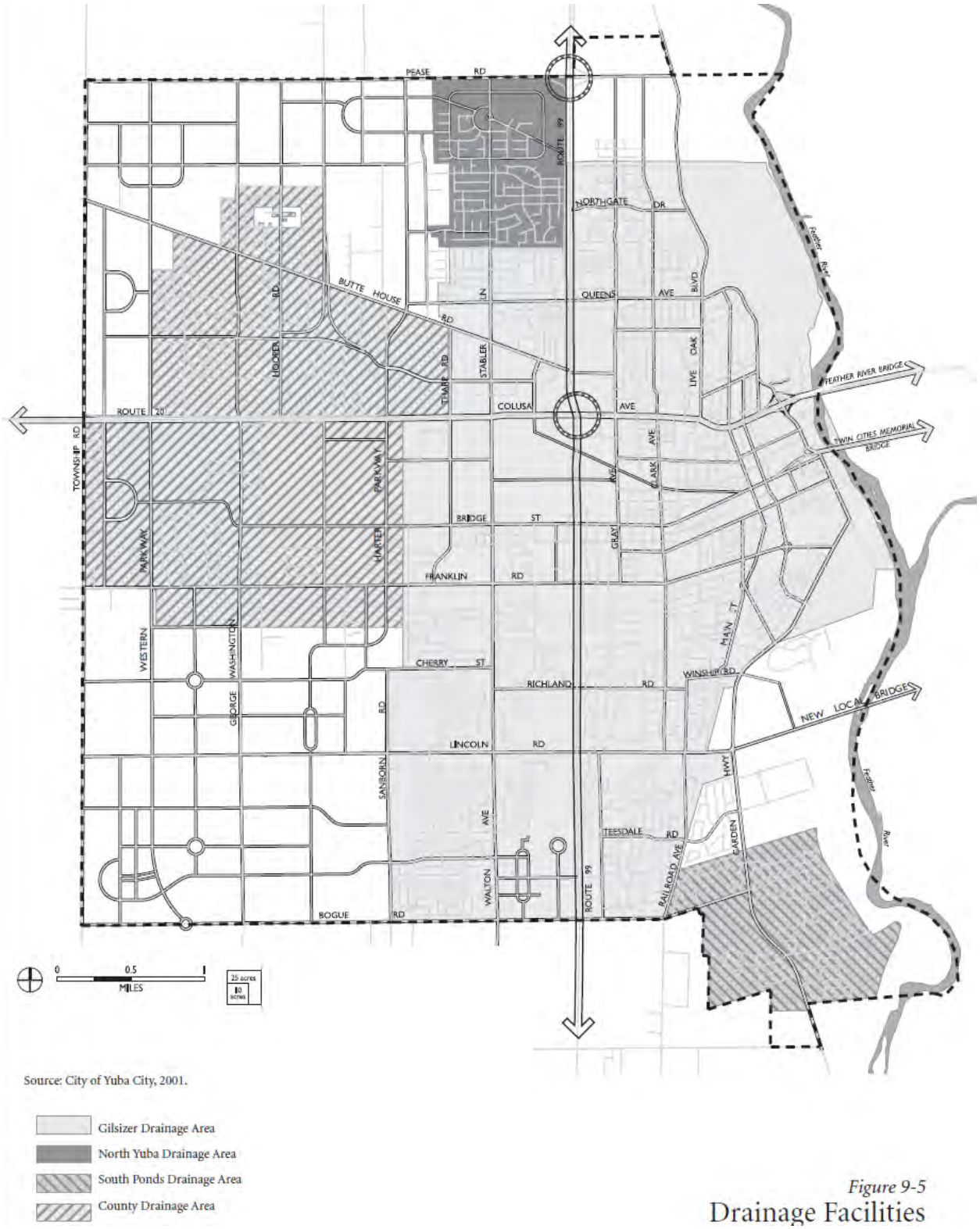
Likelihood of Future Occurrence—Occasional
Vulnerability—High

Drainage and stormwater runoff are related issues, contributing to potential flooding, which is the most significant risk to life and property in the Yuba City Planning Area. The area of the county with the greatest potential to be impacted by drainage and flooding problems is the Yuba City Urban Area. The greatest potential threat to the Yuba City Urban Area is flooding resulting from failure of levees along the Feather River. In addition to a damaging flood resulting from a dam or levee failure, the urban area is highly susceptible to flooding from stormwater runoff. As development continues to occur in the urban area, the increase in impervious surfaces will result in increased overall run-off at an accelerated rate. Ongoing improvements to the drainage infrastructure are being designed and constructed to accommodate this increase in run-off; however, removing run off and flood waters from the urban area does not in itself resolve drainage issues. Lack of downstream channel maintenance and limited flow capacity within the Sutter Bypass can backup flood waters and also contributes to localized flooding issues within the urban area.

The Yuba City Planning Area is located on an alluvial terrace that generally drains to the southwest. The Sacramento River drains the entire county and the Sacramento Valley with the final outlet being the Delta and San Francisco Bay. Drainage facilities in Yuba City include the Gilsizer Slough, Live Oak Canal, and various City facilities. These facilities are summarized below and illustrated in Figure B.13.

- **Gilsizer Slough**. At one time, this natural drainage channel drained Yuba City and areas to the south of the urban area. The Slough discharges to the State Drain, which flows north to State Pumping Plant No. 2, and then into the Sutter Bypass. Tributaries to the Gilsizer Slough are included in the Gilsizer County Drainage District, except for a small area north of Colusa Highway, which is pumped into the Feather River.
- **Live Oak Canal**. This facility once drained runoff from areas north of Pease Road including an area that is now part of the Tierra Buena County Drainage District. The area north of Pease Road is now drained by the State East Interceptor Canal. This canal drains to the Sutter Bypass through the Wadsworth Canal.
- **City Facilities**. Portions of north and south Yuba City are drained to holding ponds. This water is then pumped over the levee into the Feather River. The Garden Highway/Bogue Road area is also pumped into the Feather River.

Figure B.13. Drainage Facilities in Yuba City



Source; 2004 Yuba City General Plan Update

Yuba City incurred damage as a result of high water events occurring during the 2005-2006 winter storms from December 17, 2005 through January 3, 2006. Of primary concern to the city was damage associated with two city-owned properties:

- Damage to six effluent percolation ponds on the east side of the Feather River, southeast of the City's Wastewater Treatment Facility. The ponds, composed of graded earthen fill, are an integral part of the wastewater treatment process. Heavy rains and severe storms caused the Feather River to flood its banks, overtopping the adjacent percolation ponds and causing damage to the structure of each of the six ponds. The damages sustained include silt debris deposits, scour along the pond levee slopes and pond bottoms, tearing/displacement of the fabric lining of the ponds, washout of rip rap and fill along the pond slopes, and erosion damage and washout of fill around the concrete spillways of each pond. Similar damages occurred in previous high water events in 1986, 1995, and 1997.
- Damage to the Low Lift Station Access Road which runs along the banks of the Feather River. The roadway, shoulders and embankments are composed of graded and compacted aggregate base and backfill. Severe storms caused the Feather River to flood over its banks and resulted in major roadway flooding that washed out the roadway, roadway shoulders and integral ground of both along sections of the Low Lift Station Access Road.

The City's Capital Improvements Plan (CIP) includes a generic project title of "Drainage Improvements". In the last few years, there have been constructed improvements on Willow Way and Rockholt Way. Upcoming projects include Helen Avenue and Sanborn Road.

Future Development

Future development in the City will add more impervious surfaces and need to drain those waters. The City has a track record of addressing localized flooding in the past, and will continue those efforts in the future.

Levee Failure

Vulnerability to Levee Failure

Likelihood of Future Occurrence—Occasional
Vulnerability—High

The most significant risk from flooding in the Yuba City Planning Area results from the potential for dam or levee failure. Overtopping of the Feather River levees is considered to be a significant local concern due to the general topography of the region. The Feather River, which forms the eastern border of the General Plan Study Area, consists of a large watershed that stretches to the Sierra Crest. The City's location in the lower portions of the watershed exposes the community to substantial risk from riverine flooding. Additionally riverine flooding can overwhelm the integrity of the local or regional levee system. Levee failure can result if water overtops a levee, if high river levels saturate the levee banks, or if the levee itself is structurally defective. Levee

failure can occur very rapidly with little warning. Once a levee is breached, floodwaters can inundate large low-lying areas. Levee overtopping or failure could cause catastrophic flooding in the City.

Figure 4.88 in Section 4.3.9 of the base plan shows that in the Sutter Butte Flood Control Agency/PBI levee break scenario, the City would be inundated with four to six feet of water.

Values at Risk

GIS was used to determine the possible impacts of levee failure within the City of Yuba City. The methodology described in Section 4.3.8 of the base plan was followed in determining structures and values at risk in the levee protected areas. Table B.16, from the FEMA Q3 maps, shows the property use, improved parcel count, improved values, estimated contents, total values and estimated loss of parcels that fall in a levee protected area in the City of Yuba City.

Table B.16. Yuba City – Values in the Area Protected By Levee

Zone	Property Use	Improved Parcel Count	Improved Value	Estimated Contents Value	Total Value
Zone X by Levee	Agricultural	1	$40,430	$40,430	$80,860
Zone X by Levee	Commercial	6	$3,986,782	$3,986,782	$7,973,564
Zone X by Levee	Industrial	8	$2,555,535	$3,833,303	$6,388,838
Zone X by Levee	Institutional	4	$822,588	$822,588	$1,645,176
Zone X by Levee	Residential	4	$488,401	$244,201	$732,602
Zone X by Levee	Vacant Land	335	$63,645,895	$0	$63,645,895
Total Zone X by Levee		**358**	**$71,539,631**	**$8,927,303**	**$80,466,934**

Source: FEMA DFIRM, FEMA Q3, Sutter County 2012 Assessor's Data

Flooded Acres

Also of interest is the land area affected by the various flood zones or protected by levee. The following is an analysis of flooded levee protected acres in the City in comparison to total area within city limits. The methodology for this analysis is the same as that in Section 4.3.8 of the base plan. Table B.17 represent a detailed analysis of total acres for the FEMA Q3 levee protected zones in the City of Yuba City.

Table B.17. City of Yuba City – Flooded Acres in Levee Protected Zones

Flood Zone	Property Use	Total Flooded Acres	Improved Flooded Acres	% of Improved Flooded Acres
Zone X by Levee	Agricultural	46	40	87%
Zone X by Levee	Commercial	69	68	98%
Zone X by Levee	Industrial	32	24	75%
Zone X by Levee	Institutional	32	17	53%

Flood Zone	Property Use	Total Flooded Acres	Improved Flooded Acres	% of Improved Flooded Acres
Zone X by Levee	Residential	8.9	8.9	100%
Zone X by Levee	Vacant Land	91	62	68%
Total Zone X by Levee	**---**	**279**	**220**	**79%**

Source: FEMA DFIRM, Q3

Population at Risk

A separate analysis was performed to determine population in levee protected zones. GIS analysis was performed to determine population in the flood zones. Using GIS, the Sutter County DFIRM and Q3 layer was overlaid on the improved residential parcel data. Those parcel centroids that intersect the levee protected zones were counted and multiplied by the 2010 Census Bureau average household factors for Yuba City (see Table B.18). According to this analysis, there is a total population of 12 in the levee protected zones in Yuba City. It is important for these residents, as well as businesses that may fall in these levee protected areas, to have evacuation plan.

Table B.18. City of Yuba City – Population at Risk in the Levee Protected Areas

Flood Type	Improved Residential Parcels	Population
X Protected By Levee	4	12

Source: DFIRM, Q3, US Census Bureau, Sutter County 2012 Assessor's Data

Critical Facilities at Risk

A separate analysis was performed on the critical facility inventory in Sutter County and all jurisdictions by flood zone. GIS was used to determine whether the facility locations intersect a DFIRM flood hazard areas, and if so, which zone it intersects. As shown in Figure B.9 in the flood vulnerability above, there are critical facilities in the levee protected zones in the City. These facilities are shown in Table B.19. Details of critical facility definition, type, name and address and jurisdiction by flood zone are listed in Appendix E.

Table B.19. City of Yuba City – Critical Facilities in the Levee Protected Areas

Flood Zone	Category	Type	Facility Count
X by Levee	Essential Services Facilities	Communications	1
		Storm Water Facility	1
		Total X by Levee	**2**

Source: Sutter County GIS, DFIRM, Q3

Future Development

GIS Analysis

To determine potential development constraints based on the location of future development areas relative to the FEMA flood zones, additional analysis was performed using GIS. For each community, the future development areas, overlain with the General Plan land use diagrams, were intersected with the FEMA flood zones to identify future areas of development in levee protected areas. Table B.20 provides a parcel level analysis of the future development areas by flood zone. These are shown in Figure B.10 in the flood vulnerability section.

Table B.20. Future Development in Yuba City by Flood Zone

Future Development Area	General Plan Land Use	Total Parcel Count	Improved Parcel Count	Existing Improved Value	Land Value	Total Value
Areas Protected by Levee Flood Zone						
Sphere Of Influence	Agricultural/Rural	1	0	$0	$7,358	$7,358
	Business, Technology & Light Industry	6	5	$2,065,044	$242,228	$2,307,272
	Low Density Residential	363	265	$53,506,670	$10,885,869	$64,392,539
	Manufacturing, Processing & Warehousing	15	12	$1,703,241	$1,028,381	$2,731,622
	Medium/Low Density Residential	138	76	$14,395,797	$5,386,620	$19,782,417
	Public & Semi-Public	6	2	$17,238	$3,607,344	$3,624,582
	Total	**529**	**360**	**$71,687,990**	**$21,157,800**	**$92,845,790**

Source: Sutter County GIS, FEMA DFIRM, Q3

Wildfires

Vulnerability to Wildfires

Likelihood of Future Occurrence—Likely
Vulnerability—Low

Although the HMPC feel this is a low significance hazard, due to the significance of wildfire in California, analysis of wildfire is included here. Major fires are generally categorized as either a conflagration or wildland/forestland. A conflagration may involve residential or commercial areas and spreads across both natural and constructed barriers. Wildland is associated with open range grasslands and into the foothills of a particular area. Because of development in rural areas adjacent to and within unincorporated Sutter County, a third classification has emerged, the

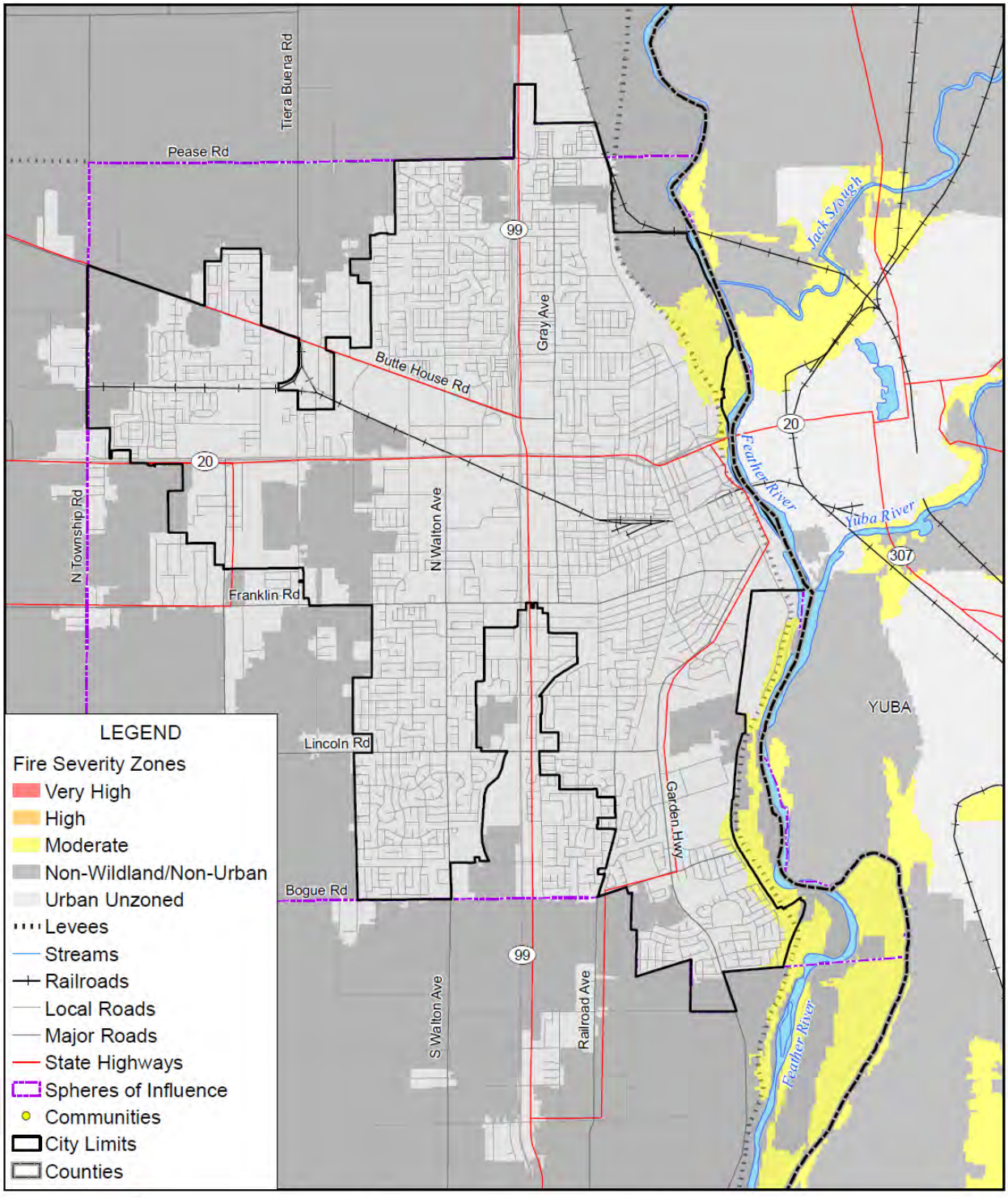
Urban Interface wildfire. The urban interface wildfire is one that burns along the urban/rural interface and can result in major losses of property and structures.

A number of factors affect the behavior of wildland and interface fires, including terrain, weather, wind, fuels and seasons. It is well known that fire travels faster uphill than down and is more difficult to fight on steep slopes than on level ground. When weather is hot and the humidity is low, wildland fires can explode with intensity of rapid combustion. Even in the absence of strong winds, a fast-moving fire can generate its own updrafts, particularly in canyons, causing burning brands to be carried high in the air and drop a long distance ahead. This results in spot fires over a wide radius as the wind changes its direction.

Yuba City is not immune to numerous types of grass and brush fires and any one of them may accelerate into an urban interface wildfire. Such a situation could lead to evacuation of large portions of the population and the potential for significant loss of personal property, structures, and rangeland. The natural fuels available in or near the City vary greatly in the rate and intensity of burning. Fires in heavy brush and stands of trees burn with great intensity but more slowly than in dry grass and leaves. Dense fuels will propagate fire better than sparse fuels. The local fire season generally extends from June through early October.

Figure B.14 shows wildfire risk in the City of Yuba City. Wildfire threat within the City is generally low, with areas of moderate risk in the riverbottoms and near waterways in the City.

Figure B.14. City of Yuba City Fire Severity Zones



Map compiled 5/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS,CALFIRE: SRA 11/7/2007,
LRA 5/2008, FRA & LRA 8/2007 DRAFT

The primary area at risk to wildland fires within the Yuba City Urban Area are the river bottoms of the West Feather River. The river bottom area includes two significant infrastructure features that could be at risk from wildfires. These include:

- The water intake pump/lift station structure for the city's water system (the elevated pump structure is located along the west bank of the Feather River.) The pumps pull water from the river and pump it in pipes across the river-bottom area to the City's Water Treatment Plan located on the west side of the adjacent levee.
- A Union Pacific Railroad trestle that spans the width of the west Feather River river bottom area. The subject rail line is Union Pacific's main north-south route between California and the Pacific Northwest. The trestle has caught fire in the past as a result of both grass fires and fires caused by the train operations.

Assets at Risk

GIS was used to determine the possible impacts of levee failure within the City of Yuba City. The methodology described in Section 4.3.12 of the base plan was followed in determining structures and values at risk in the levee protected areas. There are 171 buildings in the moderate or wildfire severity zones, as shown on Figure B.14. There are no buildings located in the high or very high wildfire severity zones in the City.

Table B.21. City of Yuba City – Assets at Risk by Fire Severity Zone

Fire Threat Class	Land Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value	% of Affected Parcels to Total
Moderate	Agricultural	1	0	$16,646	$0	$16,646	0.01%
	Industrial	3	1	$198,101	$289,805	$487,906	0.02%
	Vacant Land	167	165	$5,879,493	$23,829,624	$29,709,117	0.9%
	Total	**171**	**166**	**$6,094,240**	**$24,119,429**	**$30,213,669**	**0.9%**
Non-Wildland/Non-Urban	Agricultural	15	11	$3,766,738	$190,493	$3,957,231	0.1%
	Commercial	34	22	$34,314,134	$41,814,359	$76,128,493	0.2%
	Industrial	8	3	$6,772,601	$1,682,884	$8,455,485	0.04%
	Institutional	5	1	$2,927,865	$2,836,700	$5,764,565	0.0%
	Residential	12	12	$3,225,147	$19,212,072	$22,437,219	0.1%
	Vacant Land	32	23	$3,655,628	$3,019,239	$6,674,867	0.2%
	Total	**106**	**72**	**$54,662,113**	**$68,755,747**	**$123,417,860**	**0.6%**
Urban Unzoned	Agricultural	12	3	$3,105,513	$29,069	$3,134,582	0.1%
	Commercial	952	837	$241,209,414	$600,518,916	$841,728,330	5.1%
	Industrial	386	307	$48,500,088	$111,944,147	$160,444,235	2.1%
	Institutional	240	105	$25,442,661	$110,362,499	$135,805,160	1.3%

Fire Threat Class	Land Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Value	Total Value	% of Affected Parcels to Total
	Residential	1,594	1,594	$63,646,695	$282,845,904	$346,492,599	8.5%
	Unclassified	14	0	$0	$0	$0	0.1%
	Vacant Land	15,324	14,822	$502,236,964	$1,882,015,510	$2,384,252,474	82%
	Total	**18,522**	**17,668**	**$884,141,335**	**$2,987,716,045**	**$3,871,857,380**	**99%**
Grand Total		**18,799**	**17,906**	**$944,897,688**	**$3,080,591,221**	**$4,025,488,909**	**100%**

Source: Sutter County 2012 Assessor's Data; CAL FIRE

Population at Risk

The Fire Severity dataset was overlayed on the residential population data. Those parcel centroids that intersect the severity zones were counted and multiplied by the 2012 Census Bureau average household factors for each jurisdiction and unincorporated area. Results were tabulated by jurisdiction. According to this analysis, there is no population in the City at moderate or higher risk to wildfire. This is shown in Table B.22.

Table B.22. City of Yuba City - Count of Improved Residential Parcels and Population in Fire Severity Zone

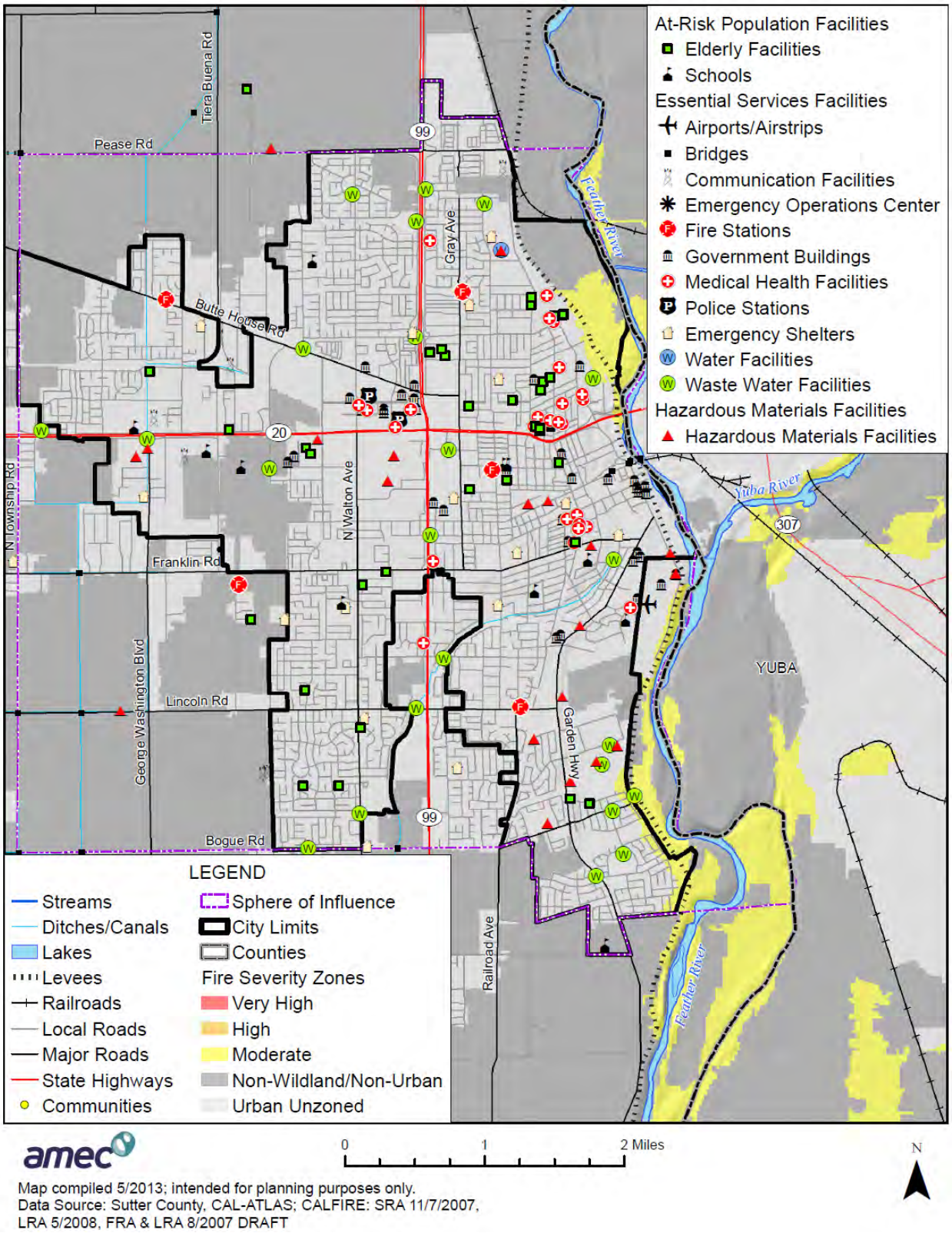
Fire Threat Class	Improved Residential Parcels	Population
Very High	–	–
High	–	–
Moderate	–	–
Non-Wildland/Urban	12	36
Urban Unzoned	1,594	4,766
Total	**1,606**	**4,802**

Source: Sutter County 2012 Assessor's Data; CAL FIRE, US Census Bureau

Critical Facilities at Risk

Wildfire analysis was performed on the critical facility inventory in Sutter County and all jurisdictions. GIS was used to determine whether the facility locations intersect a wildfire hazard areas provided by CAL FIRE, and if so, which zone it intersects. As shown in Figure B.15, there are no critical facilities in the City in a moderate or higher fire severity zone.

Figure B.15. City of Yuba City – Critical Facilities in the Fire Severity Zones



Map compiled 5/2013; intended for planning purposes only.
Data Source: Sutter County, CAL-ATLAS; CALFIRE: SRA 11/7/2007, LRA 5/2008, FRA & LRA 8/2007 DRAFT

Future Development

The City constructed a new park – Feather River Parkway – Willow Island – in the river bottoms located north of the 10th Street Bridge. The improvements include bike and pedestrian paths, a gazebo, and a base rock parking lot. However, with the project, the paths create a fire break. No other development is planned in the WUI areas.

B.6 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 capability assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

B.6.1 Regulatory Mitigation Capabilities

Table B.23 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 Yuba City.

Table B.23. City of Yuba City Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan	Y	2004	http://www.yubacity.net/planning/general-plan.htm
Zoning ordinance	Y	1995	http://www.yubacity.net/planning/zoning-codes.htm
Subdivision ordinance	Y	1990	Title 8, Chapter 2 of Municipal Code
Growth management ordinance	N		
Floodplain ordinance	Y	2007	Title 6, Chapter 9 of Municipal Code
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y	2010	Stormwater Ordinance – Title 4, Chapter 21 of Municipal Code
Building code	Y		Version: 2010 Building Code Standards
BCEGS Rating	Y		*In process of audit and new rating
Fire department ISO rating	Y		Rating – 3 City of Yuba City, 3 – County areas served by City that has fire hydrants
Erosion or sediment control program	Y		Stormwater Management Program
Stormwater management program	Y	2003	http://www.yubacity.net/stormwater/
Site plan review requirements	Y		http://www.yubacity.net/building/forms-fees-other documents.htm
Capital improvements plan	Y		http://www.yubacity.net/finance/budgets-cafrs.htm
Economic development plan	Y	2008	http://www.yubacity.net/documents/Econ-Dev/2008/economic-development-work-plan.pdf
Local emergency operations plan	Y		Slow Rise Flood Plan
Community Wildfire Protection Plans	N		

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
Flood insurance study or other engineering study for streams	Y		Maps prepared for Sutter Butte Flood Control Agency Project.
Elevation certificates	Y		None required for Y.C.
Other			

Source: AMEC Data Collection Guide

General Plan (2004)

California Law requires that every City and County in the state have a General Plan. The City of Yuba City General Plan, adopted in 2004, was prepared over a two-year period that included an extensive public review process. The General Plan is the most important policy and planning document in the city, and is used by virtually every department. The General Plan is the City's statement of its vision for the future. The General Plan contains policies covering every aspect of the City: land use (how land can be developed), circulation, noise, air quality, housing, open space and conservation, and health and safety.

Goals and policies related to mitigation of natural hazards are as follows:

Goal	Minimize risks of property damage and personal injury posed by geologic and seismic hazards.
Policy	Review proposed development sites at the earliest stage of the planning process to locate any potential geologic or seismic hazards.
Policy	Prohibit structures intended for human occupancy within 50 feet of an active fault trace.
Policy	Require comprehensive geologic and engineering studies of critical structures regardless of location.
Policy	Require preparation of a soils report as part of the development review and/or building permit process for development proposed in the area depicted with expansive soils.
Policy	Provide information for property owners to rehabilitate existing buildings using construction techniques to protect against seismic hazards.
Policy	Control erosion of graded areas with revegetation or other acceptable methods.
Policy	Maintain and update, as appropriate, the City's emergency preparedness programs, plans, and procedures to ensure the health and safety of the community in the event of an earthquake or other disaster.
Policy	Encourage the purchase of earthquake insurance.

Goal	Protect the community from risks to lives and property posed by flooding and stormwater runoff. Collect and dispose of storm water in a safe and efficient manner. Ensure that dams and levees are properly maintained for long-term flood protection.
Policy	Implement the drainage improvements identified in the City's Capital Improvement Program.
Policy	Continue to work with the U.S. Army Corps of Engineers to implement levee improvements on the Feather River. Incorporate features in the levee system to ensure flood protection and at the same time improve the connection between the city and the river.
Policy	When necessary, require new development to prepare hydrologic studies to assess storm runoff impacts on the local and subregional storm drainage systems and, if warranted, require new development to provide adequate drainage facilities and to mitigate increases in storm water flows and/or volume to avoid cumulative increases in downstream flows.

Goal	Protect the community from risks to lives and property posed by flooding and stormwater runoff. Collect and dispose of storm water in a safe and efficient manner. Ensure that dams and levees are properly maintained for long-term flood protection.
Policy	Restrict new development in areas subject to 100 year flooding
Policy	Provide information to property owners about the availability of flood insurance.
Policy	As new development occurs, work with Sutter County to establish drainage areas that serve the entire Planning Area.
Policy	Utilize parks for the secondary purpose of storm water storage

Ordinances

The City of Yuba City has many ordinances related to mitigation.

Emergency Organization (Title 2, Chapter 8)

The declared purposes of this chapter are to provide for the preparation and carrying out of plans for the protection of persons and property within the City in the event of an emergency; the direction of the Emergency Organization; and the coordination of the emergency functions of the City with all other public agencies, corporations, organizations, and affected private persons. As used in this chapter, "emergency" shall mean the actual or threatened existence of conditions of disaster or of extreme peril to the safety of persons and property within the City caused by such conditions as air pollution, fire, flood, storm, epidemic, riot, earthquake, or other conditions, including conditions resulting from war or the imminent threat of war, but other than conditions resulting from a labor controversy, which conditions are, or are likely to be, beyond the control of the services, personnel, equipment, and facilities of the City, requiring the combined forces of other political subdivisions to combat. It shall be the duty of the Yuba 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, resolutions, rules, and regulations as are necessary to implement such plans and agreements.

Zoning (Title 8, Chapter 5)

The City of Yuba City Zoning Code is the primary implementing mechanism of the General Plan. Unlike the General Plan, which provides long-range, comprehensive general policies for the general direction of land use in the City, the Zoning Code provides more specific descriptions of the types of uses that are allowed in certain areas, development standards (e.g., setbacks, building heights, lot coverage) and other detailed guidance for property development. The Zoning Code is required to be consistent with the General Plan.

The city council is authorized by the Planning and Zoning Laws of the California State Government Code, Title 7, Planning and Land Use, Division 1, Planning and Zoning, Chapter 4, Zoning Regulations, to regulate the following:

1) Use of land and buildings;

2) Height, bulk and size of buildings and structures;
3) Construction and use of signs and billboards;
4) Intensity of land use;
5) Establishment and maintenance of building setback lines.

This includes the regulation of development in the floodplain, as discussed in the flood ordinance below.

The purpose of the Zoning Code for the City is as follows:

- To promote and protect the public's health, safety, peace, comfort, convenience and general welfare;
- To provide open space, light, air, privacy, convenience of access, aesthetic values, protection of environmental values, and protection of public and private improvements;
- To facilitate and guide growth in accordance with the Yuba City Urban Area General Plan;
- To protect the social and economic stability of residential, commercial and industrial activities within the City through the orderly and planned use of land.

Subdivision (Title 8, Chapter 2)

The City of Yuba City regulates the locations and development of subdivisions within the City. The purpose of this chapter is the regulation and control of the design and improvement of subdivisions within the City of Yuba City.

Building Regulation Section (Title 7, Chapter 1)

In order to provide minimum standards for the proper regulations of building construction, the following publications are hereby adopted by reference and incorporated in this Code, except as expressly amended or superseded by the provisions of this Code.

- Adoption of the California Building Code, 2011 Edition, based on the 2009 International Building Code including, among the Appendices, Appendix Chapter H (Signs), Appendix Chapter I; (Patio Covers), and Appendix Chapters J; (Grading), as published by the International Code Council (ICC) as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations and as amended by the City of Yuba City.
  - Fire Prevention. The provisions of the California Fire Code and Chapter 5 of title 4 of the Yuba City Municipal Code shall apply to matters affecting or relating to structures, processes and premises from the hazard of fire and explosion arising from the storage, handling or use of structures, materials or devices; from conditions hazardous to life, property or public welfare in the occupancy of structures or premises; and from the construction, extension repair, alteration or removal of fire suppression and alarm systems or fire hazards in structure or on the premises from occupancy or operation.

- Adoption of the California Electrical Code, 2010 Edition, based on the 2008 National Electrical Code, as published by the National Fire Protection Association, and as adopted by the California Building Standards Commission in Title 24 of the California Code of Regulations and as amended by the City of Yuba City.
- Adoption of the California Mechanical Code, 2010 Edition, based on the 2009 Uniform Mechanical Code, as published by the International Association of Plumbing and Mechanical Officials, and as adopted by the California Building Standards Commission in Title 24 of the California Code of Regulations and as amended by the City of Yuba City.
- Adoption of the California Plumbing Code, 2010 Edition, based on the 2009 Uniform Plumbing Code, as published by the International Association of Plumbing and Mechanical Officials, and as adopted by the California Building Standards Commission in Title 24 of the California Code of Regulations and as amended by the City of Yuba City.
- Adoption of the California Energy Code, 2010 Edition, as published by the International Code Council (ICC) as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- Adoption of the California Historical Code, 2010 Edition, as published by the International Code Council (ICC) as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- Adoption of the California Existing Building Code, 2010 Edition, as published by the International Code Council (ICC) and as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- Adoption of the California Referenced Standards Code, 2010 Edition, as published by the International Code Council (ICC) as adopted and amended by the California Building Standards Commission in the California Building Standards Code, Title 24 of the California Code of Regulations.
- Adoption of the California Residential Building Code, 2010 Edition, based on the 2009 International Residential Code including, Chapter 1, Division II Administration as published by the International Code Council (ICC) as amended by the City of Yuba City.
- Adoption of the California Green Building Standards, (CALGreen) Code 2010 Edition, as published by the California Building Standards Commission as amended by the City of Yuba City.
- Adoption of the Uniform Swimming Pool Spa & Hot Tub Code, 2009 Edition, as published by the International Association of Plumbing and Mechanical Officials, and as amended by the City of Yuba City.

Flood Ordinance (Title 6, Chapter 9)

The flood hazard areas of the City of Yuba City 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 the cumulative effect of obstructions in areas of special flood hazards which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are inadequately floodproofed, elevated or otherwise protected from flood damage also contribute to the flood loss. It is the purpose of this chapter to promote the public health, safety and general welfare, and to minimize public and private losses due to flood conditions in specific areas by legally enforceable regulations applied uniformly throughout the community to all publicly and privately owned land within flood prone, mudslide [i.e. mudflow] or flood related erosion areas. These regulations are designed to:

- Protect human life and health;
- Minimize the 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 for:

- Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
- Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
- Controlling, filling, grading, dredging, and other development which may increase flood damage; and
- Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters 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.

In all areas of special flood hazard, the following standards are required:

- Anchoring.
  - All new construction and substantial improvements shall be adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.
  - All manufactured homes shall meet the anchoring standards of Section 6-9.504.

- Construction materials and methods.
  - All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
  - All new construction and substantial improvements shall use methods and practices that minimize flood damage.
  - All new construction and substantial improvements shall be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.
  - All new construction within Zone AO or AH shall have adequate drainage paths around structures on slopes to guide flood waters around and away from proposed structures.

- Elevation and floodproofing.
  - Residential new construction or substantial improvement shall have the lowest floor, including basement:
    - In an AO zone, elevated above the highest adjacent grade to a height exceeding the depth number specified in feet on the FIRM, by at least one (1) foot, or elevated at least three (3) feet above the highest adjacent grade if no depth number is specified;
    - In an A zone where no base flood elevations have been determined, elevated at least one (1) foot above the base flood elevation, as determined by the floodplain administrator through acceptable methods as listed in FEMA book "Managing Floodplain Development in Approximate Zone A Areas; A Guide for Developing Base (100 year) Flood Elevations;" and
    - In all other zones, elevated at least one (1) foot above the base flood elevation.
    - At first form inspection, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor. Such certification or verification shall be provided to the Floodplain Administrator.

  - Nonresidential new construction or substantial improvements shall either be elevated to conform with Section 6-9.501 (c)(1) or together with attendant utility and sanitary facilities:
    - Be flood proofed below the elevation recommended under Section 6-9.501 (c)(1) so that the structure is watertight with walls substantially impermeable to the passage of water;

- Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and
- Be certified by a registered professional engineer or architect that the standards of this Section 6-9.501 (c)(2) are satisfied. Such certification shall be provided to the Floodplain Administrator.

B.6.2 Administrative/Technical Mitigation Capabilities

Table B.24 identifies the City department(s) responsible for activities related to mitigation and loss prevention in Yuba City.

Table B.24. City of Yuba City Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	Y	Community Development Director	
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	Y	Deputy Public Works Director – Engineering and Senior Engineers	
Planner/Engineer/Scientist with an understanding of natural hazards	N	City has ability to hire consultants	
Personnel skilled in GIS	Y	IT Analyst	
Full time building official	Y	Contract Services	
Floodplain Manager	Y	Provided by Sutter Butte Flood Control Agency – Also, City staff administers the CRS program for the City	
Emergency Manager	Y	City Manager	
Grant writer	Y	Each Department responsible for grant writing – City also contracts for grant writing	
Other personnel			
GIS Data – Hazard areas	N		
GIS Data - Critical facilities	N		
GIS Data – Building footprints	N		
GIS Data – Land use	Y		
GIS Data – Links to Assessor's data	Y		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	Reverse 911, 1500 AM radio frequency, cable override access through Comcast, Rapid Notify	
Other			

Source: AMEC Data Collection Guide

B.6.3 Fiscal Mitigation Capabilities

Table B.25 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table B.25. City of Yuba City Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	Y	
Capital improvements project funding	Y	
Authority to levy taxes for specific purposes	Y	
Fees for water, sewer, gas, or electric services	Y	Water and Sewer
Impact fees for new development	Y	
Incur debt through general obligation bonds	Y	
Incur debt through special tax bonds	Y	
Incur debt through private activities	Y	
Withhold spending in hazard prone areas	Y	
Other		

Source: AMEC Data Collection Guide

B.6.4 Mitigation Outreach and Partnerships

The City partners with the following entities for mitigation:

- SBFCA for levee improvements,
- Local Churches for cold weather shelter,
- Red Cross when there is a need in the community

B.7 Mitigation Strategy

This section describes the mitigation strategy process and mitigation action plan for the City of Yuba City's inclusion with the Sutter County Local Hazard Mitigation Plan update.

B.7.1 Mitigation Goals and Objectives

The City of Yuba City adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy of the base plan.

B.7.2 Continued Compliance with the NFIP

As a participant of the National Flood Insurance Program (NFIP), the City of Yuba City 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 Yuba City 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 maintaining drainage systems. The goal of the program is to enhance public safety, and reduce impacts and losses while protecting the environment.

The City of Yuba City Public Works Department provides public outreach activities which include map information services, public awareness, public hazard disclosure, and flood protection information. This information is readily available to the public and consists of current and accurate flood mapping. In addition, the Public Works Department provides information about our stormwater management program and up-to-date information related to the maintenance of our drainage system.

The National Flood Insurance Program's (NFIP) 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 Yuba City is currently a participating community in the CRS as a Class 6 community, which gives a 20% discount to flood insurance policies in the Special Flood Hazard Area (SFHA), and a 10% discount to those outside of the SFHA..

The activities that the City implements and receives CRS credits for include:

- **Activity 310 - Elevation Certificates**: Elevation Certificates are maintained on all new and substantially improved buildings in the City's Special Flood Hazard Area (SFHA). Copies of Elevation Certificates are available upon request.
- **Activity 320 - Map Information Services**: Inquirers are furnished with Flood Insurance Rate Map information and flood insurance purchase requirements. Letters are provided to real estate offices and insurance agents regarding availability of information related to Flood Insurance Rate Maps and Elevation Certificates.
- **Activity 330 - Outreach Projects**: A community brochure is mailed to all properties in the community on an annual basis. An outreach brochure is mailed annually to all properties in the City's SFHA. The City also provides flood information through displays at public buildings and community events, such as the Yuba-Sutter Fair.

- **Activity 340 - Hazard Disclosure**: A brochure is made available to interested parties by real estate agents. The document advises people looking to purchase property to investigate the flood hazard before they buy.
- **Activity 350 - Flood Protection Information**: Documents relating to floodplain management are available in the reference section of the Sutter County Public Library. Flood protection information is provided on the City's website and is maintained on a continuous basis.
- **Activity 360 - Flood Protection Assistance**: The City provides technical advice and assistance to interested property owners and annually publicizes the service.
- **Activity 410 - Additional Flood Data**: In previous years, the City has received no credit for Activity 410. However, in July 2013, the California Department of Water Resources issued 200-year floodplain maps for the City.
- **Activity 420 - Open Space Preservation**: Credit is provided for preserving approximately 718 acres in the SFHA as open space.
- **Activity 430 - Higher Regulatory Standards**: Credit is provided for state mandated regulatory standards, a BCEGS classification of 4/4, the adoption of the International Building Codes, and for staff certification as floodplain managers.
- **Activity 440 - Flood Data Maintenance**: Credit is provided for maintaining and using digitized maps in the day to day management of the floodplain and for establishing and maintaining a system of elevation reference marks.
- **Activity 450 - Stormwater Management**: The City enforces regulations for freeboard in non-SFHA zones, soil and erosion control, and water quality. Credit is also provided for watershed management master planning.
- **Activity 510 - Floodplain Management Planning**: Credit is provided for the adoption and implementation of the Floodplain Management Plan.
- **Activity 520 - Acquisition and Relocation**: The City receives no credit under Activity 520.
- **Activity 530 - Flood Protection**: The City receives no credit under Activity 530.
- **Activity 540 - Drainage System Maintenance**: All of the City's drainage system is inspected regularly throughout the year and maintenance is performed as needed by the Public Works Department. Records are being maintained for both inspections and required maintenance. Credit is also provided for an ongoing Capital Improvement Program and enforcing a regulation prohibiting dumping in the drainage system.
- **Activity 610 - Flood Warning Program**: Credit is provided for a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities.
- **Activity 630 - Dam Safety**: All California communities currently receive CRS credit for the State's dam safety program.

B.7.3 Mitigation Actions

The planning team for the City of Yuba City identified and prioritized the following mitigation actions based on the risk assessment and in accordance with the process outline in Section 5,

Mitigation Strategy, of the base plan. 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. General processes and information on plan implementation and maintenance of this LHMP by all participating jurisdictions is included in Section 7, Plan Implementation and Maintenance, of the base plan.

1. Project Improvements to Decrease Localized Flooding

Hazards Addressed: Flood

Goals Addressed: 1, 2, 6

Issue/Background: Localized flooding throughout the City occurs during storm events due to lack of infrastructure and drainage problems. As the City has grown and annexed rural areas, drainage problems have arisen that have led to localized flooding of streets and low lying property. The existing infrastructure in critical areas either does not exist or is not sized to provide adequate drainage when surrounding areas were developed.

Project Description: Construct drainage improvements to address localized flooding issues.

Other Alternatives: Continue to allow localized flooding during storm events.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Yuba City Capital Improvement Program.

Priority (H, M, L): M

Responsible Office: Yuba City Public Works

Cost Estimate: $10 Million

Benefits (Losses Avoided): Reduce damage to homeowners and property loss. Reduce the possibility of safety hazards associated with flooded streets, public property, and systems. Prevent oils and foreign material from entering waterways and groundwater. Reduce labor and associated costs of cleaning up after a localized flooding event.

Potential Funding: State Funds & Grants, Local Funds

Schedule: Ongoing – The City annually constructs drainage improvements to address localized flooding.

2. Enhance Current Rapid Notify System to Include Cell Phone Enhancements

Hazards Addressed: Emergency Services/Multi-Hazard

Goals Addressed: 1, 3, 4

Issue/Background: Yuba City currently utilizes a rapid notify system that has the ability to contact land lines. However, there are many residents within the community that rely primarily on their cell phone and do not have a land line.

Project Description: Expand the current rapid notify system with a cell phone enhancement so that the City has the ability to send notifications to land lines and cell phones.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: To be determined

Priority (H, M, L): H

Responsible Office: Yuba City Fire Department

Cost Estimate:

Benefits (Losses Avoided): With the cell phone enhancement to the City's rapid notify system, the City will be able to send out notifications to all residents within the community that have a land line or cell phone.

Potential Funding: State and Federal Grants, Local Funds

Schedule: To be determined

3. Feather River Habitat Restoration

Hazards Addressed: Flood & Levee Failure

Goals Addressed: 1, 6

Issue/Background: The habitat of the Feather River Floodplain on the west bank of the Feather River has changed drastically over the years. Yuba City at one time had wastewater effluent discharge ponds located in the floodplain north of the 10th Street Bridge, and the area has been overtaken by blackberry bushes and non-native species.

Project Description: Develop and implement a Habitat Restoration Plan.

Other Alternatives: Do nothing.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Yuba City Capital Improvement Program

Priority (H, M, L): L

Responsible Office: Yuba City Public Works, Yuba City Parks & Recreation

Cost Estimate: $5+ Million

Benefits (Losses Avoided):

Potential Funding: Federal and State Grants, Local Funds

Schedule: Phase 1 of the Feather River Parkway Project (approx. 70 acres north of the 10th Street Bridge) has been completed. Phase 2 of the Feather River Parkway Project (approx. 80 acres north of the 10th Street Bridge) is scheduled for completion within the next 3 years. Future phases have not been scheduled at this time.

4. Fifth Street Bridge Replacement

Hazards Addressed: Emergency Response, Flood, & Levee Failure

Goals Addressed: 1, 3, 4, 6

Issue/Background: The Fifth Street Bridge is a 2-lane major arterial connector between Yuba City and Marysville and is one of only two bridges that connect the two communities. In 2008, a Seismic Vulnerability Evaluation and Rehabilitation/Replacement Strategy Report was prepared and concluded that the bridge is seismically vulnerable to soil liquefaction. In 2012, the bridge was also determined to be functionally obsolete by Caltrans under FHWA prescribed inspection criteria due to inadequate lane and shoulder widths. Full replacement of the bridge is needed because the current structure does not meet structural design standards.

In terms of hazard mitigation, the only hospital in the community is located in Marysville, making the Fifth Street Bridge a critical route to access the hospital. Also, the bridge is an evacuation route for the community to utilize during high water events to access higher ground in the community of Sutter.

Project Description: Construction of a new 4-lane bridge over the Feather River.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Yuba City Capital Improvement Program

Priority (H, M, L): H

Responsible Office: Yuba City Public Works

Cost Estimate: $70 Million

Benefits (Losses Avoided): Provide a bridge that meets structural design standards, improve ability for emergency services vehicles to travel between the communities, and enhance safety on the corridor.

Potential Funding: Highway Bridge Program, Regional Surface Transportation Program, Other Grant Funding, Local Funds

Schedule: Within 5 years

5. Gilsizer Slough Weir at Bogue Road

Hazards Addressed: Flood & Levee Failure

Goals Addressed: 1, 2, 4, 6

Issue/Background: Gilsizer Slough is the main channel which runs through Yuba City, transferring the drainage runoff generated by a large portion of the City to the Sutter Bypass. In the flood of 1955, the flood water backed into the City through the Gilsizer Slough, flooding several properties. In order to prevent such a occurrences from happening in the future, the Slough will need to be "blocked" in case of a levee break in the Yuba City Basin. Blocking the Slough cannot be achieved after a break occurs because of the time it will take to construct a structure to block the Slough.

Project Description: Construct a weir on Gilsizer Slough to allow the City to block the channel during a flood event.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Yuba City Capital Improvement Program

Priority (H, M, L): H

Responsible Office: Yuba City Public Works

Cost Estimate: $3 Million

Benefits (Losses Avoided): The backing of flood water into Yuba City would cause billions of dollars in damage to properties and economic impacts to the entire region.

Potential Funding: HMGP, PDM, FMS, State and Federal Grants, Local Funds

Schedule: As funding becomes available.

6. Interactive Critical Facility Data Management

Hazards Addressed: Emergency Services/Multi-Hazard

Goals Addressed: 1, 2, 4, 6

Issue/Background: Each agency within the region has critical facilities within their community that are served by other public agencies, private partners, and non-public safety groups. However, there is no means to easily access information about a critical facility within the region.

Project Description: Develop an interactive critical facility data management plan so that all participating partners can access information on critical facilities within the region.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: To be determined

Priority (H, M, L): H

Responsible Office: To be determined

Cost Estimate: Unknown

Benefits (Losses Avoided): An interactive critical facility data management plan will improve emergency services to the area during times of need.

Potential Funding: State and Federal Grants, Local Funds

Schedule: To be determined

7. Low Lift Pump Station Security Improvements

Hazards Addressed: Flood & Levee Failure

Goals Addressed: 1, 2, 4, 6

Issue/Background: The Low Lift Pump Station (LLPS) is a raw water intake structure located on the Feather River. The City relies on the LLPS to draw water from the Feather River to the Water Treatment Plant. As the City is 100% served by surface water, the LLPS is a critical structure to the City. The facility is served by overhead power and has a small diesel generator on site. During high water events, it is difficult for staff to access the LLPS to refill the generator during times of power outage. In addition, the LLPS is subject to vandalism due to its remote location.

Project Description: Construct an underground electric service from the Water Treatment Plant to the LLPS and remove the overhead power service. Install a fiber optic line between the Water Treatment Plant and LLPS to provide constant communication to and from the facility, including cameras and alarms to be able to monitor the facility.

Other Alternatives: Relocate the LLPS to the land-side of the Feather River Levee, closer to the Water Treatment Plant.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Yuba City Capital Improvement Program

Priority (H, M, L): H

Responsible Office: Yuba City Public Works

Cost Estimate: $5 Million

Benefits (Losses Avoided): Improve reliability of water supply.

Potential Funding: Proposition 50 Grant, Local Funds

Schedule: Within 3 years

8. Hazard Preparedness Public Outreach

Hazards Addressed: Emergency Services/Multi-Hazard

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: Many within the community do not know how to prepare for a hazard or what to do during an emergency situation such as a levee failure or flood.

Project Description: Prepare and distribute a Hazard Preparedness Guide to the community

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: To be determined

Priority (H, M, L): H

Responsible Office: Yuba City Fire Department

Cost Estimate: $100 Thousand

Benefits (Losses Avoided): A Hazard Preparedness Manual will encourage residents to prepare for and understand what to do during a hazardous situation which will result in a reduction of property loss and improve life safety.

Potential Funding: State and Federal Grants, Local Funds

Schedule: To be determined

9. Relocation of Treated Wastewater Effluent Diffuser Line

Hazards Addressed: Flood & Levee Failure

Goals Addressed: 1, 2, 6

Issue/Background: The treated wastewater effluent diffuser line is located in the Feather River near Shanghai Bend. With recent naturally occurring changes to the river, the diffuser line is no longer located in the optimal location to be able to utilize it the majority of the year. Instead, the City has had to utilize discharge ponds located on the east side of the Feather River in the floodplain on a much more frequent basis.

Project Description: Relocate the diffuser line downstream to an area where the river channel is more stable.

Other Alternatives: Find an alternative method to dispose of treated effluent.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Yuba City Capital Improvement Program

Priority (H, M, L): M

Responsible Office: Yuba City Public Works

Cost Estimate: $13 Million

Benefits (Losses Avoided): The ability to utilize the diffuser line year round will reduce the City's reliance on discharge ponds located within the floodplain, which have been a repetitive loss in the past.

Potential Funding: Local Funds – CIP Budget

Schedule: Within 5 years

10. Response Logistics Planning

Hazards Addressed: Emergency Services/Multi-Hazard

Goals Addressed: 1, 4, 5, 6

Issue/Background: Multiple public agencies, private partners, and non-public safety groups provide aid during emergency events. Improved logistical planning amongst all of these partners would improve the ability to serve the region during emergency situations or hazardous events.

Project Description: Develop a logistical response plan that incorporates public agencies, private partners, and non-public safety groups.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: To be determined

Priority (H, M, L): H

Responsible Office: To be determined

Cost Estimate: Unknown

Benefits (Losses Avoided): A response logistic plan coordinated by public agencies, private partners, and non-public safety groups will improve emergency services to the area during times of need.

Potential Funding: State and Federal Grants, Local Funds

Schedule: To be determined

11. 200-Year Flood Protection for Sphere of Influence Area

Hazards Addressed: Flood & Levee Failure

Goals Addressed: 1, 2, 4, 6

Issue/Background: The southwest portion of the City's Sphere of Influence is located within the 200-year floodplain.

Project Description: Construct a J-levee around the southwest portion of the City's Sphere of Influence to protect the urban area and allow development to occur per the City's General Plan.

Other Alternatives: Improve the Sutter Bypass Levee to provide 200-yr flood protection.

Existing Planning Mechanism(s) through which Action Will Be Implemented: To be determined

Priority (H, M, L): H

Responsible Office: Yuba City Public Works

Cost Estimate: $70+ Million

Benefits (Losses Avoided): Provide 200-year flood protection to the City's Sphere of Influence area, thereby reducing flood risk.

Potential Funding: Federal and State Funds or Grants, Local Funds

Schedule: Within next 10 years

12. Alternative Methods to Dispose of Treated Wastewater Effluent

Hazards Addressed: Flood & Levee Failure

Goals Addressed: 1, 2, 4, 6

Issue/Background: When water levels in the Feather River are high enough, the City uses a diffuser line to dispose of treated wastewater. However, due to changes to the river within recent years, the diffuser line is no longer located in an optimal location to be able to utilize it much of the year. Therefore, the City's only other alternative currently is to dispose of the treated wastewater in discharge ponds located on the east side of the Feather River in the floodplain. The discharge ponds have been damaged in past high water events and have been repaired previously using FEMA funds.

Project Description: Develop alternative methods to dispose of treated wastewater effluent through utilizing the effluent for irrigation purposes or relocating the discharge ponds out of the floodplain.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Yuba City Capital Improvement Program

Priority (H, M, L): L

Responsible Office: Yuba City Public Works

Cost Estimate: Estimated $10-$20 Million

Benefits (Losses Avoided): Future mitigation and reconstruction costs of rebuilding the ponds after a major storm event.

Potential Funding: State and Federal Funds or Grants, Local Funds

Schedule: Contingent upon funding availability

13. Establish Backup Power Sources for Critical Facilities within Yuba City

Hazards Addressed: Emergency Services/Multi-Hazard

Goals Addressed: 1, 2, 4, 6

Issue/Background: Yuba City has numerous critical facilities in which all do not have backup power. During times of a power outage, staff has to prioritize those facilities that do not have backup power to determine where portable generators should be placed first. However, there are not enough generators to power all of the critical facilities at the same time.

Project Description: Establish backup power sources for critical facilities within Yuba City.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Yuba City Capital Improvement Program

Priority (H, M, L): H

Responsible Office: Yuba City Public Works

Cost Estimate: $5+ Million

Benefits (Losses Avoided): Reduce the risk of a critical facility losing power thereby making it inoperable, causing property damage and life safety issues.

Potential Funding: State and Federal grants, Local Funds

Schedule: Within next 10 years

14. Yuba City Urban Area Emergency Operations Center

Hazards Addressed: Flooding/Dam Break/Major Community Emergencies & Disasters

Goals Addressed: 1, 2, 4, 5, 6

Issue/Background: At the time of the 1996-97 New Year's Eve flood threat and evacuation, Yuba City's Emergency Operations Center (EOC) was located within the Yuba City Police Department building. This facility is located in an area that could be threatened by both localized flooding, as well as by a catastrophic failure of a levee on the west side of the Feather River.

Yuba City made the decision to relocate the City's EOC to the site of the Yuba City Fire Department's Fire Station No.4, located to the southwest of the City. The new fire station is located on approximately 2.5-acres and was occupied in 2009. The site is a part of 10-acres of

land that is undeveloped but has been master planned for a future training site and EOC. The current fire station can provide sleeping accommodations and large scale food preparation for emergency managers during an emergency, has sufficient open hard surface for staging of equipment and personnel for emergency response, and is sufficiently west of the threat of flooding, while still on the edge of the urbanized City.

The City of Yuba City and the County of Sutter each have their own individual EOC, with the City's being within the City boundaries and the County having their in the community of Sutter, located approximately 10-15 miles west of Yuba City. In past flood threats to our community, City and County emergency managers have had to drive back and forth between facilities to discuss mutual emergency response (i.e., announcing voluntary and mandatory evacuation orders, planning for evacuation routes, and related emergency responses) that proved to be time consuming and fraught with communication problems. Both of the existing EOC facilities are too small for a joint operation, so liaisons representing the two agencies are posted in each EOC to assist in coordination of actions and communications. Having a facility that allows for joint emergency operations between the City and the County will assist in coordination of planning and response.

Project Description: We are proposing to construct a building of approximately 7,000 square feet that will house the Yuba City/Sutter County Regional EOC. We estimate the facility to cost approximately $4.0 million. This cost would include construction, audio-visual/voice data/communications equipment, and furnishings. The proposed facility would also have an emergency generator as well as a 2,000-gallon fuel tank which will keep the entire facility fully operational for up to seven days without refueling. The project will entail architectural and engineering professional services, including design and development of plans and specifications, off-site improvements, building construction and fixtures, furnishings and equipment, permits, administrative costs and fees, and project contingency.

This facility will be a centralized location to support multi-agency and/or multi-jurisdictional disaster response coordination and communication to easily serve as a location for a Yuba City Urban area regional EOC between the County, two cities and other governmental agencies (i.e., school districts, levee districts, etc.).

Other Alternatives: We do not see any feasible alternative in light of the above mentioned background. As an interim measure, Yuba City Fire applied for and will receive $111,289 from the California Department of Water Resources' Flood Emergency Response Project Grant program which will provide funding for high speed data link upgrades, telephone system improvements and electrical upgrades to Fire Station No.4. Fire Station No.4 is located at 150 Ohleyer Road in southwest Yuba City. The proposed upgrades and improvements will make the facility fully functional as a regional EOC for those governmental agencies in the Yuba City Urban Area that are involved in all hazards emergency response. The facility will be able to accommodate emergency managers from the City, County, levee districts, Gilsizer Drainage District and other local agencies involved in the emergency response, while providing for better

coordination and management of regional resources and assets. These improvements are viewed as only an interim measure, as Fire Station No.4 is a full service operational fire station, and a lengthy EOC operation will have an adverse impact on the station's operation and response.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Yuba City Fire has hired HMC Architects of San Francisco to develop a site plan for an Emergency Operations Center and a regional training facility proposed to be built on a City-owned parcel located adjacent to Yuba City Fire Station No.4. An initial Site Plan of Development has been completed, but we are working to finalize the development plan.

Priority (H, M, L): High

Responsible Office: Yuba City Fire Department

Cost Estimate: $4 million

Benefits (Losses Avoided): The proposed facility upgrades to Yuba City Fire Station No.4 will improve the coordination and communications of emergency management and response of multiple agencies located in the Yuba City Urban Area.

In the Yuba City Urban Area, multiple agencies are working closely together in managing the flood fight. Although, Levee District Nos. 1 & 9 are responsible for the west Feather River levees protecting the Yuba City area, City of Yuba City personnel provide trained personnel to conduct levee patrols during the incident and will mobilize people and equipment, under the direction of the appropriate levee district, to deal with boils and other structural problems encountered along the levees. The City of Yuba City, County of Sutter, Levee District No.1, Levee District No. 9 and the Gilsizer Drainage District have experience of sharing information, personnel and equipment during flood threat incidents, but we have had difficulty communicating with each other due to each organization managing the incident out of different facilities. This facility will allow for greater coordination and communication during such incidents, and will foster more efficient and effective deployment of resources and decision making.

The proposed project is consistent with SEMS and NIMS in that the Yuba City Urban Area Emergency Operations Center fosters the Incident Command System bringing responsible responding agencies together in a structured format to respond in a coordinated and effective way to maximize resources and personnel and decision-making processes. Furthermore, the proposal encourages and provides for Multi-Agency Coordination Systems by bringing all area emergency response stakeholders into a common operational area to coordinate activities above the field level and to prioritize the incident demands for critical or competing resources thereby facilitating the effective use of personnel and resources. This unified command concept with assist in standardizing communications operations, functional response and collaborative decision making while allowing agencies with different legal, geographic and functional responsibilities to coordinate, plan and interact effectively. The proposal also assists in assuring

effective and responsive dissemination of vital public information by operating a Joint Information Center at the Yuba City Urban Area Emergency Operations Center.

The Sutter County/OA Emergency Operations Center is located approximately 10 miles west of Yuba City in the town of Sutter at the base of the Sutter Buttes. The Sutter County/OA emergency operations center is adequate for their agency's needs but is inadequate to service the needs of a Yuba City Urban Area coordinated emergency response.

The City's EOC site is located closer to the flood incident, but still far enough away for safety and continuity of the emergency management operation. The site is closer for local response agencies to meet and coordinate response efforts. The facility offers continuity of response because of features offered at the fire station (i.e., food preparation, sleeping, bathroom/showers, large secured parking/staging area, etc.).

The facility upgrades will also provide a working platform/location for California Department of Water Resources responders to work from when responding to and managing flood emergencies in the Yuba/Sutter area.

Potential Funding: As an interim measure, the Yuba City Fire Department applied for and received a $111,289 award from the California Department of Water Resources' Flood Emergency Response Project Grant program to upgrade the apparatus bay of Yuba City Fire Station No.4 to act as the City's fully functional and operational Emergency Operations Center (EOC). The intent is to operate the facility as a Yuba City Urban Area Regional EOC so as to include the City, County, levee districts, school districts, etc. in the coordination of the area's response to a community-wide emergency. The City plans on applying for funding under FEMA's Emergency Operations Center grant program or similar programs to fund the construction of the proposed facility.

Schedule: Within next 5 years, dependent on funding.

Multi-Jurisdictional Mitigation Actions

15. Enhance Public Awareness of the Affects of Natural Hazards and Public Understanding of Disaster Preparedness

Hazards Addressed: All (priority and non-priority) hazards

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: There are a total of 9 jurisdictions participating in the Sutter County Local Hazard Mitigation Plan. Each jurisdiction is responsible for their own outreach/education program for hazards in their community.

Project Description: The level of effort varies by jurisdiction. All jurisdictions contend with limited resources; some must sacrifice educational outreach campaigns to direct their limited resources to the most critical projects. A single unified outreach program will ascertain both broad and targeted educational needs. Resources will be leveraged by consolidating messaging where appropriate and reaching across jurisdictional lines.

Other Alternatives: Status quo.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing outreach programs will be reviewed for effectiveness. Successful components will be expanded across the broader region.

Responsible Office: Sutter County, Yuba City, Live Oak, all other districts

Priority (H, M, L): High

Cost Estimate: To be determined

Benefits (Losses Avoided): Increase residents' knowledge of potential hazards and activities required to mitigate hazards.

Potential Funding: HMGP Grant

Schedule: Ongoing

16. Planned Multi-Hazard CRS Outreach Projects

Hazards Addressed: Multi-hazard

Goals Addressed: 1, 3, 4, 5, 6

Issue/Background: Sutter County Water Resources, the City of Live Oak, and Yuba City Public Works perform many types of outreach each year to make citizens in the County aware of flooding and other hazards. Each entity handles CRS related projects as appropriate.

Project Description:

For Sutter County 11 projects yearly projects are planned.

- OP1: (October, 2013) Presentation on the National Flood Insurance Program at the National Weather Service – Town Hall meeting in Yuba City.
- OP2: (October, 2013) Presentation on County's flood issues at Sutter County - Board of Supervisors meeting.
- OP3: Presentation to local engineers and designers regarding construction requirements for SFHA, flood openings.

- OP4: Presentation to local realtors concerning flood risk & floodplain management. Advertise one-on-one assistance regarding Property Protection Advice.
- OP5: Post informational material on Facebook. Advertise one-on-one assistance regarding Property Protection Advice.
- OP6: Include annual postcard with tax bill. Advertise one on one assistance regarding Property Protection Advice.
- OP7: Include an article in the Recology (waste collection provider's) newsletter.
- OP8: Host an informational booth at the Yuba-Sutter Home & Garden Show.
- OP9: A brochure "Building in a High Risk, Special Flood Hazard Area - Do I Need to Elevate?"
- OP10: A brochure for Southeast Sutter Basin - "Important Information in the Event of Flood"
- OP11: A brochure for Robbins Basin - "Important Information in the Event of Flood"

For Live Oak, the City plans to continue to implement and improve the City's CRS Program

For Yuba City, the City plans to continue to implement and improve the City's CRS Program

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CRS Program

Priority (H, M, L): High for Sutter County, medium for Live Oak and Yuba City

Responsible Office: CRS Coordinator/Sutter County Water Resources, Live Oak, Yuba City Public Works

Cost Estimate: Staff time and printing costs.

Benefits (Losses Avoided): Increased awareness for citizens of flood risk and other natural disaster that can affect the County. This also gives points for CRS, which helps to keep costs for flood insurance holders in the County down.

Potential Funding: Existing budget

Schedule: 2013-2014 schedules are in place. This project is ongoing and will continue until the next update of this Plan.

17. Implementation of CRS Activities

Hazards Addressed: Multi-Hazard

Goals Addressed: 1, 2, 3, 4, 5 and 6

Issue/Background: The CRS Program brings several mitigation concepts under one umbrella to help communities develop solid floodplain management programs by reducing flood losses, protecting properties from flood damage, and helping to strengthen the insurance aspects of the NFIP. The CRS is one of FEMA's premier mitigation programs which also help's to mitigate damage from other natural hazards. Communities who implement CRS activities receive a rating which results in the reduction of flood insurance premiums for policy holders in that community. Sutter County, Yuba City and Live Oak all participate in the CRS Program and will be verified under the 2013 CRS Coordinators Manual. This also provides continued compliance with the NFIP.

Project Description: Continue to implement CRS Activities and look for additional CRS credits under the 2013 CRS Coordinator's Manual to better protect residence from flood damage and other natural hazards.

Other Alternatives: None

Priority (H, M, L): High

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: Staff time

Benefits (Losses Avoided): Increased flood protection and reduction in the cost of flood insurance

Potential Funding: Existing Budget

Schedule: Ongoing

18. Review and Amend Flood Damage Prevention Ordinance, as Appropriate

Hazards Addressed: Flood, Levee Failure

Issues/Background: A community's flood damage prevention ordinance sets minimum rules, regulations, and standards for development in the SFHA. Since these standards are minimum protection standards, higher regulatory may be necessary to better protect properties from potential flood damage. This is certainly true when FIRM maps are updated, when floor control projects are completed or when a community has experienced a recent flood. Since only part of Sutter County has been mapped by the NFIP, an evaluation of current regulations is necessary for the county, Yuba City and Live Oak. Each community should evaluate their current higher regulatory standards and make decisions if additional higher standards may be necessary to protect both current and future development. Evaluation of higher regulatory standards is also

important because of changes in the 2013 CRS Coordinator's Manual. This also provides continued compliance with the NFIP.

Project Description: Review current flood damage prevention higher regulatory standards and assess the need for additional higher regulations in terms of protecting both current and future development from potential flood damage.

Other Alternatives: None

Priority (H, M, L): Medium

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: Staff time

Benefits (Losses Avoided): Increased flood protection and reduction in the cost of flood insurance

Potential Funding: Existing Budget

Schedule: Next 2 years

Goals Addressed: 1, 2, and 4

19. Implement County-Wide Stormwater Management Ordinance

Hazards Addressed: Flood, Severe Storm (Heavy Rainfall)

Goals Addressed: 1, 2, and 4

Issues/Background: Continuity of stormwater standards is important for everyone in a watershed or in watersheds throughout a county. Common stormwater regulations mean that no one is ignoring a problem and passing it on to someone else downstream. Therefore is critical that Sutter County, Yuba City and Live Oak work together to create a unifies stormwater management ordinance that provides for retention and detention when necessary so there is no adverse impact on adjoining properties or communities downstream. Controlling stormwater (runoff from impervious surfaces) is essential as communities develop. A unified county-wide stormwater management ordinance will also help all CRS communities in the county achieve more credit for Activity 450 - Stormwater Management because they will all be regulating to the same standards.

Project Description: Sutter County, Yuba City and Live Oak will work together to implement a county-wide stormwater management ordinance so that uniform regulations are in place

throughout the county and that protections are in place to prevent increased runoff from creating adverse impacts downstream even outside of Sutter County.

Other Alternatives: Leave current fragmented regulations in place

Priority (H, M, L): Medium

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: $40,000

Benefits (Losses Avoided): Increased flood protection and reduction in the cost of flood insurance

Potential Funding: Existing Budget and possible CBGD or state funding

Schedule: Within 5 years

20. Prepare Post-Disaster Guidance Materials

Hazards Addressed: Multi-Hazard

Goals Addressed: 1, 2, 3, 4, 5 and 6

Issue/Background: After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- Patrolling evacuated areas to prevent looting,
- Providing safe drinking water,
- Monitoring for diseases,
- Vaccinating residents for tetanus and other diseases,
- Clearing streets, and
- Cleaning up debris and garbage.

Throughout the recovery phase, everyone wants to get "back to normal." The problem is that "normal" means the way they were before the disaster, exposed to repeated damage from future disasters. There should be an effort to help prepare people and property for the next disaster. Such an effort would include:

- Public information activities to advise residents about mitigation measures they can incorporate into their reconstruction work,
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs,

- Identifying other mitigation measures that can lessen the impact of the next disaster,
- Acquiring substantially or repeatedly damaged properties from willing sellers,
- Planning for long-term mitigation activities, and
- Applying for post-disaster mitigation funds.

Making sure the general public understands the requirements for post-disaster cleanup and reconstruction is vital to ensuring that a community recovers quickly and safely from a disaster. Preparing public information materials to distribute to the public will help educate citizens on the correct procedures for both cleanup and post-disaster reconstruction and development.

Project Description: Sutter County, Yuba City and Live Oak will work together to prepare outreach educational materials which identify correct procedures for both cleanup and redevelopment after a disaster to better educate residents of the requirements for rebuilding, etc..

Other Alternatives: None

Priority (H, M, L): Medium

Responsible Office: Sutter County Department of Water Resources, Yuba City Engineering Department, and Live Oak's Building Department

Cost Estimate: Staff time

Benefits (Losses Avoided): Educating the public on the requirements for post-disaster redevelopment will ensure safer conditions during and after a disaster through timely information on how and when structures can be rebuilt, etc.

Potential Funding: Existing Budget

Schedule: Within 5 years

21. Feather River Regional Flood Management Plan

Hazards Addressed:

- Description of the current flood management conditions
- Opportunities for improved flood management while achieving multiple objectives (flood protection, agricultural conservation and habitat restoration, for example)
- Needed projects based upon priority
- Preliminary financing plans

Goals Addressed: 1, 2, 3, 4, 6

Issue/Background: The regional planning process will partner local governments and stakeholders with DWR to identify and prioritize projects in the Feather River Region that will accomplish the goals established in the Central Valley Flood Protection Plan. The region's goals are to build on the successes of recent flood management efforts and to position the region to implement actions by maximizing remaining Prop 1E and 84 bond funds. The end result will be actions to reduce flood risk in urban, rural and small communities through a combination of improvements to the levee system, as well as updated emergency response and recovery plans.

Project Description: The Yuba County Water Agency (YCWA), Three Rivers Levee Improvement Authority (TRLIA), Marysville Levee Commission (MLC) and Sutter Butte Flood Control Agency (SBFCA) are partnering to develop the Feather River Flood Management Plan. Flood Management projects included in the plan will be eligible for future state and federal funding.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: Sutter Butte Flood Control Agency

Cost Estimate: $1,200,000

Benefits (Losses Avoided):

- Flood management challenges and deficiencies at the regional levee identified
- Potential solutions/projects identified and prioritized
- Financial strategies that identify benefits and sources of funding for project implementation identified

Potential Funding: The planning process is being funded in full by the Department of Water Resources with bond funding approved by California voters in 2006. The completed plan will be considered by the State for a 2017 update to the Central Valley Flood Protection Plan, which was originally approved by the Central Valley Flood Protection Board in 2012.

Schedule: Completed in fall 2014

22. Feather River West Levee Rehabilitation Project

Hazards Addressed: Flood, Levee Failure

Goals Addressed: 1, 2, 6

Issue/Background: Under and through seepage problems have resulted in major levee failures in Yuba City in 1955 and 1997. As a result, the levee does not provide 100-year flood protection as required by the Federal Emergency Management Agency (FEMA), or the state's requirement for 200-year flood for areas with more than 10,000 residents.

Project Description: Rehabilitation of 44 miles of levees along the west bank of the Feather River, from Thermalito Afterbay south to the Sutter Bypass, will address underseepage and through-seepage which is caused by water pressure and velocity both under and through the levees.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: Sutter Butte Flood Control Agency

Cost Estimate: $312 million for Project 1 and Project 2

Benefits (Losses Avoided): Provide 200-year level of flood protection for urban areas in the Sutter Basin, and provide 100-year flood protection for non-urban areas in the southern portion of the Basin.

Potential Funding: SBFCA has received an initial design grant from DWR for $9 million and expects to receive multiple construction/implementation grants to fund approximately 76 percent of the total cost. The local funding is generated from an assessment district passed by Sutter and Butte County property owners in 2010.

Schedule: Construction on the first portion of the work – near Shanghai Bend, south of Yuba City – began on July 22, 2013. Work is scheduled to continue through the 2015 construction season.

23. River Level Gauge System

Hazards Addressed: Flood

Goals Addressed: 1, 2, 6

Issue/Background: Sutter County maintains (5) five river gauges to monitor river levels and aid in the evacuation of affected areas on all stream reaches in the County, Live Oak, and Yuba City. These systems have been in use since 1998 and were upgraded in 2010 with Homeland Security grant funds.

Project Description: Sutter County has relied on this system for real time localized alert and warning regarding high water events on river levees. As with any system it requires funds and equipment to maintain and sustain this system.

Other Alternatives: To use the Department of Water Resources river gauges. These gauges are not in prime locations to provide accurate and timely alert and warning.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Project is a continuation of efforts currently in place.

Priority (H, M, L): High

Responsible Office: Sutter County Office of Emergency Management, City of Live Oak, Yuba City

Cost Estimate: Varies. Last upgrade in 2010 cost $21,000. Occasional vandalism has cost between $1,500 and $2,500. Currently, there is a need for replacement of equipment at location at the cost of $2,000.

Benefits (Losses Avoided): With this system in place and maintained it provides effective warning and notification to Sutter County OEM for emergency response.

Potential Funding: Funding would be from grants or the general fund.

Schedule: Project is in place. Maintenance and sustainment are ongoing

24. Sutter Basin Feasibility Study

Hazards Addressed: Flood, Levee Failure

Goals Addressed: 1, 2, 6

Issue/Background: The Sutter Basin Feasibility Study was initiated in 2000 and a Feasibility Scoping Meeting was held in January 2005. However the study remained essentially inactive until the formation of the Sutter Butte Flood Control Agency (SBFCA), which agreed to serve as the local partner along with the Central Valley Flood Protection Board (CVFPB) in 2007.

Project Description: The purpose of the Study is to document the planning process leading up to the recommendation of the tentatively selected plan (TSP) and in doing so reaffirm Federal interest, identify the national economic development (NED) plan, identify the locally preferred plan (LPP), and evaluate residual risk. Plans were evaluated at a suitable level of detail for the identification of the NED and LPP plans. Refined analysis, including total project costs, will be presented in the Final Report which is issued as a Chief of Engineers Report.

Other Alternatives: N/A

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: Sutter Butte Flood Control Agency along with U.S. Army Corps of Engineers

Cost Estimate: $18 million

Benefits (Losses Avoided): Provide 200-year level of flood protection for urban areas in the Sutter Basin, and provide 100-year flood protection for non-urban areas in the southern portion of the Basin. Achieve Federal financial interest in levee improvements to protect the Butte/Sutter basin.

Potential Funding: The Study is cost shared 50-50 by Federal (USACE) and Non-Federal (State of California and SBFCA) partners.

Schedule: The Study is projected to be completed by the end of 2013.

Annex C GILSIZER COUNTY DRAINAGE DISTRICT

C.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Gilsizer County Drainage District, a participating jurisdiction to the Sutter County 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 risk assessment and mitigation strategy for this community.

C.2 Planning Process

As described above, the District followed the planning process detailed in Section 3.0 of the base plan. In addition to providing representation on the Sutter County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants included staff from the following District departments:

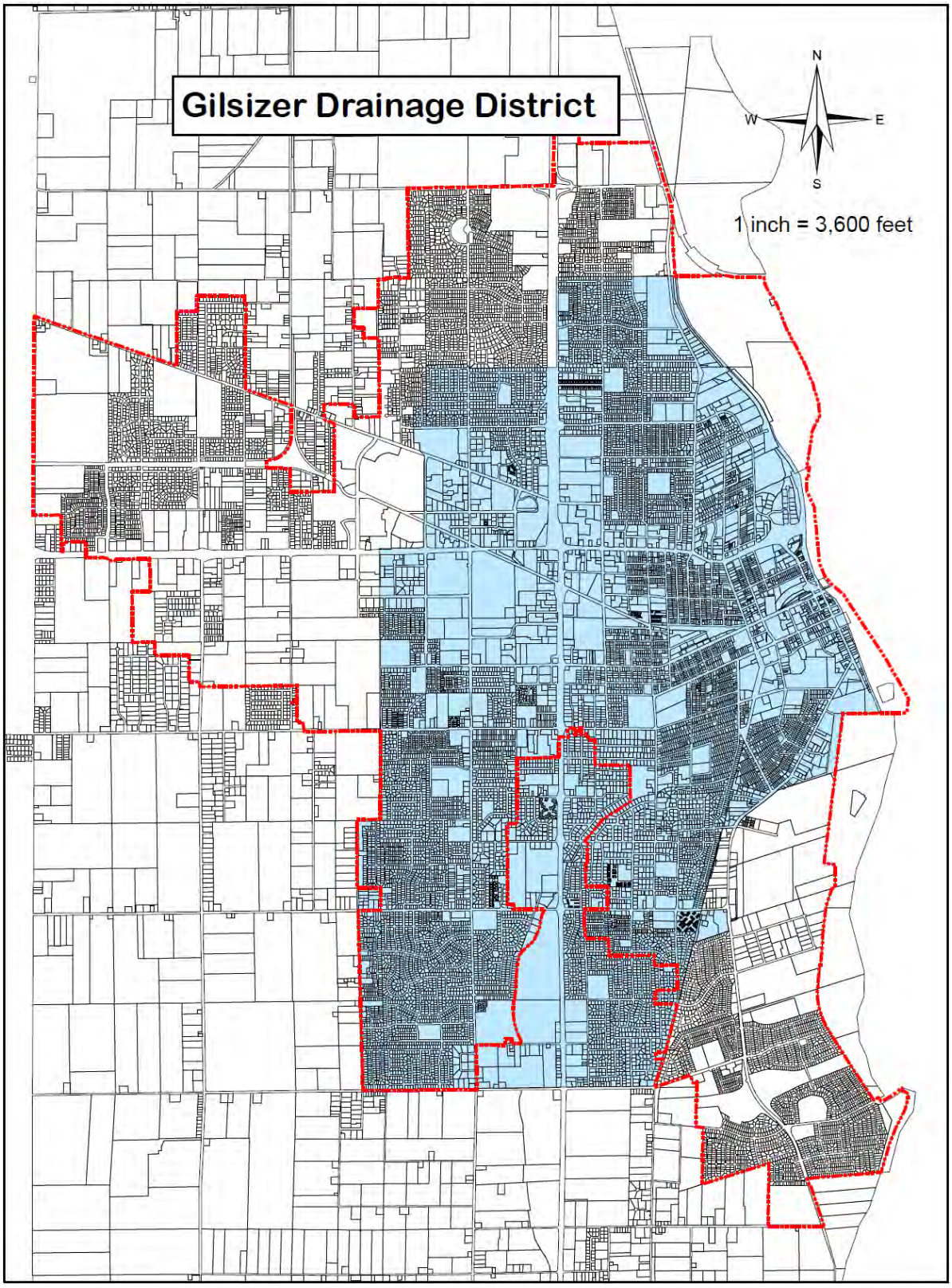
- Diana Langley, Interim District Manager

Additional details on plan participation and District representatives are included in Appendix A.

C.3 Community Profile

The community profile for the District is detailed in the following sections. Figure C.1 displays a map and the location of the District within Sutter County.

Figure C.1. Gilsizer County Drainage District Base Map



Source: Gilsizer County Drainage District

C.3.1 History

Gilsizer County Drainage District was formed in 1963 to improve storm drainage service to the Yuba City area and to maintain Gilsizer Slough and other district drainage facilities. The District comprises 6,005 acres including most of the City of Yuba City (see Figure C.1). The District's major facilities are Gilsizer Slough and a pumping station near the Feather River levee north of the Tenth Street Bridge. The pumping station collects storm drainage from approximately 2,500 acres of the northeasterly part of Yuba City and discharges directly into the Feather River. Most of the City and surrounding area drain to Gilsizer Slough.

The Gilsizer County Drainage District is responsible for the operation and maintenance of drainage ditches that direct storm water runoff away from developed and improved properties in the low-lying Yuba City area of Sutter County. The ditches have been cut and channeled through native soils and backfill, with each drainage ditch having sloped banks.

According to the District, while some improvements to the system have been made to increase capacity with the expansion of the Yuba City Urban Area, some areas still need further improvements. Flooding still occurs in parts of Yuba City caused by old pipelines designed for small flows. The District will continue to make improvements to the Slough, increasing capacity as required by expanding areas of development.

C.4 Hazard Identification and Summary

This section details how the risk varies across the Sutter County planning area. The District's planning team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the District (see Table C.1). In the context of the plan's planning area, there are no hazards that are unique to the District.

Information on past occurrences and the likelihood of future occurrences is detailed in Section 4, Risk Assessment, of the base plan. Additional information for high and medium significant hazards for the District is included in the Vulnerability Assessment section of this Annex.

Table C.1. Gilsizer County Drainage District Hazard ID Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure	Extensive	Unlikely	Catastrophic	High
Drought & Water shortage				
Earthquakes				
Earth Movements: Erosion	Limited	Occasional	Limited	Low
Earth Movements: Landslide				
Floods: 100/200/500 year	Extensive	Occasional	Catastrophic	High
Floods: Localized Stormwater	Significant	Occasional	Critical	Medium
Invasive Species: Pests/Plants				
Levee Failure	Extensive	Occasional	Catastrophic	High
Marine Invasive Species				
Severe Weather: Extreme Cold/ Freeze				
Severe Weather: Extreme Heat				
Severe Weather: Fog				
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Extensive	Highly Likely	Critical	Low
Severe Weather: Tornado				
Volcanoes				
Wildfires				

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

C.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment of the base plan. This vulnerability assessment provides an inventory of the property and other assets located within the District and further analyzes those assets at risk to identified hazards ranked of medium or high significance (as listed in Table C.1) to the community. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the main plan.

C.5.1 Total Assets at Risk

This section identifies the District's total assets at risk, including values at risk, critical facilities and infrastructure.

Values at Risk

Significant assets directly within the District include a range of properties and infrastructure. These may include District-owned property and infrastructure. An inventory of key district assets is provided in Table C.2. Total value of these assets exceeds $600,000 for the District.

Table C.2. Key Assets in the District

Name of Asset	Facility Type	Replacement Value	Hazard Info
Storm Pump Stations	Wastewater Treatment Facility	$600,000	Dam Failure, Flood, Localized Flooding, Levee Failure

Source: Gilsizer County Drainage District

C.5.2 Priority Hazards: Vulnerability Assessment

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table C.1 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the base plan for more detailed information about these hazards and their impacts on the Sutter County planning area).

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.

Dam Failure

Vulnerability to Dam Failure

Likelihood of Future Occurrence—Unlikely
Vulnerability—High

The most significant risk from flooding in the District results from the potential for dam or levee failure. Dam failure occurs when a dam is not structurally sound or is unable to withstand damages resulting from seismic activity. The degree and speed of dam failure depends on the dam's structural characteristics. There are 10 dams located outside Sutter County that could cause significant flooding should failure occur. Table C.3 lists six dams that are located on the Feather River and Yuba Rivers. Failure of any one of these dams could cause significant flooding in the District. These dams are under the jurisdiction of the California Department of Water Resources (DWR), Yuba County Water Agency, Pacific Gas & Electric, and the Corps of Engineers.

Table C.3. Dams Upstream of Yuba City

Dam	Owner	Stream	Type
Oroville Dam	State Department of Water Resources	Feather River	Earth
New Bullards Bar	Yuba County Water Agency	Yuba River	Radius arch
Lake Almanor	Pacific Gas & Electric	Feather River (North Fork)	Earth and rock
Thermalito Afterbay Dam	State Department of Water Resources	Feather River	Earth
Thermalito Forebay Dam	State Department of Water Resources	Feather River	Earth
Englebright Dam	Corps of Engineers	Yuba River	Radius arch

Source; 2004 Yuba City General Plan Update

Due to the topography surrounding the District, dam failure would result in water of significant depth in the District (should the levees breach). This is due to the "bowl effect" of the southern

portions of the County, which can be seen on Figure 4.88 in Section 4.3.9 of the base plan. The District would also have ample warning time to prepare evacuations.

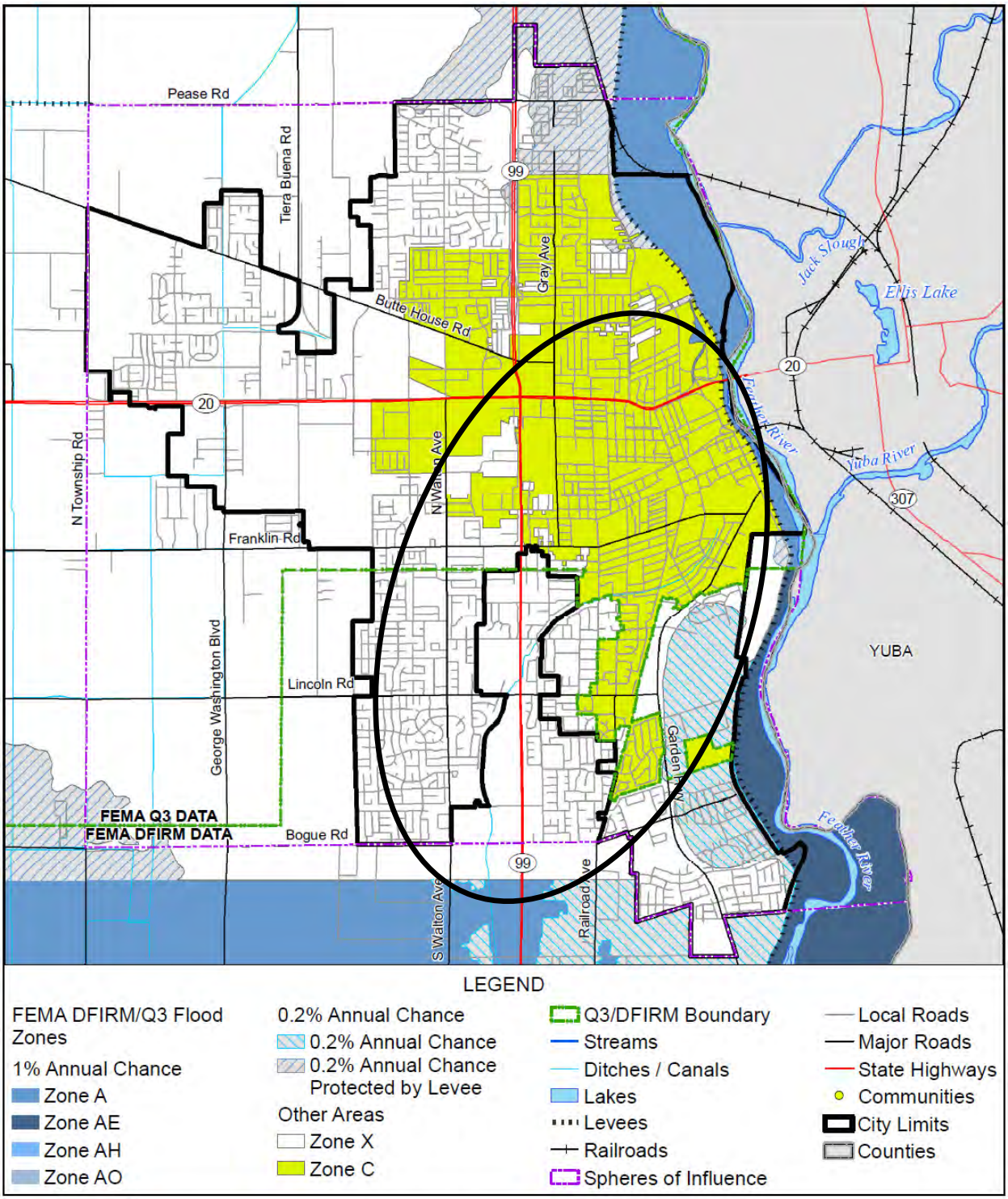
Floods: 100/500 year

Vulnerability to Floods: 100/500 year

Likelihood of Future Occurrence—Occasional/Unlikely
Vulnerability—High

A small portion of the City of Yuba City is located inside of the 100 year flood zone as defined by the Federal Emergency Management Agency (FEMA). This is seen in Figure C.2. The District is approximated by the black circle.

Figure C.2. City of Yuba City DFIRM



The two significant hazards facing the drainage district are winter storms and flooding. Typically, during large winter storm events, excessive rainwater runoff collects in and flows through the drainage ditches in the Gilsizer County Drainage District. These large volumes of high-velocity water erode the banks of the drainage ditches and along the toes of the banks where they intercept the bottom of the ditches. Storm water runoff into the banks of the ditches creates gullies and irregular depressions and undermine the integrity of the ditches. Damages associated with past hazard events include those detailed below:

- December 17, 2005 to January 3, 2006: Severe storms and flooding caused excessive amounts of rainwater runoff to collect in and flow through the Gilsizer drainage ditch. Ditch slope and toe erosion to 21 areas of the ditches resulted in excess of $313,749 in damages.

Floods: Localized Stormwater

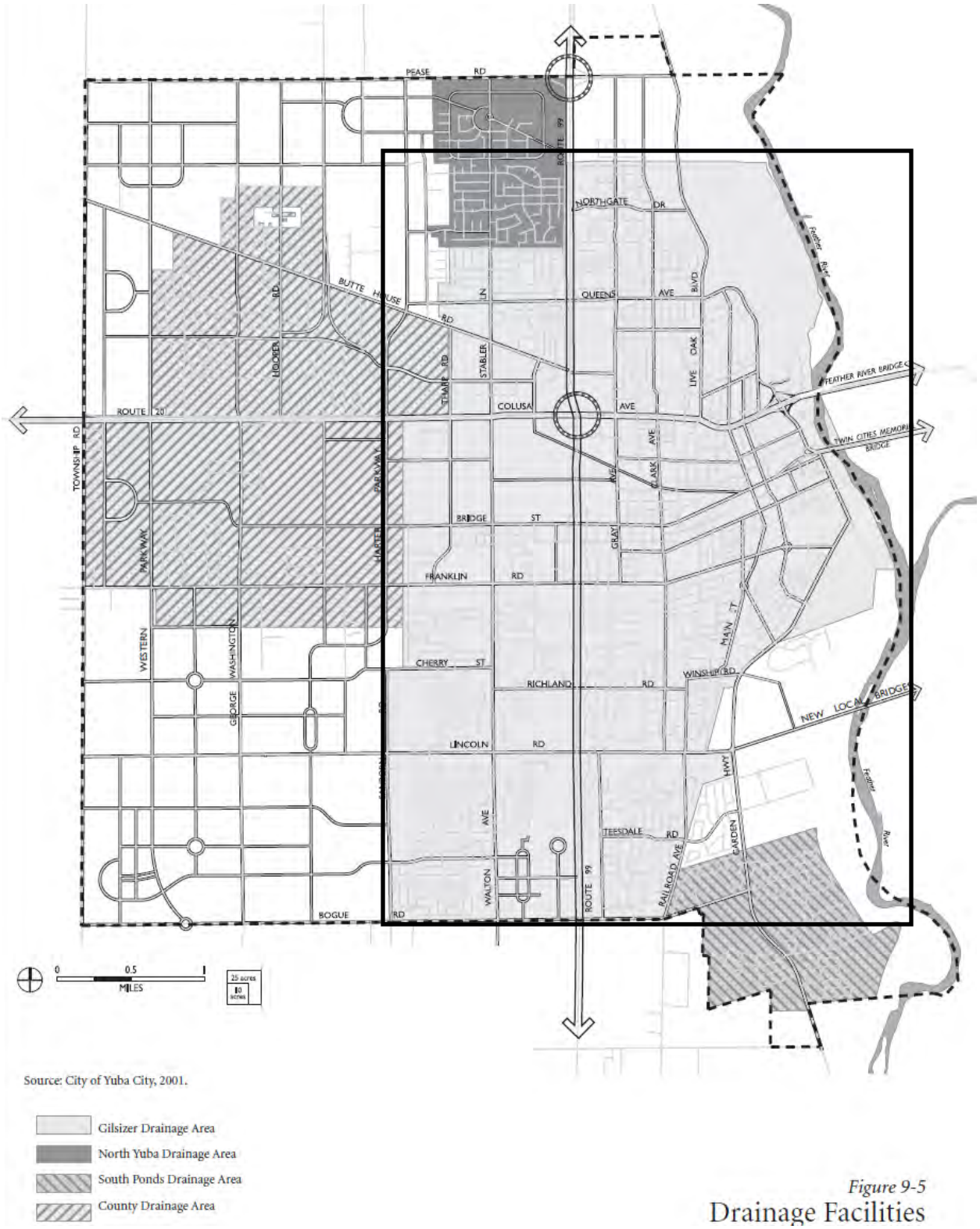
Vulnerability to Floods: Localized Stormwater

Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

Drainage and stormwater runoff are related issues, contributing to potential flooding, which is the most significant risk to life and property in the District and Yuba City. The City is located on an alluvial terrace that generally drains to the southwest. The Sacramento River drains the entire county and the Sacramento Valley with the final outlet being the Delta and San Francisco Bay. Drainage facilities in Yuba City include the Gilsizer Slough. This area is summarized below and illustrated in Figure C.3 (with the Drainage District area in the black box).

- **Gilsizer Slough**. At one time, this natural drainage channel drained Yuba City and areas to the south of the urban area. The Slough discharges to the State Drain, which flows north to State Pumping Plant No. 2, and then into the Sutter Bypass. Tributaries to the Gilsizer Slough are included in the Gilsizer County Drainage District, except for a small area north of Colusa Highway, which is pumped into the Feather River.

Figure C.3. Drainage Facilities in Yuba City



Source; 2004 Yuba City General Plan Update

In 2007, the Local Agency Formation Commission (LAFCO) performed municipal service reviews and found the following:

> To determine the need for future improvements, the District uses the recommendations of the "Nolte Report." District officials predict that storm drainage from within the District boundaries has the potential to increase by 30 percent over the next several years after which there should be little further increase from the present area. The District has investigated possible approaches to funding for improvements but there have been no final decisions to this regard.

There is a need to perform another study of the District facilities because the system was originally designed to handle a 50-yr storm and there is a need to determine what improvements would be required to provide 100-yr storm conveyance.

According to the HMPC, all localized flooding in the Yuba City area has been mitigated with specific projects and the requirement for new development to provide on-site detention.

Levee Failure

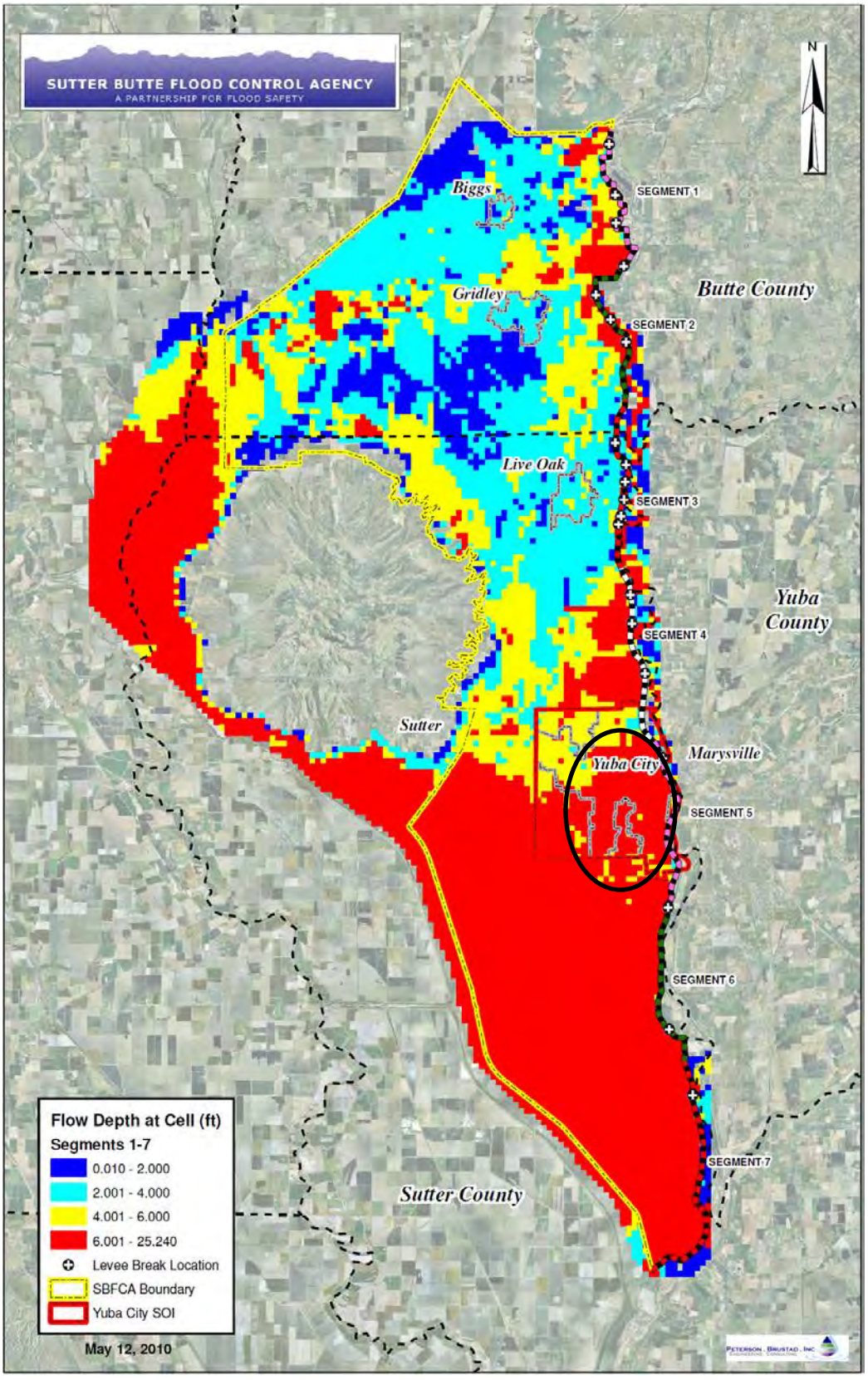
Vulnerability to Levee Failure

Likelihood of Future Occurrence—Occasional
Vulnerability—High

The most significant risk from flooding in the District and Yuba City results from the potential for levee failure. Overtopping of the Feather River levees is considered to be a significant local concern due to the general topography of the region. The Feather River, which forms the eastern border of the District, consists of a large watershed that stretches to the Sierra Crest. The District's location in the lower portions of the watershed exposes the District's facilities to substantial risk from riverine flooding. Additionally riverine flooding can overwhelm the integrity of the local or regional levee system. Levee failure can result if water overtops a levee, if high river levels saturate the levee banks, or if the levee itself is structurally defective. Levee failure can occur very rapidly with little warning. Once a levee is breached, floodwaters can inundate large low-lying areas. Levee overtopping or failure could cause catastrophic flooding in the District. According to the flood break analysis done in the base plan, the District would be inundated with 6 to 25 feet of water. This is seen in Figure C.4. Approximate District boundaries are shown in the black oval. All District facilities would be inundated.

The Slough is also subject to flooding by backwater if there is a break in the Sutter Bypass levee.

Figure C.4. Sutter County Levee Break Scenario Flood Depths



C.6 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 capability assessment is divided into four sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, and mitigation outreach and partnerships.

C.6.1 Regulatory Mitigation Capabilities

Table C.4 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table C.4. Gilsizer County Drainage District Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan	N		
Zoning ordinance	N		
Subdivision ordinance	N		
Growth management ordinance	N		
Floodplain ordinance	N		
Other special purpose ordinance (stormwater, steep slope, wildfire)	N		
Building code	N		Version:
BCEGS Rating	N		
Fire department ISO rating	N		Rating:
Erosion or sediment control program	N		
Stormwater management program	Y		Covered by Yuba City and Sutter County's Stormwater Management Program
Site plan review requirements	N		
Capital improvements plan	N		
Economic development plan	N		
Local emergency operations plan	N		
Community Wildfire Protection Plans	N		
Flood insurance study or other engineering study for streams	Y		
Elevation certificates	N		
Other			

Source: AMEC Data Collection Guide

C.6.2 Administrative/Technical Mitigation Capabilities

Table C.5 identifies the department(s) responsible for activities related to mitigation and loss prevention in the District.

Table C.5. Gilsizer County Drainage District Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	Yes		Yuba City/Sutter County
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	Yes		Yuba City/Sutter County
Planner/Engineer/Scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		
Full time building official	No		
Floodplain Manager	No		
Emergency Manager	Yes		Yuba City/Sutter County
Grant writer	No		
Other personnel	Yes	Operations Supervisor	
GIS Data – Hazard areas	No		
GIS Data - Critical facilities	No		
GIS Data – Building footprints	No		
GIS Data – Land use	No		
GIS Data – Links to Assessor's data	No		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	No		
Other			

Source: AMEC Data Collection Guide

C.6.3 Fiscal Mitigation Capabilities

Table C.6 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table C.6. Gilsizer County Drainage District Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	Y	If City chose to use CDBG funds for drainage improvements that improve Gilsizer.
Capital improvements project funding	Y	Annual budget

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Authority to levy taxes for specific purposes		
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	Y	
Incur debt through general obligation bonds		
Incur debt through special tax bonds		
Incur debt through private activities		
Withhold spending in hazard prone areas	Y	
Other		

Source: AMEC Data Collection Guide

C.6.4 Mitigation Outreach and Partnerships

The district partners with the City of Yuba City, Sutter County, and SBFCA for mitigation projects and outreach.

C.7 Mitigation Strategy

This section describes the mitigation strategy process and mitigation action plan for the Gilsizer County Drainage District's inclusion with the Sutter County Local Hazard Mitigation Plan update.

C.7.1 Mitigation Goals and Objectives

The Gilsizer County Drainage District adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy of the base plan.

C.7.2 Mitigation Actions

The planning team for the District identified and prioritized the following mitigation actions based on the risk assessment and in accordance with the process outline in Section 5, Mitigation Strategy, of the base plan. 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. General processes and information on plan implementation and maintenance of this LHMP by all participating jurisdictions is included in Section 7, Plan Implementation and Maintenance, of the base plan.

1. Master Drainage Study and Improvements to Meet 200-YR Flood Protection

Hazards Addressed: Flood

Goals Addressed: 1, 2, 6

Issue/Background: A Master Drainage Study for Gilsizer Drainage District was prepared in 1979 for the planning period through 2000. The Gilsizer Slough was designed for a 50-year storm with 1 foot of freeboard. Since that time, development projections for the area have changed and the Slough needs to be re-evaluated to determine improvements to provide 200-year flood protection to the area.

Project Description: Prepare a Master Drainage Study that evaluates improvements necessary to provide 200-year flood protection to the urban area. A component of the Study will include development of a Capital Improvement Program and funding mechanism to fund the improvements.

Other Alternatives: There is no viable alternative.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Gilsizer Drainage District Capital Improvement Program

Priority (H, M, L): H

Responsible Office: Gilsizer Drainage District

Cost Estimate: $10+ Million

Benefits (Losses Avoided): Reduce the risk of flooding which reduces property loss.

Potential Funding: HMGP, PDM, FMA, State Funds & Grants, Local Funds

Schedule: Prepare the Master Drainage Study within the next five years and install capital improvements as funding becomes available.

2. Revetment of Slough Channel

Hazards Addressed: Flood

Goals Addressed: 1, 2, 6

Issue/Background: During periods of high water, high-velocity water in the Gilsizer Slough causes ditch erosion and bank failure.

Project Description: Install an interlocking concrete block system to prevent future bank erosion and failure.

Other Alternatives: Line the slough with concrete, pipe the slough to replace the ditches

Existing Planning Mechanism(s) through which Action Will Be Implemented: Gilsizer Drainage District Capital Improvement Program

Priority (H, M, L): H

Responsible Office: Gilsizer Drainage District

Cost Estimate: $5+ Million

Benefits (Losses Avoided): Prevent future erosion to channel slope, and reduce the risk of flooding with reduces property loss.

Potential Funding: HMGP, PDM, FMA, State Funds & Grants, Local Funds

Schedule: Ongoing – Gilsizer staff installs improvements as funding is available.

Annex D LEVEE DISTRICT 1

D.1 Introduction

This Annex details the hazard mitigation planning elements specific to Levee District 1, a participating jurisdiction to the Sutter County 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 risk assessment and mitigation strategy for this community.

D.2 Planning Process

As described above, the District followed the planning process detailed in Section 3.0 of the base plan. In addition to providing representation on the Sutter County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants included staff from the following District departments:

- Bill Hampton, General Manager

Additional details on plan participation and District representatives are included in Appendix A.

D.3 Community Profile

D.3.1 History

Levee District One of Sutter County was the first levee district formed in the State of California in 1868. The District is one of two levee districts within the County responsible for levee maintenance. Levee District One has responsibility for 17 miles of levees along the Feather River from the north end of Yuba City (Pease Road) down river to Markuse Road.

D.4 Hazard Identification and Summary

This section details how the risk varies across the Sutter County planning area. The District's planning team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the District (see Table D.1). In the context of the plan's planning area, there are no hazards that are unique to the District.

Information on past occurrences and the likelihood of future occurrences is detailed in Section 4, Risk Assessment, of the base plan. Additional information for high and medium significant hazards for the District is included in the Vulnerability Assessment section of this Annex.

Table D.1. Levee District 1 Hazard ID Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure	Limited	Likely	Critical	Medium
Drought & Water shortage				
Earthquakes				
Earth Movements: Erosion	Limited	Likely	Critical	Medium
Earth Movements: Landslide				
Floods: 100/200/500 year	Limited	Occasional	Catastrophic	High
Floods: Localized Stormwater				
Invasive Species: Pests/Plants				
Levee Failure	Extensive	Unlikely	Catastrophic	High
Marine Invasive Species				
Severe Weather: Extreme Cold/ Freeze				
Severe Weather: Extreme Heat				
Severe Weather: Fog				
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Significant	Occasional	Critical	High
Severe Weather: Tornado				
Volcanoes				
Wildfires				

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

D.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment of the base plan. This vulnerability assessment provides an inventory of the property and other assets located within the District and further analyzes those assets at risk to identified hazards ranked of medium or high significance (as listed in Table D.1) to the community. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the main plan.

D.5.1 Total Assets at Risk

This section identifies the District's total assets at risk, including values at risk, critical facilities and infrastructure.

Values at Risk

Significant assets directly within the District include a range of properties and infrastructure. These may include District-owned property and infrastructure. An inventory of key district assets is provided in Table D.2. District assets include levees within the jurisdictional boundaries and associated support facilities. Total value of these assets exceeds $100 million for the District.

Table D.2. Key Assets in the District

Name of Asset	Facility Type	Replacement Value	Hazard Info
Levee System	Flood Protection	In excess of $100,000,000	Flood, Levee Failure

Source: Levee District 1

D.5.2 Priority Hazards: Vulnerability Assessment

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table D.1 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the base plan for more detailed information about these hazards and their impacts on the Sutter County planning area).

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.

Dam Failure

Vulnerability to Dam Failure

Likelihood of Future Occurrence—Unlikely
Vulnerability—High

The District lies in the inundation zones of Shasta, Bullards Bar, and Oroville Dam. Failures at any of these facilities could overwhelm the levees.

Earth Movements: Erosion

Vulnerability to Earth Movements: Erosion

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

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. As farmers settled the valleys in the 1800s, the Gold Rush drew prospectors to the hills. As mining in the Sierra Nevada turned to the more "efficient" methods of hydraulic mining, the use of environmentally destructive high-pressure water jets washed entire mountainsides into local streams and rivers. As a result, the enormous amounts of silt deposited in the riverbeds of the Central Valley increased flood risk. As a remedy to these rising riverbeds, levees were built very close to the river channels to keep water velocity high and thereby scour away the sediment. However, the design of these narrow channels has been too successful. While the Gold Rush silt is long gone, the erosive force of the constrained river continues to eat away at the levee system and stream banks within the District.

Floods: 100/500 year

Vulnerability to Floods: 100/500 year

Likelihood of Future Occurrence—Occasional/Unlikely
Vulnerability—High

The hazards facing the District are heavy rain in the mountains and river floods. Flooding could occur as the result of levee failure or overtopping. Yuba City sits on the banks of the Feather River, which is monitored by Levee District One. Over the years the Feather River has been eroding into the levee causing significant concern in some areas. All water coming into the Yuba City basin is pumped out by Gilsizer and others. Levee District One only has the levees to watch over.

In December 1955, the levee breached near Shanghai Bend with the loss of many lives and billions of dollars in property losses.

Levee failure from either breaching or overtopping would result in the total loss of levee embankment material, as was the case in the 1997 flood event (see discussion in levee failure section of this document).

In 2007, the Local Agency Formation Commission (LAFCO) performed municipal service reviews and found that Levee District 1 has sufficient infrastructure planning and practices to ensure that infrastructure and capital facilities can be maintained within the planning period of five years. As a result, the District has sufficient flood and drainage resources to accommodate projected service demands within its current boundaries over the next five years. The District continues to receive an "excellent" rating from the Department of Water Resources.

Levee Failure

Vulnerability to Levee Failure

Likelihood of Future Occurrence—Unlikely
Vulnerability—High

Floods can threaten the District from several sources. Usually, the possibility of flooding can be anticipated from eight to twenty hours before the "Emergency Period" is reached. However, as demonstrated in Linda, California, in February 1986, it is possible for a levee to collapse with little or no warning when there are still four or more feet of freeboard available.

Generally, levees fail due to overtopping or collapse. A catastrophic levee failure resulting from collapse probably will occur very quickly with relatively little warning. Such a failure would occur where the levee is saturated and the high hydrostatic water pressure on the river side, coupled with erosion of the levee from high water flows or an inherent defect in the levee, causes an almost instant collapse of a portion of the levee. Under such circumstances, structures located

relatively near the break will suffer immediate and extensive damage. Several hundred yards away from the break the energy of the flood waters will be dispersed sufficiently to reduce, but not eliminate, flooding damage to structures in its path. The flood water will flow in a relatively shallow path toward any low point in the affected area. Flood water will collect in these low areas and the levels will rise as the flow continues. When the rivers are high, it is not possible to close or repair a levee break until the water surface in the river and the flooded area equalize.

A major overtopping of a levee, if flow persists, will result in severe erosion of the levee crowns on the landward side and cause levee failure over a period of minutes to several hours. A severe levee overtopping can, therefore, be considered as a levee break for the purpose of determining the extent of flooding that any area will suffer. Generally, overtopping can be predicted based on river stages and the warning given depending on the source of the flood waters.

The levees within the District boundaries were built between 1868 and the early 1900s. Over the years, the river has changed courses many times. The straightening of Shanghai Bend and Star Bend levees has relieved much of pressure and helped alleviate a portion of the flooding concerns.

All District levees are considered critical to the operations of the District and in providing adequate flood and drainage control within its boundaries. Should any of these identified assets fail, excessive flooding will occur within the District. Depending on the location of the failure, flooding could cause a small number of residents and property to be inundated to a very large area of the District. Flood water elevations could be anywhere from one to twenty feet in depth for an undetermined amount of time.

Flooding of this magnitude would cause major loss to property owners, destroy historical landmarks, impact local transportation, agricultural crops and public utilities.

Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind

Vulnerability to Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind

Likelihood of Future Occurrence—Occasional
Vulnerability—High

According to historical hazard data, severe weather is an annual occurrence in the District. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrence in the area. Problems associated with the primary effects of severe weather include flooding, pavement deterioration, washouts, high water crossings, landslide/mudslides, debris flows, and downed trees. However, it is the secondary effects of heavy rain and storms that are of concern to the District. Heavy rains can cause riverine flooding, localized flooding, levee failure, and stream bank erosion.

D.6 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 capability assessment is divided into three sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities.

D.6.1 Regulatory Mitigation Capabilities

Table D.3 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table D.3. Levee District 1 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan	N		
Zoning ordinance	N		
Subdivision ordinance	N		
Growth management ordinance	N		
Floodplain ordinance	N		
Other special purpose ordinance (stormwater, steep slope, wildfire)	N		
Building code	N		Version:
BCEGS Rating	N		
Fire department ISO rating	N		Rating:
Erosion or sediment control program	Y		
Stormwater management program	N		
Site plan review requirements	N		
Capital improvements plan	N		
Economic development plan	N		
Local emergency operations plan	Y		
Community Wildfire Protection Plans	N		
Flood insurance study or other engineering study for streams	Y		
Elevation certificates	N		
Other			

Source: AMEC Data Collection Guide

D.6.2 Administrative/Technical Mitigation Capabilities

Table D.4 identifies the department(s) responsible for activities related to mitigation and loss prevention in the District.

Table D.4. Levee District 1 Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	N		
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	N		
Planner/Engineer/Scientist with an understanding of natural hazards	N		
Personnel skilled in GIS	N		
Full time building official	N		
Floodplain Manager	Y		
Emergency Manager	Y		
Grant writer	N		
Other personnel	N		
GIS Data – Hazard areas	N		
GIS Data - Critical facilities	N		
GIS Data – Building footprints	N		
GIS Data – Land use	N		
GIS Data – Links to Assessor's data	N		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	N		
Other			

Source: AMEC Data Collection Guide

D.6.3 Fiscal Mitigation Capabilities

Table D.5 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table D.5. Levee District 1 Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	N	
Capital improvements project funding	Y	
Authority to levy taxes for specific purposes	Y	

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
Incur debt through general obligation bonds	Y	
Incur debt through special tax bonds	N	
Incur debt through private activities	Y	
Withhold spending in hazard prone areas	N	
Other		

Source: AMEC Data Collection Guide

D.7 Mitigation Strategy

This section describes the mitigation strategy process and mitigation action plan for Levee District 1's inclusion with the Sutter County Local Hazard Mitigation Plan update.

D.7.1 Mitigation Goals and Objectives

Levee District 1 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy of the base plan.

D.7.2 Mitigation Actions

The planning team for the District identified and prioritized the following mitigation actions based on the risk assessment and in accordance with the process outline in Section 5, Mitigation Strategy, of the base plan. 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. General processes and information on plan implementation and maintenance of this LHMP by all participating jurisdictions is included in Section 7, Plan Implementation and Maintenance, of the base plan.

1. Bank Erosion Repairs to Levees

Hazards Addressed:

Goals Addressed: 1, 2, 6

Issue/Background: High water and rapid flows have caused erosion of the levee slope in several areas.

Project Description: There are three areas in need of repairs.

- Area 1: 1/5 mile south of Boydes pump boat ramp

- Area 2: one mile south of Stewart Road
- Area 3: behind courthouse building in Yuba City

In Area 1, the river has eroded into the toe of the levee. In Area 2, the river has eroded into the bank close to the toe of the levee for about ¼ of a mile. In both of these areas, the district is working with the USACE and the state to rock the bank along the eroded areas. In Area 3, the river has been eroding into the levee over the years, now causing significant concern. The District is working with the USACE and the state to rebuild the levee toe and then rocking the bank.

Other Alternatives: Leave as is and monitor

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: High

Responsible Office: Levee District 1

Benefits (Losses Avoided): Life Safety and property loss. Prevent future erosion to levee slope and limit potential for a levee breaks in these areas. Should a break occur in the area behind the courthouse, downtown Yuba City would be inundated.

Cost Estimate: To be determined

Potential funding: USACE, State DWR, HMGP, PDM, FMA; Local Funds

Schedule: Within five years

Annex E RECLAMATION DISTRICT 70

E.1 Introduction

This Annex details the hazard mitigation planning elements specific to Reclamation District 70, a participating jurisdiction to the Sutter County 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 risk assessment and mitigation strategy for this community.

E.2 Planning Process

As described above, the District followed the planning process detailed in Section 3.0 of the base plan. In addition to providing representation on the Sutter County Hazard Mitigation Planning Committee (HMPC), the District formulated its own internal planning team to support the broader planning process requirements. Internal planning participants included staff from the following District departments:

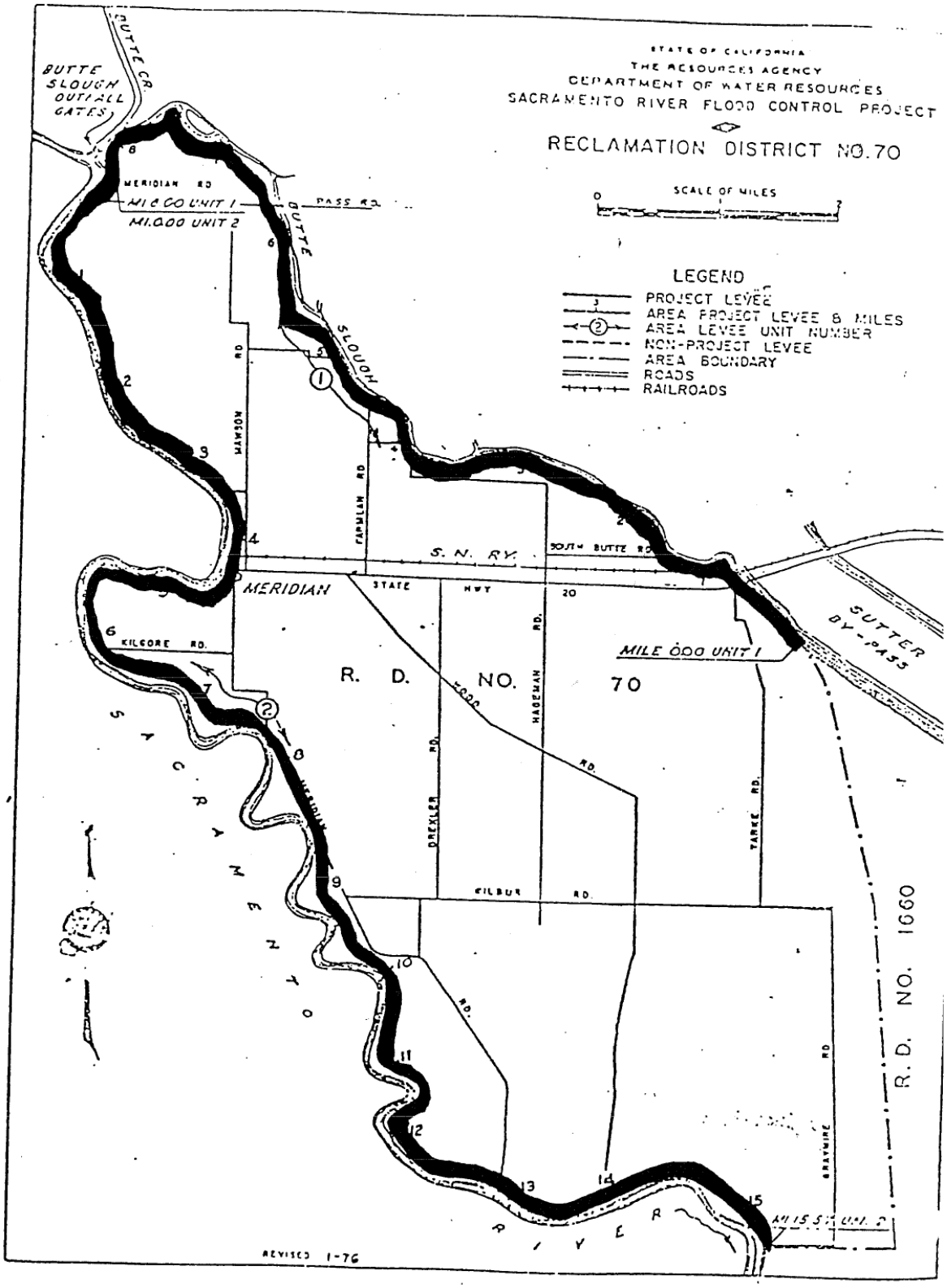
- District Manager

Additional details on plan participation and District representatives are included in Appendix A.

E.3 Community Profile

The community profile for the District is detailed in the following sections. Figure E.1 displays a map and the location of the District within Sutter County.

Figure E.1. Reclamation District 70 Base Map



Source: Sutter County General Plan Background Report

E.3.1 History

Reclamation District 70 (RD 70) was established by voters in 1905 and provides drainage and flood protection to an area surrounding Meridian, CA. The District provides flood protection and drainage by maintaining approximately 23.6 miles of levees, and 100 miles of drainage ditches. The District is bounded by the Sacramento River, Butte Slough and the Sutter By-Pass, and is generally located just inside the western boundary of Sutter County, east of Colusa County (see Figure E.1). The District is approximately 17 miles west of Yuba City, and serves an area of approximately 20,315.02 gross acres, or 31.74 square miles. The predominant land uses within the District are agricultural.

Reclamation District 70 and Reclamation District 1660 share management, employees, offices and equipment. Daily operations for RD 70 and RD 1660 occur from the RD 70 facility. While the District currently shares resources with Reclamation District 1660, it remains autonomous by holding meetings and determining assessments relevant to RD 70. Therefore there are limited opportunities to share additional facilities and resources.

E.4 Hazard Identification and Summary

This section details how the risk varies across the Sutter County planning area. Each district's planning team identified the hazards that affect each District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to each District (see Table E.1). In the context of the plan's planning area, there are no hazards that are unique to the District.

Information on past occurrences and the likelihood of future occurrences is detailed in Section 4, Risk Assessment, of the base plan. Additional information for high and medium significant hazards for the District is included in the Vulnerability Assessment section of this Annex.

Table E.1. Reclamation District 70 Hazard ID Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure	Extensive	Unlikely	Catastrophic	High
Drought & Water shortage	Extensive	Likely	Critical	High
Earthquakes	Limited	Unlikely	Limited	Medium
Earth Movements: Erosion	Limited	Likely	Critical	Medium
Earth Movements: Landslide	Limited	Occasional	Negligible	Low
Floods: 100/200/500 year	Limited	Occasional	Catastrophic	High
Floods: Localized Stormwater	Extensive	Occasional	Critical	High
Invasive Species: Pests/Plants				
Levee Failure	Extensive	Occasional	Catastrophic	High
Marine Invasive Species	Significant	Likely	Limited	Low
Severe Weather: Extreme Cold/ Freeze	Limited	Likely	Negligible	Low
Severe Weather: Extreme Heat	Limited	Likely	Negligible	Low
Severe Weather: Fog				
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Significant	Occasional	Critical	High
Severe Weather: Tornado	Limited	Occasional	Limited	Low
Volcanoes	Limited	Unlikely	Negligible	Low
Wildfires	Limited\	Unlikely	Negligible	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

E.5 Vulnerability Assessment

The intent of this section is to assess each district's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment of the base plan. This vulnerability assessment provides an inventory of the property and other assets located within the District and further analyzes those assets at risk to identified hazards ranked of medium or high significance (as listed in Table E.1) to the community. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the main plan.

E.5.1 Total Assets at Risk

This section identifies the District's total assets at risk, including values at risk, critical facilities and infrastructure.

Values at Risk

Significant assets directly within each district include a range of properties and infrastructure. These may include District-owned property and infrastructure. An inventory of key district assets is provided in Table E.2. Total value of these assets exceeds $4 million for the RD 70.

Table E.2. Key Assets in RD 70

Name of Asset	Facility Type	Replacement Value	Hazard Info
RD 70 Pumping Plant	Pumps	$4,000,000	
RD 70 Mobile Trailer	Dwelling	$30,000	
RD 70 Office	Office	$200,000	
RD 70 Shop	Shop	$100,000	
Total		**$4,330,000**	

Source: Reclamation District 70

E.5.2 Development Trends and Growth

Reclamation District 70

Reclamation District 70 will experience minimal rural growth throughout its service area due to County zoning policies that regulate agricultural parcel sizes. Large agricultural parcels limit the ability of rural subdivision development and therefore population growth. Agricultural uses will likely not expand as well given that the majority of land currently exists in agricultural uses.

E.5.3 Priority Hazards: Vulnerability Assessment

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table E.1 as high or medium significance hazards. Impacts of

past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the base plan for more detailed information about these hazards and their impacts on the Sutter County planning area).

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.

Dam Failure

Vulnerability to Dam Failure

Likelihood of Future Occurrence—Unlikely
Vulnerability—High

The District lies in the inundation zones of both Shasta and Oroville dams. Failures at either facility could overwhelm the levees and pumping stations.

Drought and Water Shortage

Vulnerability to Drought and Water Shortage

Likelihood of Future Occurrence—Likely
Vulnerability—High

Reclamation District 70 is primarily made up farmland, and the District relies on assessment from the local land owners. If the District were to experience a long term drought and or water shortages, it could affect the local land owners with paying their assessment.

Earth Movements: Erosion

Vulnerability to Earth Movements: Erosion

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

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. As farmers settled the valleys in the 1800s, the Gold Rush drew prospectors to the hills. As mining in the Sierra Nevada turned to the more "efficient" methods of hydraulic mining, the use of environmentally destructive high-pressure water jets washed entire mountainsides into local streams and rivers. As a result, the enormous amounts of silt deposited in the riverbeds of the Central Valley increased flood risk. As a remedy to these rising riverbeds, levees were built very close to the river channels to keep water velocity high and thereby scour away the sediment. However, the design of these narrow channels has been too successful. While the Gold Rush silt is long gone, the erosive force of the constrained river continues to eat away at the levee system and stream banks within the District.

Earthquake

Vulnerability to Earthquake

Likelihood of Future Occurrence—Unlikely
Vulnerability—Medium

An earthquake could potential cause a levee failure. Although it is unlikely, there is concern if it did happen in the winter months when the river and bypass are full of water.

Floods: 100/500 year

Vulnerability to Floods: 100/500 year

Likelihood of Future Occurrence—Occasional/Unlikely
Vulnerability—High

Two significant hazards facing the District are winter storms and flooding. Flooding would occur as a result of levee failure or overtopping. The representative for the Districts describes the potential effects of flooding within the boundaries as extensive and potentially catastrophic. Meridian Basin is surrounded by levees maintained and monitored by Reclamation District 70 and Reclamation District 1660. All water coming into this Basin must be pumped or gravity feed out. During high water, the release of water at Shasta Dam and high Sacramento River water flows will not allow for gravity feed so that all water must be pumped out of the basin. The drainage facilities under the ownership and control of the District are at risk to damage from excessive rainfall, storm water runoff and flooding

In March of 1940 flooding occurred, but no details were available.

Levee failure from either breaching or overtopping would result in the total loss of levee embankment material, as was the case in the 1997 flood event (see discussion in levee failure section of this document). In addition, localized flooding can overwhelm pumping plants. This is discussed in the next section.

In 2007, the Local Agency Formation Commission (LAFCO) performed municipal service reviews and found that Reclamation District 70 has sufficient infrastructure planning and practices to ensure that infrastructure and capital facilities can be maintained within the planning period of five years. As a result, the District has sufficient flood and drainage resources to accommodate projected service demands within its current boundaries over the next five years.

Floods: Localized Stormwater

Vulnerability to Floods: Localized Stormwater

Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

Winter storms periodically occur that overwhelm the drainage system and pumping plants and cause local flooding. Localized storms could also cause power outages that would prevent the District's pumps from operating.

Levee Failure

Vulnerability to Levee Failure

Likelihood of Future Occurrence—Occasional
Vulnerability—High

Floods can threaten the District from several sources. Usually, the possibility of flooding can be anticipated from eight to twenty hours before the "Emergency Period" is reached. However, as demonstrated in Linda, California, in February 1986, it is possible for a levee to collapse with little or no warning when there are still four or more feet of freeboard available.

Generally, levees fail due to overtopping or collapse. A catastrophic levee failure resulting from collapse probably will occur very quickly with relatively little warning. Such a failure would occur where the levee is saturated and the high hydrostatic water pressure on the river side, coupled with erosion of the levee from high water flows or an inherent defect in the levee, causes an almost instant collapse of a portion of the levee. Under such circumstances, structures located relatively near the break will suffer immediate and extensive damage. Several hundred yards away from the break the energy of the flood waters will be dispersed sufficiently to reduce, but not eliminate, flooding damage to structures in its path. The flood water will flow in a relatively shallow path toward any low point in the affected area. Flood water will collect in these low

areas and the levels will rise as the flow continues. When the rivers are high, it is not possible to close or repair a levee break until the water surface in the river and the flooded area equalize.

A major overtopping of a levee, if flow persists, will result in severe erosion of the levee crowns on the landward side and cause levee failure over a period of minutes to several hours. A severe levee overtopping can, therefore, be considered as a levee break for the purpose of determining the extent of flooding that any area will suffer. Generally, overtopping can be predicted based on river stages and the warning given depending on the source of the flood waters.

Levee failure is a major concern for the district. In January 1997, a levee breach on the Sutter Bypass caused flooding to approximately 75% of the Meridian Basin. Damage to property and infrastructure was in the millions. Highway 20 and county roads were closed for weeks.

Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind

Vulnerability to Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind

Likelihood of Future Occurrence—Occasional
Vulnerability—High

According to historical hazard data, severe weather is an annual occurrence in the District. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrence in the area. Problems associated with the primary effects of severe weather include flooding, pavement deterioration, washouts, high water crossings, landslide/mudslides, debris flows, and downed trees. However, it is the secondary effects of heavy rain and storms that are of concern to RD 70. Heavy rains can cause riverine flooding, localized flooding, levee failure, and stream bank erosion. Heavy rain storms usually accompany strong winds; Strong winds could cause a power failure which would leave the districts pumps non-operational. This could cause localized flooding.

E.6 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 capability assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

E.6.1 Regulatory Mitigation Capabilities

Table E.3 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table E.3. Reclamation District 70 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan	N		County
Zoning ordinance	N		County
Subdivision ordinance	N		County
Growth management ordinance	N		County
Floodplain ordinance	N		County
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y		Levee Maintenance Plan
Building code	N		Version: County
BCEGS Rating	N		County
Fire department ISO rating	N		Rating: County
Erosion or sediment control program	N		County
Stormwater management program	N		County
Site plan review requirements	N		County
Capital improvements plan	N		County
Economic development plan	N		County
Local emergency operations plan	Y		Levee Maintenance Plan
Community Wildfire Protection Plans	N		County
Flood insurance study or other engineering study for streams	N		County
Elevation certificates	N		County
Other			

Source: AMEC Data Collection Guide

E.6.2 Administrative/Technical Mitigation Capabilities

Table E.4 identifies the department(s) responsible for activities related to mitigation and loss prevention in the District.

Table E.4. Reclamation District 70 Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	No		
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	No		
Planner/Engineer/Scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		

Personnel Resources	Yes/No	Department/Position	Comments
Full time building official	No		
Floodplain Manager	No		
Emergency Manager	No		
Grant writer	No		
Other personnel	No		
GIS Data – Hazard areas	No		
GIS Data - Critical facilities	No		
GIS Data – Building footprints	No		
GIS Data – Land use	No		
GIS Data – Links to Assessor's data	No		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)		County	
Other			

Source: AMEC Data Collection Guide

E.6.3 Fiscal Mitigation Capabilities

Table E.5 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table E.5. Reclamation District 70 Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	N	
Capital improvements project funding	N	
Authority to levy taxes for specific purposes	N	
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
Incur debt through general obligation bonds	N	
Incur debt through special tax bonds	N	
Incur debt through private activities	N	
Withhold spending in hazard prone areas	N	
Other		

Source: AMEC Data Collection Guide

E.6.4 Mitigation Outreach and Partnerships

The District continues to work with state, federal, and local agencies to ensure levee stability. In accordance with Public Law 84-99, Standard Operating Procedures for Responding to Flood Emergencies, the District has an adopted "Slow Rise Emergency Plan". The District is a

member of California Central Valley Flood Control Association. The Association is comprised of Reclamation and Levee Districts.

E.6.5 Other Mitigation Efforts

The District has a regular levee maintenance plans that include levee slope dragging, levee crown grading, patrolling, rodent control, thinning and pruning of trees, disking fire breaks, vegetation spraying, and vegetation burning. Regular ditch maintenance includes ditch cleaning, burning, and vegetation spraying.

E.7 Mitigation Strategy

This section describes the mitigation strategy process and mitigation action plan for the District's inclusion with the Sutter County Local Hazard Mitigation Plan update.

E.7.1 Mitigation Goals and Objectives

Reclamation District 70 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy of the base plan.

E.7.2 Mitigation Actions

The planning team for the District identified and prioritized the following mitigation actions based on the risk assessment and in accordance with the process outline in Section 5, Mitigation Strategy, of the base plan. 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. General processes and information on plan implementation and maintenance of this LHMP by all participating jurisdictions is included in Section 7, Plan Implementation and Maintenance, of the base plan.

1. Alternative Power Source at Pumping Station

Hazards Addressed: Flooding

Goals Addressed: 1, 2, 4, 6

Issue/Background: An alternative power source at the pump station is needed. During a high water situation in the Valley, if the pumps fail because the power goes out, localized flooding could occur affecting homes in the area

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: High

Responsible Office: RD 70

Cost Estimate: Unknown

Benefits (Losses Avoided): Reduced risk of flooding and damages to property.

Potential Funding: To be Determined

Schedule: ASAP

2. Levee/Erosion Repair

Hazards Addressed: Levee Failure/Flooding

Goals Addressed: 1, 2, 6

Issue/Background: Repair Levee where seepage is located along Sutter Bypass

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: High

Responsible Office: RD 1660

Cost Estimate: Unknown

Benefits (Losses Avoided): Risk of Levee Failure and Flooding

Potential Funding: DWR Grant

Schedule: ASAP

3. Coordination with State DWR Flood Emergency Response Projects

Hazards Addressed: Flooding

Goals Addressed: 1, 4, 5, 6

Issue/Background: The Mid and Upper Sacramento River Regional Flood Response Project is intended to address the State priorities of 1) improving local flood emergency plans and incorporating them into multi-hazard emergency response plans and 2) improving regional and interagency coordination. Secondary Project objectives will be implemented upon that foundation. All project preparedness activities will also be implemented in accordance with the

Federal Integrated Planning System (IPS) and Federal Emergency Management Agency (FEMA) Comprehensive Preparedness Guide (CPG) 101 as well as applicable standards of the California Standardized Emergency Management System (SEMS). The Project will integrate all levels of government involved in flood response, both vertically and horizontally, into the implementation process in accordance with National Response Framework doctrine.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: DWR ER Grant

Priority: High

Responsible Office: RD 1660 and RD 70

Cost Estimate: $1.2 million

Benefits (Losses Avoided):

Potential Funding: This Project will improve flood preparedness and reduce flood risks in the Mid and Upper Sacramento River Valley by ensuring high quality first response to incipient flood threats and by improving decision making in the event of a levee breach. Collection of critical information, and pre-event identification of containment options to foreseeable breach scenarios, will facilitate rapid and effective decision making to reduce flood damage. The Project will supplement this improved first response and decision making with the creation of enhanced regional multi-agency coordination systems. These systems will improve the ability of the region to develop a common operating picture and share resources during a flood event. Finally, the Project will place the resources needed for initial response to threats to levee integrity, for initial public protection actions, and for prompt action to contain flood waters in an integrated and more sophisticated regional stockpile system.

Schedule: The project will start in the late fall of 2013

Annex F RECLAMATION DISTRICT 1001

F.1 Introduction

This Annex details the hazard mitigation planning elements specific to Reclamation District 1001, a participating jurisdiction to the Sutter County 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 risk assessment and mitigation strategy for this community.

F.2 Planning Process

As described above, the District followed the planning process detailed in Section 3.0 of the base plan. In addition to providing representation on the Sutter County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants included staff from the following District departments:

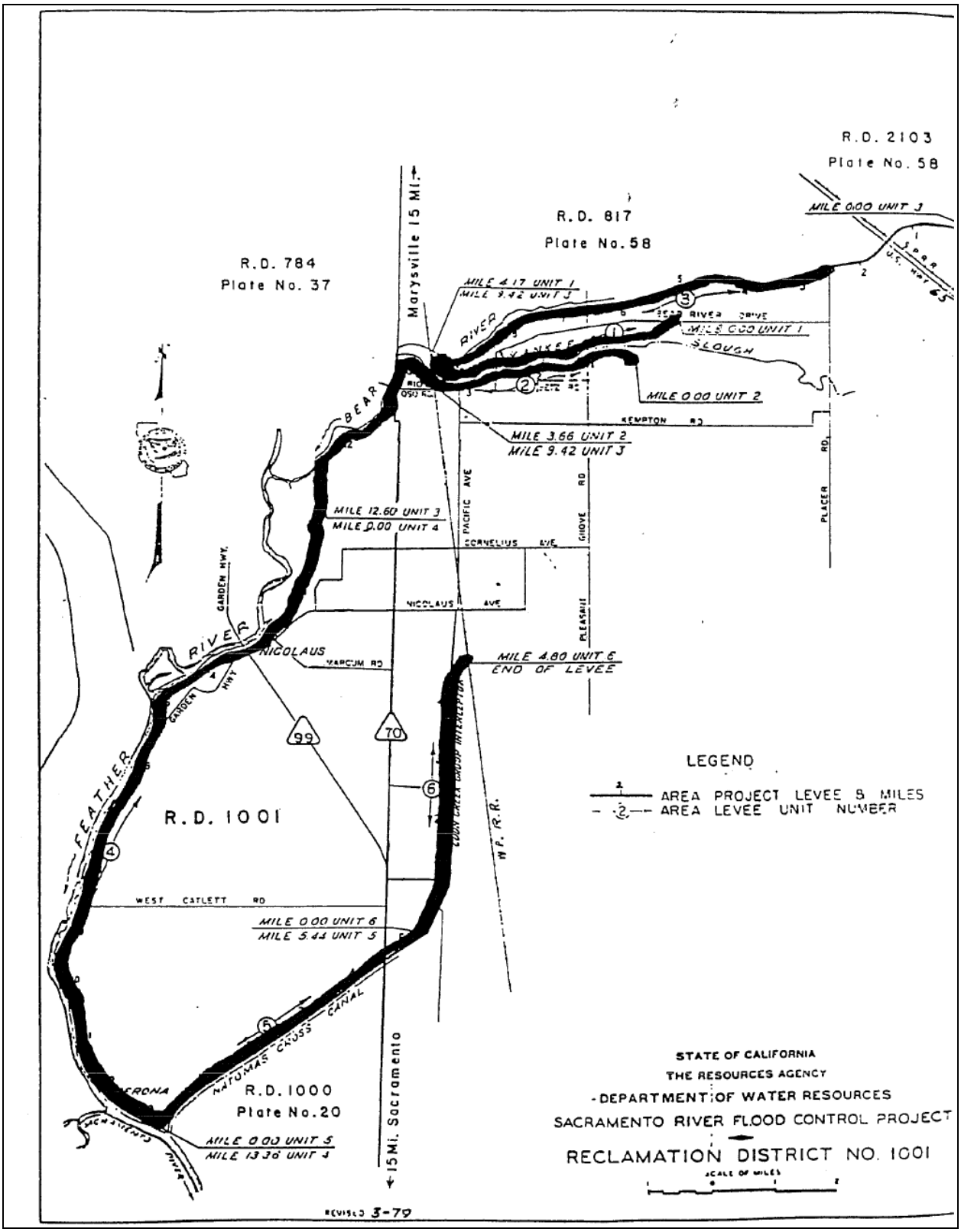
- David Williams Supervisor
- Diane Fales Secretary/Manager (retired)
- Tom Engler Engineering Consultant
- Andrew Stresser Secretary/Manager

Additional details on plan participation and District representatives are included in Appendix A.

F.3 Community Profile

The community profile for the District is detailed in the following sections. Figure F.1 displays a map and the location of the District within Sutter County.

Figure F.1. Reclamation District Base Map



Source: Sutter County General Plan Background Report

F.3.1 History

Reclamation District (RD) 1001 was established by the State Legislature in 1911 for the purpose of providing drainage and reclamation of lands within its boundaries. RD1001 is located in the south eastern portion of the county; boundaries include: south of Bear River, east of Feather River, east of Sacramento River from end of Feather River, north of Natomas Cross Canal, and west of East Side Canal. The District is located approximately 25 miles north of the City of Sacramento and 20 miles south of the City of Yuba City with a gross service area of approximately 32,000 acres. The District is within the scope of the Sacramento River Flood Control Project, as approved by the United States and the State of California.

F.4 Hazard Identification and Summary

This section details how the risk varies across the Sutter County planning area. The District's planning team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the District (see Table F.1). In the context of the plan's planning area, there are no hazards that are unique to the District.

Information on past occurrences and the likelihood of future occurrences is detailed in Section 4, Risk Assessment, of the base plan. Additional information for high and medium significant hazards for the District is included in the Vulnerability Assessment section of this Annex.

Table F.1. Reclamation District 1001 Hazard ID Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure	Significant	Unlikely	Critical	Medium
Drought & Water shortage	Significant	Occasional	Limited	Low
Earthquakes	Extensive	Unlikely	Catastrophic	Low
Earth Movements: Erosion	Significant	Likely	Critical	High
Earth Movements: Landslide	Limited	Occasional	Negligible	Low
Floods: 100/200/500 year	Extensive	Occasional	Catastrophic	High
Floods: Localized Stormwater	Extensive	Likely	Catastrophic	High
Invasive Species: Pests/Plants	Significant	Occasional	Negligible	Low
Levee Failure	Extensive	Occasional	Catastrophic	High
Marine Invasive Species	Limited	Unlikely	Negligible	Low
Severe Weather: Extreme Cold/ Freeze	Significant	Occasional	Negligible	Low
Severe Weather: Extreme Heat	Significant	Occasional	Negligible	Low
Severe Weather: Fog	Extensive	Likely	Negligible	Low
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Extensive	High	Catastrophic	High
Severe Weather: Tornado	Limited	Occasional	Limited	Low
Volcanoes	Limited	Unlikely	Negligible	Low
Wildfires	Limited	Occasional	Limited	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

F.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment of the base plan. This vulnerability assessment provides an inventory of the property and other assets located within the District and further analyzes those assets at risk to identified hazards ranked of medium or high significance (as listed in Table F.1) to the community. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the main plan.

F.5.1 Total Assets at Risk

This section identifies the District's total assets at risk, including values at risk, critical facilities and infrastructure.

Values at Risk

Significant assets directly within the District include a range of properties and infrastructure. These may include District-owned property and infrastructure. An inventory of key district assets is provided in Table F.2. Total value of these assets exceeds $14 million for RD 1001.

Table F.2. Key Assets in RD 1001

Name of Asset	Facility Type	Replacement Value	Hazard Info
Main Pumping Plan	Pumping Plan	$3,000,000	Flammable/Toxic
Pump House Auto	Pumps	$7,500,000	Flammable/Toxic
Yankee Slough Pump - Swanson	Pump	$150,000	Flammable/Toxic
Yankee Slough Pump – Brewer	Pump	$150,000	Flammable/Toxic
Yankee Slough Pump – UPRR	Pump	$150,000	Flammable/Toxic
Office and Shop	Buildings	$1,000,000	Flammable/Toxic
House #2	Employee Residence	$500,000	Flammable/Toxic
Pump House	Employee Residence	$500,000	Flammable/Toxic
Mobile Equipment	Equipment	$1,500,000	Flammable/Toxic
Total		**$14,450,000**	

Source: Reclamation District 1001

F.5.2 Development Trends and Growth

Reclamation District 1001 has sufficient resources to accommodate projected service demands, given existing growth constraints, over the next 10 years and beyond. The County can not issue

any building permits in the District because the entirety of the District is located in a special flood hazard zone.

F.5.3 Priority Hazards: Vulnerability Assessment

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table F.1 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the base plan for more detailed information about these hazards and their impacts on the Sutter County planning area).

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.

Dam Failure

Vulnerability to Dam Failure

Likelihood of Future Occurrence—Unlikely
Vulnerability—Medium

The District lies in the inundation zones of the Shasta, Camp Far West, and Oroville dams. Failures at any facility could overwhelm the levees and pumping stations.

Earth Movements: Erosion

Vulnerability to Earth Movements: Erosion

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

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. As farmers settled the valleys in the 1800s, the Gold Rush drew prospectors to the hills. As mining in the Sierra Nevada turned to the more "efficient" methods of hydraulic mining, the use of environmentally destructive high-pressure water jets washed entire mountainsides into local streams and rivers. As a result, the enormous amounts of silt deposited in the riverbeds of the Central Valley increased flood risk. As a remedy to these rising riverbeds, levees were built very close to the river channels to keep water velocity high and thereby scour away the sediment. However, the design of these narrow channels has been too successful. While the Gold Rush silt is long gone, the erosive force of the constrained river continues to eat away at the levee system and stream banks within the District.

Floods: 100/500 year

Vulnerability to Floods: 100/500 year

Likelihood of Future Occurrence—Occasional/Unlikely
Vulnerability—High

The two significant hazards facing the drainage district are winter storms and flooding. District assets are shown in Table F.2. All assets identified in Table F.2 are considered critical to the operations of the District and in providing adequate flood and drainage control within its boundaries. Should any of these identified assets fail, excessive flooding will occur within the District. Depending on the location of the failure, flooding could cause a small number of residents and property to be inundated to a very large area of the District. Flood water elevations could be anywhere from one to twenty feet in depth for an undetermined amount of time.

Flooding of this magnitude would cause major loss to property owners, close two major state highways used as commuter routes to jobs in the Sacramento, destroy historical landmarks, impact local transportation, agricultural crops and public utilities.

Floods: Localized Stormwater

Vulnerability to Floods: Localized Stormwater

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

RD1001 include lateral drains and a pumping facility. The pumps function to remove excess water from the District with a capacity of pumping approximately 300,000 gallons per minute. The drains are repaired on an as-needed basis. Recent repairs to the pumping facility include rebuilding two pumps (150 & 250 horsepower) in 2005 and replacement of a 52 inch elbow and replacement and/or rebuild of intake and discharge pipes within the pump facility.

All drainage water in the District flows mostly by gravity into drain laterals that all flow to Reclamation District 1001 Main Pumping Plant in the southern portion of the District. This pump facility pumps water into the Natomas Cross Canal one mile east of the Sacramento River. Should there be a major levee break, this facility could not handle the volume of water pouring into the District thus backing up flood water for miles.

Levee Failure

Vulnerability to Levee Failure

Likelihood of Future Occurrence—Occasional
Vulnerability—High

Floods can threaten the District from several sources. Usually, the possibility of flooding can be anticipated from eight to twenty hours before the "Emergency Period" is reached. However, as demonstrated in Linda, California, in February 1986, it is possible for a levee to collapse with little or no warning when there are still four or more feet of freeboard available.

Generally, levees fail due to overtopping or collapse. A catastrophic levee failure resulting from collapse probably will occur very quickly with relatively little warning. Such a failure would occur where the levee is saturated and the high hydrostatic water pressure on the river side, coupled with erosion of the levee from high water flows or an inherent defect in the levee, causes an almost instant collapse of a portion of the levee. Under such circumstances, structures located relatively near the break will suffer immediate and extensive damage. Several hundred yards away from the break the energy of the flood waters will be dispersed sufficiently to reduce, but not eliminate, flooding damage to structures in its path. The flood water will flow in a relatively shallow path toward any low point in the affected area. Flood water will collect in these low areas and the levels will rise as the flow continues. When the rivers are high, it is not possible to close or repair a levee break until the water surface in the river and the flooded area equalize.

A major overtopping of a levee, if flow persists, will result in severe erosion of the levee crowns on the landward side and cause levee failure over a period of minutes to several hours. A severe levee overtopping can, therefore, be considered as a levee break for the purpose of determining the extent of flooding that any area will suffer. Generally, overtopping can be predicted based on river stages and the warning given depending on the source of the flood waters.

The levees within the district boundaries were built between 1912 and 1914. Recent repairs to the levees include stone protection completed on the waterside in 1997-1998 and repairs to the

North Cross Canal and Bear River after the 1997 floods. Current project includes the Mid Valley Levee Rehab project for levee repairs along the Feather and Sacramento Rivers. Levees are maintained to USACE maintenance standards and inspected by DWR twice a year. The District is currently formulating a master management plan for levee maintenance and improvements. The USACE, DWR and the District's Board of Trustees are the parties responsible for levee improvements.

All assets identified above are considered critical to the operations of the District and in providing adequate flood and drainage control within its boundaries. Should any of these identified assets fail, excessive flooding will occur within the District. Depending on the location of the failure, flooding could cause a small number of residents and property to be inundated to a very large area of the District. Flood water elevations could be anywhere from one to twenty feet in depth for an undetermined amount of time.

Flooding of this magnitude would cause major loss to property owners, close two major state highways used as commuter routes to jobs in the Sacramento, destroy historical landmarks, impact local transportation, agricultural crops and public utilities.

Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind

Vulnerability to Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind

Likelihood of Future Occurrence—Likely
Vulnerability—High

According to historical hazard data, severe weather is an annual occurrence in the District. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrence in the area. Problems associated with the primary effects of severe weather include flooding, pavement deterioration, washouts, high water crossings, landslide/mudslides, debris flows, and downed trees. However, it is the secondary effects of heavy rain and storms that are of concern to RD 1001. Heavy rains can cause riverine flooding, localized flooding, levee failure, and stream bank erosion.

F.6 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 capability assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

F.6.1 Regulatory Mitigation Capabilities

Table F.3 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table F.3. Reclamation District 1001 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan	N		County
Zoning ordinance	N		County
Subdivision ordinance	N		County
Growth management ordinance	N		County
Floodplain ordinance	N		County
Other special purpose ordinance (stormwater, steep slope, wildfire)	N		
Building code	N		Version: County
BCEGS Rating	N		County
Fire department ISO rating	N		Rating: County
Erosion or sediment control program	N		County
Stormwater management program	N		County
Site plan review requirements	N		County
Capital improvements plan	N		County
Economic development plan	N		County
Local emergency operations plan	N		County
Community Wildfire Protection Plans	N		County
Flood insurance study or other engineering study for streams	N		County
Elevation certificates	N		County
Other			

Source: AMEC Data Collection Guide

F.6.2 Administrative/Technical Mitigation Capabilities

Table F.4 identifies the department(s) responsible for activities related to mitigation and loss prevention in the District.

Table F.4. Reclamation District 1001 Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	No	County	

Personnel Resources	Yes/No	Department/Position	Comments
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	No	County	
Planner/Engineer/Scientist with an understanding of natural hazards	No	County	
Personnel skilled in GIS	No	County	
Full time building official	No	County	
Floodplain Manager	No	County	
Emergency Manager	No	County	
Grant writer	No	County	
Other personnel	No	County	
GIS Data – Hazard areas	No	County	
GIS Data - Critical facilities	No	County	
GIS Data – Building footprints	No	County	
GIS Data – Land use	No	County	
GIS Data – Links to Assessor's data	No	County	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	No	County	
Other			

Source: AMEC Data Collection Guide

F.6.3 Fiscal Mitigation Capabilities

Table F.5 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table F.5. Reclamation District 1001 Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	N	
Capital improvements project funding	N	
Authority to levy taxes for specific purposes	N	
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
Incur debt through general obligation bonds	N	
Incur debt through special tax bonds	N	
Incur debt through private activities	Y	
Withhold spending in hazard prone areas	N	
Other		

Source: AMEC Data Collection Guide

F.6.4 Mitigation Outreach and Partnerships

The District continues to work with state, federal, and local agencies to ensure levee stability. In accordance with Public Law 84-99, Standard Operating Procedures for Responding to Flood Emergencies, the District has an adopted "Slow Rise Emergency Plan". The District also partners with the following entities for mitigation activities:

- Yuba Sutter Flood Fight Coalition:
- LD #1
- Marysville Levee District
- RD #10
- RD #784
- RD #817
- RD #2103

F.6.5 Other Mitigation Efforts

- Alternative Power Source at Pump House
- Coordination with State DWR Flood Emergency Response Project

F.7 Mitigation Strategy

This section describes the mitigation strategy process and mitigation action plan for the District's inclusion with the Sutter County Local Hazard Mitigation Plan update.

F.7.1 Mitigation Goals and Objectives

Reclamation District 1001 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy of the base plan.

F.7.2 Mitigation Actions

The planning team for the District identified and prioritized the following mitigation actions based on the risk assessment and in accordance with the process outline in Section 5, Mitigation Strategy, of the base plan. 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. General processes and information on plan implementation and maintenance of this LHMP by all participating jurisdictions is included in Section 7, Plan Implementation and Maintenance, of the base plan.

1. Flood System Repair Project #1

Hazards Addressed: Levee Failure

Goals Addressed: 1, 2, 6

Project Description: Drained seepage berm has occurred along 3,100 feet at levee mile 9.30 in Unit 4 of the Feather River levee system.

Issue/Background: Seepage and boils within this reach require sandbagging. Seepage berm was constructed near levee mile 9.82 of Unit 4 of the Feather River levee system.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: High

Responsible Office: RD 1001 and DWR

Cost Estimate: $5,000,000

Benefits (Losses Avoided): Substantially reduce risk to flooding to people and property near the levee.

Potential Funding: Federal, state, LMA grants.

Schedule: To be determined.

2. Flood System Repair Project #2

Hazards Addressed: Levee failure

Goals Addressed: 1, 2, 6

Project Description: Recontour levee slope at levee mile 4.07 in Unit 5 of Feather River levee system. This affects a section 500 feet long by 75 feet of slope length.

Issue/Background: Intermittent slumps along the slope throughout this interval at about mid-slope.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: High

Responsible Office: DWR and RD 1001

Cost Estimate: $200,000

Benefits (Losses Avoided): Substantially reduce risk to flooding to people and property near the levee.

Potential Funding: Federal, state, LMA grants.

Schedule: To be determined.

3. Flood System Repair Project #3

Hazards Addressed: Levee Failure

Goals Addressed: 1, 2, 6

Project Description: Recontour levee slope at levee mile 2.77 in Unit 5 of Feather River levee system. This affects a section 500 feet long by 75 feet of slope length.

Issue/Background: Intermittent slumps along the slope throughout this interval at about mid-slope.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: High

Responsible Office: DWR and RD 1001

Cost Estimate: $200,000

Benefits (Losses Avoided): Substantially reduce risk to flooding to people and property near the levee.

Potential Funding: Federal, state, LMA grants.

Schedule: To be determined.

4. Flood System Repair Project #4

Hazards Addressed: Levee Failure and Erosion

Goals Addressed: 1, 2, 6

Project Description: Widen levee.

Issue/Background: 100 feet of erosion at the waterside toe. Erosion has up to eleven feet of face.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: Medium

Responsible Office: DWR and RD 1001

Cost Estimate: $600,000

Benefits (Losses Avoided): Substantially reduce risk to flooding to people and property near the levee.

Potential Funding: Federal, state, LMA grants.

Schedule: To be determined.

5. Flood System Repair Project #5

Hazards Addressed: Levee Failure

Goals Addressed: 1, 2, 6

Project Description: Drained seepage berm.

Issue/Background: Landside seepage and sandboils at levee mile 13 of Unit 4 of the Feather River levee system.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: Medium

Responsible Office: DWR and RD 1001

Cost Estimate: $3,800,000

Benefits (Losses Avoided): Substantially reduce risk to flooding to people and property near the levee.

Potential Funding: Federal, state, LMA grants.

Schedule: To be determined.

6. *Flood System Repair Project #6*

Hazards Addressed: Levee Failure

Goals Addressed: 1, 2, 6

Project Description: Drained seepage berm.

Issue/Background: Excessive seepage resulted in a pond, characterized by depressed area at top of levee with dense vegetation at levee mile 11.5 of Unit 4 of the Feather River levee system.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: Medium

Responsible Office: DWR and LMA

Cost Estimate: $750,000

Benefits (Losses Avoided): Substantially reduce risk to flooding to people and property near the levee.

Potential Funding: Federal, state, LMA grants.

Schedule: To be determined.

7. *Flood System Repair Project #7*

Hazards Addressed: Levee Failure

Goals Addressed: 1, 2, 6

Project Description: Drained seepage berm

Issue/Background: Slide of old levee break. Large pond near landside toe of levee indicates vulnerable area at levee mile 10.2 of Unit 4 of the Feather River levee system.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: Medium

Responsible Office: DWR and RD 1001

Cost Estimate: $3,200,000

Benefits (Losses Avoided): Substantially reduce risk to flooding to people and property near the levee.

Potential Funding: Federal, state, LMA grants.

Schedule: To be determined.

8. Flood System Repair Project #8

Hazards Addressed: Levee Failure and Erosion

Goals Addressed: 1, 2, 6

Project Description: Widen levee.

Issue/Background: Multiple rotational failures in the berm at levee mile 12.07 of the Feather River levee system. Erosion is into the levee toe and the lower slope.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: Medium

Responsible Office: DWR and RD 1001

Cost Estimate: $900,000

Benefits (Losses Avoided): Substantially reduce risk to flooding to people and property near the levee.

Potential Funding: Federal, state, LMA grants.

Schedule: To be determined.

9. Alternative Power Source at Pump House

Hazards Addressed: Should the District lose its power to run the pumps at the Pump House at alternative power source could be substituted to maintain maximum efficiency.

Goals Addressed: 1, 2, 6

Issue/Background: Pumps at Pump House run off of electricity from PG&E, during a storm event the pump house has lost power preventing the pumps from running.

Project Description: Ideally a diesel, gas or natural gas generator would be purchased and remain onsite should the Pump House receive a power failure. At which time the generator would be used to run the pumps.

Other Alternatives: Plum the Pump House for a generator to be hooked up, during a significant storm event a generator could be rented or on standby should there is a power failure.

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): Medium

Responsible Office: Reclamation District 1001

Cost Estimate: $100,000

Benefits (Losses Avoided): $500,000 to 5,000,000

Potential Funding: Undetermined

Schedule: Next 5 years

10. Flood Emergency Response Project

Hazards Addressed: Training and Materials to effectively Flood Fight

Goals Addressed: 1, 2, 6

Issue/Background: Grant established to offer LMAs assistance for preparing and battling a flood fight

Project Description: Develop training video, coordinate SIMS/NIMS/ICS training, establish a flood safe location for the Yuba Sutter Coalition and purchase emergency equipment and supplies.

Other Alternatives: Seek additional grants for materials and planning

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority (H, M, L): High

Responsible Office: RD 784

Cost Estimate: $284,519

Benefits (Losses Avoided): $5,000,000 to $500,000

Potential Funding: DWR Grant

Schedule: 2013/2014 fiscal year

Annex G RECLAMATION DISTRICT 1500

G.1 Introduction

This Annex details the hazard mitigation planning elements specific to Reclamation District 1500, a participating jurisdiction to the Sutter County 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 risk assessment and mitigation strategy for this community.

G.2 Planning Process

As described above, the District followed the planning process detailed in Section 3.0 of the base plan. In addition to providing representation on the Sutter County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants included staff from the following District departments:

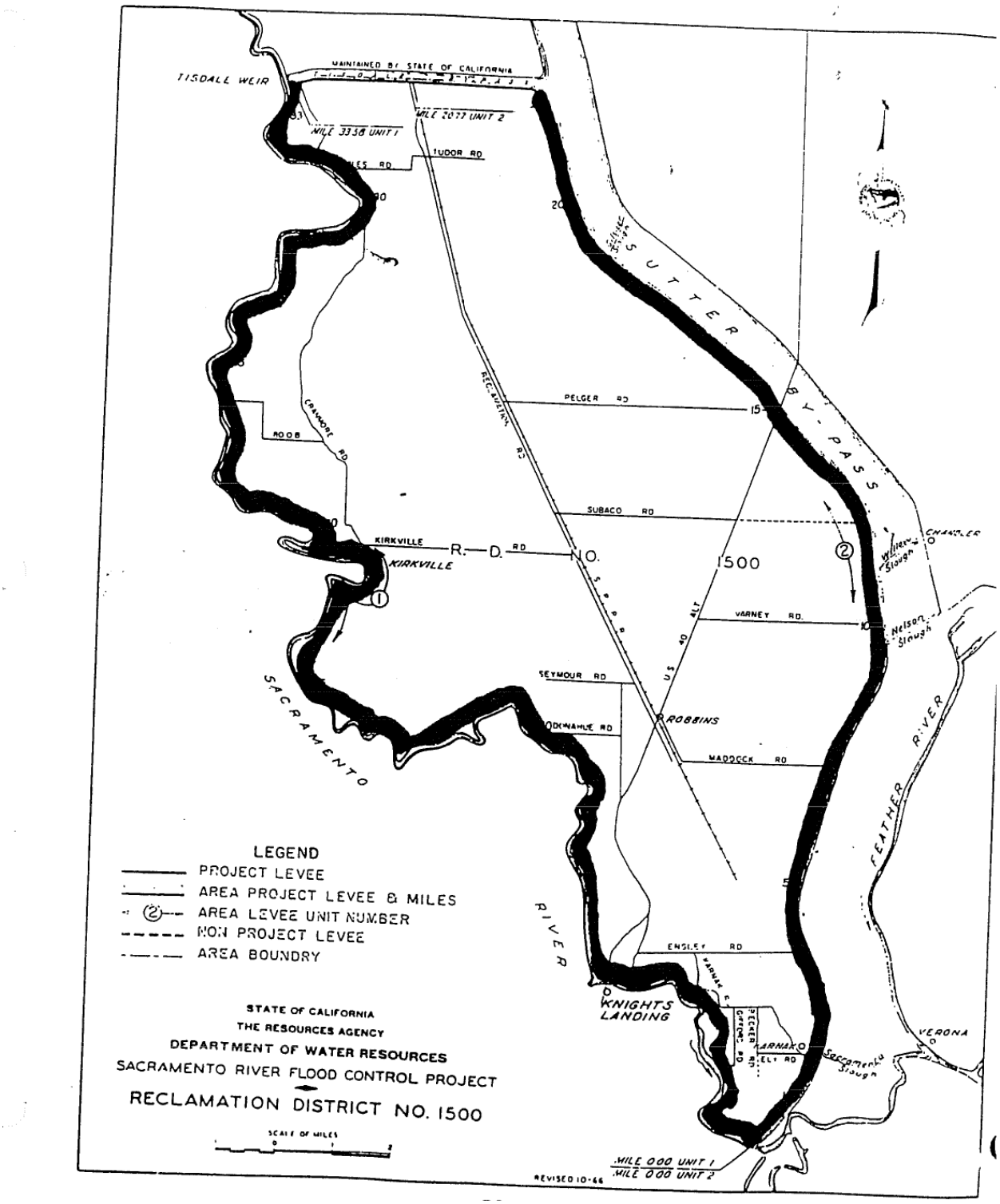
- Dennis Peterson, District Manager

Additional details on plan participation and District representatives are included in Appendix A.

G.3 Community Profile

The community profile for the District is detailed in the following sections. Figure G.1 displays a map and the location of the District within Sutter County.

Figure G.1. Reclamation District 1500 Base Map



Source: Sutter County General Plan Background Report

G.3.1 History

Reclamation District 1500 was established by the State Legislature in 1913 for the purposes of providing drainage and reclamation of lands within its boundaries. The District is located approximately 45 miles northwest of the City of Sacramento, California with a gross service area of 67,851 acres. The entire District is within the scope of the Sacramento River Flood Control Project, as approved by the United States and the State of California.

G.4 Hazard Identification and Summary

This section details how the risk varies across the Sutter County planning area. The District's planning team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the District (see Table G.1). In the context of the plan's planning area, there are no hazards that are unique to the District.

Information on past occurrences and the likelihood of future occurrences is detailed in Section 4, Risk Assessment, of the base plan. Additional information for high and medium significant hazards for the District is included in the Vulnerability Assessment section of this Annex.

Table G.1. Reclamation District 1500 Hazard ID Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure				
Drought & Water shortage	Extensive	Likely	Critical	High
Earthquakes				
Earth Movements: Erosion				
Earth Movements: Landslide				
Floods: 100/200/500 year	Extensive	Occasional	Critical	High
Floods: Localized Stormwater	Limited	Occasional	Limited	Medium
Invasive Species: Pests/Plants				
Levee Failure	Extensive	Likely	Catastrophic	High
Marine Invasive Species	Limited	Likely	Limited	Low
Severe Weather: Extreme Cold/ Freeze				
Severe Weather: Extreme Heat				
Severe Weather: Fog				
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Extensive	Likely	Critical	Medium
Severe Weather: Tornado				
Volcanoes				
Wildfires				

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

G.5 Vulnerability Assessment

The intent of this section is to assess the District's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment of the base plan. This vulnerability assessment provides an inventory of the property and other assets located within the District and further analyzes those assets at risk to identified hazards ranked of medium or high significance (as listed in Table G.1) to the community. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the main plan.

G.5.1 Total Assets at Risk

This section identifies the District's total assets at risk, including values at risk, critical facilities and infrastructure.

Values at Risk

Significant assets directly within the District include a range of properties and infrastructure. These may include District-owned property and infrastructure. An inventory of key district assets is provided in Table G.2. Total value of these assets exceeds $8.3 million for the RD 1500.

Table G.2. Key Assets in RD 1500

Name of Asset	Facility Type	Replacement Value	Hazard Info
Karnak Pump Plant	Pump Station	$8,000,000	
District Communication Center	Communication Facility	$300,000	
Total		**$8,300,000**	

Source: Reclamation District 1500

G.5.2 Development Trends and Growth

Reclamation District 1500 has sufficient resources to accommodate projected service demands, given existing growth constraints, over the next 10 years and beyond.

G.5.3 Priority Hazards: Vulnerability Assessment

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table G.1 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the base plan for more detailed information about these hazards and their impacts on the Sutter County planning area).

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.

Drought & Water Shortage

Vulnerability to Drought & Water Shortage

Likelihood of Future Occurrence—Likely
Vulnerability—High

Reclamation District 1500 is primarily made up farmland, and the District relies on assessment from the local land owners. If the District were to experience a long term drought and or water shortages, it could affect the local land owners with paying their assessment.

Floods: 100/500 year

Vulnerability to Floods: 100/500 year

Likelihood of Future Occurrence—Occasional/Unlikely
Vulnerability—High

The two significant hazards facing the drainage district are winter storms and flooding.

The drainage facilities under the ownership and control of the district are at risk to damage from excessive rainfall, stormwater runoff and flooding. Of greatest concern to RD1500 is excessive flooding that could occur should the Karnak Pumping Facility Fail. Sutter Basin is surrounded by levees maintained and monitored by Reclamation District 1500. All water coming into this Basin must be pumped or gravity feed out. During high water, the release of water at Oroville Dam and high Feather River water flows will not allow for gravity feed so that all water must be

pumped out of the basin. If the pumps at Karnak fail, then flooding in the south end of the District will start immediately; and within 4 to 6 hours water will be in the Sutter Basin Growers Co-Op and the town of Robbins. The Co-Op's approximate annual revenue to its growers is $22 million with assets valued at about $8.3 million. Flooding the town of Robbins would cause considerable damage to its 100 residents, school and businesses. If flooding occurs in the Basin, then Hwy 113 a major north-south transportation route from Yuba City south, with a bridge over the Sutter Bypass, could close, which in the 1997 storm and flood events was one of the few emergency routes out of Yuba City that remained opened. The following photo is of the Karnak Pump Plant.

Figure G.2. Karnak Pump Plant

Source: RD 1500

Floods: Localized Stormwater

Vulnerability to Floods: Localized Stormwater

Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

Winter storms periodically occur that overwhelm the drainage system and pumping plants and cause local flooding.

Levee Failure

Vulnerability to Levee Failure

Likelihood of Future Occurrence—Likely
Vulnerability—High

Floods can threaten the District from several sources. Usually, the possibility of flooding can be anticipated from eight to twenty hours before the "Emergency Period" is reached. However, as demonstrated in Linda, California, in February 1986, it is possible for a levee to collapse with little or no warning when there are still four or more feet of freeboard available.

Generally, levees fail due to overtopping or collapse. A catastrophic levee failure resulting from collapse probably will occur very quickly with relatively little warning. Such a failure would occur where the levee is saturated and the high hydrostatic water pressure on the river side, coupled with erosion of the levee from high water flows or an inherent defect in the levee, causes an almost instant collapse of a portion of the levee. Under such circumstances, structures located relatively near the break will suffer immediate and extensive damage. Several hundred yards away from the break the energy of the flood waters will be dispersed sufficiently to reduce, but not eliminate, flooding damage to structures in its path. The flood water will flow in a relatively shallow path toward any low point in the affected area. Flood water will collect in these low areas and the levels will rise as the flow continues. When the rivers are high, it is not possible to close or repair a levee break until the water surface in the river and the flooded area equalize.

A major overtopping of a levee, if flow persists, will result in severe erosion of the levee crowns on the landward side and cause levee failure over a period of minutes to several hours. A severe levee overtopping can, therefore, be considered as a levee break for the purpose of determining the extent of flooding that any area will suffer. Generally, overtopping can be predicted based on river stages and the warning given depending on the source of the flood waters.

Severe Weather: Heavy rain, hailstorm, lightning, and Wind

Vulnerability to Severe Weather: Heavy rain, hailstorm, lightning, and Wind

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

According to historical hazard data, severe weather is an annual occurrence in the District. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrence in the area. Problems associated with the primary effects of severe weather include flooding, pavement deterioration, washouts, high water crossings, landslide/mudslides, debris flows, and downed trees. However, it is the secondary effects of heavy rain and storms that are of concern to RD 1500. Heavy rains can cause riverine flooding, localized flooding, levee failure, and stream bank erosion.

G.6 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 capability assessment is divided into four sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, and mitigation outreach and partnerships.

G.6.1 Regulatory Mitigation Capabilities

Table G.3 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table G.3. Reclamation District 1500 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan	N		
Zoning ordinance	N		
Subdivision ordinance	N		
Growth management ordinance	N		
Floodplain ordinance	N		
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y		Levee maintenance plans
Building code	N		Version:
BCEGS Rating	N		
Fire department ISO rating	N		Rating:
Erosion or sediment control program	N		

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
Stormwater management program	N		
Site plan review requirements	N		
Capital improvements plan	N		
Economic development plan	N		
Local emergency operations plan	Y		Levee maintenance plans
Community Wildfire Protection Plans	N		
Flood insurance study or other engineering study for streams	N		
Elevation certificates	N		
Other			

Source: AMEC Data Collection Guide

G.6.2 Administrative/Technical Mitigation Capabilities

Table G.4 identifies the department(s) responsible for activities related to mitigation and loss prevention in the District.

Table G.4. Reclamation District 1500 Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	No		
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	No		
Planner/Engineer/Scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		
Full time building official	No		
Floodplain Manager	No		
Emergency Manager	No		
Grant writer	No		
Other personnel	No		
GIS Data – Hazard areas	No		
GIS Data - Critical facilities	No		
GIS Data – Building footprints	No		
GIS Data – Land use	No		
GIS Data – Links to Assessor's data	No		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	No		
Other			

Source: AMEC Data Collection Guide

G.6.3 Fiscal Mitigation Capabilities

Table G.5 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table G.5. Reclamation District 1500 Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	N	
Capital improvements project funding	N	
Authority to levy taxes for specific purposes	Y	
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
Incur debt through general obligation bonds	N	
Incur debt through special tax bonds	N	
Incur debt through private activities	N	
Withhold spending in hazard prone areas	N	
Other		

Source: AMEC Data Collection Guide

G.6.4 Mitigation Outreach and Partnerships

The District partners with the County and other reclamation districts for mitigation outreach.

G.7 Mitigation Strategy

This section describes the mitigation strategy process and mitigation action plan for the District's inclusion with the Sutter County Local Hazard Mitigation Plan update.

G.7.1 Mitigation Goals and Objectives

Reclamation District 1500 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy of the base plan.

G.7.2 Mitigation Actions

The planning team for the District identified and prioritized the following mitigation actions based on the risk assessment and in accordance with the process outline in Section 5, Mitigation Strategy, of the base plan. 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. General processes and information on

plan implementation and maintenance of this LHMP by all participating jurisdictions is included in Section 7, Plan Implementation and Maintenance, of the base plan.

1. Alternative Power Source at Karnak Pump Station

Hazards Addressed: Flooding

Goals Addressed: 1, 2, 6

Issue/Background: An alternative power source at the pump station is needed. During a high water situation in the Valley, if the pumps fail because the power goes out, the Town of Robbins and the entire Sutter Basin could flood.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: High

Responsible Office: RD 1500

Cost Estimate: To be determined.

Benefits (Losses Avoided): Reduced risk of flooding.

Potential Funding: To be determined.

Schedule: ASAP

Annex H RECLAMATION DISTRICT 1660

H.1 Introduction

This Annex details the hazard mitigation planning elements specific to Reclamation 1660, a participating jurisdiction to the Sutter County 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 risk assessment and mitigation strategy for this community.

H.2 Planning Process

As described above, the District followed the planning process detailed in Section 3.0 of the base plan. In addition to providing representation on the Sutter County Hazard Mitigation Planning Committee (HMPC), the District formulated its own internal planning team to support the broader planning process requirements. Internal planning participants included staff from the following District departments:

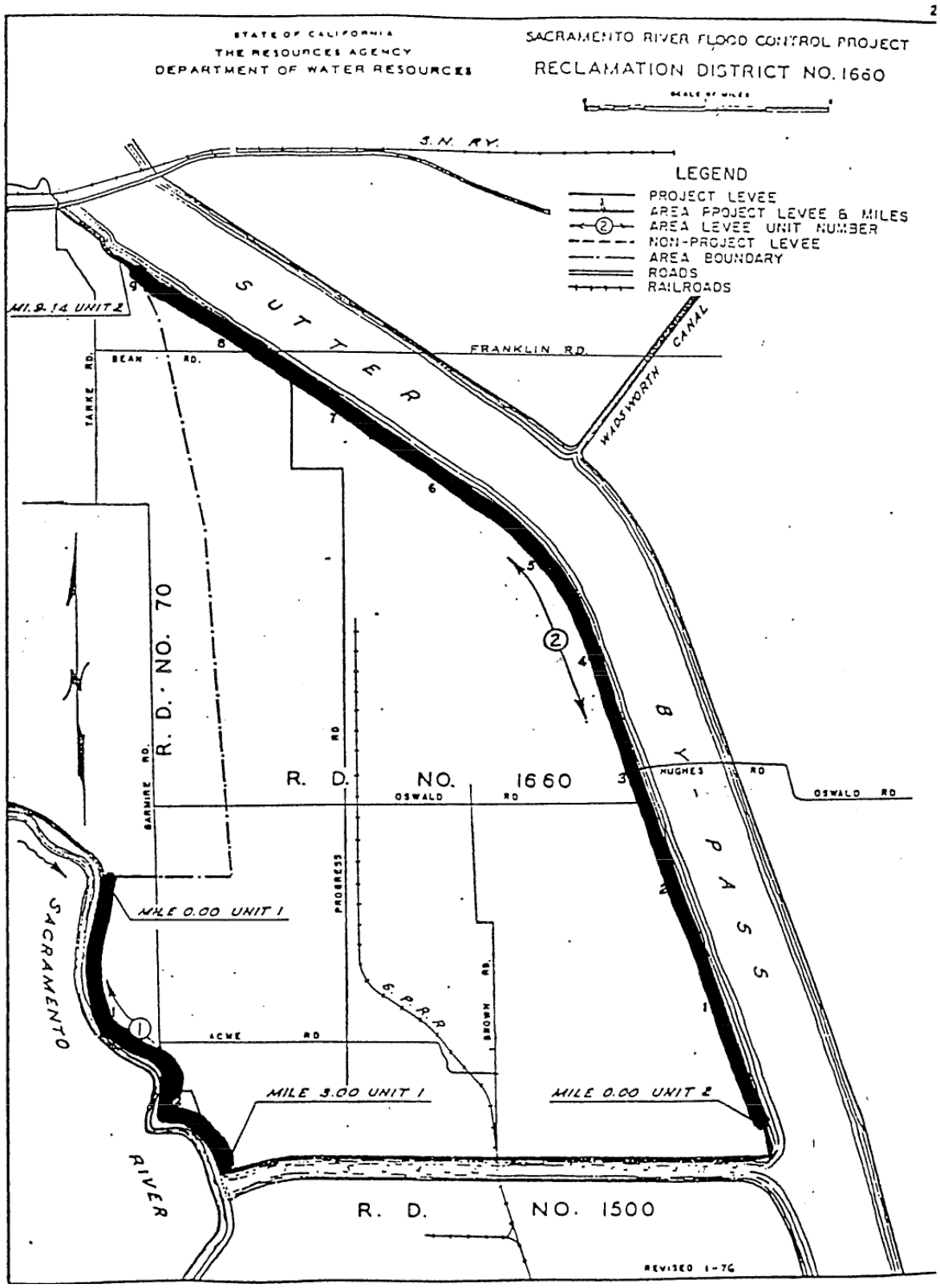
- District Manager

Additional details on plan participation and District representatives are included in Appendix A.

H.3 Community Profile

The community profile for the District is detailed in the following sections. Figure H.1 displays a map and the location of the District within Sutter County.

Figure H.1. Reclamation District 1660 Base Map



Source: Sutter County General Plan Background Report

H.3.1 History

Reclamation District 1660 (RD 1660) was established by voters in 1915 with the purpose of providing drainage and flood protection in western Sutter County. The District is approximately 17 miles west of Yuba City, and serves an area of approximately 14,832.81 gross acres, or 23.14 square miles. The District provides flood protection and drainage by maintaining approximately 12.2 miles of levees, and 100 miles of drainage ditches. The District is generally bounded by the Sacramento River to the west, RD 70 to the north and the Sutter By-Pass to the east. The predominant land uses within the District are agricultural.

H.4 Hazard Identification and Summary

This section details how the risk varies across the Sutter County planning area. The District's planning team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to each District (see Table H.1). In the context of the plan's planning area, there are no hazards that are unique to the District.

Information on past occurrences and the likelihood of future occurrences is detailed in Section 4, Risk Assessment, of the base plan. Additional information for high and medium significant hazards for the District is included in the Vulnerability Assessment section of this Annex.

Table H.1 Reclamation District 1660 Hazard ID Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure	Extensive	Unlikely	Catastrophic	High
Drought & Water shortage	Extensive	Likely	Critical	High
Earthquakes	Limited	Unlikely	Limited	Medium
Earth Movements: Erosion	Limited	Likely	Critical	Medium
Earth Movements: Landslide	Limited	Occasional	Negligible	Low
Floods: 100/200/500 year	Limited	Occasional	Catastrophic	High
Floods: Localized Stormwater	Extensive	Occasional	Critical	High
Invasive Species: Pests/Plants				
Levee Failure	Extensive	Occasional	Catastrophic	High
Marine Invasive Species	Significant	Likely	Limited	Low
Severe Weather: Extreme Cold/ Freeze	Limited	Likely	Negligible	Low
Severe Weather: Extreme Heat	Limited	Likely	Negligible	Low
Severe Weather: Fog				
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Significant	Occasional	Critical	High
Severe Weather: Tornado	Limited	Occasional	Limited	Low
Volcanoes	Limited	Unlikely	Negligible	Low
Wildfires	Limited\	Unlikely	Negligible	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

H.5 Vulnerability Assessment

The intent of this section is to assess each district's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment of the base plan. This vulnerability assessment provides an inventory of the property and other assets located within each District and further analyzes those assets at risk to identified hazards ranked of medium or high significance (as listed in Table H.1) to the community. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the main plan.

H.5.1 Total Assets at Risk

This section identifies the District's total assets at risk, including values at risk, critical facilities and infrastructure.

Values at Risk

Significant assets directly within each district include a range of properties and infrastructure. These may include District-owned property and infrastructure. An inventory of key district assets is provided in Table H.2. Total value of these assets exceeds $5 million for RD 1660.

Table H.2 Key Assets in RD 1660

Name of Asset	Facility Type	Replacement Value	Hazard Info
RD 1660 Pumping Plant	Pump	$4,000,000	
RD 1660 Office	Office	$150,000	
RD 1660 House	Dwelling	$200,000	
RD 1660 Shop	Shop	$100,000	
RD 1660 Pump	Pump	$200,000	
RD 1660 Pump	Pump	$200,000	
RD 1660 Pump	Pump	$200,000	
Total		**$5,050,000**	

Source: Reclamation District 1660

H.5.2 Development Trends and Growth

Reclamation District 1660 will experience minimal rural growth throughout its service area due to County zoning policies that regulate agricultural parcel sizes. Large agricultural parcels limit the ability of rural subdivision development and therefore population growth. Agricultural uses will likely not expand as well given that the majority of land currently exists in agricultural uses.

H.5.3 Priority Hazards: Vulnerability Assessment

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table H.1 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the base plan for more detailed information about these hazards and their impacts on the Sutter County planning area).

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.

Dam Failure

Vulnerability to Dam Failure

Likelihood of Future Occurrence—Unlikely
Vulnerability—High

The District lies in the inundation zones of both Shasta and Oroville dams. Failures at either facility could overwhelm the levees and pumping stations.

Drought and Water Shortage

RD 70 and 1660

Vulnerability to Drought and Water Shortage

Likelihood of Future Occurrence—Likely
Vulnerability—High

Reclamation District 1660 is primarily made up farmland, and the District relies on assessment from the local land owners. If the District were to experience a long term drought and or water shortages, it could affect the local land owners with paying their assessment.

Earth Movements: Erosion

Vulnerability to Earth Movements: Erosion

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

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. As farmers settled the valleys in the 1800s, the Gold Rush drew prospectors to the hills. As mining in the Sierra Nevada turned to the more "efficient" methods of hydraulic mining, the use of environmentally destructive high-pressure water jets washed entire mountainsides into local streams and rivers. As a result, the enormous amounts of silt deposited in the riverbeds of the Central Valley increased flood risk. As a remedy to these rising riverbeds, levees were built very close to the river channels to keep water velocity high and thereby scour away the sediment. However, the design of these narrow channels has been too successful. While the Gold Rush silt is long gone, the erosive force of the constrained river continues to eat away at the levee system and stream banks within the District.

Earthquake

Vulnerability to Earthquake

Likelihood of Future Occurrence—Unlikely
Vulnerability—Medium

An earthquake could potentially cause a levee failure. Although it is unlikely there is concern if it did happen in the winter months when the river and bypass are full of water.

Floods: 100/500 year

Vulnerability to Floods: 100/500 year

Likelihood of Future Occurrence—Occasional/Unlikely
Vulnerability—High

Two significant hazards facing the District are winter storms and flooding. Flooding would occur as a result of levee failure or overtopping. The representative for the District describes the potential effects of flooding within the boundaries as extensive and potentially catastrophic. Meridian Basin is surrounded by levees maintained and monitored by Reclamation District 70 and Reclamation District 1660. All water coming into this Basin must be pumped or gravity

feed out. During high water, the release of water at Shasta Dam and high Sacramento River water flows will not allow for gravity feed so that all water must be pumped out of the basin. The drainage facilities under the ownership and control of the district are at risk to damage from excessive rainfall, storm water runoff and flooding.

In March of 1940 flooding occurred, but no details were available.

Levee failure from either breaching or overtopping would result in the total loss of levee embankment material, as was the case in the 1997 flood event (see discussion in levee failure section of this document). In addition, localized flooding can overwhelm pumping plants. This is discussed in the next section.

In 2007, the Local Agency Formation Commission (LAFCO) performed municipal service reviews and found that Reclamation District 1660 has sufficient infrastructure planning and practices to ensure that infrastructure and capital facilities can be maintained within the planning period of five years. As a result, the District has sufficient flood and drainage resources to accommodate projected service demands within its current boundaries over the next five years.

Floods: Localized Stormwater

Vulnerability to Floods: Localized Stormwater

Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

Winter storms periodically occur that overwhelm the drainage system and pumping plants and cause local flooding. Localized storms could also cause power outages that would prevent the districts pumps from operating.

Levee Failure

Vulnerability to Levee Failure

Likelihood of Future Occurrence—Occasional
Vulnerability—High

Floods can threaten the District from several sources. Usually, the possibility of flooding can be anticipated from eight to twenty hours before the "Emergency Period" is reached. However, as demonstrated in Linda, California, in February 1986, it is possible for a levee to collapse with little or no warning when there are still four or more feet of freeboard available.

Generally, levees fail due to overtopping or collapse. A catastrophic levee failure resulting from collapse probably will occur very quickly with relatively little warning. Such a failure would occur where the levee is saturated and the high hydrostatic water pressure on the river side, coupled with erosion of the levee from high water flows or an inherent defect in the levee, causes

an almost instant collapse of a portion of the levee. Under such circumstances, structures located relatively near the break will suffer immediate and extensive damage. Several hundred yards away from the break the energy of the flood waters will be dispersed sufficiently to reduce, but not eliminate, flooding damage to structures in its path. The flood water will flow in a relatively shallow path toward any low point in the affected area. Flood water will collect in these low areas and the levels will rise as the flow continues. When the rivers are high, it is not possible to close or repair a levee break until the water surface in the river and the flooded area equalize.

A major overtopping of a levee, if flow persists, will result in severe erosion of the levee crowns on the landward side and cause levee failure over a period of minutes to several hours. A severe levee overtopping can, therefore, be considered as a levee break for the purpose of determining the extent of flooding that any area will suffer. Generally, overtopping can be predicted based on river stages and the warning given depending on the source of the flood waters.

Levee failure is a major concern for the district. In January 1997, a levee breach on the Sutter Bypass caused flooding to approximately 75% of the Meridian Basin. Damage to property and infrastructure was in the millions. Highway 20 and county roads were closed for weeks.

Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind

Vulnerability to Severe Weather: Heavy Rain, Hailstorm, Lightning, and Wind

Likelihood of Future Occurrence—Occasional
Vulnerability—High

According to historical hazard data, severe weather is an annual occurrence in the District. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrence in the area. Problems associated with the primary effects of severe weather include flooding, pavement deterioration, washouts, high water crossings, landslide/mudslides, debris flows, and downed trees. However, it is the secondary effects of heavy rain and storms that are of concern to RD 1660. Heavy rains can cause riverine flooding, localized flooding, levee failure, and stream bank erosion.

H.6 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 capability assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

H.6.1 Regulatory Mitigation Capabilities

Table H.3 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table H.3 Reclamation District 1660 Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan	N		County
Zoning ordinance	N		County
Subdivision ordinance	N		County
Growth management ordinance	N		County
Floodplain ordinance	N		County
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y		Levee Maintenance Plan
Building code	N		Version: County
BCEGS Rating	N		County
Fire department ISO rating	N		Rating: County
Erosion or sediment control program	N		County
Stormwater management program	N		County
Site plan review requirements	N		County
Capital improvements plan	N		County
Economic development plan	N		County
Local emergency operations plan	Y		Levee Maintenance Plan
Community Wildfire Protection Plans	N		County
Flood insurance study or other engineering study for streams	N		County
Elevation certificates	N		County
Other			

Source: AMEC Data Collection Guide

H.6.2 Administrative/Technical Mitigation Capabilities

Table H.4 identifies the department(s) responsible for activities related to mitigation and loss prevention in the District.

Table H.4 Reclamation District 1660 Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	No		

Personnel Resources	Yes/No	Department/Position	Comments
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	No		
Planner/Engineer/Scientist with an understanding of natural hazards	No		
Personnel skilled in GIS	No		
Full time building official	No		
Floodplain Manager	No		
Emergency Manager	No		
Grant writer	No		
Other personnel	No		
GIS Data – Hazard areas	No		
GIS Data - Critical facilities	No		
GIS Data – Building footprints	No		
GIS Data – Land use	No		
GIS Data – Links to Assessor's data	No		
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)		County	
Other			

Source: AMEC Data Collection Guide

H.6.3 Fiscal Mitigation Capabilities

Table H.5 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table H.5 Reclamation District 1660 Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants	N	
Capital improvements project funding	N	
Authority to levy taxes for specific purposes	Y	
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
Incur debt through general obligation bonds	N	
Incur debt through special tax bonds	N	
Incur debt through private activities	N	
Withhold spending in hazard prone areas	N	
Other		

Source: AMEC Data Collection Guide

H.6.4 Mitigation Outreach and Partnerships

The District continues to work with state, federal, and local agencies to ensure levee stability. In accordance with Public Law 84-99, Standard Operating Procedures for Responding to Flood Emergencies, the District has an adopted "Slow Rise Emergency Plan". The District is a member of California Central Valley Flood Control Association. The Association is comprised of Reclamation and Levee Districts.

H.6.5 Other Mitigation Efforts

RD 70 and 1660

The District has regular levee maintenance plans that include levee slope dragging, levee crown grading, patrolling, rodent control, thinning and pruning of trees, disking fire breaks, vegetation spraying, and vegetation burning. Regular ditch maintenance includes ditch cleaning, burning, and vegetation spraying.

H.7 Mitigation Strategy

This section describes the mitigation strategy process and mitigation action plan for the District's inclusion with the Sutter County Local Hazard Mitigation Plan update.

H.7.1 Mitigation Goals and Objectives

Reclamation District 1660 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy of the base plan.

H.7.2 Mitigation Actions

The planning team for the District identified and prioritized the following mitigation actions based on the risk assessment and in accordance with the process outline in Section 5, Mitigation Strategy, of the base plan. 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. General processes and information on plan implementation and maintenance of this LHMP by all participating jurisdictions is included in Section 7, Plan Implementation and Maintenance, of the base plan.

1. Levee Repair

Hazards Addressed: Levee Failure/Flooding

Goals Addressed: 1, 2, 6

Issue/Background: Repair Levee where seepage is located along Sutter Bypass

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: High

Responsible Office: RD 1660

Cost Estimate: Unknown

Benefits (Losses Avoided): Risk of Levee Failure and Flooding

Potential Funding: DWR Grant

Schedule: ASAP

2. Alternative Power Source at Pump Station

Hazards Addressed: Flooding

Goals Addressed: 1, 2, 6

Issue/Background: An alternative power source at the pump station is needed. During a high water situation in the Valley, if the pumps fail because the power goes out, localized flooding could occur affecting homes in the area

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Priority: High

Responsible Office: RD 1660

Cost Estimate: Unknown

Benefits (Losses Avoided): Reduced risk of flooding.

Potential Funding: TBD

Schedule: ASAP

3. Coordination with State DWR Flood Emergency Response Projects

Hazards Addressed: Flooding

Goals Addressed: 1, 2, 6

Issue/Background: The Mid and Upper Sacramento River Regional Flood Response Project is intended to address the State priorities of 1) improving local flood emergency plans and incorporating them into multi-hazard emergency response plans and 2) improving regional and interagency coordination. Secondary Project objectives will be implemented upon that foundation. All project preparedness activities will also be implemented in accordance with the Federal Integrated Planning System (IPS) and Federal Emergency Management Agency (FEMA) Comprehensive Preparedness Guide (CPG) 101 as well as applicable standards of the California Standardized Emergency Management System (SEMS). The Project will integrate all levels of government involved in flood response, both vertically and horizontally, into the implementation process in accordance with National Response Framework doctrine.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: DWR ER Grant

Priority: High

Responsible Office: RD 1660 and RD 70

Cost Estimate: $1.2 million

Benefits (Losses Avoided):

Potential Funding: This Project will improve flood preparedness and reduce flood risks in the Mid and Upper Sacramento River Valley by ensuring high quality first response to incipient flood threats and by improving decision making in the event of a levee breach. Collection of critical information, and pre-event identification of containment options to foreseeable breach scenarios, will facilitate rapid and effective decision making to reduce flood damage. The Project will supplement this improved first response and decision making with the creation of enhanced regional multi-agency coordination systems. These systems will improve the ability of the region to develop a common operating picture and share resources during a flood event. Finally, the Project will place the resources needed for initial response to threats to levee integrity, for initial public protection actions, and for prompt action to contain flood waters in an integrated and more sophisticated regional stockpile system.

Schedule: The project will start in the late fall of 2013

Appendix A 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 the participating jurisdictions and added to this appendix. A model resolution is provided below:

Resolution # _____

Adopting the Sutter County Local Hazard Mitigation Plan

Whereas, (Name of Government/District/Organization seeking FEMA approval of hazard mitigation plan) recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments;

Whereas, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, (Name of Government/District/Organization) fully participated in the FEMA-prescribed mitigation planning process to prepare this local hazard mitigation plan; and

Whereas, the California Office of Emergency Services and Federal Emergency Management Agency, Region IX officials have reviewed the Sutter County Local Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body;

Whereas, the (Name of Government/District/Organization) desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Sutter County Local Hazard Mitigation Plan;

Whereas, adoption by the governing body for the (Name of Government/District/Organization), demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Local Hazard Mitigation Plan.

Whereas, adoption of this legitimacies the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

Now, therefore, be it resolved, that the (Name of Government/District/Organization) adopts the Sutter County Local Hazard Mitigation Plan as an official plan; and

Be it resolved, that the (Name of Government/District/Organization) adopts the Sutter County Local Hazard 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, (Name of Government/District/Organization) 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 requirements of AB 2140.

Passed:_____
(date)

_____
Certifying Official

Appendix B PLANNING PROCESS

B.1 Sutter County Step 1: Organize to Prepare a Plan

Note to plan participants and reviewers: The planning process outlined in this appendix was followed by all CRS communities. If an individual jurisdiction performed an act outside of the acts performed by the planning area as a whole, it will be denoted in subsections in this appendix.

A Involvement of Community Land Use and Comprehensive Planning

- Sutter County
  - Doug Libby, AICP Principal Planner
  - Lisa Wilson, Planner
  - Leanne Mueller, Associate Planner
  - Jarvis Jones, GIS Analyst

- Live Oak
  - Jim Goodwin, City Manager
  - Jim Little, Chief Building Official
  - Satwant Takhar, Finance Director, Assistant City Manager
  - Andrea Redamonti, Community Services, Contract Planner

- Yuba City
  - Diana Langley, Deputy Public Works Director
  - Aaron Busch, Community Development Director

B Staff of Community Departments on LHMPC with Expertise on CRS Step 7 Activities

In order to promote the integration of CRS into this planning process, the representatives from the County and the Cities of Yuba City and Live Oak were selected based on their areas of expertise relative to the CRS mitigation categories as detailed in Table B.1.

Table B.1. Sutter County Staff Capability with Six Mitigation Categories

Jurisdiction/ Department	Prevention	Property Protection	Natural Resource Protection	Emergency Services	Structural Flood Control Projects	Public Information	Other
Sutter County							
Planning Services – Lisa Wilson	X	X	X			X	X

Jurisdiction/ Department	Prevention	Property Protection	Natural Resource Protection	Emergency Services	Structural Flood Control Projects	Public Information	Other
Emergency Management – John DeBeaux	X	X		X	X	X	X
Public Works – Dan Peterson	X	X	X		X	X	X
Information Technology – Jarvis Jones	X		X			X	X
Yuba City							
Community Development/ Planning – Aaron Bush	X	X	X			X	X
Public Works - Diana Langely	X	X	X		X	X	X
Fire - Bill Fuller		X		X		X	X
Live Oak							
Building/ Public Works/ Planning - Jim Little	X	X	X		X	X	X
City Manager – Jim Goodwin	X	X	X	X		X	X
Finance Director – Satwant Takhar	X	X	X	X		X	X

SUTTER COUNTY
COMMUNITY SERVICES DEPARTMENT

Animal Services | Emergency Management | Fire Services
Building Inspection | Environmental Health | Planning

StormReady County

February 26, 2013

To: Honorable Board of Supervisors

Re: Approval of a Resolution to update the 2008 Multi-Jurisdictional Multi-Hazard Mitigation Plan (MJMHMP) and establishment of Sutter County Local Hazard Mitigation Planning Committee

Recommendation

It is recommended that the Board of Supervisors approve a resolution to update the 2008 Multi-Jurisdictional Multi-Hazard Mitigation Plan (MJMHMP) and establishment of Sutter County Local Hazard Mitigation Planning Committee

Background & Discussion

On May 23, 2012, the Board of Supervisors authorized the Emergency Services Manager to submit an application for the FY 2012 Pre-Disaster Mitigation Competitive (PDMC) Grant Program funds. On August 24, 2012, CalEMA approved the application. The final approval for grant funding was **$90,000**. The Board of Supervisors accepted the grant and approved the corresponding budget amendment on October 23, 2012.

The grant program provides funding for the review and update of Sutter County's Multi-Jurisdictional Multi-Hazard Mitigation Plan (MJMHMP). The current plan was approved by FEMA on January 23, 2008; it will expire on January 23, 2013. The purpose of the plan is to reduce or eliminate long-term risk to people and property from natural hazards and their effects on the Sutter County Planning Area of California. The Sutter County Planning Area geographically corresponds to the jurisdictional boundaries of Sutter County, the City of Yuba City, and the City of Live Oak. The current plan partners include the County, and the incorporated communities of the City of Yuba City and the City of Live Oak. The current plan also covers six participating districts: the Gilsizer County Drainage District, Levee District One, and Reclamation Districts 1001, 1500, 70, and 1660.

Sutter County and the incorporated communities of Yuba City and Live Oak are members of the Federal Emergency Management Agency (FEMA) National Flood Insurance Program Community Rating System (CRS). This rating system provides credit points for activities implemented by communities which exceed minimum FEMA requirements. Having a current Multi-Hazard Mitigation Plan/Floodplain Management Plan allows the County/Cities to reduce or eliminate long-term risk to people and property from natural hazards and their effects on the County/Cities. In addition the Plan will allow the County/Cities to maximize CRS credit points which ultimately will provide a discount to County/City residents' flood insurance policies.

1130 Civic Center Boulevard, Suite A • Yuba City, CA 95993 • (530) 822-7400 • FAX: (530) 822-7109

Since the MJMHMP is required to receive funding for mitigation projects, disaster mitigation funding, and credit points under the CRS, it is imperative that we keep the plan updated and current with FEMA.

On October 23, 2012, the Board of Supervisors accepted the grant award, approved the associated budget amendment, and authorized the Community Services Director to issue a Request for Proposal (RFP) for professional services to review and update our current MJMHMP. On November 15, 2012, ten (10) proposals were received. Upon completion of interviews, the panel selected AMEC to review and update our MJMHMP.

The original MJMHMP was completed by AMEC in January 2008. Their knowledge of our hazards and the potential impacts on the community allowed the MJMHMP to be approved by CalEMA and FEMA without problem the first time through the approval process. With strong qualifications in the Community Rating System and a proven track record of FEMA approved plans, it is expected that we will update our plan on time and continue our CRS rating. Additionally, AMEC will use the 2013 CRS criteria to update our plan maximizing our points towards our CRS rating.

Under the Community Rating System, it is a requirement when updating the MJMHMP to formally establish a local hazard mitigation planning committee to ensure maximum participation in the review and update process. This resolution will formalize the process and maximize our CRS points as they relate to the MJMHMP.

Past Considerations of the Board

In 2008, the Board supported the development of the MJMHMP and approved the finished product before sending it to CalEMA and FEMA for final approval. On October 23, 2012, the grant was accepted and a budget amendment was approved. On January 8, 2013, the Board of Supervisors approved a contract with the AMEC Environment & Infrastructure to review and update the MJMHMP.

Alternatives

None, in order to receive CRS credit for developing our plan we need to have the resolution in place.

Other Department and/or Agencies Involvement

As noted above, the current plan partners include the County, and the incorporated communities of the City of Yuba City, the City of Live Oak, and six participating districts: the Gilsizer County Drainage District, Levee District One, and Reclamation Districts 1001, 1500, 70, and 1660. Currently, we have letters of intent to participate in the planning process from all of our original planning partners.

Fiscal Impact

There is no direct fiscal impact. There is no change to the budget for this update. However, failure to approve the resolution could affect our CRS rating which in turn may affect discounts associated with the CRS for Sutter County residents.

Committee Action:

At its meeting, on February 14, 2013, the Public Works/Support Services Committee reviewed this request and approved the above recommendations in concept.

Respectfully,

JOHN E. DeBEAUX JR., EMERGENCY OPERATIONS MANAGER
OFFICE OF EMERGENCY MANAGEMENT

RESOLUTION NO 09-2013

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LIVE OAK TO UPDATE THE SUTTER COUNTY LOCAL HAZARD MITIGATION PLAN AND ESTABLISHMENT OF SUTTER COUNTY LOCAL HAZARD MITIGATION PLANNING COMMITTEE

WHEREAS, Sutter County and its incorporated communities are exposed to flooding, wildfire, severe weather, and other natural hazards that increase the vulnerability to life, property, environment and the County's economy; and

WHEREAS, hazard mitigation planning will create an operational framework for reducing losses from these hazards; and

WHEREAS, hazard mitigation planning is a requirement of the Robert T. Stafford Disaster Mitigation Act of 2000 (DMA 2000) and continued eligibility for certain sources of federal mitigation funding programs that support loss reduction activities; and

WHEREAS, Sutter County is in the process of updating its Sutter County Multi-Jurisdictional Multi Hazard Mitigation Plan, dated January 2008 in support of FEMA's DMA 2000 to remain eligible for future federal disaster funding; and

WHEREAS, Sutter County and its incorporated communities participate in the National Flood Insurance Program (NFIP); and

WHEREAS, the Disaster Mitigation Act of 2000 (DMA) and the NFIP's Community Rating System (CRS) Program require the County and incorporated communities to adopt an updated Hazard Mitigation Plan on a 5-year basis; and

WHEREAS, FEMA and the CRS Program encourage public participation and involvement from a variety of stakeholders throughout the planning process; and

WHEREAS, the Local Hazard Mitigation Planning Committee (HMPC) will be involved in the development of the hazard mitigation plan through assessment of the flood, wildfire and other hazards that threaten our community, development of goals that address the identified hazards, and creation of various mitigation strategies that will be implemented to reduce our exposure to future natural hazard losses, while contributing to other community and economic goals and objectives; and

WHEREAS, the HMPC has the responsibility to meet and fulfill the obligations of the DMA and CRS planning requirements; and

WHEREAS, DMA and CRS require the public and other stakeholders to be fully involved in the planning process;

WHEREAS, a multi-jurisdictional and public HMPC will be established to lead this mitigation planning effort. The HMPC will be widely advertised and open to all attendees and should consist of representatives of various county departments, the incorporated communities, special districts, other federal, state and local agency stakeholders, the public, and others who could be affected by or interested in the impacts of natural disasters; and

NOW, THEREFOE, BE IT RESOLVED THAT, the Live Oak City Council hereby supports the update of the 2008 Sutter County Multi-Jurisdictional Multi Hazard Mitigation Plan and establishes the new Local Hazard Mitigation Planning Committee (HMPC) comprised of representatives from:

a. Sutter County offices
   1) Public Works
   2) Emergency Management
   3) Community Services
   4) Public Health
   5) Sutter County Fire Services
   6) Sheriff
   7) Administration
   8) Assessor

b. Incorporated communities
   1) City of Yuba City
   2) City of Live Oak

c. Other participating jurisdictions
   1) Levee District One
   2) Gilsizer County Drainage District
   3) Reclamation District No. 70
   4) Reclamation District No. 1001
   5) Reclamation District No. 1500
   6) Reclamation District No. 1660

d. Other private citizens and stakeholders including local, regional, state and federal agencies and partners appointed by the Sutter County Office of Emergency Management.

PASSED AND ADOPTED this 20th day of March, 2013, by the following vote:

AYES: Council Members Hodges, Baland, Ghag, Vice Mayor Rogers & Mayor Alvarado
NOES: None
ABSENT: None
ABSTAIN: None

APPROVED:

Steve Alvarado, Mayor

ATTEST:

Melissa Dempsey, City Clerk

CITY OF LIVE OAK INCORPORATED JANUARY 28, 1947 LIVE OAK, CALIFORNIA

CITY OF LIVE OAK

June 7, 2012

Sutter County Office of Emergency Management
Attn: John E. DeBeaux, Jr., Emergency Operations Manager
1130 Civic Center Blvd, Suite A
Yuba City, CA 95993

RE: Letter of Commitment as participating jurisdiction in the Sutter County Multi-jurisdictional Hazard Mitigation Planning

Dear Mr. DeBeaux,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Live Oak is submitting this letter of commitment to confirm that the City of Live Oak has agreed to participate in the Sutter County Multi-jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Live Oak agrees to participate in meeting the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Sutter County Office of Emergency Management to complete the plan in conformance with FEMA requirements.

The City of Live Oak understands that it must engage in the following planning process, as more fully described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction. ;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the requirements of participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Jim Goodwin, commit the City of Live Oak to the Sutter County Multi-jurisdictional Hazard Mitigation Planning effort.

Executed this 7th day of June, 2012

Jim Goodwin, City Manager

9955 Live Oak Blvd. • Live Oak, CA 95953
Telephone: (530) 695-2112 • FAX (530) 695-2595

RESOLUTION NO. 13-027

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF YUBA CITY AUTHORIZING THE UPDATE TO THE 2008 MULTI-JURISDICTIONAL MULTI-HAZARD MITIGATION PLAN AND ESTABLISHMENT OF SUTTER COUNTY LOCAL HAZARD MITIGATION PLANNING COMMITTEE

WHEREAS, Sutter County and its incorporated communities are exposed to flooding, wildfire, severe weather, and other natural hazards that increase the vulnerability to life, property, environment and the County's economy; and

WHEREAS, hazard mitigation planning will create an operational framework for reducing losses from these hazards; and

WHEREAS, hazard mitigation planning is a requirement of the Robert T. Stafford Disaster Mitigation Act of 2000 (DMA 2000) and continued eligibility for certain sources of federal mitigation funding programs that support loss reduction activities; and

WHEREAS, Sutter County and the participating agencies are in the process of updating the Sutter County Multi-Jurisdictional Multi-Hazard Mitigation Plan, dated January 2008 in support of FEMA's DMA 2000 to remain eligible for future federal disaster funding; and

WHEREAS, Sutter County and its incorporated communities participate in the National Flood Insurance Program (NFIP); and

WHEREAS, the Disaster Mitigation Act of 2000 (DMA) and the NFIP's Community Rating System (CRS) Program require the County and incorporated communities to adopt an updated Hazard Mitigation Plan on a 5-year basis; and

WHEREAS, FEMA and the CRS Program encourage public participation and involvement from a variety of stakeholders throughout the planning process; and

WHEREAS, the Local Hazard Mitigation Planning Committee (HMPC) will be involved in the development of the hazard mitigation plan through assessment of the flood, wildfire and other hazards that threaten our community, development of goals that address the identified hazards, and creation of various mitigation strategies that will be implemented to reduce our exposure to future natural hazard losses, while contributing to other community and economic goals and objectives; and

WHEREAS, the HMPC has the responsibility to meet and fulfill the obligations of the DMA and CRS planning requirements; and

WHEREAS, DMA and CRS require the public and other stakeholders to be fully involved in the planning process;

WHEREAS, a multi-jurisdictional and public HMPC will be established to lead this mitigation planning effort. The HMPC will be widely advertised and open to all attendees and should consist of representatives of various county departments, the incorporated communities, special districts, other federal, state and local agency stakeholders, the public, and others who could be affected by or interested in the impacts of natural disasters; and

NOW, THEREFOE, BE IT RESOLVED THAT, the City Council for the City of Yuba City hereby supports the update of the 2008 Sutter County Multi-Jurisdictional Multi Hazard Mitigation Plan and establishes the new Local Hazard Mitigation Planning Committee (HMPC) comprised of representatives from:

a. Sutter County offices
   1) Public Works
   2) Emergency Management
   3) Community Services
   4) Public Health
   5) Sutter County Fire Services
   6) Sheriff
   7) Administration
   8) Assessor

b. Incorporated communities
   1) City of Yuba City
   2) City of Live Oak

c. Other participating jurisdictions
   1) Levee District One
   2) Gilsizer County Drainage District
   3) Reclamation District No. 70
   4) Reclamation District No. 1001
   5) Reclamation District No. 1500
   6) Reclamation District No. 1660

d. Other private citizens and stakeholders including local, regional, state and federal agencies and partners appointed by the Sutter County Office of Emergency Management.

The forgoing resolution was duly and regularly introduced, passed, and adopted by the City Council of the City of Yuba City at a regular meeting thereof held on the 19th day of March 2013.

Ayes: Councilmembers Dukes, Maan, Starkey and Mayor Buckland

Noes: None

Absent: Councilmember Gill

John Buckland, Mayor

ATTEST:

Terrel Locke, City Clerk

CITY OF YUBA CITY INCORPORATED JAN 23, 1908 SUTTER CO. CALIFORNIA

The Forgoing Instrument is a correct copy of Original on file in this Office.
CERTIFIED 3/20/13
Terrel Locke, City Clerk of the City of Yuba City, State of California
By Terrel Locke, City Clerk Deputy

13-027

GILSIZER COUNTY DRAINAGE DISTRICT
701 BOGUE ROAD
YUBA CITY, CALIFORNIA 95991
(530)673-0134, FAX (530)673-0134

July 9, 2012

Sutter County Office of Emergency Management
Attn: John E. DeBeaux, Jr., Emergency Operations Manager
1130 Civic Center Blvd, Suite A
Yuba City, CA 95993

Re: Letter of Commitment as participating jurisdiction in the Sutter County Multi-jurisdictional Hazard Mitigation Planning

Dear John E. DeBeaux Jr.:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Gilsizer Drainage District is submitting this letter of commitment to confirm that the Gilsizer Drainage District has agreed to participate in the Sutter County Multi-jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Gilsizer Drainage District agrees to participate in meeting the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Sutter County Office of Emergency Management to complete the plan in conformance with FEMA requirements.

The Gilsizer Drainage District understands that it must engage in the following planning process, as more fully described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the requirements of participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; The Gilsizer Drainage District is committed to the Sutter County Multi-jurisdictional Hazard Mitigation Planning effort.

Executed this 9th day of July 2012

George Musallam, Interim District Manager

LEVEE DISTRICT ONE OF SUTTER COUNTY

Since April 1868
243 Second Street ·Yuba City, CA 95991
Office: (530) 673-2454 · Fax: (530) 673-0109
E-Mail: 1d1@syix.com
www.leveedistrict1.com

RECEIVED
MAY 29 2012
COMMUNITY SERVICES

May 25, 2012

Sutter County Office of Emergency Management
Attn: John E. DeBeaux, Jr., Emergency Operations Manager
1130 Civic Center Blvd, Suite A
Yuba City, CA 95993

Re: Letter of Commitment as participating jurisdiction in the Sutter County Multi-jurisdictional Hazard Mitigation Planning

Dear John E. DeBeaux Jr.,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, Levee District One is submitting this letter of commitment to confirm that Levee District One has agreed to participate in the Sutter County Multi-jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Levee District One agrees to participate in meeting the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to the Sutter County Office of Emergency Management to complete the plan in conformance with FEMA requirements.

Levee District One understands that it must engage in the following planning process, as more fully described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction. ;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the requirements of participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, William H. Hampton, commit Levee District One to the Sutter County Multi-jurisdictional Hazard Mitigation Planning effort.

Executed this 25th day of May, 2012.

William H. Hampton

; Silva	**Al Montna**	**Barbara LeVake**	**Bill Hampton**	**Sean Minard**	**Somach Simmons & Dunn**
·r	**Director**	**Director**	**Manager**	**Engineer**	**Attorneys**
74-2120	**(530) 674-2837**	**(530) 673-5237**	**(530) 673-2454**	**(530) 742-6485**	**(916) 446-7979**

B.1.1 HMPC and Steering Committee Invitation List

Table B.2. Sutter County Invite List

Name	Email	Agency	Phone
Al Lehenbauer	Al.Lehenbauer@calema.ca.gov	CalOES - Inland Region	(916) 845-8475
Al Sawyer	ASawyer@co.sutter.ca.us	Sutter County Development Services (Public Works)	(530) 822-7450
Andrew Stresser	rd1001@syix.com	Reclamation District 1001	(530) 656-2318
Andy Duffey	aduffey@succeed.net	Reclamation District 70/1660	(530) 696-2569
Bill Fuller	wfuller@yubacity.net	Yuba City Fire Department	(530) 822-4809
Bill Hampton	ld1@syix.com	Levee District 1	(530) 673-2454
Brad Arnold	sswd@hughes.net	South Sutter Water District	(530) 656-2242
Bruce Morton	bmorton@ycusd.k12.ca.us	YC Unified Schools	(530) 822-7640
Charles Smith	CSmith@co.sutter.ca.us	Sutter County Public Information Officer	(530) 822-7100
Dan Peterson	DWPeterson@co.sutter.ca.us	Sutter County Development Services (Water Resources)	(530) 822-7450
Dan Yager	DYager@co.sutter.ca.us	Sutter County Development Services (Fire Chief)	(530) 822-7400
Danelle Stylos	dstylos@co.sutter.ca.us	Sutter County Development Services (Director)	(530) 822-7400
Diana Langley	dlangley@yubacity.net	Yuba City Public Works	(530) 822-4792
Geri Goetzinger	rdmscsd@syix.com	Sutter Community Services District	(530) 755-1733
Gloria Jennings-Graham	gloriajennings-graham@redcross.org	American Red Cross	(530) 673-1460
Grace Espindola	GraceE@sutter.k12.ca.us	Sutter County Schools	(530) 822-2969
Jack Bailey	reclaim1500@hotmail.com	Reclamation District 1500	(530) 738-4423
Janice Bell	jbell@colusasheriff.com	Colusa County Sheriff	(530) 458-0218
Jeanine Foster	jeanine.foster@amec.com	AMEC	(303) 717-7171
Jeff Pierce	JPierce@co.sutter.ca.us	Sutter County Undersheriff	(530) 822-2222
Jeff Williams	JWilliams@co.sutter.ca.us	Sutter County Development Services (Environmental Health)	(530) 822-7400
Jennifer Broussard	JBroussard@co.sutter.ca.us	Sutter County Public Health	(530) 822-7215
Jerilyn Anderson	jerilyn.anderson@calema.ca.gov	CalOES - Inland Region	(916) 616-1401
Jim Arkens	JArkens@co.sutter.ca.us	Sutter County County Administrator	(822) 530-7100
Jim Brown	jim.brown@calema.ca.gov	CalOES - Inland Region	(530) 845-8487
Jim Little	jlittle@liveoakcity.org	City of Live Oak	(530) 695-2112
John Gulserian	jgulserian@buttecounty.net	Butte County OEM	(530) 538-7373
John Spitler	john.spitler@gswater.com	Golden State Water	(916) 853-3616
Lori Rollins	lori.rollins@pge.com	Pacific Gas & Electric	(530) 634-6430
Lynn Phillips	ldsewd@hughes.net	Sutter Extension Water District	(530) 673-7138
Mark Brown	MBrown@co.sutter.ca.us	Asst Agriculture Commissioner	(530) 822-7500

Name	Email	Agency	Phone
Mark Quisenberry	MarkQ@co.sutter.ca.us	Agriculture Commissioner	(530) 822-7500
Megan Greve	mgreve@co.sutter.ca.us	Suter County Deputy CAO	(530) 822-7100
Michael Barker	mbarker@co.sutter.ca.us	Sutter County Information Technology	(530) 822-7130
Michael Bissette	m.bissette@sutterbuttesflood.org	Sutter Buttes Flood Control Agency	(530) 415-0983
Pete Daley	pdaley@yubacity.net	Yuba City Fire Chief	(530) 822-4698
Phyllis Banks	phyllis.banks@calema.ca.gov	CalOES - Hazard Mitigation	(916) 845-8136
Rob Landon	rlandon@yubacity.net	Yuba City Police Chief	(530) 822-4667
Ron Welch	rwelch@bicountyambulance.com	Bi-County Ambulance	(530) 674-2780
Russ Brown	rbrown@co.yuba.ca.us	Yuba County Public Information Officer	
Scott Bryan	sbryan@co.yuba.ca.us	Yuba County OEM	(530) 749-7520
Shawne Corley	SCorley@co.sutter.ca.us	Sutter County Asst CAO	(530) 822-7100
Steven M. Smith	SMSmith@co.sutter.ca.us	Sutter County Deputy CAO	(530) 822-7100
Steven Thompson	sutterwater@aol.com	Sutter Community Services District	(530) 755-1733

Email Invite to HMPC and Steering Committee for Kickoff Meeting

From: John DeBeaux [mailto:jedebeaux@co.sutter.ca.us]
Sent: Friday, February 08, 2013 11:01 AM
To: Jim Arkens; Shawne Corley; Megan Greve; Steven M. Smith, CAO; J. Paul Parker; Douglas Gault; Todd Retzloff; Al Lehenbauer (Al.Lehenbauer@calema.ca.gov); Al Sawyer; Andy Duffey; Bill Fuller; Bill Hampton; Charles Smith, PIO; Cindy Matthews (cindy.matthes@noaa.gov); Dan Peterson; Dan Yager; Danelle Stylos; Diana Langley; Jack Bailey; Janice Bell; Foster, Jeanine; Jeff Pierce; Jeff Williams; Jennifer Broussard; Jerilyn Anderson (jerilyn.anderson@calema.ca.gov); Jim Brown (jim.anderson@oes.ca.gov); Jim Goodwin; John Forberg; John Gulserian; Lisa Purvis Wilson; Marcus Madden; Pete Daley; Phyllis Banks; Rob Landon; Russ Brown; Scott Bryan
Subject: Mitigation Plan Kickoff Meeting Press Release

Good Morning –

Attached is the press release being sent out today for our Multi Jurisdictional Multi Hazard Mitigation Plan (MJMHMP) Kickoff Meeting on February 20, 2013. Please disseminate to anyone who may need to attend (the more participation the better). At this meeting we will discuss the process for reviewing and updating our plan.

Thanks,

John

John E. DeBeaux Jr., MPA
Emergency Operations Manager
Office of Emergency Management
Sutter County Community Services
(530) 822-7400 x204
Cell: (530) 682-7902

From: John DeBeaux [mailto:jedebeaux@co.sutter.ca.us]
Sent: Thursday, February 14, 2013 2:25 PM
To: Grace Espindola; Bruce Morton; k6taz@yahoo.com; aornelas@chp.ca.gov; hawck.james@sac.sysco.com; perkinsmi@usa.redcross.org; Al Lehenbauer (Al.Lehenbauer@calema.ca.gov); Al Sawyer; Andrew Stresser (rd1001@syix.com); Andy Duffey; Bill Fuller; Bill Hampton; Charles Smith, PIO; Cindy Matthews; Dan Peterson; Dan Yager; Danelle Stylos; Diana Langley; Jack Bailey; Janice Bell; Foster, Jeanine; Jeff Pierce; Jeff Williams; Jennifer Broussard; Jerilyn Anderson (jerilyn.anderson@calema.ca.gov); Jim Brown (jim.anderson@oes.ca.gov); Jim Goodwin; John Forberg; John Gulserian; Lisa Purvis Wilson; Marcus Madden; Pete Daley; Phyllis Banks; Rob Landon; Russ Brown; Scott Bryan
Cc: Jim Arkens; Shawne Corley; Megan Greve; Steven M. Smith, CAO
Subject: FW: Mitigation Plan Kickoff Meeting Press Release

Good Afternoon –

Just a reminder about next week's kickoff and public meetings. I hope to see y'all there.

Thanks,

John

John E. DeBeaux Jr., MPA
Emergency Operations Manager
Office of Emergency Management
Sutter County Community Services
(530) 822-7400 x204
Cell: (530) 682-7902

February 8, 2013

FOR IMMEDIATE RELEASE
CONTACT: Emergency Operations Manager John DeBeaux Jr., 530-822-7400

SUTTER COUNTY INVITES PARTICIPATION IN HAZARD MITIGATION PLAN UPDATE

Sutter County is the lead agency for updating a multi-jurisdictional plan to mitigate damage from a variety of potential disasters, including floods, earthquakes, wildfires, dam failures, drought and severe weather. Partnering with the County in this plan update are the cities of Yuba City and Live Oak, in addition to other jurisdictions.

Local jurisdictions are required to have official Hazard Mitigation Plans to better position resources in advance of a disaster and to qualify for mitigation funding from the Federal Emergency Management Agency (FEMA).

The Sutter County Office of Emergency Management will be hosting two meetings to kick off the process to update the Local Hazard Mitigation Plan first adopted in 2008. Officials from Sutter County, Yuba City, Live Oak, state and local agencies, members of the public and other interested stakeholders are invited to participate in the planning effort.

Separate meetings are scheduled for 2 p.m. and 6 p.m. on Wednesday, February 20 at the Sutter County Veteran's Hall, 1425 Veteran's Memorial Circle, Yuba City.

The 2008 Sutter County Multi-Hazard Mitigation Plan addresses a comprehensive list of hazards. A hazard mitigation planning committee will be appointed to assess the likely impacts of these hazards to the people and assets of the Sutter County planning area, establish updated goals, and prioritize projects to reduce the impacts of future disasters on people and property within Sutter County.

The purpose of the kickoff meetings is to inform the planning committee, participating jurisdictions, and other interested stakeholders about the purpose and process of the plan and to describe how to participate and the benefits of doing so.

Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses, and individuals recover from disaster. Some disasters are predictable and, in many cases, much of the damage can be reduced or even eliminated. FEMA has targeted natural disaster loss reduction as one of its primary goals. The Disaster Mitigation Act of 2000 requires local governments to have a FEMA-approved hazard mitigation plan to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs.

Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Hazard mitigation planning is the process by which hazards that threaten a community are identified, their likely impacts are assessed, mitigation goals are set, and appropriate strategies for reducing risk are developed, prioritized, and implemented.

The Sutter County Office of Emergency Management has taken the initiative to develop this plan update under the direction of Emergency Operations Manager John DeBeaux. The County has drawn on the expertise of consultants with AMEC Environment & Infrastructure, Inc., a firm that specializes in hazard mitigation and emergency management. The County and consultants will organize a Hazard Mitigation Planning Committee to facilitate development of this plan update. Upon preliminary approval by the California Emergency Management Agency (Cal- EMA) and FEMA Region IX, the plan will be presented to the Sutter County Board of Supervisors for formal adoption.

Please come to the kickoff meeting to learn more about hazard mitigation and the LHMP Update process. For more information on this project and how you can be involved, contact John DeBeaux, 530-822-7100, or jedebeaux@co.sutter.ca.us.

Kickoff Meeting

AGENDA

Sutter County
Local Hazard Mitigation Plan (LHMP) Update Project
Kickoff Meeting: February 20, 2013

1) Introductions
2) Mitigation, Mitigation Planning, & the Disaster Mitigation Act Requirements
3) National Flood Insurance Program's (NFIP) Community Rating System, 2013 Overview
4) The Role of the Hazard Mitigation Planning Committee (HMPC)
5) Planning for Public Input
6) Coordinating with other Agencies
7) Hazard Identification
8) Data Collection Needs (Handout)
9) Questions and Answers/Adjourn

GOP blocks vote on Hagel

WASHINGTON (MCT) – Senate Republicans refused to allow a vote Wednesday on the nomination of Chuck Hagel to lead the Defense Department, staging the first filibuster against a president's choice to head the Pentagon.

Senate Majority Leader Harry Reid, D-Nev., called the move "a shame" as he announced on the Senate floor that he was unable to reach an agreement with the top Republican on the Armed Services Committee to avoid such a delay. Reid filed a motion to end the filibuster and said he expected to vote on it Friday.

Only two Cabinet appointments have ever been filibustered, according to the Senate historian's office. C. William Verity, President Ronald Reagan's choice for Commerce secretary in 1987 and Dirk Kempthorne, President George W. Bush's nominee for the Interior Department in 2006.

Public Can Assist In Sutter County, Yuba City, Live Oak Hazard Mitigation Plan Update

Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses, and individuals recover from disaster. Some disasters are predictable and, in many cases, much of the damage can be reduced or even eliminated. The Federal Emergency Management Agency (FEMA) has targeted natural disaster loss reduction as one of its primary goals. The Disaster Mitigation Act of 2000 requires local governments to have a FEMA-approved hazard mitigation plan to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs.

Sutter County is the lead agency for updating a multi-jurisdictional plan to mitigate damage from a variety of potential disasters, including floods, earthquakes, wildfires, dam and levee failures, drought and severe weather. Partnering with the County in this plan update are the cities of Yuba City and Live Oak, in addition to other jurisdictions. Local jurisdictions are required to have FEMA-approved Hazard Mitigation Plans to better position resources in advance of a disaster and to qualify for mitigation funding from FEMA.

A hazard mitigation planning committee will be appointed to assess the likely impacts of hazards to the people and assets of the Sutter County planning area, establish updated goals, and prioritize projects to reduce the impacts of future disasters on people and property within Sutter County.

The Sutter County Office of Emergency Management, in conjunction with Yuba City and Live Oak will be hosting two meetings to kick off the process to update the Local Hazard Mitigation Plan first adopted in 2008. Officials from Sutter County, Yuba City, Live Oak, state and local agencies, members of the public and other interested stakeholders are invited to participate in the planning effort.

Planning Committee Meeting
Wednesday, February 20 @ 2pm
(Public is welcome to attend)

Open Public Meeting
Wednesday, February 20 @ 6pm

Both meetings will be held at the Sutter County Veterans Hall, 1425 Veteran's Memorial Circle, Yuba City.

For additional information:

Sutter County, John E. DeBeaux Jr.
530-822-7400

Yuba City, Diana Langley
530-822-4792

Live Oak, Jim Goodwin
530-695-2012

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
HMPC Kickoff Meeting #1
February 20, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
John Gulserian ESO	jgulserian@buttecounty.net	530-538-7377	Butte OEM
Scott Vickers	svickers@calpine.com	707-374-1505	CPN Pipeline
Andy Dufffey	adufffey@succeed.net	530-682569	RD 70 & 1660
Lewis McElhany	lmcelhany@co.sutter.ca.us	(530) 822-7424	SCSO
Andrew Stresser	rd1001@syix.com	(530)656-2318	RD1001
Bill Fuller	wfuller@yubacity.net	(530)822-4809	Yuba City Fire
LISA WILSON	LWILSON@co.sutter.ca.us	530-822-7400	SUTTER CO
DAN VEGA	"	"	SUTTER CO. FIRE
Gloria Jennings-Graham	Gloria.Jennings-Graham@redcross.org	530-673-1460	Red Cross Northeastern CA
John DeBeaux		822-7400	Sutter OEM

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
HMPC Kickoff Meeting #1
February 20, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
Dan Peterson Sutter County Deputy Dir PW	dwpeterson@ co.sutter.ca.gov	822-3299	Sutter County
Kirby Everhart, Cal EMA Hazard Mitigation	Kirby.everhart@calema.ca.gov	(916) 845-8731	Cal EMA
Jennifer Broussard PH Emerg. Prep. Coord.	jbroussard@co.sutter.ca.us	822-7215	SC Public Health
ELEANOR M KNOX	[illegible]	751958[illegible]	ARES
Jack Bailey Rec. Dist 1500	[illegible]	738-4423	R. D. 1500
JIM ARKENS			SUTTER COUNTY
Jeff Williams	jwilliams@co.sutter.ca.us	822-7400	Sutter County
Jerilyn Anderson	Jerilyn.Anderson @calema.ca.gov	916-616-1401	CalEMA
Danelle Stylos	dStylos@Co.Sutter.Ca.us	822-7400	SUTTER COUNTY

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
HMPC Kickoff Meeting #1
February 20, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
[illegible] E. SWEETMAN	KG6TAZ@YAHOO.COM	639-2433	ARES HAM RADIO
MAX SARTAIN	MSSAK.7@GMAIL.COM	916 765-0189	FD 1500
[illegible]	[illegible]	5308222969	Sutter COE
Ron Murdock	[illegible]	5306748533	ARRL Ham Radio
DENNIS PETERSEN	[illegible]	46 735-1405	FD 1500
Diana Langley - Deputy PW Director	dlangley@yubacity.net	530-822-4792	City of Yuba City
Marcus Madden - Building Dept.			
Pam Allison	pama@cbc.com	5305131858	Cleanite Buildrite
Cindi Smith	csmith@co.sutter.ca.us	530 822 7100	County of Sutter
Jim Goodwin	citymgr@liveoakcity.org	530.695.2112	City of Live Oak
AL SAWYER	asawyer@co.sutter.ca.us	530 822 7450	SUTTER CO
Ron Welch	rwelch@bi-county.com	674-5781	Bi County Amb
Phyllis Banks	Phyllis.Banks@calema.ca.gov	916 845-8136	Cal EMA

Email Invites to Risk Assessment and Mitigation Strategy Meeting

From: John DeBeaux [mailto:jedebeaux@co.sutter.ca.us]
Sent: Friday, May 24, 2013 9:31 AM
To: Al Lehenbauer (Al.Lehenbauer@calema.ca.gov); Al Sawyer; Andrew Stresser (rd1001@syix.com); Andy Duffey; Bill Fuller; Bill Hampton; Bruce Morton; Charles Smith, PIO; Dan Peterson; Dan Yager; Danelle Stylos; Diana Langley; Grace Espindola ; Jack Bailey; Janice Bell; Foster, Jeanine; Jeff Pierce; Jeff Williams; Jennifer Broussard; Jerilyn Anderson (jerilyn.anderson@calema.ca.gov); Jim Arkens; Jim Brown (jim.brown@calema.ca.gov); Jim Goodwin; John Forberg; John Gulserian; Lisa Purvis Wilson; Marcus Madden; Megan Greve; Pete Daley; Phyllis Banks; Rob Landon; Russ Brown; Scott Bryan; Shawne Corley; Steven M. Smith, CAO
Subject: FW: LHMP Meeting notice

All,

The next two planning meetings for the **Sutter County Local Hazard Mitigation Plan Update** have been scheduled as follows:

Meeting #1 - Wednesday, June 12, 2013 from 1:00 pm to 4:30 pm - Risk Assessment Overview of Chapter 4 and Mitigation Strategy Development, with a focus on updating plan goals & objectives.

Meeting #2 - Thursday, June 13, 2013 from 8:30 am to 12 pm – Mitigation Strategy Development: Identifying and Prioritizing Mitigation Actions for each priority hazard for the plan update.

Both meetings will be at the Yuba City Wastewater Treatment Plant meeting room, located at 302 Burns Drive, Yuba City.

It is very important that all participating jurisdictions to the plan update are represented and that key players from each jurisdiction attend and participate in these meetings. The resulting Mitigation Strategy will be most effective if the right people are involved. Cal EMA and FEMA approval is also contingent on participation by all jurisdictions seeking plan approval.

We ask that you please attend both meetings to make sure that you have input on the risk assessment and projects to protect the existing built environment, as well as strategies for future development. These two meetings will allow us to complete a first draft of the entire Sutter County Local Hazard Mitigation Plan update.

If you have any questions, please feel free to contact myself or our consultant, Jeanine Foster with AMEC at 303 717-7171.

Thanks again for your assistance in updating our Local Hazard Mitigation Plan. We appreciate your involvement!

Risk Assessment and Mitigation Strategy Meeting

AGENDA

LHMP Risk Assessment & Mitigation Strategy Meetings
Agenda

HMPC Meeting #2: June 12, 2013

1) Introductions
2) Status of the DMA Planning Process
3) Review of Risk Assessment
4) Update Plan Goals and Objectives
5) Review of Mitigation Alternatives

HMPC Meeting #3: June 13, 2013

1) Identify Updated List of Mitigation Actions
2) Review Mitigation Selection Criteria
3) Prioritize Mitigation Projects
4) Review of Schedule/ Final Data Needs

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Risk Assessment/Mitigation Strategy Meeting #2
June 12, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
Jeanine Foster	jeanine.fosterameccom	(38) 717-7171	AMEC
John DeBeaux	jdebeaux@co.sutter.ca.us	(530) 822-7400	Sutter County OEM
Lori Rollins	Lori.Rollins@pge.com	530 634-6430	PG&E
Diana Langley	dlangley@yubacity.net	530-822-4792	Yuba City & Gilsizer Drainage District
Geri Goetzinger	rdmscsd@syix.com	530-755-1735	Sutter CSD
Steven Thompson	Sutterwater@aol.com	530-755-1753	Sutter CSD
Jim Litke	JLitke@live oak.ca.us	530-682-1458	City of Live Oak.
Andy Duffey	aduffey@succeed.net	530-682-2996	RD 70/1660
Gloria Jennings Graham	~~Gtom~~ Gloria.JenningsGraham@redcross.org	©530-847-4926 916 868-3616	Red Cross
John Spitler	john.spitler@gswater.com		GSWC
Lynn Phillips	lpsewcd@hughes.net	530 673-7138	Sutter Extension Water District
Jeff Williams	jwilliams@co.sutter.ca.us	530 822-7400	Sutter County
Jim Arkens			SUTTER COUNTY

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Risk Assessment/Mitigation Strategy Meeting #2
June 12, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
Bruce Morton YCUSD	bmorton@ycusd.k12ca.us	822-5840	YCUSD
Brad Arnold G.M.	SSWD@hughes.net	530-656-2242	South Sutter W.D.
Dinelle Stylos / CSDr	dstylos@co.sutter.ca.us	530 822-7400	Sutter County
Ronald Welch	rwelch@bicountyambulance.com	674-8780	Bi-County Ambulance
Bill Fuller	wfuller@yubacity.net	822-4809	Yuba City Fire
Jerilyn Anderson		916 616-1401	CalEMA
Dan Peterson	dwpeterson@co.sutter.ca.us	822-7450	Sutter County Public Works/Water Resources
Grace Espindola Sutter COE	gracec@sutter.k12.ca.us	530-822-2969	Sutter County Office of Ed.

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Risk Assessment/Mitigation Strategy Meeting #3
June 13, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
Jim Little	jlittle@lincolncity.org	530 682-1458	City of Live Oak
Gloria Jennings-Graham	Gloria.Jennings-Graham@redcross.org	530-844-4926	Red Cross
Lori Rollins	Lori.Rollins@pge.com	530 634-6430	PG&E
Bruce Morton	bmorton@ycusd.k12.ca.us	530-822-7640	YCUSD
Michael Bessette	m.bessette@sutterbuttesfd.org	530-415-0983	SBFCA
Dan Peterson	dwpeterson@co.sutter.ca.us	530 822-3299	Sutter County Public Works/Water Resources
Jeff Williams	jwilliams@co.sutter.ca.us	530 822 7400	Sutter County EM
Mike McGee	mmcgee@co.sutter.ca.us		Sutter county Building
DAN YAGER	dyager@co.sutter.ca.us	822-7400	Comm Serv. Fire
JOHN SHALOWITZ	JSHALOWITZ@SUTTER.CA.US	822-7400	Comm. Serv. FIRE
JOHN SPITLER	john.spitler@gswater.com	916 853-3616	Golden State Water Company
Al Lehenbauer	al.lehenbauer@calema.ca.gov	916 845 8475	Cal EMA Inland Region
Bill Fuller	wfuller@yubacity.net	530-822-4809	Yuba City Fire

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Risk Assessment/Mitigation Strategy Meeting #3
June 13, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
Jim Little	jlittle@lincolncity.org	530 682-1458	City of Live Oak
Gloria Jennings-Graham	Gloria.Jennings-Graham@redcross.org	530-844-4926	Red Cross
Lori Rollins	Lori.Rollins@pge.com	530 634-6430	PG&E
Bruce Morton	bmorton@ycusd.k12.ca.us	530-822-7640	YCUSD
Michael Bessette	m.bessette@sutterbuttesfd.org	530-415-0983	SBFCA
Dan Peterson	dwpeterson@co.sutter.ca.us	530 822-3299	Sutter County Public Works/Water Resources
Jeff Williams	jwilliams@co.sutter.ca.us	530 822 7400	Sutter County EM
Mike McGee	mmcgee@co.sutter.ca.us		Sutter county Building
DAN YAGER	dyager@co.sutter.ca.us	822-7400	Comm Serv. Fire
JOHN SHALOWITZ	JSHALOWITZ@SUTTER.CA.US	822-7400	Comm. Serv. FIRE
JOHN SPITLER	john.spitler@gswater.com	916 853-3616	Golden State Water Company
Al Lehenbauer	al.lehenbauer@calema.ca.gov	916 845 8475	Cal EMA Inland Region
Bill Fuller	wfuller@yubacity.net	530-822-4809	Yuba City Fire

From: Charles Smith, PIO [mailto:CSmith@co.sutter.ca.us]
Sent: Friday, August 16, 2013 11:46 AM
To: Al.Lehenbauer@calema.ca.gov; Al Sawyer; rd1001@syix.com; Andy Duffey; Bill Fuller; Bill Hampton; Brad Arnold - SSWD; Bruce Morton - YCUSD; Charles Smith, PIO; Dan Peterson; Dan Yager; Danelle Stylos; Diana Langley; Geri Goetzinger - Sutter CSD; Gloria Jennings-Graham; Grace Espindola; Jack Bailey; Janice Bell; Foster, Jeanine; Jeff Pierce; Jeff Williams; Jennifer Broussard; jerilyn.anderson@calema.ca.gov; Jim Arkens; jim.brown@calema.ca.gov; Jim Little; John Gulserian; John Spitler - Golden State Water; Lori Rollins; Lynn Phillips - Sutter Extension Water District; Mark Brown; Mark Quisenberry; Megan Greve; Michael Barker
Subject: Local Agency Hazard Mitigation Steering Committee meeting Friday

Dear Sutter County Hazard Mitigation Steering Committee member:

Below is information from the flyer for the public meeting scheduled for 6 p.m. Thursday at the Veteran's Hall. **The Steering Committee meeting is scheduled for Friday, Aug. 23, at 9 a.m. at the Sutter County CAO's office conference room, 1160 Civic Center Blvd., Yuba City.**

Your Input is needed with the Sutter County Hazard Mitigation Plan Update
Help Us Mitigate Disasters Before They Happen!

Floods, levee failure droughts, earthquakes and other natural hazards pose significant threat to the Sutter County planning area. Knowing the potential risks, anticipating them, and being properly prepared before, during, and after a disaster can prevent devastating losses. Sutter County, the Cities of Yuba City and Live Oak, and participating special districts are developing a Local Hazard Mitigation Plan (LHMP) Update to identify and minimize the damage from natural hazards before they occur.
A Federal Emergency Management Agency (FEMA) approved Hazard Mitigation Plan establishes our eligibility to receive grant money for projects designed to mitigate known or potential hazards. Our Hazard Mitigation Plan addresses a comprehensive list of hazards, establishes goals, and defines projects designed to reduce the impacts that disasters have on people and property. A draft of the LHMP Update has just been released for public and stakeholder review and comment.
Public input on the draft plan is welcomed and valued. After public review and comment, the LHMP Update will be submitted to Cal EMA/FEMA for review and approval. The approved plan will ultimately be adopted by the governing boards for each participating jurisdiction. The draft plan is available for review at: www.bepreparedsutter.org
You are invited to attend a public meeting where we will describe details of our Hazard Mitigation Plan findings and the schedule for project implementation. You can use this forum to present and discuss your ideas. The Public Meeting will be held at the following time and location:
August 22, 2013 – 6:00 p.m.
Address: Sutter County Veteran's Hall, 1425 Veterans Memorial Circle, Yuba City
Final comments may be submitted in one of the following ways:

- Mail written comments to:

Jeanine Foster
AMEC Environment & Infrastructure, Inc.
1002 Walnut Street, Suite 200
Boulder, CO 80302

- Fax written comments to (303) 442-0616 (Attention: Jeanine Foster).
- Email comments to jeanine.foster@amec.com.
- Drop off written comments at Sutter County, 1130 Civic Center Blvd., Yuba City Attn. John Debeaux

AGENDA

Sutter County
Local Hazard Mitigation Plan (LHMP) Update Project
Final Steering Committee Meeting #4
August 23, 2013

1) Introductions
2) Addressing Public Comments on the LHMP Update
3) Final Steering Committee Input
4) Questions and Answers

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Final Steering Committee/HMPC Meeting#4
August 23, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
Jeanine Foster / PM	jeanine.foster@amec.com	303 717-7171	AMEC / Consultant
Diana Langley	dlangley@yubacity.net	530-822-4792	City of Yuba City
Jim Whitle	jwhitle@liveoakcity.org	530 682-1458	City of Live Oak
Dan Peterson / Chief Water Resources	dwpeterson@co.sutter.ca.us	(530) 822-3299	County of Sutter
Jeff Williams Env. Hlth Manage	jwilliams@co.sutter.ca.us	530-822-7400	County of Sutter
Danelle Stylos / Sutter County Development Ser Director	dstylos@co.sutter.ca.us	530 822-744	Sutter County
DAN YARGA Fire Chief	dyager@co.sutter.ca.us	530 822-7400	Sutter Co.
Andy Duffey	aduffey@succeed.net	530-682-2996	RD 70 / 1660
JOAN SPITLER / SECURITY & EMERG. PREP.	john.spitler@gswater.com	916 853-3616	GOLDEN STATE WATER COMPANY
Brad Arnold G.M.	SSWD@hughes.net	530-656-2242	South Sutter Water District

LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE

DATA COLLECTION GUIDE

Sutter County
Hazard Mitigation Planning Committee (HMPC)

February 2013

Clarification on Terminology to be used during the Hazard Mitigation Planning Process

HAZARD – Something that is potentially dangerous

Natural – dangerous situations or events driven by the conditions of nature

Man-made – dangerous incidents driven by human interaction with the physical environment.

MITIGATION – Hazard Mitigation means any sustained action taken to reduce or eliminate
long-term risk to human life and property from natural hazards.

PLANNING PROCESS – This is the method in which AMEC uses to makes sure all the required components of the plan are included so that the State and FEMA approval process is successful.

AMEC'S 10 STEP PLANNING PROCESS USES A COMBINATION OF THREE RECOMMENDED PROCESSES – DMA, FMA AND COMMUNITY RATING SYSTEM (CRS)

FEMA Phases	Hazard Mitigation Grant and Pre-Disaster Mitigation Grant Programs (DMA, 44 CFR 201)	Flood Mitigation Assistance Program (44 CFR 78.5)	Community Rating System Floodplain Management Planning (10-Step Process)
Phase I Organize Resources	Coordination among agencies	Coordination with other agencies or organizations	Organize to prepare the plan
	Integration with other planning efforts	Involve the public, including a description of the planning process. Public involvement may include workshops, public meetings, or hearings	Coordination with other agencies
	Involve public throughout the planning process		Involve the public
Phase II Assess Risks	Identify all hazards	Flood hazard area inventory that identifies the flood risk, including estimates of the number and types of structures at risk and repetitive-loss properties	Assess the (flooding) hazard
	Profile hazard events		
	Assess vulnerability	Problem identification, including a description of the existing flood hazard, the extent of flood depth and damage potential, and the applicant's floodplain management goals	Assess the problem
	Estimate potential losses		
Phase III Develop the Mitigation Plan	Documentation of planning process	Review of possible mitigation actions, including the identification and evaluation of cost-effective and technically feasible mitigation actions	Set goals
	Capability assessment		Review possible activities

	Funding sources		
Phase IV Implement and Monitor Progress and Project Management/ Project Tracking	Adoption	Documentation of the formal plan adoption by the legal entity submitting the plan (e.g., governor, mayor, county executive)	Adopt the plan
	Implementation of mitigation measures		Implement, evaluate, and revise the plan
	Monitoring, evaluating, and updating the plan		
	Continued public involvement		

RISK – A combination of hazard, vulnerability, and exposure. The impact 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.

VULNERABILITY – Being open to damage or attack. The likelihood that an area or sector will be negatively affected by a hazard event.

IMPACT - Measured or observed affect of a hazard event that could include social, economic, and environmental sectors.

MITIGATION CAPABILITIES - In the context of hazard mitigation, mitigation capabilities relate to loss prevention mechanisms implemented by a jurisdiction or community that act to reduce hazard-related impacts from a hazard event.

MITIGATION STRATEGY – As a part of the planning process, each participating jurisdiction is required to identify their specific mitigation goals, objectives and actions (collectively referred to as the mitigation strategy) designed to reduce the risk and vulnerability of a community to identified hazards.

Goals are a broader statement of what a jurisdiction would like to work toward accomplishing. Such as: “Reduce impacts from natural hazards on life, wildlife, property and the environment.”

Objectives provide more specifics on how to obtain the goal. Such as: “Increase awareness about natural hazards.”

Actions are specific projects that will need to be implemented to successfully accomplishing identified goals and objectives. Such as: “Develop a natural hazards public outreach program.”

PARTICIPATING JURISDICTIONS – A participating jurisdiction may be defined as a geographical area over which a governing body has the power and right to exercise authority as in a County, City, Township, Parish, Borough, Tribal and Special District; however, there might not be a distinct political boundary as in a watershed or metropolitan district. A participating jurisdiction for purposes of this LHMP update include any jurisdiction that is willing to meet the plan participation requirements and is seeking approval of the plan for their jurisdiction.

HAZARD MITIGATION PLANNING COMMITTEE (HMPC) - The HMPC is a committee made up of local representation from all the jurisdictions, who want to participate in the planning process, that are located within an identified geographical boundary (i.e., Sutter County Planning Area. For example: this includes representation for each municipality, city, town, and special district within a county, as well as representation for the county government and/or any special district and/or unincorporated area within the county. Also included on the HMPC are other agencies, neighboring jurisdictions, and other public and private stakeholders with an interest in the Sutter County LHMP update process.

LOCAL HAZARD MITIGATION PLANNING COMMITTEE (LHMPC) - The LHMPC is a smaller committee that is made up of representatives of each participating jurisdiction to a multi-jurisdictional plan. The LHMPC focuses on coordinating and collecting data from their jurisdiction and providing local input to the development of the plan document.

BEST AVAILABLE (Existing) DATA – This includes the most current, consistent data that accurately depicts the features and conditions of a given area. DMA regulations require the use of best available, existing data for plan development. The development of new data is not required.

OVERVIEW

The contents of this workbook have been designed to assist Sutter County and participating jurisdictions in collecting necessary background information to support the hazard mitigation planning process pursuant to the Federal Disaster Mitigation Act (DMA) of 2000 and the NFIPs Community Rating System (CRS).

The essential information needed to support the planning process includes background information about each jurisdiction in general and relative to hazards, risks, vulnerabilities, and mitigation capabilities as previously described.

The planning process is heavily dependent on the data submitted back to AMEC by each of the participating jurisdictions represented. The DMA plan development process does not require the development of new data, but requires *existing data only*.

The goal of this process is to produce a hazard mitigation plan that meets the needs of each participating jurisdiction, as well as the requirements of DMA and CRS and that contains a list of projects that may be eligible for federal mitigation funding, pre and post disaster.

PARTICIPATION

The DMA planning regulations and guidance stress that **each** jurisdiction seeking the required FEMA approval of their mitigation plan must:

- Participate in the process;
- Provide details about their specific geographical planning area where the risk in their area differs from that experienced by the entire area;
- Identify specific projects to be eligible for funding; and
- Have the governing board formally adopt the plan.

For HMPC members, „participation" means the planning committee representatives will:

- Attend and participate in Local HMPC meetings;
- Provide available data that is requested of the HMPC coordinator
- Review and provide/coordinate comments on the draft plans;
- Advertise, coordinate and participate in the public input process; and
- Coordinate the formal adoption of the plan by the governing board.

DATA COLLECTION WORKBOOK

This workbook contains an explanation of the types of hazard mitigation or loss prevention data that is needed for the hazard mitigation planning process. This workbook identifies specific requirements for general community information, the Risk Assessment Process (ie., Hazard Identification and Profiles; Vulnerability Assessment; Capability Assessment), as well as defines requirements for development of the Mitigation Strategy.

The worksheets have been developed to facilitate the data collection process. These need to be completed by a representative for each participating jurisdiction and returned as soon as possible. Completion of the data collection workbook by each participating jurisdiction will serve two purposes:

1) They will help facilitate the collection of the necessary information from the local perspective; and
2) They will function as evidence of "participation" in the planning process.

WORKSHEET #1: HAZARD IDENTIFICATION

Name of Department/Jurisdiction:_____

Use this worksheet to identify possible hazards that may impact your jurisdiction. Please rank according to the guidelines that follow the table. Use the Hazard Event Worksheet #2 to provide evidence to justify your conclusions.

Hazard	Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance	Hazard Map? (paper/GIS/ source)
Dam Failure					
Drought & Water shortage					
Earthquakes					
Earth Movements: Landslide					
Earth Movements: Erosion					
Extreme cold & Freeze					
Extreme Heat					
Floods: 100/200/500 year					
Floods: Localized Stormwater					
Levee Failure					
Invasive Species: Pests/Plants					

Marine Invasive Species					
Severe Weather & Storms: Heavy rain, Thunderstorms hail, lightning, wind					
Volcanoes					
Wildfires					

Prepared by: _____
Phone: _____
Email: _____
Date: _____

Please return worksheets by mail, email, or fax to:
Jeanine Foster, AMEC Earth & Environmental
1002 Walnut Street, Suite 200
Boulder, CO 80302
fax: (303) 442-0616
email: jeanine.foster@amec.com

Guidelines

Frequency of Occurrence:
Highly Likely: Near 100% probability in next year.
Likely: Between 10 and 100% probability in next year or at least one chance in ten years.
Occasional: Between 1 and 10% probability in next year or at least one chance in next 100 years.
Unlikely: Less than 1% probability in next 100 years.

Potential Magnitude
Catastrophic: More than 50% of area affected
Critical: 25 to 50%
Limited: 10 to 25%
Negligible: Less than 10%

Spatial Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Significance (your subjective opinion)
Low, Medium, High

WORKSHEET #2: HISTORIC HAZARD EVENT

Name of Department/Jurisdiction:_____

Please fill out one sheet for each significant hazard event with as much detail as possible. Attach supporting documentation, photocopies of newspaper articles, 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	

Prepared by: _____
Phone: _____
Email: _____
Date: _____

Please return worksheets by mail, email, or fax to:
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Boulder, CO 80302
fax: (303) 442-0616
email: jeanine.foster@amec.com

WORKSHEET #3: VULNERABILITY ASSESSMENT

Name of Department/Jurisdiction: _____

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table and questions that follow. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets as defined below. These may include hospitals, fire stations, or historic buildings. In the hazard specific column of the asset inventory table, indicate if there is a specific hazard to which the asset is at risk.

Critical Facilities

FEMA generally defines four kinds of critical facilities:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials
- Hospitals, nursing homes, and housing likely to have occupants who may not be sufficiently mobile to avoid injury or death during a hazard event
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for emergency response activities before, during, and after a hazard event
- Public and private utility facilities that are vital to maintaining or restoring normal services to hazard areas before, during, and after a hazard event

FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

Essential Facilities	High Potential Loss Facilities	Transportation and Lifeline
▪ Hospitals and other medical facilities ▪ Police stations ▪ Fire station ▪ Emergency Operations Centers	▪ Power plants ▪ Dams/levees ▪ Military installations ▪ Hazardous material sites ▪ Schools ▪ Shelters ▪ Day care centers ▪ Nursing homes ▪ Main government buildings	▪ Highways, bridges, and tunnels ▪ Railroads and facilities ▪ Bus facilities ▪ Airports ▪ Water treatment facilities ▪ Natural gas facilities and pipelines ▪ Oil facilities and pipelines ▪ Communications facilities

2007 Sutter County Critical Facilities - MHMP

The 2007 Sutter County plan utilized the following definition of critical facilities taken from the Sutter County General Plan Background Report, 1996:

"Critical facilities are generally defined as those providing important health and safety functions (e.g., hospitals, fire stations, etc.), having large numbers of occupants (office buildings, etc.), engaged in large scale industrial processes (manufacturing plants, mills, etc.), providing large numbers of people with critical services (electricity, gas, water, waster water, etc.) involved with the manufacturing, use, storage or distribution of toxic and hazardous materials (refineries, petrochemical plants, warehouses, etc.), having a network character upon which the community depends heavily (highways, important roads, bridges, etc.), and those whose failure threatens large numbers of people in the nearby and surrounding areas (dams, nuclear power plants, etc.).

A list of mapped critical facilities from the 2007 plan is provided at the

Natural, Cultural, and Historical Assets

Natural resource assets may include wetlands, threatened and endangered species, or other environmentally sensitive areas. Historical assets include state and federally listed historic sites.

Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

Critical Facility/Asset Inventory:_____(Jurisdiction)

Name of Asset	Facility Type	Replacement Value	Hazard Info

Additional Hazard, Risk, and Vulnerability Questions

Localized/Stormwater Flooding

1. Please describe the localized/stormwater flood issue specific to your jurisdiction in paragraph form. In addition, please complete a table similar to the below example detailing types and location of localized/stormwater flooding problems. If available, also attach a map of problem areas.

EXAMPLE TABLE

AMADOR COUNTY HAZARD EVENT MAP
ROAD LIST OF PROBLEM AREA REOCCURANCES

No.	Road Name	Usual Problems						
		Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides /Mudslides	Debris	Downed Trees
1	Lamoine Rd.					X		
2	Old Sacramento Rd.	X	X					
3	Spring Valley Rd.	X	X					
4	Fiddletown Rd.	X	X					
5	Quartz Mtn East	X		X	X			
6	Quartz Mtn No.	X		X	X			
7	New Chicago Rd.	X		X	X			
8	Varni Ranch Rd.	X		X	X			
9	Tanzi Rd.	X		X	X			
10	Barney Rd.	X	X					
11	Ajax Hill Rd.	X	X					
12	Michigan Bar Rd.					X		
13	Carbondale Rd.	X	X					
14	Amador Creek Rd.	X		X				
15	Mayflower Rd.	X		X				
16	Turner Rd.	X		X	X			
17	Stringbean Alley	X		X				
18	Fairia Rd.	X		X	X			
19	Sutter-Ione Rd.	X	X					
20	Five Mile Dr.	X	X					
21	W. Marlette	X	X					
22	Cook Rd.	X	X					
23	Old Stockton Rd.	X	X					
24	Martin Ln.	X		X				
25	Jackson Valley Rd.	X	X					
26	Camanche Rd. Bridg						X	
27	Camanche Rd.	X	X					
28	Buena Vista Rd.	X	X					
29	Coal Mine Rd.	X		X	X			
30	Curran Rd.	X	X					
31	Camanche Pkwy No.		X			X		
32	Maxwell Rd.	X	X					
33	Bell Rd.	X	X					
34	Ostrom Rd.	X	X					
35	Shakeridge Rd.					X		
36	Hale Rd.	X			X			
37	Charleston Rd.					X		
38	Rams Horn Grade					X		
39	Sutter Creek Rd.	X	X		X	X	X	
40	Pine Grove/Volcano Rd.	X					X	
41	Climax Rd.					X		
42	New York Ranch Rd.	X						
43	Argonaut Ln.	X	X					
44	Clinton Rd.				X			
45	Butte Mtn. Rd.				X			
46	Middle Bar Rd.					X		X
47	Electra Rd.				X	X		
48	West Lake Road							X
49	Kit Carson Rd.			X				

Earthquake Vulnerability

1. Number of unreinforced masonry buildings. If available, please provide an inventory of URM buildings specific to your jurisdiction. Include any tables and/or maps. Is this a layer available in GIS?

Special Populations

1. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

Future Development

1. Describe development trends and expected growth areas and how they relate to hazard areas and vulnerability concerns/issues. Please provide zoning/land use maps and GIS layers and maps and tables detailing areas targeted for future development within your jurisdiction.

Prepared by: _____
Phone: _____
Email: _____
Date: _____

Please return worksheets by mail, email, or fax to:
Jeanine Foster, AMEC Earth & Environmental
1002 Walnut Street, Suite 200
Boulder, CO 80302
fax: (303) 442-0616
email: jeanine.foster@amec.com

WORKSHEET #4: MITIGATION CAPABILITY ASSESSMENT

Name of Department/Jurisdiction: _____

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities.

Regulatory

The following planning and land management tools are typically used by local jurisdictions to implement hazard mitigation activities. Please indicate which of the following your jurisdiction has in place. If your jurisdiction does not have this capability or authority, please indicate in the comments column if a higher level of government has the authority. ***Also use the comments column to indicate how we can obtain a copy of the plan or document (i.e. available on the web, will put on ftp, will email or mail).***

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
General plan			
Zoning ordinance			
Subdivision ordinance			
Growth management ordinance			
Floodplain ordinance			
Other special purpose ordinance (stormwater, steep slope, wildfire)			
Building code			Version:
BCEGS Rating			
Fire department ISO rating			Rating:
Erosion or sediment control program			
Stormwater management program			
Site plan review requirements			
Capital improvements plan			
Economic development plan			
Local emergency operations plan			
Community Wildfire Protection Plans			

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
Flood insurance study or other engineering study for streams			
Elevation certificates			
Other			

Administrative/Technical

Identify the technical and personnel resources responsible for activities related to hazard mitigation/loss prevention within your jurisdiction. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level government that can provide technical assistance, please indicate so in the comments column.

Personnel Resources	Yes/No	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices			
Engineer/Professional trained in construction practices related to buildings and/or infrastructure			
Planner/Engineer/Scientist with an understanding of natural hazards			
Personnel skilled in GIS			
Full time building official			
Floodplain Manager			
Emergency Manager			
Grant writer			
Other personnel			
GIS Data – Hazard areas			
GIS Data - Critical facilities			
GIS Data – Building footprints			

Personnel Resources	Yes/No	Department/Position	Comments
GIS Data – Land use			
GIS Data – Links to Assessor's data			
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)			
Other			

Fiscal

Identify whether your jurisdiction has access to or is eligible to use the following financial resources for hazard mitigation

Financial Resources	Accessible/Eligible to Use (Y/N)	Comments
Community Development Block Grants		
Capital improvements project funding		
Authority to levy taxes for specific purposes		
Fees for water, sewer, gas, or electric services		
Impact fees for new development		
Incur debt through general obligation bonds		
Incur debt through special tax bonds		
Incur debt through private activities		
Withhold spending in hazard prone areas		
Other		

Additional Capabilities Questions

1. Does your community have any hazard-related certifications, such as Storm Ready certification or Firewise Communities certification?

2. List any past or ongoing public education or information programs, such as for responsible water use, earthquake or fire safety, household preparedness, or environmental education.

3. **By hazard, list any other past or ongoing mitigation projects or programs designed to reduce disaster losses.**

The Mitigation Strategy

One of the planning process' last activities will be for HMPC members to prepare brief descriptions of proposed mitigation projects that would effectively reduce future disaster losses. This section provides guidance on the categories of mitigation measures to be considered and a mitigation project outline with one example projects.

Categories of Mitigation Measures

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 measures 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***
  - ***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)
    - Passing out sand and sandbags (public works)
    - 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 naturally beneficial functions of floodplains and watersheds to be better realized. These natural and beneficial floodplain functions include the following:

- storage of floodwaters
- absorption of flood energy
- reduction in flood scour
- infiltration that absorbs overland flood flow
- groundwater recharge
- removal/filtering of excess nutrients, pollutants, and sediments from floodwaters
- habitat for flora and fauna
- recreational and aesthetic opportunities

Methods of protecting natural resources include:

- ***Wetlands Protection***
- ***Riparian Area/Habitat Protection/Threatened-Endangered Species***
- ***Erosion & Sediment Control***
- ***Best Management Practices***

  Best management practices ("BMPs") are measures that reduce nonpoint source pollutants that enter the waterways. Nonpoint source pollutants come from non-specific locations. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams. BMPs can be implemented during construction and as part of a project's design to permanently address nonpoint source pollutants. There are three general categories of BMPs:

1. Avoidance: setting construction projects back from the stream.
2. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
3. Cleanse: Stopping pollutants after they are en route to a stream, such as using grass drainageways that filter the water and retention and detention basins that let pollutants settle to the bottom before they are drained

- ***Dumping Regulations***
- ***Set-back regulations/buffers***
- ***Fuels Management***
- ***Water Use Restrictions***
- ***Landscape Management***
- ***Weather Modification***

STRUCTURAL PROJECTS 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 bureau, displays)
- ***Library Resources***
- ***Real Estate Disclosure***
- ***Environmental Education***

Mitigation Action Worksheet

Instructions: Use this guide to record potential mitigation projects (1 page per project) identified during the planning process. Provide as much detail as possible and use additional pages as necessary. These will be collected following HMPC meetings on mitigation goals and measures and included in the plan.

Jurisdiction:

Mitigation Project Title:

Hazards Addressed:

Issue/Background:

Project Description:

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Responsible Office:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Schedule:

Mitigation Action Worksheet - EXAMPLE

Action #12: Elevate Remaining 95 Homes in the Dry Creek Watershed

Hazards Addressed: Floods

Issue/Background: Historically, flooding in the Dry Creek watershed has been a major concern. The February 1986 flood caused widespread damage in most of the Dry Creek watershed. Nearly all bridges and culverts were overtopped, with 30 sustaining embankment damages and one crossing washing out; two bridges over Dry Creek were damaged, street cave-ins occurred at a number of locations, and over 125 homes flooded. Of the 145 homes subject to historical flooding within the Watershed, 95 structures remain non-elevated. Of these 95 remaining homes, 25-30 declined initial grant money for elevation as did the three repetitive loss structures. Placer County is not only concerned with existing flooding problems, but with future problems resulting from increased growth and development in the area. According to the 1992 Dry Creek Watershed, Flood Control Plan, substantial flood damages will occur with the 100-year flood under existing conditions. Areas with the most extensive and frequent damages include areas in the location of the 95 homes. The report indicates that some of these areas are susceptible to flooding from storms as frequent as the 10-year storm. Elevating the remaining 95 homes will reduce future flood-related losses.

Project Description: Elevation of 95 homes to current floodplain ordinance requirements of BFE+1.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Capital Improvement Plan, Dry Creek Watershed Master Plan

Responsible Office: Placer County Flood Control and Water Conservation District, in conjunction with its member agencies including the cities of Rocklin, Loomis, and Roseville.

Priority (H, M, L): Medium

Cost Estimate: The cost to elevate is estimated at $40 per square foot. Homes need to be elevated anywhere from one to six feet. Of the 95 homes where elevating is feasible, it is estimated to cost $6 million or $50 to $6 K per home.

Benefits (Losses Avoided): Life Safety; Reduction in Property Loss.

Potential Funding: HGMP, PDM, Dry Creek Trust Fund

Schedule: Within three years

Critical Facilities (mapped) from 2007 MHMP

Unincorporated Sutter County Critical Facilities	
Owner	**Critical Facility**
Various	Cellular Phone Tower
Verizon Wireless	Cellular Phone Tower
Airtouch	Cellular Phone Tower
AT&T	Cellular Phone Tower
Nextel	Cellular Phone Tower
Airtouch	Cellular Phone Tower
Nextel	Cellular Phone Tower
American Tower Co.	Cellular Phone Tower
American Tower Corp.	Cellular Phone Tower
Nextel	Cellular Phone Tower
Airtouch & AT&T	Cellular Phone Tower
	Cellular Phone Tower
Airtouch	Cellular Phone Tower
American Tower	Cellular Phone Tower
AT&T and Sbc	Cellular Phone Tower
Sprint Pcs	Cellular Phone Tower
Nextel	Cellular Phone Tower
Rcs Wireless	Cellular Phone Tower
Airtouch And Nextel	Cellular Phone Tower
AT&T	Cellular Phone Tower
Airtouch & Nextel	Cellular Phone Tower
Cingular Wireless	Cellular Phone Tower
AT&T	Cellular Phone Tower
	Cellular Phone Tower
Sba Comm.	Cellular Phone Tower
	Cellular Phone Tower
Nextel	Cellular Phone Tower
AT&T And Nextel	Cellular Phone Tower
Nextel	Cellular Phone Tower
	Cellular Phone Tower
American Tower Corp.	Cellular Phone Tower
MCI	Cellular Phone Tower
Meridian #65	Fire Station
Sutter #6	Fire Station
Oswald-Tudor #8	Fire Station
Sutter Basin	Fire Station
Oswald Tudor #2	Fire Station
Sutter Basin	Fire Station
Sutter Basin	Fire Station
East Nicolaus #2	Fire Station
East Nicolaus #85	Fire Station
Pleasant Grove #9	Fire Station

Unincorporated Sutter County Critical Facilities	
Owner	**Critical Facility**
Pleasant Grove #2	Fire Station
Brittan School	Mass Care Center
Meridian Elementary School District	Mass Care Center
Sutter High School	Mass Care Center
Sutter United Methodist Church	Mass Care Center
Sutter Youth Organization	Mass Care Center
Winship Elementary School	Mass Care Center
Encinal School	Mass Care Center
Live Oak Church Of The Brethren	Mass Care Center
Nuestro School	Mass Care Center
Adventist Christian School	Mass Care Center
Barry School	Mass Care Center
Central Gaither School	Mass Care Center
Grace Baptist Church/Christian School	Mass Care Center
Lincrest School	Mass Care Center
Robbins School	Mass Care Center
YC Assembly Hall Of Jehovah's Witness	Mass Care Center
Browns Elementary School District	Mass Care Center
Marcum-Illinois School District	Mass Care Center
Pleasant Grove School	Mass Care Center
Colusa County Fairgrounds	Mass Care Center
Placer County Fairgrounds	Mass Care Center
Silver Dollar Fairgrounds	Mass Care Center
Willow Glen Care Center Nursing Home	Medical Care Facility
Sungarden Rest Home Nursing Home	Medical Care Facility
Sutter County Sheriff	Police Station
Brittan Elementary School District	School
Browns Elementary School District	School
East Nicolaus Joint Union High School District	School
Marcum-Illinois Union School District	School
Franklin Elementary School District	School
Encinal Elementary School	School
Meridian Elementary School District	School
Nuestro Elementary School District	School
Pleasant Grove Joint Union School District	School
Sutter Union High School District	School
Winship Elementary School District	School
Barry Elementary School	School
Central Gaither Elementary School	School
Lincrest Elementary School	School
Robbins Elementary School	School
Meridian School District	School
Grace Christian Academy And Pre-School	School

Unincorporated Sutter County Critical Facilities	
Owner	**Critical Facility**
Adventist Christian School	School
Sewer Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility
Seepage Station	Wastewater Treatment Facility
Water Tank	Wastewater Treatment Facility

Yuba City Critical Facilities	
Owner	**Critical Facility**
Verizon Wireless	Cellular Phone Tower
Airtouch	Cellular Phone Tower
Yuba City Fire #7	Fire Station
Yuba City Fire #2	Fire Station
Yuba City Fire #1	Fire Station
Yuba City Fire #4	Fire Station
Yuba City Fire #3	Fire Station
Tierra Buena Elementary School	Mass Care Center
Albert Powell High School	Mass Care Center
Andros Karperos School	Mass Care Center
April Lane School	Mass Care Center
Bridge Street School	Mass Care Center
Church Of Christ	Mass Care Center
First Lutheran School	Mass Care Center
Gray Avenue Middle School	Mass Care Center
King Avenue School	Mass Care Center
St. Isidore's School	Mass Care Center
Yuba City High School	Mass Care Center
Veterans Memorial Hall	Mass Care Center
Lincoln School	Mass Care Center
Yuba/Sutter Fairgrounds	Mass Care Center
Yuba/Sutter Fairgrounds	Mass Care Center
Tierra Buena Elementary School	Mass Care Center
Fremont Hospital	Medical Care Facility
Sutter Yuba Mental Health Hospital	Medical Care Facility
North Valley Behavioral Health Hospital	Medical Care Facility
Courtyard Assisted Living Nursing Home	Medical Care Facility
Emmanuel Health Care Center Nursing Home	Medical Care Facility
Fountains Skilled Nursing Home	Medical Care Facility
Yuba City Care Center Nursing Home	Medical Care Facility
Feather River Surgery Center Surgical Center	Medical Care Facility
Sutter North Surgery Center Surgical Center	Medical Care Facility

Yuba City Critical Facilities	
Owner	**Critical Facility**
Barreras Senior Care Nursing Home	Medical Care Facility
Creekside Country Manor Nursing Home	Medical Care Facility
Dorothy's Care Home Nursing Home	Medical Care Facility
Golden Years Residential Nursing Home	Medical Care Facility
Konda's Assisted Living Nursing Home	Medical Care Facility
Summerfield Care Center Nursing Home	Medical Care Facility
Yuba City Manor Nursing Home	Medical Care Facility
Rcca Colusa Nursing Home	Medical Care Facility
Sutter County Sheriff	Police Station
Yuba City Police Department	Police Station
Feather River Academy	School
Yuba City Unified School District	School
Gray Avenue Middle School	School
Albert Powell High School	School
Andros Karperos School	School
April Lane Elementary School	School
Yuba City High School	School
Bridge Street Elementary School	School
Butte Vista School	School
Child Development Programs	School
King Avenue Elementary School	School
Lincoln Elementary School	School
Park Avenue Elementary School	School
Tierra Buena Elementary School District	School
West Walton Elementary School	School
Faith Christian High School	School
Faith Christian Elementary School	School
St. Isadore's Catholic School	School
First Baptist Academy	School
First Lutheran Elementary School	School
River Valley High School	School
Sewer Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility
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Sewer Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility

Yuba City Critical Facilities	
Owner	**Critical Facility**
Sewer Lift Station	Wastewater Treatment Facility
Storm Lift Station	Wastewater Treatment Facility
Storm Lift Station	Wastewater Treatment Facility
Storm Lift Station	Wastewater Treatment Facility
Storm Lift Station	Wastewater Treatment Facility
Storm Lift Station	Wastewater Treatment Facility
Waste Water Treatment Plant	Wastewater Treatment Facility
Water Treatment Plant	Wastewater Treatment Facility

Live Oak Critical Facilities	
Owner	**Critical Facility**
Live Oak #5	Fire Station
Church Of The Nazarene	Mass Care Center
Live Oak Middle School	Mass Care Center
Live Oak High School	Mass Care Center
Luther Elementary School	Mass Care Center
Live Oak Manor Nursing Home	Medical Care Facility
Sutter County Sheriff	Police Station
Live Oak Unified School District	School
Live Oak High School	School
Live Oak Middle School	School
Luther Elementary School	School
Valley Oak Alternative High School	School
Sewer Lift Station	Wastewater Treatment Facility
Water Well	Wastewater Treatment Facility
Water Well	Wastewater Treatment Facility
Water Well	Wastewater Treatment Facility
Water Tank	Wastewater Treatment Facility
Sewage Lift Station	Wastewater Treatment Facility
Water Well	Wastewater Treatment Facility
Storm Water Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility
Water Well	Wastewater Treatment Facility
Storm Water Lift Station	Wastewater Treatment Facility
Water Well	Wastewater Treatment Facility
Storm Water Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility
Sewer Lift Station	Wastewater Treatment Facility
Waste Water Treatment Plant	Wastewater Treatment Facility

Although not mapped, the HMPC also thought that churches should be included in the list of critical facilities. Churches often function as a meeting place for large numbers of people during and after disasters.

Internal Meetings

amec

MEETING RECORD

Project: Hazard Mitigation Plan update	**Date:** 2/27/13
Meeting Purpose: To provide an overview of why the county has a Hazard Mitigation Plan and what is involved in updating the plan.	

Meeting Attendees: Public Health Emergency Preparedness Unit: Dr. Lou Ann Cummings, Anne Westlake, Ranjit Dhaliwal, & Jennifer Broussard.

Items Discussed:

- County is updating the Hazard Mitigation (HM) Plan.
- Two kick off meetings were held. One session was videotaped and will be posted on the Office of Emergency Management's facebook page and possibly the county website.
- Discussed plan has to be updated every 5 years to receive FEMA funds during a disaster.
- Discussed that update is also tied to flood insurance program and can decrease flood insurance rates if enough points are earned. Briefly discussed CRS process.

Follow-up:
Report updates as necessary.

By:
Name: Jennifer Broussard
Organization: Sutter County Public Health

MEETING RECORD

Project: SUTTER COUNTY MITIGATION PLAN UPDATE	Date: 2/20/13
Meeting Purpose: Department Meeting	

Meeting Attendees: See ATTACHED

Items Discussed: Discussed Recent Kickoff Meeting. Asked for update using DATA collection. Answered follow up questions for Kickoff meeting.

Follow-up: Will address again at next Department Meeting

By:
Name: John Deveaux
Sutter OEM

SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Jurisdictional Tracking: Participation in Plan Development Process

Name/Title	Department	E-Mail Address	Phone	Meeting/Task Description
John DeBeaux	Comm Serv OEM	je.lebeaux@co.sutter.ca.us	7400	Dept Meeting MJMHMP UPDATE
Jeff Williams	Community Services Env. Hlth	jwilliams@co.sutter.ca.us	822-7400	" "
DAN YAGEN	Comm Serv. Fire	dyager@co.sutter.ca.u	"	"
LISA WILSON	PLANNING	LBURNSWILSON@Co.Su	7400	"
Bob Clary	Code Enf Admin	bclary@	"	"
STEVE GEIGER	COMMUNITY SERVICES - PLANNING	sgeiger@co.sutter.ca.us	-7400	"
Marcus Maeder	" " - Building	mmaeder@co.sutter.ca.us	"	"
Danelle Styles	Community Services Planning	dstyles@co.sutter.ca.us	822-7400	"
DIANA BARRETT	ANIMAL CONTROL	dbarrett@co.sutter.ca.us	822-7375	"

Jurisdiction: Sutter Co Community Services

Jurisdictional Lead Name: John DeBeaux

Date: 2/26/13

Jurisdictional Lead Signature:

B.2 Sutter County Step 2: Involve the Public

Due to the multijurisdictional nature of this plan update, all public outreach activities described in this section were conduction in coordination with and on behalf of all participating jurisdictions, including the 3 CRS communities.

A List of Steering Committee Members

Table B.3. Sutter County LHMP Steering Committee

Community	Department/Organization/ Representative	Citizen	Stakeholder	# Meetings
Sutter County				
John DeBeaux	Emergency Management			3
Dan Peterson	Public Works			3
Michael Bessette	Sutter-Buttes Flood Control Agency		Y	3
Ronald Welch	Bi-County Ambulance		Y	3
Lori Rollins	PG & E		Y	2
Steve Sweetman	ARES Ham Radio	Y		1
Yuba City				
Diana Langley	Public Works			3
Bill Fuller	Fire Department			3
Gloria Jennings	Sutter County American Red Cross		Y	3
Scott Vickers	CPN Pipeline		Y	1
Pam Allison	Cleanrite Buildrite		Y	1
Eleanor Knox	ARES Ham Radio	Y		1
Live Oak				
Jim Little	Building Department			3
John Spitler	Golden State Water Company		Y	2
Ron Murdock	ARLL Ham Radio	Y		1
Jerilyn Anderson	Cal-EMA		Y	2
John Gulsarian	Butte County Emergency Management		Y	2
Reclamation District 70 & 1660	Andy Duffy			3
Reclamation District 1001	Andrew Stresser			3
Reclamation District 1500	Jack Bailey & Max Savaxe			2
Levee District 1	Bill Hampton* (out sick in early planning process)			*Coordinated via phone/e-mail
Gilsizer Drainage District	Diana Langley (Yuba City)			3

Due to the multijurisdictional nature of this plan update, all public outreach activities described in this section were conduction in coordination with and on behalf of all participating jurisdictions, including the 3 CRS communities.

B and C Public Meetings

Table B.4. Public Meetings

Public Meeting Type	Meeting Topic	Meeting Date	Location
Early Public Meeting	1) Intro to DMA and mitigation planning 2) NFIP CRS 2013 Overview	2/20/2013	Sutter County Veteran"s Hall, Yuba City
Draft Plan Public Meeting	Presentation of Draft LHMP (this meeting was not advertised but was still held for those invited via email)	8/22/2013	Sutter County Veteran"s Hall, Yuba City
Draft Plan Public Meeting	Presentation of Draft LHMP (this meeting was advertised and was held to ensure the County and cities received credit from the CRS for the meeting)	8/29/2013	Sutter County Veteran"s Hall, Yuba City

Early Public Meeting

AGENDA

Sutter County
Local Hazard Mitigation Plan (LHMP) Update Project
Public Meeting#1: February 20, 2013

1) Introductions
2) Mitigation, Mitigation Planning, & the Disaster Mitigation Act Requirements
3) National Flood Insurance Program's (NFIP) Community Rating System, 2013 Overview
4) Questions and Answers/Adjourn

6 Pp

SIGN-IN SHEET
Sutter County
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Public Meeting #1
February 20, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
Jennifer Broussard	broussard245@comcast.net		Public
Kirby Everhart Hazard Mitigation	Kirby.everhart@calema.ca.gov	(916)845-8131	Cal EMA
John DeBeaux	jdebeaux@co.sutter.ca.us	822-7400	Sutter OEM
John FORBERG	jforberg@co.sutter.ca.us	822-7130	Sutter IT
Griffin Rogers	grogers@appeal-democrat.com	749-4783	Appeal-Democrat
Diana Langley	dlangley@yubacity.net	822-4792	City of Yuba City
Dan Peterson Chief-Water Resources	dwpeterson@co.sutter.ca.gov	822-3299	County of Sutter
Chuck Smith	csmith@co.sutter.ca.us	8227100	County of Sutter

AGENDA

Sutter County
Local Hazard Mitigation Plan (LHMP) Update Project
Public Meeting
August 22, 2013

1) Introductions
2) Mitigation, Mitigation Planning, & the Disaster Mitigation Act Requirements
3) Overview of the Sutter County Local Hazard Mitigation Plan Update
4) Questions and Answers/Public Input

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Final Public Meeting#2
August 22, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
Jeanine Foster / AMEC	jeanine.foster@amec.com	303 717-7171	AMEC / Consultant
Chuck Smith / PIO	CSmith@co.sutter.ca.us	530 822-7100	County of Sutter
Dan Peterson Sutter County Water Resources	dwpeterson@co.sutter.ca.us	(530) 822-3299	County of Sutter

AGENDA

Sutter County
Local Hazard Mitigation Plan (LHMP) Update Project
Public Meeting
August 29, 2013

1) Introductions
2) Overview of the Sutter County Local Hazard Mitigation Plan Update
3) Questions and Answers/Public Input

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d Cross said reach. Officials were trying to establish air or water links to the scene.

Honduran and Guatemalan diplomats traveled to the area to help identify victims and make sure the injured were getting needed medical attention, the nations' foreign officials said.

Mario Bustillos Borge, the Red Cross chief in Tabasco, described the rescue as a complex situation that was making it difficult to get rapid confirmation of the exact number of dead and injured.

"There are some very high estimates, and others that are more conservative," he told a local radio station, without providing details.

While the number of Mexicans heading to the U.S. has dropped dramatically, there has been a surge of Central Americans making the 1,000-mile northbound journey, fueled in large part by the rising violence brought to migration enforcement by Mexican authorities and a false perception that Mexican criminal gangs are not preying on migrants as much as they had been.

Central American migration remains small compared to the numbers of Mexicans still headed north, but steeply rising numbers speak starkly to the violence and poverty at home.

hours, trying to signal a return to normalcy across the country.

"We have crossed the swamps and muddy pools, and now we are on the safe side," Ahmed el-Musalamani, a spokesman for interim-president's spokesman, said Sunday.

He added: "We have overcome the tough phase."

Sunday, top Brotherhood leader Mohammed Badie and five other members of the Islamist Brotherhood saw their hearings postponed until Oct. 29. The defendants, two of whom are still in hiding and being tried in absentia, face charges stemming from clashes outside the Brotherhood's Cairo headquarters on June 30 that left nine dead.

Ed Bevacqua
Certified Mortgage Planning Specialist
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229 Clark Ave., Yuba City
(530) 673-7323
Mon 9–2, Tue-Fri 9–5:30, Sat 9–1
Diane & Sherita, formerly of Flower Petaler are back and excited to serve our friends & neighbors in the Yuba-Sutter area.

Final Open Meeting For Sutter County, Yuba City, Live Oak Hazard Mitigation Plan

Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses, and individuals recover from disaster. Some disasters are predictable and, in many cases, much of the damage can be reduced or even eliminated. The Federal Emergency Management Agency (FEMA) has targeted natural disaster loss reduction as one of its primary goals. The Disaster Mitigation Act of 2000 requires local governments to have a FEMA-approved hazard mitigation plan to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs.

Sutter County is the lead agency for updating a multi-jurisdictional plan to mitigate damage from a variety of potential disasters, including floods, earthquakes, wildfires, dam and levee failures, drought and severe weather. Partnering with the County in this plan update are the cities of Yuba City and Live Oak, in addition to other jurisdictions. Local jurisdictions are required to have FEMA-approved Hazard Mitigation Plans to better position resources in advance of a disaster and to qualify for mitigation funding from FEMA.

This process began in February of 2013 with an initial public meeting and the establishment of a Planning Committee that included representatives of various local agencies. The public review draft of the plan update is now available at the reference desk of the Sutter County Library (hard copy) 750 Forbes Avenue, Yuba City, (hours 10 a.m. to 7 p.m. Monday through Thursday and 10 a.m. to 5 p.m. Friday and Saturday)

It is also available online (pdf file) at www.bepreparedsutter.org

Open Public Meeting

A final public meeting to review and accept comments on the public review draft update of the Local Hazard Mitigation Plan is scheduled for Thursday, Aug. 29, at 6 p.m. at the Sutter County Veteran's Hall, 1425 Veterans Memorial Circle, Yuba City.

Email

Address email comments to: jeanine.foster@amec.com

Online Survey

In addition, the public is invited to participate in an online survey on hazards and hazard mitigation. This information will be reviewed as part of the planning process. The online address to participate in the survey is www.surveymonkey.com/s/SutterCountyHazardMitigation

For additional information:

Sutter County, John E. DeBeaux Jr.
530-822-7400

Yuba City, Diana Langley
530-822-4792

Live Oak, Jim Goodwin
530-695-2012

SIGN-IN SHEET
SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Final Public Meeting#3
August 29, 2013

Name/Title	Email Address	Phone	City/Organization/ Affiliation
Dan Peterson Chief, Water Resources	dwpeterson@ co.sutter.ca.us	(530) 822-3209	County of Sutter
Chuck Smith Public Information officer	csmith@co-Sutter.ca.us	822-7100	County of Sutter

Public Meeting Handout

SUTTER COUNTY PUBLIC MEETING INFORMATION

1.1.1 Participating Jurisdictions

- Sutter County
- City of Live Oak
- City of Yuba City
- Gilsizer Drainage District
- Levee District 1
- Reclamation District 70
- Reclamation District 1001
- Reclamation District 1500
- Reclamation District 1660

1.1.2 Hazards List

- Dam Failure*
- Drought & Water shortage*
- Earthquakes
- Earth Movements: Erosion
- Earth Movements: Landslide
- Floods: 100/200/500 year*
- Floods: Localized Stormwater Flood*
- Invasive Species: Pests/Plants*
- Levee Failure*
- Marine Invasive Species*
- Severe Weather: Extreme Cold/Freeze*
- Severe Weather: Extreme Heat*
- Severe Weather: Fog
- Severe Weather: Heavy rain, hailstorm, lightning, wind*
- Severe Weather: Tornado
- Volcano
- Wildfires*

*Priority Hazards - County

1.1.3 Plan Goals

Master Goal/Mission Statement

To develop sustainable communities to preserve life, protect property, the environment, and the economy from natural hazards by improving the communities' capabilities to prevent losses.

Goal 1: Minimize risk and vulnerability of the community to hazards and reduce damages and protect lives, properties, and public health in Sutter County

- Minimize economic and resource impact
- Minimize impact to both existing and future development
- Prevent and reduce flood-related losses
- Improve integrity of levees
- Prevent and reduce agricultural losses

Goal 2: Provide protection for critical facilities, infrastructure, utilities and services from hazard impacts.

- Update and maintain list of critical facilities: Essential Services, At-Risk Populations, Hazardous Materials Facilities
- Protect evacuation routes

Goal 3: Improve community awareness, education, and preparedness for hazards that threaten our communities

- Enhance public outreach, education and preparedness program to include all hazards of concern
- Increase public knowledge about the risk and vulnerability to identified hazards and recommended responses to disaster events
- Increase public communications to keep the public well informed prior to, during and after a disaster event, including information regarding evacuation and sheltering options
- Provide planning and coordination for "At-Risk" populations
- Increase public's awareness and involvement in communities' mitigation projects

Goal 4: Increase communities' ability to be prepared for, respond to, and recover from a disaster event

- Improve interagency (local, state, federal) emergency coordination and communication to ensure effective community preparedness, response and recovery
- Enhance the use of shared resources/Develop a strong mutual aid support system
- Create and maintain a fully functional, interoperable radio and communication system
- Improve interoperable communication with non-public safety and private partners

Goal 5: Enhance collaboration and coordination of disaster-related plans with local, state, and federal agencies and private partners

- Protect and maintain continuity of operations

Goal 6: Maintain FEMA Eligibility/Position the communities for grant funding.

Table 1.1. Sutter County Planning Area's Mitigation Actions

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Multi-jurisdictional Actions						
Enhance Public Awareness of the Affects of Natural Hazards and Public Understanding of Disaster Preparedness	Sutter County, Live Oak, Yuba City	New Action and Ongoing	X	X	X	Public Information
Planned Multi-Hazard CRS Outreach Projects	Sutter County, Live Oak, Yuba City	New Action	X	X	X	Public Information
Implementation of CRS Activities	Sutter County, Yuba City and Live Oak	New Action and Ongoing	X	X	X	Prevention Emergency Services Property Protection Natural Resource Protection Structural Public Information
Review and Amend Flood Damage Prevention Ordinance, as Appropriate	Sutter County, Yuba City and Live Oak	New Action		X	X	Prevention Property Protection
Evaluate the Development and Implementation of County-Wide Stormwater Management Ordinance	Sutter County, Yuba City and Live Oak	New Action		X	X	Natural Resource Protection Prevention Property Protection
Prepare Post-Disaster Guidance Materials	Sutter County, Yuba City and Live Oak	New Action	X	X		Public Information
Feather River Regional Flood Management Plan	Sutter County, Yuba City and Live Oak	New Action	X	X	X	Structural Natural Resource Protection
Feather River West Levee Rehabilitation Project	Sutter County, Yuba City and Live Oak	New Action	X	X	X	Structural Natural Resource Protection
River Level Gauge System	Sutter County, Yuba City and Live Oak	New Action	X	X		Structural
Sutter Basin Feasibility Study	Sutter County, Yuba City and Live Oak	2007 Action	X	X	X	Structural Natural Resource Protection

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Sutter County Actions						
Flood System Repair Program	Sutter County	New Action	X	X	X	Structural Natural Resource Protection
Robbins Wastewater Plant - Backup Power Source	Sutter County	New Action	X		X	Property Protection
Live Oak Canal - Improvement Project	Sutter County	New Action	X	X	X	Structural
Gilsizer Slough - Master Drainage Study	Sutter County	New Action	X	X	X	Property Protection Structural Natural Resource Protection
Robbins Wastewater Plant - Water Meters & Mains	Sutter County	New Action	X			Structural
NIXLE Text Notification System	Sutter County	New Action	X	X		Emergency Services Property Protection
Robbins Wastewater Plant - Water Treatment Plant	Sutter County	New Action	X			Structural
Replace Pipe under Road to Transport Water to East Side of City to Enhance Fire Flows	City of Live Oak	New Action	X	X		Property Protection
Eliminate Local Flooding Areas at the Six Locations Identified in the Master Drainage Study	City of Live Oak	New Action	X	X	X	Property Protection Structural Natural Resource Protection
Hwy 99 Improvements	City of Live Oak	New Action	X	X		Structural
EOC Equipment and Supplies	City of Live Oak	New Action	X	X		Emergency Services
Blackboard Connect Upgrades and Maintenance	City of Live Oak	New Action	X	X		Emergency Services
Backup Power to Critical Facilities	City of Live Oak	New Action	X	X		Property Protection Structural
Well, Holding Tank, Water Treatment Equipment with Associated Water lines and Water Main Upgrade	City of Live Oak	New Action	X	X		Structural

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Project Improvements to Decrease Localized Flooding	City of Yuba City	New Action	X	X	X	Prevention Property Protection Structural Natural Resource Protection
Enhance Current Rapid Notify System to Include Cell Phone Enhancements	City of Yuba City	New Action	X	X	X	Emergency Services
Feather River Habitat Restoration	City of Yuba City	New Action	X	X	X	Natural Resource Protection
Fifth Street Bridge Replacement	City of Yuba City	New Action	X	X	X	Prevention Emergency Services Structural
Gilsizer Slough Weir at Bogue Road	City of Yuba City	New Action	X	X	X	Structural Property Protection
Interactive Critical Facility Data Management	City of Yuba City	New Action	X	X	X	Emergency Services Property Protection
Low Lift Pump Station Security Improvements	City of Yuba City	New Action	X	X	X	Emergency Services Property Protection
Hazard Preparedness Public Outreach	City of Yuba City	New Action	X	X	X	Public Information
Relocation of Treated Wastewater Effluent Diffuser Line	City of Yuba City	New Action	X	X	X	Property Protection Emergency Services
Response Logistics Planning	City of Yuba City	New Action	X	X	X	Prevention Emergency Services Public Information
200-Year Flood Protection for Sphere of Influence Area	City of Yuba City	New Action	X	X	X	Structural Property Protection
Alternative Methods to Dispose of Treated Wastewater Effluent	City of Yuba City	New Action	X	X	X	Property Protection Emergency Services
Establish Backup Power Sources for Critical Facilities within Yuba City	City of Yuba City	New Action	X	X	X	Property Protection Emergency Services

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Yuba City Urban Area Emergency Operations Center	City of Yuba City	New Action	X	X	X	Emergency Services Structural
Master Drainage Study and Improvements to Meet 200-YR Flood Protection	Gilsizer County Drainage District	New Action	X	X	X	Property Protection Structural Natural Resource Protection
Revetment of Slough Channel	Gilsizer County Drainage District	2007 Action	X	X	X	Property Protection Structural Natural Resource Protection
Bank Erosion Repairs	Levee District 1	2007 Action	X	X		Property Protection Structural Natural Resource Protection
Alternative Power Source at Pumping Station	RD 70	New Action	X	X	X	Emergency Services Property Protection
Coordination with State DWR Flood Emergency Response Project	RD 70	New Action	X	X	X	Prevention Emergency Services
Flood System Repair Project #1	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #2	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Flood System Repair Project #3	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Flood System Repair Project #4	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #5	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #6	RD 1001	New Action	X	X		Property Protection Natural Resource Protection
Flood System Repair Project #7	RD 1001	New Action	X	X		Property Protection Natural Resource Protection

Action Title	Lead Jurisdiction	New Action/2007 Action	Address Current Development	Address Future Development	Continued Compliance with NFIP	CRS Category
Flood System Repair Project #8	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Alternative Power Source at Pump House	RD 1001	New Action	X	X		Property Protection Structural
Flood Emergency Response Project	RD 1001	New Action	X	X		Property Protection Natural Resource Protection Structural
Alternative Power Source at Karnak Pump Station	RD 1500	New Action	X	X		Emergency Services Property Protection
Levee Repair	RD 1660	New Action	X	X		Property Protection Natural Resource Protection Structural
Alternative Power Source at Pump Station	RD 1660	New Action	X	X		Emergency Services Property Protection
Coordination with State DWR Flood Emergency Response Project	RD 1660	New Action	X	X		Prevention Emergency Services

B.2.1 Other Public Outreach

Due to the multijurisdictional nature of this plan update, all public outreach activities described in this section were conduction in coordination with and on behalf of all participating jurisdictions, including the 3 CRS communities.

Table B.5. Public Outreach Efforts

Effort	Description
Meeting with Amateur Radio Emergency Service	Discussed roles of ARES in communication of disaster information. Sought input on plan development.
Meeting with American Legion	Discussed needs of the Veterans Community in Sutter County and their role in hazard planning. Sought historical data on flooding, levee breaks, and other hazard issues.
Article in Appeal-Democrat	An article was published to make citizens in the County aware of the hazard mitigation update process and invite participation.
Flood Hazard and Flood Insurance Letter	As part of CRS activity 330, a letter was mailed to 2,086 different property owners with properties in the floodplain in July of 2013. These owners actually own 3,992 parcels with structures that fall within a SFHA. The letter included information how to participate on the HMPC
Survey	A public survey was posted on the City"s website and on the County"s Facebook page inviting the public to comment on how prepared both the County and individuals are for a possible natural disaster.
Facebook	Sutter County informed citizens linked to them that the County was updating the plan, that a copy was available, and that a survey was taking place.
Coordination with Californians for Flood Safety	The County worked with Californians for Flood Safety (a community advocacy group) to advertise the Plan update and survey process on their Facebook page. The draft plan was provided for review and input – on behalf of all 3 CRS communities - and the survey was also provided.
Public Outreach at Library	The County prepared a table at the Library. Invitations were placed on Facebook to let the public know that the documents were there for review and to remind citizens to take the public survey.
Website	Information on the Plan update process and location of documents was posted on the County website. Links to the County website were placed on the Live Oak and Yuba City websites.

Meeting with Amateur Radio Emergency Service

amec

MEETING RECORD

Project: MJMHMP	Date: 3/27/13
Meeting Purpose: ARES Emergency OPS Discussion with MJMHMP	

Meeting Attendees: See ATTACHED

Items Discussed: Details regarding ARES participation in an emergency. Talked about their roles in the update process of the MJMHMP. Agreed that the info they could provide was mostly emergency communication. Not a lot of mitigation. Went over the hazards. ARES Agreed Floods were the most probable followed by fires. ARES Representative did attend the Kickoff meeting (AFTERNOON OF 2/20) and will continue to ATTEND meetings AS invited.

ARES - Amateur Radio Emergency Services

Follow-up: ARES sent a contact list update for EOC.

By:
Name: John DeBeaux
Sutter County OEM

SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Jurisdictional Tracking: Participation in Plan Development Process

Name/Title	Department	E-Mail Address	Phone	Meeting/Task Description
John DeBeaux Emerg OPS Mgr	Sutter County OEM	jdebeaux	(530) 822-7400	Lead/OEM
ELEANOR KNOX	ARES	[illegible]	530 751 9590	
STEVE SWEETMAN	ARES	K6TAZ @ ARRL.NET	530 639-2433	
Ron Murdock	ARRL Sacramento Valley	wbkj@arrl.net	530 674 8533	
Jennifer Brassard	Sutter County P.H.	jbrassard@co.sutter.ca.us	822-7215	

Jurisdiction: Amateur Radio

Jurisdictional Lead Name: _____

Date: 3/27/13

Jurisdictional Lead Signature: _____

Meeting with American Legion

amec

MEETING RECORD

Project: SUTTER COUNTY MULTI JURISDICTION MULTI HAZARD MITIGATION PLAN UPDATE	Date: 3/7/13
Meeting Purpose: Regular Meeting of American Legion Post 705	

Meeting Attendees: SEE ATTACHED.

Items Discussed: The need for an Update and what the legionnaires can do to be involved. As an active veterans organization in Sutter county, the membership wanted information on the MJMHMP. We went over hazards members of the post talked about some histonical flooding. They asked questions about CRS and levee strength. The legionnaires said they'd be happy to assist by attending meetings, reviewing documents and other items as they are presented to the public.

Follow-up: At the meeting in April the legionnaires inquired on the progress of the update

By:
Name: John DeBeaux
Sutter County OEM

SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Jurisdictional Tracking: Participation in Plan Development Process

Name	Title	E-Mail Address	Phone	Meeting/Task Description
JAMES R. JURKIEWICZ	COMMANDER	JJURKIEWICZ@CLEAR-CXN.NET	530 671-5849	Scheduled American Legion Meeting – Special Presentation on the Multi Jurisdiction Multi Hazard Mitigation Plan update to membership by Sutter County Office of Emergency Management. John DeBeaux, Sutter County Emergency Operations Manager presenting. (530) 822-7400
Don Johnson				
LARRY L. HECHT		lhecht50@gmail.com	530-821-2209	
Keith Churchill		KEITHCHURCHILL1139@comcast.net		
William E. Burke		weburke1126@yahoo	821-0517	
Julen Lowe				
Robert Logan				
JOSEPHINE MUELLER	SERVICE OFFICER	JOSEPHINEMUELLER@	530-671-7335 @ATT.NET	
Richard A. LAWSON			(530) 673-9175	
David Pickle				

Jurisdiction: **Stephen M. Brammer Post 705 of The American Legion, Yuba City, CA** Date: **March 7, 2013**

Jurisdictional Lead Name: JAMES R. JURKIEWICZ COMMANDER Jurisdictional Lead Signature: James R Jurkiewicz

Article in Appeal-Democrat

YUBA-SUTTER APPEAL-DEMOCRAT

RISING FUEL COST

onally creep toward $4

ond-highest state average, at $4.18.

Yuba City has the second-lowest average statewide for a gallon of regular unleaded gasoline, at $3.96.

It's trailing only a cent behind Modesto, where the average is $3.95, and a cent above the Chico-Paradise area, at $3.97. Los Angeles-Long Beach and Orange County are the highest in the state at $4.30, according to the AAA Fuel Gauge Report.

– Laura van der Meer

Chris Kaufman/Appeal-Democrat

er of Lincoln prepares to pump gasoline on Wednesday at Econo Gas in Marysville.

ıpletely empty is
0 bucks (to fill
month, it was
"
like other com-
eaded to Yuba
avis said his gas
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y gas card. It's a
card," Tavis
one of the lucky

ONLINE

www.appealdemocrat.com

FIND A LOW PRICE: To find the lowest prices in Yuba-Sutter as reported by your fellow motorists, go to appeal democrat.com or scan the code below with your mobile device's scanner application to see it now.

zing 'importance' of ag

Sutter County resident Tammy Van Dyke-Hoppin said farmers to find that next generation to take on farming," she said.

Marysville High student Bailey Jenks, 17, and others are doing so.

BRIEFS

SUTTER COUNTY

Man crashes in short chase

A Yuba City man was arrested Wednesday after crashing his car into a traffic light pole while trying to get away from a Sutter County sheriff's deputy, authorities said.

Satpal Baraich, 37, was booked into the Sutter County Jail on suspicion of evading police, obstruction and drunken driving, Undersheriff Jeff Pierce said.

Deputies tried to stop Baraich just after 12:30 a.m. near Bridge Street and Highway 99 on a traffic infraction. Baraich fled at high speed, but clipped the curb at Bridge and Cooper streets and hit the light pole, Pierce said.

Baraich ran, but was tracked down near A Street and arrested. The chase last less than one mile. Only minor injuries were reported and no other vehicles were involved, authorities said.

Baraich is scheduled for arraignment on Friday in Sutter County Superior Court.

SUTTER COUNTY

Hazard plan being updated

Sutter County has begun updating its hazard mitigation plan, starting with two meetings at the Veterans Memorial Hall on Wednesday.

Mandated open meetings were held to give the public the chance to become more involved in the planning, said John DeBeaux Jr., emergency operations manager for Sutter County.

"We are doing our due diligence," he said.

During presentations, officials outlined steps that need to be taken when planning for an emergency. They also described a number of changes being considered in the update, which include putting an emphasis on flood and tornado preparedness.

Yuba City and Live Oak, in addition to other jurisdictions, are partnering with the county.

SALMON: Farmers win

From A1

planting, and feature a mixture of hatchery born fish with natives to see if either adapts better to the habitat.

The fish would be released back into the Sacramento River.

For farmers, the program provides the possibility that their land could be valuable during the offseason and help improve the plight of fish and access to water.

"Everybody who is dependent on water should be making some strides toward trying to solve some of these fish issues," said John Brennan, manager of Knaggs Ranch, one of the participating farms.

Flood Hazard and Flood Insurance Letter

July 2013

Dear Sutter County Resident:

The County is working on ways to improve and increase its circulation of, and accessibility to, information that pertains to the floodplain, in an effort to better educate and assist its citizens about developing and living in the floodplain. Please take the time to read the information below, and if you have further questions, or would like additional information, a variety of contact information has been supplied at the end of this document. You may also contact Sutter County – Water Resources at (530) 822-3299 or visit the County's website at: http://www.suttercounty.org/doc/government/depts/pw/wr/fp/fphome

Local Flood Hazard (Know Your Hazard)

Sutter County has approximately 160,000 acres of floodplain and about 4,800 individual parcels that are partially or entirely located within the floodplain. The levees along the Feather and Sacramento Rivers are Sutter County's first line of defense against flooding from large storm events. Levees provide a specific level of flood protection; no levee system provides full protection from all flooding to the people and property located behind it. The potential for a flood disaster remains an unpredictable threat to our community.

Sutter County features several large rivers, smaller tributaries and streams that are susceptible to annual flooding events that pose threats to life and safety and have the potential to cause significant property damage. Large rivers include the Sacramento River and Feather River plus the Sutter Bypass which diverts water from the Sacramento River through the heart of the County. Streams and creeks with annual flooding include the Auburn Ravine, Bear River, Yankee Slough, Pleasant Grove Creek, Curry Creek, Howsley Creek, Bunkham Slough, Markham Slough, North King Slough, Gilsizer Slough and the Live Oak Canal.

- ***Recent Flooding Events***

The three most recent flood events in Sutter County occurred in 1986, 1995 and 1997. On January 1, 1997 Sutter County declared a state of emergency as the Feather River surpassed flood stage levels and the Meridian Basin flooded as a result of a levee break. Nearly 70,000 people from Yuba City, and surrounding areas were evacuated due to fears of additional levee breaks and backwater effects.

- ***Additional Causes of Flooding in Sutter County***

In addition to levee breaches, riverine flooding and urban flooding can also affect Sutter County. Riverine flooding is the overbank flooding of rivers and streams. Urban flooding is caused by increases in impervious surfaces associated with urban development, which creates an increase in stormwater runoff.

Flood Insurance (Insure Your Property)

Standard property insurance does not cover flood damage, yet structures located within a floodplain face a 26% chance of experiencing a flood during the life of a 30-year mortgage. Flood insurance is recommended for all structures protected by levees, even if not mapped within a floodplain. For these reasons, Sutter County participates in the National Flood Insurance Program (NFIP) that makes available federally-backed flood insurance for all structures, whether or not they are located within the floodplain. Following the purchase of flood insurance, NFIP imposes a 30-day waiting period, so residents should purchase insurance before the onset of the rainy season to ensure coverage during the flooding season.

Federal financial assistance requires the purchase of flood insurance for buildings located within a 100-year floodplain — a requirement that affects nearly all mortgages financed through commercial lending institutions. Structural coverage must be purchased equal to the amount of the loan, or other financial assistance, or for the maximum amount available, which is currently $250,000 for a single family residence.

The NFIP insures buildings with two types of coverage: structural and contents. Structural coverage includes walls, floors, insulation, furnace and other items permanently attached to the structure. Contents coverage may be purchased separately to cover the contents of an insurable building. Flood insurance also pays a portion of the costs of actions taken to prevent flood damage. Renters should also purchase flood insurance for their contents.

Visit: http://www.suttercounty.org/doc/government/depts/pw/wr/fp/fphome

Flood Safety (Protect Yourself from Hazard)

The County's Office of Emergency Management has flood warning information available that can be accessed by calling (530) 822-7400, or by accessing the Emergency Services website at:

http://www.bepreparedsutter.org

The website includes information about disaster preparedness, emergency contacts, road conditions, road closures, and links to the National Weather Service. In case of an emergency, call 911.

Following is a list of important considerations that should be followed during times of flooding:

1. ***Prepare an evacuation plan:*** Before a flood hits, develop an evacuation plan that includes a meeting place outside of the house plus an escape route out of the floodplain and away from floodwaters.
2. ***Do not walk through flowing water:*** Drowning is the number one cause of flood deaths. Currents can be deceptive; six inches of moving water can knock you off your feet. If you walk in standing water, use a pole or stick to probe before you step.
3. ***Do not drive through a flooded area:*** More people drown in their cars than anywhere else. Do not drive around road barriers; the road or bridge may be washed out.
4. ***Stay away from power lines and electrical wires:*** The number two flood killer after drowning is electrocution. Electrical current can travel through water. Report downed power lines by dialing 911
5. ***Shut off gas and electricity and move valuable contents upstairs:*** Be prepared in with a checklist because warning of an impending flood may provide little time for preparation prior to evacuation.
6. ***Look out for animals, especially snakes:*** Animals that have been flooded out of their homes may seek shelter in yours. Use a pole or stick to turn objects over and to push away/scare away small animals.
7. ***Look before you step:*** After a flood, the ground and floors are covered with debris including broken bottles and nails. Floors and stairs that have been covered with mud can be very slippery.
8. ***Be alert for gas leaks:*** Use a flashlight to inspect for damage. Don't smoke or use candles, lanterns or open flames unless you know that the gas has been turned off and the area has been ventilated.

Property Protection Measures

Measures to protect a property from flood damage include elevation of the home, relocating the home to higher ground, constructing floodwalls or berms, flood-proofing and protecting utilities, grading to direct water away from structures, correcting local drainage problems, relocating furniture to higher areas, and placing emergency sandbags to protect structures. More information concerning cost-effective methods for reducing or eliminating the risk of flooding is available to property owners. For further information, contact the County at (530) 822-3299 or FEMA Region IX at (510) 627-7006. Information about sandbags and the locations of sites where sandbags are available during flooding can be obtained by contacting the Sutter County Development Services Department at (530) 822-7450, or by visiting the County's website.

Natural and Beneficial Functions (Protect Natural Floodplain Functions)

Floodplain lands and adjacent waters combine to form a complex, dynamic physical and biological system found nowhere else. When portions of floodplains are preserved in their natural state, or restored to it, they provide many benefits to both human and natural systems. Some are static conditions—such as providing aesthetic pleasure—and some are active processes, such as reducing the number and severity of floods, helping handle stormwater runoff and minimizing non-point water pollution. For example, the floodplain within the Sutter Bypass provides aesthetic pleasure, habitat for local wildlife, accommodates excess flows from the Sacramento River, and reduces the number and severity of floods.

Map of the Local Flood Hazard

Flood Insurance Rate Maps for Sutter County are available both at the Sutter County Library and online at:
http://www.suttercounty.org/doc/government/depts/pw/fema_fis

Visit: http://www.suttercounty.org/doc/government/depts/pw/wr/fp/fphome

Flood Warning System

The Sutter County early flood warning system consists of multiple ways of warning the public of the flooding problems in the County as follows:

- A broadcast on Cable Channel 19 displaying the warning;
- The "Stream Level" link on the Sutter County home web page (www.suttercounty.org);
- An automatic telephone dialing system to the urban area encompassing Yuba City; and
- Flooding information broadcasted on radio stations KUBA (1600 AM & 100.7 FM), KMJE (101.5 FM), and KKCY (103.1 FM).

Floodplain Development Permit Requirements (Build Responsibly)

A development permit must be obtained before any construction, substantial improvement or other development, including manufactured homes, within any area of special flood hazard as identified on the current Flood Insurance Rate Maps (FIRMs). The issuance of a Floodplain Development Permit is a federal requirement which cannot be waived by the County. Normal agricultural activities and insignificant activities such as planting a garden, re-roofing a structure or installing a mailbox are not required to obtain development permits. Building to current standards can protect your property from future flood hazards, can lower future flood insurance premiums, and can improve drainage between homes.

Substantial Improvement/Damage Requirements

Any structure located within a SFHA that is substantially improved or substantially damaged (i.e. the cost of reconstruction, rehabilitation, addition or other improvement to a building equals or exceeds 50% of the building's market value) must meet the same construction requirements as a new building. More information on substantial improvement/damage rules can be found in "*Answers to Questions about Substantially Damaged Buildings*", FEMA -213. A copy of this FEMA manual is available at the Sutter County Library.

Drainage System Maintenance

Maintaining the flow capacity in streams that cross County properties requires cooperation and assistance to prevent flooding and bank erosion. Following are some suggestions and information for understanding the ways that floodplains function and how the County regulates the floodplain in order to protect property and lives, while affording County citizens the ability to obtain floodplain insurance.

- ***Do not dump or throw anything into ditches or streams:*** A plugged channel cannot convey water, so when it rains; the excess water must go somewhere. Every piece of trash contributes to flooding. Please report any dumping of debris into drainage ways or rivers to Sutter County at (530) 822-7450.
- ***Remove debris, trash, loose branches and vegetation:*** Keep banks clear of brush and debris to maintain an unobstructed flow of water in stream channels. Do not remove live vegetation growing on a stream bank, as it is regulated by state and federal agencies. Before removing streamside vegetation, or to report clearing of vegetation or trees on steam banks, contact Sutter County at (530) 822-7450.

County Floodplain Information Services:

The County can determine the relationship of a particular property to the floodplain, including: 1) whether the property is located within the Special Flood Hazard Area; 2) Flood Insurance Rate Map (FIRM) Zone for property; 3) Base Flood Elevation for property and potential depths of flooding, if available; and 4) whether the property is located within a Floodway. The County also keeps elevation certificates on file for many structures located in the floodplain, can provide information concerning past floods, and can answer questions about purchasing, maintaining, or improving flood insurance coverage. Contact Sutter County - Water Resources at **(530) 822-3299** for further information.

Sutter County - Local Hazard Mitigation Plan (LHMP) Update:

Visit: http://www.suttercounty.org/doc/government/depts/pw/wr/fp/fphome

Sutter County is developing a Local Hazard Mitigation Plan (LHMP) Update to their 2007 plan. The purpose of this LHMP Update is to assess risk to natural hazards, implement actions to reduce future losses, and maintain eligibility for federal mitigation funds. Members of the community have a very important role in this process. A draft of the LHMP Update will be available on the county website by late July 2013 for review and comment by the public and all interested stakeholders. For more information on this project and how to get involved, contact Sutter County – Emergency Operations at (530) 822-7219 or visit the County website.

Important Contact Information:

1) Sutter County Internet Home Page: *http://www.suttercounty.org*

2) Sutter County Department of Water Resources: Phone: (530) 822-3299
Email: dwpeterson@co.sutter.ca.us
Web: *http://www.suttercounty.org/doc/government/depts/pw/wr/wrhome*

3) Sutter-Butte Flood Control Agency (SBFCA): Phone: (530) 755-9859
Web: http://www.sutterbutteflood.org/

4) Federal Emergency Management Agency (FEMA): Phone: (425) 487-4600
Web: *http://www.fema.gov/nfip/*

5) Sutter County Planning Division: Phone: (530) 822-7400
Web: *http://www.suttercounty.org/doc/government/depts/cs/ps/cs_planning_services*

6) Sutter County Community Services: Phone: (530) 822-7400
Web: *http://www.suttercounty.org/doc/government/depts/cs/cshome*

7) Sutter County Department of Emergency Services: Phone: (530) 822-7400
Emergency: 911
Web: *http://www.suttercounty.org/doc/government/depts/cs/es/cs_es_home*

8) Sutter County Library (Main Branch at 750 Forbes Avenue): Phone: (530) 822-7137
Web: *http://www.co.sutter.ca.us/doc/government/depts/library/library*

9) Central Valley Flood Protection Board (formerly known as the Reclamation Board)
Phone: (916) 574-0609
Web: *http://www.cvfpb.ca.gov/*

10) National Marine Fisheries Service (NMFS): Phone: (206) 526-6150
Web: *http://www.nmfs.noaa.gov/* (and) *http://www.nwr.noaa.gov/*

11) U.S. Army Corps of Engineers: Phone: (916) 557-5100
Web: *http://www.spk.usace.army.mil/*

12) FEMA Map Service Center:
Web:
http://www.msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1

Visit: http://www.suttercounty.org/doc/government/depts/pw/wr/fp/fphome

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Price Quote

Quotes Good for 30 days

Date: 7-12-13

BFS Rep: _____

Estimate Prepared By: Pam

Company: Sutter County

Name: Dan Peterson

Address: _____

City: _____ State: _____ Zip: _____

Phone: 822-7450 Fax: _____

Email: dwpeterson@co.sutter.ca.us

Job Title: Special Flood Hazard Bulk Mail

❑ Deposit $_____ ❑ COD ❑ Net 15

Qty.	Paper Stock	Colors	Sides	Other	Price
2,086	8.5 x 11 white 20#	black ink	2	2 sheets per letter	$239.52
2,086	#10 white regular envelope	black ink	1	return address & permit printing	$120.02
2,086	bulk mail prep includes:				$359.16
	database setup, fold (2) insert (2)				
	seal envelope, imprint, sort, & deliver				
2,086	postage estimate (.303)				$632.06

Art Estimate (based on $65 per hour) _____

Notes:

Tax no tax on bulk mail

Total $1,350.76

NOTE: Any changes to original specifications or art may result in additional charges.
CONDITIONS: All prices quoted are good for 30 days from date of quotation unless otherwise noted. All prices quoted are FOB our facility in Yuba City, CA and any other shipping will be charged additionally. TERMS: All new accounts are 50% on order and 50% on approval of proof. All other accounts are COD unless other arrangements are made at the time of order. Discounts and other credits may be available with other payment arrangements. Payments made with Credit Cards do not qualify for cash discounts.

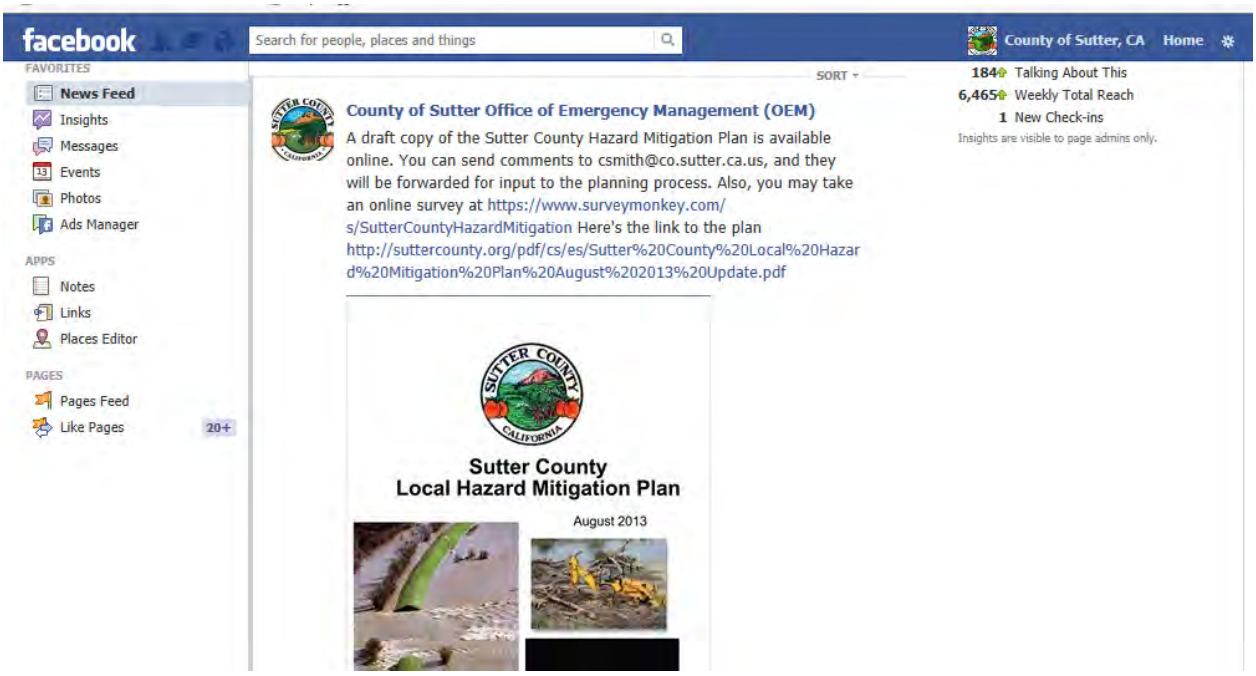
ACCEPTED BY CUSTOMER:. X _____ 7/30/2013
Signature Date

Survey

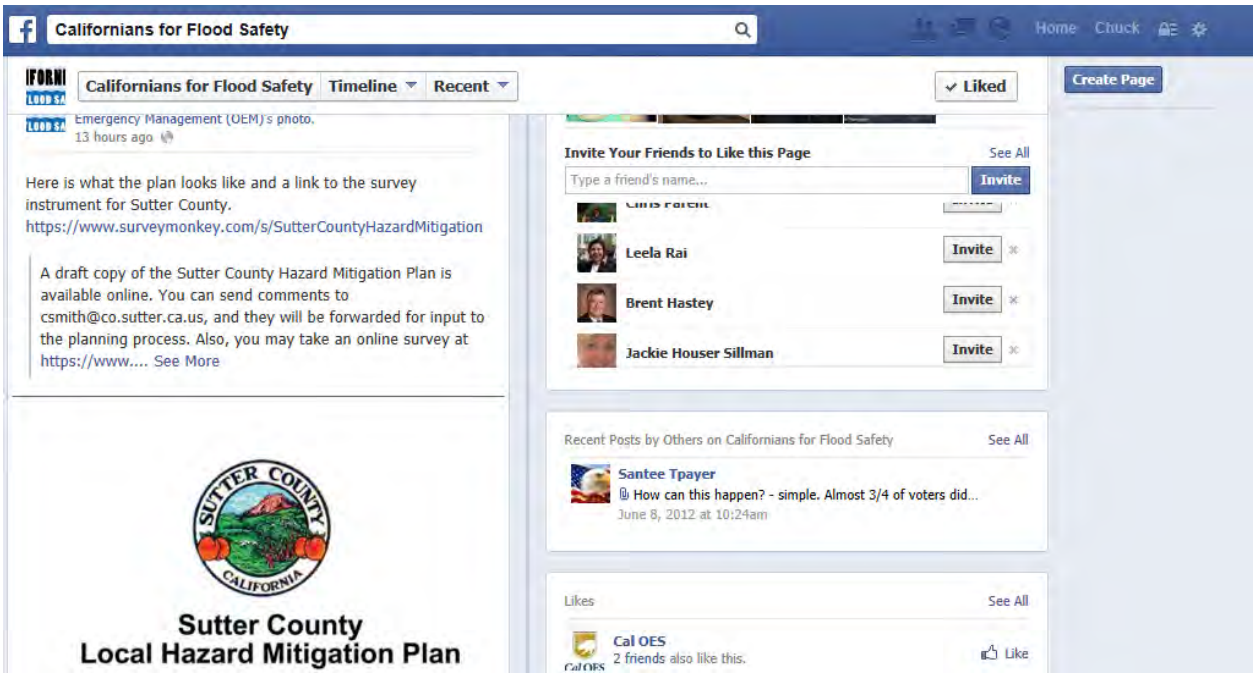
Survey Posting on Facebook

Survey Posting on Sutter County Website

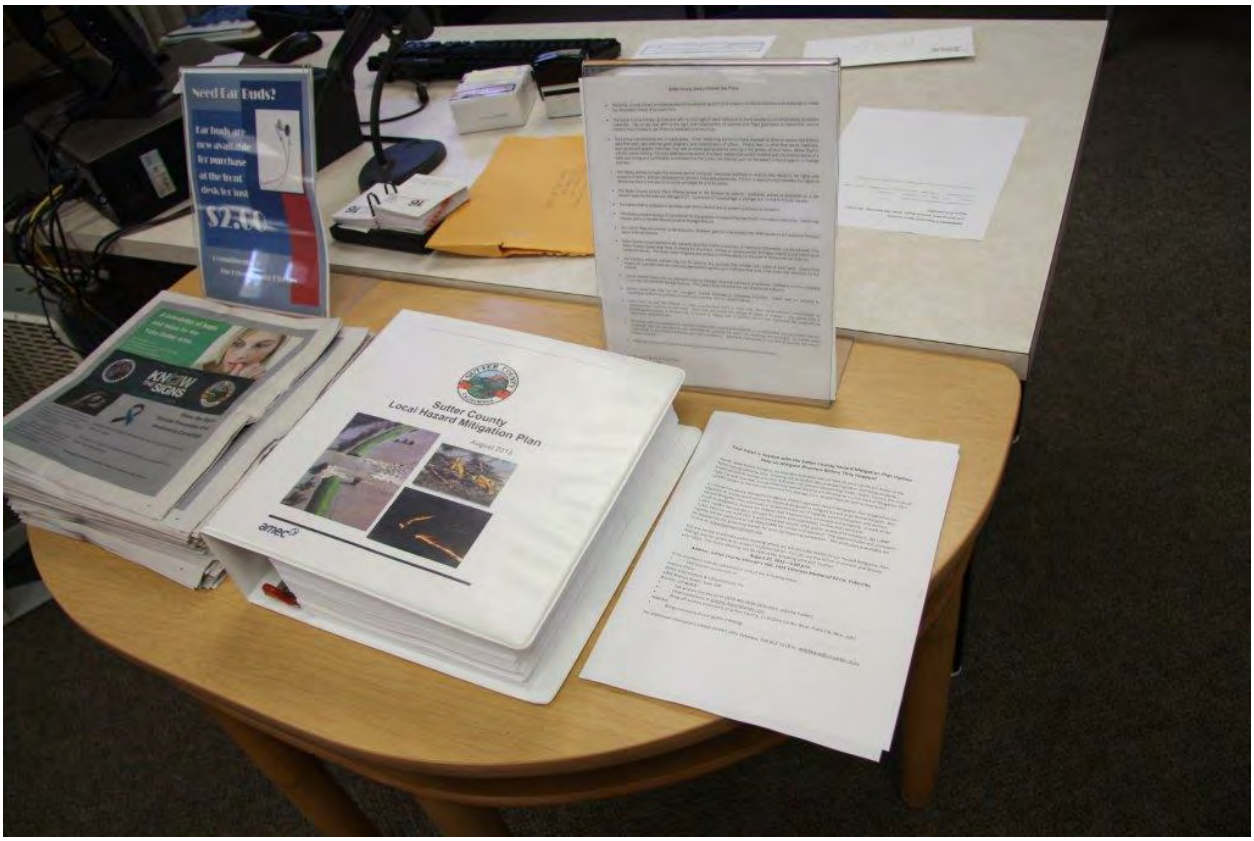
Public Outreach on Facebook



Outreach with Californians for Flood Safety



Public Outreach at Library



Flyer from Library

Your Input is needed with the Sutter County Hazard Mitigation Plan Update

Help Us Mitigate Disasters Before They Happen!

Floods, levee failure droughts, earthquakes and other natural hazards pose significant threat to the Sutter County planning area. Knowing the potential risks, anticipating them, and being properly prepared before, during, and after a disaster can prevent devastating losses. Sutter County, the Cities of Yuba City and Live Oak, and participating special districts are developing a Local Hazard Mitigation Plan (LHMP) Update to identify and minimize the damage from natural hazards before they occur.

A Federal Emergency Management Agency (FEMA) approved Hazard Mitigation Plan establishes our eligibility to receive grant money for projects designed to mitigate known or potential hazards. Our Hazard Mitigation Plan addresses a comprehensive list of hazards, establishes goals, and defines projects designed to reduce the impacts that disasters have on people and property. A draft of the LHMP Update has just been released for public and stakeholder review and comment.

Public input on the draft plan is welcomed and valued. After public review and comment, the LHMP Update will be submitted to Cal EMA/FEMA for review and approval. The approved plan will ultimately be adopted by the governing boards for each participating jurisdiction.. **The draft plan is available for review at:** *www.bepreparedsutter.org*

You are invited to attend a public meeting where we will describe details of our Hazard Mitigation Plan findings and the schedule for project implementation. You can use this forum to present and discuss your ideas. The Public Meeting will be held at the following time and location:

August 22, 2013 – 6:00 p.m.

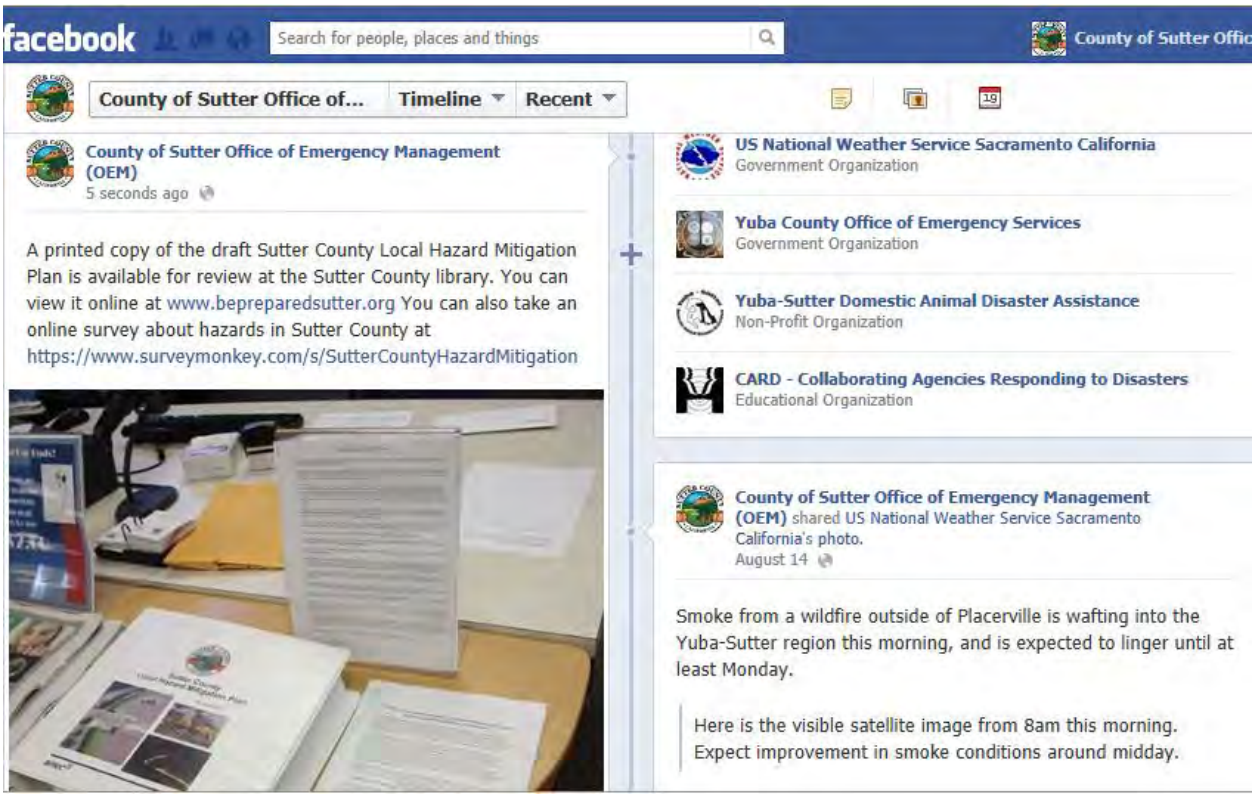
Sutter County Veteran's Center, 1425 Veterans Memorial Circle, Yuba City, CA

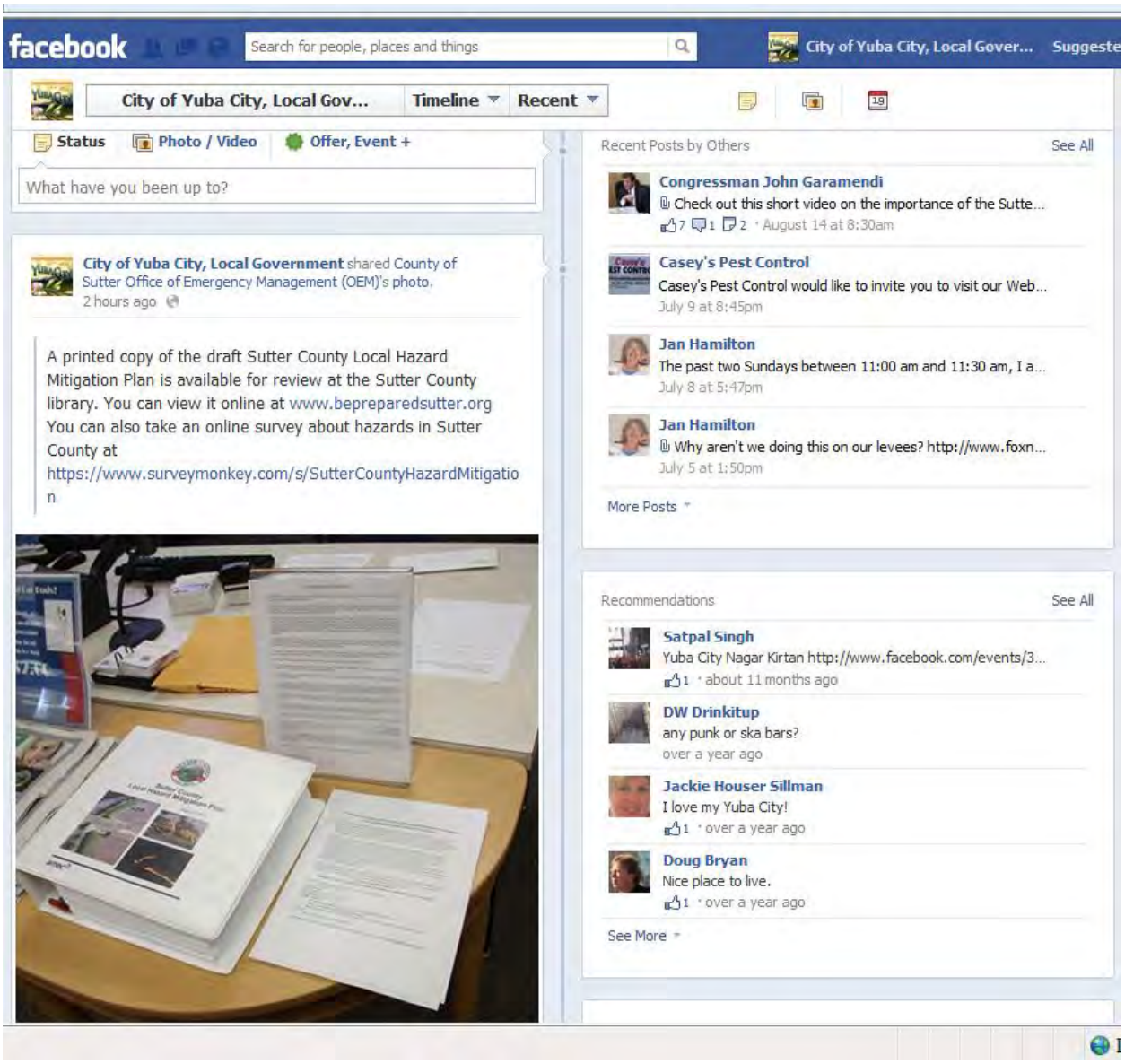
Final comments may be submitted in one of the following ways:

- Mail written comments to:
  Jeanine Foster
  AMEC Environment & Infrastructure, Inc.
  1002 Walnut Street, Suite 200
  Boulder, CO 80302
- Fax written comments to (303) 442-0616 (Attention: Jeanine Foster).
- Email comments to **jeanine.foster@amec.com**.
- Drop off written comments at Sutter County, 1160 Civic Center Blvd., Yuba City, Attn. John Debeaux
- Bring comments to our public meeting.

For additional information, please contact John Debeaux: 530-822-7219 or jedebeaux@co.sutter.ca.us.

Facebook Invitations to View Draft and Take the Public Survey

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City of Yuba City, Local Gover...
Suggeste
City of Yuba City, Local Gov...
Timeline
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What have you been up to?
City of Yuba City, Local Government shared County of Sutter Office of Emergency Management (OEM)'s photo.
2 hours ago
A printed copy of the draft Sutter County Local Hazard Mitigation Plan is available for review at the Sutter County library. You can view it online at www.bepreparedsutter.org You can also take an online survey about hazards in Sutter County at https://www.surveymonkey.com/s/SutterCountyHazardMitigation
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DW Drinkitup
any punk or ska bars?
over a year ago
Jackie Houser Sillman
I love my Yuba City!
1 · over a year ago
Doug Bryan
Nice place to live.
1 · over a year ago
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Sutter County Website

Sutter County

SUTTER COUNTY California Emergency Services Government
www.suttercounty

Site Search

go

Advanced Search (include PDF)

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- Sutter County Home
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- Government
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- Property Assessments
- Recreational Facilities
- Road Construction & Closures
- Road Service Request
- Suppliers / Contractors –

Home > Government > Depts > Development Services > Emergency Management > Hazard Mitigation

Wednesday, July 31, 2013

Local Hazard Mitigation Plan (LHMP)

Sutter County is leading a Local Hazard Mitigation Plan (LHMP) Update to their 2007 plan. The purpose of this LHMP Update is to assess risk to natural hazards, implement actions to reduce future losses, and maintain eligibility for federal mitigation funds in accordance with the Disaster Mitigation Act of 2000. Partners with the County in this planning effort include the Cities of Live Oak and Yuba City and several special districts. Another benefit of this Mitigation Planning Update process is to enhance the floodplain management practice of the cities and county which can help reduce the costs of flood insurance to residents of Sutter County, Yuba City and Live Oak through participation in FEMA's National Flood Insurance Program's Community Rating System (CRS).

What is Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines hazard mitigation as, "any sustained action taken to reduce or eliminate long-term risk to life and property from natural hazards." Another way to understand hazard mitigation is as the prevention component of the emergency management process. (see figure)

Emergency Management Cycle

- Preparedness activities are the emergency plans, training, drills, and exercises that individuals, communities and first responders participate in on almost a daily basis. These are things done to get ready for an emergency or disaster before it happens.
- Response is the short-term, emergency actions taken to address the immediate impacts of a hazard.
- Recovery is the longer-term process of restoring the community back to normal or predisaster conditions.
- Mitigation activities are actions that will prevent or eliminate losses, even if an incident does occur. Mitigation can reduce or

Fair
61.0 °F

Emergency Management Links

- Emergency Management Home
- Fire Services
- Additional Emergency Information
- Disaster Preparedness
- Emergency Guide for Business and Industry
- Emergency Kits & Supplies
- Flood Preparedness Home
- Hazardous Material
- Links & Emergency Information
- Wildland Fires
- Severe Weather

Government

- Government Home
- Board of Supervisors
- County Departments
- Elected Officials
- Government Info

Departments

- Agricultural Commissioner
- Assessor
- Auditor / Controller
- Child Support Services

eliminate the need for an emergency response and greatly reduce the recovery period.

This may sound complicated, but we all do many of these things on a daily basis.

Why is Natural Hazard Mitigation Important?

Most people who live or work in Sutter County have been affected by natural hazards in one way or another. Sutter County and its residents are vulnerable to a variety of hazards including floods, levee failure, drought and other severe weather events.

The rising costs associated with disaster response and recovery have focused the attention of federal, state, and local governments on addressing natural hazards before they occur. Obviously, events like torrential rains and floods cannot be prevented from occurring. Planning for natural hazards and implementing mitigation measures, however, can reduce the impact of such events when they do occur. Emergency response and recovery costs; property damage and monetary losses; 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.

Hazard Mitigation Plan and Plan Update Process

Mitigation planning is a process for state and local governments to identify community-level policies and actions that will mitigate and thus reduce the impacts of natural hazards. According to a federal law, the Disaster Mitigation Act of 2000, local governments were required to complete a "local hazard mitigation plan (LHMP)" every five years in order to remain eligible for future federal disaster mitigation funding. Sutter County's last LHMP was completed in 2007.

After securing Federal Emergency Management Agency (FEMA) mitigation grant funding in 2012, Sutter County is using the funds to support an update of their LHMP. Partners in this planning effort include the Cities of Live Oak and Yuba City and several special districts. This LHMP Update is being developed by a Hazard Mitigation Planning Committee comprised of representatives from various County and City departments; neighboring jurisdictions such as Butte County and key federal state and local agency stakeholders, and the public. The plan is addressing an updated list of hazards, including, flood, dam and levee failure, earthquake, severe weather, and agricultural hazards such as pests and invasive species. The plan will assess the likely impacts of these hazards to the people and property of the County and will also establish updated goals and prioritize projects to reduce the impacts of

future disasters on people and property as well as to critical facilities and infrastructure.

The plan helps reduce damages from natural hazards by defining the kinds of hazards and emergencies that are not only possible, but also most probable, and the history of where and when they have happened and where they are likely to occur in the future. Wherever possible, the plan identifies steps that help avoid, reduce, alleviate, or mitigate disaster damages. Another benefit of mitigation planning is that it can also help lessen the cost of flood insurance in Sutter County and the Cities of Live Oak and Yuba City through FEMA's National Flood Insurance Program's (NFIP) Community Rating System.

National Flood Insurance Program's Community Rating System

The National Flood Insurance Program's (NFIP) 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 goals of the CRS Program. The objective of the CRS is to reward communities for what they are doing, as well as to provide an incentive for implementing additional flood protection activities. The reduction in flood insurance premium rates is provided according to a community's CRS classification. Sutter County joined the CRS in 2008 and Yuba City joined in 2007. Both are currently a CRS Class 6, which provides a 20 percent discount on flood insurance for those located within the special flood hazard area (SFHA) and a 10 percent discount for those located in non-SFHA areas. The City of Live Oak joined the CRS program in 2011 and is currently a CRS Class 9 which provides a 5 percent discount on flood insurance for residents located both within and outside of the SFHA areas.

Opportunities for Input

Members of the community have a very important role in this process. A draft of the LHMP Update will be available early summer for review and comment by the public and all interested stakeholders on this website.

Public and local stakeholder attendance is invited and encouraged at this upcoming public meeting.

For more information on this project and how to provide input, contact John DeBeaux at (530) 822-7219 or Email John DeBeaux.

Additional Links

- Multi-Jurisdiction Multi-Hazard Mitigation Plan
- Public Outreach Survey

This is an Adobe Acrobat PDF file.
You can download a free PDF reader from Adobe.

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City of Live Oak Website

Office of Emergency Management

Mission Statement

The Office of Emergency Management (OEM) is responsible for the overall emergency preparedness programs of the City of Live Oak. The emergency management plan is designed as an all hazards plan that covers all natural and man-made hazards, and includes terrorism and weapons of mass destruction.

Emergency Management Contact Information:

Mayor Mary M. Dennis - Director	(210) 653-9140
Gary L. Woppert - Coordinator	(210) 653-9140 ext. 379
Emergency Management Fax Number	(210) 657-7930
Live Oak Non-Emergency Dispatch Center	(210) 653-0033

The Office of Emergency Management is located within the Fire Department facilities at:
8001 Shin Oak Drive
Live Oak, Texas 78233

What disasters might affect Live Oak?

The following statistics illustrate why emergency preparedness is so important:

- Texas ranks #1 in the nation for tornado occurrences.
- Texas ranks #1 in the nation for flash flooding occurrences.
- Texas leads the nation in railroad accidents.
- Texas has more hazardous materials transported over our highways than any other state.
- Texas ranks #2 in the nation for hurricane occurences.
- Texas has over 250,000 miles of underground pipelines carrying various products, many of which are hazardous.
- Texas experiences persistent droughts every few years.
- Wildfires claim thousands of acres of vegetation every year.

CALENDAR

July 2013

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

View Full Calendar

WHAT'S NEW

The following websites provide information and planning tools to help you prepare for different emergency situations:

Connect-CTY

National Terrorism Advisory System

READY OR NOT? HAVE A PLAN

How can you be prepared for an emergency?

The key to surviving a major disaster or emergency is to be prepared. Unfortunately, most disasters occur without warning and leaving very little reaction time. It is critical that every citizen and business owner develops a Disaster Plan and knows how to help protect their family and property from a potential disaster.

We encourage everyone to review the material contained within this web site to learn more about emergency preparedness. Links to several other emergency preparedness websites are offered on the Agency Links webpage located in the menu at left.

In addition, the OEM Coordinator is available to discuss your concerns and help develop your emergency plans. Many brochures and planning checklists, on an assortment of emergency topics, are available by visiting the OEM office. Coloring books are also available to help teach children how to safely react in the event of an emergency.

The OEM Coordinator is also available to present programs to any group of citizens or businesses regarding preparedness. The Coordinator can also assist with arranging other programs such as crime prevention and fire prevention.

REGIONAL HAZARD MITIGATION PLAN FLYER - PUBLIC REVIEW

READY South Texas

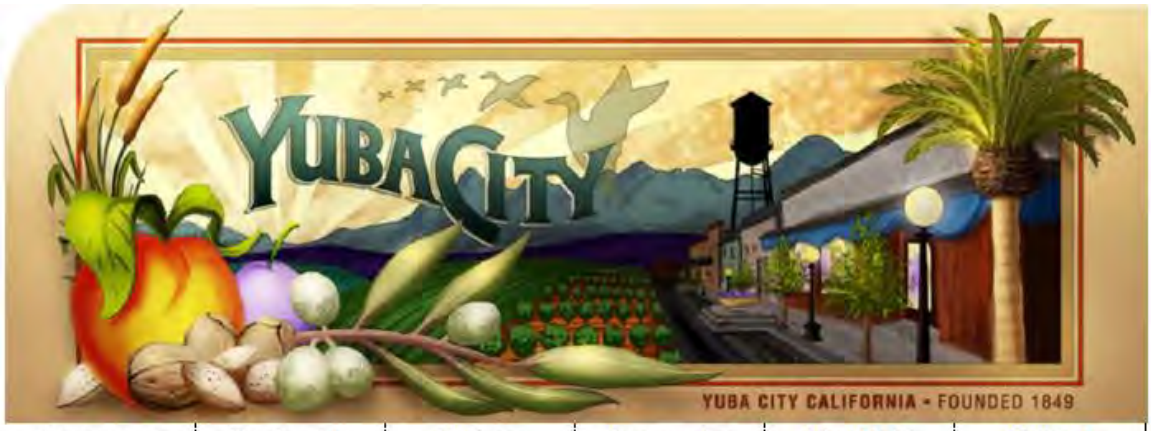
Ready America

Prepare. Plan. Stay Informed.

EDWARDS AQUIFER AUTHORITY

- Forms
- |
- Contact Us
- |
- Jobs
- Twitter
- Facebook
- Youtube
- Flickr

Yuba City Website



Government | City Services | Business | Community | How Do I? | Contact

CITY SERVICES

Public Works:

- Engineering Division
- Maintenance Division
- Utilities Division
- Bid Notices/RFPs
- Bid Opening Results
- Informal Bidding Process
- Encroachment Permit
- Construction in Progress
- 5th Street Bridge Project
- Rate Increases
- Floodplain Management
- Sewer System Management
- Stormwater Management

Public Works

Multi-Hazard Mitigation Plan

Sutter County is leading a Local Hazard Mitigation Plan (LHMP) Update to their 2007 plan. The purpose of this LHMP Update is to assess risk to natural hazards, implement actions to reduce future losses, and maintain eligibility for federal mitigation funds in accordance with the Disaster Mitigation Act of 2000. Partners with the County in this planning effort include the Cities of Live Oak and Yuba City and several special districts. Another benefit of this Mitigation Planning Update process is to enhance the floodplain management practice of the cities and county which can help reduce the costs of flood insurance to residents of Sutter County, Yuba City and Live Oak through participation in FEMA's National Flood Insurance Program's Community Rating System (CRS) For more information on this process, see here.

Sutter County, California and the incorporated communities of Yuba City and Live Oak have developed a comprehensive **Multi-Hazard Mitigation Plan** to better position resources in addressing potential hazards **before they occur** and to maintain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA).

In compliance with the Disaster Mitigation Act of 2000 the final plan has been adopted by the following

ADA Transition Plan

Bicycle Master Plan

Traffic Volume Data

Technical Documents

Contact Information

Yuba City homepage

jurisdictions governing boards: Sutter County, City of Yuba City, City of Live Oak, Gilsizer Drainage District, Levee District 1, and Reclamation Districts 70, 1001, 1500, & 1660. These board adoptions were recognized by FEMA and the plan received final approval in January 2008. The Multi Hazard Mitigation Plan will remain valid for five years.

- Multi-Hazard Plan Cover
- Multi-Hazard Plan Exec Summary, Table of Contents, Sects 1, 2 & 3
- Multi-Hazard Plan Section 4.1 Hazard ID 1
- Multi-Hazard Plan Section 4.1 Hazard ID 2
- Multi-Hazard Plan Section 4.2 Vulnerability
- Multi-Hazard Section 4.3 Jurisdictional Elements
- Multi-Hazard Plan Section 4.4 Capability
- Multi-Hazard Plan Sections 5, 6 & 7
- Multi-Hazard Plan Appendices

File(s) require free Adobe Acrobat Reader.

B.3 Sutter County Step 3: Coordinate

This planning step credits incorporating other plans and other agencies' efforts into the floodplain management plan. Other agencies and organizations must be contacted to determine if they have studies, plans and information pertinent to the floodplain management plan, to determine if their programs or initiatives may affect the community's program, and to see if they could support the community's efforts. Coordination efforts with these other agencies are documented in Table B.6 below.

Due to the multijurisdictional nature of this plan update, all public outreach activities described in this section were conduction in coordination with and on behalf of all participating jurisdictions, including the 3 CRS communities.

Table B.6. List of Agencies Coordinated With Through the Plan Update Process and Coordination Mechanisms

Agency Name/ Contact	Mechanism	Contacted via Mail	Contacted via Phone	Contacted Face-to Face	Topics Discussed
Beale Air Force Base	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
Bi-County Ambulance Daniel Bermingham	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
California Highway Patrol	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
Fremont-Rideout Health Group	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
REACH Jeff Kennedy	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
Yuba County Fire	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
Linda Fire Rich Webb	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
Olivehurst Fire	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents

Agency Name/ Contact	Mechanism	Contacted via Mail	Contacted via Phone	Contacted Face-to Face	Topics Discussed
Wheatland Fire	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
Yuba County Health William Smith	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
SSVEMS John Poland	Yuba Sutter Emergency Medical Care Committee			X	Invited participation and review of plan documents
Planned Parenthood Susanna Ramirez	Sutter County Public Health Communicable Diseases and Infections			X	Invited participation and review of plan documents
Ampla Health Veronica Padilla	Sutter County Public Health Communicable Diseases and Infections			X	Invited participation and review of plan documents
Sutter Surgical Hospital Debby Treanor	Sutter County Public Health Communicable Diseases and Infections			X	Invited participation and review of plan documents
Sutter-Yuba Mosquito and Vector Control Ronald McBride	Sutter County Public Health Communicable Diseases and Infections			X	Invited participation and review of plan documents
Sutter Urgent Care Bryan Walker	Sutter County Public Health Communicable Diseases and Infections			X	Invited participation and review of plan documents
Rideout Health Cynthia Zips	Sutter County Public Health Communicable Diseases and Infections			X	Invited participation and review of plan documents
Red Cross Gloria Jenning-Grahm	Email				Invited comment on the Public Review Draft
Cal EMA – Mitigation Phyllis Banks	Email				Invited comment on the Public Review Draft
Cal EMA – Grants Kirby Everhart	Email				Invited comment on the Public Review Draft

Agency Name/ Contact	Mechanism	Contacted via Mail	Contacted via Phone	Contacted Face-to Face	Topics Discussed
Sutter Butte Flood Control Agency Mike Inamine	Email				Invited comment on the Public Review Draft
Butte County John Gulserian	Email				Invited comment on the Public Review Draft
Sacramento County George Booth	Email				Invited comment on the Public Review Draft
NOAA Cindy Matthews	Email				Invited comment on the Public Review Draft
California Department of Water Resources Ricardo Pineda	Email				Invited comment on the Public Review Draft
Prudential Real Estate Gail Carter	Email				Invited comment on the Public Review Draft
Yuba Sutter Chamber of Commerce Pamala Allison	Email				Invited comment on the Public Review Draft
First American Title Company Janell Willis	Email				Invited comment on the Public Review Draft
Union Bank Maureen Bumgarner,	Email				Invited comment on the Public Review Draft
Farmers Insurance Warren Jackson	Email				Invited comment on the Public Review Draft
Pacific Gas and Electric Co. Doreen Monahan	Email				Invited comment on the Public Review Draft
Recology (the local garbage disposal, landfill, and recycling company) Jackie Sillman,	Email				Invited comment on the Public Review Draft
US Army Corps of Engineers Lynne White	Email				Invited comment on the Public Review Draft

YUBA SUTTER
EMERGENCY MEDICAL CARE COMMITTEE

Minutes of March 20, 2013

Bi-County Ambulance
1700 Poole Blvd.
Yuba City, CA 95993
(530) 674-2780

MEMBERS PRESENT:

Beale AFB	
Bi-County Ambulance	Daniel Bermingham
CHP	
Fremont-Rideout Health Group	
REACH	Jeff Kennedy
Sutter County Fire	John Shalowitz
Sutter County Public Health	Jennifer Broussard
Sutter County Sheriff	
Sutter County OEM	John DeBeaux
Sutter County Supervisor	Ron Sullenger
Yuba County Fire	
Linda Fire	Rich Webb
Olivehurst Fire	
Wheatland Fire	
Yuba City Fire Dept	John Limas
Yuba County Health Dept	William Smith
Yuba County OES	
Yuba County Sheriff	
Yuba County Supervisor	
SSVEMS	John Poland

OTHERS ATTENDING:

John Anderson	Yuba County HPP
Ranjit Dhaliwal	Sutter County Public Health
Vivian Hall	Bi-County Ambulance

1. **Call to Order**
The regular meeting of the EMCC was called to order by Rich Webb at 9:00 AM

2. **Introductions**

3. **Approval of minutes for February 20, 2013**
Motion was made by Jeff Kennedy and seconded by Jennifer Broussard. Motion passed.

4. **Public Comment**

5. **Old Business**

Public Information Programs

Public Health Preparedness/Response to Bioterrorism/HPP Grants

Jeff Kennedy (Sutter County HPP): Meeting follows.
Reported on audit preparation of supplies and training, MOU and government structuring (how partnerships work).
Funding was addressed: 2012 funds are still available – deadline for applying is April 01, 2013.

William Smith: Reported on shelter operations Red Cross training; sixty attendees

Aircraft Utilization & QI - SSV/EMS

John Poland: There will be an audit on aircraft usage focusing on the southern counties (Yuba County & south).

ICS /NIMS

6. **New Business**

John DeBeaux:
Sutter County is updating their Hazard mitigation plan. Info on future meetings will be sent to the committee.
Cal EMA is working on drafting a N. CA catastrophic flood plan. Kick off meeting March 28, 2013, from 9AM to 1PM at Yuba County government center
April 02, 2013 Management PIO at Mather 9AM to 1PM
April 11, 2013 Fire and Hazmat at Mather 9AM to 1PM

7. **Incident Review**

8. **Upcoming Exercises**

William Smith: Tuesday there will be a N95 respirator training event
May exercise will replicate the SF earthquake

9. **Sierra-Sacramento Valley EMS Agency Report**

John Poland: Informed committee of updated website with links to individual counties and providers

EMT & paramedic Title 22 regulations effective April 01, 2013

Norcal Region 3 plan being reviewed for finalization

MCI policy discussed; John referred to recent incidents on Hwy 70 in Yuba County and on Hwy 20 in Sutter County. Reporting will be mandatory June 01, 2013.

Treatment protocol June 01, 2013, changes: fluid administration language updated for IV and IO

General trauma management policy regarding spinal precautions of patients with helmets is being reviewed.

Vehicle supplies and inventory are being updated. Suggested inventory for BLS providers should be finalized in April

ALS providers having ongoing issue of dextrose shortages

Membership of Medical Control Committee being updated; confirmed Jeff Kennedy and Ron Welch from Y-S EMCC would continue to attend. Any issues this committee feels need to be addressed should be brought to their attention.

Jeff Kennedy: Policy 838 (crisis standards of care) up for review

10. **Next Meeting Date**
The next meeting will be April 17, 2013

11. **Meeting Adjournment**
Meeting adjourned at 9:30 AM by Rich Webb

MEETING RECORD

Project: Hazard Mitigation Plan update	**Date:** 3/5/13
Meeting Purpose: To provide an overview of why the county has a Hazard Mitigation Plan and what is involved in updating the plan.	

Meeting Attendees: See attached sign in sheet.

Items Discussed:

- County is updating the Hazard Mitigation (HM) Plan.
- Two kick off meetings were held. One session was videotaped and will be posted on the Office of Emergency Management's facebook page and possibly the county website.
- Discussed plan has to be updated every 5 years to receive FEMA funds during a disaster.
- Discussed that update is also tied to flood insurance program and can decrease flood insurance rates if enough points are earned. Briefly discussed CRS process.

Follow-up:
Report updates as necessary.

By:
Name: Jennifer Broussard
Organization: Sutter County Public Health

SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Jurisdictional Tracking: Participation in Plan Development Process

Name/Title	Department	E-Mail Address	Phone	Meeting/Task Description
ALICE WILLIAMS-ROOT SUPV. PHN	Public Health	N/A Have internally	822-7215	Discussed county is updating Hazard
Diane Scott Med Clrk	"	"	"	mitigation Plan & that a video of public
Usha Gaji, PHN	"	"	"	meeting should be on-line soon.
Sarah Ludwick PHN	"	"	"	
[illegible]	"	"	"	
Daniel Weston LVN	"	"	"	
[illegible]	"	"	"	
[illegible]	"	"	"	
[illegible]	"	"	"	
[illegible]	"	"	"	
[illegible]	"	"	"	
[illegible] RN, PHN	"	"	"	
Carla Reynolds CHS Coord.	"	"	"	
[illegible] RN PHN II	"	"	"	

Jurisdiction: Sutter County

Jurisdictional Lead Name: _____

Date: 3/5/13

Jurisdictional Lead Signature: _____

SUTTER COUNTY
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
Jurisdictional Tracking: Participation in Plan Development Process

Name/Title	Department	E-Mail Address	Phone	Meeting/Task Description
Joy Denham PHN II	Public Health	N/A	822-7215	Discussed County is updating Hazard
JoAnn Higginson	"		"	mitigation Plan + that a video of
				public meeting should be online soon

Jurisdiction: Sutter County

Jurisdictional Lead Name: _____

Date: 3/5/13

Jurisdictional Lead Signature: _____

RIDEOUT HEALTH

DISASTER MEETING MINUTES
March 12, 2013
10:00 a.m.

Present: Liz Clarke, Steve Sweetman, Theresa Zogakis, Frank Gibson, Kyff Carpio, Mike Pierce, Peter McCormack, John Anderson, Jennifer Broussard, Mark Eyre, Bill Smith, Oscar Marin, Chad Haase, Cynthia Zips, Tony Gambino, Jeannie Pittman, Jennifer Furtado

SUBJECT	DISCUSSION/CONCLUSION	ACTION/WHO/DUE DATE
1.0 Call To Order	The meeting was called to order at 10:00 a.m. by Liz Clarke	No further action.
2.0 Introductions	Introductions were made.	No further action.
3.0 Review Of Previous Minutes from January 8, 2013	The minutes from the January 8, 2013 meeting were reviewed and approved.	No further action.
4.0 HPP Progress Report/Update	The next Yuba-Sutter HPP planning meeting is scheduled for March 20 at 9:30 at Bi-County. The budget review must be submitted by April 1 to the HPP coordinator.	Liz Clarke
5.0 Infection Control Update	Cynthia reported no changes to fourth quarter data. For the months December 2012 – Mid February 2013 there were 53 new c diff cases and of those cases, 20 were hospital onset. There were 40% readmits for the past month. Cynthia attended the Sutter County quarterly meeting. There are resources for free health care, dental and HIV testing. Patients are charged for services per their income and those that do not have income receive free service. Dog bites and rabies vaccines were also discussed at the meeting. Physicians do give the rabies vaccines. The Yuba Sutter area is high risk for the West Nile virus and there has been one death as a result. Jennifer reported that Sutter County is updating the Hazard Mitigation (HM) plan and a consult has been hired. The county will coordinate the update with Live Oak and Yuba City, as it will be a county wide process. Two kick-off meetings were held and one session was videotaped and will be posted on the Office of Emergency Management's face book page and possibly the county website. It can be viewed at www.bepreparedsutter.org The plan must be updated every five years to receive FEMA funds during a disaster. The update is also tied into the flood insurance program and can	Cynthia will share the resource information for free healthcare with Liz.

5.0 Infection Control Update (Cont'd)	decrease flood insurance rates if enough points are earned. Community participation is one of the highest categories to earn points. Jennifer encouraged the committee to view the website for update information on how to participate in the process if interested.	
6.0 Security Report	Kyff reported that he does not have any new information with regards to Walmart's assistance with training costs. He spoke to the assistant manager and he is not sure if they are out of funding. It was noted that Sam's Club may be another option to seek training funds.	
7.0 Safety Officer Report	Kyff reported that the Safety Committee is now combined with the Safety Council, which reports to the VP of Quality. Quarterly reports from the Safety Council will be provided for the VP of Quality. The Safety Council will meet with the VP of Quality upon request. A request was made that the quarterly Safety Council reports be provided for the Disaster Committee to review.	Kyff will provide quarterly Safety Council reports to the Disaster Committee.
8.0 Engineering Update	Mike reported that the 4th and 5th floors are in the process of being cleaned out. The disaster supplies will need to be moved out of the 4th floor and relocated to the trailers once they are rented during the next couple of months.	Oscar will create a list of disaster supplies that are in inventory. Oscar will meet with Tony and Mike to review the inventory and see what expired supplies need to be replaced.
9.0 Communication Update	No representation.	No further action.
10.0 ARES/HAM Radio Updates	No representation.	No further action.
11.0 YSDADA	Jeannie did not have an update other than YSDADA is continues to train in preparation for disaster.	No further action.
12.0 Diagnostic Services	Peter reported that he is looking at the feasibility of replacing the CT in the modular with a faster CT.	More info to come.
13.0 RT Update	Mark did not have any new information to report.	No further action.
14.0 Nutrition Services Update	Chad has verified that there is enough food and water inventory. Food trays have a one-year shelf life. The new trays that are out have a five-year shelf life. The stoves and paper products are located upstairs in the hospital. A water purifier will be needed.	Chad to look into getting a water purifier.
15.0 Pharmacy Update	No representation.	No further action.
16.0 IT/IS Update	No representation.	No further action.
17.0 Materials Management	No representation.	No further action.
18.0 Old/New Business	The 2013 Emergency Management Plan is still work in progress. Mike noted that Tracy Buckman may be of assistance with the emergency management process and that John Rust set aside funds for Tracy to help review our information.	

MEETING RECORD

Project: Hazard Mitigation Plan update	**Date:** 3/8/13
Meeting Purpose: To provide an overview of why the county has a Hazard Mitigation Plan and what is involved in updating the plan.	

Meeting Attendees: See attached sign in sheet.

Items Discussed:

- Sutter County is updating the Hazard Mitigation (HM) Plan. A consultant was hired. The county is coordinating the update with Live Oak and Yuba City. It is a county wide process.
- Two kick off meetings were held. One session was videotaped and will be posted on the Office of Emergency Management's facebook page and possibly the county website. View www.bepreparedsutter.org for more details.
- Discussed plan has to be updated every 5 years to receive FEMA funds during a disaster.
- Discussed that update is also tied to flood insurance program and can decrease flood insurance rates if enough points are earned. Community participation is one of the highest categories to earn points.
- Encouraged all participants to view website for update information on how to participate in the process if they are interested.

Follow-up:
Report updates as necessary.

By:
Name: Jennifer Broussard
Organization: Sutter County Public Health

SUTTER COUNTY PUBLIC HEALTH
COMMUNICABLE DISEASES & INFECTIONS
COMMUNITY MEETING
March 8, 2013

Name	Signature	Facility	email address & phone #
Susana Ramirez		Planned Parenthood, Mar Monte	susana_ramirez@ppmarmonte.org
Veronica Padilla		Ampla Health	vpadilla@amplahealth.org
Debbie Treanor		Sutter Surgical Hospital - North Valley	
Jeff Williams		Sutter County Community Services	
Ronald McBride		Sutter-Yuba Mosquito & Vector Control	rmcbride@sutter-yubamvcd.org
Tracy Bauernn		YCUSD	tbauernn@ycusd.k12.ca.us
Allison Anderson		SCOSE	allisona@sutter.k12.ca.us
Dalvinder Nagra		SCPHD	
Tina Thornton		Ampla Health	tthornton@ampla.org
Jennifer Broussard		SCPH	jbroussard@co.sutter.ca.us
Kristen Belta		SCPH	
Linda Olson		SCSOS	Linda O@sutter.k12.ca.us

SUTTER COUNTY PUBLIC HEALTH
COMMUNICABLE DISEASES & INFECTIONS
COMMUNITY MEETING
March 8, 2013

Name	Signature	Facility	email address & phone #
Bryan Walker		Sutter Urgent Care	WalkerB2@SutterHealth.org
Elizabeth Fraley		Planned Parenthood Mar Monte	elizabeth_fraley@ppmarmonte.org
Elizabeth Engelken		Yuba City Unified	eengelken@ycusd.k12.ca.us
A Cima, [illegible] MPH		SCPH	
Hilton Perez,		Ample Health	HPEREZ@amplehealth.org
Cynthia Zips	Cynthia Zips	Rideout Health	czips@RRHC.org

From: Foster, Jeanine
Sent: Tuesday, August 13, 2013 1:06 PM
To: 'wcroyle@water.ca.gov'; 'gloria-jennings-grahm@redcross.org'; 'kirby.everhart@calema.ca.gov'; 'phyllis.banks@calema.ca.gov'; 'admin@sutterbutteflood.org'
Subject: Sutter County LHMP Update: Public Review Draft

Good Afternoon,

As you might be aware, Sutter County in conjunction with the Cities of Yuba City and Live Oak and several participating special districts are in the process of updating their Local Hazard Mitigation Plan (LHMP). This plan updates their 2007 plan and is being prepared to meet the requirements of the Disaster Mitigation Act (DMA) of 2000 and the NFIP's Community Rating System (CRS) 2013 Coordinator's Manual. This plan, addresses natural hazards of concern to the Sutter County Planning Area, with an emphasis on flood and levee failure, and will maintain each participating jurisdiction's eligibility for FEMA pre and post disaster funding.

The public review LHMP draft is currently online on the County website at the link provided below. Please take this time to review and provide any input to the plan document. A formal public meeting on the draft plan is being held in the County on August 22nd in the evening. Please visit the County website for details on meeting location and time.

http://www.co.sutter.ca.us/doc/government/depts/cs/es/hazard_mitigation

Your input can be provided directly to me, John DeBeaux, the Sutter County project lead, or bring your comments to next week's meetings.

Thanks very much.

Jeanine Foster
Project Manager
AMEC Environment & Infrastructure
(303) 717-7171

From: Foster, Jeanine
Sent: Tuesday, August 13, 2013 12:55 PM
To: 'Pineda, Ricardo@DWR'; 'cindy.matthews@NOAA.gov'; 'w.croyle@water.ca.gov'; 'Gulserian, John'; 'Booth. George'
Cc: Morrison, Chris; 'John DeBeaux'
Subject: Sutter County LHMP Update: Public Review Draft

Good Afternoon,

As you might be aware, Sutter County in conjunction with the Cities of Yuba City and Live Oak and several participating special districts are in the process of updating their Local Hazard Mitigation Plan (LHMP). This plan updates their 2007 plan and is being prepared to meet the requirements of the Disaster Mitigation Act (DMA) of 2000 and the NFIP's Community Rating System (CRS) 2013 Coordinator's Manual. This plan, addresses natural hazards of concern to the Sutter County Planning Area, with an emphasis on flood and levee failure, and will maintain each participating jurisdiction's eligibility for FEMA pre and post disaster funding.

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http://www.co.sutter.ca.us/doc/government/depts/cs/es/hazard_mitigation

Your input can be provided directly to me, John DeBeaux, the Sutter County project lead, or bring your comments to next week's meetings.

Thanks very much.

Jeanine Foster
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From: Charles Smith, PIO
Sent: Tuesday, August 13, 2013 3:40 PM
To: 'pama@crbr.com'; 'gail.carter1@gmail.com'; 'jwillis@firstam.com'; 'maureen.bumgarner@unionbank.com'; 'wjackson@farmersagent.com'; 'D1M2@pge.com'; 'jsillman@recology.com'
Subject: link to draft Sutter County Hazard Mitigation Plan

Please share this email as you wish!

As promised at our first Program for Public Information Committee meeting, I am providing a link to an online copy of the draft Sutter County Hazard Mitigation Plan.
http://suttercounty.org/pdf/cs/es/Sutter%20County%20Local%20Hazard%20Mitigation%20Plan%20August%202013%20Update.pdf
A public meeting on the draft plan is scheduled for Thursday, Aug. 22, at 6 p.m. at Veteran's Hall on Memorial Loop in Sutter County. (Don't confuse this meeting with our scheduled PPI Committee meeting earlier in the day!)

If you have any comments regarding the draft plan, please reply to my email address and the comments will be forwarded for inclusion in the planning document. Or, you can attend the meeting next Thursday and provide comments.

I am also providing a link to an online survey, the results of which will also be included in the planning document.

Thanks for your interest in your community.

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From: Foster, Jeanine
Sent: Wednesday, August 14, 2013 1:26 PM
To: 'Lynne.A.White@usace.army.mil'
Cc: Morrison, Chris
Subject: Sutter County LHMP Update: Public Review Draft

Good Afternoon,

As you might be aware, Sutter County in conjunction with the Cities of Yuba City and Live Oak and several participating special districts are in the process of updating their Local Hazard Mitigation Plan (LHMP). This plan updates their 2007 plan and is being prepared to meet the requirements of the Disaster Mitigation Act (DMA) of 2000 and the NFIP's Community Rating System (CRS) 2013 Coordinator's Manual. This plan, addresses natural hazards of concern to the Sutter County Planning Area, with an emphasis on flood and levee failure, and will maintain each participating jurisdiction's eligibility for FEMA pre and post disaster funding.

The public review LHMP draft is currently online on the County website at the link provided below. Please take this time to review and provide any input to the plan document. A formal public meeting on the draft plan is being held in the County on August 22nd in the evening. Please visit the County website for details on meeting location and time.

http://www.co.sutter.ca.us/doc/government/depts/cs/es/hazard_mitigation

Your input can be provided directly to me, John DeBeaux, the Sutter County project lead, or bring your comments to next week's meetings.

Thanks very much.

Jeanine Foster
Project Manager
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Appendix C MITIGATION STRATEGY

Sutter County
Local Hazard Mitigation Plan Update
Risk Assessment & Mitigation Strategy Meetings

June 12th & 13th, 2013

Agenda …1

Day 1:
Hazard Identification & Profiles…3
Risk Assessment Methodology…4
Risk Assessment Summary …6
Priority Hazards by Jurisdiction…10

Mitigation Goals Development …12
Formulating Mitigation Goals …12
Goals from 2007 LHMP…15

Day 2:

Mitigation Action Strategy …19
Categories of Mitigation Measures…19
Mitigation Actions from 2007 Plan …23
Mitigation Criteria …25
Initial Prioritization Instructions…27
Mitigation Action Worksheet …28

Jeanine Foster (jeanine.foster@amec.com)

AMEC Earth & Environmental

LHMP Risk Assessment & Mitigation Strategy Meetings
Agenda

HMPC Meeting #2: June 12, 2013

1) Introductions

2) Status of the DMA Planning Process

3) Review of Risk Assessment

4) Develop Plan Goals and Objectives

5) Review of Mitigation Alternatives

HMPC Meeting #3: June 13, 2013

1) Identify Mitigation Projects

2) Review Mitigation Selection Criteria

3) Prioritize Mitigation Projects

4) Review of Schedule/Data Needs

Table C.1. Hazard Summary for Sutter County

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Dam Failure	Extensive	Unlikely	Catastrophic	Medium
Drought & Water shortage	Extensive	Occasional	Critical	Medium
Earthquakes	Limited	Unlikely	Negligible	Low
Earth Movements: Erosion	Limited	Highly Likely	Limited	Low
Earth Movements: Landslide	Limited	Occasional	Negligible	Low
Floods: 100/500 year	Extensive	Occasional	Catastrophic	High
Floods: Localized Stormwater	Limited	Highly Likely	Limited	Medium
Invasive Species: Pests/Plants	Significant	Likely	Limited	Meidum
Levee Failure	Extensive	Occasional	Critical	High
Marine Invasive Species	Limited	Likely	Limited	Medium
Severe Weather: Extreme Cold/ Freeze	Extensive	Likely	Critical	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Critical	Medium
Severe Weather: Fog	Significant	Occasional	Limited	Low
Severe Weather: Heavy rain, hailstorm, lightning, and Wind	Extensive	Highly Likely	Critical	Medium
Severe Weather: Tornado	Limited	Likely	Limited	Low
Volcanoes	Significant	Unlikely	Limited	Low
Wildfires	Significant	Likely	Limited	Medium

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

C.1 Risk Assessment Methodology

C.1.1 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.

C.1.2 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.

C.1.3 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. It also considers the extent to which existing mitigation measures are in place to adequately address the hazard.

C.1.4 Sutter County Hazard ID/Vulnerability/Priority Summary

Dam failure

- No dam failure incidents for Sutter County
- 1 low hazard dam located in the County: 9 high hazard dams in nearby counties with a potential to affect Sutter. However, in the event of a dam failure, warning time is good.
- LOFO: Unlikely
- Vulnerability: High - Extremely High?
- Non-Priority Hazard

Drought

- 6 significant multi-year historical Dry Periods in California since 1850
- 1 disaster declaration for Sutter County in 1976/77
- Northern Sacramento Valley counties, including Sutter County, generally have sufficient groundwater and surface water supplies to mitigate even the severest droughts of the past century
- LOFO: Occasional
- Vulnerability: Low or medium?
- Non-Priority Hazard

Earthquake

- Limited felt occurrences in Sutter County
- County generally at low risk of damaging earthquake occurrence
- LOFO: Unlikely - large, damaging earthquake
- Vulnerability: Low
- Non-Priority Hazard

Earth Movement: Erosion

- Erosion from wind: occurs annually, but no information on significant issues
- Stream bank erosion: occurs annually in levee areas
- LOFO: Unlikely - large, damaging earthquake
- Vulnerability: Low
- Non-Priority Hazard

Earthmovement: Landslide

- State of California identifies most of County generally at Nil risk of landslides, with Sutter-Buttes at Low risk
- Minor past incidents of slope failure in the past
- LOFO: Occasional
- Vulnerability: Low
- Non-Priority Hazard

Flood Hazards

100/500 year

- Some Flood history in County; although levees have historically provided additional protection
- 12 of 13 federal declaration for storms and flooding from 1950-present
- LOFO: 100-Occasional; 500-Unlikely
- Vulnerability: High
- Priority Hazard

Localized/Stormwater flooding

- Significant localized flood history in the County - occurs annually
- LOFO: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Invasive Species: Insect/Pests

- Significant localized flood history in the County - occurs annually
- WNV up again in 2012, with no cases since 2008
- LOFO: Likely
- Vulnerability: Low
- Non-Priority Hazard

Landslides/Debris Flows

- Some areas at risk to slope failure in the County; California data indicates County at low to nil risk.
- LOFO: Occasional
- Vulnerability: Medium
- Priority Hazard

Levee Failure

- Significant levees located throughout County. Significant past levee failures have been limited; although, levee conditions are a concern. Several levee improvement projects underway.
- LOFO: Likely based on current status; Occasional based on future status given current repairs/projects
- Vulnerability: High - Extremely High
- Priority Hazard

Marine Invasive Species

- Limited history in the County. Hydrilla a documented issue; Zebra mussels still upsteam of County.
- LOFO: Likely
- Vulnerability: Low
- Non-Priority Hazard

Severe weather

Extreme Cold/Freeze

- Annual occurrences of cold weather/freeze.
- 5 winter storm and freeze events occurred in Sutter County over 52 years
- Most significant impact is to agriculture industry
- LOFO: Likely
- Vulnerability: Medium
- Priority Hazard

Extreme heat

- Annual occurrences - it gets hot every summer
- Although only two past events were recorded in national databases, data from the Western Regional Climate Center indicates that high temperatures will continue to occur in the Planning Area on an annual basis
- Climate change might affect this hazard in the future
- LOFO: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Fog

- The NCDC data shows no severe fog incidents for Sutter County since 1993. The SHELDUS database shows two events of fog in Sutter County
- LOFO: Occasional
- Vulnerability: Low
- Non-Priority Hazard-

Heavy rain, Thunderstorms, hail, lightning, wind

- Significant County history: annual occurrences
- Based on SHELDUS data and HMPC input, 65 heavy rain, hail, lightning, and thunderstorm wind incidents over a 51-year period
- Severe storms/heavy rains are the primary cause of most major flooding
- LOFO: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Tornadoes

- 4 tornadoes occurred in Sutter County over 64 years. none were greater than an EF1.
- LOFO: Likely
- Vulnerability: Low
- Non-Priority Hazard
- Volcano
- No recorded impacts (ashfall) to Sutter County from historic regional volcanic events
- LOFO: Unlikely
- Vulnerability: Extremely Low
- Non-Priority Hazard

Wildfire

- Fires occur on an almost annual basis in the Sutter County Planning Area However; the County has little forested area, so wildfires are generally limited in size and area affected (usually grassland and vegetative fires), and are easier to contain than fires in forested or mountainous areas of California
- LOFO: Likely
- Vulnerability: Medium
- Priority Hazard

*LOFO=Likelihood of Future Occurrence

C.1.5 Priority Hazards by Jurisdiction

Jurisdiction	Priority Hazards
Unincorporated Sutter County	Dam Failure Drought & Water Shortage Flood: 100/200/500–year Flood: Localized/Stormwater Invasive Species: Pests/Plants Levee Failure Marine Invasive Species Severe Weather: Extreme Cold/Freeze Severe Weather: Extreme heat Severe Weather: Heavy Rains, Thunderstorms, hail, lightning, wind Wildfire
City of Live Oak	Dam Failure Drought & Water Shortage Flood: 100/200/500–year Flood: Localized/Stormwater Levee Failure Severe Weather: Heavy Rains, Thunderstorms, hail, lightning, wind
City Yuba City	Dam Failure Drought & Water Shortage Flood: 100/200/500–year Flood: Localized/Stormwater Levee Failure
Gilsizer County Drainage District	Dam Failure Flood: 100/200/500–year Flood: Localized/Stormwater Levee Failure
Levee District 1	Dam Failure Earth Movements: Erosion Flood: 100/200/500–year Flood: Localized/Stormwater Levee Failure
Reclamation District 70	Dam Failure Drought & Water Shortage Earthquakes Earth Movements: Erosion Flood: 100/200/500–year Flood: Localized/Stormwater Levee Failure Severe Weather: Heavy Rains, Thunderstorms, hail, lightning, wind
Reclamation District 1001	Dam Failure Earth Movements: Erosion Flood: 100/200/500–year Flood: Localized/Stormwater Levee Failure Severe Weather: Heavy Rains, Thunderstorms, hail, lightning, wind

Jurisdiction	Priority Hazards
Reclamation District 1500	Drought & Water Shortage Earthquakes Earth Movements: Erosion Flood: 100/200/500–year Flood: Localized/Stormwater Levee Failure Severe Weather: Heavy Rains, Thunderstorms, hail, lightning, wind
Reclamation District 1660	Dam Failure Drought & Water Shortage Flood: 100/200/500–year Flood: Localized/Stormwater Levee Failure Severe Weather: Extreme Cold/Freeze Severe Weather: Extreme heat Severe Weather: Heavy Rains, Thunderstorms, hail, lightning, wind

C.2 Mitigation Goals Development

C.2.1 Formulating Mitigation Goals

Up to now, the HMPC has been involved in collecting and providing data for the Sutter County Local Hazard Mitigation Plan. From this information, a Risk Assessment has been developed that describes the risk and vulnerability of the 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 us to incorporating these improvements into the Mitigation Strategy portion of the plan. Our planning goals should provide direction for what should be done to make the planning area more disaster resistant.

GOALS: Goals are stated without regard for implementation, that is, implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that the goals are not dependent on the means of achievement. 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.

Goals statements will 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.

Finally, before we formulate our goals, we should consider other planning area goals from other County plans and programs. This keeps us from "reinventing the wheel," as well as being consistent with Multi-Objective Management --- or "MOM" --- where communities strive for efficiency by combining projects/needs that are similar in nature or location. Utilizing "MOM" effectively results in multiple sources of funding that can be "packaged" and broadening the supporting constituency base by including "outcomes" desired by various stakeholder groups.

Types/Sources of other area mitigation plans and programs include:

- Emergency Operations Plans
- Comprehensive Plans
- Stormwater Program and Plans
- Flood/Watershed Management Plans and Studies
- Water Management/Drought Plans
- Community Wildfire Protection/Fire Plans
- Others

Example: Goals from the Sutter County General Plan Safety Element

Flooding

GOAL:	**GOAL PHS 1 Minimize the potential for loss of life, personal injury, and property damage associated with floods.**
Objective:	NFIP. Continue to participate in the National Flood Insurance Program and the Community Rating System.
Objective:	Minimize Risk of Flood Damage. Require a minimum of 100- year flood protection and regulate development in accordance with local, state, and federal requirements to avoid or minimize the risk of flood damage.
Objective:	Flood Protection for New Development. Require new development in urban and/or urbanizing areas to provide 200-year flood protection within 3 years of adoption of the Central Valley Flood Protection Plan in accordance with state regulations, and require new development outside urban or urbanizing areas to provide 100-year flood protection in accordance with federal regulations.
Objective:	Development in Dam Inundation Areas. Require new development located in dam inundation areas to consider the risks from dam failure.
Objective:	Essential Facilities. Require that new essential public facilities (e.g., hospitals, health care facilities, emergency shelters, fire stations, etc.) be located, when feasible, outside of flood hazard zones, as defined by FEMA, or designed to maintain the structural and operational integrity of the facility during flooding events.

Seismic and Geologic Hazards

GOAL:	**GOAL PHS 2 Minimize the risk of personal injury and property damage due to geologic and seismic hazards and adverse soil conditions.**
Objective:	Review Standards. Review and enforce seismic and geologic safety standards and require the use of best management practices in site design and building construction methods.
Objective:	Minimize Exposure to Geologic Hazards. Minimize development in areas where geologic hazards exist from landslides and erosion.
Objective:	Site-Specific Geotechnical Analysis. Require the preparation of a County approved site-specific geotechnical analysis prior to approval of development in areas where the potential for geologic or seismic hazards exists (e.g., ground shaking, landslides, liquefaction, expansive soils, steep slopes, subsidence, and erosion) and incorporate recommended project features to avoid or minimize the identified hazards.
Objective:	Essential Facilities. Promote the upgrade, retrofitting, and/or relocation of existing essential facilities (e.g., hospitals, schools, law enforcement and fire stations, etc.) that do not meet current building code standards and are within areas susceptible to seismic or geologic hazards.

Emergency Response

GOAL:	GOAL PHS 4 Respond appropriately, effectively, and efficiently to natural and human-made emergencies and disasters.
Objective:	Emergency Operation Plans. Continue to implement and regularly update countywide emergency operation plans to reduce or eliminate long-term risk to life and property from natural or human-made emergencies and disasters.
Objective:	Evacuation Routes. Regularly review established evacuation routes to ensure emergency access to and from all parts of the County.
Objective:	Emergency Access. Require minimum road and driveway widths and clearances around structures consistent with established requirements in order to ensure emergency access.
Objective:	Emergency and Disaster Preparedness Training. Coordinate with local and regional agencies to regularly conduct emergency and disaster preparedness training to test operational and emergency plans.
Objective:	StormReady Program. Continue to be a member of the StormReady Program ensuring a higher level of community awareness to minimize the loss of life and property from severe weather.
Objective:	Coordination. Continue to be responsible for planning, preparedness, emergency response, and recovery activities associated with natural and human-made disasters. Provide communication and coordination between local and federal agencies, medical facilities, schools, local radio stations, and special needs service providers.
Objective:	Public Education. Support public education and awareness regarding emergency response and disaster preparedness.

C.2.2 Goal Development

You will each be given 3 sticky notes. On each note you will write what you think the goals for this mitigation planning effort should be. To get you started, provided below are possible goals for this mitigation plan. You may reword these or develop your own. These goal statements should serve as examples. It is vital that our Hazard Mitigation Planning Committee establish its own goals. Use one note for each goal. The purpose of the goal development is to reach a consensus on plan goals --- something everyone can live with.

- 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 MEMA/FEMA needs
- Maintain FEMA eligibility/position jurisdictions for grant funding
- Maintain current service levels
- Provide protection for existing facilities 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 facilities and services 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

When done, we will:

- Pin/tape them to the wall/easel-chart and arrange them by category
- Combine and reword them into 3-4 goals for the plan.

Sutter County Planning Area (From Previous Plan

Master Goal/Mission Statement

To develop sustainable communities to preserve life, protect property, the environment, and the economy from natural hazards by improving the communities' capabilities to prevent losses.

GOAL 1: Improve community awareness about hazards that threaten our communities and identify appropriate actions to minimize their impacts upon people and property.

- Objective 1.1: Increase public awareness about the nature and extent of hazards they are exposed to, where they occur, and recommend responses to identified hazards (create/continue an outreach program, provide educational resources and training)
  - Provide information regarding sheltering options
  - Provide information regarding data sites where the hazard progression can be tracked (e.g., websites, brochures)
  - Provide information on flood preparedness
  - Supplies
  - When and how to evacuate
  - Designated TV/Radio channels for Public Information

GOAL 2: Minimize Risk and Vulnerability to Flood Hazards.

- Objective 2.1: Improve the integrity of the levees to at least 100-year flood protection
- Objective 2.2: Eliminate open drainage ditches within 20' of traveled roadways within urbanized areas.
- Objective 2.3: Minimize damage/loss to roads
- Objective 2.4: Identify/Protect evacuation routes
- Objective 2.5:Reduce localized flooding from storm events
- Objective 2.6: Provide Protection for community critical facilities

GOAL 3: Reduce Agricultural Losses

- Objective 3.1: Noxious weed abatement

GOAL 4: Maintain Coordination of Disaster Plans with other Community Plans

- Objective 4.1: Coordinate with changing DHS needs
  - 4.1.1 NIMS
  - 4.1.2 DMA planning
  - 4.1.3 Emergency Operations Plans

- Objective 4.2 Coordinate with Community Plans
  - Community General Plans
  - Master Drainage Studies
  - Intergovernmental Agency Disaster Planning
  - Duty Roster
  - Available Equipment (e.g., sandbags, pumps)

- Objective 4.3: Coordinate with other counties and inter-county coordination among districts

City of Live Oak

Planning Area Goal 2: Minimize Risk and Vulnerability to Flood Hazards

- Objective 2.1: Ensure that all future development be constructed above the 100-year flood level
- Objective 2.2: Improve digital mapping accuracy.
- Objective 2.3: Increase drainage flow and stability on major canals
- Objective 2.4: Preserve power supply for Gilsizer and Live Oak Canal pumps
- Objective 2.5: Maintain duty lists and call-down phone tree numbers
- Objective 2.6: Provide for safe and efficient collection and removal of stormwater

Reclamation District 1500

Planning Area Goal 2: Minimize Risk and Vulnerability to Flood Hazards

- Objective 2.2: Protect the Sutter Basin during high water, specifically the Town of Robbins
  - 2.2.1: Provide an alternate power supply to the Karnack Pumping Plan that dewaters the Sutter Basin from High Water

Gilsizer County Drainage District

- GOAL 1: Reduce the frequency of emergency incidents
- GOAL 2: Reduce risk from hazards
- GOAL 3: Collect and dispose of stormwater in a safe and efficient manner

C.3 Categories of Mitigation Measures Considered

The following categories are based on the Community Rating System.

- Prevention
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Information

C.4 Alternative Mitigation Measures per Category

Note: The review of mitigation measures is in compliance with the FEMA's nationally accepted six mitigation categories and FEMA's CRS Program requirement to provide a comprehensive evaluation of the six mitigation categories with a specific requirement that Preventative Measures be thoroughly reviewed. This review leads to the projects incorporated into the mitigation actions plan.

C.4.1 Preventive Measures

Preventive measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventive measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventive measures. Some examples of types of preventive measures include:

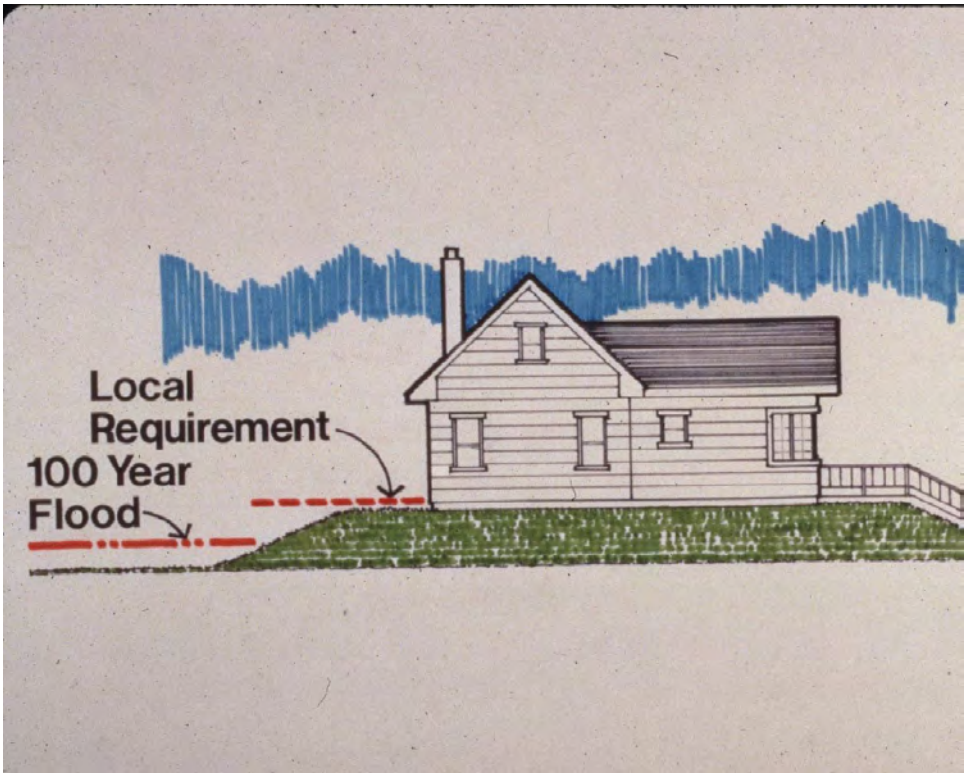
- Building codes
- Comprehensive land use planning
- Zoning ordinances
- Open space preservation
- Floodplain regulations
- Stormwater management and subdivision ordinance

Building Codes

Building codes provide one of the best methods of addressing natural hazards. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood

(the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure C.1.

Figure C.1. Building Codes and Flood Elevations



Sutter County has adopted the 2010 California Building Code, as has the City of Live Oak. Yuba City has adopted the 2011 California Building Code. Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step.

Manufactured Homes

Manufactured or mobile homes are usually not regulated by local building codes. They are built in a factory in another state are shipped to a site. They do have to meet construction standards set by the U.S. Department of Housing and Urban Development. All mobile homes constructed after 1976 must comply with HUD's National Manufactured Home Construction and Safety Standards. These standards apply uniformly across the country and it is illegal for a local unit of government to require additional construction requirements. Local jurisdictions may regulate the location of these structures and their on-site installation.

The NFIP allows communities to exempt mobile homes in existing mobile home parks from some of the flood protection requirements. The CRS provides up to 50 points if the community does not use this exemption.

Sutter County, the City of Live Oak, and Yuba City all require that manufactured homes in Zone A be elevated and anchored to resist flotation, collapse or lateral movement. Within Zones A1-30, AH, and AE on the community's Flood Insurance Rate Map, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated at least one foot above the base flood elevation and be securely fastened to an adequately anchored foundation system to resist flotation, collapse, and lateral movement. All manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A 1-30, AH, and AE on the community's Flood Insurance Rate Map that are not subject to the provisions of Section 1780-545(a) will be securely fastened to an adequately anchored foundation system to resist flotation, collapse, and lateral movement, and be elevated so that either the: (1) Lowest floor of the manufactured home is at least one foot above the base flood elevation; or(2) Manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade. Upon the completion of the structure, the elevation of the lowest floor, including basement, shall be certified by a registered civil engineer or licensed land surveyor and verified by the community building inspector to be properly elevated. Such certification and verification shall be provided to the Floodplain Administrator.

Local Implementation

Sutter County has adopted the 2010 California Building Code, as has the City of Live Oak. Yuba City has adopted the 2011 California Building Code. The jurisdictions Code of Ordinances requires that new residential construction be designed with the lowest floor, including the basement, elevated to or above the base flood elevation.

Reduce Future Flood Losses

For new residential construction, nonresidential construction, or substantial improvement, Sutter County, Live Oak, and Yuba City Code requires that either the lowest floor be elevated to one foot above the base flood elevation or that the below the base flood level the structure is watertight, "with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy." This reduces future flood losses by keeping development out of known floodplains. This is done by enacting and enforcing the current standards and/or adopting higher regulatory standards.

Current Standards

In addition, all new construction or substantial improvements shall be:

- Designed or modified and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy
- Constructed in ways that minimize flood damage
- Constructed with materials resistant to flood damage
- Constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities designed or located so as to prevent water from entering or accumulating within components during flooding

Sutter County, Live Oak, and Yuba City Codes also require that:

- All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
- New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters in the system and discharge from the systems into flood waters; and
- On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

CRS Credit

The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's BCEGS classification and points are awarded for adopting the International Code series. Sutter County's BCEGS rating is a Class 3 for both residential and commercial. Sutter County uses the California Building Code. The City of Live Oak's has not been rated by BCGS. The City of Yuba City is in process of audit and a new rating. The previous rating from 2005 was 4/4.

The CRS also has a prerequisite for a community to attain a Class 6 or better within the CRS program, the community must have a BCEGS class of 5/5 or better. To attain a Class 4 or better in the CRS program, the community must have a BCEGS class of 4/4 or better. Both Sutter County and Yuba City have a BCEGS classification of 3/3.

Comprehensive Planning and Zoning

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, particularly floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of land that is prone to flooding, such as open space or recreation. Planning and zoning activities can also provide benefits by simply allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach.

Comprehensive Plans

These plans are the primary tools used by communities to address future development. They can reduce future flood-related damages by indicating open space or low density development within floodplains and other hazardous areas. Unfortunately, natural hazards are not always emphasized or considered in the specific land use recommendations.

Generally, a plan has limited authority. It reflects what the community would like to see happen. Its utility is that it guides other local measures, such as capital improvement programs, zoning ordinances, and subdivision regulations.

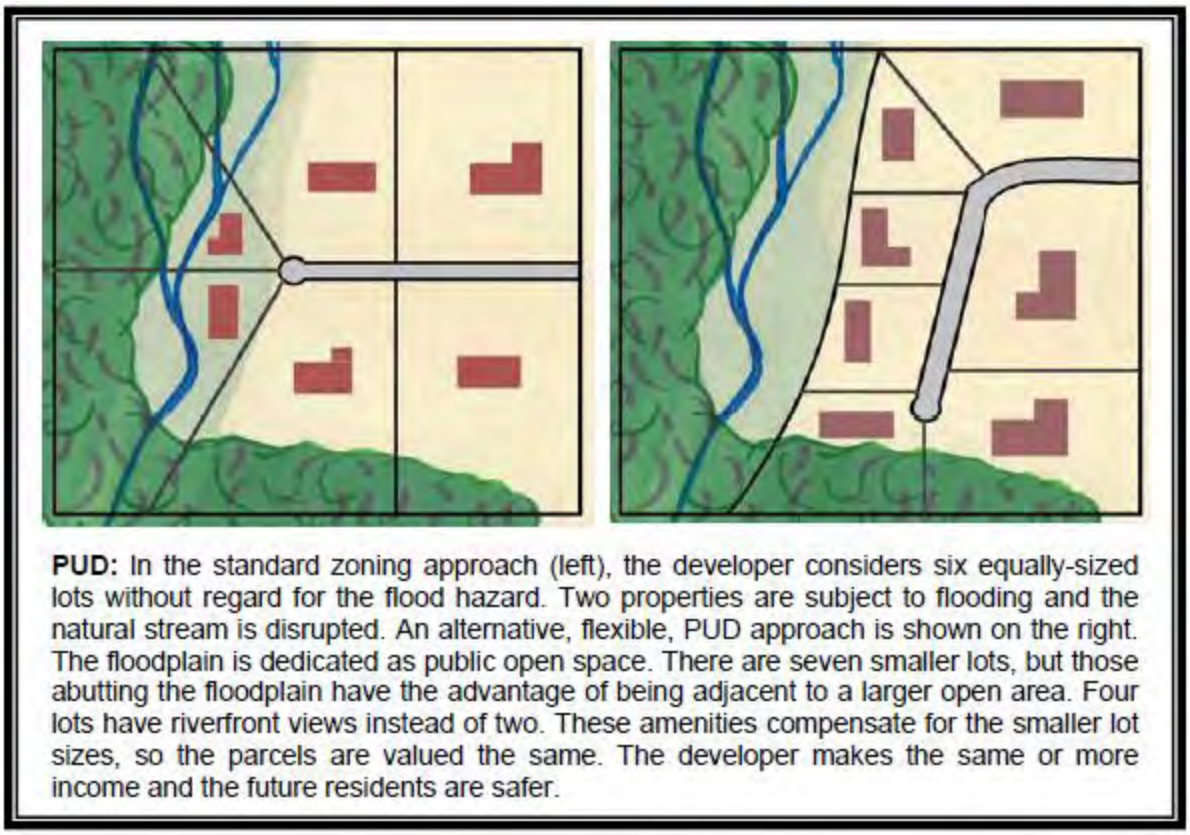
Zoning Regulations

A zoning ordinance regulates development by dividing a community into zones or districts and setting development criteria for each of those zones or districts. Zoning codes are considered the primary tool to implement a comprehensive plan's guidelines for how land should be developed.

Zoning ordinances can limit development in hazardous areas, such as reserving floodplain zones for agricultural uses. Often, developers will produce a standard grid layout. The ordinance and the community can allow flexibility in lot sizes and location so developers can avoid hazardous areas.

One way to encourage such flexibility is to use the planned unit development (PUD) approach or cluster development. The PUD and cluster approach’s allows the developer to easily incorporate flood hazard mitigation measures into the project. Open space or floodplain preservation can be facilitated as site design standards and land use densities can be adjusted to fit the property's specific characteristics, as shown in Figure C.2.

Figure C.2. Zoning for Development in the Floodzone



PUD: In the standard zoning approach (left), the developer considers six equally-sized lots without regard for the flood hazard. Two properties are subject to flooding and the natural stream is disrupted. An alternative, flexible, PUD approach is shown on the right. The floodplain is dedicated as public open space. There are seven smaller lots, but those abutting the floodplain have the advantage of being adjacent to a larger open area. Four lots have riverfront views instead of two. These amenities compensate for the smaller lot sizes, so the parcels are valued the same. The developer makes the same or more income and the future residents are safer.

Capital Improvement Plans

A capital improvement plan can guide a community's major public expenditures for a 5- to 20-year period. Capital expenditures may include acquisition of open space within the hazardous areas, extension of public services into hazardous areas, or retrofitting existing public structures to withstand a hazard.

Local Implementation

In 2010, Sutter County and the City of Live Oak approved new respective General Plans. The City of Yuba City adopted their General Plan in 2004.

Reduce Future Flood Losses

Enacting the General Plans and the comprehensive zoning and future land uses contained in each General Plan will help to reduce future flood losses by helping to keep development out of hazardous areas and known floodplains.

Current Standards

Sutter County, Live Oak, and Yuba City's zoning codes do not provide for any additional restrictions on development in floodplains, aside from what is required under each jurisdiction's floodplain regulations regarding building elevations.

CRS Credit

The CRS provides flood insurance discounts to those communities that implement various floodplain management activities that meet certain criteria. Comparing local activities to those national criteria helps determine if local activities should be improved.

Credits are provided for regulations that encourage developers to preserve floodplains or other hazardous areas from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Credits are also provided for setting aside floodplains for low density zoning, such as five acre lots or conservation.

Open Space Preservation

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to no build on the part set aside in the easement.

Although there are some federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes. These are usually linear areas along property lines or channels. Maintenance easements also can be donated by streamside property owners in return for a community maintenance program.

Local Implementation

In 2010, Sutter County and the City of Live Oak approved new respective General Plans. The City of Yuba City adopted their General Plan in 2004. Each General Plan, in coordination with the Codes of each jurisdiction, protects current open space. In addition, each General Plan includes a statement that the jurisdiction:

> "should actively pursue every source of funding for park development and that funding sources include revision of existing subdivision park fee structures in order to generate additional acquisition funds."

Reduce Future Flood Losses

Enacting the General Plans and the comprehensive zoning and future land uses contained in each General Plan will reduce flood losses by keeping development out of known floodplains.

Current Standards

Sutter County, Live Oak, and Yuba City's zoning codes do not provide for any additional restrictions on development in floodplains, aside from what is required under each jurisdiction's floodplain regulations regarding building elevations.

CRS Credit

Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. Up to 1,450 points can be given, based on how much of the floodplain is in community public undeveloped properties, parks, wildlife refuges, golf courses, or other uses that can be depended on to stay open (Activity 420 - Open Space Preservation).

Subdivision Regulations

Subdivision regulations govern how land will be subdivided and they set construction standards. These standards generally address roads, sidewalks, utilities, storm sewers, and drainage ways. They can include the following flood protection standards:

- Requiring that the final plat show all hazardous areas
- Requiring that each lot be provided with a building site above the flood level
- Requiring that all roadways be no more than one foot below the flood elevation
- Local Implementation

Each jurisdictions subdivision regulations require, at a minimum, the following to protect the natural and beneficial functions of the floodplain:

- All natural drainage courses into which other drainage courses empty shall be left undisturbed and shall be provided with adequate dedicated rights of way.
- All land developments shall be related to the surrounding drainage pattern with proper provisions made for proper drainage facilities.
- Adequate easements are required along any stream or important surface drainage course.

Floodplain Regulations

Most communities with a flood problem participate in the National Flood Insurance Program (NFIP). The NFIP sets minimum requirements for the participating communities' standards for development, subdivision of land, construction of buildings, installation of mobile homes, and improvements and repairs to buildings. These are usually spelled out in a separate ordinance.

The NFIP minimum requirements are summarized in on the next page. It should be stressed that these are minimum requirements. Local conditions, such as high velocity flooding or the presence of a potential dam failure, may warrant higher local standards.

Sutter County, Live Oak, and Yuba City each have floodplain management regulations that exceed minimum NFIP standards.

Enforcement

To ensure that communities are meeting the NFIP standards, FEMA periodically conducts a Community Assessment Visit. During this visit, the maps and ordinances are reviewed, permits are checked, and issues are discussed with staff. Failure to meet all of the requirements can result in one or more consequences:

- Reclassification under the Community Rating System to a higher class
- Probation, which entails a $50 surcharge on every flood insurance policy in the community, or
- Suspension from the NFIP.

In 2004, Lafourche Parish, Louisiana was cited and reclassified from a CRS Class 9 to a Class 10, in effect kicking the Parish out of the CRS. Suspension is more serious. It means that the community is out of the NFIP and the following sanctions are imposed:

- Flood insurance will not be available. No resident will be able to purchase a flood insurance policy.
- Existing flood insurance policies will not be renewed.
- No direct federal grants or loans for development may be made in identified flood hazard areas under programs administered by federal agencies, such as HUD, EPA, and the Small Business Administration.
- Federal disaster assistance will not be provided to repair insurable buildings located in identified flood hazard areas for damage caused by a flood.
- No federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas. This includes policies written by FHA, VA, and others.
- Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazard areas that there is a flood hazard and the property is not eligible for federal disaster relief.

These sanctions can be severe for any community with a substantial number of buildings in the floodplain. Most communities with a flood problem have joined the NFIP and are in full compliance with their regulatory obligations.

One way to assure good administration and enforcement is to have Certified Floodplain Managers on staff. The Association of State Floodplain Managers administers the national

Certified Floodplain Manager (CFM®) program. Certification involves a three hour exam and a requirement for continuing education each year. The exam covers the regulatory standards of the National Flood Insurance Program as well as mapping, administration, enforcement and flood hazard mitigation.

Minimum National Flood Insurance Program Regulatory Requirements

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA). As a condition of making flood insurance available for their residents, communities that participate in the NFIP agree to regulate new construction in the area subject to inundation by the 100-year (base) flood. The floodplain subject to these requirements is shown as an A or V Zone on the Flood Insurance Rate Map (FIRM).

There are five major floodplain regulatory requirements. Additional floodplain regulatory requirements may be set by state and local laws.

1) All development in the 100-year floodplain must have a permit from the community. The NFIP regulations define "development" as any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.
2) Development along a river or other channel cannot obstruct flows so as to cause an increase in flooding on other properties. An analysis must be conducted to demonstrate that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.
3) New buildings may be built in the floodplain, but they must be protected from damage from the base flood. In riverine floodplains, the lowest floor of residential buildings must be elevated to be at or above the base flood elevation (BFE). Nonresidential buildings must be either elevated or floodproofed.
4) Under the NFIP, a "substantially improved" building is treated as a new building. The NFIP regulations define "substantial improvement" as any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the start of construction of the improvement. This requirement also applies to buildings that are substantially damaged.
5) Communities are encouraged to adopt local ordinances that are more comprehensive or provide more protection than the federal criteria. The NFIP's Community Rating System provides insurance premium credits to recognize the additional flood protection benefit of higher regulatory standards.

Local Implementation

Sutter County, Yuba City and Live Oak implement local subdivision regulations which require hazardous areas to be shown on the final plate and implement floodplain regulations as part of the NFIP including some higher regulatory standards.

Reduce Future Flood Losses

Future flood losses should be reduced by enforcement of current floodplain regulations. When Sutter County is remapped in its entirety (so that no Q3 maps are considered current standards), the floodplain regulations in each jurisdiction may need to be revisited.

Current Standards

Sutter County, Live Oak, and Yuba City have floodplain ordinances that meet all of the NFIP's minimum floodplain regulatory requirements and exceed some of them such as establishing one foot of freeboard.

CRS Credit

There are many higher regulatory standards that warrant CRS credit. These standards include:

- Delineating a floodway, the area of higher hazard near the channel. This would allow development outside the floodway (called the "floodplain fringe") without engineering studies to determine their impact on others.
- Requiring all new construction to be elevated one or two feet above the base flood elevation to provide an extra level of protection from waves and higher floods. This extra protection is reflected in a distinct reduction in flood insurance rates.
- Having all developers (not just the larger ones) provide flood data where none are available.
- Specifications to protect foundations from erosion, scour and settling.
- Prohibiting critical facilities from all or parts of the floodplain.
- Prohibiting hazardous materials.
- Requiring buffers adjacent to streams or natural areas.
- Restrictions on use of enclosures below elevated buildings.
- Flood storage lost due to filling and construction must be compensated for by removal of an equal volume of storage.
- The CRS also provides credit for having trained staff and a higher credit if the staff members are Certified Floodplain Managers.

It should be noted that one of the prerequisites for participation in the CRS is that the community be in full compliance with the minimum requirements of the NFIP. A community with a number of "potential violations" risks being removed from the CRS entirely.

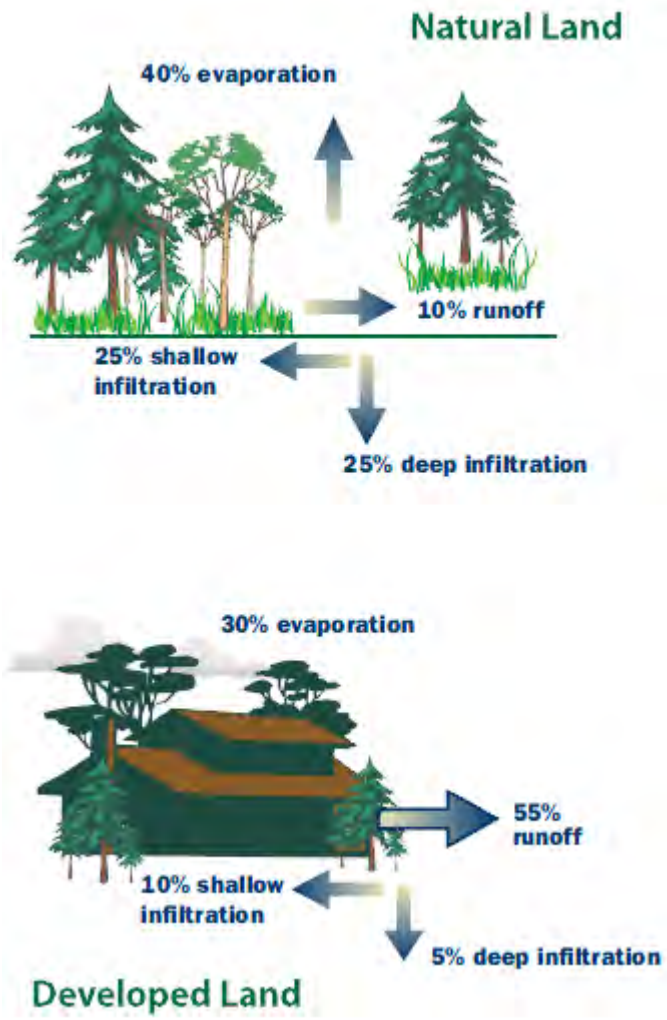
Sutter County, Live Oak, and Yuba City have floodplain ordinances that set specific restrictions on the use of enclosures below elevated buildings, which is an extra requirement beyond NFIP's minimum requirements. Floodways within each jurisdiction are delineated, and certain requirements apply to development within these floodways. New construction, substantial improvements, fill, and other encroachments are prohibited within the regulatory floodway without certification and supporting technical data, signed by a registered professional engineer, to show that the fill will not increase the water surface elevation of the base flood or the developer or applicant for new construction receives a conditional FIRM and floodway revision.

Stormwater Management and Subdivision Ordinance

Development in floodplains is development in harm's way. New construction in the floodplain increases the amount of development exposed to damage and can aggravate flooding on neighboring properties.

Development outside a floodplain can also contribute to flooding problems. Stormwater runoff is increased when natural ground cover is replaced by urban development (see Figure C.3). Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality.

Figure C.3. Runoff and Infiltration of Natural and Developed Land



There are three ways to prevent flooding problems caused by stormwater runoff:

1) Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties, and
2) Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions.
3) Set construction standards so buildings are protected from shallow water.

Most communities participate in the NFIP, which sets minimum requirements for regulating development in the floodplain. All new buildings must be protected from the base or 100-year flood and no development can cause an increase in flood heights or velocities.

Stormwater runoff regulations require developers to build retention or detention basins to minimize the increases in the runoff rate caused by impervious surfaces and new drainage

systems. Generally, each development must not let stormwater leave at a rate higher than what existed under pre-development conditions.

Standards for drainage requirements are typical in subdivision regulations. Standards for storm sewers, ditches, culverts, etc., are best set when an area is laid out and developed. Traditionally, the national standard is to require that the local drainage system carry the 10-year storm. Recently, communities are finding that older estimates of the 10-year storm understated the true hazard, so they are addressing larger storms.

One problem with requiring the drainage system to carry water away is that runoff increases with urban development. The runoff equivalent of a 10-year storm occurs more frequently, and from smaller storms. The problem is just sent downstream onto someone else's property.

Accordingly, modern subdivision regulations require new developments to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions. This is usually done by constructing retention or detention basins to hold the runoff for a few hours or days, until flows in the system have subsided and the downstream channels can accept the water without flooding.

If the storm sewers or roadside ditches cannot handle a heavy rain, the standard subdivision design uses the streets to carry excess runoff. If the flows exceed the streets' capacity, adjacent properties will flood. Therefore, the third approach to protecting from stormwater flooding is to make sure new buildings are elevated one or two feet above the street or above adjacent grade.

Local Implementation

Reduce Future Flood Losses

Current practices and tracking mechanisms are seeking to reduce flood risks. The levee improvements will help reduce localized flood risks by improving pumping stations and reducing loads on those facilities. In order to reduce future flood losses, the County and each City may need to create stormwater management ordinances.

Current Standards

Although Sutter County, Live Oak, and Yuba City do not have stormwater management ordinances, each jurisdictions subdivision design standards require that subdivisions provide for adequate drainage of surface waters and erosion control. All land development must be related to the surrounding drainage pattern, with provisions made for proper drainage facilities. The minimum runoff must be determined by the rational method. In addition, all natural drainage courses into which other drainage courses empty shall be left undisturbed and shall be provided with adequate dedicated rights of way. Street alignment should follow contour lines or be generally parallel to drainage ways.

CRS Credit

CRS credit is provided for both higher regulatory standards in the floodplain and stormwater management standards for new developments. Credit is based on how those standards exceed the minimum NFIP requirements.

Conclusions (adoption or revision of such plans and regulations)

- State administration of installation of mobile or manufactured homes does not guarantee that they will be adequately tied down or protected from flooding and other hazards.
- Most zoning ordinances do not designate floodprone areas for any special type of land use.
- Standards in subdivision regulations for public facilities should account for the hazards present at the site. New building sites, streets, and water systems should facilitate access and use by fire and emergency equipment.
- Sutter County, Live Oak, and Yuba City have floodplain development ordinances that exceed minimum national and state standards and will be helpful in preventing flood problems from increasing. Adopting a 1 foot freeboard requirement for residential development will reduce future flood losses and better protect residents.
- Sutter County, Live Oak, and Yuba City should continue to enforce stormwater management best management practices to control post development site runoff. Consideration of a unified countywide stormwater ordinance will provide consistent regulations between communities.

Recommendations

- Sutter County, Yuba City and Live Oak should continue to implement CRS activities, because of the recent changes in the 2013 Coordinator's Manual including many changes to CRS activities that each community is currently receiving credit. Sutter County, Yuba City, and Live Oak should consider amending their local floodplain Ordinances for additional higher standards such as elevating residential structures above the base flood elevation and providing compensatory storage.
- Sutter County, Yuba City, and Live Oak should consider development of a county-wide stormwater management ordinance to ensure there is uniformity among regulations so that the watersheds are managed consistently throughout the county.

C.4.2 Property Protection Measures

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building,
- Modify the building so it can withstand the impacts of the hazard, and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency.

Keeping the Hazard Away

Generally, natural hazards do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house.

Flooding

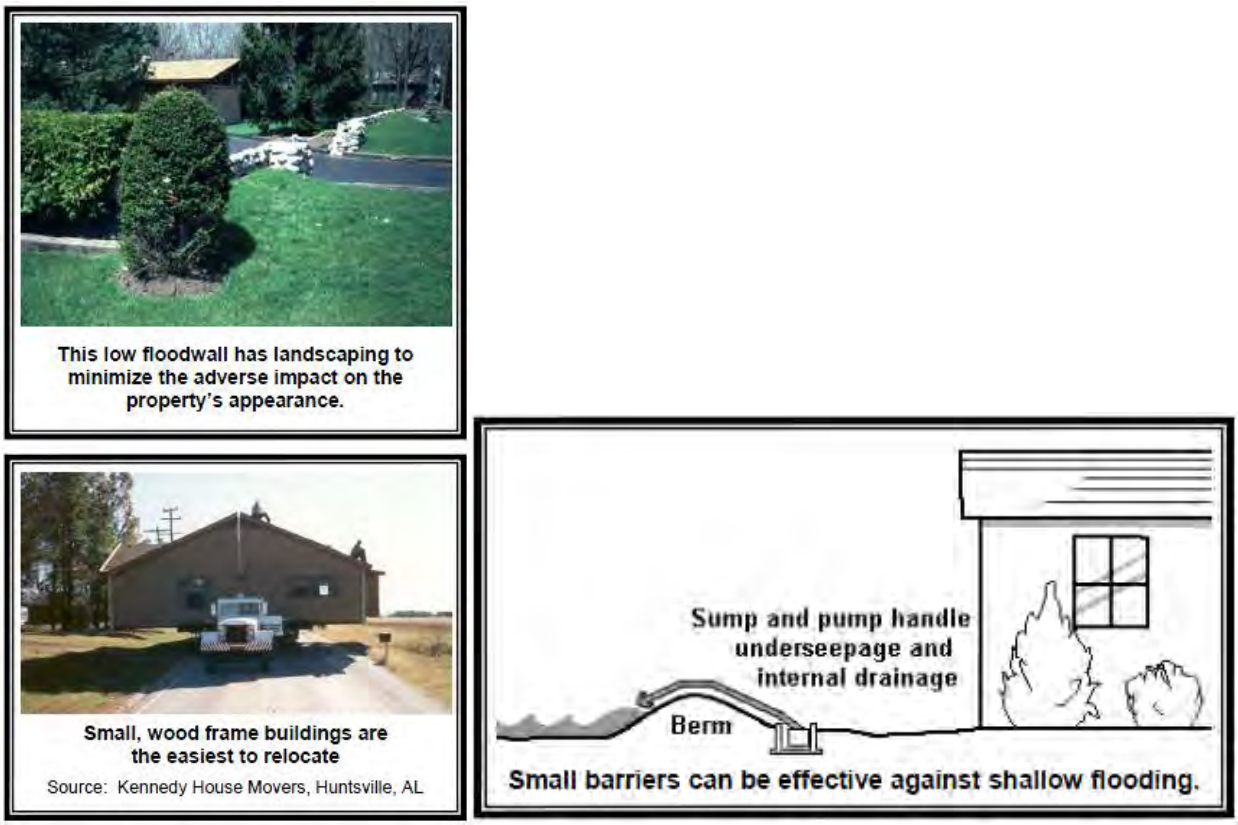
There are five common methods to keep a flood from reaching and damaging a building:

- Erect a barrier between the building and the source of the flooding.
- Move the building out of the floodprone area.
- Elevate the building above the flood level.
- Demolish the building.
- Replace the building with a new one that is elevated above the flood level.

Barriers

A flood protection barrier can be built of dirt or soil (a "berm") or concrete or steel (a "floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier.

Figure C.4. Types of Barriers



Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and properly maintained. A berm can also settle over time, lowering its protection level. A floodwall can crack, weaken, and lose its watertight seal. Therefore, barriers need careful design and maintenance (and insurance on the building, in case of failure).

Relocation

Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. However, experienced building movers can handle any job.

In areas subject to flash flooding, deep waters, or other high hazard, relocation is often the only safe approach. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

Building Elevation

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

One concern with elevation is that it may expose the structure to greater impacts from other hazards such as wind. If not braced and anchored properly, an elevated building may have less resistance to the shaking of an earthquake and the pressures of high winds.

Demolition

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damages. It is cheaper to demolish them and either replace them with new, flood protected structures ("pilot reconstruction"), or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move - such as larger, slab foundation or masonry structures - and for dilapidated structures that are not worth protecting. Generally, demolition projects are undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to public open space use, like a park.

Figure C.5. Demolition of Flooded Home

Demolishing a repetitively flooded home

One problem that sometimes results from an acquisition and demolition project is a "checkerboard" pattern in which nonadjacent properties are acquired. This can occur when some owners, especially those who have and prefer a waterfront location, are reluctant to leave their

homes. Creating such an acquisition pattern in a community simply adds to the maintenance costs that taxpayers must support.

Pilot Reconstruction

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood and wind protection codes. This was formerly known as "demo/rebuild." FEMA funding programs refer to this approach as "pilot reconstruction." It is still a pilot program, and not a regularly funded option.

Certain rules must be followed to qualify for federal funds for pilot reconstruction:

- Pilot reconstruction is only possible after it has been shown that acquisition or elevation are not feasible, based on the program's criteria.
- Funds are only available to people who owned the property at the time of the event for which funding is authorized.
- It must be demonstrated that the benefits exceed the costs.
- The new building must be elevated to the advisory base flood elevation.
- The new building must not exceed more than 10% of the old building's square footage.
- The new building must meet all flood and wind protection codes.
- There must be a deed restriction that states the owner will buy and keep a flood insurance policy.
- The maximum federal grant is 75% of the cost, up to $150,000. FEMA is developing a detailed list of eligible costs to ensure that disaster funds are not used to upgrade homes.

Local Implementation

Sutter County has had experience with acquisition, demolition, or elevation to protect buildings from flooding, including acquiring repetitive loss properties. The County has received grants from FEMA to manage these programs. Live Oak and Yuba City have had no repetitive loss properties.

CRS Credit

The CRS provides the most credit points for acquisition and relocation, because this measure permanently removes insurable buildings from the floodplain. The CRS credits barriers and elevating existing buildings (Activity 530 - Flood Protection). Elevating a building above the flood level will also reduce the flood insurance premiums on that individual building. Because barriers are less secure than elevation, not as many points are provided. Higher scores are possible, but they are based on the number of buildings removed compared to the number remaining in the floodplain.

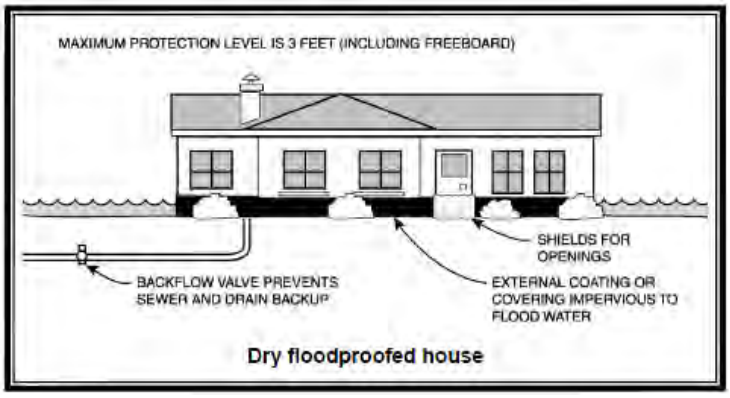
Retrofitting

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

Dry Floodproofing

Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

Figure C.6. Dry Floodproofing



Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.

Wet Floodproofing

The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Local Implementation

Dry flood proofing would be most appropriate for most of Sutter County, Live Oak, and Yuba City due to the current base flood elevations and the nature of flooding in the County (relatively low level flooding). There have been no elevation projects within the County, and the County is not aware of any structures that have been retrofitted from any other means and there are no records (permits) for them.

CRS Credit

Credit for dry and wet floodproofing and sewer backup protection is provided under Activity 530 - Retrofitting. Because these property protection measures are less secure than barriers and elevation, not as many points are provided.

Insurance

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, as long as the policy is in force, without requiring human intervention for the measure to work.

Private Property

Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the NFIP. Flood insurance coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area.

Figure C.7. Flood Insurance Coverage

Table 5-1 Example Flood Insurance Premiums

Building Exposure	Premium
In the Special Flood Hazard Area (AE Zone)	
Pre-FIRM ("subsidized") rate	$1,689
Post-FIRM (actuarial) rates	
2 feet above the base flood elevation	$440
1 foot above the base flood elevation	$643
At the base flood elevation	$1,167
1 foot below the base flood elevation	$4,379
Outside the Special Flood Hazard Area	$1,029

Premiums are for $150,000 in building coverage and $75,000 in contents coverage for a one story house with no basement and a $500 deductible, using the October 2008 *Flood Insurance Manual*. Premiums include the 5% Community Rating System discount in unincorporated St. Tammany Parish. Premiums are higher in the municipalities, which are not in the CRS.

Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Contents coverage can be purchased separately. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. Most people don't realize that there is a 30-day waiting period to purchase a flood insurance policy and there are limits on coverage.

Public Property

Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

Under Section 406(d) of the Stafford Act:

> "If an eligible insurable facility damaged by flooding is located in a [mapped floodplain] … and the facility is not covered (or is underinsured) by flood insurance on the date of such flooding, FEMA is required to reduce Federal disaster assistance by the maximum amount of insurance proceeds that would have been received had the buildings and contents been fully covered under a National Flood Insurance Program (NFIP) standard flood insurance policy. [Generally, the maximum amount of proceeds for a non-residential property is $500,000.]

[Communities] Need to:

- Identify all insurable facilities, and the type and amount of coverage (including deductibles and policy limits) for each. The anticipated insurance proceeds will be deducted from the total eligible damages to the facilities.
- Identify all facilities that have previously received Federal disaster assistance for which insurance was required. Determine if insurance has been maintained. A failure to maintain the required insurance for the hazard that caused the disaster will render ineligible for Public Assistance funding…
- [Communities] must obtain and maintain insurance to cover [their] facility - buildings, equipment, contents and vehicles - for the hazard that caused the damage in order to receive Public Assistance funding. Such coverage must, at a minimum, be in the amount of the eligible project costs. FEMA will not provide assistance for that facility in future disasters if the requirement to purchase insurance is not met. - FEMA Response and Recovery Directorate Policy No. 9580.3, August 23, 2000

In other words, the law expects public agencies to be fully insured as a condition of receiving federal disaster assistance.

Local Implementation

Data on private insurance policies are not available; however, flood insurance is available in Sutter County, Live Oak, and Yuba City. As of February 28, 2013, there were 4,875 policies in force in the unincorporated County, 101 policies in force in the City of Live Oak, and 2,018 policies in force in Yuba City. These policies are described in Section 4.3.6 of the base plan.

CRS Credit

There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage.

The Government's Role

Property protection measures are usually considered the responsibility of the property owner. However, local governments should be involved in all strategies that can reduce flood losses, especially acquisition and conversion of a site to public open space. There are various roles a municipality can play in encouraging and supporting implementation of these measures.

One of the first duties of a local government is to protect its own facilities. Fire stations, water treatment plants and other critical facilities should be a high priority for retrofitting projects and insurance coverage. Often public agencies discover after the disaster that their "all-hazard" insurance policies do not cover the property for the type of damage incurred. Flood insurance is even more important as a mitigation measure because of the Stafford Act provisions discussed in section 5.15.2 above.

Providing basic information to property owners is the first step in supporting property protection measures. Owners need general information on what can be done. They need to see examples, preferably from nearby. Public information activities that can promote and support property protection are covered in section 5.7.

Communities can help owners by helping to pay for a retrofitting project. Financial assistance can range from full funding of a project to helping residents find money from other programs. Some communities assume responsibility for sewer backups, street flooding, and other problems that arise from an inadequate public sewer or public drainage system. Less expensive community programs include low interest loans, forgivable low interest loans and rebates. A forgivable loan is one that does not need to be repaid if the owner does not sell the house for a specified period, such as five years. These approaches don't fully fund the project, but they cost the community less and they increase the owner's commitment to the flood protection project. Often, small amounts of money act as a catalyst to pique the owner's interest to get a self-protection project moving.

The more common outside funding sources are listed below. Unfortunately, the last three are only available after a disaster, not before, when damage could be prevented.

Pre-disaster funding sources:

- FEMA's Pre-Disaster Mitigation (PDM) grants
- FEMA's Flood Mitigation Assistance (FMA) grants
- Community Development Block Grants
- Conservation organizations, although generally these organizations prefer to purchase vacant land in natural areas, not properties with buildings on them.

Post-disaster funding sources:

- Insurance claims
- The NFIP's Increased Cost of Compliance. This provision increases a flood insurance claim payment to help pay for a flood protection project required by code as a condition to rebuild the flooded building. It can also be used to help pay the non-federal cost-share of an elevation project.

Post-disaster funding sources, federal disaster declaration needed

- FEMA's disaster assistance (for public properties). However, after a flood, the amount of assistance will be reduced by the amount of flood insurance that the public agency should be carrying on the property.
- Small Business Administration disaster loans (for non-governmental properties)
- FEMA's Hazard Mitigation Grant Program

Acquisition Agent

The community can be the focal point in an acquisition project. Most funding programs require a local public agency to sponsor the project. The local government could process the funding application, work with the owners, and provide some, or all, of the local share. In some cases, the local government would be the ultimate owner of the property, but in other cases another public agency could assume ownership and the attendant maintenance responsibilities.

Mandates

Mandates are considered a last resort if information and incentives are insufficient to convince a property owner to take protective actions. An example of a retrofitting mandate is the requirement that communities have to disconnect downspouts from the sanitary sewer line.

There is a mandate for improvements or repairs made to a building in the mapped floodplain. If the project equals or exceeds 50% of the value of the original building, it is considered a

"substantial improvement." The building must then be elevated or otherwise brought up to current flood protection codes.

Another possible mandate is to require less expensive hazard protection steps as a condition of a building permit. For example, many communities require upgraded electrical service as a condition of a home improvement project. If a person were to apply for a permit for electrical work, the community could require that the service box be moved above the base flood elevation or the installation of a separate ground fault interrupter circuits in the basement.

Local Implementation

As of the development of this plan, Sutter County, Live Oak, and Yuba City are not aware of any homes that have been retrofitted for flood protection or acquired and relocated to another site. Therefore, no credit has been applied for under CRS Activity 530 by any community in Sutter County.

CRS Credit

Except for public information programs, the CRS does not provide credit for efforts to fund, provide incentives, or mandate property protection measures. CRS credits are provided for the actual projects after they are completed. However, to participate in CRS, a community must certify that it has adequate flood insurance on all properties that have been required to be insured. The minimum requirement is to insure those properties in the mapped floodplain that have received federal aid, as specified by the Flood Disaster Protection Act of 1973.

Repetitive Loss Properties and Analysis

Repetitive loss properties deserve special attention because they are more prone to damage by natural hazards than any other properties in the County planning area. Further, protecting repetitive loss buildings is a priority with FEMA mitigation funding programs.

Unincorporated Sutter County's vulnerability to flooding is highlighted by its number of Repetitive Losses. According to the February 28, 2013 data from the state on NFIP communities, there are 9 repetitive loss (RL) buildings in the unincorporated County with 21 paid losses totaling $269,959.89. Of these RL buildings, 3 are in the A zones and 4 are in the B, C, or X zone. 1 of these structures has incurred four or more losses.

There are no repetitive loss properties in Live Oak or Yuba City.

Conclusions

- There are several ways to protect individual properties from damage by natural hazards. The advantages and disadvantages of each should be examined for each situation.
- Property owners can implement some property protection measures at little cost, especially for sites in areas of low hazards (e.g., shallow flooding, sewer backup, and thunderstorms).

For other measures, such as relocation and elevation, the owners may need financial assistance.

- Less than 30% of the buildings in the floodplains in Sutter County, Live Oak, and Yuba City are covered by flood insurance.
- Local government agencies can promote and support property protection measures through several activities, ranging from public information to financial incentives to full funding.
- It is unlikely that most government properties, including critical facilities, have any special measures to protect them from flooding.
- Property protection measures can protect the most damage-prone buildings in the County planning area for repetitive loss properties.

Recommendations

- Public education materials should be developed to explain property protection measures that can help owners reduce their exposure to damage by floods and the various types of insurance that are available.
- Because properties in floodplains will be damaged at some point, a special effort should be made to provide information and advice to floodplain property owners. Special attention should be given to repetitive loss and high hazard areas.
- All property protection projects should be voluntary. Other than state and federally mandated regulations, local incentives should be positive as much as possible, such as providing financial assistance.
- A FEMA Hazard Mitigation Assistance (HMA) Grant workshop focused on private firms and citizens should be conducted annually to showcase the assistance that FEMA (HMGP, PDM, FMA, RFC and SRL) provides and to encourage public participation.
- A standard checklist should be developed to evaluate a property's exposure to damage from floods. It should include a review of insurance coverage and identify where more information can be found on appropriate property protection measures. The checklist should be provided to each agency participating in this planning process and made available to the public.
- Sutter County, Live Oak, and Yuba City should evaluate its own properties using the standard checklist. A priority should be placed on determining critical facilities' vulnerability to damage and whether public properties are adequately insured.
- Sutter County, Live Oak, and Yuba City should protect their own publicly owned facilities with appropriate mitigation measures.

References

Disaster Mitigation Guide for Business and Industry, Federal Emergency Management Agency, FEMA-190, 1990.

Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings, FEMA, FEMA-259, 1995.

Flood Insurance Agent's Manual, FEMA, 2000.

Flood Proofing Techniques, Programs and References, U.S. Army Corps of Engineers National Flood Proofing Committee, 1991.

Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding. FEMA, FEMA-312, 1998.

Local Flood Proofing Programs, U.S. Army Corps of Engineers, 1994.

C.4.3 Natural Resource Protection

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater and snow melt in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. The regulatory programs are discussed in Section 5.3 Preventive Measures of the base plan. This section covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Seven areas are reviewed:

- Wetland protection
- Erosion and sedimentation control
- River restoration
- Best management practices
- Dumping regulations
- Urban forestry
- Farmland protection

Wetland Protection

Wetlands are often found in floodplains and depressional areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and they provide habitat for many species of fish, wildlife and plants.

Wetlands that are determined to be part of the waters of the United States are regulated by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (US EPA) under Section 404 of the Clean Water Act. Before a "404" permit is issued, the plans are reviewed by several agencies, including the Corps and the U.S. Fish and Wildlife Service. Each of these agencies must sign off on individual permits.

There are also nationwide permits that allow small projects that meet certain criteria to proceed without individual permits. Wetlands not included in the Corps' jurisdiction or that are addressed by a nationwide permit may be regulated against by local authorities.

If a permit is issued by the Corps, County, or one of the cities, the impact of the development is typically required to be mitigated. Wetland mitigation can include creation, restoration, enhancement or preservation of wetlands elsewhere. Wetland mitigation is often accomplished within the development site, however, mitigation is allowed off-site and sometimes in another watershed. The appropriate type of mitigation is addressed in each permit.

Some developers and government agencies have accomplished the required mitigation by buying into a wetland bank. Wetland banks are large wetlands created for the purpose of mitigation. The banks accept money to reimburse the owner for setting the land aside from development.

When a wetland is mitigated at a separate site there are drawbacks to consider. First, it takes many years for a new wetland to approach the same quality as an existing one. Second, a new wetland in a different location (especially if it is in a different watershed) will not have the same flood damage reduction benefits as the original one did.

Local Implementation

Sutter County, Live Oak, and Yuba City ordinances do not require any specific wetland protection measures.

CRS Credit

The CRS focuses on activities that directly affect flood damage to insurable buildings. While there is no credit for relying on the Corps of Engineers' 404 regulations, there is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations.

The CRS focuses on activities that directly affect flood damage to insurable buildings. While there is no credit for relying on the Corps of Engineers' 404 regulations, there is credit for maintaining water quality buffers that protect streams, rivers, lakes and shorelines in their natural condition or restoring them to an approximate natural state. Credit is also available for an approved habitat conservation plan.

Erosion and Sedimentation Control

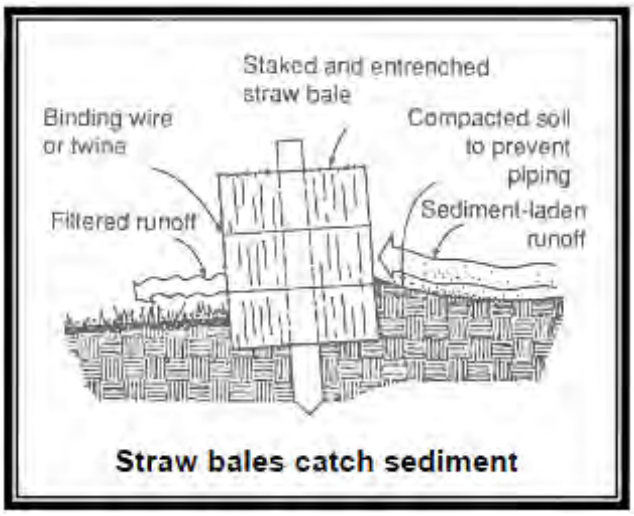
Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil.

Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands. When channels are constricted and flooding cannot deposit sediment in the bottomlands, even more sediment is left in the channels. The result is either clogged streams or increased dredging costs.

Not only are the drainage channels less able to perform their job, but the sediment in the water reduces light, oxygen and water quality, and often carries chemicals, heavy metals and other pollutants. Sediment has been identified by the US EPA as the nation's number one nonpoint source pollutant for aquatic life.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices.

Figure C.8. Erosion Control



If erosion occurs, other measures are used to capture sediment before it leaves the site. Silt fences, sediment traps and vegetated filter strips are commonly used to control sediment transport. Runoff from the site can be slowed down by terraces, contour strip farming, no-till farm practices, hay or straw bales, constructed wetlands, and impoundments (e.g., sediment basins and farm ponds). Slowing surface water runoff on the way to a drainage channel increases infiltration into the soil and reduces the volume of topsoil eroded from the site.

Erosion and sedimentation control regulations mandate that these types of practices be incorporated into construction plans. The most common approach is to require applicants for permits to submit an erosion and sediment control plan for the construction project. This allows the applicant to determine the best practices for the site.

Local Implementation

Sutter County, Live Oak, and Yuba City all have ordinances that include standards for erosion and sedimentation control.

CRS Credit

Local governments whose ordinances include erosion and sedimentation control provisions can qualify for up to 45 points for this measure.

River Restoration

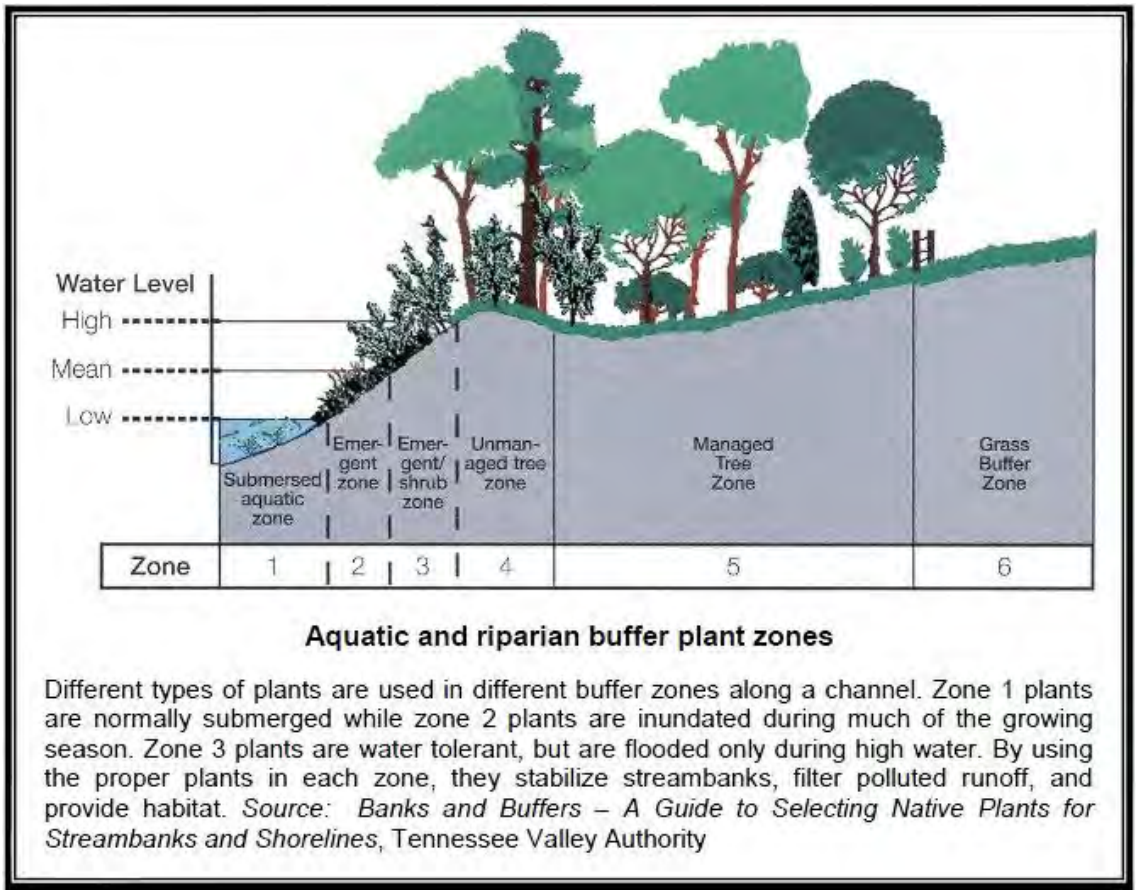
There is a growing movement that has several names, such as "stream conservation," "bioengineering," or "riparian corridor restoration." The objective of these approaches is to return streams, stream banks and adjacent land to a more natural condition, including the natural meanders. Another term is "ecological restoration," which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

- In all, restoring the right vegetation to a stream has the following advantages:
- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value
- Prevents property loss due to erosion

- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

Figure C.9. River Restoration Zones



Aquatic and riparian buffer plant zones

Different types of plants are used in different buffer zones along a channel. Zone 1 plants are normally submerged while zone 2 plants are inundated during much of the growing season. Zone 3 plants are water tolerant, but are flooded only during high water. By using the proper plants in each zone, they stabilize streambanks, filter polluted runoff, and provide habitat. *Source: Banks and Buffers – A Guide to Selecting Native Plants for Streambanks and Shorelines*, Tennessee Valley Authority

Local Implementation

Sutter County, Live Oak, and Yuba City do not yet implement these activities, but may consider adopting some of them in the future.

CRS Credit

The CRS focuses on activities that directly affect flood damage to insurable buildings. However, there are credits for preserving open space in its natural condition or restored to a state approximating its natural condition. There are also credits for channel setbacks, buffers and protecting shorelines.

Best Management Practices

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA and the California Department of Water Resources.

Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other 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.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple usages of drainage and storage facilities.

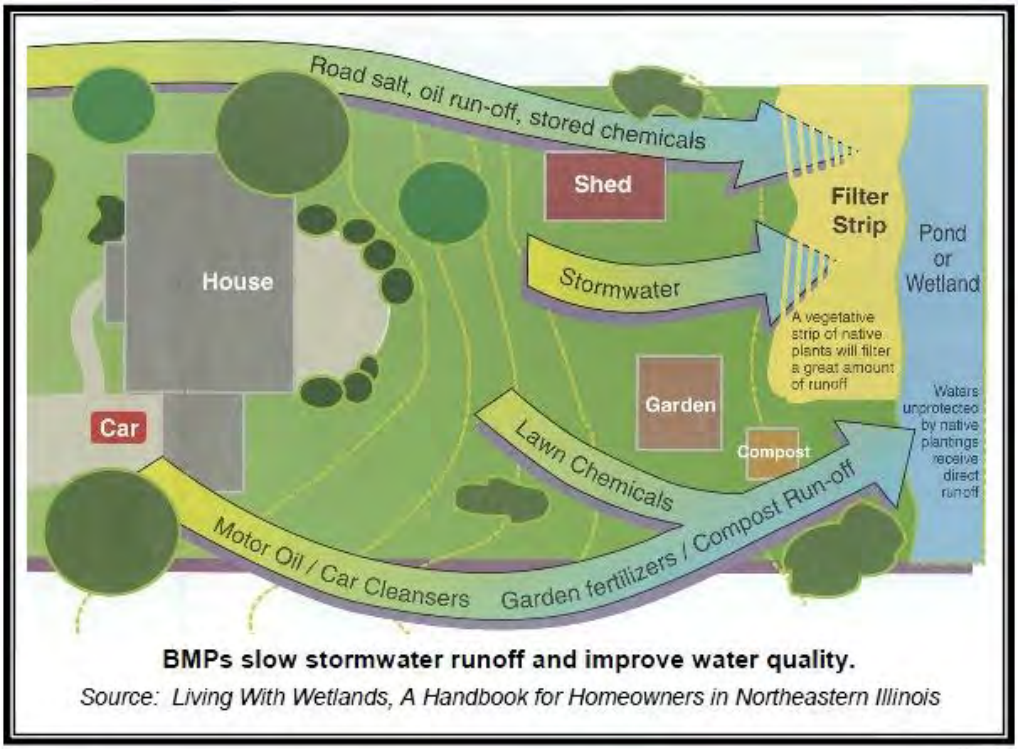
Local Implementation

Sutter County, Live Oak, and Yuba City participate in the National Pollutant Discharge Elimination System permitting program and require BMPs to minimize stormwater impacts.

CRS Credit

A community can receive CRS points if regulations require new developments to include in the design of their permanent stormwater management facilities appropriate BMPs that will improve the quality of surface waters.

Figure C.10. Stormwater Best Management Practices



BMPs slow stormwater runoff and improve water quality.

Source: Living With Wetlands, A Handbook for Homeowners in Northeastern Illinois

Dumping Regulations

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how regarding their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

Local Implementation

Sutter County, Live Oak, and Yuba City ordinances makes it unlawful for anyone to deposit waste, grass, weeds, brush or other refuse in any street, ditch or watercourse, or on others' property, or on public property. It is also illegal to dispose of certain wastes in public sewers.

CRS Credit

The CRS provides credit for enforcing and publicizing a regulation that prohibits dumping in the drainage system.

Farmland Protection

Farmland protection is quickly becoming an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can lead to additional stormwater runoff and emergency management difficulties.

Figure C.11. Floodplain Damages to Farmland

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States Department of Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land. Eligible land includes cropland, rangeland,

grassland, pastureland, or forest land that is part of an agricultural operation. Certain lands within historical or archaeological resources are also included.

The hazard mitigation benefits of farmland protection are similar to those of open space preservation, as discussed in section 5.3 Preventive Measures:

- Farmland is preserved for future generations,
- Farmland in the floodplain keeps damageable structures out of harm's way,
- Farmland keeps more stormwater on site and lets less stormwater runoff downstream,
- Rural economic stability and development is sustained,
- Ecosystems are maintain, restored or enhanced, and

The rural character and scenic beauty of the area is maintained.

Local Implementation

Sutter County currently requires farmland protection provisions under the Williamson Act. Live Oak and Yuba City currently do not require any farmland protection provisions.

CRS Credit

Credit is given for preserving open space in the floodplain, regardless of why it is being preserved. Credit is also provided for density zoning of floodprone areas.

Conclusions

- A hazard mitigation program can use resource protection programs to support protecting areas and natural features that can mitigate the impacts of natural hazards.
- Sutter County, Live Oak, and Yuba City ordinances prohibit illicit discharges into public sewers or onto public or private property.
- Preserving farmland in the floodplain will maintain open pace and prevent damage to homes, businesses, and other development.

Recommendations

- Sutter County, Live Oak, and Yuba City should consider adopting regulations that offer wetland protection.
- The public and decision makers should be informed about the hazard mitigation benefits of restoring rivers, wetlands and other natural areas. Restoration and protection techniques should be explained.
- Sutter County, Live Oak, and Yuba City should publicize its illicit discharge rules more widely.
- The public should be informed about the need to protect streams and wetlands from dumping and inappropriate development and the relevant codes and regulations.

References

Banks and Buffers - A Guide to Selecting Native Plants for Stream banks and Shorelines, Tennessee Valley Authority, 1997.

CRS Coordinator's Manual, Community Rating System, FEMA, 2007.

Stream Corridor Restoration Principles, Processes and Practices, Federal Interagency Stream Restoration Working Group, 1998.

C.4.4 Emergency Services Measures

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. At the state level, emergency services programs are coordinated by the California Emergency Management Agency (Cal EMA). Locally, emergency services are coordinated by the Sutter County Office of Emergency Management.

This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

Threat Recognition

The first step in responding to a flood, storm, or other natural hazard is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The National Weather Service (NWS) is the prime agency for detecting meteorological threats, such as tornadoes, thunderstorms and winter storms. Severe weather warnings are transmitted through NOAA's Weather Radio System. Federal agencies can only look at the large scale, e.g., whether conditions are appropriate for the formation of a thunderstorm. Local emergency managers can provide more site-specific and timely recognition by sending out NWS trained spotters to watch the skies when the Weather Service issues a watch or a warning.

Severe snow storms can often be forecast days in advance of the expected event, which allows time for warning and preparation. Though more difficult, the NWS can also forecast ice storms.

A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On larger rivers, this measuring and calculating is performed by the NWS, a part of the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Support for NOAA's efforts is provided by cooperating partners from state and local agencies.

Forecasts of expected river stages are made through the Advanced Hydrologic Prediction Service (AHPS) of the National Weather Service. Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. NOAA Weather Radio is considered by the federal government as the official source for weather information.

On smaller rivers, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

Local Implementation

Sutter County is a StormReady certified county. StormReady communities are better prepared to save lives from the onslaught of severe weather through advanced planning, education and awareness. Three USGS stream gages are located in the County. These allow for real time forecasting and monitoring. The County has an emergency operations plan.

CRS Credit

Credit can be received for using river flood stage predictions for the NWS's gages. The actual score is based on how much of the community's floodplain is affected by these systems. Potential CRS credit is possible under Activity 610 - Flood Warning Program and Response.

Warning

After the threat recognition system tells the emergency management office that a flood, tornado, thunderstorm, hurricane or other hazard is coming, the next step is to notify the public and staff of other agencies and critical facilities. More people can implement protection measures if warnings are early and include specific detail.

The NWS issues notices to the public using two levels of notification:

- Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.
- Warning: a flood, tornado, etc., has started or been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- Commercial or public radio or TV stations

- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- Email notifications

Multiple or redundant systems are most effective - if people do not hear one warning, they may still get the message from another part of the system. Each has advantages and disadvantages:

- Radio and television provide a lot of information, but people have to know when to turn them on. They are most appropriate for hazards that that develop over more than a day, such as a tropical storm, hurricane, or winter storm.
- NOAA Weather Radio can provide short messages of any impending weather hazard or emergency and advise people to turn on their televisions for more information, but not everyone has a Weather Radio.
- Outdoor warning sirens can reach many people quickly as long as they are outdoors. They do not reach people in tightly-insulated buildings or those around loud noise, such as at a factory, during a thunderstorm, or in air conditioned homes. They do not explain what hazard is coming, but people should know to turn on a radio or television when they hear the siren.
- Automated telephone notification services are also fast, but can be expensive and do not work when phone lines are down. Nor do they work for unlisted numbers, call screening services, or cellular service, unless people sign up for notifications.
- Where a threat has a longer lead time, going door-to-door and manual telephone trees can be effective.

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should have a public information aspect. Citizens should know the difference between a tornado warning (when they should seek shelter in a low spot), a flood warning (when they should stay out of low areas), and other appropriate warnings and responses.

StormReady

The National Weather Service established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center,

- Have more than one way to receive severe weather warnings and forecasts and to alert the public,
- Create a system that monitors weather conditions locally,
- Promote the importance of public readiness through community seminars, and
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

Being designated a StormReady community by the National Weather Service is a good measure of a community's emergency warning program for weather hazards. It is also credited by the CRS.

Local Implementation

Sutter County is a StormReady certified county. StormReady communities are better prepared to save lives from the onslaught of severe weather through advanced planning, education and awareness. Local police and fire departments are responsible for enforcing actions required during an emergency.

CRS Credit

Community Rating System points are based on the number and types of warning media that can reach the community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more points if there are additional measures, like telephone trees. Being designated as a StormReady community can provide additional points. These credits are in Activity 610 - Flood Warning Program and Response.

Response

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness),
- Closing streets or bridges (police or public works),
- Shutting off power to threatened areas (utility company),
- Passing out sand and sandbags (public works),
- Holding children at school or releasing children from school (school superintendent),
- Opening evacuation shelters (the American Red Cross),
- Monitoring water levels (public works), and
- Establishing security and other protection measures (police).

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

A flood stage forecast map shows areas that will be under water at various flood stages. Different flood levels are shown as color coded areas, so the emergency manager can quickly see what will be affected. Emergency management staff can identify the number of properties flooded, which roads will be under water, which critical facilities will be affected, and who to warn. With this information, an advance plan can be prepared that shows problem sites and determines what resources will be needed to respond to the predicted flood level.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

Local Implementation

Sutter County Office of Emergency Management serves as the Emergency Manager for the County. The City Manager serves as the Emergency Manager for Live Oak. The City Manager serves as the Emergency Manager for Yuba City. Response is provided cooperation with the County Sherriff, city police, and fire departments.

CRS Credit

The CRS program provides credit under Activity 610- Flood Warning for a warning system that effectively notifies residents of a flood and has procedures for testing and monitoring the system.

Evacuation and Shelter

According to Emergency Management: Principles and Practice, "The principle of evacuation is to move citizens from a place of relative danger to a place of relative safety, via a route that does not pose significant danger." There are six key ingredients to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., the handicapped, prisoners, hospital patients, and schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility.

Local Implementation

The County, in coordination with Live Oak and Yuba City, has established evacuation routes.

CRS Credit

Because it is primarily concerned with protecting insurable buildings, the CRS does not provide any special credit for evacuation or sheltering of people (minimal credit is given in Activity 510 - Floodplain Management for evacuation policies and procedures). It is assumed that the emergency response plan would include all necessary actions in response to a flood.

Post-Disaster Recovery and Mitigation

After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- Patrolling evacuated areas to prevent looting,
- Providing safe drinking water,
- Monitoring for diseases,
- Vaccinating residents for tetanus and other diseases,
- Clearing streets, and
- Cleaning up debris and garbage.

Throughout the recovery phase, everyone wants to get "back to normal." The problem is that "normal" means the way they were before the disaster, exposed to repeated damage from future disasters. There should be an effort to help prepare people and property for the next disaster. Such an effort would include:

- Public information activities to advise residents about mitigation measures they can incorporate into their reconstruction work,
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs,
- Identifying other mitigation measures that can lessen the impact of the next disaster,
- Acquiring substantially or repeatedly damaged properties from willing sellers,
- Planning for long-term mitigation activities, and
- Applying for post-disaster mitigation funds.

Regulating Reconstruction

Requiring permits for building repairs and conducting inspections are vital activities to ensure that damaged structures are safe for people to reenter and repair. There is a special requirement to do this in floodplains, regardless of the type of disaster or the cause of damage. The NFIP requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building's market value, the building must be retrofitted to meet the standards of a new building in the floodplain. In most cases, this means that a substantially damaged building must be elevated above the base flood elevation.

This requirement can be very difficult for understaffed and overworked offices following a disaster. However, if these activities are not carried out properly, not only does the community miss a tremendous opportunity to redevelop or clear out a hazardous area, it may be violating its obligations under the NFIP. In some areas, mutual aid agreements have been established so building inspectors from a community not affected by the disaster can work in the communities that were hit the hardest.

Local Implementation

The County Emergency Operations plan has post-disaster recovery policies in place for the County.

CRS Credit

The CRS does credit post-disaster mitigation procedures if the policies and procedures are incorporated into a flood mitigation or multi-hazard plan through Activity 510 - Floodplain Management Planning.

Conclusions

- There are several threat recognitions systems that can provide Sutter County, Yuba City, and Live Oak with advance notice of an impending emergency.
- Sutter County, Yuba City, and Live Oak depend on local media outlets, sirens, telephones and door-to-door notices to warn residents. These media should reach most people who need to know of a threat.
- Emergency management guidance could be very helpful when things happen quickly and for hazards that have predictable impacts, such as tornado, winter storms and flooding.

Recommendations

- Sutter County, Yuba City, and Live Oak should continue to work together to protect people before and after a disaster including an outreach program to promote each community’s warning system.

References

CRS Coordinator's Manual, FEMA, 2007.

CRS Credit for Flood Warning Programs, FEMA, 2006.

Emergency Management: Principles and Practice for Local Government, International City/County Management Association, 1991.

Flood Fight Operations, FEMA, 1995.

Guide for All-Hazard Emergency Operations Planning, FEMA SLG-101, 1996.

C.4.5 Flood Control Measures

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings,
- Many projects can be built without disrupting citizens' homes and businesses, and
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

Pros and Cons of Structural Flood Control Projects

- Advantages
  - They may provide the greatest amount of protection for land area used.
  - Because of land limitations, they may be the only practical solution in some circumstances.
  - They can incorporate other benefits into structural project design, such as water supply and recreational uses.
  - Regional detention may be more cost-efficient and effective than requiring numerous small detention basins.

- Disadvantages
- They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat.
- They require regular maintenance, which if neglected can have disastrous consequences.
- They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage.
- They can create a false sense of security, as people protected by a project often believe no flood can ever reach them.

– Although it may be unintended, in many circumstances they promote more intensive land use and development in the floodplain.

Levees and Floodwalls

Probably the best known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour. Key considerations when evaluating the use of a levee include:

- Design and permitting costs,
- Right of way acquisition,
- Removal of fill to compensate for the floodwater storage that will be displaced by the levee,
- Internal drainage of surface flows from the area inside the levee,
- Cost of construction,
- Cost of maintenance,
- Mitigation of adverse impacts to wetlands and other habitats,
- Loss of river access and views, and
- Creating a false sense of security, because while levees may reduce flood damage for smaller more frequent rain events, they may also overtop or breach in extreme flood events and subsequently create more flood damage than would have occurred without the levee.

Levees placed along the river or stream edge degrade the aquatic habitat and water quality of the stream. They also are more likely to push floodwater onto other properties upstream or downstream. To reduce environmental impacts and provide multiple use benefits, a setback levee is the best project design. The area inside a setback levee can provide open space for recreational purposes and provide access sites to the river or stream.

Floodwalls perform like levees except they are vertical-sided structures that require less surface area for construction. Floodwalls are constructed of steel sheet pile or reinforced concrete, which makes the expense of installation cost prohibitive in many circumstances. Floodwalls also degrade adjacent habitat and can displace erosive energy to unprotected areas of shoreline downstream.

Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

Figure C.12. Retention Pond

Retention pond

Regardless of size, reservoirs protect the development that is downstream from the reservoir site. Unlike levees and channel modifications, they do not have to be built close to or disrupt the area to be protected. Reservoirs are most efficient in deeper valleys where there is more room to store water, or on smaller rivers where there is less water to be stored.

In urban areas, some reservoirs are simply manmade holes, excavated to store floodwaters. Reservoirs in urban areas are typically constructed adjacent to streams (though usually outside of the floodplain). When built in the ground, there is no dam for these retention and detention basins and no dam failure hazard. Wet or dry basins can also serve multiple uses by doubling as parks or other open space uses.

There are several considerations when evaluating the use of reservoirs and detention:

- There is the threat of flooding the protected area should the reservoir's dam fail,
- There is a constant expense for the management and maintenance of the facility,
- They may fail to prevent floods that exceed their design levels,
- Sediment deposition may occur and reduce the storage capacity over time,
- They can impact water quality as they are known to affect temperature, dissolved oxygen and nitrogen, and nutrient levels, and

- If not designed correctly, in-stream reservoirs may cause backwater flooding problems upstream

Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

Figure C.13. Diversion

Diversions are limited by topography; they will not work in some areas. Unless the receiving water body is relatively close to the floodprone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive.

Dredging

Dredging is often viewed as a form of conveyance improvement. However, it has the following problems:

- Given the large volume of water that comes downstream during a flood, removing a foot or two from the bottom of the channel will have little effect on flood heights.

- Dredging is often cost prohibitive because the dredged material must be disposed of somewhere.
- Unless in-stream or tributary erosion is corrected upstream, the dredged areas usually fill back in within a few years, and the process and the expense have to be repeated.
- If the channel has not been disturbed for many years, dredging will destroy the habitat that has developed.

Figure C.14. Dredging Activity

To protect the natural values of the stream, federal law requires a U.S. Army Corps of Engineers permit before dredging can proceed. This can be a lengthy process that requires a lot of advance planning and many safeguards to protect habitats, which adds to the cost of the project.

CRS Credit

Structural flood control projects that provide 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS in order to avoid duplicating the larger premium reduction provided by removing properties from the mapped floodplain.

The CRS credits smaller flood control projects that meet the following criteria:

- They must provide protection to at least the 25-year flood,
- They must meet certain environmental protection criteria,
- They must meet federal, state and local regulations, such as the Corps of Engineers' 404 permit and California Division of Dam Safety for dam safety rules, and

- They must meet certain maintenance requirements.

These criteria ensure that credited projects are well-planned and permitted. Any of the measures reviewed in this section would be recognized under Activity 530 - Flood Protection, although it would be very hard to qualify a dredging project. Credit points are based on the type of project, how many buildings are protected, and the level of flood protection provided.

Local Implementation

In coordination with California Department of Water Resources and the Sutter Butte Flood Control Agency, levees and drainage facilities are being brought to current standards of flood protection and prevention.

Conclusions

- The County, cities, and local districts have received funding for construction of a countywide drainage project that will move storm and flood waters more efficiently and reduced potential for overbank flooding.

Recommendations

- Sutter County, the cities, and special districts should implement the countywide drainage improvement project to reduce the potential from overbank flooding along the Feather and Sacramento Rivers.

References

CRS Coordinator's Manual, FEMA, 2007.

CRS Credit for Drainage System Maintenance, FEMA, 2006.

Kane County, IL Natural Hazards Mitigation Plan, January, 2009

C.4.6 Public Information Measures

A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, and businesses about hazards and ways to protect people and property from these hazards. These activities can motivate people to take the steps necessary to protect themselves and others.

Information can bring about voluntary mitigation activities at little or no cost to the government. Property owners mitigated their flooding problems long before government funding programs existed. The typical approach to delivering information involves two levels of activity. The first is to broadcast a short and simple version of the message to everyone potentially affected. The second level provides more detailed information to those who respond and want to learn more.

This chapter starts with activities that reach out to people and tell them to be advised of the hazards and some of the things they can do. It then covers additional sources of information for those who want to learn more. It ends with a general public information strategy.

Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Research has shown that outreach projects work. However, awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Press releases and story ideas may be all that's needed to gain their interest. After a flood in another community, people and the media become interested in their flood hazard and how to protect themselves and their property. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

Other approaches: Examples of other outreach projects include:

- Presentations at meetings of neighborhood, civic or business groups,
- Displays in public buildings or shopping malls,
- Signs in parks, along trails and on waterfronts that explain the natural features (such as the river) and their relation to the hazards (such as floods),
- Brochures available in municipal buildings and libraries, and
- Special meetings, workshops and seminars.

Local Implementation

Sutter County, Yuba City, and Live Oak have websites that provides flood protection information. Sutter County, Yuba City, and Live Oak provide direct mail to residents which include flood protection and property protection measures. Sutter County, Yuba City, and Live Oak also have flood materials placed in public locations.

CRS Credit

The Community Rating System provides credit for outreach projects which cover six flood-related topics. Credit is also available for producing flood response materials. Another way to achieve credit for outreach is for producing a plan for public information (PPI). A 40% bonus is applied to outreach credits which are included in a PPI.

Real Estate Disclosure

Many times after a flood or other natural disaster, people say they would have taken steps to protect themselves if they had known they had purchased a property exposed to a hazard. There are some federal and state requirements about such disclosures, but they have their limits.

Federal law: Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building whether the property is in a floodplain as shown on the Flood Insurance Rate Map. If so, flood insurance is required for buildings located within the floodplain if the mortgage or loan is federally insured. However, because this requirement has to be met only 10 days before closing, the applicant is often already committed to purchasing the property when he or she first learns of the flood hazard.

State law: State laws set standards for real estate sales and licensing of agents and brokers.

Local Implementation

Sutter County, Yuba City, and Live Oak receive credit for providing for the local real estate agents disclosure of flood hazards to prospective buyers. Credit is also provided for state and community regulations requiring disclosure of flood hazards.

CRS Credit

Communities in areas that have additional disclosure requirements are eligible for five points under the "Other disclosure requirements" as well as 10 points for the "Disclosure of other hazards."

Libraries and Websites

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They

provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for tornadoes and floods or a website about floods for children. The "FEMA for Kids" website teaches children how to protect their home and what to have in a family disaster kit.

Local Implementation

Sutter County, Yuba City, and Live Oak provide flood materials in public locations. Sutter County, Yuba City, and Live Oak also have extensive flood protection websites at:

- http://www.co.sutter.ca.us/doc/government/depts/cs/es/esmg/cs_es_prep_phase
- http://www.liveoakcity.org/index.php?option=com_content&view=article&id=277:community-rating-system-can-reduce-flood-insurance-rates-for-the-citizens-of-live-oak&catid=14
- http://www.yubacity.net/flood/

CRS Credit

The Community Rating System provides credit for having a variety of flood references in the local public library and additional credits for similar material included on municipal websites (Activity 350 - Flood Protection Information).

Technical Assistance

Hazard Information

Many benefits stem from providing map information to inquirers. Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

Communities can easily provide map information from FEMA's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never get wet.

Property Protection Assistance

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track.

- Building or public works department staffs can provide the following types of assistance:
- Visit properties and offer protection suggestions,
- Recommend or identify qualified or licensed contractors,
- Inspect homes for anchoring of roofing and the home to the foundation,
- Provide advice on protecting windows and garage doors from high winds, and
- Explain when building permits are needed for home improvements.

There is a concern that a local official might provide the wrong information and the community would be sued if a project failed. To counter this, there are guidelines for local programs and training on how to identify the right measures. FEMA conducts a free week-long course at its Emergency Management Institute on property protection measures for flooding. FEMA and the Corps of Engineers periodically conduct one- or two-day retrofitting workshops.

Local Implementation

FEMA floodplain maps are available on Sutter County's website, as described above. The County also responds to requests on whether a property is located in s Special Flood Hazard Area.

FEMA floodplain maps are available on Yuba City website, as described above. The County also responds to requests on whether a property is located in s Special Flood Hazard Area.

Live Oak does not have maps available on their site as of the creation of this Plan update.

CRS Credit

The Community Rating System provides points for providing map information to inquirers. Points are available for providing one-on-one flood protection assistance to residents and businesses and for making site visits. Both services must be publicized.

Public Information Program Strategy

A public information program strategy is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A strategy consists of the following parts, which are incorporated into this plan:

- The local flood hazard (discussed in Chapter 4 of this plan)

- The property protection measures appropriate for the flood hazard (discussed in Chapter 5 of this plan)
- Flood safety measures appropriate for the local situation (discussed in Chapter 5 of this plan)
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies (discussed in Chapter 5 of this plan)
- Goals for the community's public information program (discussed in Chapter 3 of this plan)
- The outreach projects that will be done each year to reach the goals (discussed in the Recommendations section of Chapter 5 of this plan)
- The process that will be followed to monitor and evaluate the projects (discussed in Chapter 8)

Figure C.15 illustrates several flood safety tips that can be used in an outreach campaign to better inform the public of the hazards associated with flooding.

Figure C.15. Flood Safety Tips for Outreach Campaign

Flood Safety

Pay attention to evacuation orders. Listen to local radio or TV stations for forecasts and emergency warnings. Know about evacuation routes and nearby shelters and have plans for all family members on how to evacuate and where to meet if you're split up during an emergency.

Do not drive through a flooded area. During a flood, more people drown in their cars than anywhere else. Don't drive around road barriers; the road or bridge may be washed out.

Do not walk through flowing water. Flash flooding is the leading cause of weather-related deaths in the U.S. Currents can be deceptive; 6 inches of moving water can knock you off your feet in a strong current. If you walk in standing water, use a stick to help you locate the ground.

Stay away from power lines and electrical wires. Electrical currents can travel through water. Report downed power lines to the police or sheriff by calling 911.

Have the power company turn off your electricity. Some appliances, like TV sets, keep electrical charges even after they've been unplugged. Don't use appliances or motors that have gotten wet unless they have been taken apart, cleaned and dried.

Look before you step. After a flood, the ground and floors are covered with debris like broken bottles and nails. Floors and stairs that are covered with mud can also be slippery.

Be alert for gas leaks. Use a flashlight to inspect damage. Don't smoke or use candles, lanterns, or open flames unless you know the gas has been shut off and the area has been ventilated.

Look out for animals that may have been flooded out of their homes and who may seek shelter in yours. Use a pole or stick to turn things over and scare away small animals.

Look before you step. After a flood, the ground and floors are covered with debris. Floors and stairs that have been covered with mud will be very slippery.

Carbon monoxide exhaust kills. Use a generator or other gasoline-powered machine outdoors. The same goes for camping stoves. Charcoal fumes are especially deadly – cook with charcoal outdoors.

Clean everything that got wet in the flood. Floodwaters have picked up sewage and chemicals from roads, farms, factories, and storage buildings. Spoiled food, and flooded cosmetics and medicines can be health hazards. When in doubt, throw it out.

Take care of yourself. Recovering from a flood is a big job. It is tough on both the body and the spirit and the effects a disaster has on you and your family may last a long time.

CRS Credit

The CRS provides up to 350 points for a Plan for Public Information (PPI)

Conclusions

- There are many ways that public information can be used so that people and businesses will be more aware of the hazards they face and how they can protect themselves.
- Libraries and websites are currently being used as public information tools in Waveland.
- The most important topics to cover in public information activities are:
  - Safety precautions for all types of hazards, but especially tornados, earthquakes, thunder storms, winter storms and floods.
  - Knowing where emergency evacuation shelters are in town.

  - Flood protection measures, including rules for new construction and insurance.
  - Keeping drainage ways clear and protection from local drainage problems.
  - Family and emergency preparedness measures.
  - What the County and cities are doing and sources of assistance.
  - Protecting water quality and wetlands and the benefits of open space.
- The most appropriate ways to spread this information are:
  - Websites and social media
  - Mailings to everyone, in utility bills or otherwise
  - News releases or newspaper articles
  - Newsletters
  - Displays, particularly at special events
  - Handouts, flyers and other materials, which can be distributed at special events and presentations

Recommendations

- The City of Live Oak could add a page on its website to promote flood safety information for all natural hazards.
- Sutter County, Live Oak, and Yuba City could create a Twitter account and use Facebook accounts to maximize the number of people reached with flood hazard and safety information.
- County and City staff should reach out to residents, civic organizations and faith-based organizations to help spread the word about flood hazards and safety measures.

References

Are You Ready? A Guide to Citizen Preparedness, FEMA, 2002.

CRS Coordinator's Manual, Community Rating System, FEMA, 2007.

CRS Credit for Outreach Projects, FEMA, 2006.

C.5 Mitigation Alternative Selection Criteria

The following criteria were used to select and prioritize proposed mitigation measures:

STAPLE/E

- Social-Does the measure treat people fairly? (different groups, different generations)
- Technical-Will it work? (Does it solve the problem? Is it feasible?)
- Administrative-Do you have the capacity to implement and manage project?

- Political-Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support?
- Legal-Does your organization have the authority to implement? Is it legal? Are there liability implications?
- Economic-Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?
- Environmental-Does it comply with environmental regulations?

Sustainable Disaster Recovery

- Quality of life
- Social equity
- Hazard mitigation
- Economic development
- Environmental protection/enhancement
- Community participation

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

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)?
- What is timing of available funding?
- What is visibility of project?
- Community credibility

Table C.2. Mitigation Actions from the 2007 Plan

Jurisdiction/Hazard/Action	Complete	Ongoing	Not Yet Started	Project in 2013 Update
Multi-Jurisdiction Actions				
Multi-Hazard Public Awareness Program				
Sutter Basin Feasibility Study and Improvements				
O'Banion Road DWR Pump Station Improvements				
Noxious Terrestrial Weed Control Project				
Aquatic Weed Elimination Project				
Sutter County				
Road Projects to Improve Right of Passage and to Decrease Localized Flooding				
Bypass Crossing @Sacramento Ave.				
Live Oak Canal Constriction Removal				
Bogue Road Flood Water Diversion Berm				
City of Live Oak				
Road Projects to Improve Right of Passage and to Decrease Localized Flooding				
Lift Pump Back Up Generator Improvements				
Yuba City				
Emergency Communications Improvements				
Various Street Improvements to Decrease Localized Flooding				
Low Lift Pump Access Road Improvements				
Relocation of Wastewater Effluent Discharge Ponds				
East and West Feather River Bank Stabilization				
Gilsizer Slough Weir at Bogue Road				
Comprehensive Flood Management Plan				
Implementation of Additional CRS Activities				
Floodplain Management Planning Outreach				
Fire Flow Improvements for Groundwater Regions 1, 2 and 3				
Gilsizer County Drainage District				
Revetment of Slough Channel/Headwalls at Road Crossing				
Levee District One				
Bank Erosion Repairs To Levees in Several Areas				
Star Bend Set Back Levee				
Relief Well Location (N. Star Bend)				
Reclamation District 70				
Pumping Plant Project				
Reclamation District 1001				
Unit 2 LB Yankee Slough Levee Repairs				
Feather River/Sacramento River Landslide Stability Berm				

Jurisdiction/Hazard/Action	Complete	Ongoing	Not Yet Started	Project in 2013 Update
North Levee of Natomas Cross Canal Repairs				
Infrastructure Improvements – District-wide and Main Pumping Facility				
Reclamation District 1500				
Karnak Pump Plant Renovation				
Reclamation District 1660				
Sutter By-Pass Project				

Table C.3. Sutter County Initial Prioritization Process

Responsible Jurisdiction/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	Public outreach: Education and Preparedness for all Hazards	Multi-hazard	Not included in voting
	Establish backup power sources/generators for critical facilities	Emergency Services/Multi-hazard	36
	Retrofit critical facilities for alternative power sources	Emergency Services/Multi-hazard	21
	Developed interactive Critical Facility data management and communication system	Emergency Services/Multi-hazard	11
	Response logistics planning, including coordination with private partners and non-public safety groups	Emergency Services/Multi-hazard	36
Yuba City	Enhance EOC Communications system -urban areas regional response -coordinate all agencies/school districts/ and others	Emergency Services/Multi-hazard	14
	Enhance current rapid notify system to include cell phone enhancements	Emergency Services/Multi-hazard	5
	Nixle System – to include text messaging	Emergency Services/Multi-hazard	3
	Evacuation Planning and Exercising	Dam Failure	4
	Establish program for Brown Water Use	Drought & Water Supply	6
	Conduct URM inventory	Earthquake	Not included in voting
	Continue ongoing inspection, maintenance, and repair programs	Erosion	6
	DWR Sacramento River Bank Erosion Program	Erosion	0
SBFCA	West Feather River Flood Control Project: 200-year level of protection for urban areas	Erosion, Flood & Levee Failure	61

Responsible Jurisdiction/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Cal EMA capability	Northern California Catastrophic Flood Response Plan (AR Scenario) -for all watershed, including Delta Region) -framework for all response plans	Flood & Levee Failure	8
Yuba City	200-year protection for sphere of influence areas -SW portion of town affected -Sutter By-Pass (J-levee, elevation projects)	Flood & Levee Failure	11
	Huncut River Gauges Improvements -to include flow in addition to levels	Emergency Response; Flood & Levee Failure	0
Yuba City	Low Lift pump station improvements in floodplains -underground electric -fuel to generator -ultimately relocate	Flood & Levee Failure	12
	Other Bridges (maintenance and repairs) (all CalTrans) -20 – at Meridian -99 at Nicolas -113 at Knights landing (2) -scouring issues	Flood & Levee Failure	0
	10th Street Repairs (FHWA) -scouring -evacuation route	Flood & Levee Failure	4
	Sutter Bypass (Flood System Repair Program (for YC sphere of influence) -Slurrywall to address seapage at 60 locations; project addresses primary locations -also addresses erosion -for more rural areas	Flood & Levee Failure	61
SBFCA	Feather River Regional Plan -plans for levee and flood repairs -looking at projects and funding mechanisms -SBFCA, Yuba City, Water Agencies, TRLIA	Flood & Levee Failure	36
	Mid-Upper Sacramento Plan	Flood & Levee Failure	21
	Mid Sacramento Plan	Flood & Levee Failure	50
	Acquisition project – RL properties	Flood & Levee Failure	0
Yuba City	Alternate disposal wastewater treatment for RL of pond	Flood & Levee Failure	0
All Jurisdictions	Implement various stormwater improvement projects for localized flooding -stormwater master plan -Gilsizer -urban areas	Flood & Levee Failure	22
Yuba City	Relocation of diffuser line	Flood & Levee Failure	0
Yuba City	Feather River Habitat Restoration	Flood & Levee Failure	0

Responsible Jurisdiction/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Yuba City	Feather River -open space/trails, north of 10th St. Bridge to Shanghai Bend	Flood & Levee Failure	0
Live Oak	Boat Ramp Area/Tisdale -cleanup/repairs/erosion	Flood & Levee Failure	0
Yuba City	5th St. Bridge Replacement -one of two access pts to hospital -scouring & liquefaction -evacuation route	Flood & Levee Failure	46
Multiple	Aquatic Weed Elimination Project	Marine Invasive Species	Not included in voting
Multiple	Terrestrial Weed Control Project	Invasive Species: Pests/Plant	Not included in voting
	Schools – pipe replacement projects	Extreme Cold Freeze	3
Live Oak	Enlarge water distribution system/Increase fire flows	Wildfire	0

Mitigation Action Status Summary Worksheet

Title of Project:

Progress to date:

INITIAL PRIORITIZATION INSTRUCTIONS

Connecting the Dots!

Our Team mitigation recommendations are listed 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

The blue dots are for medium priority

The green dots are for low priority

Place your dots on the recommendations, using the different colors to indicate your priority. You may use as many of your dots, of any color, on any recommendation --- or you may spread them out using as few of your dots as you wish. The dots will indicate the consensus of the team.

Use your list of criteria to help you make your determinations.

After the totals are counted, we will discuss them further to confirm or change any of the results as we see fit.

Mitigation Action Worksheet: New 2013 Projects

Instructions: Use this guide to record potential mitigation projects (1 page per project).

Mitigation Project Title:

Project Description:

Hazards Addressed:

Issue/Background:

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Responsible Office:

Priority (H, M, L):

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Schedule:

Appendix D REFERENCES

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Appendix E CRITICAL FACILITIES

Table E.1. Sutter County Planning Area – Critical Facility Detail Table

Type	Name	Address	Flood Zone	Fire Threat
Congregate Care Facility	Bev's Residential Care	10493 Live Oak Blvd	C	Urban Unzoned
Congregate Care Facility	Paul and Laura Hase Guest Home	2429 Ivy St	C	Urban Unzoned
Congregate Care Facility	River Valley Care Center	9000 Larkin Rd	C	Urban Unzoned
School	Valley Oak High School	2207 Pennington Rd	C	Urban Unzoned
School / Shelter	Live Oak High School	2351 Pennington Rd	C	Urban Unzoned
School / Shelter	Live Oak Middle School	2082 Pennington Rd	C	Urban Unzoned
School / Shelter	Luther	10123 Connecticut Ave	C	Urban Unzoned
Emergency Evacuation Shelter	Church Of The Nazarene	2727 Fir St.	C	Urban Unzoned
Fire Station	Live Oak		C	Urban Unzoned
Government Facility	Live Oak City Hall	9955 Live Oak Boulevard	C	Urban Unzoned
Government Facility	Live Oak Library	10321 Live Oak Boulevard	C	Urban Unzoned
Government Facility	Live Oak Post Office	2622 Gum Street	C	Urban Unzoned
Government Facility	Live Oak Schools District Office	2201 Pennington Rd	C	Urban Unzoned
Medical Health Facility	Peach Tree Live Oak Medical Clinic	9980 Live Oak Blvd	C	Urban Unzoned
Police	Live Oak Sub		C	Urban Unzoned
Storm Water Facility	Live Oak Storm Water Lift Station		C	Urban Unzoned
Storm Water Facility	Live Oak Storm Water Lift Station		C	Urban Unzoned
Storm Water Facility	Live Oak Storm Water Lift Station		C	Urban Unzoned
Waste Water Facility	Live Oak Sewage Lift Station		C	Urban Unzoned
Waste Water Facility	Live Oak Sewer Lift Station		C	Urban Unzoned
Waste Water Facility	Live Oak Sewer Lift Station		C	Urban Unzoned
Waste Water Facility	Live Oak Sewer Lift Station		C	Urban Unzoned
Waste Water Facility	Live Oak Sewer Lift Station		C	Non-Wildland/Non-Urban
Waste Water Treatment	Live Oak Waste Water Treatment Plant		C	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Water Supply	Live Oak Water Tank		C	Urban Unzoned
Water Supply	Live Oak Water Well		C	Urban Unzoned
Water Supply	Live Oak Water Well		C	Urban Unzoned
Water Supply	Live Oak Water Well		C	Urban Unzoned
Water Supply	Live Oak Water Well		C	Urban Unzoned
Water Supply	Live Oak Water Well		C	Urban Unzoned
Water Supply	Live Oak Water Well		C	Urban Unzoned
Adult Day Care	Creative Arts Center	732 Plumas St	C	Urban Unzoned
Adult Day Care	Easter Seals- Ace It III	1670 Sierra Ave	C	Urban Unzoned
Adult Day Care	Pride Industries	950 Tharp Rd	C	Urban Unzoned
Adult Day Care	The Bakery	903 Chestnut St	C	Urban Unzoned
Adult Day Care	W.I.S.E Program	935B Spiva Ave	C	Urban Unzoned
Assisted Living Facility	RCCA Colusa	2419 Colusa Hwy	X	Urban Unzoned
Assisted Living Facility	RCCA-Augusta Lane #1	1775 Augusta Ln	X	Urban Unzoned
Assisted Living Facility	RCCA-Augusta Lane #2	1948 Augusta Ln	X	Urban Unzoned
Assisted Living Facility	RCCA-River Oaks	499 River Oaks Dr	X	Urban Unzoned
Assisted Living Facility	RCCA-White Oaks	1805 White Oaks Dr	0.2% Annual Chance	Urban Unzoned
Assisted Living Facility	Wilfredo A Chico's Home	1583 Countryside Dr	X	Urban Unzoned
Congregate Care Facility	Alma Amaya's Family Home II	589 Bird St	C	Urban Unzoned
Congregate Care Facility	Chestnut Commons	911 Chestnut St	C	Urban Unzoned
Congregate Care Facility	Claudia S. Cook Home #2	1438 Franklin Rd	X	Urban Unzoned
Congregate Care Facility	Golden Acres Home Care II	2962 Jefferson Ave	X	Urban Unzoned
Congregate Care Facility	Golden Years	837 Allen Way	X	Urban Unzoned
Congregate Care Facility	Harvey Care Home	1144 Joseph St	X	Urban Unzoned
Congregate Care Facility	Independent Living Skills (I.L.S)	764 Cooper Ave	C	Urban Unzoned
Congregate Care Facility	Priorities, Inc	1535 Plumas Ct	C	Urban Unzoned
Congregate Care Facility	Rosewood Care Center	1547 Plumas St	C	Urban Unzoned
Congregate Care Facility	Summerfield Senior Care Center	1224 Plumas St	C	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Congregate Care Facility	Sutter Estates	1230 Plumas St	C	Urban Unzoned
Congregate Care Facility	The Courtyard	1240 Williams Way	C	Urban Unzoned
Congregate Care Facility	The Fountains	1260 Williams Way	C	Urban Unzoned
Congregate Care Facility	The Gardens	840 Washington Ave	C	Urban Unzoned
Congregate Care Facility	Willow Glen Care Center	1547 Plumas St	C	Urban Unzoned
Congregate Care Facility	Yuba City Care Center	1220 Plumas St	C	Urban Unzoned
Congregate Care Facility	Yuba City Manor	1880 Live Oak Blvd	C	Urban Unzoned
Congregate Care Facility	Yuba Skilled Nursing Center	521 Lorel Way	C	Urban Unzoned
Hospice	Fremont-Rideout Hospice	939 Live Oak Blvd	C	Urban Unzoned
Hospice	Sutter Medical Foundation	400 Plumas St	C	Urban Unzoned
School	Butte Vista	2195 Blevin Rd	X	Urban Unzoned
School	Child Development Programs	Bernard Dr	X	Urban Unzoned
School	Faith Christian	2620 Colusa Hwy	X	Urban Unzoned
School	Faith Christian High School	3105 Colusa Hwy	X	Urban Unzoned
School	Feather River Academy	256 Wilbur Ave	C	Urban Unzoned
School	First Baptist Academy	916 Plumas St	C	Urban Unzoned
School	First Lutheran	850 Cooper Ave	C	Urban Unzoned
School	Park Avenue	100 Morton St	C	Urban Unzoned
School	River Valley High School	801 El Margarita Rd	X	Non-Wildland/Non-Urban
School	Riverbend School	301 Stewart Rd	X	Non-Wildland/Non-Urban
School	Twin Rivers Charter	840 Cooper Avenue	C	Urban Unzoned
School	West Walton	1700 Camino Del Flores	X	Urban Unzoned
School / Shelter	Albert Powell High School	1875 Clark Ave	C	Urban Unzoned
School / Shelter	Andros Karperos	1666 Camino Del Flores	X	Urban Unzoned
School / Shelter	April Lane	800 April Ln	C	Urban Unzoned
School / Shelter	Bridge Street	500 Bridge St	C	Urban Unzoned
School / Shelter	Gray Avenue	808 Gray Ave	C	Urban Unzoned
School / Shelter	King Avenue	630 King Ave	C	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
School / Shelter	Lincoln	1582 Lincoln Rd	X	Urban Unzoned
School / Shelter	St. Isadore's Catholic School	200 Clark Ave	C	Urban Unzoned
School / Shelter	Tierrra Buena	1794 Villa Ave	X	Urban Unzoned
School / Shelter	Yuba City High School	850 B St	C	Urban Unzoned
Senior Center	Senior Center	777 Ainsley Avenue	C	Urban Unzoned
Bridge	Bridge Type: B - No.: 18C-0018		C	Urban Unzoned
Bridge	Bridge Type: B - No.: 18C-0023		C	Urban Unzoned
Bridge	Bridge Type: B - No.: 18C-0055		C	Urban Unzoned
Communications	AirTouch, Metro PCS @ 137' Permit: BP 14961 - Type: 185' TOWER		X by Levee	Urban Unzoned
Communications	Permit: UP 93-18 - Type:		X	Non-Wildland/Non-Urban
Communications	Verizon Wireless Permit: UP 00-10 - Type: 120' TOWER		X	Urban Unzoned
Corporation Yard	CORPORATION YARD	1185 MARKET STREET	C	Urban Unzoned
Emergency Evacuation Shelter	Church of Christ	1321 Peach Tree Lane	C	Urban Unzoned
Emergency Evacuation Shelter	Veterans Memorial Hall	1425 Veterans Memorial Cr	C	Urban Unzoned
Emergency Evacuation Shelter	YC Assembly Hall of Jehovah?s Witn	650 N. George Washington	X	Urban Unzoned
Emergency Evacuation Shelter	Yuba/Sutter Fairgrounds	442 Franklin Ave.	C	Urban Unzoned
Fire Station	Yuba City Fire		C	Urban Unzoned
Fire Station	Yuba City Fire		X	Urban Unzoned
Fire Station	Yuba City Fire		C	Urban Unzoned
Fire Station	Yuba City Fire		C	Urban Unzoned
Government Facility	Agricultural Department	142 Garden Highway	C	Urban Unzoned
Government Facility	Board Of Supervisors Chamber - Old Hall Of Records	466 2nd Street	C	Urban Unzoned
Government Facility	Central Services	275 Samuel Drive	C	Urban Unzoned
Government Facility	Child Support Services / Cal Works	543 Garden Highway	X	Urban Unzoned
Government Facility	Clerk Recorder	433 2nd Street	C	Urban Unzoned
Government Facility	Community Memorial Museum	1333 Butte House Road	X	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Government Facility	Courthouse East	463 2nd Street	C	Urban Unzoned
Government Facility	Courthouse West	446 2nd Street	C	Urban Unzoned
Government Facility	Department Of Motor Vehicles	1570 Poole Boulevard	C	Urban Unzoned
Government Facility	Economic Development	1227 Bridge Street	C	Urban Unzoned
Government Facility	Facilities Management	146 Garden Highway	C	Urban Unzoned
Government Facility	Family Law Information Center	430 Center Street	C	Urban Unzoned
Government Facility	Highway Patrol	1619 Poole Boulevard	X	Urban Unzoned
Government Facility	Information Technology	512 2nd Street	C	Urban Unzoned
Government Facility	Library	750 Forbes Avenue	C	Urban Unzoned
Government Facility	Probation	595 Boyd Street	C	Urban Unzoned
Government Facility	Public Defender	604 B Street Suite 2	C	Urban Unzoned
Government Facility	Rehabilitation Department	1237 B Live Oak Boulevard	C	Urban Unzoned
Government Facility	Social Security Administration	355 Percy Avenue	C	Urban Unzoned
Government Facility	Superintendent Of Schools	970 Klamath Lane	C	Non-Wildland/Non-Urban
Government Facility	Sutter County Administrative Offices / Assessor	1060 Civic Center Boulevard	C	Urban Unzoned
Government Facility	Sutter County Community Services / Public Works	1030 Civic Center Boulevard	C	Urban Unzoned
Government Facility	Sutter County Elections	1435 Veterans Memorial Circle	C	Urban Unzoned
Government Facility	Sutter County Public Health	1445 Veterans Memorial Circle	C	Urban Unzoned
Government Facility	Sutter County Superintendent Of Schools	970 Klamath Lane	C	Urban Unzoned
Government Facility	Usda Service Center	1521 Butte House Road	C	Urban Unzoned
Government Facility	Veterans Hall	1425 Veterans Memorial Circle	C	Urban Unzoned
Government Facility	Welfare	190 Garden Highway	C	Urban Unzoned
Government Facility	Welfare	539 Garden Highway, Suite C	X	Urban Unzoned
Government Facility	Yuba City Hall	1201 Civic Center Boulevard	C	Urban Unzoned
Government Facility	Yuba City Post Office	761 Plumas Street	C	Urban Unzoned
Government Facility	Yuba City Schools District Office	750 Palora Avenue	C	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Medical Health Facility	Ampla Children's Medical Center	931 Market St	C	Urban Unzoned
Medical Health Facility	Ampla Family Health Center	935 Market St	C	Urban Unzoned
Medical Health Facility	DaVita Yuba City Dialysis Center	1525 Plumas Ct	C	Urban Unzoned
Medical Health Facility	Endoscopy Center (North Valley GI)	870 Shasta St	C	Urban Unzoned
Medical Health Facility	Endoscopy Center-Sutter Medical Foundation	550 B St	C	Urban Unzoned
Medical Health Facility	Families First Health-Wellness	466 Del Norte Ave	C	Urban Unzoned
Medical Health Facility	Family Physicians, Inc	1233 Plumas St	X	Urban Unzoned
Medical Health Facility	Feather River Surgery Center	370 Del Norte Ave	C	Urban Unzoned
Medical Health Facility	Fremont Medical Center	970 Plumas St	C	Urban Unzoned
Medical Health Facility	Fremont-Rideout Home Health	939 Live Oak Blvd	C	Urban Unzoned
Medical Health Facility	Fremont-Rideout Urgent Care (Occupational Health)	1531 Plumas St	C	Urban Unzoned
Medical Health Facility	Interim HomeStyle Services	1557 Starr Dr	C	Urban Unzoned
Medical Health Facility	North Valley Orthopedic	370 Del Norte Ave	C	Urban Unzoned
Medical Health Facility	Planned Parenthood	430 Palora Ave	C	Urban Unzoned
Medical Health Facility	Regency Urgent Care	1429 Colusa Hwy	C	Urban Unzoned
Medical Health Facility	Richland Family Health Center	334 Samuel Dr	X	Urban Unzoned
Medical Health Facility	Sutter County Public Health-Clinical Services	1445 Veterans Memorial Cir	C	Urban Unzoned
Medical Health Facility	Sutter Medical Foundation	400 Plumas St	C	Urban Unzoned
Medical Health Facility	Sutter Medical Foundation	969 Plumas St	C	Urban Unzoned
Medical Health Facility	Sutter Medical Foundation	480 Plumas St	C	Urban Unzoned
Medical Health Facility	Sutter Medical Foundation	440 Plumas St	C	Urban Unzoned
Medical Health Facility	Sutter Medical Foundation	460 Plumas St	C	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Medical Health Facility	Sutter Medical Foundation	444 Plumas St	C	Urban Unzoned
Medical Health Facility	Sutter Mental Health	1965 Live Oak Blvd	C	Urban Unzoned
Medical Health Facility	Sutter North Feather Down Family Practice	1590 Poole Ave	C	Urban Unzoned
Medical Health Facility	Sutter Surgical Hospital-North Valley	455 Plumas St	C	Urban Unzoned
Medical Health Facility	Yuba Sutter Dialysis Center	2115 E Onstott Rd	C	Urban Unzoned
Police	Sheriffs Department		C	Urban Unzoned
Police	Yuba City PD		C	Urban Unzoned
Storm Water Facility	Yuba City Storm Lift Station		X	Urban Unzoned
Storm Water Facility	Yuba City Storm Lift Station		X by Levee	Urban Unzoned
Storm Water Facility	Yuba City Storm Lift Station		X	Urban Unzoned
Storm Water Facility	Yuba City Storm Lift Station		0.2% Annual Chance	Urban Unzoned
Storm Water Facility	Yuba City Storm Lift Station		0.2% Annual Chance	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Non-Wildland/Non-Urban
Waste Water Facility	Yuba City Sewer Lift Station		C	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		C	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		C	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Waste Water Facility	Yuba City Sewer Lift Station		0.2% Annual Chance	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Treatment	Yuba City Waste Water Treatment Plant		C	Urban Unzoned
Water Treatment	Yuba City Water Treatment Plant		C	Urban Unzoned
Hazardous Materials Facilities	All Seasons Tree & Turf	Yuba City 95991	C	Urban Unzoned
Hazardous Materials Facilities	California Cold Logistics	700 Jones St. Yuba City Ca, 95991	C	Urban Unzoned
Hazardous Materials Facilities	Clark Pest Control	Yuba City 95991	C	Urban Unzoned
Hazardous Materials Facilities	Epa Provco	Yuba City 95991	0.2% Annual Chance	Urban Unzoned
Hazardous Materials Facilities	Feather River Energy Center	302 Burns Dr. Yuba City Ca, 95991	0.2% Annual Chance	Urban Unzoned
Hazardous Materials Facilities	Greenleaf-2 Power Plant	875 N Walton Ave. Yuba City, Ca 95993	C	Urban Unzoned
Hazardous Materials Facilities	John Taylor Fert.	Yuba City 95993	X	Urban Unzoned
Hazardous Materials Facilities	Onstott Dusters	Yuba City 95992	C	Urban Unzoned
Hazardous Materials Facilities	Sutter Orchard Supply	Yuba City 95991	C	Urban Unzoned
Hazardous Materials Facilities	Sutter Yuba Mosquito Abatement	Yuba City 95991	X	Urban Unzoned
Hazardous Materials Facilities	Tractor Supply Co.	Yuba City 95993	C	Urban Unzoned
Hazardous Materials Facilities	United Agri Products	Yuba City 95991	X	Urban Unzoned
Hazardous Materials Facilities	Western Farm Services/Source One	Yuba City 95991	C	Urban Unzoned
Hazardous Materials Facilities	Wilbur Ellis Company	900 N George Washington Blvd. Yuba City, Ca 95993	X	Urban Unzoned
Hazardous Materials Facilities	Yuba City Energy Center	875-B N Walton Ave. Yuba City, Ca 95993	C	Urban Unzoned
Hazardous Materials Facilities	Yuba City Waste Water Treatment Plant	302 Burns Dr. Yuba City, Ca 95991	C	Urban Unzoned
Hazardous Materials Facilities	Yuba City Water Treatment Plant	701 Northgate Dr. Yuba City, Ca 95991	C	Urban Unzoned
Assisted Living Facility	Rhea Dodd Care Home	895 Wood Rd	X by Levee	Non-Wildland/Non-Urban
Congregate Care Facility	Emerald Oaks	2290 Forrest Ln	X	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Congregate Care Facility	Sun Garden Rest Home	3444 Elmer Ave	X	Non-Wildland/Non-Urban
School	Butte View Continuation Hs	2044 Elm St	X	Urban Unzoned
School	East Nicolaus High School	2454 Nicolaus Ave	0.2% Annual Chance	Urban Unzoned
School	Three Rivers High	2378 Nicolaus Ave	0.2% Annual Chance	Urban Unzoned
School / Shelter	Adventist Christian School	369 Harding Ave	X	Urban Unzoned
School / Shelter	Barry	1255 Barry Rd	0.2% Annual Chance	Urban Unzoned
School / Shelter	Brittan	2340 Pepper St	X	Urban Unzoned
School / Shelter	Browns	1248 Pacific Ave	1% Annual Chance	Non-Wildland/Non-Urban
School / Shelter	Central Gaither	8403 Bailey Rd	1% Annual Chance	Non-Wildland/Non-Urban
School / Shelter	Encinal	6484 Larkin Rd	X	Non-Wildland/Non-Urban
School / Shelter	Franklin	332 N Township Rd	X	Non-Wildland/Non-Urban
School / Shelter	Grace Christian Academy	1980 S Walton Ave	X	Urban Unzoned
School / Shelter	Lincrest	1400 Phillips Rd	X	Urban Unzoned
School / Shelter	Marcum-Illinois	2452 El Centro Blvd	1% Annual Chance	Moderate
School / Shelter	Meridian	15898 Central St	X by Levee	Non-Wildland/Non-Urban
School / Shelter	Nuestro	3934 Broadway Rd	X	Non-Wildland/Non-Urban
School / Shelter	Pleasant Grove	3075 Howsley Rd	1% Annual Chance	Non-Wildland/Non-Urban
School / Shelter	Robbins	Robbins Circle	X by Levee	Urban Unzoned
School / Shelter	Sutter Union High School	2665 Acacia St	X	Urban Unzoned
School / Shelter	Winship	4305 S Meridian Rd	X by Levee	Non-Wildland/Non-Urban
Airport	Sutter Co Airport		X	Urban Unzoned
Bridge	Bridge Type: B - No.: 18C-0001		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0009		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0010		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0012		1% Annual Chance	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Bridge	Bridge Type: B - No.: 18C-0024		X by Levee	Urban Unzoned
Bridge	Bridge Type: B - No.: 18C-0025		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0030		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0031		1% Annual Chance	Moderate
Bridge	Bridge Type: B - No.: 18C-0032		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0035		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0036		1% Annual Chance	Moderate
Bridge	Bridge Type: B - No.: 18C-0037		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0038		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0039		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0041		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0042		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0043		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0046		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0047		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0049		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0050		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0051		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0052		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0053		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0054		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0057		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0058		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0059		X by Levee	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Bridge	Bridge Type: B - No.: 18C-0061		1% Annual Chance	Moderate
Bridge	Bridge Type: B - No.: 18C-0062		1% Annual Chance	Moderate
Bridge	Bridge Type: B - No.: 18C-0064		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0065		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0066		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0067		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0068		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0069		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0070		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0071		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0072		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0073		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0074		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0075		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0077		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0078		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0079		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0080		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0081		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0082		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0084		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0085		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0086		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0087		1% Annual Chance	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Bridge	Bridge Type: B - No.: 18C-0088		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0089		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0090		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0091		1% Annual Chance	Moderate
Bridge	Bridge Type: B - No.: 18C-0092		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0093		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0094		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0095		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0097		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0098		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0099		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0100		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0101		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0102		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0103		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0104		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0105		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0106		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0107		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0109		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0110		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0111		1% Annual Chance	Moderate
Bridge	Bridge Type: B - No.: 18C-0112		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0113		1% Annual Chance	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Bridge	Bridge Type: B - No.: 18C-0114		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0115		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0116		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0117		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0118		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0119		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0120		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0121		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0123		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0124		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0125		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0126		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0127		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0128		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0129		X	Urban Unzoned
Bridge	Bridge Type: B - No.: 18C-0130		X	Urban Unzoned
Bridge	Bridge Type: B - No.: 18C-0132		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0133		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0134		1% Annual Chance	Moderate
Bridge	Bridge Type: B - No.: 18C-0135		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: B - No.: 18C-0137		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-001		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-002		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-003		1% Annual Chance	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Bridge	Bridge Type: C - No.: C-004		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-005		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-006		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-007		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-008		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-009		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-010		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-011		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-012		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-013		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-014		1% Annual Chance	Urban Unzoned
Bridge	Bridge Type: C - No.: C-015		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-016		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-017		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-018		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-019		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-020		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-021		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-022		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-023		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-024		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-025		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-026		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-027		X	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Bridge	Bridge Type: C - No.: C-028		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-029		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-030		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-031		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-032		1% Annual Chance	Moderate
Bridge	Bridge Type: C - No.: C-033		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-034		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-035		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-036		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-037		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-039		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-040		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-041		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-042		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-043		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-044		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-045		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-046		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-047		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-048		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-049		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-050		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-051		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-052		X	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Bridge	Bridge Type: C - No.: C-053		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-054		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-055		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-056		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-057		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-058		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-059		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-060		X	Moderate
Bridge	Bridge Type: C - No.: C-061		X	Moderate
Bridge	Bridge Type: C - No.: C-062		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-063		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-064		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-065		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-066		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-067		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-068		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-069		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-070		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-071		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-072		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-073		0.2% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-074		0.2% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-075		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-076		1% Annual Chance	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Bridge	Bridge Type: C - No.: C-077		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-078		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-079		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-080		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-081		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-082		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-083		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-084		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-085		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-086		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-087		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-088		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-089		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-090		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-091		X	Urban Unzoned
Bridge	Bridge Type: C - No.: C-092		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-093		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-094		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-095		X by Levee	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-096		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-097		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-098		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-099		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-100		X	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Bridge	Bridge Type: C - No.: C-101		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-102		X	Moderate
Bridge	Bridge Type: C - No.: C-103		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-104		X	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-105		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-106		1% Annual Chance	Non-Wildland/Non-Urban
Bridge	Bridge Type: C - No.: C-107		X by Levee	Non-Wildland/Non-Urban
Communications	AirTouch & AT&T Permit: UP 93-05 - Type: 235' TOWER		X by Levee	Non-Wildland/Non-Urban
Communications	AirTouch & Nextel Permit: UP 97-07 - Type: 115' MONOPOLE		1% Annual Chance	Non-Wildland/Non-Urban
Communications	AirTouch and MetroPCS @ 108' Permit: UP 98-01 - Type: 150' TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	AirTouch and Nextel Permit: UP 1636 - Type: 150' TOWER		1% Annual Chance	Moderate
Communications	AirTouch Permit: UP 92-10 - Type: 137' MONOPOLE		X	Moderate
Communications	AirTouch Permit: UP 96-31 - Type: 150' LATTICE TOWER		X by Levee	Non-Wildland/Non-Urban
Communications	AirTouch, Nextel, SBC Permit: BP 17693 - Type: 150' TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	American Tower Co. Permit: UP 00-05 - Type: 160' TOWER		X by Levee	Non-Wildland/Non-Urban
Communications	American Tower Corp. Permit: UP 00-04 - Type: 100' MONOPOLE		X	Non-Wildland/Non-Urban
Communications	American Tower Corp. Permit: UP 00-06 - Type: 140' LATTICE TOWER		X by Levee	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Communications	American Tower Permit: UP 01-23 - Type: 130' LATTICE TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	AT&T and Nextel Permit: UP 91-06 - Type: 150' TOWER		X by Levee	Non-Wildland/Non-Urban
Communications	AT&T and SBC Permit: UP 91-08 - Type: 150' TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	AT&T Permit: UP 91-02 - Type: 195' GUYED TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	AT&T Permit: UP 91-04 - Type: 190' GUYED TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	AT&T Permit: UP 96-10 - Type: 150' TOWER		X by Levee	Non-Wildland/Non-Urban
Communications	Cingular Wireless Permit: UP 01-07 - Type: 130' MONOPOLE		0.2% Annual Chance	Non-Wildland/Non-Urban
Communications	INACTIVE Permit: PRE-PERMIT - Type: MICROWAVE TOWER		X	Moderate
Communications	MCI Permit: UP 1325 - Type: 190' GUYED TOWER		0.2% Annual Chance	Non-Wildland/Non-Urban
Communications	Nextel and Metro PCS Permit: UP 97-16 - Type: 185' TOWER		X	Non-Wildland/Non-Urban
Communications	Nextel Permit: UP 00-20 - Type: 101' MONOPOLE		X by Levee	Non-Wildland/Non-Urban
Communications	Nextel Permit: UP 01-08 - Type: 180' MONOPOLE		X by Levee	Non-Wildland/Non-Urban
Communications	Nextel Permit: UP 96-09 - Type: 100' MONOPOLE		X by Levee	Urban Unzoned
Communications	Nextel Permit: UP 97-08 - Type: 90' TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	Nextel Permit: UP 97-10 - Type: 115' MONOPOLE		0.2% Annual Chance	Non-Wildland/Non-Urban
Communications	NO PERMIT ISSUED Permit: PG&E - Type: NO PERMIT		0.2% Annual Chance	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Communications	Permit: 04-013 - Type: PG&E POLE		X	Urban Unzoned
Communications	Permit: 05-008 - Type: 115' MONOPOLE		X by Levee	Urban Unzoned
Communications	Permit: 06-041 - Type: PG&E POLE		X	Urban Unzoned
Communications	Permit: BP 12465 - Type: 120' MONOPOLE		1% Annual Chance	Urban Unzoned
Communications	Permit: BP 23818 - Type: CO-LOCATION		1% Annual Chance	Non-Wildland/Non-Urban
Communications	Permit: BP 4940 - Type: 40' TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	Permit: KFBX - Type: RADIO ANTENNA		0.2% Annual Chance	Non-Wildland/Non-Urban
Communications	Permit: UP 1349 - Type: MULTIPLE TOWERS		X	Moderate
Communications	Permit: UP 1349 - Type: MULTIPLE TOWERS		X	Moderate
Communications	Permit: UP 92-14 - Type: RADIO ANTENNA		X	Non-Wildland/Non-Urban
Communications	Permit: UP 95-14 - Type: RADIO ANTENNA		X	Non-Wildland/Non-Urban
Communications	Permit: UP 99-05 - Type: RADIO ANTENNA		0.2% Annual Chance	Moderate
Communications	Permit: UP 99-33a - Type: 185' MONOPOLE		X	Non-Wildland/Non-Urban
Communications	RCS Wireless Permit: UP 99-22 - Type: 140' TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	SBA comm. RCS Wireless, Sprint PCS Permit: UP 00-12 - Type: 199' TOWER		1% Annual Chance	Non-Wildland/Non-Urban
Communications	Sprint PCS Permit: UP 99-26 - Type: 185' LATTICE TOWER		1% Annual Chance	Moderate
Communications	Verizon Wireless Permit: UP 01-04 - Type: 150' Lattice		1% Annual Chance	Non-Wildland/Non-Urban
Emergency Evacuation Shelter	Live Oak Church of the Brethren	1990 Archer Ave.	X	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Emergency Evacuation Shelter	Sutter United Methodist Church	7751 S. Butte Rd.	X	Urban Unzoned
Emergency Evacuation Shelter	Sutter Youth Organization	7740 Butte House Rd.	X	Urban Unzoned
Emergency Operations Center	Sutter County EOC		X	Urban Unzoned
Fire Station	East Nicolaus		1% Annual Chance	Moderate
Fire Station	East Nicolaus		1% Annual Chance	Non-Wildland/Non-Urban
Fire Station	Meridian		X by Levee	Urban Unzoned
Fire Station	Oswald Tudor		1% Annual Chance	Non-Wildland/Non-Urban
Fire Station	Oswald-Tudor		0.2% Annual Chance	Urban Unzoned
Fire Station	Pleasant Grove		X	Moderate
Fire Station	Pleasant Grove		1% Annual Chance	Urban Unzoned
Fire Station	Sutter		X	Urban Unzoned
Fire Station	Sutter Basin		X by Levee	Urban Unzoned
Fire Station	Sutter Basin		X by Levee	Urban Unzoned
Fire Station	Yuba City Fire		X	Non-Wildland/Non-Urban
Government Facility	Airport Operations	100 Airport Road	X	Urban Unzoned
Government Facility	Animal Control	102 2nd Street	X by Levee	Urban Unzoned
Government Facility	Library - Sutter Branch	2147 California Street	X	Urban Unzoned
Government Facility	Live Oak Sign Shop	3098 Acacia Ave	X	Moderate
Government Facility	Meridian Post Office	1041 Third Street	X by Levee	Urban Unzoned
Government Facility	Meridian Schools District Office	P.0. Box 160 Meridian	X by Levee	Non-Wildland/Non-Urban
Government Facility	Nicolaus Post Office	2900 Garden Highway	1% Annual Chance	Non-Wildland/Non-Urban
Government Facility	Pleasant Grove Post Office	3126 Howsley Road	1% Annual Chance	Urban Unzoned
Government Facility	Rio Oso Post Office	2156 Rio Oso Road	1% Annual Chance	Non-Wildland/Non-Urban
Government Facility	Robbins Post Office	4879 Del Monte Avenue	X by Levee	Urban Unzoned
Government Facility	Shop	2560 Pacific Ave	0.2% Annual Chance	Non-Wildland/Non-Urban
Government Facility	Sign Ship (Closed)	9001 Sawtelle Ave	1% Annual Chance	Non-Wildland/Non-Urban
Government Facility	Sutter Post Office	2209 California Street	X	Urban Unzoned
Medical Health Facility	Feather River Tribal Health Inc	1231 Plumas St	X	Urban Unzoned

Type	Name	Address	Flood Zone	Fire Threat
Paved Airstrip	Auburn Ravine		0.2% Annual Chance	Non-Wildland/Non-Urban
Paved Airstrip	Bob's Flying Service		X by Levee	Non-Wildland/Non-Urban
Paved Airstrip	Farm Air Flying Service		1% Annual Chance	Non-Wildland/Non-Urban
Paved Airstrip	Moe's Flying Service		1% Annual Chance	Non-Wildland/Non-Urban
Paved Airstrip	Private		1% Annual Chance	Non-Wildland/Non-Urban
Paved Airstrip	Siller		1% Annual Chance	Non-Wildland/Non-Urban
Paved Airstrip	Sutter Buttes Dusters		X	Non-Wildland/Non-Urban
Paved Airstrip	Tolles Flying Service		X by Levee	Non-Wildland/Non-Urban
Paved Airstrip	Van Dyke Shop		1% Annual Chance	Non-Wildland/Non-Urban
Paved Airstrip	Wagner Flying Service		X by Levee	Non-Wildland/Non-Urban
Seepage Water Facility	Yuba City Seepage Station		0.2% Annual Chance	Moderate
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Facility	Yuba City Sewer Lift Station		X	Urban Unzoned
Waste Water Treatment	Rio Ramaza Csd Waste Water Treatment		1% Annual Chance	Non-Wildland/Non-Urban
Waste Water Treatment	Robbins Wwd 1 Waste Water Treatment Plant		X by Levee	Non-Wildland/Non-Urban
Water Supply	E Nicolaus Mwc Water Well		1% Annual Chance	Urban Unzoned
Water Supply	Robbins Wwd 1 Water Well		X by Levee	Non-Wildland/Non-Urban
Water Supply	Robbins Wwd1 Water Well		X by Levee	Non-Wildland/Non-Urban
Water Supply	Sutter Co Water Well		1% Annual Chance	Non-Wildland/Non-Urban
Water Supply	Sutter Csd Water Tank		X	Moderate
Water Supply	Sutter Csd Water Well		X	Non-Wildland/Non-Urban
Water Supply	Sutter Csd Water Well		X	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Agriform Farm Supply	4036 Pleasant Grove Rd. Pleasant Grove, Ca 95668	0.2% Annual Chance	Non-Wildland/Non-Urban

Type	Name	Address	Flood Zone	Fire Threat
Hazardous Materials Facilities	Bear River Supply	218 Pleasant Grove Rd. Rio Oso, Ca 95674	1% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Bob's Flying Service	Knights Landing 95645	X by Levee	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Farm Air Flying Service	Sacramento 95837	1% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Growers Ag Service	2100 Everglade Yuba City, Ca 95993	1% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Harlan Howard Pest Control	Yuba City 95993	X	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Helena Chemical Company	6788 Colusa Hwy Yuba City, Ca 95993	X	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Lomo Cold Storage	6005 Live Oak Blvd. Live Oak, Ca 95993	X by Levee	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Moe's Crop Dusting	Marysville 95901	1% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Quadren Cryogenic Processing Ltd	2490 Kirksville Rd. Robbins, Ca	X by Levee	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Rafter V Ranch	Pleasant Grove 95668	0.2% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Robert Harper (Jones Living Trust)	Rio Oso 95674	1% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Scott's Ag Spray	Yuba City 95992	X	Non-Wildland/Non-Urban
Hazardous Materials Facilities	South Sutter Cold Storage	896 Obanion Rd. Yuba City, Ca 95993	1% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Sunrise Ag	Live Oak 95953	X	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Sunrise Dusters	Knights Landing 95645	X by Levee	Urban Unzoned
Hazardous Materials Facilities	Sutter Buttes Dusters	Live Oak 95953	X	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Sutter Energy Center	5029 S Township Rd. Yuba City, Ca 95993	1% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Sysco Food Services Of Sacremento	7062 Pacific Ave. Pleasant Grove, Ca 95668	1% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Tolle's Flying Service	Robbins 95676	X by Levee	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Tri-Cal, Inc.	Sutter 95982	X	Non-Wildland/Non-Urban
Hazardous Materials Facilities	Twin Cities Aviation	Yuba City 95991	X by Levee	Urban Unzoned
Hazardous Materials Facilities	Va Farms/Van Dyke Bros	Pleasant Grove 95668	0.2% Annual Chance	Non-Wildland/Non-Urban
Hazardous Materials Facilities	West Wheatland, Inc.	Yuba City 95991	1% Annual Chance	Non-Wildland/Non-Urban

Appendix F LOCALIZED FLOODING

Provided in this Appendix F is a list of roads that were either flooded in the winter of 2005-2006 or roads that flood every year. All of these samples take water on them with hard rains. The amount of damage or flooding that's occurs depends of course on the quantity flow of the runoff, these samples however are average of what will occur year to year.

Site #1 Sacramento Ave.

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site #2 Keys @ Natomas Levee Rd.

Photo courtesy of Sutter County Dept. of Public Works.

Site #3 Fifield Rd.

Low Water Crossing

Photo courtesy of Sutter County Dept. of Public Works.

Fifield Bridge

Photo courtesy of Sutter County Dept. of Public Works.

Site 5 Catlett Rd.

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site 6 & 7 Pleasant Grove Rd.

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site #8 Nicolaus Rd

Photo courtesy of Sutter County Dept. of Public Works.

Site 9 Hicks / Brewer Rds.

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site 10 Subaco Rd.

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site 11. Pennington Rd. @ Powell Rd.

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site 13 West Butte Rd. @ North Butte Rd.

Photo courtesy of Sutter County Dept. of Public Works.

Site 13 A West Butte Rd. (North of Pass Rd.)

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site 14 Kellogg Rd.

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site 15 Pass Rd. @ Kellogg Rd.

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site 16 Pass Rd

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site 17 Pass Rd. (West of North West Butte Rd.)

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

Site 18 West Butte Rd.. (South of Pass Rd.)

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

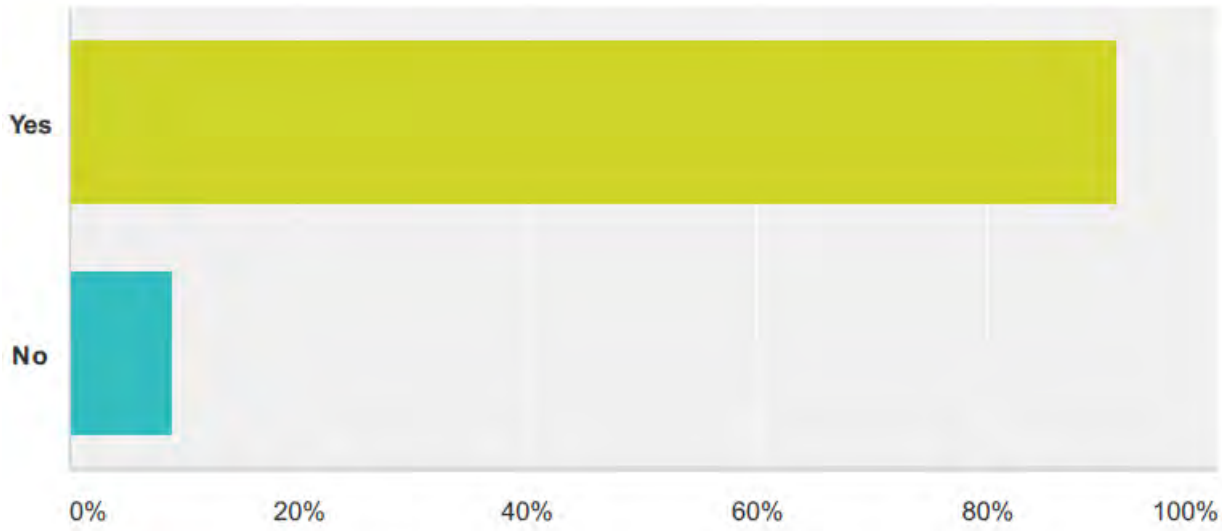
Hughes / Oswald Rds.

Photo courtesy of Sutter County Dept. of Public Works.

Photo courtesy of Sutter County Dept. of Public Works.

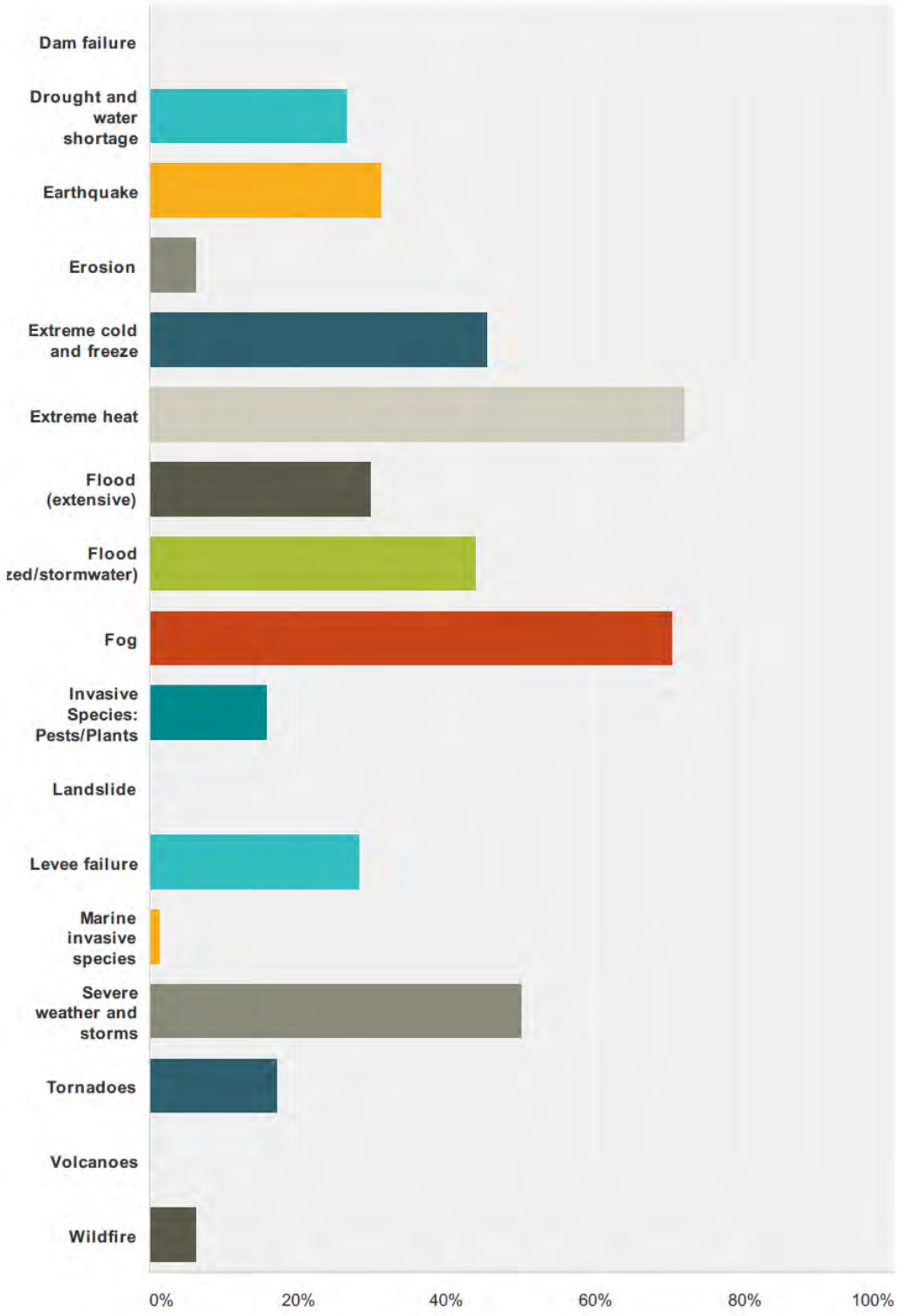
Q1 Are you a resident of Sutter County or the incorporated communities of Live Oak or Yuba City?

Answered: 67 Skipped: 1



Q2 Which of the following types of natural hazard events have you or someone in your household experienced within the County?

Answered: 64 Skipped: 4



Q3 How concerned are you about the impact of any of the above hazards on the community?

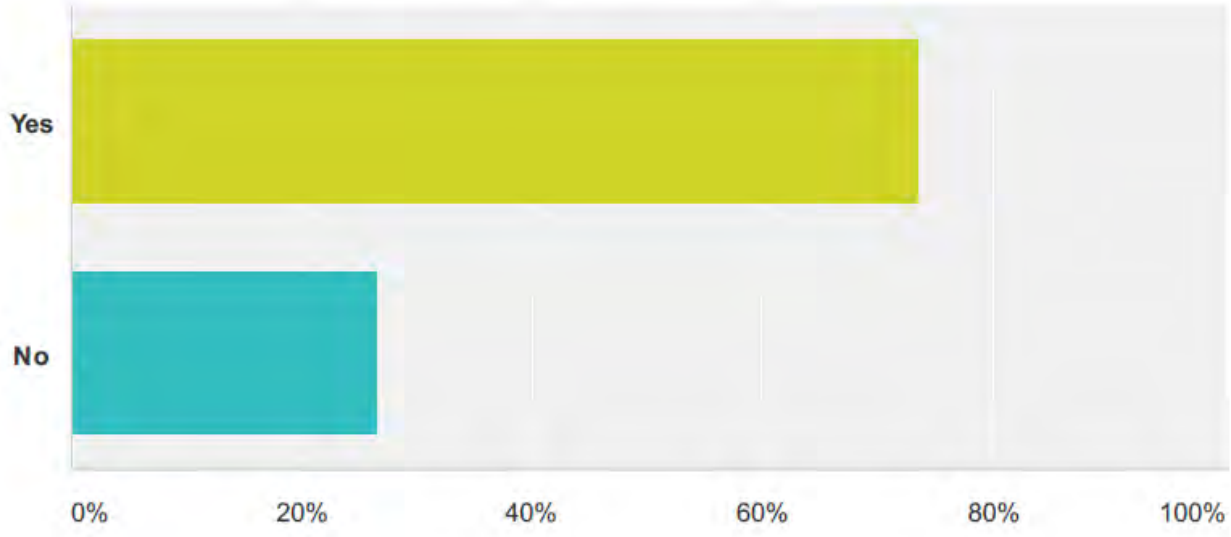
Answered: 49 Skipped: 19

#	Responses	Date
1	Very	8/19/2013 12:50 PM
2	Only flood concerns me, and the fact that Tierra Buena area has a massive amount of mosquitos and flies	8/16/2013 5:30 PM
3	Mild concern	8/15/2013 11:48 AM
4	Fairly concerned with flooding.	8/14/2013 6:02 PM
5	Wildfires and Levee failures are always a concern. I think we can work through anything else.	8/14/2013 4:10 PM
6	Some of the items, like fog or sever weather, cannot really be averted by government. I do have higher concern about the levees. Currently (Aug 14, 2013) we are having levees being rebuilt in Yuba City. I hope soon Live Oak will get this work done as well.	8/14/2013 1:21 PM
7	Floods and extreme weather and how it impacts people with disabilities.	8/13/2013 4:54 PM
8	Not very concerned because I think the County has plans in place to warn us.	8/13/2013 11:40 AM
9	I am concerned. The levee repairs will mitigate alot of my issues.	8/13/2013 9:48 AM
10	The threat of flooding is always a concern due to the history of the area.	8/13/2013 9:31 AM
11	I'm most concerned about flooding. I was in Yuba Co during the last two floods.	8/12/2013 7:44 PM
12	Very concerned about levee failure and flooding due to severe storms and their affect on area dams.	8/12/2013 4:59 PM
13	Very	8/12/2013 3:40 PM
14	very, especially floods and wildfires	8/12/2013 3:05 PM
15	very concerned	8/12/2013 2:28 PM
16	Levee failure remains a concern.	8/12/2013 12:57 PM
17	Storm drains in Live Oak in Many areas after a little bit of rain floods the streets.	8/12/2013 9:35 AM
18	Somewhat concerned about loss of property and belongings. Our Emergency notification for rising water is excellent.	8/11/2013 10:28 PM
19	Very concerned. The recent budget cut to the emergency services makes me believe the supervisors don't take emergency preparedness seriously and don't care about the public.	8/11/2013 7:43 AM
20	Not as much as I should be	8/10/2013 6:08 PM
21	Always a concern.	8/10/2013 5:00 PM
22	Very	8/10/2013 3:49 PM
23	Not very concerned, apart of the seasons around here....feels natural.	8/10/2013 3:40 PM
24	Very concerned	8/10/2013 12:15 PM
25	Extreme /severe weather prepardness.	8/10/2013 11:24 AM
26	very concerned about the levee systems.	8/10/2013 11:12 AM
27	barely	8/10/2013 10:28 AM
28	Very comcerned.	8/10/2013 9:51 AM
29	Somewhat concern	8/10/2013 6:10 AM
30	Very concerned about flood protection. We need very secure levees to protect us from the possibility of a flood event.	8/10/2013 3:17 AM
31	Not very. We're all set to load the horses into trailers that are already full of camping gear and Get Out Of Dodge.	8/9/2013 11:04 PM
32	Very concerned with flooding.	8/9/2013 10:32 PM
33	Very concerned about the flood issues	8/9/2013 9:11 PM

34	I'm very concerned about extensive flooding because of living close to a levee here. The summer was exceptionally hot and I worry it may just worsen as the years go by. Water shortage is a matter looming in the future, but not discussed.	8/9/2013 8:10 PM
35	only slightly for earthquake, flood. Fog more so.	8/9/2013 8:05 PM
36	They seem to be mostly normal weather conditions to me. Not overly concerned.	8/9/2013 5:18 PM
37	concerned about flooding	8/9/2013 5:10 PM
38	Concerned about hazard impact due to lack of planning by residents	8/9/2013 4:47 PM
39	People getting too laid back about levee failures. Even with the rebuilt levees in the next few years, we will still be at risk...just a lesser risk. Also concerned about getting funds for re-building Sutter Bypass levees!! Nobody talks about that!	8/9/2013 4:41 PM
40	concerned about the immediate impact, but I know that Sutter County has personnel to handle the issues	8/9/2013 4:35 PM
41	Very concerned about flood control	8/9/2013 4:30 PM
42	Concerned.	8/9/2013 4:19 PM
43	Not terribly. Drought is the biggest concern from the above list. Mosquitoes are my number one concern for quality of life.	8/9/2013 4:17 PM
44	Very concerned.	8/9/2013 4:13 PM
45	Not very concerned.	8/9/2013 4:11 PM
46	Very concerned about levee breakage.	8/9/2013 4:01 PM
47	I get concerned with the extreme temperatures as I am sensitive to them; the fog as it makes driving very difficult; storms as I worry about lengthy power outages and damage.	8/9/2013 3:49 PM
48	I am most concerned about flood and levee failure.	8/9/2013 3:47 PM
49	Very concerned about flooding	8/9/2013 3:43 PM

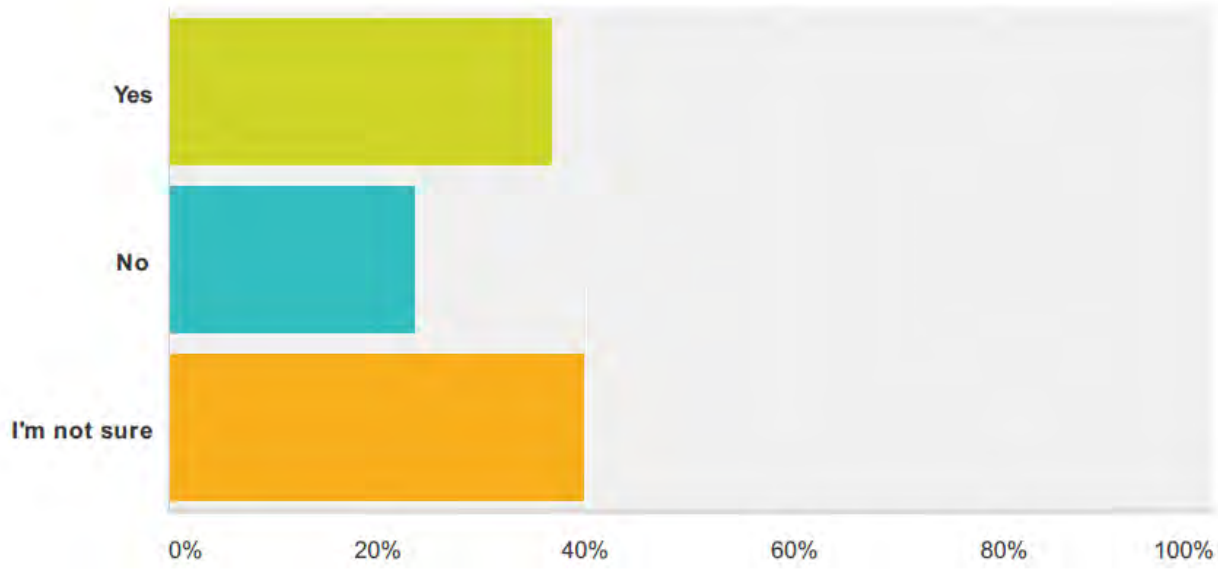
Q4 Do you know what a FEMA designated floodplain is?

Answered: 68 Skipped: 0



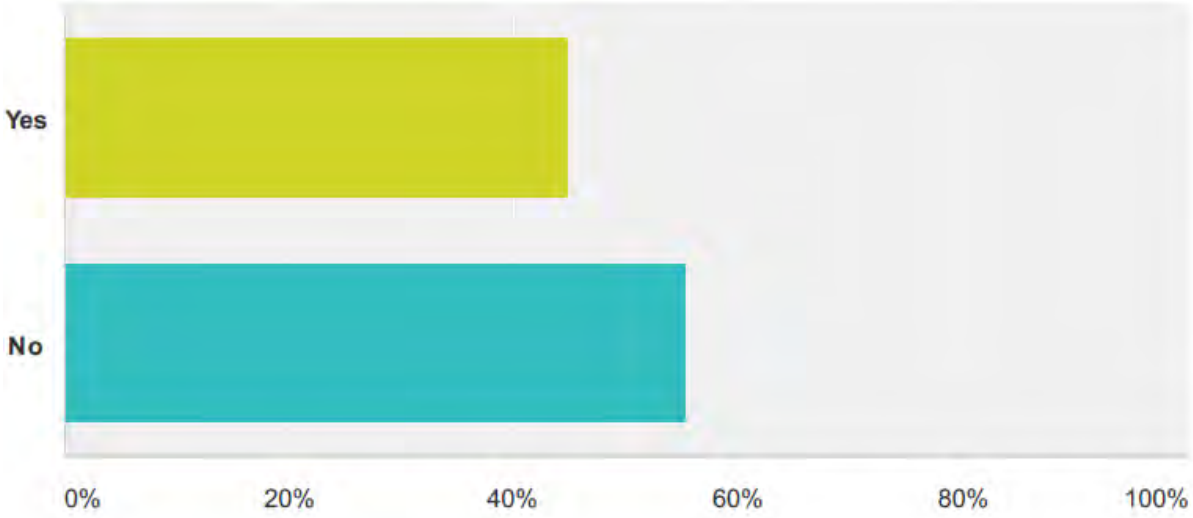
Q5 Is your home located in a FEMA designated floodplain?

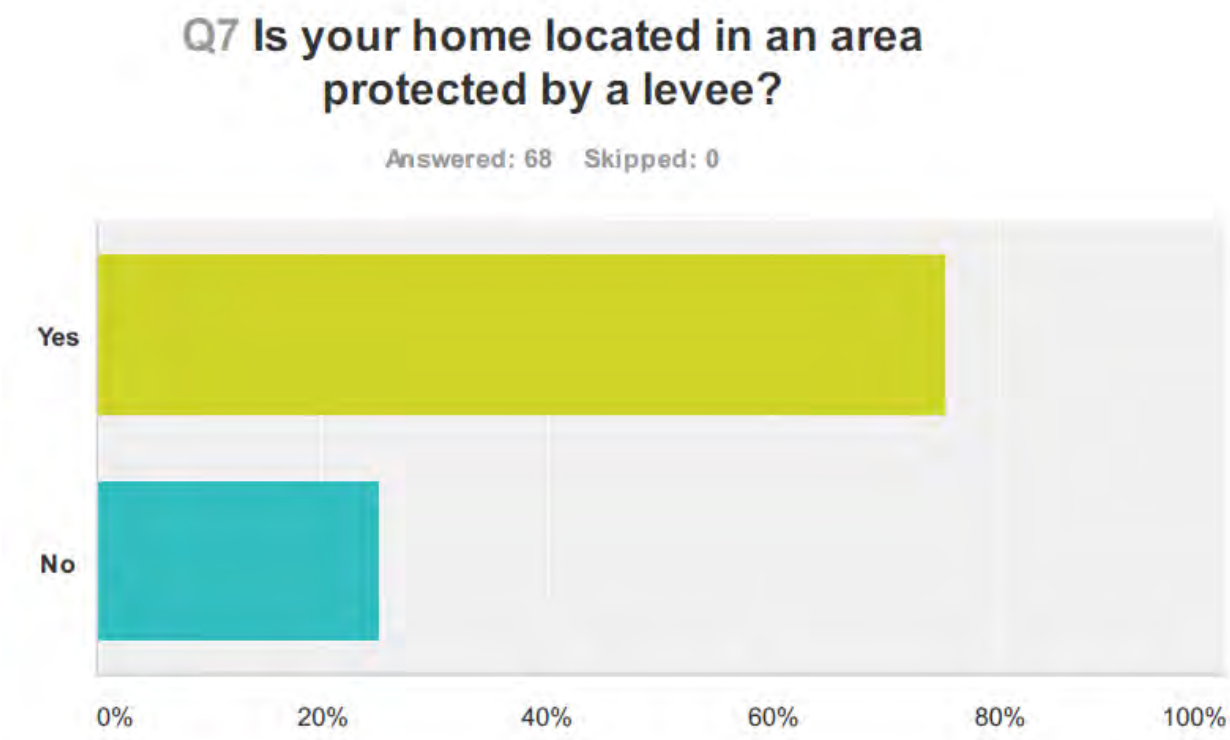
Answered: 68 Skipped: 0



Q6 Do you have flood insurance?

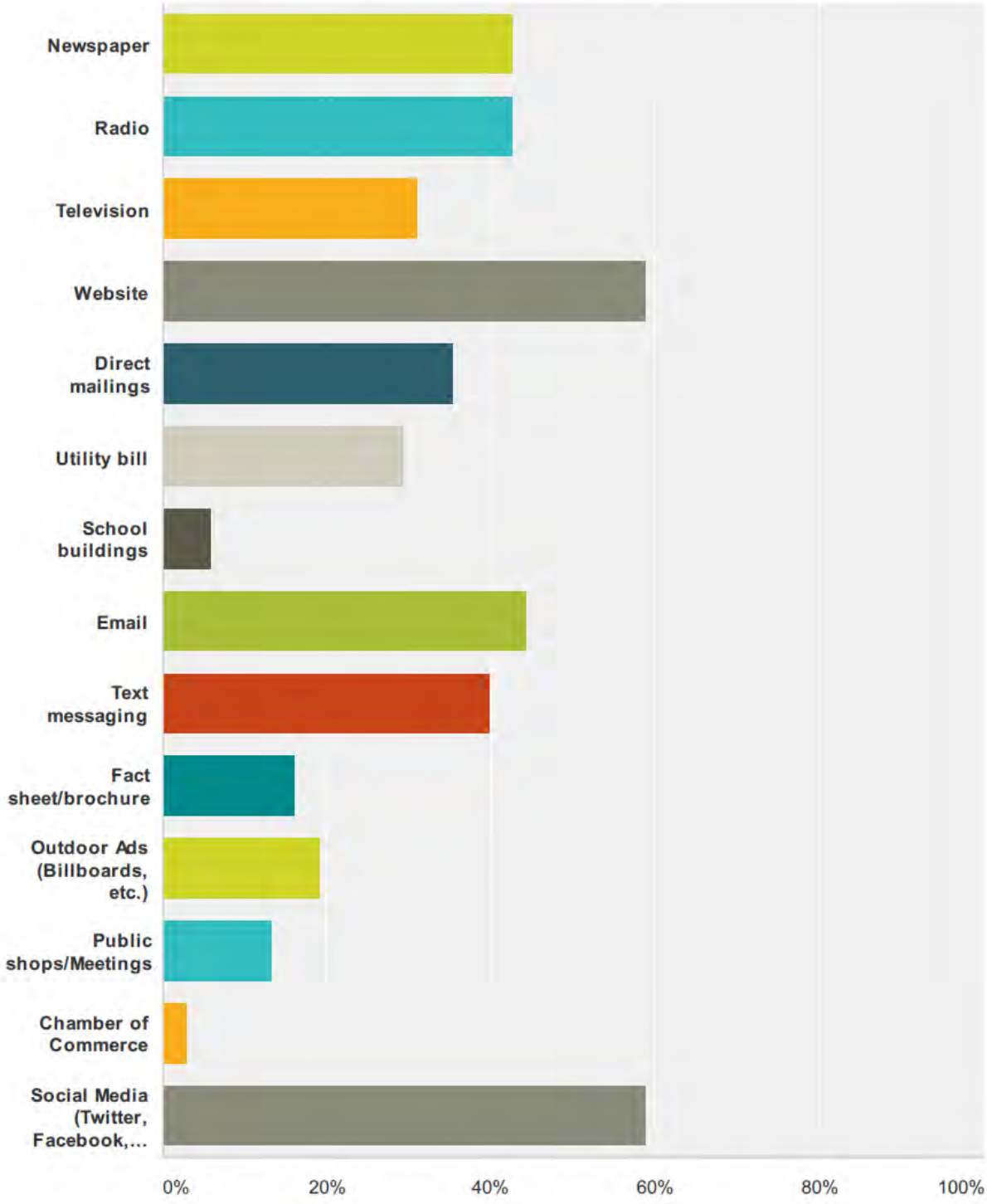
Answered: 67 Skipped: 1




Q7 Is your home located in an area protected by a levee?
Answered: 68 Skipped: 0
Yes
No
0%
20%
40%
60%
80%
100%

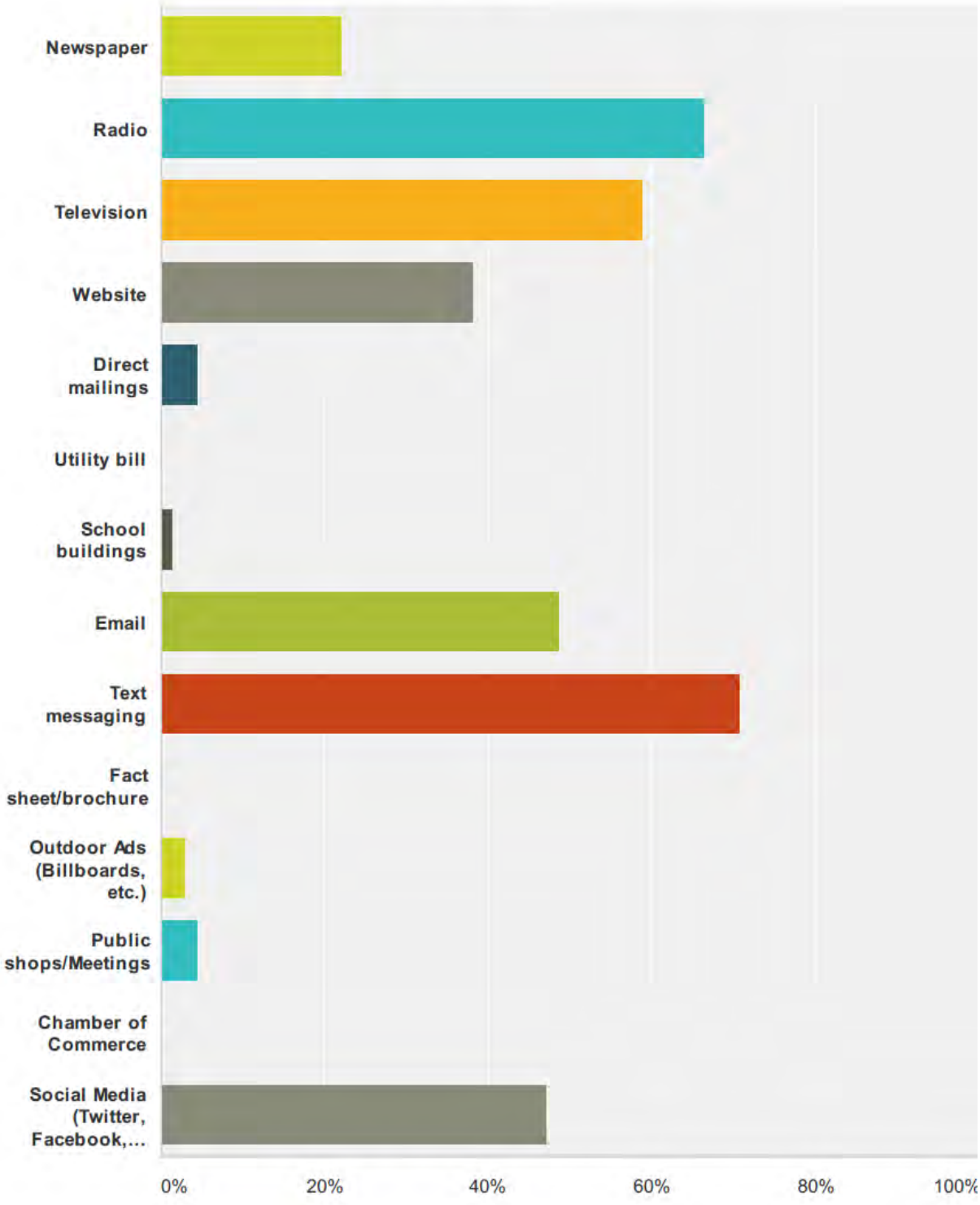
Q8 What is the most effective way for you to receive information about how to prepare for disasters? Please indicate all that apply

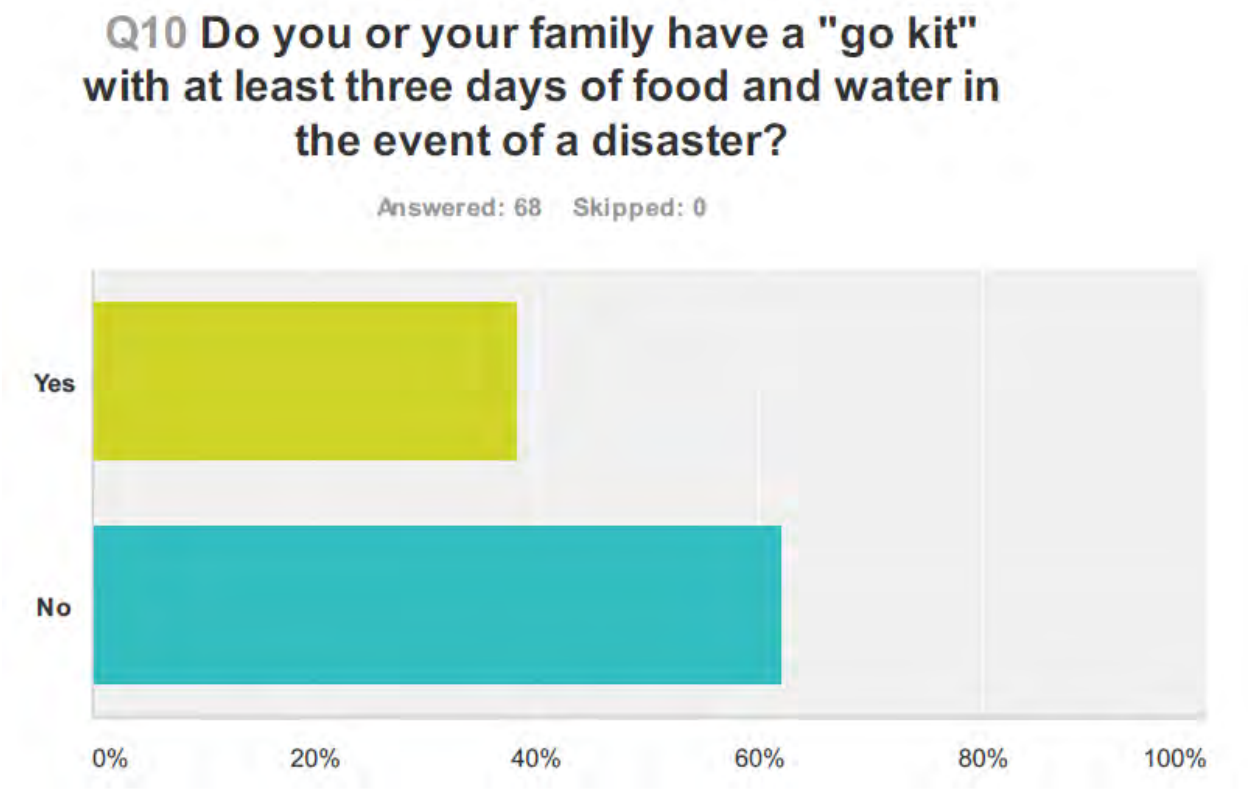
Answered: 68 Skipped: 0



Q9 What is the most effective way for you to receive information during a disaster? Please indicate all that apply

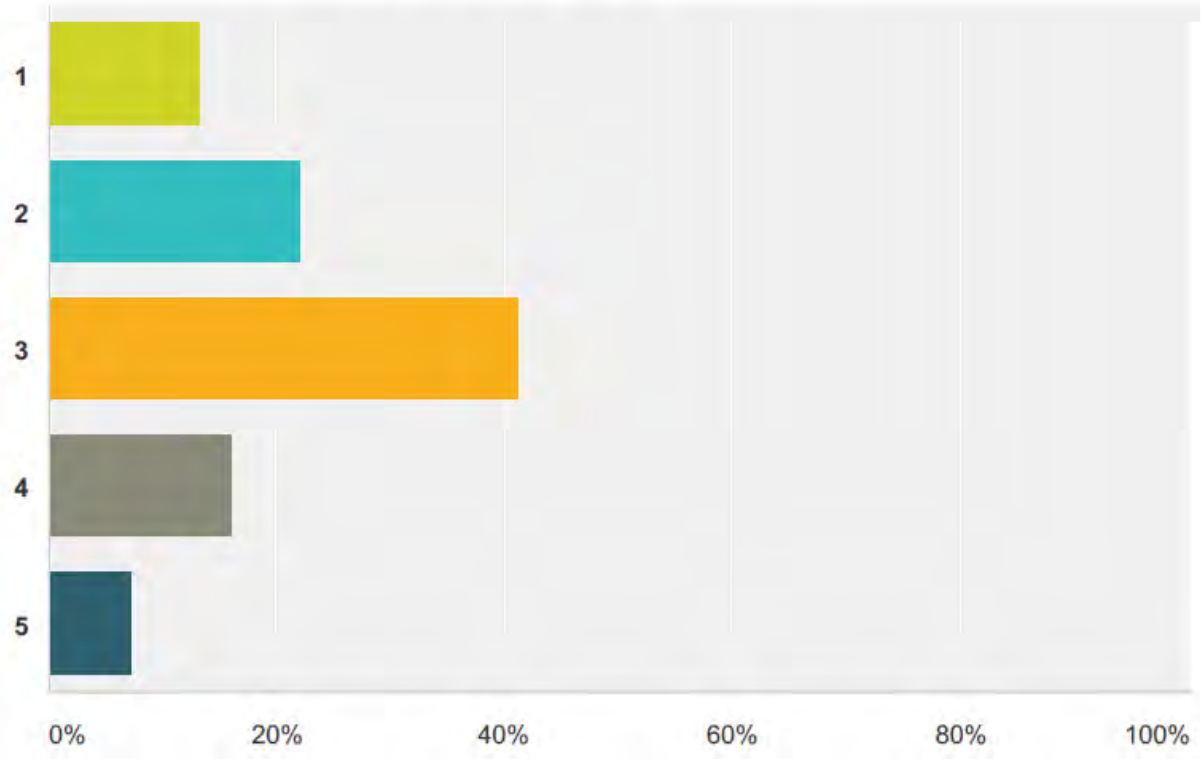
Answered: 68 Skipped: 0




Q10 Do you or your family have a "go kit" with at least three days of food and water in the event of a disaster?
Answered: 68 Skipped: 0
Yes
No
0%
20%
40%
60%
80%
100%

Q11 How prepared do you feel you and your household are for the possible impacts of natural hazard events likely to occur within Sutter County. Rank on a scale of 1 to 5, with 5 being the most prepared?

Answered: 68 Skipped: 0



Q12 Are there any methods you think should be considered to reduce hazard-related losses in Sutter County?

Answered: 28 Skipped: 40

#	Responses	Date
1	To ensure that people with functional needs are included in the input process.	8/13/2013 4:54 PM
2	Fix the levees now!	8/13/2013 4:41 PM
3	Flood is not a surprise event, it's hard to get people to prepare in advance. Flood warning stages should also have a "get ready to leave" continuum so people can prepare at the time of the impending flood.	8/13/2013 11:40 AM
4	Continued outreach to citizens on the need to prepare and be self sufficiant for 72 or more hours.	8/13/2013 9:48 AM
5	levees, clean water available, open roads for evacuation	8/12/2013 7:44 PM
6	resident should have knowledge of things like "to go kits", emergency shelters, keeping water on hand - most people don't know this type of information,	8/12/2013 3:43 PM
7	improve the levees	8/12/2013 2:28 PM
8	By educating the community in every language.	8/12/2013 9:35 AM
9	Education and outreach.	8/11/2013 7:43 AM
10	Always keep the levees 100 % ready.	8/10/2013 6:08 PM
11	Make sure levees are secure.	8/10/2013 5:00 PM
12	Better roadway access out	8/10/2013 3:49 PM
13	1. I answered this survey because my business is in Sutter Co, I live in Yuba Co and cross the bridge daily. 2. Bring back your Emergency Manager Full Time!! He cannot continue to operate FT on a PT basis, it does not work that way. Do not have a Fire or Police personnel do this, that is shifting $$'s to that dept that will then be lost and unaccounted for, this happened in the early 80' in many depts throughout CA. If Sutter Co wants to stay prepared and on the forefront of any disaster you must have at least one full time person doing continuing to keep abreast of the changes and updates for Sutter County.	8/10/2013 8:32 AM
14	Stop building in the floodplain. Make sure there are reliable transportation arteries out of town if a flood is imminent.	8/10/2013 3:33 AM
15	Restrict access to the levees so people don't cause damage to them, and upgrade them to provide 200 yr flood protection throughout the entire length.	8/10/2013 3:17 AM
16	Some type of reverse 911 for cell phones.	8/9/2013 11:04 PM
17	More training for county employees and local businesses.	8/9/2013 10:32 PM
18	I think the river should be dredged.	8/9/2013 9:11 PM
19	Educating public about emergency procedures, agencies, etc. Using the college (Yuba College at Sutter might be a valuable venue and resource for this). Offering a hazard/disaster workshop for example.	8/9/2013 8:10 PM
20	None that I can think of.	8/9/2013 5:18 PM
21	Stress the need for flood insurance continually!!	8/9/2013 4:41 PM
22	public education is the best way, but it's tough to get the information out in a way that reaches everyone. there are always people who don't pay attention or don't care.	8/9/2013 4:35 PM
23	none that hasn't already been discussed or proposed.	8/9/2013 4:30 PM
24	Have a plan and well trained team consisting of enough designated personnel to operate evacuation, communications (with citizens, state, and federal officials), and management should the need arise. Most likely flood, but also earthquake or act of terrorism.	8/9/2013 4:19 PM
25	Improved infrastructure, move electrical lines underground, updated sewer, water and gas lines, etc.	8/9/2013 4:13 PM
26	Keep fortifying our levees.	8/9/2013 4:11 PM
27	A valid escape plan out of town.	8/9/2013 4:01 PM
28	Encourage residents to check their trees to see if there are any that are in danger of falling, especially onto a power line, home, car, across a road, etc. If people check for these and have them removed in a timely manner, the number of injuries and outages can be reduced as well as the amount of damage, which can be costly depending on what is damaged.	8/9/2013 3:49 PM