

Multi-Hazard Mitigation Plan

4.2 Vulnerability Assessment

As the second part of the risk assessment process, the HMPC conducted a vulnerability assessment to describe the impact that each hazard identified in the preceding section would have upon the Sutter County Planning Area. The vulnerability assessment was conducted, based on the best available data and significance of the hazard. This assessment is an attempt to quantify assets at risk, by jurisdiction where possible, to further define populations, buildings, and infrastructure at risk to natural hazards. The vulnerability assessment for this Countywide Multi-Hazard Mitigation Plan followed the methodology described in the FEMA publication 386-2 “*Understanding Your Risks – Identifying Hazards and Estimating Losses*” (FEMA, 2002) and addressed steps 3 and 4, where data permits, of the following four-step process:

- (1) Identify hazards
- (2) Profile hazard events
- (3) **Inventory assets and**
- (4) **Estimate losses.**

The scope of the vulnerability assessment is to describe the risks to the county as a whole. Data from each jurisdiction was also evaluated and is integrated here in the jurisdictional elements, and noted where the risk differs for a particular jurisdiction across the Planning Area.

Further, at the beginning of each of the hazard-specific sections, an estimate of the vulnerability of the Sutter County Planning Area to each significant hazard, in addition to the estimate of risk or likelihood of future occurrence, is provided.

The DMA regulations require that the HMPC evaluate the risks associated with each of the hazards identified through the planning process. However, as previously described in Section 4.1, only those risks identified as significant are further evaluated in this section. The hazards evaluated further as part of this vulnerability assessment include, in alphabetical order:

- Agricultural Hazards
- Dam Failure
- Drought
- Earthquakes
- Floods
- Severe Weather

- Extreme Temperatures
- Winterstorms: Heavy Rains/Thunderstorms/Wind/Hail/Lightning
- Soil/Geologic Hazards
 - Erosion
- West Nile Virus
- Wildfires

SUTTER COUNTY PLANNING AREA TOTAL VULNERABILITY AND VALUES AT RISK

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

- Total Values at Risk
- Critical Facility Inventory
- Cultural and Natural Resource Inventory
- Development Trends

Total Values at Risk

The following data obtained from the Sutter County Assessor’s office is based on the Certified Roll Values for 2006. This data should be used as a guideline to overall values in the county, as the information has some limitations. The most significant limitation is created by proposition 13. Instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is likely low and does not reflect current market value of properties within the county. It is also important to note, in 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. The total 2006 Roll Values for Sutter County are provided in the following tables.

CITY OF YUBA CITY 2006 Roll Values							
Property Type	Units Improved	Total Improved Value	Total Improved Land Value	Units Unimproved	Total Unimproved Land Value	Grand Totals	
						Units	\$\$
Residential	15,893	\$ 2,364,181,182	\$ 720,568,875	35	\$ 4,198,380	15,928	\$ 3,088,948,437
Commercial	793	\$ 462,986,037	\$ 168,461,437	115	\$ 41,274,950	908	\$ 672,722,424
Industrial	305	\$ 98,995,131	\$ 30,322,762	88	\$ 21,859,440	393	\$ 151,177,333
Agricultural	40	\$ 4,851,612	\$ 4,525,987	14	\$ 3,168,316	54	\$ 12,545,915
Institutional	101	\$ 95,232,482	\$ 10,728,610	138	\$ 12,425,746	239	\$ 118,386,838
Other	48	\$ 6,090,314	\$ 2,115,466	945	\$ 56,343,411	993	\$ 64,549,191
Total	17,180	\$ 3,032,336,758	\$ 936,723,137	1,335	\$ 139,270,243	18,515	\$ 4,108,330,138

CITY OF LIVE OAK 2006 Roll Values							
Property Type	Units Improved	Total Improved Value	Total Improved Land Value	Units Unimproved	Total Unimproved Land Value	Grand Totals	
						Units	\$\$
Residential	1,790	\$ 177,821,695	\$ 65,617,918	-	\$ -	1,790	\$ 243,439,613
Commercial	61	\$ 13,866,546	\$ 3,362,066	21	\$ 734,075	82	\$ 17,962,687
Industrial	9	\$ 7,061,320	\$ 1,172,035	1	\$ 14,353	10	\$ 8,247,708
Agricultural	16	\$ 1,243,271	\$ 894,090	15	\$ 9,027,369	31	\$ 11,164,730
Institutional	29	\$ 5,577,812	\$ 748,192	46	\$ 341,800	75	\$ 6,667,804
Other	13	\$ 1,212,626	\$ 607,593	719	\$ 9,188,362	732	\$ 11,008,581
Total	1,918	\$ 206,783,270	\$ 72,401,894	802	\$ 19,305,959	2,720	\$ 298,491,123

UNINCORPORATED SUTTER COUNTY 2006 Roll Values							
Property Type	Units Improved	Total Improved Value	Total Improved Land Value	Units Unimproved	Total Unimproved Land Value	Grand Totals	
						Units	\$\$
Residential	4,801	\$ 534,420,864	\$ 189,438,365	8	\$ 158,065	4,809	\$ 724,017,294
Commercial	122	\$ 29,854,420	\$ 13,105,122	31	\$ 2,005,448	153	\$ 44,964,990
Industrial	129	\$ 430,677,636	\$ 22,699,038	64	\$ 2,834,424	193	\$ 456,211,098
Agricultural	3,688	\$ 354,782,090	\$ 607,557,286	2,595	\$ 420,964,402	6,283	\$ 1,383,303,778
Institutional	100	\$ 26,000,444	\$ 8,981,493	442	\$ 12,157,995	542	\$ 47,139,932
Other	52	\$ 2,476,133	\$ 2,543,252	607	\$ 9,463,670	659	\$ 14,483,055
Total	8,892	\$ 1,378,211,587	\$ 844,324,556	3,747	\$ 447,584,004	12,639	\$ 2,670,120,147

Combining the values of all properties within the incorporated and unincorporated portions of the county results in the following total values at risk:

SUTTER COUNTY 2006 Roll Values Total Values at Risk							
Property Type	Units Improved	Total Improved Value	Total Improved Land Value	Units Unimproved	Total Unimproved Land Value	Grand Totals	
						Units	\$\$
Yuba City	17,180	\$ 3,032,336,758	\$ 936,723,137	1,335	\$ 139,270,243	18,515	\$ 4,108,330,138
Live Oak	1,918	\$ 206,783,270	\$ 72,401,894	802	\$ 19,305,959	2,720	\$ 298,491,123
Unincorporated	8,892	\$ 1,378,211,587	\$ 844,324,556	3,747	\$ 447,584,004	12,639	\$ 2,670,120,147
Total	27,990	\$ 4,617,331,615	\$ 1,853,449,587	5,884	\$ 606,160,206	33,874	\$ 7,076,941,408

Critical Facility Inventory

Of significant concern with respect to any disaster event is the location of critical facilities within the Planning Area. Critical facilities are often defined as,

Those services and facilities essential during a major emergency, and that if damaged would result in severe consequences to public health and safety, or a facility which, if unusable or unreachable because of a major emergency, would seriously and adversely affect the health, safety, and welfare of the public. Critical facilities include, but are not limited to: (1) Schools and other publicly-owned facilities, (2) Hospitals, nursing homes and housing likely to have occupants who may not be sufficiently mobile to avoid injury or death during a major disaster, (3) Police stations, fire stations, vehicle and equipment storage facilities and emergency operations centers that are needed for response activities before, during and after an event, (4) Public and private utility facilities that are vital to maintaining or restoring normal services to damaged areas before, during and after an event, and (5) Structures or facilities that produce, use or store highly volatile, flammable, explosive, toxic and/or water-reactive materials.

The Sutter County General Plan Background Report, 1996 provides some guidance on the definition of critical facilities for Sutter County,

“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.).

Using mapped data from Sutter County GIS, an inventory of Critical Facilities is provided below:

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

Unincorporated Sutter County Critical Facilities

Owner	Critical Facility
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
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

Unincorporated Sutter County Critical Facilities

Owner	Critical Facility
Central Gaither School	Mass Care Center
Grace Baptist Church/Christian School	Mass Care Center
Lincest 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
Lincest Elementary School	School
Robbins Elementary School	School
Meridian School District	School
Grace Christian Academy And Pre-School	School
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 Critical Facilities

Owner	Critical Facility
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
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

Yuba City Critical Facilities

Owner	Critical Facility
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
Sewer Lift Station	Wastewater Treatment Facility
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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 Critical Facilities

Owner	Critical Facility
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.

Cultural and Natural Resource Inventory

In evaluating the vulnerability of a given area to disaster, it is important to inventory the cultural and natural resources specific to that area. Cultural and natural resources are important to identify pre-disaster for four reasons:

- First, the community may decide that these sites are worthy of a greater degree of protection than currently exists, due to their unique and irreplaceable nature;
- Second, should these resources be impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher;

- Third, the rules for repair, reconstruction, restoration, rehabilitation and/or replacement usually differ from the norm; and
- Fourth, natural resources, such as wetlands and riparian habitat, can have beneficial functions that contribute to the reduction of flood levels and damage.

Cultural Resources

To inventory the county's cultural resources, the HMPC collected information from the following sources:

- **National Register Inventory List:** a list of properties in Sutter County which have been designated National Historic properties via the National Register maintained by the National Park Service.
- **State Historic Landmarks List:** a list of historic properties which have been designated California State Historic Landmarks maintained by the California Office of Historic Preservation in conjunction with the California Department of Parks and Recreation.
- **Historic American Building Survey List:** a list of properties which were included in a survey of historic buildings in the US. This includes historic properties in Sutter County documented during this survey as obtained from the Library of Congress website.
- **Historic Spots in California:** a list of historic settlements and towns in Sutter County which are no longer in existence.

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. And, 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 an 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, the property must be evaluated under the guidelines set forth by CEQA and NEPA.

The following **National Register Historic Landmark** exists within Sutter County boundaries:

- **Live Oak Historic Commercial District** – Along Broadway between Pennington Road and Elm Street

The California Office of Historic Preservation identifies the following **State Historical Landmarks** in Sutter County:

- **No. 346 Site of Hock Farm** – This memorial is constructed of the original iron from the fort of Hock, the first non-Indian settlement in Sutter County. Established in 1841 by John Augustus Sutter, the fort and the settlement were located on the banks of the Feather River opposite this point. The Hock Farm was the first important agricultural project in this part of the state and Sutter planted grapes, pomegranates, fig trees, and the first peach tree orchard on the land as well as using it as a stock ranch.
Location: Plaque located on State Highway 99 at Messick Rd; Site located at 5320 Garden Highway, 7 miles south of Yuba City.

- **No. 929 Site of Propagation of the Thompson Seedless Grape** – William Thompson and his family settled here in 1863. In 1872 he sent to New York for three cuttings called Lady de Collette and only one survived. The grape, first publicly displayed in Marysville in 1875, became known as Thompson seedless grape. Today, thousands of acres have been planted in California for the production of raisins, and bulk variety grapes.
- **Location:** 9001 Colusa Highway, State Highway 20, 8 miles west of Yuba City.

The **Historic Spots in California** list includes the following areas from Sutter County:

- Spanish Expeditions
- Sutter Buttes
- Camp Bethel
- Sutter’s Hock Farm
- Nicolaus
- Oro
- Vernon (Verona)
- Yuba City
- The Thompson Seedless Grape Site

No sites in Sutter County are included in the **Historic American Building Survey List**.

In addition to the officially designated sites listed above, the **Sutter County Historical Society** has developed a list of sites which have historical or cultural significance to the County. These sites are displayed in the table and map below. Those sites that are checked are also recognized by the California Department of Parks and Recreation Office of Historic Preservation as **Points of Historic Interest**.

Site of Historical and Cultural Significance to Sutter County			
Map ID Number	Name	Point of Historic Interest?	Description
1	774 B Street	<input checked="" type="checkbox"/>	E.G. Van Arsdale House built about 1880. Van Arsdale was an early Second Street merchant.
2	819 Shasta Street	<input checked="" type="checkbox"/>	A.C. McLaughlin Law Office relocated in 1953 from its original location across from the courthouse. It was a law office for A.C. McLaughlin and Justice of the Peace office for Judge Hugh D. Moncur and courtroom for the Justice and Municipal Courts.
3	442 B Street	<input checked="" type="checkbox"/>	Sutter County Canning/Packing Company.
4	334 C Street	<input checked="" type="checkbox"/>	The Stabler-Swinson House built in 1862. The R.C. Kells lived there from 1887 to 1899. Bennett Shilling lived there in 1902.
5	241 C Street	<input checked="" type="checkbox"/>	Butler House was built in 1973. It was owned later by Judge Coats and by Lewis Duncan, a former Yuba City Police Chief and City Clerk.
6	212 C Street	<input checked="" type="checkbox"/>	Old Harkey House built about 1870. Harkey was an early sheriff of Sutter County. The house later became the residence of Sid Smith. It is currently being used as a “bed and breakfast” facility.
7	500 2 nd Street	<input checked="" type="checkbox"/>	Sanborn Law Office built in 1870. Mr. Sanborn,

Site of Historical and Cultural Significance to Sutter County			
Map ID Number	Name	Point of Historic Interest?	Description
			Lawrence Shillig and D.A. Winship practiced law in this office. The original wooden walls were covered by stucco in 1906. In 1908, Yuba City was incorporated as a city in this building.
8/9	446 2 nd Street	<input checked="" type="checkbox"/>	Sutter County Hall of Records.
10	423 2 nd Street	<input checked="" type="checkbox"/>	Thomas D. Boyd House built about 1869. It was known as the Clark House in the 1870's.
11	422 2 nd Street	<input checked="" type="checkbox"/>	McC Campbell House was built about 1880.
12	413 2 nd Street	<input checked="" type="checkbox"/>	Rose Carpenter House built about 1880, and later owned by George Boyd.
13	379 2 nd Street	<input checked="" type="checkbox"/>	McGruder House built in 1887. Mr. McGruder was the United States Mining Inspector for hydraulic mining. It was later the home of C.F. Child.
14	360 2 nd Street	<input checked="" type="checkbox"/>	Eugene Boyd House built in 1890, by M.S. Sanborn. Mr. Boyd served as Sutter County Recorder from 1931 to 1963.
15	329 2 nd Street	<input checked="" type="checkbox"/>	William O'Banion House built in 1880.
16	Bogue Road	<input type="checkbox"/>	Named after nurseryman and orchardist J. Bogue. One-half mile to the west is Bogue Station on the Southern Pacific tracks along Railroad Avenue. To the east along the Feather River levee is the site of the 1955 flood levee break.
17	East of Garden Highway, north of Tudor	<input type="checkbox"/>	John A. Sutter's Hock Farm, built in 1841. The metal, rusted front of one of the buildings still stands. Toward the levee and to the south is the site of John A. Sutter's home (near the Holmes home). To the west on Messick Road, a short distance from the Hock Farm, is the site of the early Messick railroad shop.
18	Northeast Corner Township and O'Banion Roads	<input type="checkbox"/>	Site of Old Bailey Home.
19	Southwest Corner Garden Highway and O'Banion Road	<input type="checkbox"/>	Old C.E. Sullivan Ranch, at one time the largest single walnut grower in the world, in 1960 – 650 acres. Nuggett and Carnelo Walnuts were developed on this ranch.
20	Star Bend Road (north of Tudor)	<input type="checkbox"/>	Approximate area of the A.F. Abbott Ranch near Star Bend where the Phillips cling peach was produced and grown commercially. Developed in 1888 by nurseryman Joseph D. Phillips, the fruit, an off-shoot of the Tuscan and Orange Cling, was first propagated by J. Bogue. Near the ranch was the Abbott Station on the Southern Pacific tracks.
21	Tudor Road	<input type="checkbox"/>	Old Saunders Home, built in 1920. Located in the settlement of Tudor, another railroad station on the Southern Pacific line from the Woodland area.
22	Wilson Road	<input type="checkbox"/>	Wilson Station, site of Southern Pacific line stop, tracks and small wooden bridge remain. Two tracks are seen – one mainline track, the other a siding for handling freight, etc.
23	Kirkville Road	<input type="checkbox"/>	Chandler Station Site, Southern Pacific line stop in

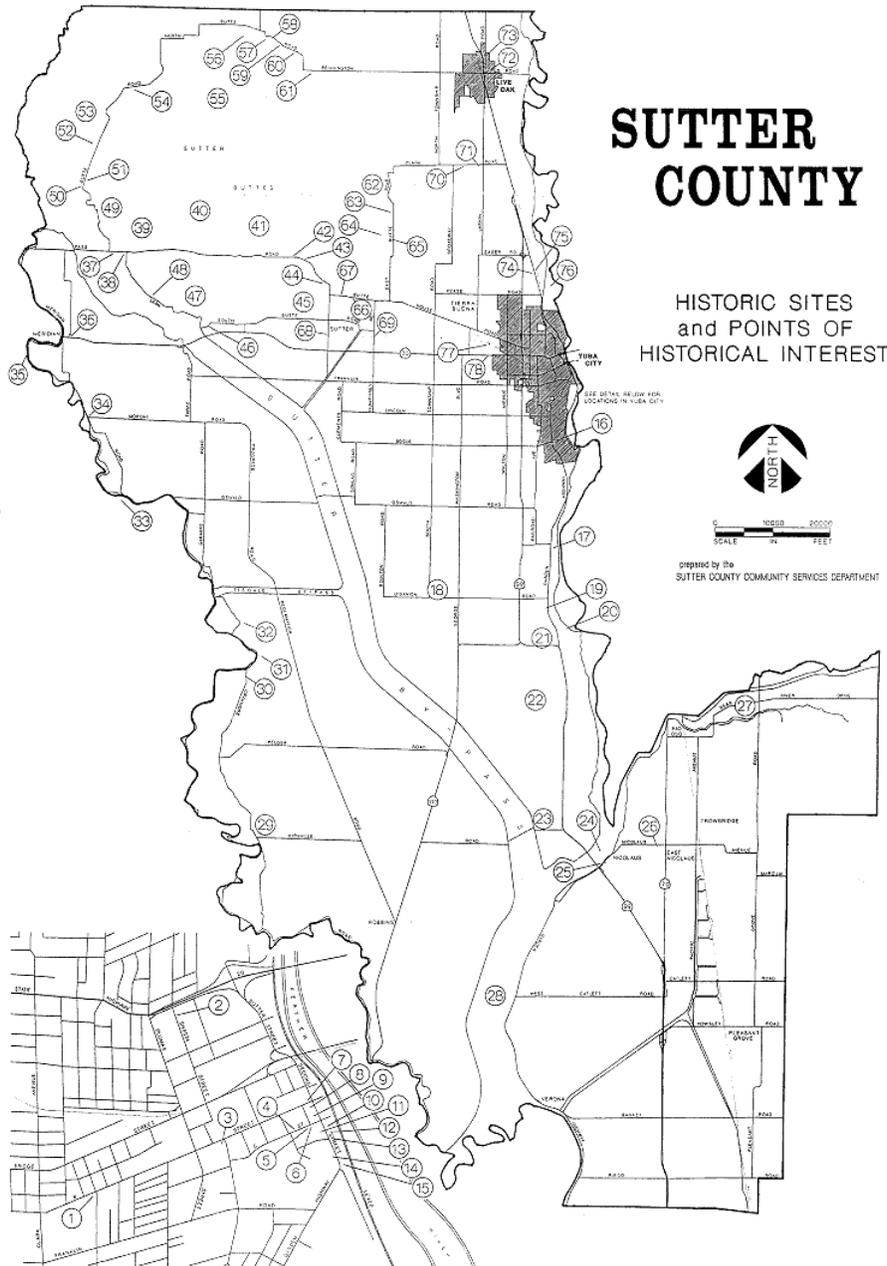
Site of Historical and Cultural Significance to Sutter County			
Map ID Number	Name	Point of Historic Interest?	Description
			the early days.
24	Nicolaus	<input type="checkbox"/>	Site of Sam Brannan's "White House" to the north of the new Nicolaus Bridge, opposite the town of Nicolaus. The home was located on two square miles of land sold to him in 1849 by John Sutter. The house had eight rooms, each with fireplaces and a winding staircase in the one and one-half story structure. This house was the scene of gala parties for people from San Francisco who arrived by riverboat. This home was last owned by Charles Tweedy of Dingville, and was moved from its original site – sold again and torn down. The lumber used for the "White House" was brought around the "Horn".
25	Nicolaus - Site of the Old Bell Hotel - Early Sutter County Courthouse - St. Boniface Catholic Church - Old Wagner Home - American Hotel Site - Main Street	<input checked="" type="checkbox"/>	To the east of the Nicolaus Bridge is the town of Nicolaus, founded in the late 1840's. Nicolaus was one of the earliest towns in Sutter County, founded by Nicolaus Allgier. The County Seat was moved from Nicolaus in 1856 to Yuba City. The Nicolaus Ferry crossed the Feather River near Nicolaus and was started in 1843 to connect New Helvetia (now Sacramento) with Sutter's Hock Farm. The original "ferry" was rowed by Indians.
26	Site of old East Nicolaus High School	<input checked="" type="checkbox"/>	On Nicolaus Avenue, east of Nicolaus and to the south of the road is the John A. Peter house built in 1881.
27	Rio Oso, Pleasant Grove, and Bear River	<input type="checkbox"/>	Near this area is the site of the town of Oro, near Barham's Crossing just south of the Bear River. Barham was a settler who came to this area in 1849 and in 1850 built a bridge at this site.
28	North of Verona	<input type="checkbox"/>	The Southern Pacific Railroad once ran through this town which was the County Seat in the early 1850's.
29	Kirkville	<input type="checkbox"/>	This townsite was located on land obtained by T.D. Kirk in 1874 from Jonas Spect (the original discoverer of gold in the Yuba River). Mr. Spect obtained the land from the estate of O.S. Colegrove, an 1851 settler who named the riverside place Colegrove Point.
30	Two miles south of Tisdale Weir on a river road named Cranmore Road	<input checked="" type="checkbox"/>	Wooley's Grave.
31	Cranmore	<input type="checkbox"/>	Located here is the large Les Butler home with its elaborate front entrance, built in 1888.
32	Tisdale Road	<input type="checkbox"/>	One mile south of this road is the Hunter burial site with marks for two Hunter children. Also present in the area is a U.S. Geological Survey Benchmark, 35 feet above sea level.
33	Grimes	<input type="checkbox"/>	Located north past the Winship Grammar School is the site of the Grimes Ferry Crossing and the town of Grimes.

Site of Historical and Cultural Significance to Sutter County			
Map ID Number	Name	Point of Historic Interest?	Description
34	Wilbur Road, Meridian	<input checked="" type="checkbox"/>	The brick house built in 1872 by Sumner Paine, a brick maker and miner who came to California from Maine in 1852. This property was later sold to the Alameda Sugar Company of San Francisco, which eventually became the Meridian Farms Land Company.
35	Sycamore	<input type="checkbox"/>	To the west of Kilgore Road is the site of the Sycamore Ferry Crossing and the town of Sycamore.
36a	State Highway 20	<input type="checkbox"/>	Site of the Old Meridian Grammar School, original structure built near here in 1875.
36b	Corner of Third and Bridge	<input type="checkbox"/>	Old Sacramento Northern Railroad Station Building.
36c	Meridian	<input type="checkbox"/>	Founded in 1852 by Lewis O'Neill who built a crude cabin to the south of what is now Main Street. In 1857 John F. Fouts came to Meridian and in 1860 started a ferry over the Sacramento River. In 1862 the settlement became known as Fout's Ferry. However, W.C. Smith arrived and the growing town was renamed Meridian, being barely ¼ mile from the Meridian Line of the U.S. Survey of California.
37/38/39	Pass Road	<input type="checkbox"/>	To the north on the slopes of the Sutter Buttes are stone fences which served two purposes: 1) cleared the land of rocks for farming and 2) utilized the rocks for fencing.
40/41	Sutter Buttes, north of Pass Road	<input type="checkbox"/>	To the north in a valley, is the Old Moore Getty House, built in 1871. The original homestead cabin is now the living room of the residence.
42	Pass Road	<input type="checkbox"/>	To the north is the house of Carl DeWitt. Part of this house is an old log cabin built in 1873, the deed of which was signed by Abraham Lincoln
43	Pass Road	<input checked="" type="checkbox"/>	Fremont Monument. General John C. Fremont is said to have camped in this area for eight days in 1846 just before the Bear Flag Revolution.
44	Pass Road	<input type="checkbox"/>	Old George E. Britton House built in 1869-1870.
45	Acacia Avenue	<input type="checkbox"/>	The entrance to the town of Sutter, formerly called South Butte, Sutter City, which was founded in 1871.
45a	Slough School	<input type="checkbox"/>	Built in 1893 and used until approximately 1960.
47	West Butte Road	<input type="checkbox"/>	Area near where William Thompson Sr. Ranch was located, on which the Thompson Seedless Grape originated.
48	West Butte Road	<input type="checkbox"/>	Fredrick Tarke House, built in 1885.
49/50	West Butte Road	<input type="checkbox"/>	Near the site of the first oil well in 1866.
51	West Butte Road	<input type="checkbox"/>	Site of residence built in 1866 by Howard Brady
52/53	West Butte Road	<input type="checkbox"/>	Site of small early settlement of Noyesburg
54	North Butte Road	<input type="checkbox"/>	Old Pierce House, built in 1879
55	West Butte Road	<input type="checkbox"/>	Abandoned titan missile site.
56	North Butte Road	<input type="checkbox"/>	Spillman Grave site, south of North Butte Road.
57	North Butte Road	<input type="checkbox"/>	Site of the early town of Pennington, called North Butte in earlier days.
58	North Butte Road	<input type="checkbox"/>	Site of North Butte School and Lodge Historical Marker.

Site of Historical and Cultural Significance to Sutter County			
Map ID Number	Name	Point of Historic Interest?	Description
59	North Butte Road	<input type="checkbox"/>	Site of Peace Valley Cemetery – Historical Monument.
60	North Butte Road	<input type="checkbox"/>	Old Cornelius Williams House, built in 1890.
61	Pennington Road	<input type="checkbox"/>	Dow Grove, site of Farm Bureau picnics in the 1920s.
62	East Butte Road	<input type="checkbox"/>	Site of Camp Bethel, built in 1862 on property of Gilbert N. Smith, ranch near Sand Creek. Although East Butte was never a town, this location near the Sutter Buttes was early settled by ranchers.
63	East Butte Road	<input type="checkbox"/>	Albert N. Smith House, built in 1888. Previous owners of the two-story wooden house on the west side of the road north of Sanders Road, were also the Burns and Langs.
64	East Butte Road	<input type="checkbox"/>	E.J. Howard House, started in 1862 with the balance of the house added between 1862-1870.
65	East Butte Road	<input type="checkbox"/>	Old Union District Grammar School site, also used as a Sunday School, was started in 1868 and continued in use until 1917.
66a	Butte House Road	<input checked="" type="checkbox"/>	Site of the “Old Butte House” which was a stage stop.
66b	2234 California Street	<input type="checkbox"/>	Old Felts Building, was an old store and early post office.
66c	Corner of California and Nelson Streets, Sutter	<input type="checkbox"/>	Native Daughters of the Golden West Hall, built in 1888 was originally designed for but never used as a bank.
67	Butte House Road	<input type="checkbox"/>	Sutter Cemetery, where once a small grammar school was located in the center of the cemetery. Whenever a funeral was held school was dismissed for the day.
68	Acacia Avenue	<input type="checkbox"/>	Old Sacramento Northern Railway Depot.
69	Humphrey Road	<input type="checkbox"/>	Site of the early Humphrey Station Stop.
70/71	Clark Road	<input type="checkbox"/>	Site of Stafford Station, Sacramento Northern Railway formerly extending to Chico through Durham.
72	Pennington Road	<input type="checkbox"/>	One of the first homes in Live Oak. Built for Louis Schnepel in 1883. In January 1924 it was moved to its present location, 2447 Pennington Road, from the site on Broadway where the Odd Fellows Hall was built in Live Oak.
73	Larkin Road	<input type="checkbox"/>	One of the first homes in Live Oak. This old residence was moved a short distance from its original site due to the construction of Highway 99, to its present location on Larkin.
74	Live Oak Highway	<input type="checkbox"/>	Sutter’s Hock Farm Historical Monument, first white settlement in Sutter County established in 1841.
75	Live Oak Highway	<input type="checkbox"/>	Site of Berg Station, Southern Pacific Railroad
76	Live Oak Highway	<input type="checkbox"/>	Site of the old Berg Ranch.
77	Harter Road	<input type="checkbox"/>	Harter House built in 1872. Harter cannery was an important early drying and canning facility.
78	2078 Colusa Highway	<input type="checkbox"/>	Jake Onstott House built in 1887 by the pioneer grain rancher.

The following figure taken from the Sutter County General Plan illustrates locations of Designated Historic Sites and Points of Historical Interest.

Sutter County Designated Historic Sites and Points of Historical Interest



Natural Resources

For purposes of this plan, natural resources include threatened and endangered species, sensitive habitats and other natural resources identified by the HMPC.



(Source: AMEC Earth & Environmental)

Threatened and Endangered Species

To further evaluate the county's vulnerability in the event of a disaster, it is important to inventory key natural resources such as threatened and endangered species.

Endangered Species means any species of fish, plant life, or wildlife, which is in danger of extinction throughout all or a significant part of its range and is protected by law.

Threatened Species means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and protected by law.

The following table lists the number of plants and animals found within California or off the coast of the State that have been classified as Endangered or Threatened by the California Fish and Game Commission (state list) or by the U.S. Secretary of the Interior or the U.S. Secretary of Commerce (federal list). The State listing of plants and animals is pursuant to the California Endangered Species Act of 1984 of the Fish and Game Code. The state listing of plants is also

pursuant to the Native Plant Protection Act of 1977. The federal listing of plants and animals is pursuant with the Federal Endangered Species Acts of 1973, as amended.

STATE AND FEDERALLY LISTED ENDANGERED, THREATENED, AND RARE PLANTS AND WILDLIFE OF CALIFORNIA		
July 2005		
Designation	Plants	Animals
SE = State-listed as Endangered	131	47
ST = State-listed as Threatened	22	32
FE = Federally-listed as Endangered	138	84
FT = Federally-listed as Threatened	47	39
SR = State-listed Rare ¹	67	
SCE = State Candidate (Endangered)	1	0
SCT = State Candidate (Threatened)	0	0
FPE = Federally proposed (Endangered)	0	1
FPT = Federally proposed (Threatened)	0	2
FPD = Federally proposed (Delisting)	0	1
Total number of listed	123	154
Total number of candidate/proposed plants and animals for listing	0	3
Number State-listed only	67	31
Number Federally-listed only	33	69
Number listed under both State and Federal Acts	123	54

¹. Plant designation only.

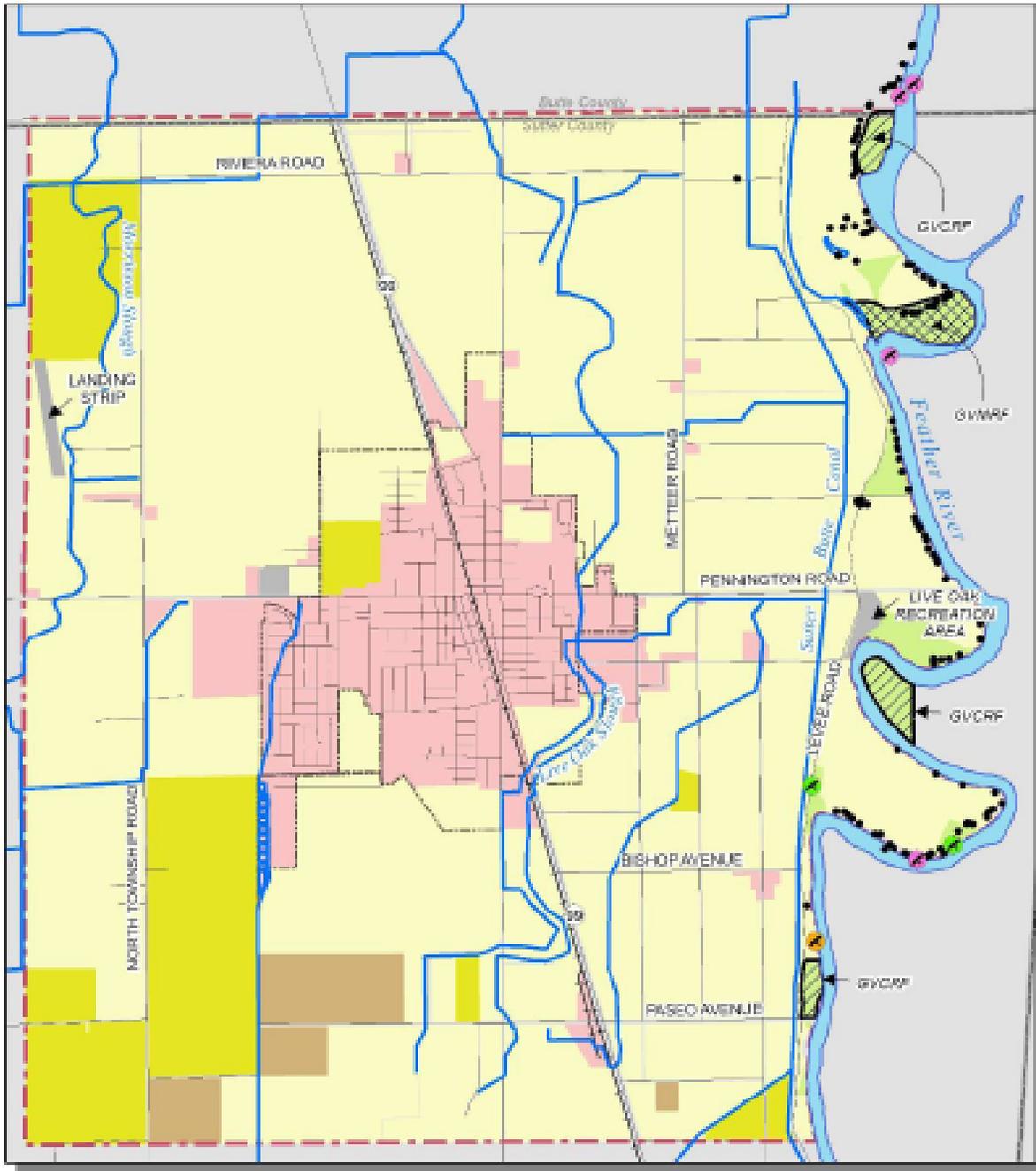
The following list includes protected plants and animals identified by the U.S. Secretary of the Interior and the California Fish and Game Commission as occurring within Sutter County. Information regarding the potential for particular species to occur in the City of Live Oak and Yuba City were provided by the respective City General Plan Natural Resources Element. The recorded presence of sensitive species in Live Oak and Yuba City are presented in the figures that follow.

Protected Plant and Wildlife Species Potentially Occurring in Sutter County					
Scientific Name	Common Name	Federal Status	State Status	Potential to Occur in Live Oak	Potential to Occur in Yuba City
<i>Layia septentrionalis</i>	Colusa layia	None	SR	Low	Low
<i>Pseudobahia bahiifolia</i>	Hartweg's golden sunburst	FE	SE	Low	High
<i>Trichocoronis wrightii</i> var. <i>wrightii</i>	Wright's trichocoronis	None	SR	Low	Low
<i>Silene verecunda</i> ssp. <i>verecunda</i>	San Francisco campion	None	SR	Low	Low
<i>Monardella douglasii</i> ssp. <i>venosa</i>	veiny monardella	None	SR	Low	Low
<i>Hibiscus lasiocarpus</i>	rose-mallow	None	SR	High	Low
<i>Navarretia leucocephala</i> ssp. <i>bakeri</i>	Baker's navarretia	None	SR	Low	Low
<i>Ambystoma californiense</i>	California tiger salamander	FE	SC	Low	Low
<i>Rana aurora draytonii</i>	California red-legged frog	FT	None	Low	Low
<i>Nycticorax nycticorax</i>	black-crowned night heron	None	None	Low	Low
<i>Branta hutchinsii leucopareia</i>	cackling (Aleutian Canada) goose	FD	None	Low	Low
<i>Buteo swainsoni</i>	Swainson's hawk	None	ST	High	Low
<i>Coccyzus americanus occidentalis</i>	western yellow-billed cuckoo	FC	SE	Moderate/High	Moderate
<i>Haliaeetus leucocephalus</i>	bald eagle	FT	None	Low	Low
<i>Athene cunicularia</i>	burrowing owl	None	SC	Moderate	Low
<i>Riparia riparia</i>	bank swallow	None	ST	Low	Moderate
<i>Agelaius tricolor</i>	tricolored blackbird	None	SC	High	Low
<i>Carduelis lawrencei</i>	Lawrence's goldfinch	None	None	Low	Low
<i>Pogonichthys macrolepidotus</i>	Sacramento splittail	None	SC	Low	Low
<i>Antrozous pallidus</i>	pallid bat	None	SC	Low	Low
<i>Perognathus inornatus inornatus</i>	San Joaquin pocket mouse	None	None	Low	Low
<i>Dipodomys californicus eximius</i>	Marysville California kangaroo rat	None	SC	Low	Low
<i>Emys marmorata marmorata</i>	northwestern pond turtle	None	SC	Low	Low
<i>Thamnophis gigas</i>	giant garter snake	FT	ST	Moderate/High	Low
<i>Branchinecta lynchi</i>	vernal pool fairy	FT	None	Low	Low

Protected Plant and Wildlife Species Potentially Occurring in Sutter County					
Scientific Name	Common Name	Federal Status	State Status	Potential to Occur in Live Oak	Potential to Occur in Yuba City
	shrimp				
<i>Linderiella occidentalis</i>	California linderiella	None	None	Low	Low
<i>Lepidurus packardii</i>	vernal pool tadpole shrimp	FE	None	High	Low
<i>Cicindela hirticollis abrupta</i>	Sacramento Valley tiger beetle	None	None	Low	Low
<i>Desmocerus californicus dimorphus</i>	valley elderberry longhorn beetle	FT	None	High	Low
<i>Anthicus sacramento</i>	Sacramento Valley tiger beetle	None	None	Low	Low
<i>Anthicus antiochensis</i>	Antioch Dunes anthicid beetle	None	None	Low	Low
<i>Branchinecta conservatio</i>	Conservancy fairy shrimp	FE	None	Low	Low
<i>Oncorhynchus mykiss</i>	Central Valley steelhead	FT	None	Low	Low
<i>Oncorhynchus tshawytscha</i>	Central Valley spring-run salmon	FT	None	High	Low
<i>Oncorhynchus tshawytscha</i>	winter-run chinook salmon, Sacramento River	FE	None	Low	Low

Source: CDFG 2001; USFWS 2006a; City of Live Oak 2006a; City of Yuba City 2004.

Sensitive Species Recorded in the Vicinity of Live Oak



Source: Updated from SWCA, 2001 to 2007, 2008.

CITY OF LIVE OAK GENERAL PLAN UPDATE



Sensitive Species in the Vicinity of Yuba City

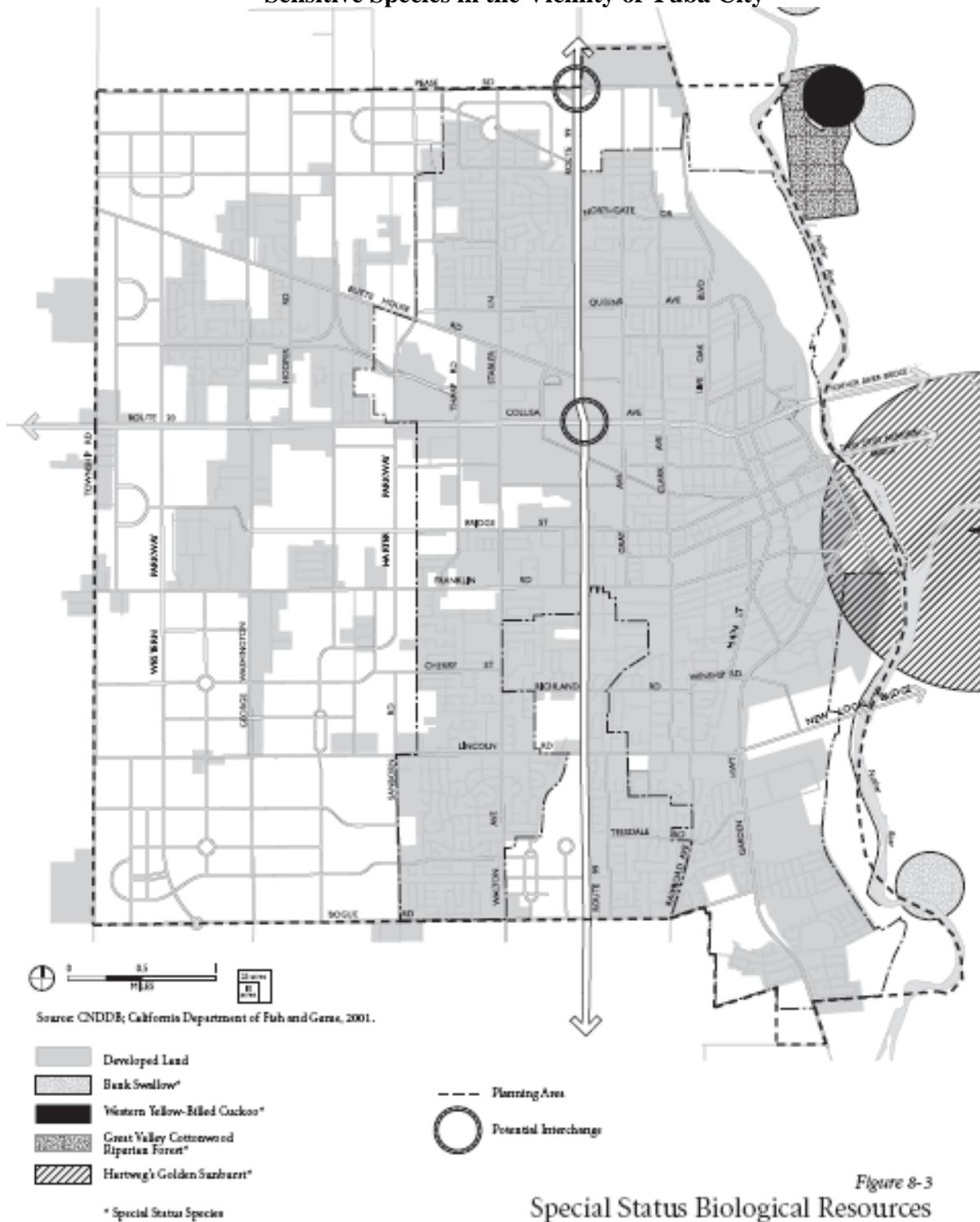


Figure 8-3
Special Status Biological Resources

Sensitive Habitats

In addition to endangered and threatened plant and animal species, five sensitive habitat types were identified by the California Department of Fish and Game Natural Diversity Database as potentially occurring in Sutter County. These habitat types are:

- Northern Hardpan Vernal Pool
- Coastal and Valley Freshwater Marsh
- Great Valley Cottonwood Riparian Forest
- Great Valley Mixed Riparian Forest
- Great Valley Willow Scrub

According to the Sutter County General Plan, recorded occurrences of the Northern Hardpan Vernal Pool are located at the north end of the Sutter Bypass and along the northern side of the Sutter Buttes. Coastal and Valley Freshwater Marsh habitats are recorded in the Butte Sink and Sutter Bypass areas. Great Valley Mixed Riparian Forest and Great Valley Cottonwood Riparian Forest are found within the riparian corridors located along the edges of streams and the Sacramento and Feather Rivers in the County. There are no recorded instances of Great Valley Willow Scrub in the County.

Within the City of Live Oak, Great Valley Cottonwood Riparian Habitat and Great Valley Mixed Riparian Habitat are both located along the west bank of the Feather River. No other identified sensitive habitats are present in the City (Live Oak 2006). Great Valley Cottonwood Riparian Habitat is present just outside the northeastern corner of the Yuba City planning area along the east bank of the Feather River. No other identified sensitive habitats are present in Yuba City (City of Yuba City 2004).

In addition, a review of the U.S. Fish and Wildlife National Wetland Inventory revealed that wetlands in the vicinity of Yuba City and the City of Live Oak are primarily associated with the Feather River. No other wetlands are mapped within Yuba City and only one 0.5-acre freshwater pond is mapped in the southwest corner of the City of Live Oak (USFWS 2006b).

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).

Development Trends

Projected growth and development trends in Sutter County were taken from the 2015 Housing Element for Sutter County, the Housing Element for Yuba City, and the Housing Element for the City of Live Oak.

Current Status (2000 Census)

- 37,110 individuals, or 45.5 percent, of Sutter County's residents live in the unincorporated portion of the county.
- 41,400 individuals, or 54.5 percent, of Sutter County's residents live within the County's incorporated cities.

Growth Rate

- According to the Sacramento Area Council of Governments most recent projections (May 2006), the population of the county unincorporated area is decreasing annually. The largest change in population occurred between 2000 and 2002 when reorganization of the Walton Avenue area occurred and a large portion was annexed to Yuba City. Therefore, while Sutter County as a whole has grown by 2.6 percent annually, the unincorporated area has decreased by 1.6 percent.
- According to the Sacramento Area Council of Governments, Yuba City is expected to grow at an annual growth rate of 2.5 percent through 2015. Assuming the unincorporated area of the Yuba City Planning Area (sphere-of-influence) grows at the same rate, the total population of the Yuba City Planning Area is projected to reach 105,730 by 2025 (Yuba City 2004).
- Statistics illustrate that population growth for Sutter County is occurring primarily in its incorporated cities, Live Oak and Yuba City. In 2001, Yuba City completed an

annexation of the Walton area which increased the population of Yuba City by 7,000 and decreased the population of the unincorporated area of the Yuba City sphere-of-influence by the same amount.

Table 1. Population Estimates 2000-2006

Area	2000	2002	2005	2006
Unincorporated	35,943	28,241	23,851	23,468
Yuba City	36,758	47,221	58,516	60,507
Live Oak	6,229	6,450	6,803	7,475
County Total	78,930	81,912	89,170	91,450

(Source: California Department of Finance, May 2006)

Development Trends

- Sutter County estimates that 40,550 housing units will be necessary to fill the County’s housing needs for the planning period of 2004 to 2015. The unincorporated Sutter County is expected to need 17,597 housing units by 2015; a 28.1 percent increase over unincorporated area housing units in 2000 (See table that follows).

Table 6. Housing Unit Estimates and Projections, Countywide, 2000-2015.

Area	2000	2005	2010	2015
Unincorporated Area	13,735	14,735	15,918	17,597
Yuba City	13,608	15,996	18,225	20,394
Live Oak	1,734	2,009	2,284	2,559
Sutter County Total	29,077	32,740	36,427	40,550

Source: SACOG 3/15/01 Projection Series

- **Land Availability:** Existing vacant and underdeveloped land in Sutter County could potentially support a maximum of 4,705 residential units based on a mix of high density, medium density, and low density areas (See table below).

Table 28. Potential Housing Units Based on Available Land, 2002-2012.

General Plan	Density Range	Acres Available	Minimum Units	Maximum Units
HDR	25-45 Units/Acre	26.86 HDR	671	1,208
MDR	8-25 Units/Acre	23.66 MDR	189	591
LDR	2-8 Units/Acre	363.31 LDR	726	2,906
TOTAL		415.53	1,586	4,705

Source: Sutter County Community Services Department

- **Housing Costs vs. Household Income:** The average median household income in Yuba City was \$32,858 according to the 2000 Census. This was lower than the median household for Sutter County, which was reported to be \$39,633. Likewise, the median household income in Live Oak was 33 percent lower than the County at the time of the U.S. Census. Both household incomes and housing costs in Yuba City rose very slowly between 1991 and 2001. According to the Sutter-Yuba Association of Realtors, housing prices in Yuba City rose 16 percent during that time period. In contrast, housing prices in Live Oak have increased dramatically in the last ten years – by as much as 190 percent. Sutter County estimates that a moderate income household in the county earning between

\$30,900 and \$46,300 in 2001 could expect to pay between \$770 and \$1,160 in monthly housing costs (See table below). The average sale price of a home in Sutter County in 2001 was \$172,000. In Yuba City the average sale price was \$148,000 during the same year. The median sales price of a home in Live Oak in 2005 was \$230,000.

Table 3.4-2: Monthly Housing Costs by Income Category for Sutter County (2001)

<i>Income Category</i>	<i>Annual Income*</i>	<i>Maximum Monthly Housing Costs</i>
Very Low	< \$19,300	< \$480
Low	\$19,300 - \$30,900	\$480 - \$770
Moderate	\$30,900 - \$46,300	\$770 - \$1,160
Above Moderate	> \$46,300	> \$1,160

* Based on FY 2001 Sutter County Area Median Income (AMI) of \$38,600 for a four-person household.

Note: All amounts are in 2001 dollars.

Source: California Department of Housing and Community Development, 2001 Income Limits, and Dyett & Bhatia, 2001.

- **Housing Stock:** Less than ½ percent of the county’s housing units are classified as substantially deteriorated or dilapidated; the majority of which are located in the City of Live Oak. The City of Live Oak housing survey estimates that over 15 percent of the housing stock in the city is dilapidated or in need of substantial rehabilitation. The majority of homes in Sutter County (60 percent) were constructed prior to 1975.
- **New Development Areas:** An inventory and assessment of parcels available for single and multi-family residential development is included in the table that follows. All parcels included in the inventory are within the spheres-of-influence and near the cities of Live Oak and Yuba City. In addition, Figures 4 and 6 below show the location of new development areas in Live Oak and Yuba City identified within the Sutter County General Plan.
 - New development planned in the City of Live Oak is primarily concentrated in the northeast portion of the City sphere of influence under the Sacramento Area Council of Governments (SACOG) preferred scenario (see Figure 5). Under this scenario an average of 100 new homes would be constructed each year.
 - New development areas identified in the Yuba City General Plan are located in the Harter Specific Plan area, on the north side of Shanghai Bend Road, west of Garden Highway and on the north side of Lincoln Road, east of Sanborn Road (known as the Lincoln East Specific Plan Area) (Figure 7).

Parcels with Potential for Residential Development in Sutter County, 2002-2012				
Site	APN	General Plan/Zoning	Acreage	Distance to Sewer
1	9-110-010	LDR/R-1-A	2.0	0'
2	9-110-011	LDR/R-1-A	2.30	0'
3	9-110-035	LDR/R-1-A	0.94	0'
4	9-110-036	LDR/R-1-A	0.60	150'
5	9-182-032	LDR/R-1-A	4.64	110'
6	9-182-034	LDR/R-1-A	3.25	700'
7	9-181-039	LDR/R-1-A	7.16	220'
8	9-200-004	HDR/R-4	1.24	400'
9	9-200-005	HDR/R-4	1.10	360'
10	9-221-007	LDR/R-1	22.73	1,350'
11	17-065-008	LDR/R-1-A	10.0	3,940'
12	17-114-034	MDR/R-3	7.88	2,200'
13	17-115-001	MDR/R-3	2.0	1,326'
14	17-115-002	MDR/R-3	2.05	1,480'
15	17-115-011	MDR/R-3	2.80	1,650'
16a	18-091-010	LDR/R-1-A	15.56	1,680'
16b	18-091-010	MDR/R-3	4.21	800'
17	19-060-066	HDR/R-4 (portion of)	24.52	1,340'
18	19-090-007	LDR/R-1-A	15.36	480'
19	19-090-022	LDR/R-2-PD	4.0	440'
20	19-090-023	LDR/R-1-PD	12.0	985'
21	19-090-062	LDR/R-1-A	7.99	0'
22	19-090-080	LDR/R-1	0.90	1,420'
23	19-090-081	LDR/R-1	11.20	650'
24	20-054-005	LDR/R-1-A	23.66	540'
25	20-054-021	LDR/R-1-A	0.45	0'
26	20-054-022	LDR/R-1-A	6.23	520'
27	20-054-027	LDR/R-1-A	20.92	0'
28	22-050-005	LDR/R-1	71.40	0'
29	22-060-013	LDR/R-1-A	9.54	2,000'
30	22-060-016	LDR/R-1-A	10.0	0'
31	22-060-027	LDR/R-1-A	24.01	2,210'
32	22-060-029	LDR/R-1-A	34.01	0'
33	22-060-032	LDR/R-1-A	2.54	1,150'
34	22-060-033	LDR/R-1-A, R-1	17.05	0'
35	22-060-044	LDR/R-1-A	5.81	670'
36a	22-072-043	MDR/R-3	4.72	0'
36b	22-072-043	LDR/R-1	8.01	300'
37	26-030-024	LDR/R-1	6.70	1,480'

Parcels with Potential for Residential Development in Sutter County, 2002-2012				
Site	APN	General Plan/Zoning	Acreage	Distance to Sewer
38	26-080-018	LDR/RE	2.35	0'
Sub-Total HRD			26.86 HDR	
Sub-Total MDR			23.66 MDR	
Sub-Total LDR			363.31 LDR	
TOTAL			413.83 Acres	

(Source: Sutter County 2004).

Figure 4. Available Sites for Development Near Live Oak

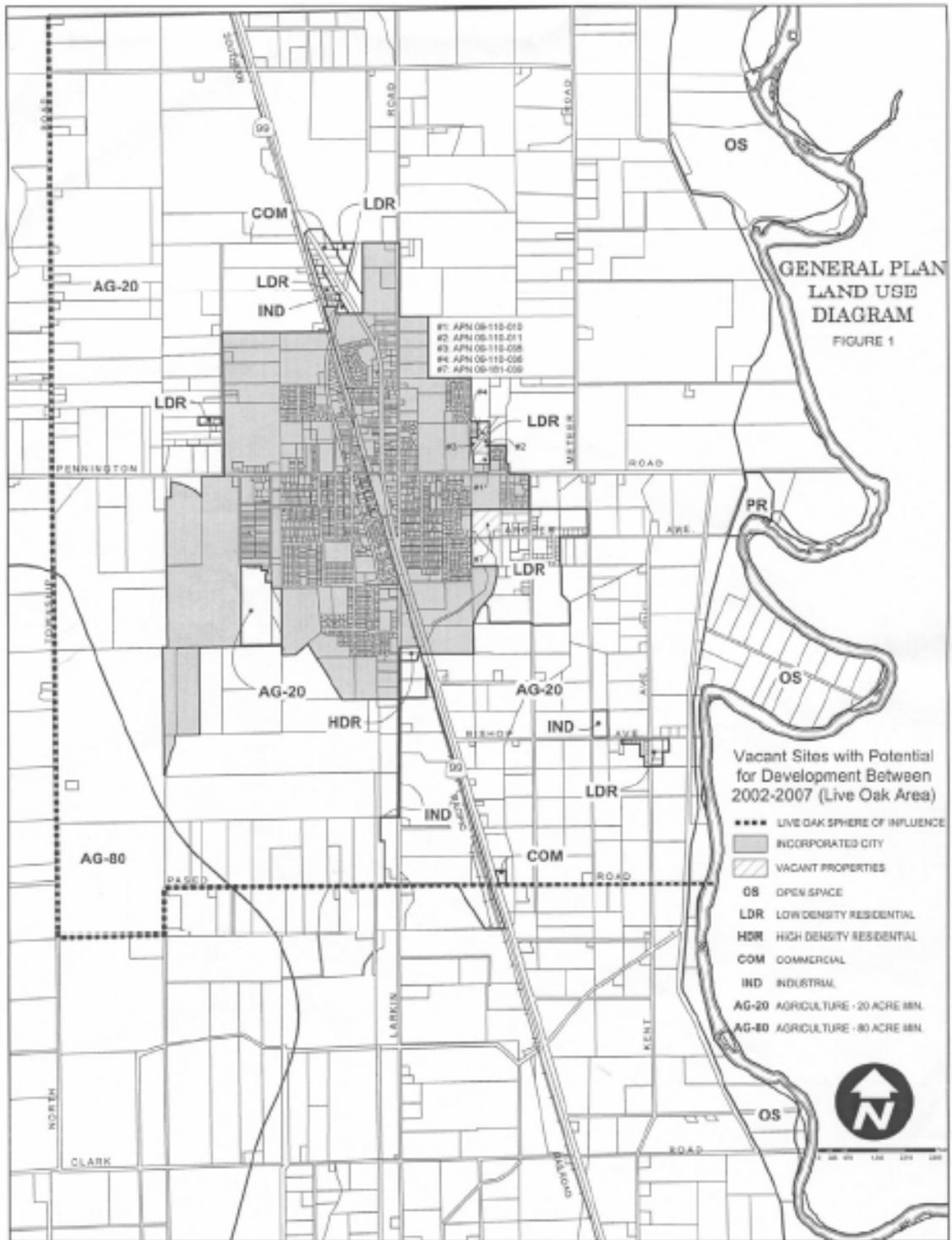


Figure 5. City of Live Oak Potential New Development Scenarios

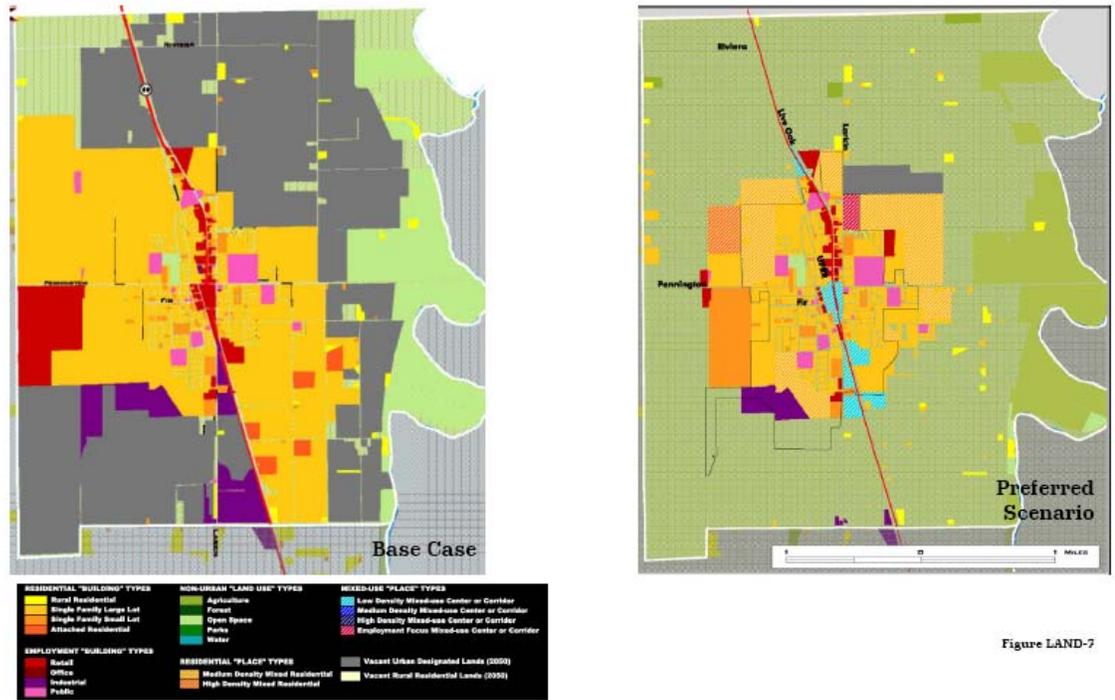
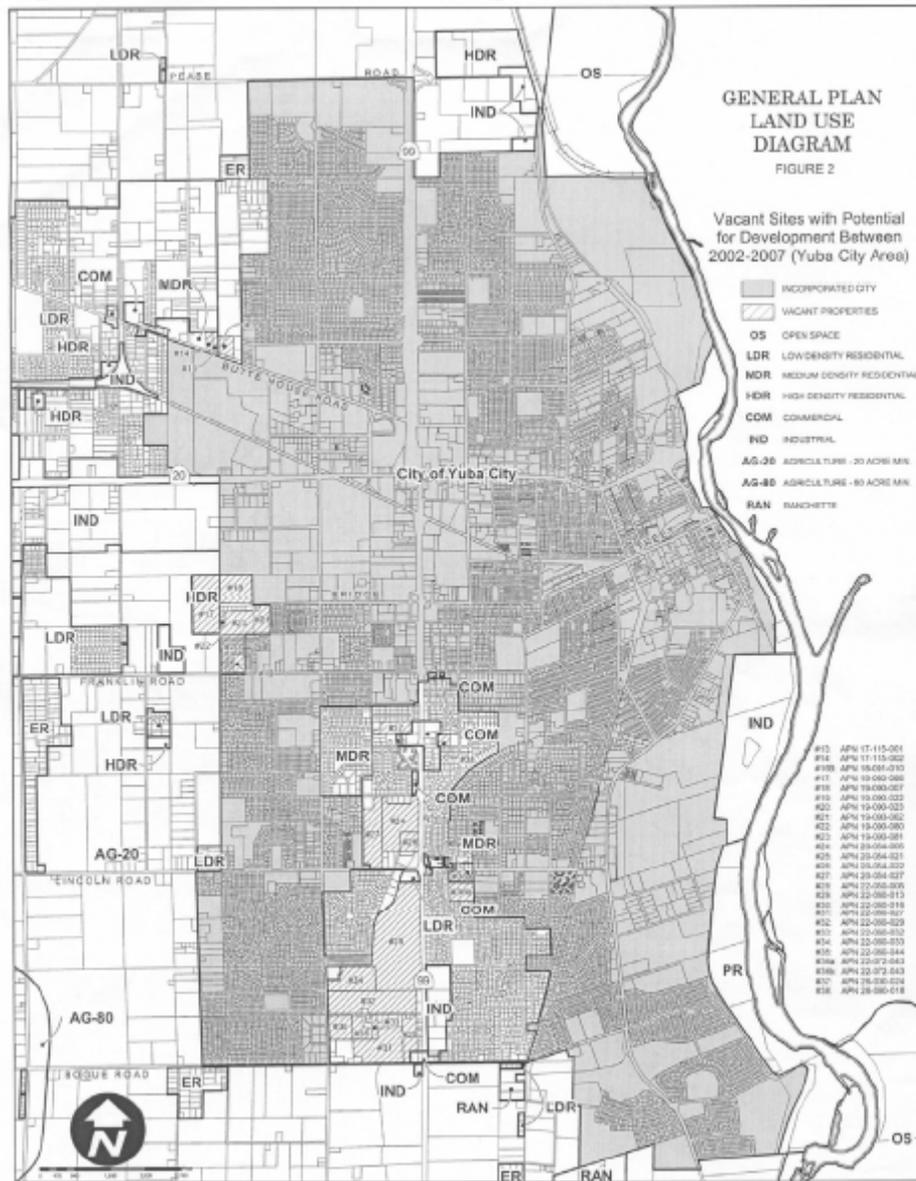


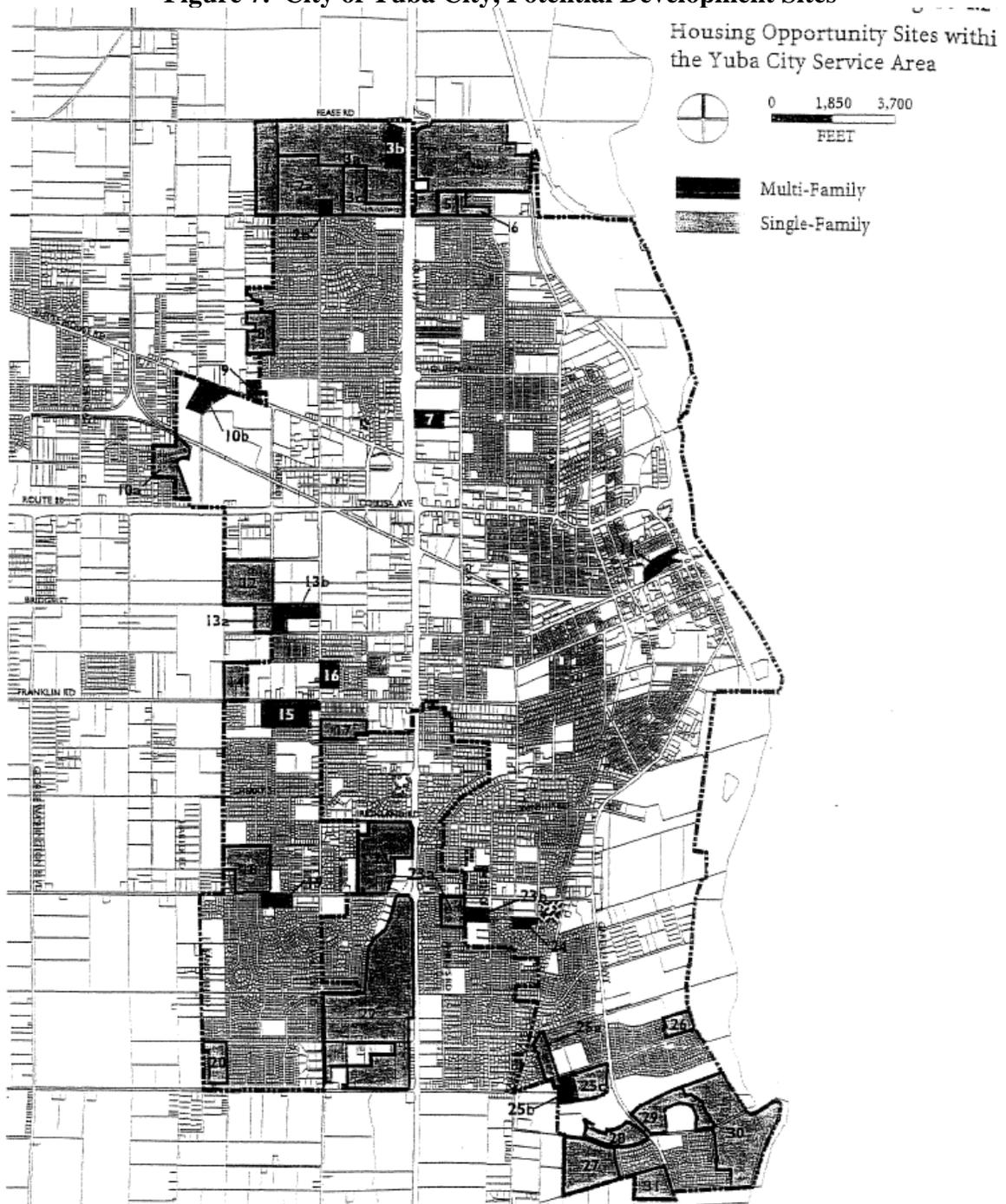
Figure LAND-7

Figure 6. Available Sites for Development In and Around Yuba City



- **Constraints.** The availability of vacant land does not appear to be a constraint on Sutter County. For example, one concentration of vacant land in the Yuba City limits, on either side of the Garden Highway south of Bogue Road, surrounds existing single family development and is likely to be developed as such. In addition, the price of developable land is not much of a constraint; land is much cheaper on average in Sutter County than in the rest of the State. The largest constraints on development are city and county land use regulations, the development review process, and the presence of protected agricultural lands. Sutter County has 51,267 acres of undeveloped land enrolled in Williamson Act contracts and 70 percent of the total county area is comprised of Prime Farmland or Farmland of Statewide Significance which constrains urban development in the unincorporated parts of the county.

Figure 7. City of Yuba City, Potential Development Sites



VULNERABILITY OF SUTTER COUNTY PLANNING AREA TO SPECIFIC HAZARDS

Community 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. Further, other information can be collected, 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) that are within the specific hazard area. Together, this information portrays the impact, or *vulnerability*, of that area to that hazard.

For those significant hazards identified in Section 4.1, the sections that follow present the general vulnerability analysis for all participating jurisdictions within the Sutter County Planning Area. Where specific hazard risks vary across the county and from jurisdiction to jurisdiction (as mentioned above), a more detailed evaluation is presented in the Jurisdictional Elements.

Identified Hazard Risk Areas: Flood and Wildfires

The HMPC identified two hazards within the Planning Area where specific geographical hazard areas have been defined: flood and wildfires. Because the two hazards listed above have discrete hazard risk areas, the HMPC has determined that the risk of these hazards varies between jurisdictions. For these two hazards, the HMPC has inventoried the following for each community, to the extent feasible, as a means of quantifying the vulnerability within the identified hazard areas:

- General hazard-related impacts, including impacts to life, safety and health;
- Values at Risk/Assessor Data;
- Identification of Critical Facilities at risk;
- Identification of Cultural and Natural Resources at risk;
- Development trends within the identified hazard area; and
- Overall Community Impacts;

This information is provided below for the Sutter County Planning Area as a whole and in detail by jurisdiction in the Jurisdictional Elements section of this plan.

Vulnerability and potential impacts from significant hazards that do not have specific mapped areas and where the risk does not vary across the Planning Area, such as drought and severe weather, are discussed below in more general terms, based on past events.

VULNERABILITY TO FLOODS

100-year Flood: Risk - Occasional; Vulnerability – Extremely High

< 100-year Flood/Localized Flooding: Risk –Highly Likely; Vulnerability - Medium

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.

Flooding has occurred, both within the 100-year floodplain and in other localized areas. Until recently, most of the Sutter County Planning Area was considered outside of the 100-year floodplain. Recent studies and the issuance of preliminary draft DFIRMS in August of 2006 have placed (or likely will place in the future) most of the Planning Area back within the 100-year or greater floodplain. This is primarily due to the inability of the aging levee system to be certified in accordance with current FEMA standards for levee certification. As such, the levees no longer provide protection from the 100-year flood. It should, however, be noted, that the levees do provide some level of protection to the planning area and are a critical factor in floodplain management for the communities.

The risk potential or likelihood of a flood event occurring in the county increases with the annual onset of heavy rains from November through April. In addition to damages to area infrastructure, other problems associated with flooding include erosion, sedimentation, degradation of water quality, loss of environmental resources, and certain health hazards.

Severe Flooding

The Sutter County Planning Area faces a risk of severe flooding for two primary reasons:

1. The cores of today's levees are often the levees built by farmers and settlers as much as 150 years ago. Early levees were not constructed to current engineering standards, and little care was given to the suitability of foundation soils. These remnants of the past make today's levee reliability uncertain.
2. The development trend in the Planning Area is steady, significant growth. Much of this growth is occurring in urban areas, which causes a significant increase in peak flow and stormwater runoff.

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.

Values at Risk

All incorporated communities and the unincorporated county have mapped flood hazard areas. GIS was used during this planning process to determine the possible impacts of flooding within the county and where the flood risk varies across the Planning Area. Once the flood hazard areas were mapped, the next step was to quantify the flood vulnerability by jurisdiction. The following methodology was followed in creating these flood vulnerability maps and determining values at risk to the 100-year and 500-year flood events.

Methodology

The County's parcel layer was used as the basis for the inventory of developed properties. In some cases there are parcels in multiple flood zones, such as Zone A and X 500. GIS was used to create a centroid, or point, representing the center of each parcel polygon, which was overlaid on the floodplain layer. For the purposes of this analysis, the flood zone that intersected the centroid was assigned as the flood zone for the entire parcel. Another assumption with this model is that every parcel with an improved value greater than zero was assumed to be developed in some way. Only improved parcels, and the value of those improvements, were analyzed and aggregated by property type and flood zone. The parcels were segregated and analyzed for the entire county, unincorporated only, Yuba City only, and Live Oak only,. The results are summarized in the tables and maps provided within the vulnerability sections for the respective jurisdictions.

To further complicate this analysis, the southern portion of the county is in the process of having several of the paper FIRMs replaced by the new preliminary draft DFIRMs, dated August 2006, as previously described in Section 4.1 of this plan. It is anticipated that new DFIRMs for the northern portion of the county will replace the remaining paper FIRMs sometime in the next two to three years. The major change associated with these updated maps is that the new DFIRMs do not recognize the existing levee system as being certified. As a result, most of the properties designated as Zone X and Zone C (outside the floodplain) in the paper maps are being re-categorized into 100-year and 500-year flood zones.

As a result of these ongoing map changes, in order to most accurately reflect the current status of FEMA floodplain mapping within the Sutter County Planning Area, the following maps, detailed

by area, were relied on in creating vulnerability maps and determining values at risk to the 100-year and 500-year flood events.

**Flood Hazard Vulnerability Assessment
Flood Maps used by Jurisdiction**

Jurisdiction	Data Type
Unincorporated Sutter County	FEMA Q3 data (as modified by County GIS) and proposed DFIRM data
City of Yuba City	FEMA Q3 data (as modified by County GIS) and proposed DFIRM data
City of Live Oak	FEMA Q3 data (as modified by County GIS)

A summary of the different types of flood zones included in these maps for the Sutter County Planning Area is presented in the following tables.

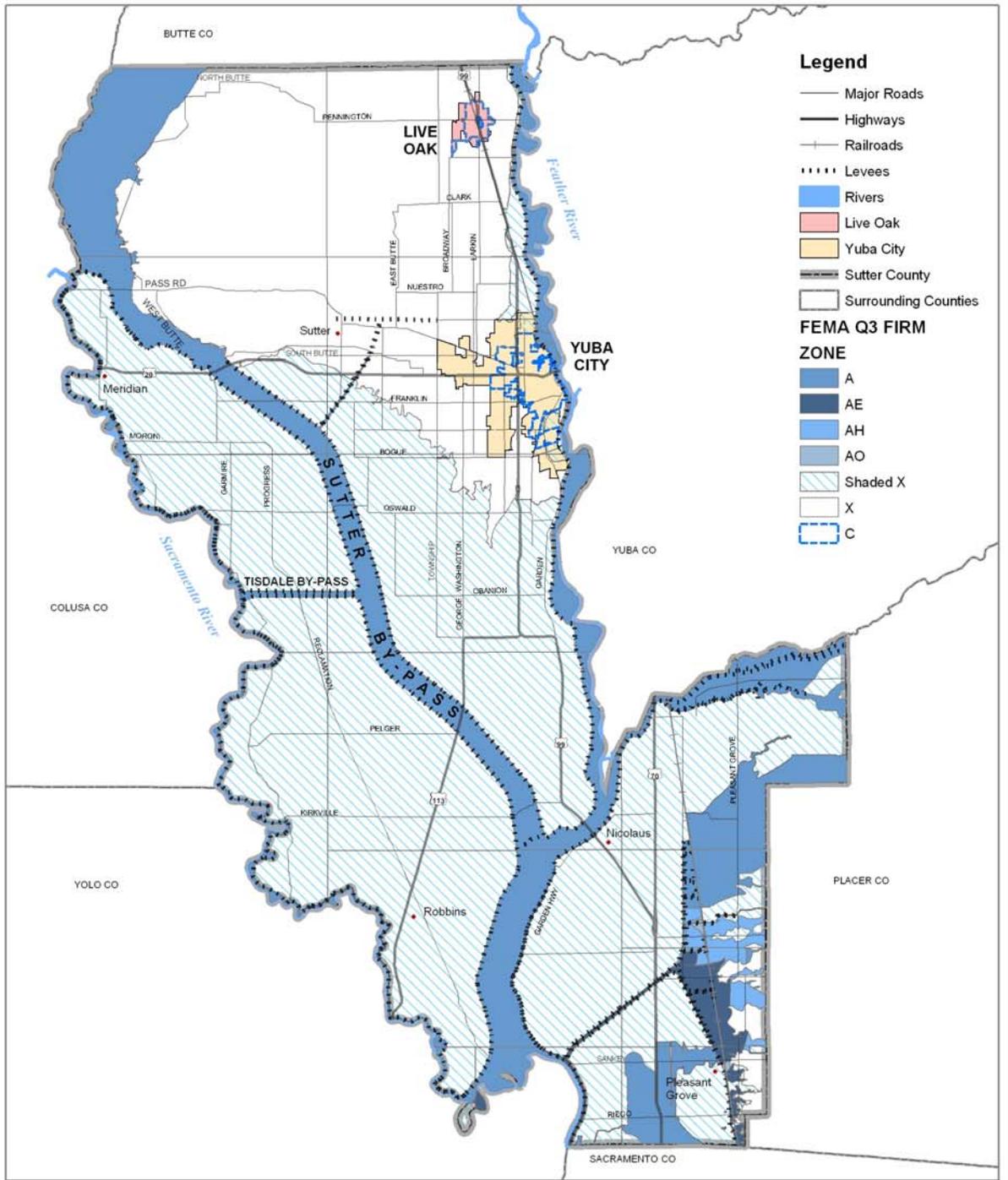
Flood Zones Summary

Special Flood Hazard Areas (SFHAs) Subject to Inundation by the 1% Annual Chance Flood (i.e., 100-year flood)	
Flood Zone	Definition
Zone A	No Base Flood Elevations determined
Zone AE	Base Flood Elevations determined
Zone AH	Flood depths of 1-3 feet (usually areas of ponding); Base Flood Elevations determined.
Zone AO	Flood depths of 1-3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
Zone AR	SFHA formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
Other Flood Areas	
Zone X (with color coding)	Areas of 0.2% annual chance flood (i.e., 500-year flood); areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
Other Areas	
Zone X (with no shading)	Areas determined to be outside the 0.2% annual chance floodplain.
Zone C (with no shading)	Areas of minimal flooding (from old paper maps)

Other Areas	
Zone D	Areas in which flood hazards are undetermined, but possible.

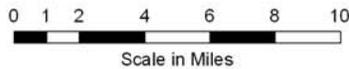
Following this methodology, flood maps for the entire Sutter County Planning Area are provided below. The table that follows summarizes the values at risk in the floodplain for the entire Sutter County Planning Area. A detailed analysis by jurisdiction is provided in the Jurisdictional Elements.

Sutter County Flood Zones Based on Q3 Data

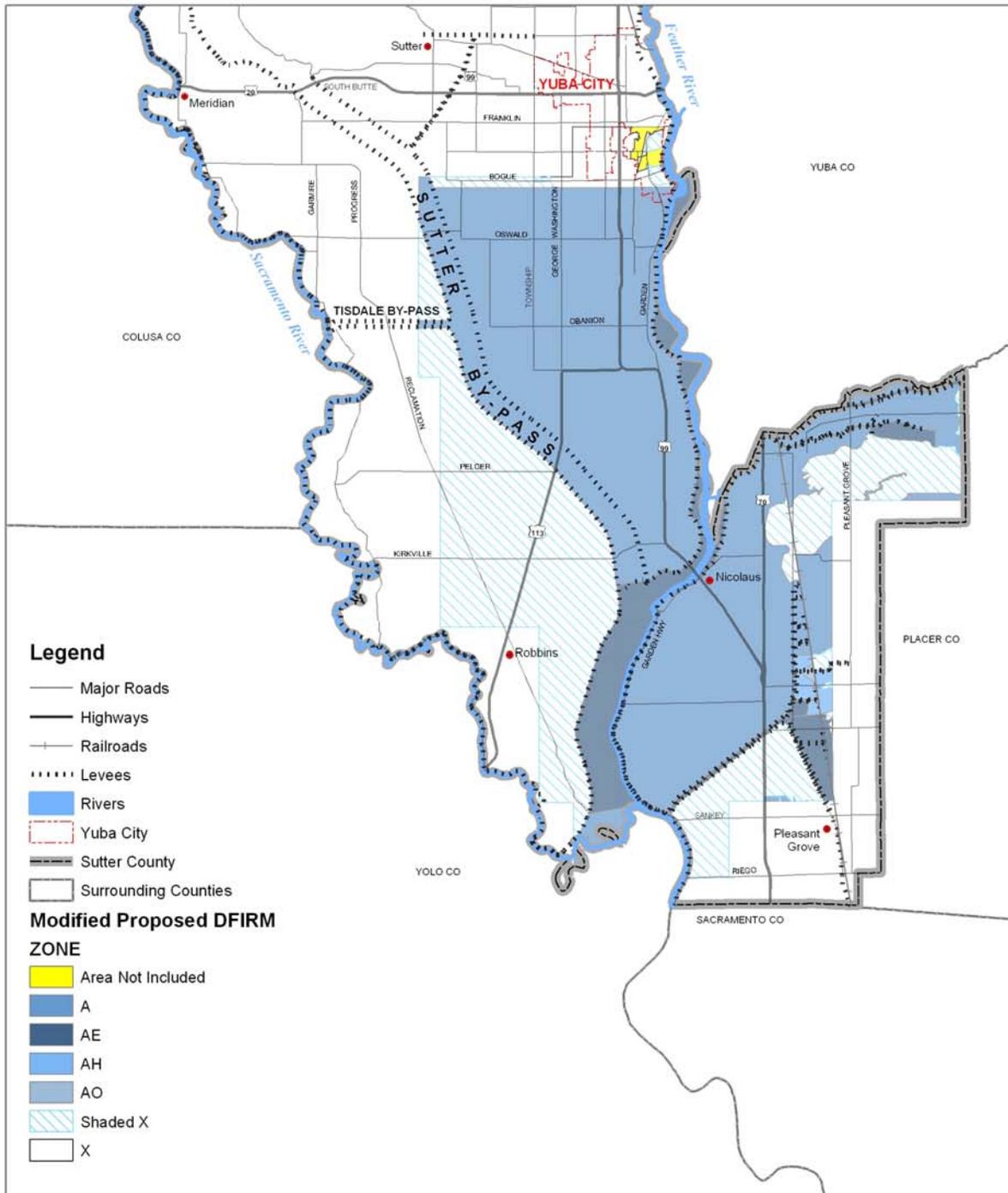


- Legend**
- Major Roads
 - Highways
 - Railroads
 - Levees
 - Blue Rivers
 - Live Oak
 - Yuba City
 - Sutter County
 - Surrounding Counties
- FEMA Q3 FIRM ZONE**
- A
 - AE
 - AH
 - AO
 - Shaded X
 - X
 - C

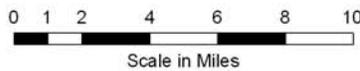
amec
 Map Compilation: AMEC 10/23/06
 Data Source: Sutter County, CA



Sutter County Flood Zones Based on Modified Proposed DFIRM



amec
 Map Compilation: AMEC 10/23/06
 Data Source: Sutter County, CA



**Sutter County Planning Area
Flood Hazard – Improved Parcels
Based on FEMA Q3 Data**

Sutter County								
	Zone A		Zone AE		Zone AH		Zone AO	
Property Type	Pcls	Improved Value	Pcls	Improved Value	Pcls	Improved Value	Pcls	Improved Value
Residential	81	\$ 3,831,892	5	\$ 399,589	2	\$ 278,777	-	\$ -
Commercial	12	\$ 1,475,287	2	\$ 322,165	1	\$ 38,395	-	\$ -
Industrial	6	\$ 17,275,779	-	\$ -	-	\$ -	-	\$ -
Institutional	7	\$ 260,234	-	\$ -	-	\$ -	-	\$ -
Agricultural	121	\$ 8,734,100	30	\$ 2,170,036	23	\$ 2,495,715	2	\$ 120,552
Other	-	\$ -	1	\$ 10,000	-	\$ -	-	\$ -
Total	227	\$ 31,577,292	38	\$ 2,901,790	26	\$ 2,812,887	2	\$ 120,552

	Shaded Zone X		Zone X		Zone C		Total	
Property Type	Pcls	Improved Value	Pcls	Improved Value	Pcls	Improved Value	Parcels	Improved Value
Residential	578	\$ 81,281,027	6,802	\$ 1,062,817,417	7,417	\$ 822,093,798	14,885	\$ 1,970,702,500
Commercial	27	\$ 7,935,740	118	\$ 59,912,425	730	\$ 407,588,626	890	\$ 477,272,638
Industrial	48	\$ 40,993,097	120	\$ 38,898,689	167	\$ 80,294,784	341	\$ 177,462,349
Institutional	16	\$ 5,535,681	65	\$ 35,559,870	98	\$ 69,358,530	186	\$ 110,714,315
Agricultural	518	\$ 44,077,257	1,319	\$ 137,835,341	8	\$ 632,068	2,021	\$ 196,065,069
Other	7	\$ 326,362	54	\$ 4,947,453	25	\$ 2,162,700	87	\$ 7,446,515
Total	1,194	\$ 180,149,164	8,478	\$ 1,339,971,195	8,445	\$ 1,382,130,506	18,410	\$ 2,939,663,386

**Sutter County Planning Area
Flood Hazard – Improved Parcels
Based on Proposed DFIRM**

Sutter County								
	Zone A		Zone AE		Zone AH		Zone AO	
Property Type	Pcls	Improved Value	Pcls	Improved Value	Pcls	Improved Value	Pcls	Improved Value
Residential	1,289	\$ 178,309,320	28	\$ 5,624,801	2	\$ 183,586	-	\$ -
Commercial	27	\$ 4,113,233	2	\$ 647,514	-	\$ -	-	\$ -
Industrial	33	\$ 349,657,890	-	\$ -	-	\$ -	-	\$ -
Institutional	21	\$ 1,413,474	4	\$ 159,221	-	\$ -	-	\$ -
Agricultural	1,404	\$ 138,898,509	77	\$ 4,687,515	10	\$ 759,998	1	\$ 4,162
Other	10	\$ 646,309	3	\$ 398,114	-	\$ -	-	\$ -
Total	2,784	\$ 673,038,735	114	\$ 11,517,165	12	\$ 943,584	1	\$ 4,162

	Shaded Zone X		Zone X		Total	
Property Type	Pcls	Improved Value	Pcls	Improved Value	Parcels	Improved Value
Residential	648	\$ 106,003,478	5,625	\$ 814,861,901	7,592	\$1,104,983,086
Commercial	2	\$ 431,951	55	\$ 24,241,667	86	\$ 29,434,365
Industrial	9	\$ 4,148,176	60	\$ 5,465,672	102	\$ 359,271,738
Institutional	4	\$ 7,919,416	15	\$ 6,604,312	44	\$ 16,096,423
Agricultural	164	\$ 11,795,898	66	\$ 8,642,498	1,722	\$ 164,788,580
Other	1	\$ 113,031	12	\$ 1,175,104	26	\$ 2,332,558
Total	828	\$ 130,411,950	5,833	\$ 860,991,154	9,572	\$1,676,906,750

Base on this analysis, the Sutter County Planning Area has significant assets at risk to the 100-year and greater floods. Combining both the Q3 data and the DFIRM data, 3,204 improved parcels are within the 100-year floodplain for a total value of \$ 722,916,167. 2,022 improved parcels fall within the 500-year floodplain for a total value of \$310,561,114. The total value of improved parcels outside of either floodplain is \$3,583,092,855. The valuation details for unincorporated Sutter County and the incorporated communities are broken out in the Jurisdictional Elements of this plan.

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.

Application of the 20% damage estimate to the Improved Parcel Value of \$722,916,167 results in an estimated \$144,583,233 at risk to damage from a 100-year flood within the Sutter County Planning Area based on current FEMA mapping. Thus, there is a 1% chance in any given year of a 100-year flood causing \$144,583,233 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.

Cultural and Natural Resources at Risk

The Yuba Sutter 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.

Critical Facilities at Risk

Critical facilities are those community components that are most needed to withstand the impacts of disaster. Included in this classification are police and fire stations, hospitals, schools that serve as emergency shelters, and lifeline utilities; power, water and sewer system components. Within the Planning Area many critical facilities are protected by the extensive flood control system. To additionally protect them individually from the potential failure of the structural flood control systems may be very difficult to justify on a benefit/cost ratio analysis. Still, the

impact to the community, should the statistically unlikely catastrophic flood event occur, would be astonishing if also these critical facilities are damaged or destroyed.

Development Trends in Hazard Area

The development trend in the Sutter County Planning Area is steady, significant growth, especially within the existing urban areas.

The Housing Element of the Sutter County General Plan expects the population in the county to grow to 109,280 by 2015. This is an additional 30,770 people from the 2000 census estimate of 78,510. Such growth will consume acres of previously undeveloped areas and the impacts may overwhelm existing drainage and flood control facilities.

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.

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 affects can result in floodplain impacts regardless.

The amount of growth in this and nearby communities will strain the limits of the entire water management system – which includes water supply in addition to water control. The Central Valley provides 2/3 of the water supply for southern California – so when flood control structures are overwhelmed, the result is not only severe flooding, but a significant loss to the state's water supply may also occur.

Local floodplain management ordinances require that new construction be built with the lowest floor at or above the base flood (100-year) elevation. New development that adheres to the elevation requirements in addition to other requirements for maintaining elevation certificates, implementing stormwater program elements and erosion or sediment controls for all new development in the floodplain should help protect new development from the 100-year flood event.

Overall Community Impact

Floods and their impacts will vary by community and will likely only affect certain areas of the county during specific flood events. Based on the risk assessment, it is evident that flooding in some areas will have an economic impact on the community. A failure of the levee system in an exceptional flood event could have significant damage potential, posing a threat to life and property and causing significant economic injury. However, many of the floods are minor,

localized flood events creating more of a nuisance (e.g., maintenance issues and traffic disruptions) than a significant economic impact to the area. The overall impact to the community from a devastating flood includes:

- Potential for loss of life and disruption of infrastructure;
- Commercial and residential structural damage;
- Damages to road/bridges resulting in loss of mobility;
- Possible damage/loss of sewer and drinking water treatment plants;
- Significant economic impact (jobs, sales, tax revenue) upon the community with the loss of commercial structures and impacts to the larger agricultural community;
- Negative impact upon commercial and residential property values; and
- Economic impacts due to washed out or flooded roads that necessitate detours.

A more catastrophic flood, such as with a dam or levee failure, would impact all of California. Recent court decisions have determined that the state is liable for flood related damages caused by levee failures – every taxpayer will foot the bill for the disaster. A levee failure in the Central Region would disrupt water supplies to the Bay Area and Central and Southern California. Extreme water conservation measures would need to be enacted. Ground water basins could be drawn down to dangerously low levels, potentially leading to contamination. Agricultural and other industries with heavy water reliance would be threatened.

VULNERABILITY TO WILDFIRES

Risk – Likely; Vulnerability –Low

Vulnerability to the Sutter County Planning Area from wildfire is low; although, there exists a limited exposure in the grass lands and shrub oaks of the Sutter Buttes and within areas in and adjacent to the grassy river bottoms. The Sutter Buttes are considered the primary concern with their limited access, steep terrain and remote location. Looking at the Planning Area as a whole, limited, fuel loads, along with the geographical and topographical features of the area, limit the potential for both natural and human-caused fires resulting in loss of life and property.

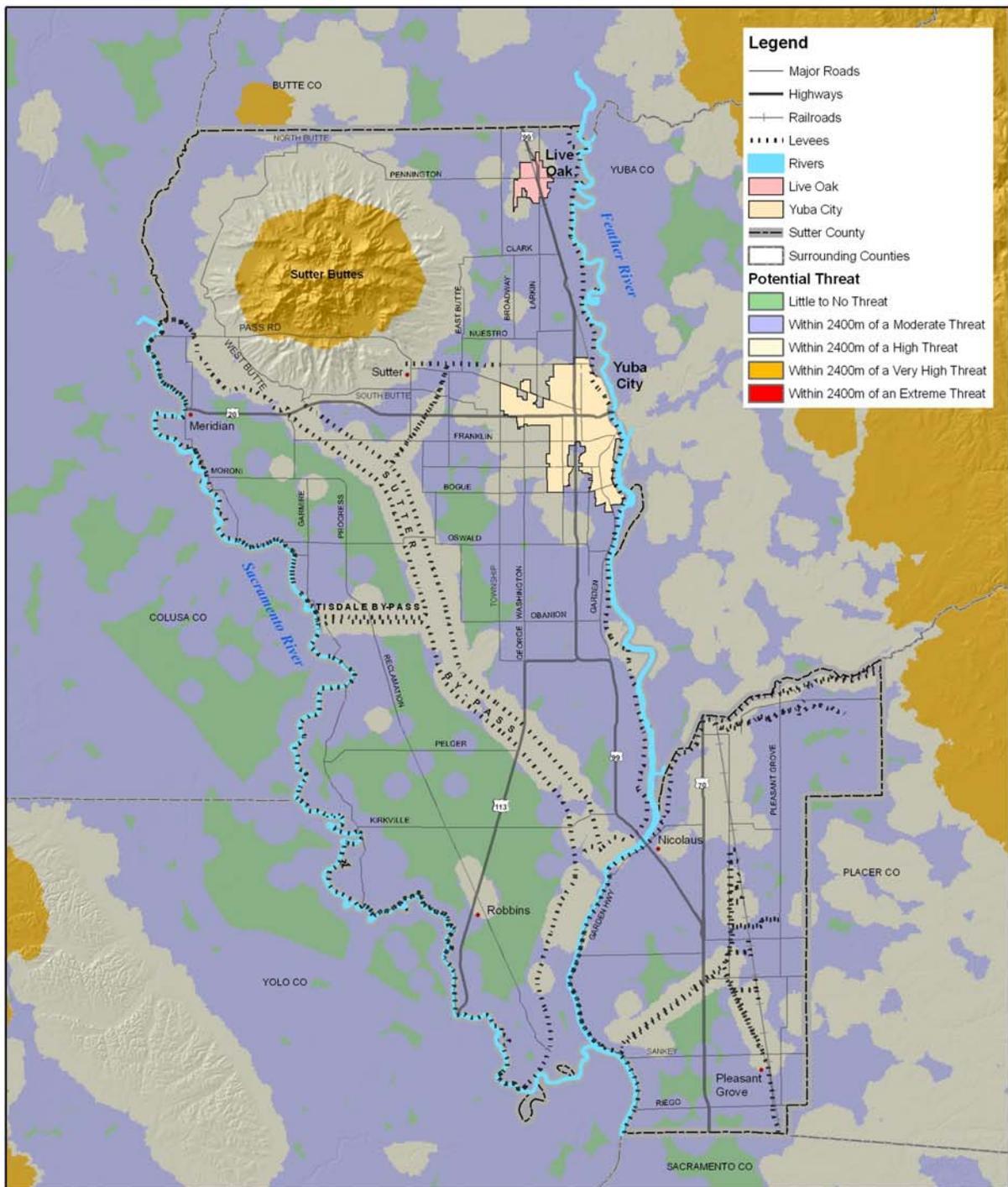
As with most wildfire vulnerability, it is the result of increased development encroaching into forested and dry grassland areas, typically referred to as the WUI. As development continues to occur throughout the Planning Area, especially in the area of the Sutter Buttes, the risk and vulnerability to wildfires will likely increase.

Any fire, once ignited, has the potential to quickly become a large, out-of-control fire, especially when combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic high wind conditions. Even the relatively flat, urbanized portion of the planning area is not immune.

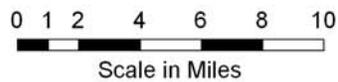
Fire Threat

The Wildland Fire Threat Map that follows shows the fire threat rating for areas throughout the Sutter County Planning Area. This potential wildland fire threat was analyzed using GIS data for the WUI Fire Threat developed by the CDF (2003 - edition 03_1 with 100 m cell size). CDF calculated a numerical index of fire threat based on the combination of fuel rank and fire rotation. This threat index was then grouped into five threat classes: Extreme, Very High, High, Moderate, and Little or No Threat. CDF buffered the threat categories with a 2400 meter buffer (approx. 1.5 miles) to identify areas that include or are near very high threat areas. Each class was buffered independently and then overlaid in the following priority - Extreme, Very High, High, Moderate, Little or No Threat. Thus, areas of greater threat class take precedence over areas with lesser or no threat class. For the purposes of this plan GIS was then used to determine the improved parcel centroids that lie within the 2400 meter of a very high fire threat.

Sutter County Potential Wildland Fire Threat Map



amec
 Map Compilation: AMEC 10/23/06
 Data Source: Sutter County, CA



Values at Risk

Overlaying the Fire Threat Map with the parcel layer for the county and incorporating assessor data, there are 28 improved agricultural parcels valued at \$3,970,499 located within 2,400 meters of the Sutter Buttes area identified as a Very High Threat of wildfire.

Cultural and Natural Resources at Risk

The Sutter County Planning Area 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 supply and water quality. Another is the aesthetic value of the area. Major fires that result in visible damage detract from that value. The Sutter Buttes itself is an important asset to Sutter County. The loss to these natural resources would be significant.

Critical Facilities at Risk

The primary area at risk to wildland fires within the Yuba City Urban Area are the riverbottoms of the West Feather River. The riverbottom 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 Plant located on the west side of the adjacent levee.
- A Union Pacific Railroad trestle that spans the width of the west Feather River riverbottom 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.

Overall Community Impact

The overall impact to the community from a severe wildfire includes:

- Potential for injury and loss of life;
- Commercial and residential structural damage;
- Impact on the water quality of watershed located within the county;
- Impact to natural resource habitats and other resources such as timber;
- Significant economic impact (jobs, sales, tourism, tax revenue) upon the community with the loss of commercial structures;
- Negative impact upon commercial and residential property values;
- Major wildland fires within the community would have a significant impact on the overall mental health of the community.

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.

Other Identified Hazards: Agricultural Hazards, Dam Failure, Drought, Earthquakes, Severe Weather, and West Nile Virus.

For the other hazards identified as significant hazards in Section 4.1, information is available where the potential impacts can be developed or inferred, although it is not tied to a county-specific location. For these other hazards, the entire Planning Area is at risk. The following sections describe the vulnerability of the Sutter County Planning Area to these other hazards.

VULNERABILITY TO AGRICULTURAL HAZARDS

Risk – Likely; Vulnerability - Medium

Given the importance of agriculture to Sutter County, agricultural disasters continue to be an ongoing concern. The primary causes of agricultural losses are severe weather events, such as drought and freeze and to a limited extent insect infestations. According to the HMPC, agricultural losses occur on an annual basis throughout the county and are usually associated with these severe weather events.

VULNERABILITY TO DAM FAILURE

Risk - Unlikely; Vulnerability –Extremely High

Dam failure flooding can occur as the result of partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall and flooding. 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, and associated revenues that accompany those functions.

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 the table that follows. 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.

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.

Oroville Dam Failure

The Oroville Dam facilities include Thermalito Diversion, Forebay, Afterbay and Lake Almanor Dams. Failures of Thermalito Diversion and Forebay Dams individually would have negligible affects due to low amounts of storage capacity. 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.

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

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. According to the EAP, failure of New Bullards Bar Dam would result in the failure of Englebright Dam 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 an New Bullards Bar Dam failure as reported by DWR.

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

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

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. This includes Keswick and Spring Creek Dams. This information is extrapolated from inundation scenarios and maps provided by USBR.

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

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. 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.

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.

VULNERABILITY TO DROUGHT

Drought: Risk – Likely; Vulnerability – High

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. A drought's effects impact various sectors in different manners and with varying intensity. Adequate water is the most critical issue; Agricultural, manufacturing, tourism, recreation, and commercial and domestic use all require a constant, reliable supply of water. As the population in the area continues to grow, so will the demand for water.

Based on historic information, the occurrence of drought in California, including Sutter County, is cyclical, driven by weather patterns. Drought has occurred in the past and will continue to occur in the future. The periods of actual drought with adverse impacts can vary from short to long term; often the period between droughts is extended. Although an area may be under an extended dry period, defining when a drought occurs is a function of drought impacts to individual water users. Since 1850, there have been 11 documented droughts in California. The vulnerability to Sutter County from drought is usually county-wide and depending on the area can include reduction in water supply, agricultural losses, and an increase in dry fuels.

VULNERABILITY TO EARTHQUAKES

Risk – Unlikely; Vulnerability – Medium

Earthquake vulnerability is primarily based upon population and the built environment. Urban areas in high hazard zones are the most vulnerable, while uninhabited areas are less vulnerable.

CGS and USGS have done considerable work using GIS technology to identify populations in high seismic hazard zones in each California county. According to the California Draft Multi-Hazard Mitigation Plan, 2004, zero percent of Sutter County's population is located in a High Seismic Hazard Zone.

Ground shaking, the principal cause of damage, is the major earthquake hazard. Many factors affect the potential damageability of structures and systems from earthquake-caused ground motions. Some of these factors include proximity to the fault and the direction of rupture, epicentral location and depth, magnitude, local geologic and soils conditions, types and quality of construction, building configurations and heights, and comparable factors that relate to utility, transportation, and other network systems. Ground motions become structurally damaging when average peak accelerations reach 10 percent 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 where:

Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars. (Bolt, 203)

Earthquakes can trigger secondary effects, such as dam failures, explosions, and fires that become disasters themselves. In addition to the potential for levee failures as a result of an earthquake, there is an extremely low probability of a seismic generated failure of a dam.

The Sutter County Shaking Potential map shown in Section 4.1 shows a 10 percent probability over 50 years of shaking intensity. Shaking is measured in a variety of ways, including peak ground acceleration, peak ground velocity, and spectral acceleration. This map is spectral acceleration, at one second frequency. The reason for looking at different frequencies is due to building response. In general, taller buildings may experience more damage by energy released in longer waveforms due to the harmonics of building sway, and ground shaking. Natural or artificially filled areas, such as the Marina District in San Francisco, tend to experience amplified motions, liquefaction, and associated ground failures that can cause extensive damage.

Fault rupture itself contributes very little damage unless the structure or system element crosses the active fault. In general, newer construction is more earthquake resistant than older construction because of improved building codes. Manufactured housing is very susceptible to damage because rarely are their foundation systems braced for earthquake motions. Locally generated earthquake motions, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry, such as was seen in the Oroville, Coalinga, Santa Cruz, and Paso Robles earthquakes.

Lifeline systems, such as water and natural gas pipelines, highways, overpasses and bridges, rail lines, electrical and other utility services, can experience substantial damage from shaking, ground deformations, and high velocities generated below ground by earthquakes.

Common impacts from earthquakes include damages to infrastructure and buildings (e.g., unreinforced masonry [brick] crumbling; architectural facades falling; underground utilities breaking, gas-fed fires; landslides and rock falls; and road closures). Earthquakes also can trigger secondary effects, such as dam failures, explosions, and fires that become disasters themselves.

Estimating Potential Losses

Earthquake losses will vary in Sutter County Planning Area depending on the source and magnitude of the event. Since there are no active faults in Sutter County, past studies of earthquake activity in the vicinity of Sutter County were reviewed and information on potential risk was used to develop HAZUS Level 1 earthquake scenarios for the county. Based on historical data, Sutter County is located within a region with faults that are capable of producing maximum credible earthquakes of up to 6.9 magnitude and peak ground acceleration at the site between 0.2g to 0.3 g. The results of the HAZUS scenarios based on these parameters is summarized below.

HAZUS-MH Earthquake Scenario

FEMA's earthquake loss estimation software, HAZUS-MH MR2, was used to simulate the effects of a potential earthquake. A worst case scenario was used to model potential earthquake impacts to Sutter County. HAZUS contains a GIS database of potentially active faults in

California that includes maximum credible earthquake magnitudes associated with each fault. The Great Valley 3 fault was chosen because it lies just west of Sutter County and has the potential for a M 6.9 earthquake. The default soil classification in HAZUS was changed from 'D' for stiff soils to 'E' for soft soils to more accurately represent the river sediments deposited in the Great Valley. The possible damages based on these parameters and the M 6.9 event occurring in the middle of the fault, west of the county are shown in the following table.

Sutter County Earthquake Scenario

Great Valley 3 Fault
 Probabilistic Earthquake
 6.9 Magnitude

According to HAZUS this more probable worst-case event could induce significant economic loss in the vicinity of \$187.62 million and deaths ranging from 1 to 2 depending upon the time of day.

The following table summarizes the HAZUS results.

HAZUS-MH Earthquake Scenario Results

Impacts/Earthquake	Sutter County M6.9
Residential Bldgs. Damaged <i>(Based upon 21,010 buildings)</i>	None: 16,570 Slight: 3,493 Moderate: 865 Extensive: 79 Complete: 3
Casualty <i>(Based upon 2pm time of occurrence)</i>	Without requiring hospitalization: 46 Requiring hospitalization: 8 Life Threatening: 1 Fatalities: 2
Displaced Households	74
Economic Loss	Property and Lifeline Damage: \$187.62
Damage to Schools <i>(Based upon 22 schools)</i>	None with at least moderate damage
Damage to Hospital <i>(Based upon 1 hospitals)</i>	None with at least moderate damage
Damage to Transportation Systems	None with at least moderate damage
Households w/out Power & Water Service <i>(Based upon 27,033 households)</i>	No loss of power Water loss @ Day 1: 1,544 Water loss @ Day 3: 42 Water loss @ Day 7: 0 Water loss @ Day 30: 0

VULNERABILITY TO SEVERE WEATHER

Extreme Temperatures: Risk – Highly Likely; Vulnerability - Medium

Winterstorms: Heavy Rains/Thunderstorms/Wind/Hail/Lightning: Risk –Highly Likely; Vulnerability - Medium

The severe weather further evaluated further in this vulnerability assessment includes: Extreme Temperatures and Winterstorms: Heavy Rains/Thunderstorms/ Hail/Lightning /Wind

Extreme Temperatures

Extreme temperature events occur within Sutter County on an annual basis. Given its significance to the community, the agricultural industry is most vulnerable to extreme temperatures. Historically, extreme temperatures have caused large losses to agricultural crops and have resulted in several USDA Disaster Declarations. In addition to damages caused by extreme temperatures, damages also resulted from freezing temperatures and drought.

Winterstorms: Heavy Rains/Thunderstorms/Hail/Lightning/Wind

Looking at historical hazard data, severe weather is an annual occurrence in Sutter County. Damages and disaster declarations related to severe weather events have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrence within the county. Wind and lightning often accompany these storms and have caused damage in the past. However, actual damages associated with the primary effects of severe weather have been limited. It is the secondary effects of 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 impacts are discussed in other sections.

VULNERABILITY TO WEST NILE VIRUS

West Nile Virus: Risk – Likely; Vulnerability - Medium

Both the risk and vulnerability to California from WNV is limited, based on the percentage of total population that actually comes down with the disease. The first appearance of WNV in the United States occurred in 1999. As of August 2003, WNV has been documented in 46 states and the District of Columbia. In California, WNV was detected on a very limited basis in both horses and humans in 2003. In 2004, California saw more cases of WNV, including 830 human infections. To date, there have been 928 human WNV cases in California from 40 counties, with 18 WNV fatalities. Since the discovery of WNV in California in 2003, Sutter County has experienced 18 human cases.

Although the potential for exposure does exist in Sutter County, the risk and vulnerability should be considered in terms of adverse effects due to exposure. The county already has an active vector control program in place for mosquitoes. And most important, protective measures to prevent exposure are relatively simple and cost effective. Given the nature of protective measures, such as wearing long sleeved clothing and using bug spray, the responsibility for protection can and should be an individual responsibility. Sutter County's current public education program should give the community both the knowledge as well as access to resources to effectively counter the risk and impact from WNV.

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