

## 11 HEALTH AND SAFETY ELEMENT



*The Butte County Fire Department has critical responsibilities for the safety of Butte County citizens and property. Photo courtesy of the Butte County Department of Development Services.*

The Health and Safety Element provides information about risks in Butte County due to natural and human-made hazards. This Element contains goals, policies, and actions designed to protect the community and its property from hazards and noise.

As required by state law, the Health and Safety Element addresses the protection of the community from unreasonable risks. Specific topics covered are:

- ◆ Noise
- ◆ Flood Hazards and Dam Inundation
- ◆ Seismic and Geologic Hazards
- ◆ Fire Hazards
- ◆ Hazardous Materials
- ◆ Emergency Response and Disaster Preparedness

- ◆ Community Health
- ◆ Climate Change Adaptation and Resilience

Each section of this Element addresses one of these issues and is divided into the following sections:

- ◆ **Background Information:** Contains information on current risks from natural and human-made hazards. An expanded discussion about the existing noise environment in Butte County is available in Chapter 16 (Noise) of the Butte County General Plan 2040 Setting and Trends Report. Expanded discussions about flood hazards, seismic and geologic hazards, fire hazards, hazardous materials, climate change hazards, and emergency response are available in Chapter 17 (Hazards and Safety) of the Setting and Trends Report. Existing public health programs are discussed in Chapter 7 (Public Services).
- ◆ **Goals, Policies, and Actions:** Provides goals, policies, and actions that are designed to reduce the risks to health and property due to natural and human-made hazards.

This Health and Safety Element is consistent with and supportive of other County-led emergency management and hazard mitigation activities, including the [County's Local Hazard Mitigation Plan](#) (LHMP). In 2006, the state adopted Assembly Bill (AB) 2140, which added provisions specifying what is to be included in an LHMP and how to establish a linkage between a local jurisdiction's LHMP and the Safety Element of their General Plan. AB 2140 requires a jurisdiction to adopt the LHMP into the Safety Element of the General Plan to be fully eligible for disaster relief funding under the California Disaster Assistance Act. The LHMP is discussed further in the Emergency Response and Disaster Preparedness section of this Element. Key terms used in this Element are defined in Appendix E.



## I. NOISE

### A. *Background Information*

Noise is defined as a sound or series of sounds that are considered to be invasive, irritating, objectionable, and/or disruptive to the quality of daily life. Noise varies in its range, source, and volume and can originate from individual incidents, such as lawn mowers, to sporadic disturbances, such as car horns or train whistles, to more constant irritants, such as traffic along major arterials.

Noise is a concern throughout Butte County, but especially in rural areas and in the vicinity of noise-sensitive uses such as residences, schools, and churches.

Section 65302(f) of the California Government Code requires that all city and county General Plans contain a Noise Element that can be used as a guide for establishing a pattern of land uses that minimizes the exposure of community residents to excessive noise. Thus, local governments are required to analyze and quantify noise levels and the extent of noise exposure through field measurements or noise modeling and implement measures and possible solutions to existing and foreseeable noise problems.

This section describes the existing noise environment in Butte County, including the location of noise-sensitive land uses and major mobile and stationary noise sources. Table HS-1 provides definitions of the acoustical terminology used in this document.

#### 1. **Noise Sources in Butte County**

There are several significant noise sources in Butte County. Mobile noise sources are those related to transportation. The major mobile noise sources in Butte County are roadway traffic, railroads, and airports. By far the most prevalent noise source is roadway traffic, which is a constant source of noise compared to the intermittent sounds from the county's railroads and airports. Railroad noise is evaluated using standards developed by the Federal Railroad Administration and the Federal Transit Administration. Airports are required to comply with the noise regulations and standards of the Federal Aviation Administration and Title 21 of the California Code of Regulations.

**TABLE HS-1 DEFINITION OF ACOUSTICAL TERMS**

Term	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-weighted sound level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
Community noise equivalent level, CNEL	The average a-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 p.m. to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m.
Day/night noise level, $L_{dn}$	The average a-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m.
Equivalent sound level, $L_{eq}$	The average of sound energy occurring over a specified period. The $L_{eq}$ is equivalent to the same average acoustical energy as the time-varying sound that actually occurs during a specified period.
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Stationary noise sources are typically associated with commercial, industrial, and public facilities. Significant stationary noise sources in unincorporated Butte County are the Neal Road Recycling and Waste Facility, solid waste transfer stations, aggregate mining operations, general service commercial and light industrial uses, recreational uses, and parks and school playing fields.

Noise exposures within industrial facilities are controlled by federal and state employee health and safety regulations through the Occupational Safety and Health Administration (OSHA) and the California Occupational Safety and Health Administration (Cal-OSHA), but even with regulations in place, exterior noise levels can exceed local noise standards. Recreational and public service facility activities can also produce noise that affects adjacent sensitive land uses. These noise sources can be continuous and may contain tonal components that may be annoying to individuals who live nearby. Noise from stationary noise sources that is perceived at sensitive uses may vary based on climatic conditions, time of day, and existing ambient noise levels.

Stationary noise sources that are typically of concern include the following:

HVAC Systems	Cooling Towers/Evaporative Condensers
Pump Stations	Lift Stations
Steam Valves	Steam Turbines
Generators	Fans
Air Compressors	Heavy Equipment
Conveyor Systems	Transformers
Pile Drivers	Grinders
Drill Rigs	Gas or Diesel Motors
Welders	Cutting Equipment
Outdoor Speakers	Blowers
Chippers	Amplified Music and Voice
Loading Docks	

## 2. Land Use Compatibility

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Places where people live, sleep, recreate, worship, and study are generally considered to be sensitive to noise because intrusive noise can be disruptive to these activities. Land use compatibility standards between these uses and noise-producing transportation (i.e., mobile) and non-transportation (i.e., stationary) noise sources are provided in Tables HS-2 and HS-3. There are separate standards for transportation and non-transportation noise sources because they affect different types of noise-sensitive uses in different ways.

## 3. Existing and Future Noise Contours

Noise contours for current and projected conditions within the county are provided in Appendix C in terms of the Day-Night Average Level ( $L_{dn}$ ), which is a descriptor of total noise exposure at a given location for an annual average day.  $L_{dn}$  is generally considered an equivalent descriptor of the community noise environment within plus or minus 1.0 dBA.

Noise contours for the four airports included within the Butte County Airport Land Use Compatibility Plan are shown in Appendix D. As shown in the Appendix D maps, the airport noise contours are affected by fire activity because the airport serves as the firefighting air tanker base for the California Department of Forestry and Fire Protection (CAL FIRE).

**TABLE HS-2**                      **MAXIMUM ALLOWABLE NOISE EXPOSURE TO  
TRANSPORTATION NOISE SOURCES**

Land Use	Exterior Noise Level Standard for Outdoor Activity Areas <sup>a</sup>		Interior Noise Level Standard	
	L <sub>dn</sub> /CNEL, dB	L <sub>eq</sub> , dBA <sup>b</sup>	L <sub>dn</sub> /CNEL, dB	L <sub>eq</sub> , dB <sup>b</sup>
Residential	60 <sup>c</sup>	--	45	--
Transient lodging	60 <sup>c</sup>	--	45	--
Hospitals, nursing homes	60 <sup>c</sup>	--	45	--
Theaters, auditoriums, music halls	--	--	--	35
Churches, meeting halls	60 <sup>c</sup>	--	--	40
Office buildings	--	--	--	45
Schools, libraries, museums	--	70	--	45
Playgrounds, neighborhood parks	--	70	--	--

Note: -- = not applicable.

<sup>a</sup> Where the location of outdoor activity areas is unknown, the exterior noise-level standard shall be applied to the property line of the receiving land use.

<sup>b</sup> As determined for a typical worst-case hour during periods of use.

<sup>c</sup> Where it is not possible to reduce noise in outdoor activity areas to 60 dB L<sub>dn</sub>/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L<sub>dn</sub>/CNEL may be allowed, provided that available exterior noise-level reduction measures have been implemented and interior noise levels are in compliance with this table.

## ***B. Goals, Policies, and Actions***

**Goal HS-1**    **Maintain an acceptable noise environment in all areas of the county.**

### Policies

- HS-P1.1        New development projects proposed in areas that exceed the land use compatibility standards in Tables HS-2 and HS-3 shall require mitigation of noise impacts.\*
- HS-P1.2        Noise from transportation sources shall not exceed land use compatibility standards in Table HS-2.\*



**TABLE HS-3                    MAXIMUM ALLOWABLE NOISE EXPOSURE TO  
NON-TRANSPORTATION SOURCES**

Noise Level Description	Daytime 7 a.m. – 7 p.m.		Evening 7 p.m. – 10 p.m.		Night 10 p.m. – 7 a.m.	
	DESIGNATION					
	Urban	Non- Urban	Urban	Non- Urban	Urban	Non- Urban
Hourly $L_{eq}$ , dB	55	50	50	45	45	40
Maximum Level, dB	70	60	60	55	55	50

## Notes:

1. “Non-Urban designations” are Agriculture, Timber Mountain, Resource Conservation, Foothill Residential and Rural Residential. All other designations are considered “urban designations” for the purposes of regulating noise exposure.
2. Each of the noise levels specified above shall be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).
3. The County can impose noise level standards which are up to 5 dB less than those specified above based upon determination of existing low ambient noise levels in the vicinity of the project site.
4. In urban areas, the exterior noise level standard shall be applied to the property line of the receiving property. In rural areas, the exterior noise level standard shall be applied at a point 100 feet away from the residence. The above standards shall be measured only on property containing a noise sensitive land use. This measurement standard may be amended to provide for measurement at the boundary of a recorded noise easement between all affected property owners and approved by the County.
5. If the ambient noise level exceeds that permitted by any of the categories in Table HS-3, the allowable noise limit shall be increased in 5 dBA increments in that category to encompass the ambient noise level.

- HS-P1.3            New noise-sensitive land uses shall not be within the 55  $L_{dn}$  contour of airports, roadways, and other noise-generating uses, with the exception of the Chico Municipal Airport.\*
- HS-P1.4            New noise-sensitive land uses shall not be within the 60  $L_{dn}$  contour of the Chico Municipal Airport.\*
- HS-P1.5            Noise from new recreational activities and events shall not exceed 60 dB at the nearest noise-sensitive land use.
- HS-P1.6            Applicants proposing a new noise-producing development project near existing or planned noise-sensitive uses shall provide a noise analysis prepared by an acoustical specialist with recommendations for design mitigation.
- HS-P1.7            Applicants for discretionary permits shall be required to limit noise-generating construction activities within 1,000 feet of residential uses to daytime hours between 7:00 a.m. and 6:00 p.m. on weekdays and non-holidays.

- HS-P1.8 Noise from generators shall be regulated near existing and future residential uses.
- HS-P1.9 The following standard construction noise control measures shall be required at construction sites to minimize construction noise impacts:\*
- a. Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
  - b. Locate stationary noise-generating equipment as far as possible from sensitive receptors when sensitive receptors adjoin or are near a construction project area.
  - c. Use quiet air compressors and other stationary noise-generating equipment where appropriate technology exists and is feasible.\*
- HS-P1.10 To reduce impacts from groundborne vibration associated with rail operations, residences, or other vibration-sensitive buildings shall be sited at least 100 feet from the centerline of the nearest railroad track whenever feasible. Development of vibration-sensitive buildings, such as those containing precision medical and industrial equipment or television, radio, and recording studios, within 100 feet from the centerline of the nearest railroad track shall require a study demonstrating that groundborne vibration issues associated with rail operations have been adequately addressed through building siting or construction techniques.

## II. FLOOD HAZARDS AND DAM INUNDATION

### A. *Background Information*

Flooding is a concern throughout Butte County. This section discusses floodplains, levee safety, floodplain development regulations, and dam inundation.

#### 1. Floodplains

Butte County has historically been subject to flooding from various rivers and creeks, most particularly from the Feather and Sacramento Rivers. Approximately 489,421 acres, or 35 percent, of the unincorporated area of Butte County is in a designated flood hazard area.<sup>1</sup> The County has completed an assessment of flooding hazards as part of the Butte County LHMP. The following are the principal areas subject to flooding in Butte County:

- ◆ Butte Creek
- ◆ Little Chico Creek
- ◆ Little Chico Creek Diversion
- ◆ Mud Creek, Sand Creek, Keefer Slough, and Rock Creek
- ◆ Ruddy Creek and Ruddy Creek Tributary
- ◆ Sycamore Creek
- ◆ Wyman Ravine, Wyandotte Creek, and associated and tributaries and others near Palermo
- ◆ Comanche Creek
- ◆ Butte Basin Overflow area for the Sacramento River

In addition to these streams, flooding in Rock Creek and Keefer Slough, north of Chico, occurred on several occasions in each of the last four decades, inundating State Routes (SR-) 99 and 32 and several county roadways, as well as impacting extensive residential and agricultural areas in and around the North Chico area and the unincorporated community of Nord. In addition, Dry Creek-Cherokee Canal poses a flood risk to the Richvale area, including rice research grounds, rice storage, and chemical storage facilities.

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<sup>1</sup> Butte County. 2019. Butte County Local Hazard Mitigation Plan, Chapter 4: Risk Assessment.

Flooding was much more prevalent and more of a risk prior to various state and federal flood-control projects, as well as various development restrictions enforced by Butte County. However, many flood management facilities need improvements and flooding remains an issue that Butte County regulatory agencies are seeking to address, in part through mapping flood hazard areas and studying flood hazards.

The following local, state, and federal agencies have responsibility for flood protection: US Army Corps of Engineers (USACE), California Department of Water Resources (DWR), Central Valley Flood Protection Board (CVFPB), and Butte County Service Area 24.

- ◆ The USACE is responsible for federal levees and canals such as the Mud Creek earthen levees, Little Chico-Butte Creek, Butte Creek earthen diversions, the Cherokee Canal, and the Feather River earthen levees.
- ◆ DWR is responsible for channel maintenance on the Chico/Mud Creeks project. In addition, DWR is responsible for operation and maintenance (including levee and channel maintenance) of all other project facilities on Butte Creek, Cherokee Canal, Big Chico Creek as it runs through Chico, Little Chico Creek Diversion to Butte Creek, and the Sacramento River. Developments or encroachments into these areas are subject to a permit from the CVFPB.
- ◆ Butte County Service Area 24 is only responsible for the Federal Flood Control Project levees on the Chico/Mud Creeks and Sandy Gulch (Sycamore to Mud Creek) Flood Control Project.

#### a. 100-Year Floodplains

Nationally, FEMA prepares guidance and sets requirements for floodplain management. FEMA provides both paper Flood Insurance Rate Maps (FIRM) and Q3 flood data, which was developed to support floodplain management and planning activities but does not replace the official paper FIRMs. FEMA prepared the most recent FIRMs in January 2022.

FEMA manages the National Flood Insurance Program (NFIP), which provides insurance to communities that participate in the program and works with state and local agencies to adopt floodplain management policies and flood mitigation measures. Federal flood insurance is required for any structure within a Special Flood Hazard Zone (zones designated by FEMA as Zone A, AE, AO, or AH) for any property that has a federally insured loan. FEMA flood information for the county was most recently updated in January 2011. More detailed information on FEMA flood zones, maps, and regulations may be found at <http://msc.fema.gov/> and through the Butte County



Department of Public Works. Butte County regulations concerning development in floodplains are contained in Article IV of Chapter 26 of the Butte County Code.

A key element of the NFIP is the identification of floodplain boundaries, which are depicted on FEMA FIRMs. The concept of the 100-year flood (also termed the “base flood”), is a central component in FIRM mapping. The 100-year flood represents a flood event that is likely to occur once every 100 years or, stated differently, that has a 1-percent chance of occurring in any given year. FEMA mapping of flood hazard zones for all of Butte County has been completed with the most accurate and up-to-date information derived from the January 2011 FIRM mapping. The Butte County LHMP uses information from the August 2017 FEMA data. FEMA refers to land areas subject to the 100-year flood event as Special Flood Hazard Areas (SFHAs). SFHAs indicate the level of analysis conducted, potential flood depths, and insurance requirements in a given area.

#### b. 200-Year Floodplains

Pursuant to the provisions of Senate Bill (SB) 5 (2007), SB 17 (2007), and Assembly Bill (AB) 162 (2007), which are discussed further in Section A.4, DWR and the CVFPP adopted the Central Valley Flood Protection Plan (CVFPP) in 2017. As required by AB 162, Butte County has incorporated CVFPP measures into this Health and Safety Element of the General Plan by including the new 200-year floodplains; levees and levee flood protection zones; dam mapping and dam inundation zones; and a more extensive flood risk analysis. This analysis considers the following:

- ◆ New floodplain data [DWR Best Available Maps, based on a 2002 USACE study]
- ◆ The impact of local and regional flood protection projects to potential new development (e.g., Feather River West Levee Project)
- ◆ Critical facilities, roadways, and other infrastructure most at risk for flood damage (LHMP).

SB 5 authorized DWR to develop the Best Available Maps displaying 100- and 200-year floodplains for areas located in the Sacramento-San Joaquin Valley watershed. SB 5 requires that these maps contain the best available information on flood hazards and be provided to cities and counties in the valley watershed. The Best Available Maps use data from multiple sources including FEMA Digital FIRMs, FEMA Q3 flood data, DWR Awareness Mapping, and USACE and other regional agency studies. The County has used these mapping sources to identify 200-year floodplain areas in Butte County.

The County has also incorporated measures recommended in the CVFPP into the Zoning Ordinance. The CVFPP recommends a range of policy and implementation measures, including, but not limited to, ensuring access to levees for repair, conveying information and transparency of flood risk to affected community members, requiring additional coordination between agencies, and locating critical facilities outside 100-year and 200-year floodplains when possible.

AB 162 and the CVFPP established certain flood protection requirements for local land use decision-making. This law set a higher standard for flood protection in the Sacramento-San Joaquin Valley area, which covers the entire Delta region, including Butte County. This higher level of flood protection—the urban level of flood protection (ULOP)—must withstand flooding that has a 1-in-200 chance (200-year flood) of occurring in any given year according to criteria developed by DWR.

Several limitations apply to implementing the ULOP:

- ◆ The ULOP applies only in urban or urbanizing areas. Government Code Section 65007 defines an “urban area” as a developed area in which there are 10,000 residents or more. An “urbanizing area” is a developed area or an area outside a developed area that is planned or anticipated to have 10,000 residents or more within the next 10 years. The Chico area is currently the only area in the mid- and upper Sacramento Regional Flood Management Plan (RFMP) regions that meets the definition of urban or urbanizing, but it is not within the most current 200-year floodplain map.
- ◆ The ULOP does not apply to local drainages. Local drainages are defined by DWR as localized conditions that may occur anywhere in a community, such as localized rainfall, water from stormwater and related drainage problems, and water from temporary water and wastewater distribution system failure. Generally, watersheds shorter than 10 miles in length are considered local drainages.
- ◆ The ULOP applies only to areas in which a 200-year flood event would result in flooding of greater than 3 feet.

Areas subject to the 200-year flood (urban or urbanizing, not local drainages, and flooding resulting in more than 3 feet) must meet the ULOP requirements. DWR and USACE have developed 200-year floodplain maps, but not all maps for the county include flood depths, so additional analysis may be necessary to determine if areas within the 200-year floodplain are subject to flood depths of greater than 3 feet.

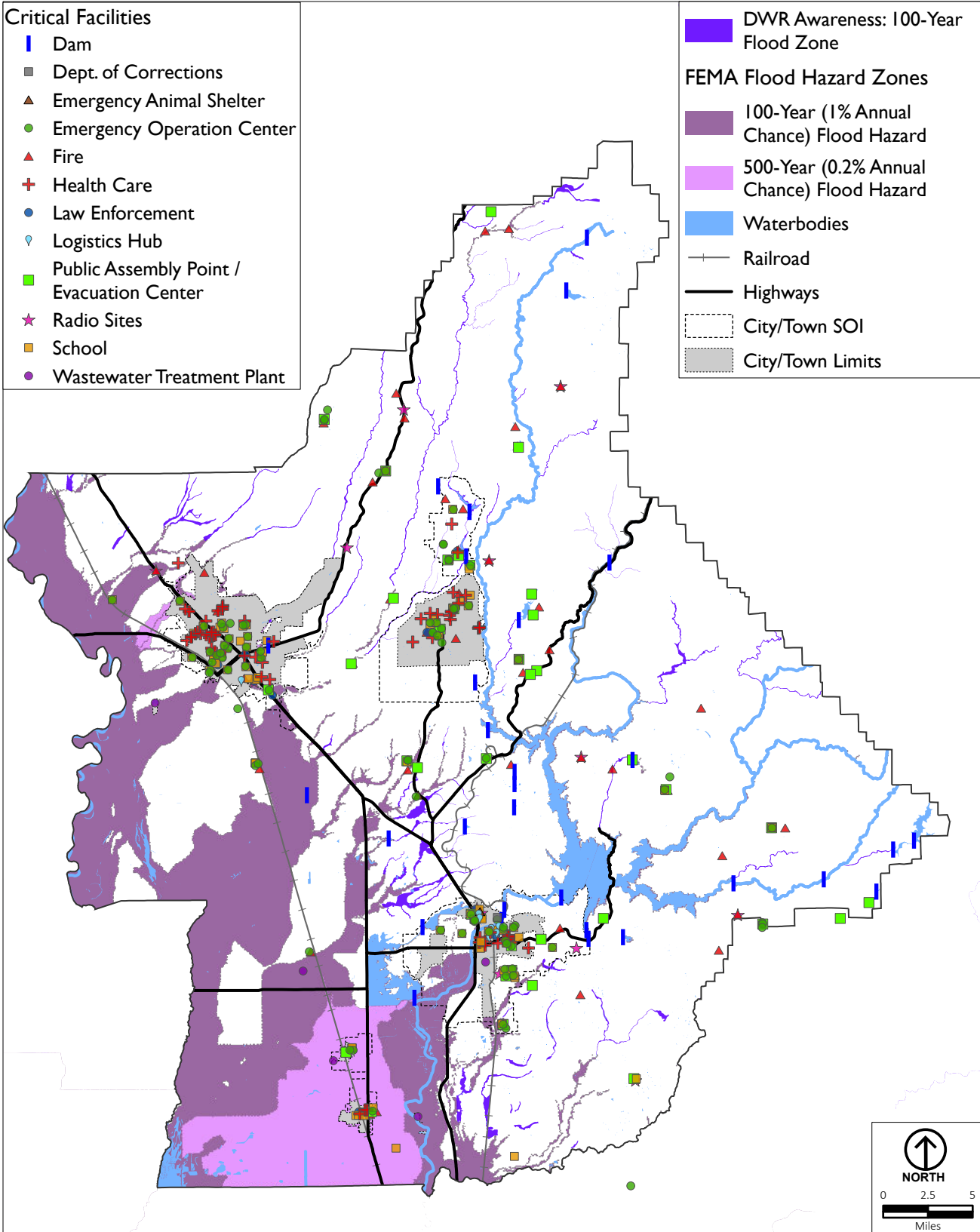
SB 5 required DWR to prepare preliminary maps for 200-year floodplains protected by project levees and to provide such maps or notice of availability of other flood risk information to cities and counties in the Central Valley by 2008. The 200-year

floodplain mapping provided by DWR to Butte County is derived from a 2002 study prepared by the USACE, focused on flooding from the Sacramento River. This study does not include flood depth information. This data source represents the DWR's Best Available Map for the 200-year floodplain for Butte County. As shown, the 200-year floodplains are along Butte County's western edge.

Any new development proposed in areas determined to be within the 200-year floodplain may be required to comply with the ULOP. Per the provisions of SB 5 and AB 162, the County must make a finding related to the proposed development in these areas and determine if the ULOP applies. This review and the findings will be based on Zoning Code Section 24-47.1, Urban Flood Protection Overlay Zone, and Buildings Code Article IV, Flood Hazard Prevention. The following agencies and programs provide additional information about flood hazards in Butte County. Figures HS-1, HS-2A, HS-2B, and HS-3 show the 100-year, 200-year, and 500-year floodplains identified by these agencies, the Urban Flood Protection Overlay, as well as local and regional studies. Maps referenced below are also available through the Butte County Department of Public Works.

- ◆ **USACE.** The USACE provides information about flood hazards in the Sacramento and San Joaquin River basins. Maps are available on the USACE Sacramento District website.
- ◆ **DWR Floodplain Evaluation and Delineation.** DWR currently provides maps and studies about floodplains. Maps are available on the DWR website, Floodplain Management section.
- ◆ **DWR-Designated Floodway Maps.** A designated floodway is defined as a channel of a river or other watercourse and the adjacent land areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure there are no increases in upstream flood elevations. DWR provides designated floodway maps for the Sacramento and Feather Rivers. DWR does not use the FEMA definition of a floodway and instead uses the following definition: "The channel of a stream and that portion of the adjoining floodplain required to reasonably provide for the construction of a project for passage of the design flood including the lands necessary for construction of project levees that are regulated by the Central Valley Flood Protection Board." Designated floodways in Butte County, including the Sacramento and Feather River floodways, are available on the DWR website, Floodplain Management section.

**BUTTE COUNTY  
GENERAL PLAN 2040  
HEALTH AND SAFETY ELEMENT**

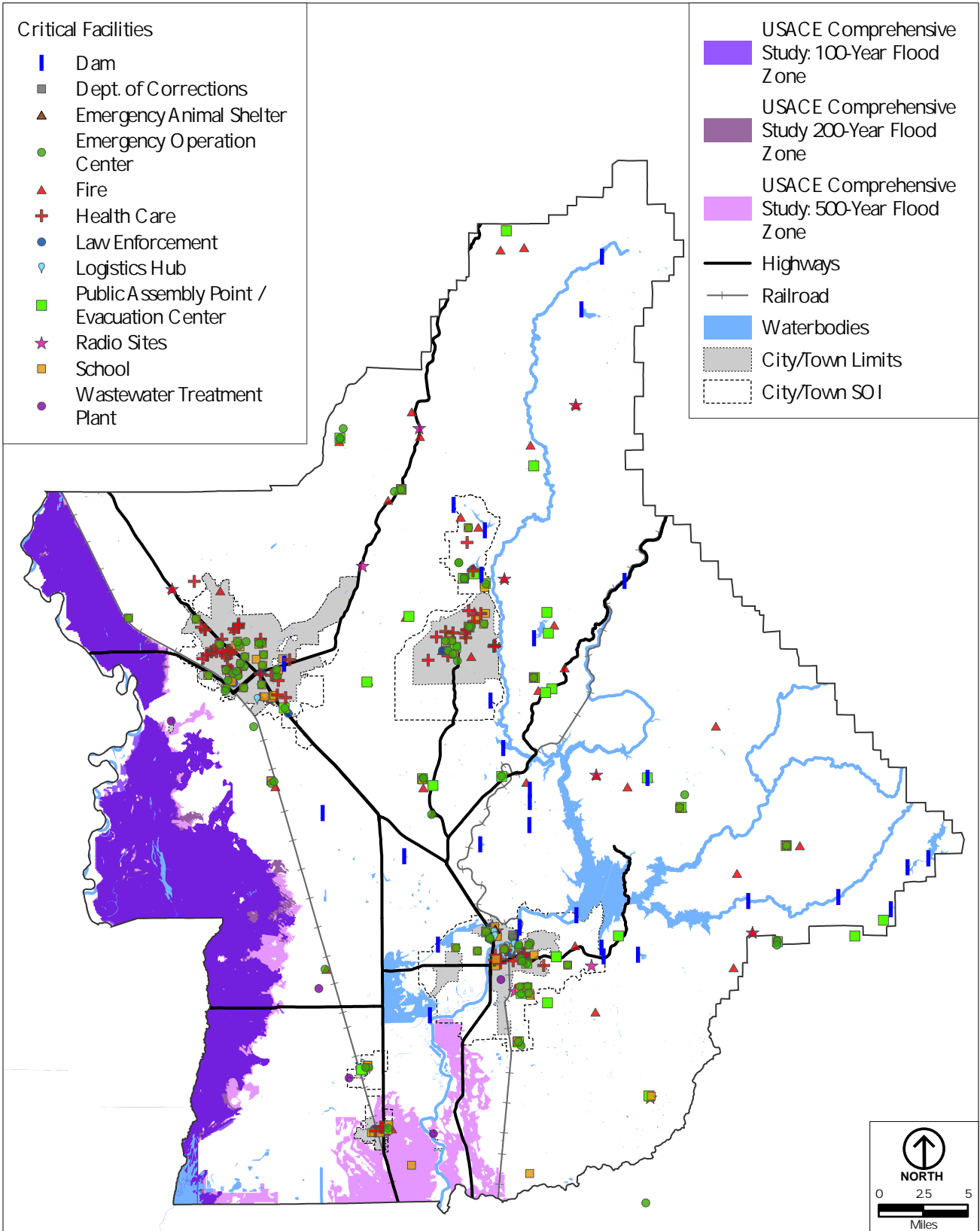


Source: Butte County, 2021; California Department of Water Resources, 2022; FEMA, 2021; PlaceWorks, 2021

**FIGURE HS-1  
FEMA FLOOD HAZARD AND DWR AWARENESS ZONES  
RPC 2(b)(v)**



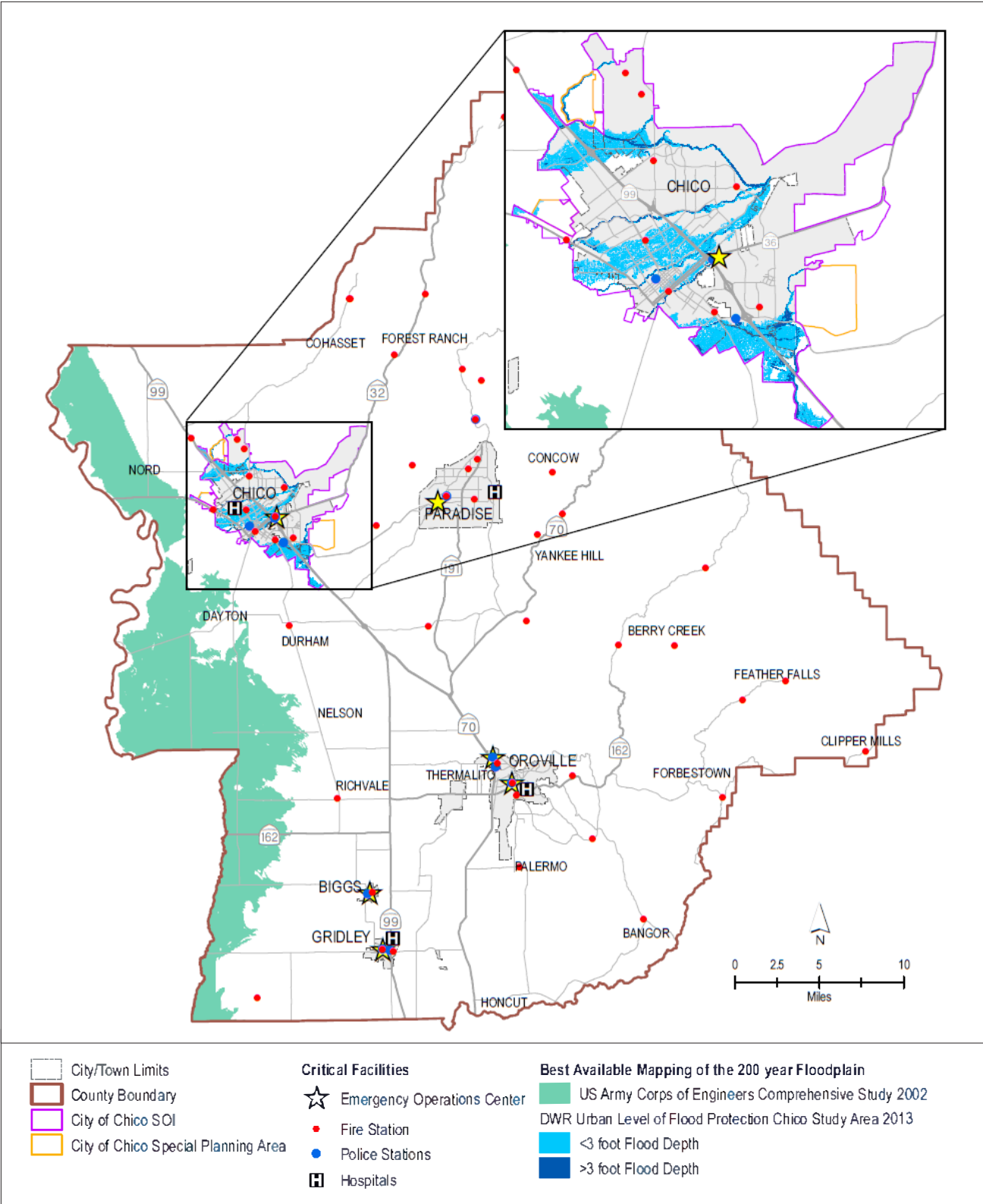
BUTTE COUNTY  
 GENERAL PLAN 2040  
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Source: Butte County, 2021; USACE, 2002; PlaceWorks, 2021;

FIGURE HS-2A  
 USACE 100-YEAR, 200-YEAR, AND 500-YEAR STUDIES  
 RPC 2(b)(v)

**BUTTE COUNTY  
GENERAL PLAN 2040  
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Source: Michael Baker International, 2016; USACE Comprehensive Study, 2002; DWR Urban Level of Flood Protection Informational Map, 2013; Butte County, 2016.

**FIGURE HS-2B  
URBAN FLOOD PROTECTION OVERLAY  
RPC 2(b)(v)**

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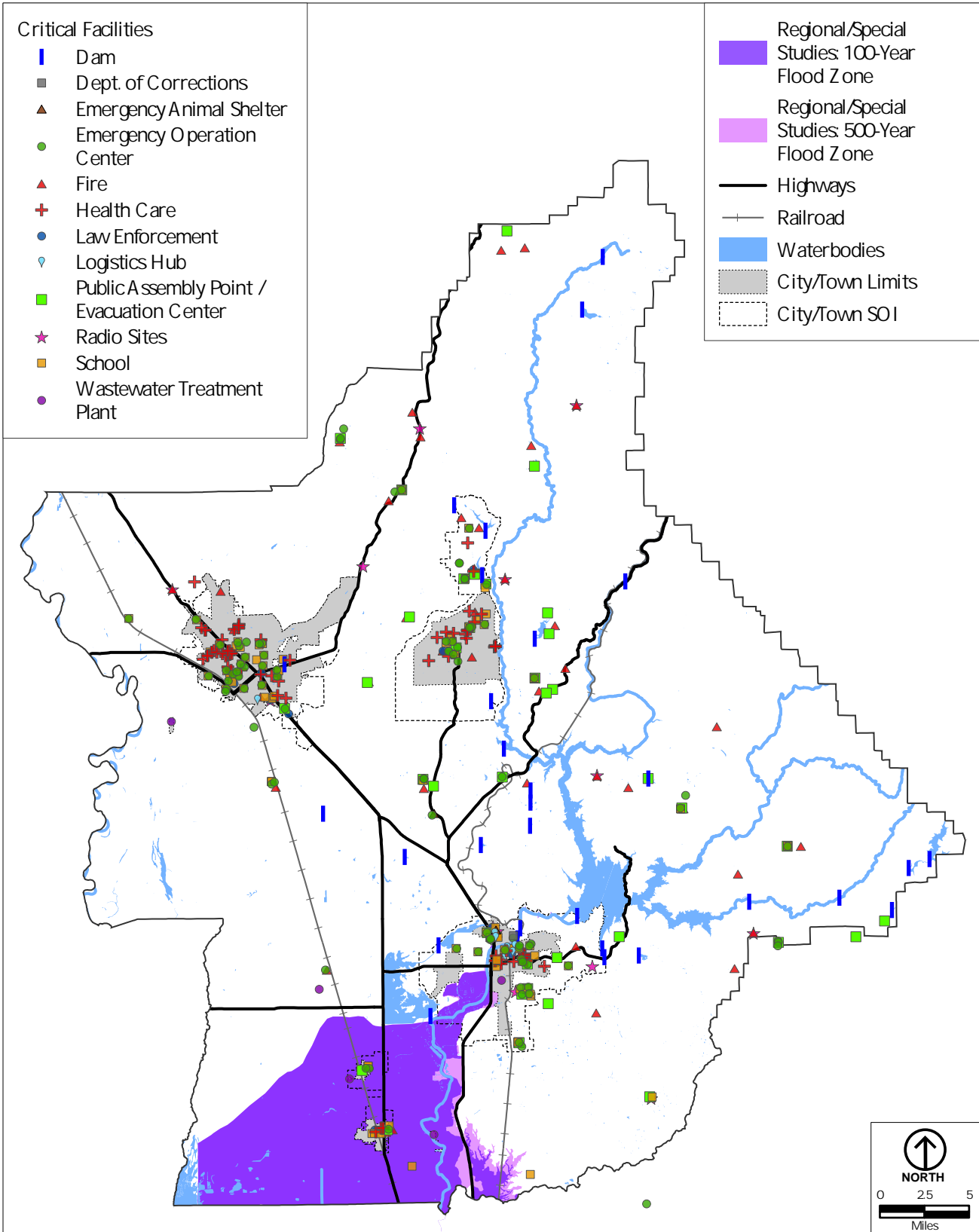


FIGURE HS-3  
 REGIONAL/SPECIAL STUDIES: 100- AND 500-YEAR FLOODS  
 RPC 2(b)(v)

- ◆ **DWR Awareness Floodplain Mapping Program.** This program identifies flood hazard areas that are not mapped by FEMA’s NFIP maps, which are only created for areas within FEMA-designated floodplains. Awareness floodplain maps are updated more frequently and can be targeted and prepared for a community or intent. Maps are available on the DWR website, Floodplain Management section.
- ◆ **Project Levees and Levee Protection Zones.** DWR has mapped inundation areas for levees that are part of state and federal water projects in the Central Valley. Project levees and levee protection zones in Butte County are shown on Figure HS-4.
- ◆ **Non-Project Levee Failure Inundation Areas.** DWR has mapped areas subject to inundation in the event of failure of levees or floodwalls that are not part of state or federal water projects. These levees are known as “non-project” levees because they may not have been built or maintained to state or federal standards, which can increase the likelihood of failure and inundation. Non-project levees in Butte County are also shown on Figure HS-4.

#### **Critical Facilities in Butte County**

DWR recommends that jurisdictions evaluate critical facilities in the context of flood mitigation. These facilities are identified in Chapter 4 of the Butte County LHMP. Certain facilities are necessary for effective response in the case of a flood:

- ◆ Public safety: police stations, fire and rescue stations, and emergency operations centers.
- ◆ Emergency response: emergency vehicle and equipment storage and essential governmental work centers, such as City Halls or Public Works offices, for continuity of government operations.
- ◆ Emergency medical: hospitals, emergency care, urgent care, and ambulance services.
- ◆ Designated emergency shelters.
- ◆ Communications: main hubs for telephone, main broadcasting equipment for television systems, radio, and other emergency warning systems.
- ◆ Public utility plant facilities: including equipment for treatment, generation, storage, pumping and distribution (hubs for water, wastewater, power, and gas).
- ◆ Essential government operations: public records, courts, jails, building permitting and inspection services, government administration and management, maintenance and equipment centers, and public health facilities.



**BUTTE COUNTY  
GENERAL PLAN 2040  
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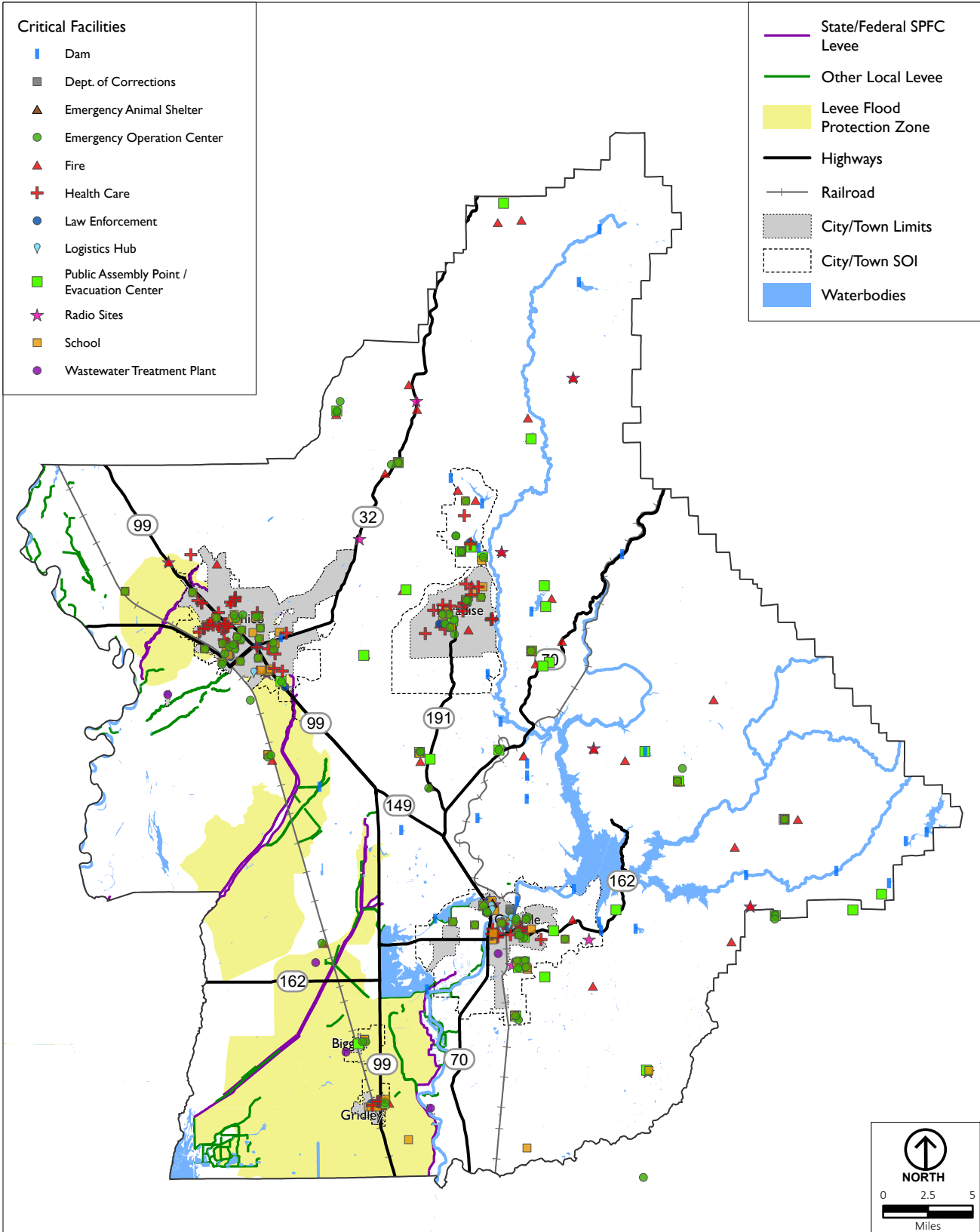


FIGURE HS-4

**LEVEES AND LEVEE FLOOD PROTECTION ZONES**  
RPC 2(b)(v)

- ◆ At-risk population facilities: schools, daycare centers, group homes, assisted living residential or congregate care facilities.
- ◆ Hazardous materials facilities: facilities that could release hazardous materials in sufficient amounts during a hazard event that would create harm to people, the environment, or property.

The location of these critical facilities and their level of protection from floods are important determinants for how well the County will be able to respond in a flood event. Several critical facilities, including essential services and at-risk population facilities, are within the 100-year and 500-year floodplains. In the unincorporated county, 18 facilities are in the 100-year floodplain (12 dams, 1 wastewater treatment plant, 2 fire stations, 1 emergency animal shelter, 1 school, and 1 evacuation center) and 2 facilities are in the 500-year floodplain (1 fire station and 1 school). Several critical facilities in the unincorporated county are also located within dam inundation areas, including two wastewater treatment plants, three fire stations, four dams, and six schools.<sup>2</sup> Some of these facilities must be located in specific areas to provide effective and timely service in an emergency event. New facilities that do not have to be located in certain areas for adequate service should be sited outside of 100- and 200-year floodplains. These measures are consistent with the CVFPP.

## 2. Levee Safety

Butte County has a number of levees constructed by both private individuals and government agencies. Many of these levees are aging and may need repair and maintenance to adequately control flood flows. Generally, levees fail from overtopping or collapse. A catastrophic levee failure resulting from collapse would occur quickly with little warning. Levees may fail because of earthquake-induced slumping, landslides, or liquefaction. Land subsidence adjacent to levees may increase water pressure against levees, adding to the potential for levee failure. In addition, many non-project levees are not maintained to specified standards, which can increase the likelihood of failure and inundation.

### a. FEMA Evaluation

FEMA evaluates levees to determine whether an area is protected from a 100-year flood by a levee. FEMA has adopted criteria to make these determinations. These criteria consider whether a particular segment of a levee has been certified to meet the criteria to withstand the 100-year flood event. According to the 2011 FIRMs, FEMA

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<sup>2</sup> Butte County. 2019. Butte County Local Hazard Mitigation Plan Update. <https://www.buttecounty.net/oem/mitigationplans>.

did not certify a number of levees in Butte County because they did not meet FEMA criteria.

Levees on the following creeks do not meet FEMA's standards:

- ◆ Butte Creek (downstream of the Skyway)
- ◆ Hamlin Slough
- ◆ Little Chico Creek (downstream of the Butte Creek Diversion Channel)
- ◆ Comanche Creek
- ◆ Cherokee Canal
- ◆ Rock Creek<sup>3</sup>

During intense storms, water could flow over the top of these levees and break out of the channel, usually not returning to the main channel for several thousand feet downstream, if at all. Therefore, the areas on the landside of these levees are shown on the 1998, 2000, 2011, and 2017 FIRMs as being subject to inundation during a 100-year flood event. The 100-year floodplain, shown in Figure HS-1, identifies the flood hazard zones, which includes all the areas subject to inundation in such an event.

#### b. DWR Evaluation

DWR has also evaluated the levee system in areas protected by Central Valley state and federal project levees for the purposes of determining whether these areas are protected from a 200-year flood and identifying the levees that are in the greatest need of repair or improvement. DWR has identified areas where flood levels would be more than 3 feet deep if a project levee were to fail or be overtopped; these areas are known as levee flood protection zones (LFPZs). DWR used information from several sources currently available to determine LFPZs, including FEMA flood data, the USACE's 2002 Sacramento and San Joaquin River Basins Comprehensive Study, and local project-levee studies.

There are four project levees in the county. These levees run along the Cherokee Canal, Butte Creek, and the Butte Creek diversion channel, and along the south side of the Chico/Mud Creek system. The locations of project and non-project levees, as well as LFPZs related to these levees, are shown in Figure HS-4. LFPZs cover significant portions of southern and western Butte County.

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<sup>3</sup> Rock Creek is managed by the Rock Creek Reclamation District, which maintains a number of levees uncertified by FEMA.

### 3. Floodplain Regulatory Framework

Regulation of development in known flood-prone areas can reduce flooding risks to life and property. Butte County has a number of programs in place and works closely with various state and federal agencies and local watershed groups as part of its overall flood management strategy. The regulations related to flood-prone areas are as follows:

- ◆ **Central Valley Flood Protection Plan.** According to California Government Code Sections 65302.9 and 65860.1, every jurisdiction in the Sacramento-San Joaquin Valley is required to update its general plan and zoning ordinance in a manner consistent with the CVFPP. In addition, the locations of the state and local flood management facilities, the locations of flood hazard zones, and the properties in these areas must be mapped consistent with the CVFPP.
- ◆ **SB 5, SB 17, and AB 162.** As part of SB 5 (Machado and Wolk), SB 17 (Florez), and AB 162 (Wolk), urban and urbanizing areas in the Sacramento Valley and San Joaquin Valley were required to achieve, or make adequate progress toward achieving, 200-year storm flood protection by the year 2016 to continue to approve development in the floodplain. Specifically, AB 162 requires that each local jurisdiction's Safety Element include 200-year floodplain maps. Maps must be based on the best available data on flood protection, including areas protected by state and federal project levees, and areas outside of these areas.
- ◆ **Permit Approval.** California Government Code Sections 65865.5, 65962, and 66474.5 require certain findings to be made prior to granting approval or issuance of building permits within an identified 200-year floodplain. Specifically, the County must find that a flood management facility protects the property to an urban level according to DWR standards or that progress has been made toward constructing a flood protection system that will provide an urban level of flood protection. The County must also require conditions of approval that will protect the property to an urban level of flood protection.
- ◆ **Flood Hazard Prevention Ordinance.** This County ordinance requires the Department of Development Services to review all applications for new construction or subdivisions in flood hazard areas and requires that the lowest floor of any new construction or substantial improvement in FEMA-designated 100-year floodplains (as shown on Figure HS-1) be elevated 1 foot or more above the regulatory flood elevation. Also, applicants must show that development within the floodplain will not raise the existing flood level in a manner that adversely affects any neighboring property. FEMA's 500-year floodplain shows areas that have a 0.2 percent probability of flooding every year. Properties in the 500-year floodplain are considered to be at moderate risk of flooding under the NFIP. Flood insurance

is not required for properties in in the 500-year floodplain, and local floodplain zoning ordinances do not apply to the 500-year floodplain. FEMA’s flood hazard zones are developed for the purpose of establishing NFIP requirements. The County Flood Hazard Prevention Ordinance also requires that the Department of Development Services review any proposed development agreement, tentative or parcel map, a subdivision or discretionary permit or other discretionary entitlement, or any ministerial permit that would result in the construction of a new residence in USACE-designated 200-year floodplains (as shown in Figure HS-2A) and conduct findings in accordance with ULOP regulations.

- ◆ **Flooding Mitigation Actions.** These actions are part of the Butte County LHMP, which is described further in Section VI of this Element. The Action Plan contains a description of flood hazards, a risk assessment, plans and programs to address the hazards, and mitigation goals and strategies for each jurisdiction in Butte County.
- ◆ **On-Site Flood Control Measures.** The County’s measures include, for example, retention or detention of peak runoff, clustering buildings and constructing narrower paved streets. On-site flood control measures are intended to decrease the amount and rate of stormwater runoff that could contribute to flood flows.

#### 4. Dam Inundation

As of 2021, there are 24 dams in Butte County under the jurisdiction of the California Department of Water Resources Division of Safety of Dams, with inundation areas in the county. An additional 16 dams located in Plumas County and Shasta County have dam failure inundation zones that reach Butte County. These dams provide the county and large sections of the state with drinking water, irrigation water, stock water, recreation, and power production. Most substantial among these is the Oroville Dam, located northeast of the city of Oroville, which has a storage capacity of over 3.5 million acre-feet. There are smaller dams at Lake Wyandotte, Lake Madrone, Lost Creek, Round Valley, Magalia Reservoir, and elsewhere. The failure of a dam may affect the dam site, downstream areas, floodwater routing, or all three. As shown, some dam failures would result in large-scale flooding directly at the dam site, while others may only affect downstream areas and floodwater routing. The dam inundation assessments show the results of technical studies completed and approved at a given time for a single dam. They do not consider likely damage, but rather illustrate the areas that may be inundated in such an event. The Dam Inundation Mapping Procedure is defined in Title 19, Division 2, Chapter 2, Section 2527 of the California Code of Regulations.

Any dam poses a potential risk of failure, which would most likely be caused from seismically induced ground shaking or other seismic events and which threatens the area below the dam with inundation. Since 1972, the state has required inundation maps for most dams, showing those areas within the potential dam failure inundation zone. Dam inundation areas for state and privately owned dams in Butte County are shown on Figure HS-5. The federal government maintains public maps of the dam inundation areas for federal dams, including the Black Butte, Whiskeytown, and Shasta Dams. The inundation zones of these dams cover much of the southern and western portions of the county. Consideration of risks from dam inundation for these facilities is coordinated between the Bureau of Reclamation, Butte County Department of Development Services, and Butte County Office of Emergency Management (OEM). Most of the state- and privately-owned dams in Butte County would affect a relatively small local inundation area. However, the failure of the Oroville Dam or the Thermalito Afterbay Dam would have the potential to inundate a substantial portion of southwestern Butte County.

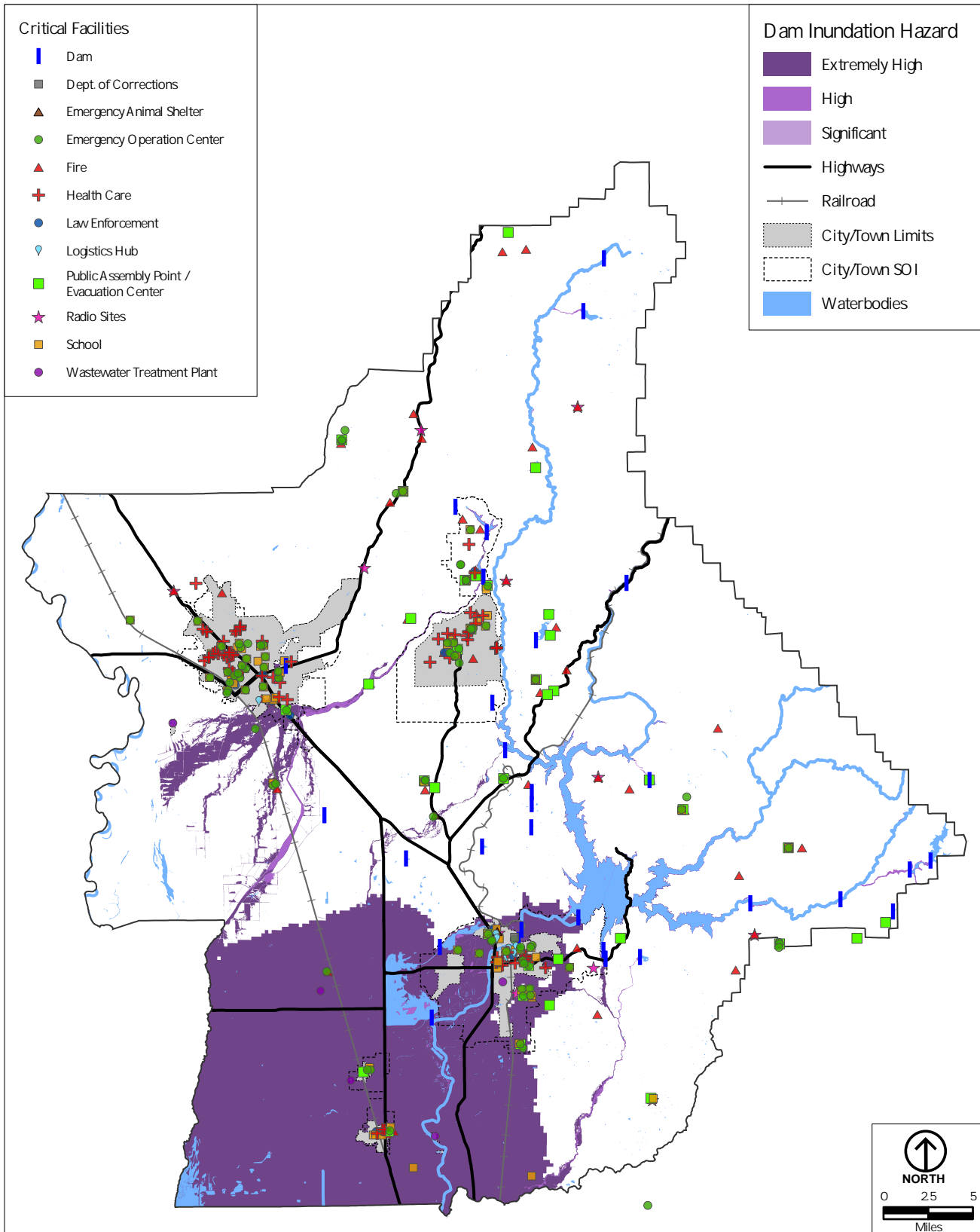


*Oroville Dam. Photo courtesy of the Butte County Department of Development Services.*

As of September 2021, of the 24 dams within Butte County, 21 have a satisfactory condition assessment, one has a fair conditions assessment (Oroville Dam), and two have a poor condition assessment (Grizzly Creek and Magalia Dams). Oroville Dam has an extremely high downstream hazard, Grizzly Creek Dam has a significant downstream hazard, and Magalia Dam has a high downstream hazard.



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Source: Butte County, 2021; CA Department of Water Resources, 2021; PlaceWorks, 2021.

FIGURE HS-5  
 DAMS AND DAM INUNDATION AREAS  
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In 1992, Harlan Tate Associates studied the Magalia Dam and concluded that the upstream slope of the dam was found to have inadequate stability under seismic loading conditions. As of 2003, the water level in the reservoir was lowered 25 feet due to seismic stability concerns. In 2021 the Paradise Irrigation District conducted preliminary investigations, constraints and alternatives analysis, and 30 percent design of Magalia Dam retrofits that would address the seismic stability issues. As of early 2022, PID is in the process of proposal award for the remainder of the construction design and environmental permitting, as well as conceptual analysis of future widening of Skyway across the dam.

In February 2017, a heavy rainstorm caused flooding that damaged the main spillway of Oroville Dam on February 7. This caused DWR to stop the flow into the main spillway. The rain fell for several more days, causing the lake level to rise and flow over the emergency spillway, even when the main spillway was reopened to quickly drain the lake. The emergency spillway could not handle all the water, causing erosion to undermine the concrete weir. An evacuation order was given on February 12 for those living directly in the inundation zone, totaling approximately 188,000 people. Although no collapse occurred, the water further damaged the main spillway and eroded the bare slope of the emergency spillway. Following the February 2017 event, DWR initiated the Oroville Dam Safety Comprehensive Needs Assessment to assess risks associated with the Oroville Dam facilities and identify dam safety and operational needs. DWR and FEMA funded \$1.1 billion in repairs to both the main spillway and emergency spillway. By 2018, the main spillway was fully reconstructed to final design and the emergency spillway was completed. Additional structures were added to the facilities to prevent uphill erosion if the emergency spillway is ever used again.

As part of the Butte County LHMP, Butte County has established Dam Failure Mitigation Actions. The Action Plan contains a description of dam failure hazards, a risk assessment, plans and programs to address the hazards, and mitigation goals and strategies for each jurisdiction in Butte County. The Butte County OEM also reviews the Emergency Action Plans for each of the dams within Butte County and participates in updates to the Emergency Action Plans.

## 5. Climate Change

Climate change has altered and is expected to continue to alter the frequency, intensity, and duration of extreme storm events, including heavy rainfall. Precipitation is projected to increase from an annual average of 42.3 to 46.7 inches per year by mid-century.<sup>4</sup> While this is only a 4.4-inch increase, precipitation patterns are also likely to

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<sup>4</sup> California Energy Commission. 2018. "Annual Average Precipitation." <https://cal-adapt.org/tools/annual-averages/>, accessed February 22, 2021.

change. More rain may fall over fewer storms throughout the year, meaning the storms may become more intense but less frequent by mid-century. Due to projected temperature increases in Butte County, more precipitation is expected to fall as rain instead of snow, increasing the amount of peak runoff downstream. These factors could lead to more flooding near rivers and creeks, as well as in low-lying areas in western Butte County. During large flooding events, areas in western Butte County may be susceptible to floodwaters from levee or dam failure. Dam failure is discussed in more detail in the previous section.

Floodwaters can be deep enough to drown people and may move fast enough to carry away people or heavy objects (such as cars). In some cases, floods can be strong enough to lift buildings off their foundations. Large flood events can affect essential utilities (such as wastewater and energy delivery), transportation, jobs, tourism, the environment, agricultural industry, and the local and regional economies.

*B. Goals, Policies, and Actions***Goal HS-2 Protect people and property from flood risk.**Policies

- HS-P2.1 The County shall coordinate with federal, state, and local agencies to maintain and improve capacity of local and regional flood control systems, and to ensure a regional approach to addressing flood hazards.
- HS-P2.2 The County supports the efforts of private landowners and public agencies to maintain existing flood management facilities.
- HS-P2.3 The County supports the Flooding Mitigation Action Plan in the Butte County Local Hazard Mitigation Plan.
- HS-P2.4 Development projects on lands within the 100-year flood zone, as identified on the most current available maps from FEMA (the most current available map at the time of the publication of General Plan 2040 is shown on Figure HS-1), shall be allowed only if the applicant demonstrates that it will not:\*
- a. Create danger to life and property due to increased flood heights or velocities caused by excavation, fill, roads, and intended use.
  - b. Create difficult emergency vehicle access in times of flood.
  - c. Create a safety hazard due to the height, velocity, duration, rate of rise and sediment transport of the flood waters expected at the site.
  - d. Create excessive costs in providing governmental services during and after flood conditions, including maintenance and repair of public facilities.
  - e. Interfere with the existing water conveyance capacity of the floodway.
  - f. Substantially increase erosion and/or sedimentation.

- g. Require significant storage of material or any substantial grading or substantial placement of fill that is not approved by the County through a development agreement, discretionary permit, or other discretionary entitlement; a ministerial permit that would result in the construction of a new residence; or a tentative map or parcel map.
- h. Place septic tank systems in areas that will be flooded, causing overflow of the system and/or contamination of water supplies.
- i. Conflict with the provisions of the applicable requirements of Government Code Sections 65865.5, 65962, or 66474.5.

HS-P2.5 The lowest floor of any new construction or substantial improvement within 100-year floodplains, as shown in Figure HS-1 or the most current maps available from FEMA, shall be elevated 1 foot or more above the 100-year flood elevation. (County Flood Ordinance Sec. 26-22).\*

HS-P2.6 The County shall make specific findings consistent with the California Department of Water Resources Urban Level of Flood Protection Criteria within the 200-year floodplain, prior to approval of a development agreement, tentative or parcel map, a subdivision or discretionary permit or other discretionary entitlement, or any ministerial permit that would result in the construction of a new residence. If a proposed development is within the Urban Level of Flood Protection Criteria, the County Flood Administrator must make a finding to ensure flood protection facilities are adequate and require new flood protection measures, as applicable.

HS-P2.7 The County shall not, and will encourage other agencies within its bounds to not, locate new essential government service facilities (as defined in Section 2) and essential health-care facilities in 100-year floodplains, as shown in Figure HS-1 or the most current maps available from FEMA, and within the 200-year floodplain, as shown in Figure HS-2A, and as defined in Government Code Section 65007. Existing essential facilities in these areas shall have heightened flood protection.

Actions

- HS-A2.1 Continue to implement Zoning Code and Building Code requirements for flood protection findings in areas within the 200-year floodplain. Findings shall be consistent with current Central Valley Flood Protection Plan (CVFPP) standards for an Urban Level of Flood Protection (ULOP).
- HS-A2.2 Annually review all areas subject to flooding as identified by FEMA for 100-year flood zones and the Department of Water Resources (DWR) for the 200-year floodplain. Make any changes identified through this review available to the public, and reference the revisions to reflect new mapping data during the development review process in these areas.
- HS-A2.3 Seek funding to evaluate, design, and implement projects to address flooding problems in the Keefer Slough/Rock Creek area.
- HS-A2.4 Develop a method, such as a checklist and/or flow chart provided during development review, to aid potential project applicants in determining flood risk and to aid staff in determining if the Urban Level of Flood Protection requirements apply and making findings consistent with Senate Bill 5.
- HS-A2.5 Harden wastewater infrastructure, including public and private infrastructure, in flood-prone areas to minimize the risk of overflow.
- HS-A2.6 Annually provide flood protection safety information via social media, the County website, and in community gathering places, such as grocery stores and community centers, to educate community members about safety during flood conditions, including the dangers of driving on flooded roads and potential contamination of land due to the overflow of septic tanks.

**Goal HS-3 Prevent and reduce flooding.**Policies

- HS-P3.1 Watersheds shall be managed to minimize flooding by minimizing impermeable surfaces, retaining or detaining stormwater, and controlling erosion.

- HS-P3.2 Applicants for new development projects shall provide plans detailing existing drainage conditions and specifying how runoff will be detained or retained on-site and/or conveyed to the nearest drainage facility and shall provide that there shall be no increase in the peak flow runoff to said channel or facility.\*
- HS-P3.3 All development projects shall include stormwater control measures and site design features that prevent any increase in the peak flow runoff to existing drainage facilities.\*
- HS-P3.4 Developers shall pay their fair share for construction of off-site drainage improvements necessitated by their projects.
- HS-P3.5 The County shall require redevelopment after flooding to meet current California Building Standards Code and flood-related Code of Ordinances requirements to reduce future vulnerabilities to flood hazards through site preparation, layout design, and flood-proofing building design and materials.

### Actions

- HS-A3.1 Pursue funding (such as the California Resilience Challenge Grant, Better Together Communities Grant, or Building Resilient Infrastructure and Communities [BRIC] Grant) to support the construction and maintenance of infrastructure projects aimed at mitigating flood hazards.
- HS-A3.2 Coordinate with Caltrans, the United States Forest Service (USFS), regional park districts, and other applicable agencies to support efforts that improve drainage, increase roadbed height, and conduct other protective steps to increase the resiliency of single-access roads and trails in flood zones.
- HS-A3.3 Conduct regular cleaning and maintenance of storm drains and address potential ponding and improvement needs along key roadways and in communities and neighborhoods subject to flooding due to poor drainage, especially in advance of the rainy season.

**Goal HS-4 Reduce risks from levee failure.**Policies

- HS-P4.1 The County supports the efforts of regional, state, or federal agencies to study levee stability throughout the county, particularly levees that were designed and constructed to provide a minimum 100-year level of protection.
- HS-P4.2 The County supports the efforts of levee owners and regional, state, or federal agencies to design and reconstruct levees that do not meet flood protection standards (200-year for urban or urbanizing areas, 100-year flood zones for all other areas) to bring them into compliance with adopted state and/or federal standards.
- HS-P4.3 The County supports the efforts of private, state, and federal levee owners and shall lead efforts for County-maintained levees to ensure levees can function properly during a 500-year flood.
- HS-P4.4 New development proposals in levee inundation areas shall mitigate risk from failure of these levees.\*

**Goal HS-5 Reduce risks from dam inundation.**Policies

- HS-P5.1 New development proposals in dam inundation areas, as mapped in Figure HS-5 or the most current available mapping, shall consider and mitigate risks from failure of these dams.\*
- HS-P5.2 Risk of failure on new development proposals in the dam inundation areas for the Black Butte, Whiskeytown, and Shasta dams shall be coordinated between the Bureau of Reclamation, US Army Corps of Engineers, Butte County Department of Development Services, and Butte County Office of Emergency Management.
- HS-P5.3 The County shall work with the California Department of Water Resources and California Division of Safety of Dams to ensure appropriate retrofits and upgrades are made to all at-risk dams within the county, such as Oroville Dam and Magalia Reservoir Dam.



Actions

- HS-A5.1 Continue to maintain and update emergency response plans that address potential flooding in dam inundation areas.
- HS-A5.2 Coordinate with Paradise Irrigation District efforts to secure funding and in implementing the stabilization of the Magalia Dam.
- HS-A5.3 Identify site or construction flood protection improvement methods to minimize damage for facilities that remain in the 100-year flood zones or 200-year floodplains. For any critical public facility sited within the 100-year flood zones or 200-year floodplains, the responsible agency or department should implement site or building flood protection improvement methods to ensure operability and minimize damage.

### III. SEISMIC AND GEOLOGIC HAZARDS

#### A. *Background Information*

Seismic and geologic hazards in Butte County include those related to earthquakes, steep slopes and landslides, erosion, and subsidence.

##### 1. Earthquakes

Seismic hazards in Butte County are primarily related to faults, ground shaking, liquefaction, and seiches. Butte County has prepared an Earthquake Mitigation Action Plan as part of its LHMP, which is described further in Section VI of this Element. The Action Plan contains a description of earthquake-related hazards, a risk assessment, plans, and programs to address the hazards and mitigation goals and strategies for each jurisdiction in Butte County.

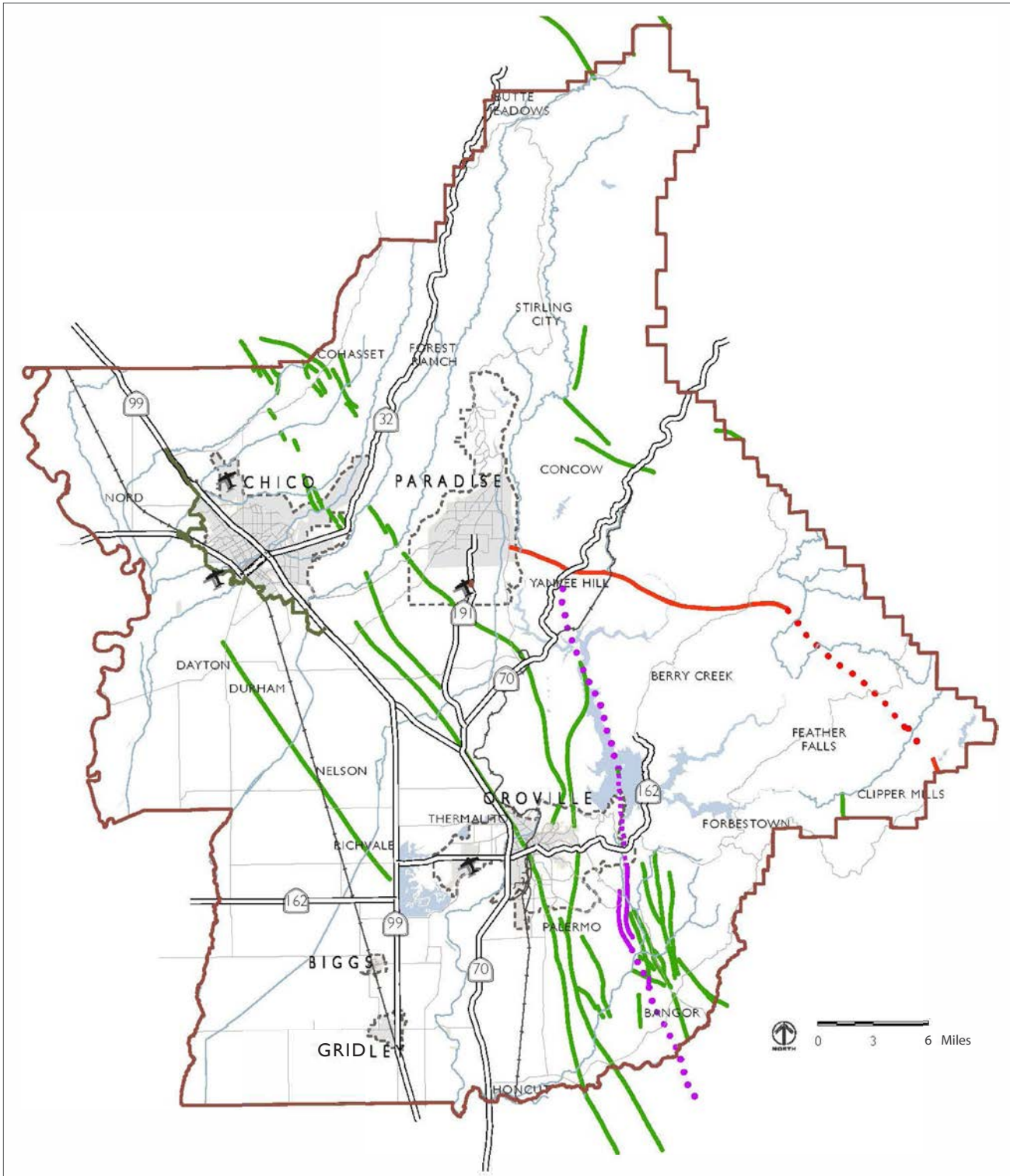
###### a. Faults

The Cleveland Hills fault is the only fault in Butte County that has been identified as an active earthquake fault pursuant to the Alquist-Priolo Earthquake Fault Zones Act. This fault was responsible for the 1975 Oroville earthquake, which had a Richter magnitude of 5.7 and produced surface displacement along approximately 2.2 miles of the fault. Fault lines in Butte County are displayed in Figure HS-6.

Other active faults and fault zones located as much as 100 miles away from Butte County have the potential to cause shaking in the county, including Coast Ranges Thrust Zone, the San Andreas Fault, the Midland-Sweitzer Fault, the Melones Fault Zone, and Eastern Sierra Faults.

In addition to mapped known faults, there are a large number of other faults within Butte County and in neighboring areas that could be considered potentially active, based on criteria developed by the California Geological Survey. In Butte County, faults that are considered by some geologists to be potentially active include the Big Bend Fault, which is thought to be capable of generating an earthquake of up to magnitude 7.0 in Butte County; the Foothill Shear zone, which extends into southern Butte County, and the Chico Monocline Fault, which could produce an earthquake of up to magnitude 7.0, significantly impacting the Chico area and other parts of the county.

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Source: Butte County General Plan 2030: Health and Safety Element, 2016.

- |                                    |                     |
|------------------------------------|---------------------|
| Cleveland Hills Fault, Active      | Greenline           |
| Cleveland Hills Fault, Concealed   | Highways            |
| Cleveland Hills Fault, Inferred    | Railroad            |
| Big Bend Fault, Potentially Active | Major Roads         |
| Big Bend Fault, Inactive           | Sphere of Influence |
| Unnamed Fault, Inactive            | City/Town           |
| Airports                           | County Boundary     |

FIGURE HS-6  
**BUTTE COUNTY FAULT LINES**  
RPC 2(b)(v)

### b. Ground Shaking

The intensity of seismically induced ground shaking at any specific site depends on the characteristics of the earthquake, the distance from the earthquake, and the local geologic and soil conditions. Earthquakes are typically measured in terms of magnitude and intensity. Earthquake “magnitude” is a measure of the total amount of energy released in an earthquake. With increasing magnitude (i.e., larger earthquakes), ground motions are stronger, last longer, and are felt over larger areas. Earthquake “intensity” refers to the effects of earthquake-induced ground motions on people and buildings. Earthquake intensity is often more useful than magnitude when discussing the damaging effects of earthquakes. The most common intensity scale is the Modified Mercalli Intensity (MMI) scale, which ranges from I (Not Felt) to X (Extreme). A summary of the observed effects corresponding to the various MMI levels is given in Table HS-4.

**TABLE HS-4 SUMMARY OF MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES**

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable circumstances.
II	Weak	Felt only by a few persons, especially on upper floors of buildings.
III	Weak	Felt noticeably indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very Strong	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.
VIII	Severe	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent.

Source: United State Geologic Survey. N.d. “Modified Mercalli Intensity Scale.” <https://www.usgs.gov/media/images/modified-mercalli-intensity-scale>.

Conservatively, ground motions as strong as those observed during the 1975 Oroville earthquake (MMI VIII) can be expected anywhere in Butte County. More conservatively, ground motions with an MMI as high as X could occur from magnitude 7 earthquakes on the Chico Monocline Fault, the Big Bend Fault, or the Foothills Shear Zone. Similar intensities could be experienced in Butte County from larger earthquakes on more distant faults, such as the Coast Ranges Thrust Zone or Melones Fault Zone.

c. Liquefaction

Liquefaction is a phenomenon primarily associated with saturated, cohesion-less soil layers close to the ground surface. During liquefaction, soils lose strength and ground failure may occur. Mapping included in the Butte LHMP indicates that much of the west and southwestern part of the county has a moderate to high potential for liquefaction.

d. Seiches

A seiche is a periodic oscillation of a body of water such as a reservoir, river, lake, harbor, or bay resulting from seismic shaking or other causes, such as landslides into a body of water. The period of the oscillation varies depending on the size of the body of water and may be several minutes to several hours. Depending on the magnitude of the oscillations, seiches can cause considerable damage to dams, levees, and shoreline facilities. Seiches have not been recorded in any of the reservoirs in Butte County that are within the jurisdiction of the California Division of Dam Safety. However, the potential for seiches does exist in Butte County, either from landslides or from stronger earthquakes that have been experienced in historical times.

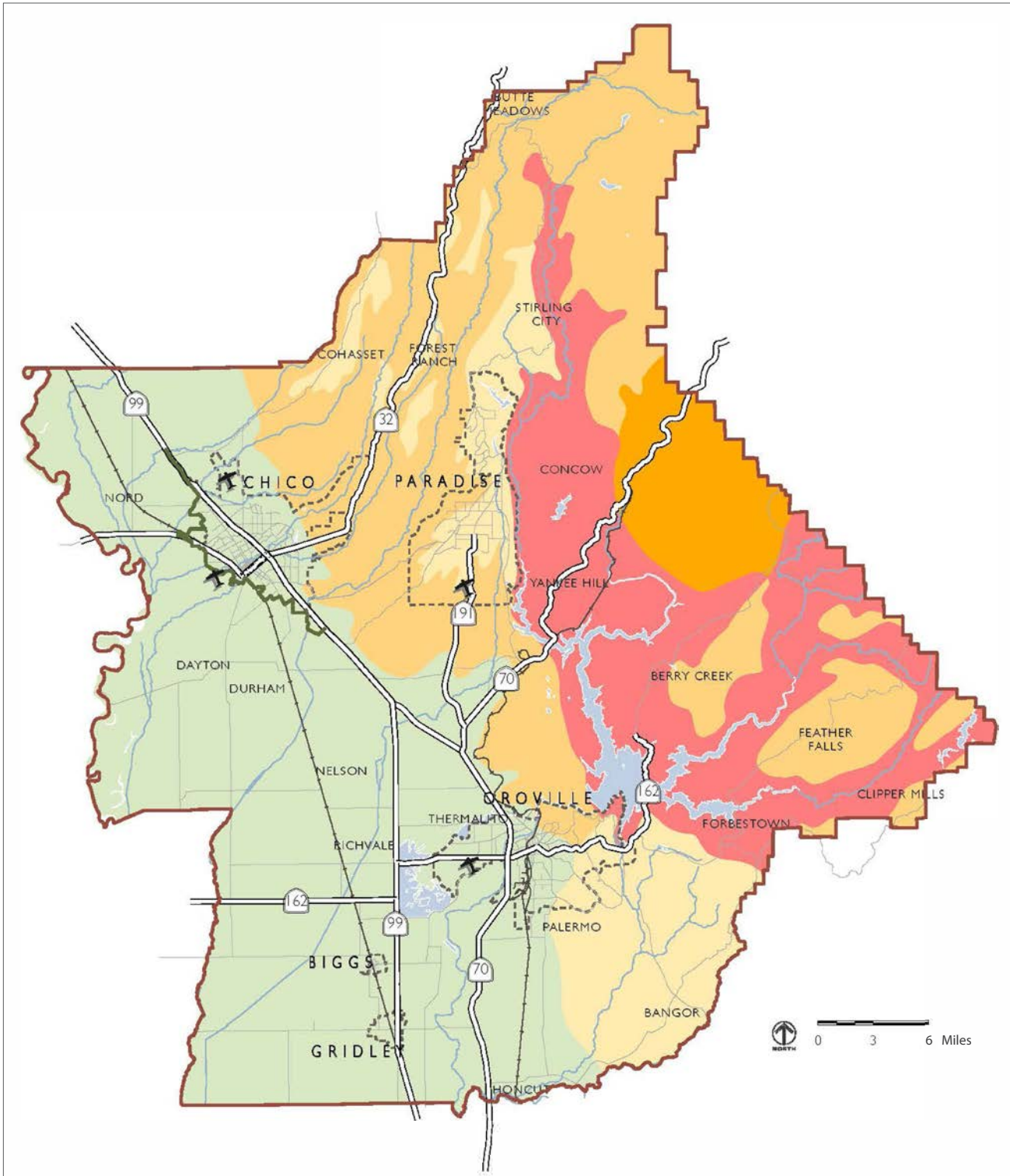
## 2. Steep Slopes and Landslides

Steep slopes, in conjunction with certain soil types, can be prone to landslides. Some of the natural causes of this instability are earthquakes, weak soils, erosion, heavy rainfall, and fire. Human activities, such as poor grading that undercuts steep slopes or overloads them with fill, excessive irrigation, and removal of vegetation can also contribute to landslides.

Landslides occur in Butte County, but they are not common. Most landslides in Butte County occur on slopes greater than 15 percent, and most new landslides occur in areas that have experienced previous landslides. Landslide potential is illustrated in Figure HS-7. The areas of highest landslide potential are in the mountainous central area of the county where well-developed soils overlay impervious bedrock on steep slopes, which at times undergo heavy rainfall. The slopes around flat uplands, such as Table Mountain, are also highly susceptible to landslides.



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Source: Butte County General Plan 2030: Health and Safety Element, 2016.

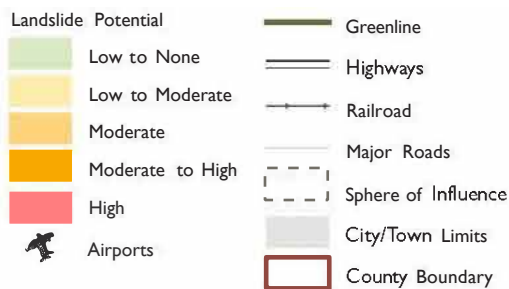


FIGURE HS-7  
**LANDSLIDE POTENTIAL**  
 RPC 2(b)(v)

Butte County has prepared a Landslide Mitigation Action Plan as part of its LHMP. The Action Plan contains a description of landslide hazards, a risk assessment, plans and programs to address the hazards and mitigation goals, and strategies for each jurisdiction in Butte County.

### **3. Erosion**

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

Erosion hazard potential in Butte County, which is displayed in Figure HS-8, is dependent on the underlying geology and the amount of rainfall the area receives, and erosion hazard increases when protective vegetation is removed. Erosion hazard potential is highest in the mountainous central area of the county where well-developed soils overlay impervious bedrock on steep slopes, which at times undergo heavy rainfall.

### **4. Expansive Soils**

Expansive soils are those that have potential to undergo significant changes in volume, either shrinking or swelling, with changes in moisture content. Periodic shrinking and swelling of expansive soils can cause extensive damage to buildings, other structures, and roads. Soils of high expansion potential generally occur in the level areas of the Sacramento Valley, including around the population centers of Chico, Oroville, Biggs, and Gridley, as shown in Figure HS-9. Soils along stream and river valleys and on steep mountain slopes generally have no or low expansion potential.

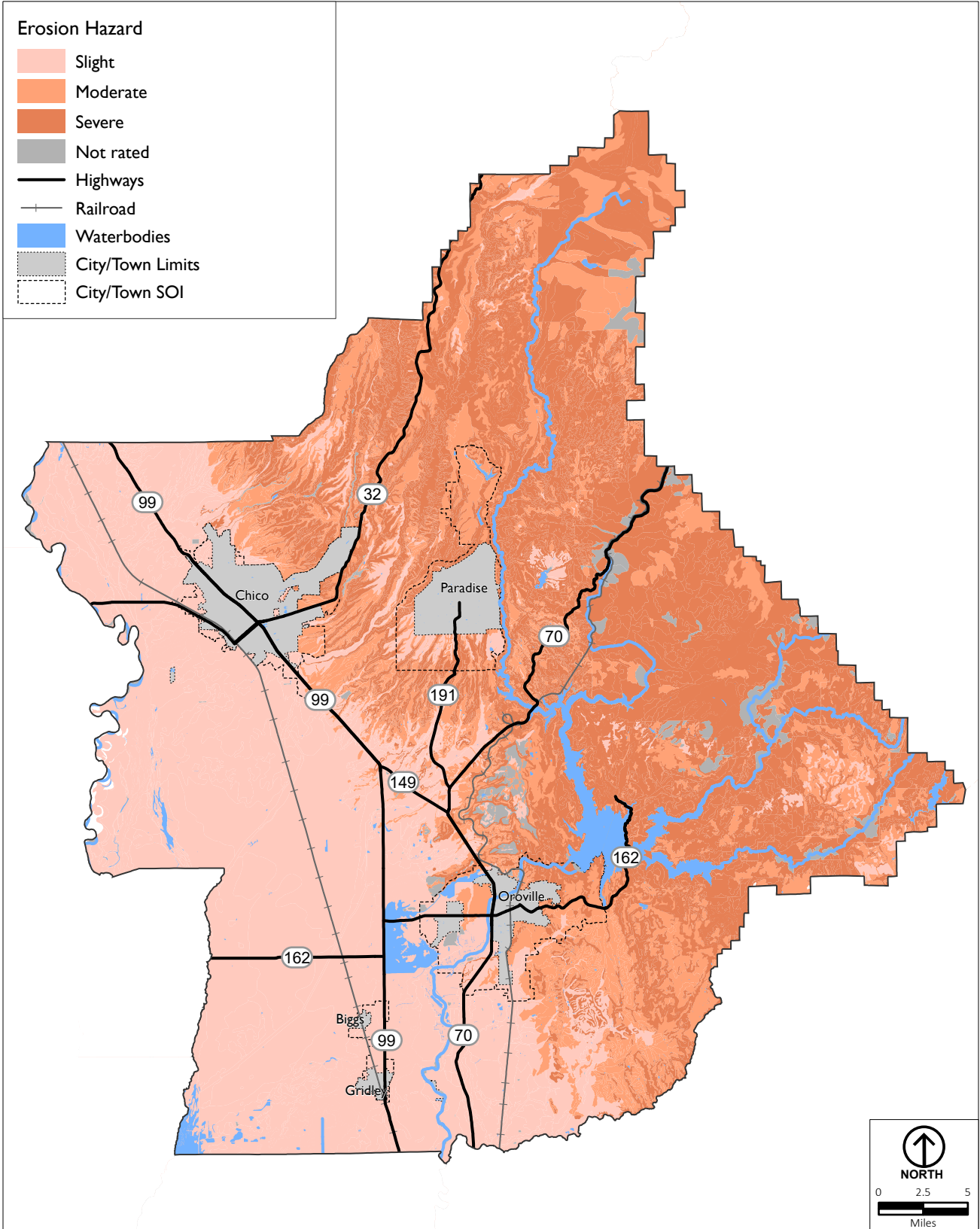
### **5. Subsidence**

Land subsidence is a gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials, often caused by groundwater or oil extraction. To date, no inelastic land subsidence has been recorded in Butte County.

Figure HS-10 shows where there is a potential for subsidence in the county associated with groundwater withdrawal. Subsidence remains a potential hazard, particularly if an extended drought or other condition were to necessitate large groundwater draw-downs.



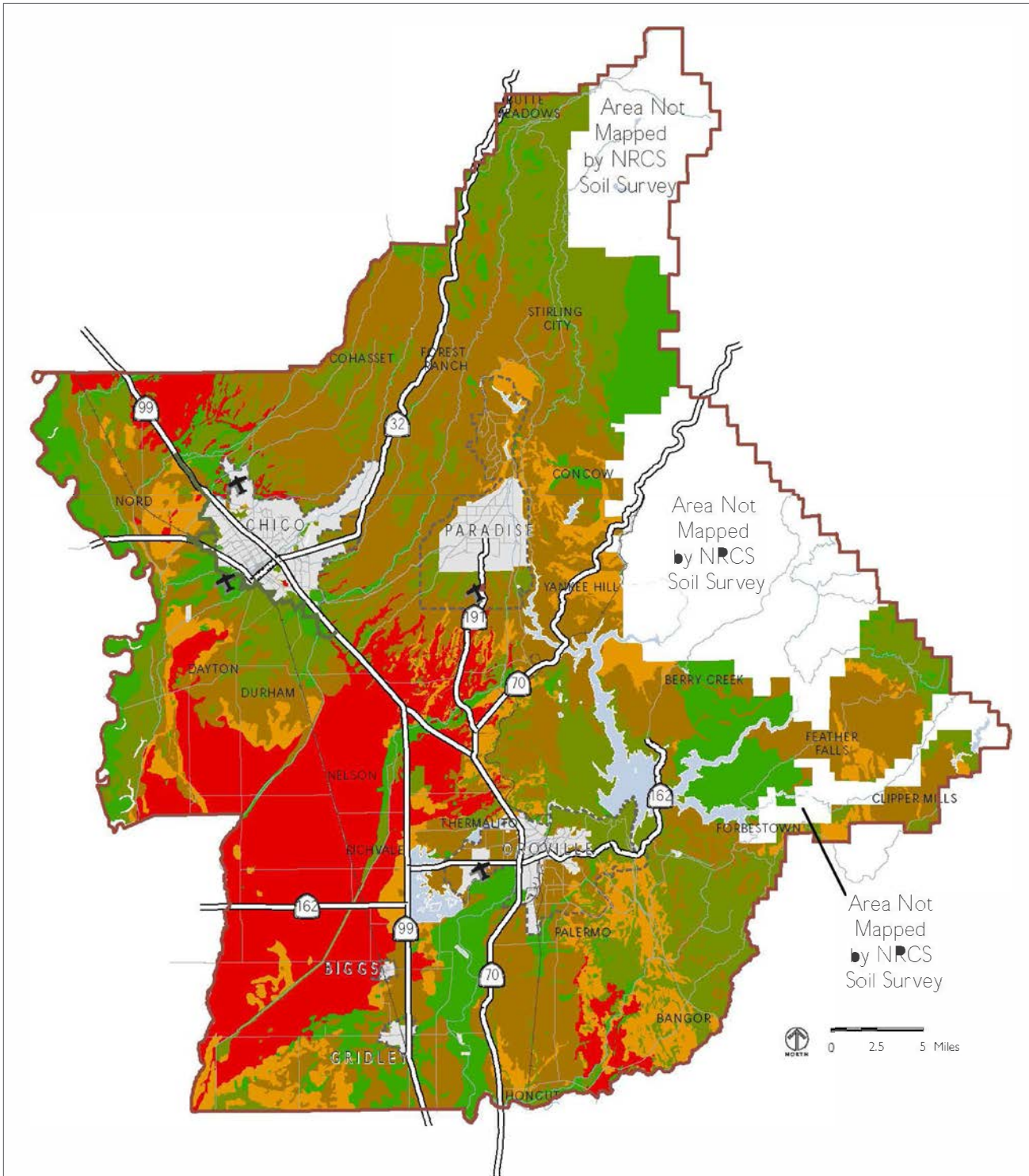
**BUTTE COUNTY  
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HEALTH AND SAFETY ELEMENT**



Source: Butte County, 2021; PlaceWorks, 2021; USDA Soil Survey Geographic Database (SSURGO), 2017.

**FIGURE HS-8  
EROSION HAZARD POTENTIAL  
RPC 2(b)(v)**

**BUTTE COUNTY  
GENERAL PLAN 2040  
HEALTH AND SAFETY ELEMENT**



Sources: PlaceWorks, Butte County General Plan 2030 Setting & Trends Report, 2007.

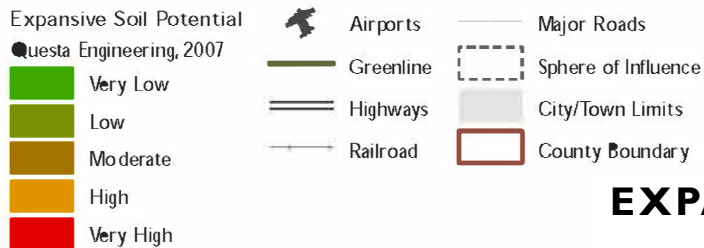
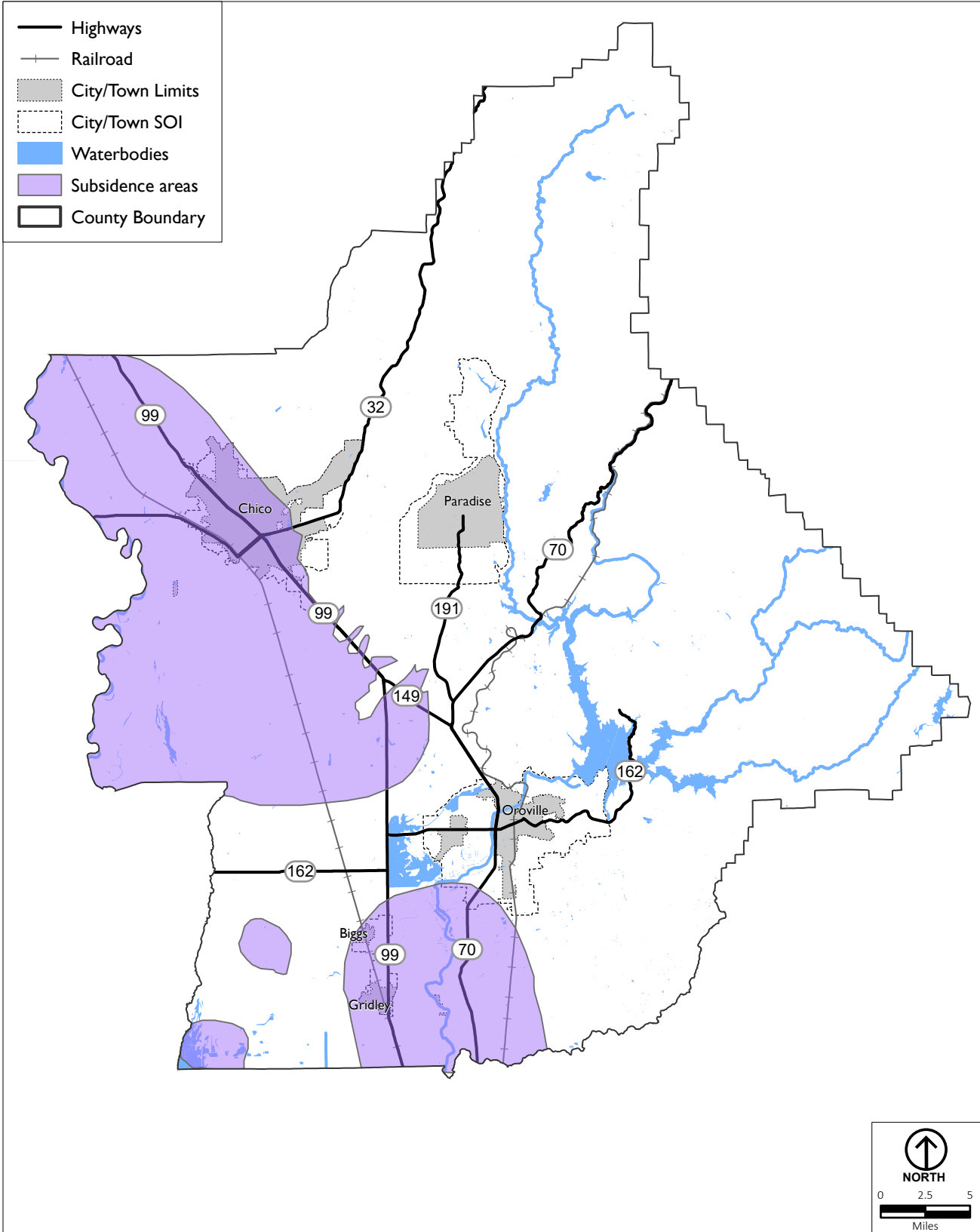


FIGURE HS-9

**EXPANSIVE SOIL POTENTIAL**  
RPC 2(b)(v)

**BUTTE COUNTY  
GENERAL PLAN 2040  
HEALTH AND SAFETY ELEMENT**



Source: Butte County, 2021; PlaceWorks, 2021;

**FIGURE HS-10  
SUBSIDENCE AREAS**  
RPC 2(b)(v)

## 6. Climate Change

While climate change is not connected to seismic hazards, climate change will likely increase landslides within the county as precipitation falls in more intense rainstorms, droughts dry out vegetation, and wildfires remove stabilizing vegetation from the mountains and hillsides. Wildfires and droughts can clear vegetation that holds soil in place and dry out soil to the point that it is less able to absorb water, creating a risk of landslides when heavy rains return. This can cause landslides and debris flows, especially in areas within or below burn scars. Droughts can also deplete surface water supplies and lead to a greater reliance on groundwater to meet demands. This could increase the potential for subsidence if groundwater levels are drawn down.

### *B. Goals, Policies, and Actions*

<b>Goal HS-6</b> Reduce risks from earthquakes.
---

#### Policies

- HS-P6.1 Appropriate detailed seismic investigations shall be completed for all public and private development projects in accordance with the Alquist-Priolo Earthquake Fault Zoning Act.\*
- HS-P6.2 Geotechnical investigations shall be completed prior to approval of schools, hospitals, fire stations, and sheriff stations, as a means to ensure that these critical facilities are constructed in a way that mitigates site-specific seismic hazards.
- HS-P6.3 Applicants shall seismically retrofit existing homes where required under existing building codes.
- HS-P6.4 The County shall promote the use of the California Earthquake Brace + Bolt Grant Program for seismic retrofits on homes built before 1980.

<b>Goal HS-7 Reduce risks from steep slopes and landslides.</b>
---

Policy

- HS-P7.1 Site-specific geotechnical investigations shall be required to assess landslide potential for private development and public facilities projects in areas rated “Moderate to High” and “High” in Figure HS-7 or the most current available mapping.\*
- HS-P7.2 The County shall coordinate with the California Department of Forestry and Fire Protection (CAL FIRE), United States Forest Service (USFS), park districts, and other agencies to take emergency action, as needed, to stabilize burned slopes and reduce erosion and runoff in burn areas above developed areas, important infrastructure, or key transportation corridors as soon as possible after a wildfire event.
- HS-P7.3 The County discourages new development in landslide or liquefaction-prone areas.

Actions

- HS-A7.1 Evaluate County-owned buildings and facilities in areas prone to landslides/debris flows and improve drainage systems, stabilize nearby slopes, and take actions to harden the property as needed.
- HS-A7.2 Use retaining walls, slope stabilization techniques, and other strategies to stabilize single-access roads and trails where feasible.

<b>Goal HS-8 Reduce risks from erosion.</b>
---

Policy

- HS-P8.1 Site-specific geotechnical investigations shall be required to assess erosion potential for private development projects and public facilities in areas rated “Very High” in Figure HS-8 or the most current available mapping. Private development projects shall implement recommendations provided in the geotechnical investigations.\*

<b>Goal HS-9 Reduce risks from expansive soils.</b>
---

Policy

- HS-P9.1 Site-specific geotechnical investigations shall be required to assess risks from expansive soils for private development projects and public facilities in areas rated “High” in Figure HS-9 or the most current available mapping. Private development projects shall implement recommendations provided in the geotechnical investigations.\*

<b>Goal HS-10 Avoid inelastic subsidence from groundwater withdrawal.</b>
---

Policies

- HS-P10.1 Continue to work with Groundwater Sustainability Agencies to ensure that groundwater withdrawals do not lead to inelastic subsidence.
- HS-P10.2 Existing programs to monitor potential subsidence activity shall be supported.



#### IV. FIRE HAZARDS

##### A. *Background Information*

The public is exposed to fire-related hazards from two potential sources: structural fires and wildland fires affecting urban and rural residential interface areas.

##### 1. Fire Risks

As the devastating BTU Lightning Complex Fire of 2008, Camp Fire of 2018, and North Complex Fire of 2020 revealed, most areas of Butte County face some level of threat from wildland fire. As shown in Figure HS-11, fire hazard severity zones in the foothills and mountainous areas of the county, extending from Cohasset in the north to Forbestown in the south, have been designated by CAL FIRE as “very high” or “high,” with the majority of the area in the “very high” classification. CAL FIRE regularly updates the Fire Hazard Severity Zone Maps as established by the Fire and Resource Assessment Program (FRAP). The Butte County Health and Safety Element will incorporate all new relevant maps to the County as they become available.

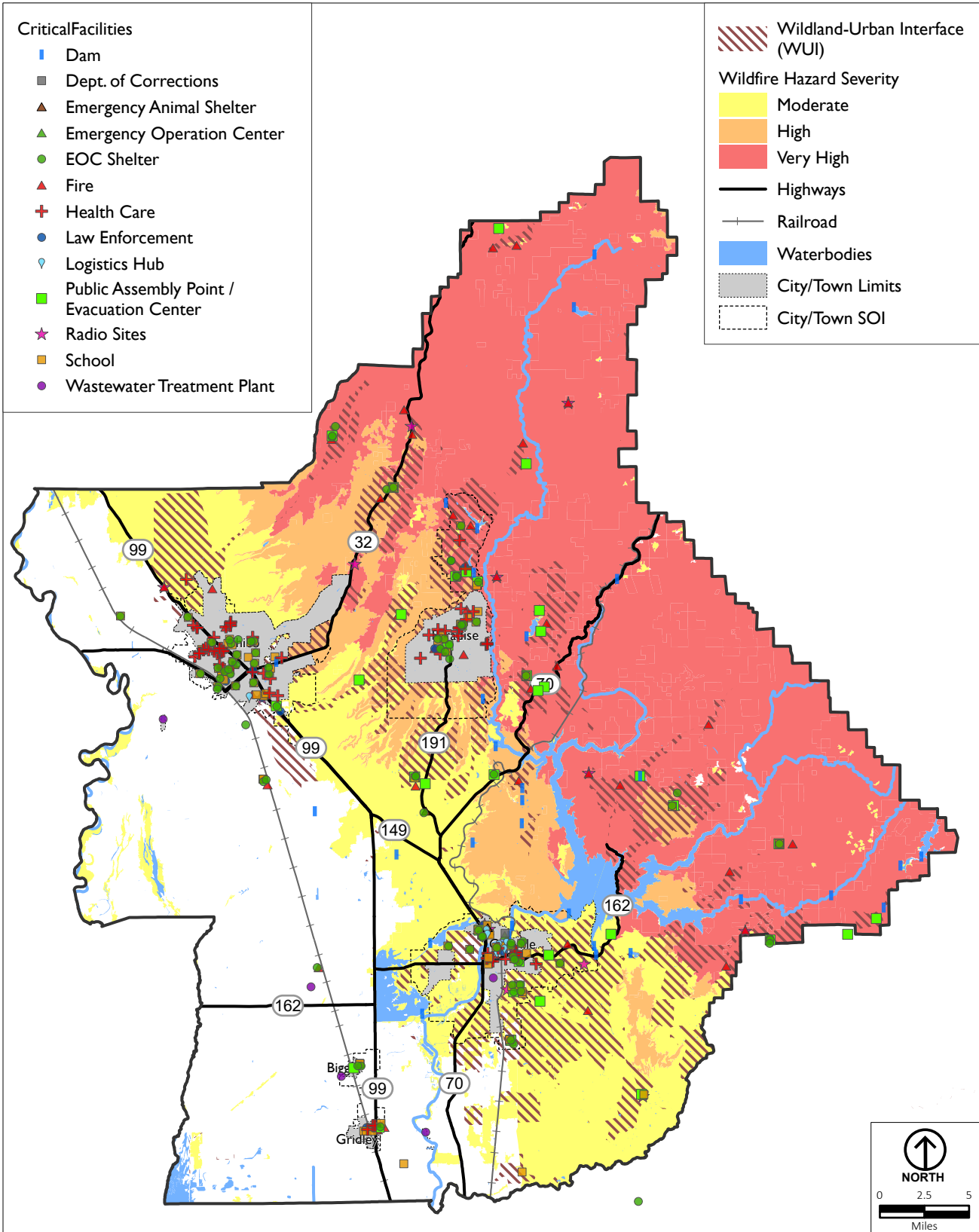
Wildland-Urban Interface (WUI) areas are also shown on Figure HS-11; WUI areas occur when urban development is intermixed with wildland vegetation, or when pockets of wildland vegetation occur inside developed areas. The foothill communities of Kelly Ridge, Bangor, Cohasset, Forest Ranch, Concow, Yankee Hill, Berry Creek, Forbestown, communities on the Upper Ridge, and the Town of Paradise are examples of WUI areas. Unlike wildfire in wildland areas, fires that occur within WUI areas are more likely to damage or destroy buildings and infrastructure that support populations, the economy, and key services within the county. Many of the WUI areas in Butte County have few access roads, which poses challenges for evacuation and for emergency responders to fight the fire and help residents in these areas. The 2022-2030 Butte County Housing Element identifies opportunity sites for new development. The County has confirmed that the potential building sites included in this site inventory are not located in either High or Very High Fire Hazard Severity Zones. The Butte County Land Use Element includes a map which designates the various land uses within the County. This map is used as the basis for existing and planned development within the County.

Several factors influence wildfire conditions and facilitate the spread of wildfires, including topography, fuels, weather conditions, and climate change. Human actions are also the leading cause of wildfires in California, increasing the risk of wildfire devastating natural lands and communities. Wildfires can lead to secondary hazards, such as landslides and debris flows, flooding downstream, and poor air quality from smoke.



Table HS-5 lists historic major wildfire incidents greater than 5,000 acres that have occurred within the county from 1887 to 2021.

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Source: Butte County, 2012; CAL FIRE, 2021; PlaceWorks, 2021.

**FIGURE HS-11  
FIRE HAZARD SEVERITY ZONES & WILDLAND-URBAN INTERFACE  
RPC 2(b)(v)**

**TABLE HS-5 HISTORIC WILDFIRES OVER 5,000 ACRES IN BUTTE COUNTY, 1887 TO 2021**

Year	Fire Name	Total Burned Acres <sup>a</sup>	Cause
1917	N/A	12,701	Miscellaneous
1917	N/A	8,003	Unknown
1918	N/A	22,232	Miscellaneous
1926	N/A	12,536	Miscellaneous
1927	N/A	8,541	Unknown
1927	N/A	27,841	Unknown
1931	N/A	5,468	Unknown
1931	N/A	42,078	Miscellaneous
1943	Pine Creek	11,360	Miscellaneous
1945	N/A	6,358	Miscellaneous
1951	Milk Ranch	12,979	Miscellaneous
1964	Lightning #1	9,876	Miscellaneous
1966	Project 19	5,725	Miscellaneous
1984	Bidwell	6,192	Miscellaneous
1990	Campbell	6,028	Equipment Use
1992	Burton	5,915	Equipment Use
1992	Villa	6,605	Powerline
1999	Musty	16,757	Lightning
1999	Doe Mill	10,857	Lightning
1999	Bucks	34,236	Lightning
2000	Storrie	56,261	Railroad
2001	Poe	8,333	Arson
2008	BTU Lightning Complex	53,699	Lightning
2008	Humboldt	23,344	Arson
2008	South-Frey	12,402	Lightning
2008	Scotch	13,009	Lightning
2017	Cherokee	8,417	Powerline
2017	Wall	6,033	Equipment Use
2017	Cascade	16,141	Unknown
2018	Camp Fire	153,336	Powerline
2020	North Complex Fire	318,935	Lightning
2021	Dixie Fire	963,309	Powerline

Source: CAL FIRE, Fire and Resource Assessment Program. 2020. "California Fire Perimeters – 1887 to 2019".

[https://services.arcgis.com/jIL9msH9OI208Gcb/arcgis/rest/services/California\\_Fire\\_Perimeters\\_1878\\_2019/FeatureServer](https://services.arcgis.com/jIL9msH9OI208Gcb/arcgis/rest/services/California_Fire_Perimeters_1878_2019/FeatureServer). Accessed February 17, 2021.

Notes:

a. The total burned acres includes all land burned by each wildfire, including land outside of Butte County.

The most destructive fires since the 2010 Butte County General Plan through 2021 in Butte County were the Camp Fire in 2018 and the North Complex Fire in 2020:

- ◆ On November 8, 2018, a power transmission line above Poe Dam near Pulga malfunctioned and sparked. A Pacific Gas and Electric Company (PG&E) Rock Creek Powerhouse field crew reported a fire under power transmission lines near Poe Dam to CAL FIRE. The fire, named the Camp Fire, spread west rapidly and evacuation orders were sent out for the Town of Paradise, the Upper Ridge communities, and surrounding areas. By November 10, the Camp Fire had become the most destructive fire in California's history. Full containment of the fire occurred November 25, after rain fell on November 21. While most of the damage occurred in the Town of Paradise, the Camp Fire damaged or destroyed several unincorporated communities and areas. In the unincorporated areas of the county, 4,569 structures were completely destroyed, 194 were damaged, and only 2,402 structures within the fire perimeter remained undamaged.<sup>5</sup> In total (including the Town of Paradise), the Camp Fire directly and indirectly caused 86 resident fatalities and injured 3 CAL FIRE personnel.<sup>6</sup>
- ◆ On August 17, 2020, a lightning storm hit Plumas National Forest in Butte and Plumas Counties. The lightning sparked 21 fires in the area, including the Sheep Fire near Susanville, the Claremont Fire near Claremont Creek just south of Quincy, and the Bear Fire in the Middle Fork Canyon near the Pacific Crest Trail. On September 5, 2020, strong winds caused the Bear Fire and Claremont Fire to grow explosively and merge into the North Complex Fire.<sup>7</sup> The communities of Berry Creek, Feather Falls, Clipper Mills, Brush Creek, Woodleaf, and Forbestown were evacuated with little warning in the afternoon of September 8 due to the rapidly spreading fire. The fire burned for three more months.<sup>8</sup> On December 3, 2020, Plumas National Forest officials announced that the North Complex Fire was 100-percent contained. The North Complex Fire burned 318,935 acres, damaged or destroyed 2,455 structures, including destroying the communities of Berry Creek and Feather Falls, and caused 16 fatalities.

<sup>5</sup> Butte County. 2019. Local Hazard Mitigation Plan, Chapter 4: Risk Assessment. <http://www.buttecounty.net/Portals/19/LHMP/2019/CH4ButteCountyLHMPUpdateChapter4RiskAssessment.pdf?ver=2019-11-13-122000-400>.

<sup>6</sup> Butte County District Attorney, The Camp Fire Public Report: A Summary of the Camp Fire Investigation, June 16, 2020, <https://www.buttecounty.net/Portals/30/CFReport/PGE-THE-CAMP-FIRE-PUBLIC-REPORT.pdf?ver=2020-06-15-190515-977>.

<sup>7</sup> U.S. Forest Service, Plumas National Forest. 2020. North Complex. <https://inciweb.nwccg.gov/incident/6997/>, accessed February 18, 2021.

<sup>8</sup> U.S. Forest Service, Plumas National Forest. 2020. North Complex. <https://inciweb.nwccg.gov/incident/6997/>, accessed February 18, 2021.

## 2. Fire Protection

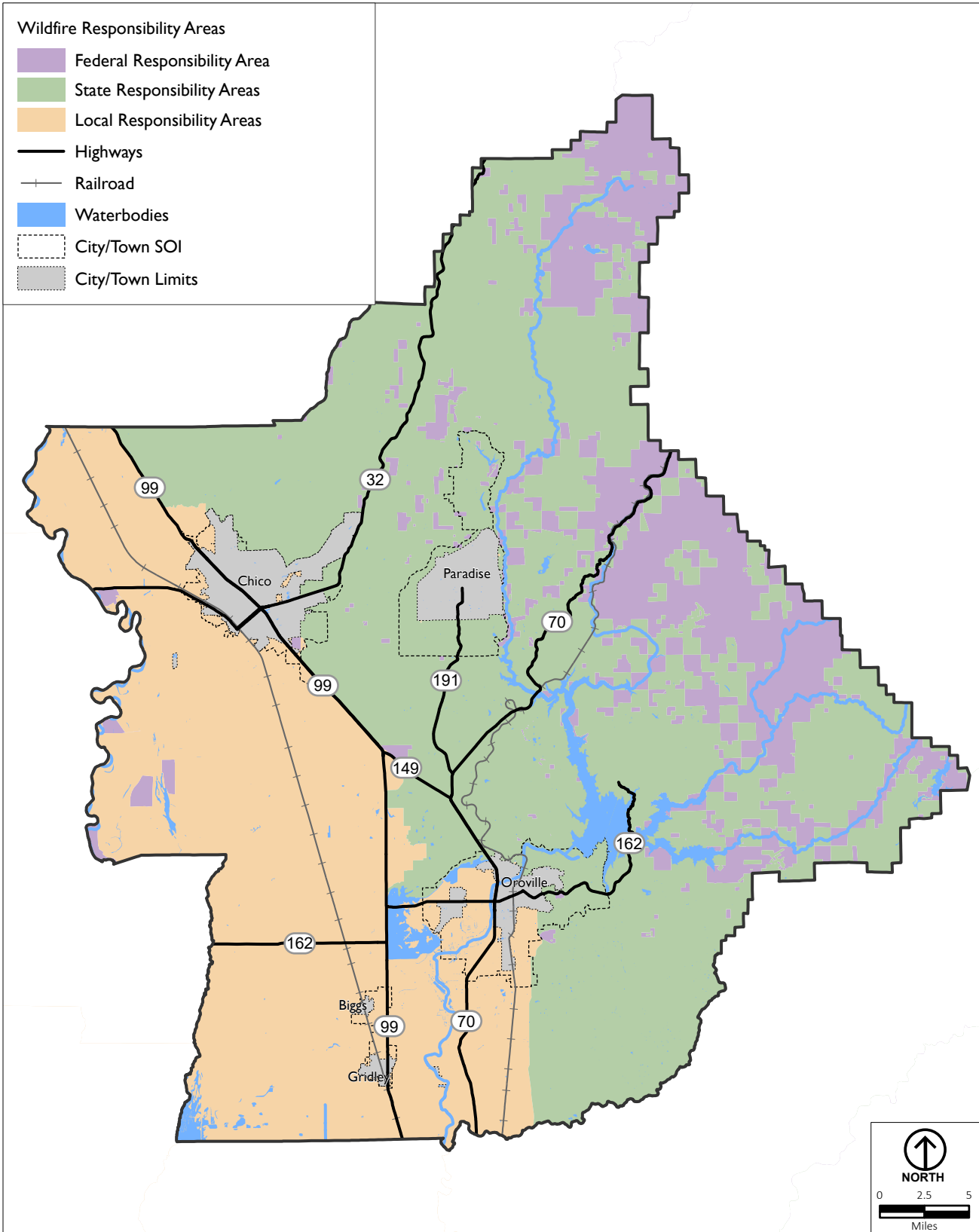
The responsibility for the prevention and suppression of wildfires in Butte County belongs to the Butte County Fire Department (BCFD), with support from CAL FIRE Butte Unit, US Forest Service (USFS) Plumas National Forest Unit, and Lassen National Forest Unit.

In CAL FIRE-designated State Responsibility Areas (SRAs), shown in Figure HS-12, the state has responsibility for preventing and suppressing wildfires. Due to the heightened risk of wildfire and increased potential for damage or loss in SRAs, development within these areas must comply with special building requirements established in Chapter 7A of the California Building Code and Chapter 47 of the California Fire Code. SRAs are also regulated by California Public Resources Code Sections 4290 and 4291, which establish requirements for maintenance of defensible space and vegetation management.



*Forest Ranch Fire Department. Photo courtesy of the Butte County Department of Development Services.*

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Source: Butte County, 2021; CAL FIRE, 2008; PlaceWorks, 2021.

**FIGURE HS-12  
WILDFIRE RESPONSIBILITY AREAS  
RPC 2(b)(v)**



The Cities of Chico and Oroville have independent fire departments; BCFD provides fire protection to the unincorporated areas of Butte County, the Cities of Biggs and Gridley, and the Town of Paradise. To address wildland fire hazards, CAL FIRE, BCFD, and the Butte County Fire Safe Council have collaborated to develop the Butte Unit Community Wildfire Protection Plan, and CAL FIRE and BCFD maintain the Fire Management Plan. This plan “systematically assesses the existing level of wildland fire protection service, identifies high-risk and high-value areas where potential exists for costly and damaging wildfires, ranks these areas in terms of priority needs, and prescribes what can be done to reduce future costs and losses.” The USFS also has Fire Management Plans for both Plumas and Lassen National Forests.

In addition, Butte County has prepared a Wildfire Mitigation Action Plan as part of its LHMP, which is described further in Section VI of this Element.

The Risk Assessment of the LHMP contains a description of wildfire hazards, a risk assessment, plans and programs to address the hazards, and mitigation goals and strategies for each jurisdiction in Butte County.

The ability to control wildfires and structural fires depends in part on the adequacy and availability of water supply. New subdivisions and commercial developments are required to install a pressurized water system with minimum water flows to meet the requirements of Butte County’s Improvement Standards. In areas where no community water system exists, water for fire protection is furnished by the County’s water tenders, which are strategically placed around the county to supplement the fire engines responding to fires. As the population continues to grow in the WUI areas, additional water tenders will be required to keep pace with growth. Since water tenders are staffed by citizen volunteer firefighters, there is no guarantee that a water tender will be able to respond when needed.

### **3. Community Wildfire Protection Plan**

The [2020-2025 Butte County Community Wildfire Protection Plan](#) (CWPP) was updated on April 23, 2020. This five-year update ensures the County and various communities have a framework for reducing the risks associated with wildfire. The CWPP includes pre-fire strategies and tactics to be implemented in cooperation with the fire agencies in Butte County, the Butte County Fire Safe Council, local community groups, and landowners. Key goals and objectives emphasized in this plan include:

- ◆ Improve the availability and use of consistent, shared information on hazards and risk assessment.



- ◆ Promote the role of local planning processes, including general plans, new development, and existing developments, and recognize individual landowner/homeowner responsibilities.
- ◆ Increase awareness and actions to improve fire resistance of human-made assets at risk and fire resilience of wildland environments through natural resource management.
- ◆ Integrate implementation of fire and vegetative fuels management practices consistent with the priorities of landowners or managers.
- ◆ Determine and seek the needed level of resources for fire prevention, natural resource management, fire suppression, and related services.
- ◆ Implement needed assessments and actions for post-fire protection and recovery.

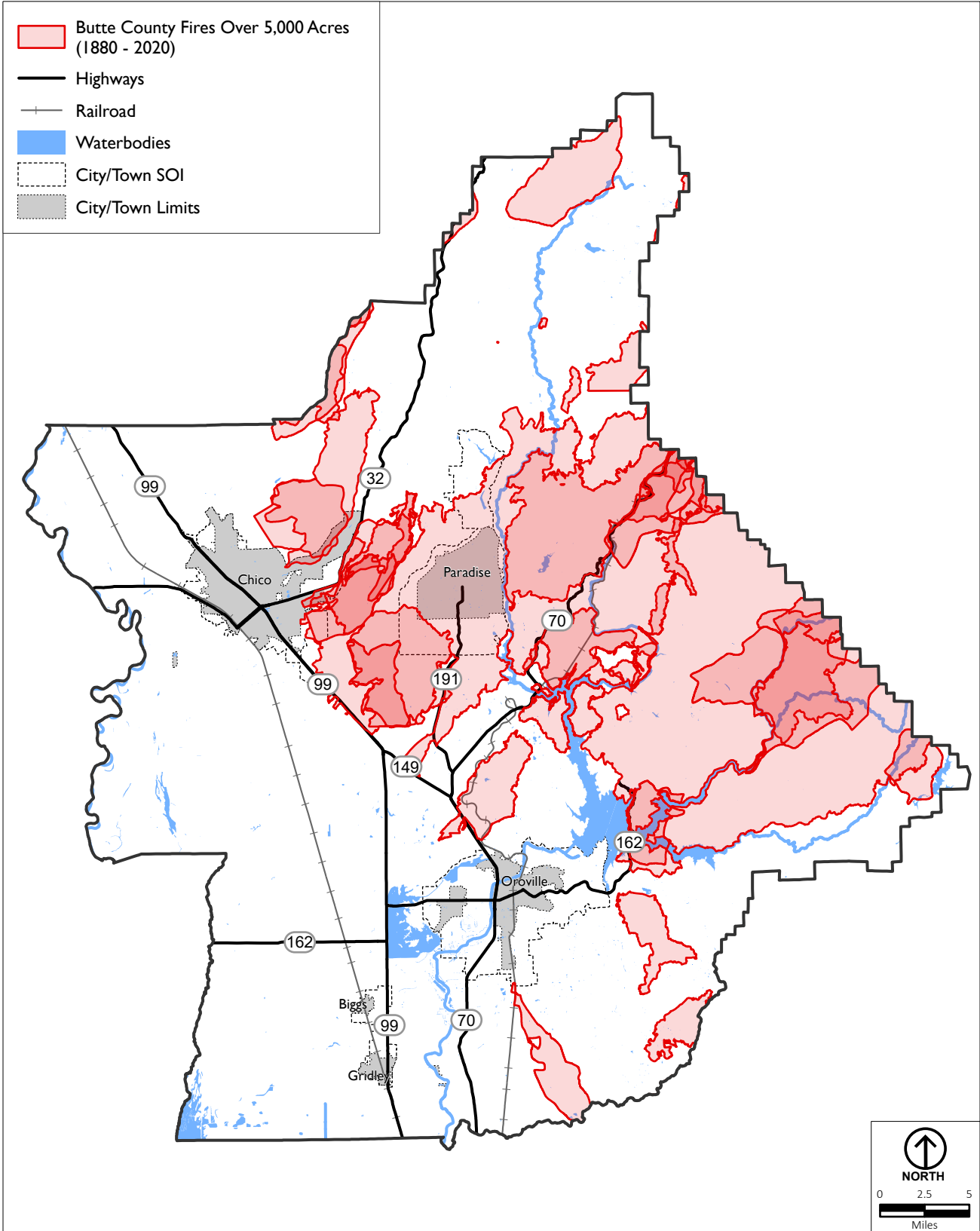
#### **4. CAL FIRE Butte Unit Strategic Fire Plan**

Butte County is part of the Butte Unit of CAL FIRE, which works within BCFD to provide fire protection services to large sections of the unincorporated area. The unit's [Strategic Fire Plan](#), prepared in 2021, lays out how CAL FIRE staff plan to implement the State Fire Plan in the region to reduce the threat posed by wildfires. It includes strategies such as public information and outreach, fuel reduction, maintenance of fire protection roads, and coordination with local agencies. This Health and Safety Element incorporates many of the fire protection strategies in the Strategic Fire Plan, helping to ensure a consistent approach to wildfire mitigation between CAL FIRE and local agencies in Butte County.

#### **5. Climate Change**

Climate change is likely to increase temperatures, including creating warmer temperatures earlier and later in the year, and cause droughts to occur more frequently, which dry out soils and vegetation. Droughts often kill plants and trees, which serve as additional fuel for wildfires. These factors are expected to increase wildfire conditions, creating a risk of more frequent and intense wildfires. Because wildfires burn the trees and other vegetation that help stabilize a hillside and absorb water, more areas burned by fire may also lead to an increase in landslides and floods. Historically, an average of 5,606 acres burned annually in the county. Figure HS-13 shows historic wildfire perimeters in the county. Wildfires are projected to increase to an annual average in the county of 8,562 acres burned (a 53-percent increase) by 2050 and an annual average of 14,132 acres burned (a 152-percent increase) by 2100.

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Source: Butte County, 2012; California Open Data Portal, 2021; PlaceWorks, 2021.

**FIGURE HS-13  
HISTORIC WILDFIRE PERIMETERS  
RPC 2(b)(v)**

*B. Goals, Policies, and Actions***Goal HS-11 Reduce risks from wildland and urban fire.**Policies

- HS-P11.1 Fire hazard risk mitigation shall be considered in all land use and zoning decisions, environmental review, subdivisions review, and the provision of public services.
- HS-P11.2 Create wildfire-resistant communities by supporting the implementation of community wildfire protection plans and wildfire fuel load reduction measures in coordination with the appropriate government, community group, or non-profit organization and California Department of Forestry and Fire Protection (CAL FIRE).
- HS-P11.3 The County shall prioritize and fund fuel-reduction projects in the State Responsibility Area covered by the California Vegetation Treatment Program (CalVTP).
- HS-P11.4 The County supports the Butte County Local Hazard Mitigation Plan (LHMP), the Butte County Community Wildfire Protection Plan, and the CAL FIRE Butte Unit Fire Plan, and will cooperate with the Butte County Fire Department, CAL FIRE, and the Butte County Fire Safe Council in implementing these plans.
- HS-P11.5 New development projects shall meet current County building and fire requirements and California Fire Safe Regulations.
- HS-P11.6 New development projects in High or Very High Fire Hazard Severity Zones or the Wildland-Urban Interface, as shown in Figure HS-11 or the most current data available from CAL FIRE, shall prepare a Fire Protection Plan for adequate emergency water flow, emergency vehicle access, visible addressing and signage, evacuation routes, fuel management, defensible space, fire safe building construction, and wildfire preparedness.
- HS-P11.7 The County shall encourage the use of voluntary conservation easements or the voluntary transfer of development rights in undeveloped wildland areas within High and Very High Fire Hazard

Severity Zones and the Wildland-Urban Interface, as shown in Figure HS-11 or the most current data available from CAL FIRE.

- HS-P11.8 New development shall not diminish fire protection and prevention services, including the inspection and enforcement of vegetation management and fire-safe regulations.
- HS-P11.9 Critical and essential facilities shall be sited outside of fire-prone areas wherever possible. If infeasible, fire-safe design elements shall be incorporated into the design of these facilities.

### Actions

- HS-A11.1 Seek funding to identify and complete roadside fuel reduction projects and maintain necessary clearance zones on critical roads to reduce wildfire risk, increase visibility, and maintain safe evacuation routes. Coordinate with the Butte County Community Wildfire Protection Plan (CWPP).
- HS-A11.2 Coordinate with CAL FIRE, USFS, regional park districts, and local tribal representatives to conduct wildland fire prevention activities and programs in new and existing development, such as controlled burning, fuel removal, grazing, defensible space, public and private fire roads, and the maintenance of existing or development of new fuel breaks.
- HS-A11.3 Partner with local tribal representatives to learn and incorporate Indigenous fire management practices into the County's fire management procedures.
- HS-A11.4 Develop standardized wildfire risk assessment and mitigation procedures for projects within the State Responsibility Area and Very High Fire Hazard Severity Zones.
- HS-A11.5 Coordinate with CAL FIRE, USFS, and regional park districts to conduct public engagement and outreach to educate residents, business owners, and visitors about fire-safe communities and evacuations in fire-prone areas.

- HS-A11.6 Develop and conduct public outreach and education programs that do the following:
- i.* Educate public and private landowners about projected high-risk wildfire areas that may increase in severity due to climate change.
  - ii.* Support communities within the Wildland-Urban Interface by teaching property owners about defensible space, vegetation management, and fire-safe landscaping practices.
- HS-A11.7 Investigate a Transfer of Development Rights program to transfer development rights in High or Very High Fire Hazard Severity Zones and the Wildland-Urban Interface to lands outside of these fire-prone areas.
- HS-A11.8 Identify funding mechanisms for the inspection and enforcement of vegetation and fire-safe standards in existing and new development.

<p><b>Goal HS-12 Protect people and property from wildland or urban fires.</b></p>
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Policies

- HS-P12.1 Regulations regarding fire-safe vegetation clearance and maintenance around structures, including non-conforming development, and infrastructure, including along driveways and private roads, shall be maintained and enforced.
- HS-P12.2 Fuel breaks shall be required along the edge of developed areas, including non-conforming development, in Local Responsibility and State Responsibility Areas, as well as the Wildland-Urban Interface, as shown in Figures HS-11 and HS-12 or the most current data available from CAL FIRE.
- HS-P12.3 Fire-resistant native landscaping and fuel breaks shall be required in residential areas.
- HS-P12.4 Coordinate with park districts and other agencies to maintain mapping of refuge areas, expanding the capacity in the county to ensure residents and visitors have a safe meeting location during a wildfire event.

- HS-P12.5 New development, significant retrofits, and reconstruction projects in Local Responsibility and the State Responsibility Areas, and the Wildland-Urban Interface, shall be consistent with the California Building Standards Code, California Fire Code, and California Fire Safe Regulation requirements.
- HS-P12.6 All development projects in High or Very High Fire Hazard Severity Zones shall provide adequate water conveyance infrastructure to meet daily and fire-flow requirements.
- HS-P12.7 Ensure that new development has adequate fire protection services, including adequate water supplies for fire suppression.

### Actions

- HS-A12.1 Explore funding opportunities for the following:
- i.* Retrofitting ventilation systems in public or community buildings to provide refuge for residents and visitors during wildfires or periods of unhealthy air quality caused by smoke from wildfires.
  - ii.* Establishing a program to offset the cost of vegetation maintenance for low-income households.
  - iii.* Coordinate with Butte County Fire Safe Council and other organizations to conduct ongoing vegetation management and fuels-reduction projects and programs.
  - iv.* Supporting financing of vegetation removal within the High and Very High Fire Hazard Severity Zones.
- HS-A12.2 Work with developers to establish vegetation management standards, including defensible space around homes that must be maintained by property owners, homeowners' associations, or a special district.
- HS-A12.3 Continue to identify water sources sufficient to meet existing and future firefighting needs using best available data. Water source identification is an ongoing process accomplished locally by individual fire departments and fire stations.
- HS-A12.4 Develop guidelines for the creation of fuel breaks in landscape setbacks.

**Goal HS-13 Identify safe and effective evacuation routes and access for fire prevention and suppression.**

Policies

- HS-P13.1 New development in High or Very High Fire Hazard Severity Zones and the Wildland-Urban Interface, as shown in Figure HS-11 or the most current data available from CAL FIRE, shall identify at least two points of access for day-to-day access and evacuation purposes and make improvements to develop, upgrade, and maintain these routes to ensure adequate capacity of evacuation routes. (See Goal HS-18 for additional evacuation policies)

Actions

- HS-A13.1 Maintain and update primary and alternative evacuation routes for communities in foothill and mountain areas with high fire hazard potential.
- HS-A13.2 Conduct a study on the capacity, viability, and safety of evacuation routes for areas in the Local Responsibility and State Responsibility Areas, as well as the Wildland-Urban Interface. Once the routes are evaluated through the study, seek funding to implement the necessary improvements to the routes.
- HS-A13.3 Develop a funding mechanism to improve connectivity of evacuation routes and to ensure adequate capacity during emergencies.

**Goal HS-14 Ensure that communities are resilient and can effectively recover from wildfires.**

Policies

- HS-P14.1 The County shall advocate for adequate fire insurance coverage and premiums with the California Insurance Commission and California State Legislature.
- HS-P14.2 The County shall plan for recovery from a large-scale wildfire disaster, focusing on temporary housing needs, emergency workers, and emergency response personnel.



- HS-P14.3 The County shall coordinate internally and with other local, regional, or state agencies to develop contingency plans for meeting intermediate and temporary housing needs of those displaced during catastrophic wildfire events until permanent housing is reconstructed.
- HS-P14.4 The County shall promote Master Plan development for communities rebuilding after an incident to reduce permit fees and construction costs.
- HS-P14.5 The County shall require redevelopment after wildfires to meet current California Building Standards Code, California Fire Code, and California Fire Safe Regulations to reduce future vulnerabilities to fire hazards through site preparation, layout design, fire-resistant landscaping, and fire-retarding building design and materials.
- HS-P14.6 The County shall coordinate with local, regional, and state agencies to develop a recovery plan for ensuring long-term housing recovery to decrease the number of residents displaced after wildfire events.
- HS-P14.7 After a wildfire, the County shall coordinate with local and regional agencies in efforts to protect water quality by stabilizing burned slopes and remediating or treating contaminated surface water or groundwater.

#### Actions

- HS-A14.1 Re-evaluate development standards after a wildfire to ensure consistency with the latest regulations and best practices.
- HS-A14.2 Identify and develop sites for emergency worker base camps and temporary housing for people impacted by disasters.

## V. HAZARDOUS MATERIALS

### A. *Background Information*

Hazardous materials are associated with industrial processes used in many parts of Butte County. These materials are also transported on county highways and roads and managed and recycled within the county. Since hazardous materials can be a serious health concern, they are regulated foremost by the Butte County Environmental Health Division, through implementation and inspection activities of the Certified Unified Program Agency (CUPA). The CUPA is responsible for implementing the “Community Right to Know Law,” the Hazardous Waste Control Law, the Underground Storage Tank Law, and other components of CUPA regulations. The Butte County CUPA relies on the California Department of Toxic Substances Control (DTSC), the State Water Resources Control Board (SWRCB), and other associated agencies for oversight and guidance, as well as referral, when incidents require intervention that exceeds the CUPA’s authority.



*Butte County Environmental Health Specialist at work. Photo courtesy of the Butte County Department of Public Health.*

## 1. Hazardous Waste Sites

In Butte County, hazardous waste sites are most commonly former industrial sites, groundwater plumes, and burn sites.

- ◆ **Former industrial sites** may be contaminated by past use of hazardous materials. The DTSC maintains a database of all the hazardous materials sites in Butte County. As of 2021, the DTSC database of hazardous materials indicates there are 27 active sites in Butte County, including four sites with active land use restrictions, five sites with certified and operation or maintenance status, two sites with an operating permit, and one site undergoing closure. Active status sites are those with active cleanups, certified operation and maintenance, land use restrictions, and hazardous waste disposal sites. These sites include areas within incorporated cities, as they still require permitting by the County Public Health Department.
- ◆ **Groundwater Contamination** is usually the result of illicit disposal, contaminated runoff from a hazardous materials site, or leaking underground fuel tanks. DTSC has identified large groundwater plumes of industrial solvents. All groundwater contamination plumes are currently being remediated under the jurisdiction and oversight of Cal-EPA.
- ◆ **Burn Sites**, where waste products are burned as an alternative to being simply buried in the ground, are seldom allowed in municipal areas. There are two burn sites in unincorporated areas of Butte County, which have both completed cleanups required by DTSC.

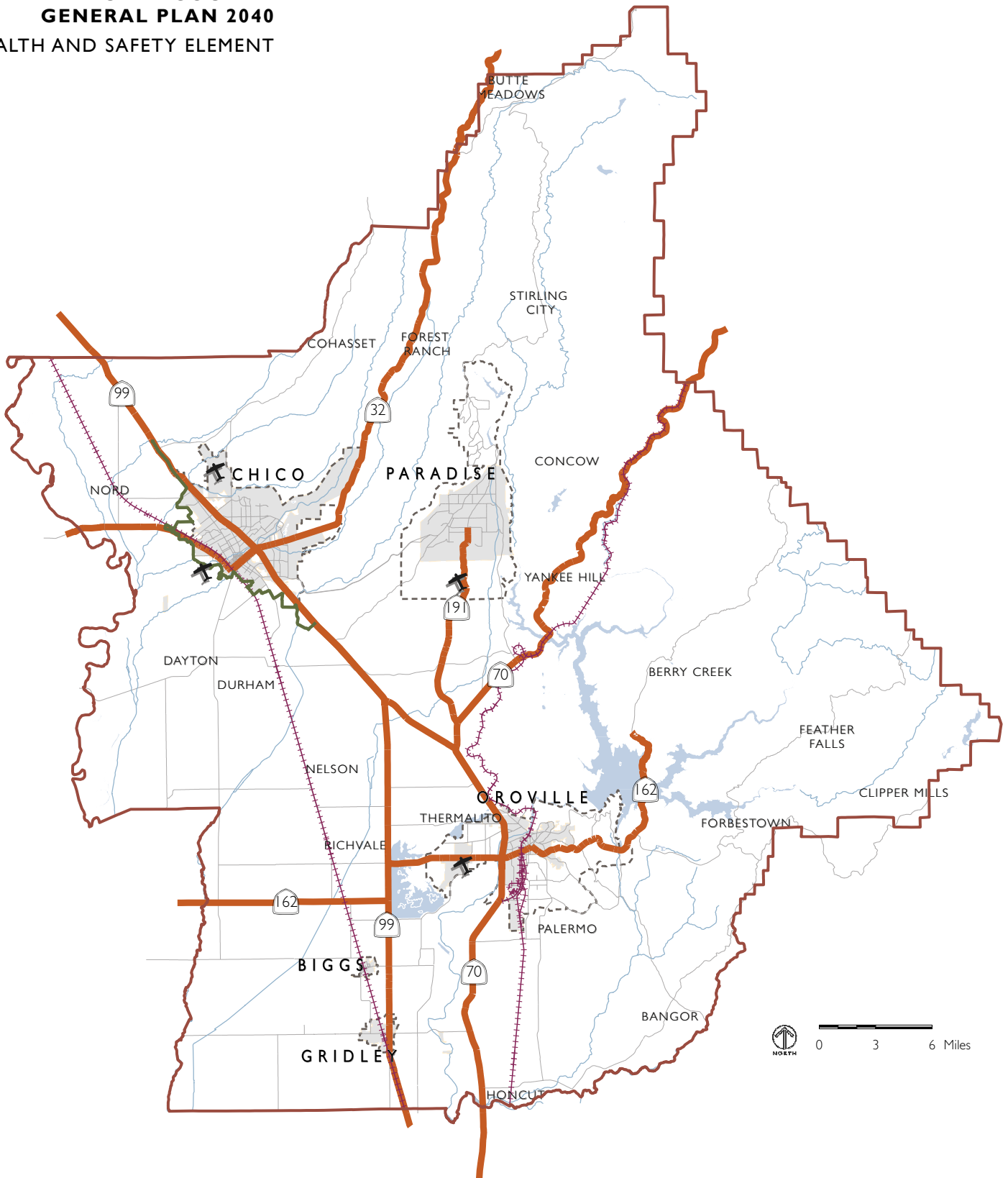
## 2. Hazardous Materials Transport

Nearly all of the hazardous materials transported through Butte County are carried by truck on the State Highway system. Figure HS-14 shows the County roads and city streets that are used to transport locally generated wastes from the source to the regional highway system. The County has not quantified the amount of hazardous materials that are transported on these routes to adjoining counties or states.

## 3. Hazardous Waste Disposal

Butte County has no registered Class I facilities that accept hazardous waste. There are only two remaining Class I landfills in California permitted to receive untreated hazardous wastes: the Kettleman Hills facility in Kings County and the Casmalia Resources Facility in Santa Barbara County. Businesses that handle or generate hazardous waste are regulated by the CUPA. Proper storage, off-site shipping, and documentation of the final disposal site is the primary function of this particular CUPA program.

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Source: Butte County GIS, 2009.

- +++++ Rail Route
- Highway Route
- ✈ Airports
- Greenline
- Major Roads
- - - Sphere of Influence
- City/Town Limits
- ▭ County Boundary

**FIGURE HS-14  
DESIGNATED ROUTES for HAZARDOUS MATERIALS TRANSPORT**

RPC 2(b)(v)

While there are no hazardous waste facilities for large volumes of waste, Butte County did assume responsibility for a permanent household hazardous waste collection facility in 2002. This facility is adjacent to the Chico Airport at 1101 Marauder Street, Chico. Recology Butte Colusa Counties in Oroville, Waste Management, Inc. in Gridley, and a facility in Paradise also operate household hazardous waste facilities.

#### **4. Hazardous Materials Emergency Response**

The Environmental Health Division of the County's Public Health Department has developed a Hazardous Materials Emergency Response Plan (Area Plan) containing processes and strategies for responding to emergencies involving hazardous materials in the county. In Butte County, a unified team from the fire departments of Chico, Oroville, Paradise, Biggs, Gridley and Butte County, and CAL FIRE serves as first responders to hazardous materials incidents or emergencies. Several agencies, including the Public Health Department, act as support to the team when requested. The team was first organized by the Butte County Fire Chiefs Association in 1989 through the use of a Joint Powers Agreement.

#### ***B. Goals, Policies, and Actions***

<b>Goal HS-15 Reduce risks from the harmful effects of hazardous materials.</b>
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##### Policies

- |          |   |
|----------|---|
| HS-P15.1 | The County supports the Hazardous Materials Emergency Response Plan (Area Plan).  |
| HS-P15.2 | Hazardous materials carrier routes shall be designated to direct hazardous materials transport away from populated areas.   |
| HS-P15.3 | Hazardous and toxic materials shall be transported only along the designated highway and rail routes shown in Figure HS-14.   |
| HS-P15.4 | Proponents of new hazardous waste management facilities shall demonstrate that potential environmental impacts can be mitigated as a condition of approval.   |
| HS-P15.5 | Environmental assessment and/or investigation shall be required prior to General Plan Amendment or Rezone approval that would allow uses with sensitive receptors, such as residential developments, schools, or care facilities, on sites previously used for commercial, industrial, agricultural, or mining uses to determine whether soils, |

groundwater, and existing structures are contaminated and require remediation. Policies and oversight authority shall follow California Health and Safety Code Division 20, Chapters 6.5 and 6.8 when determining jurisdiction.

## VI. EMERGENCY RESPONSE AND DISASTER PREPAREDNESS

### A. *Background Information*

Emergency planning reduces both the risks and consequences of natural and human-caused hazards that occur in the county, such as those from flooding or fire. The following descriptions explain how Butte County will respond to an emergency situation, coordinate its internal departments, and cooperate with neighboring jurisdictions.

#### 1. Local Hazard Mitigation Plan

Butte County has a current LHMP approved by FEMA that includes an assessment of the County's risk and vulnerability related to natural and other identified hazards and a comprehensive mitigation strategy, which includes actions and projects designed to mitigate or reduce the impacts of those hazards and to increase community resiliency. The County prepared the LHMP in accordance with the Disaster Mitigation Act of 2000 (DMA 2000) and followed FEMA's 2011 LHMP guidance. The LHMP incorporates a process where hazards are identified and profiled, the people and facilities at risk are analyzed, and mitigation actions are developed to reduce or eliminate hazard risk. The implementation of these mitigation actions, which include both short- and long-term strategies, involve planning, policy changes, programs, projects, and other activities. The Board of Supervisors formally adopted the LHMP and incorporated it into this Health and Safety Element of the General Plan, as permitted by California Government Code Section 65302.6. The LHMP should be consulted as part of this Health and Safety Element to ensure the general health and safety of people within Butte County.

#### 2. Butte County Emergency Operations Plan

The [Emergency Operations Plan](#) (EOP), updated in April 2022, serves as the official EOP for Butte County. It includes planned operational functions and the overall responsibilities of each area of the county with level of service in addressing emergency situations. While emergency services are administered at the state and county level, they are available to local jurisdictions as well. The EOP is designed to focus on potential large-scale disasters, rather than daily emergencies that are regularly handled by local law enforcement and protection agencies. The EOP defines the County's planned response to emergency situations associated with natural disasters, hazardous



materials incidents, and terrorism defense operations. A key component of the 2022 Butte County EOP is the identification of goals and standards for emergency services training, which is in section 9.4, Trainings and Exercises of that document.

The EOP is activated by the following alarms or incidents:

- ◆ An order of the Butte County Director of Emergency Management.
- ◆ A state of emergency proclaimed by the Governor.
- ◆ A proclaimed state-of-war emergency.
- ◆ A presidential declaration of a National Emergency.
- ◆ Upon receipt of an attack warning.
- ◆ An occurrence of a catastrophic disaster that requires immediate government response.

### **3. Hazardous Materials Emergency Response Plan**

As noted in Section V of this Element, the Environmental Health Division of the Butte County Public Health Department has developed a Hazardous Materials Emergency Response Plan (Area Plan). The Area Plan describes agency roles, strategies, and processes for responding to emergencies involving hazardous materials.

### **4. Inter-Agency Coordination and Response**

Butte County maintains an Office of Emergency Management (OEM) to coordinate interagency and intergovernmental comprehensive emergency management planning, operations and disaster assistance claims management for the County. OEM works with state and local agencies to develop effective emergency response systems within the county. OEM acts as the requesting and coordinating agency when situations require the involvement of state and other outside agencies.

### **5. Evacuation Planning**

Butte County developed evacuation plans and maps for sub-regions of the county, including Berry Creek, Butte Creek/Butte Valley, Cohasset/Richardson Springs, East Oroville/Bangor/Palermo/Cherokee, Forbestown/Clipper Mills/Feather Falls/Robison Mill/Hurleton, Forest Ranch/Butte Meadows, Paradise/Upper Ridge, and Yankee Hill. Each plan includes a map of key evacuation routes, advisory language, and preparation tips for community members. There are also 11 flood evacuation zones in the southern and western portions of the county, with guidance for evacuation routes, public assembly points, and evacuation centers. These evacuation plans help educate and prepare residents for emergencies and enables OEM to



effectively respond to a disaster event. Evacuation routes and plans can be found on the County's website at: <http://www.buttecounty.net/oem/disasterpreparedness>.

As of 2022, Butte County is in the process of identifying the safety, capacity, and viability of evacuation routes throughout the county, which will be consistent with AB 747 requirements.

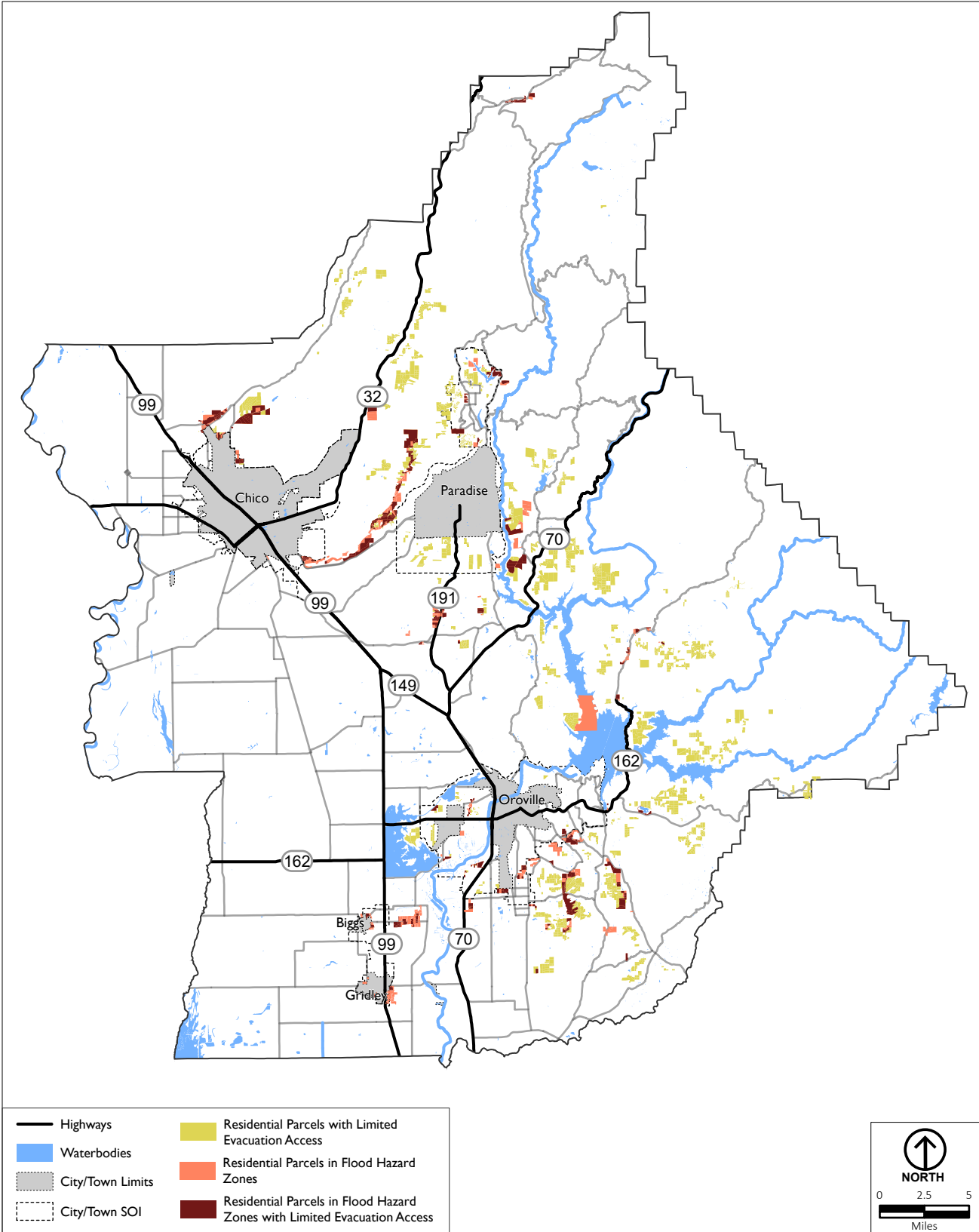
In remote areas of the county, several communities have evacuation constraints, including only one ingress and egress from neighborhoods or communities. Figure HS-15 and Figure HS-16 show evacuation-constrained residential areas throughout the county in flood hazard areas and wildfire hazard zones, pursuant to California Government Code Section 65302(g)(5).

## **6. Emergency Communication**

Efficient emergency response and communication systems are essential to ensuring the safety of county residents and visitors during emergencies. Key communications systems currently in place to help notify residents and businesses of emergencies and evacuation orders include emergency radio station 1460 AM, emergency information via phone networks through dialing 2-1-1, a reverse 911 notification system, Code Red, the Integrated Public Alert & Warning System (IPAWS) through FEMA, and Alert FM. Code Red is an opt-in mass notification system that provides emergency alerts, including evacuation zones, via cellphones, landlines, email, and text messages. This system provides emergency alerts through the Butte County Sheriff's office in English, Spanish, and Hmong. The IPAWS system provides alerts to the public through mobile phones using Wireless Emergency Alerts, and through radio and television using the Emergency Alert System and National Oceanic and Atmospheric Administration Weather Radio. During the 2018 Camp Fire, reverse 911 calls were the primary tool for evacuation notices sent out to alert residents of the approaching threat.<sup>9</sup>

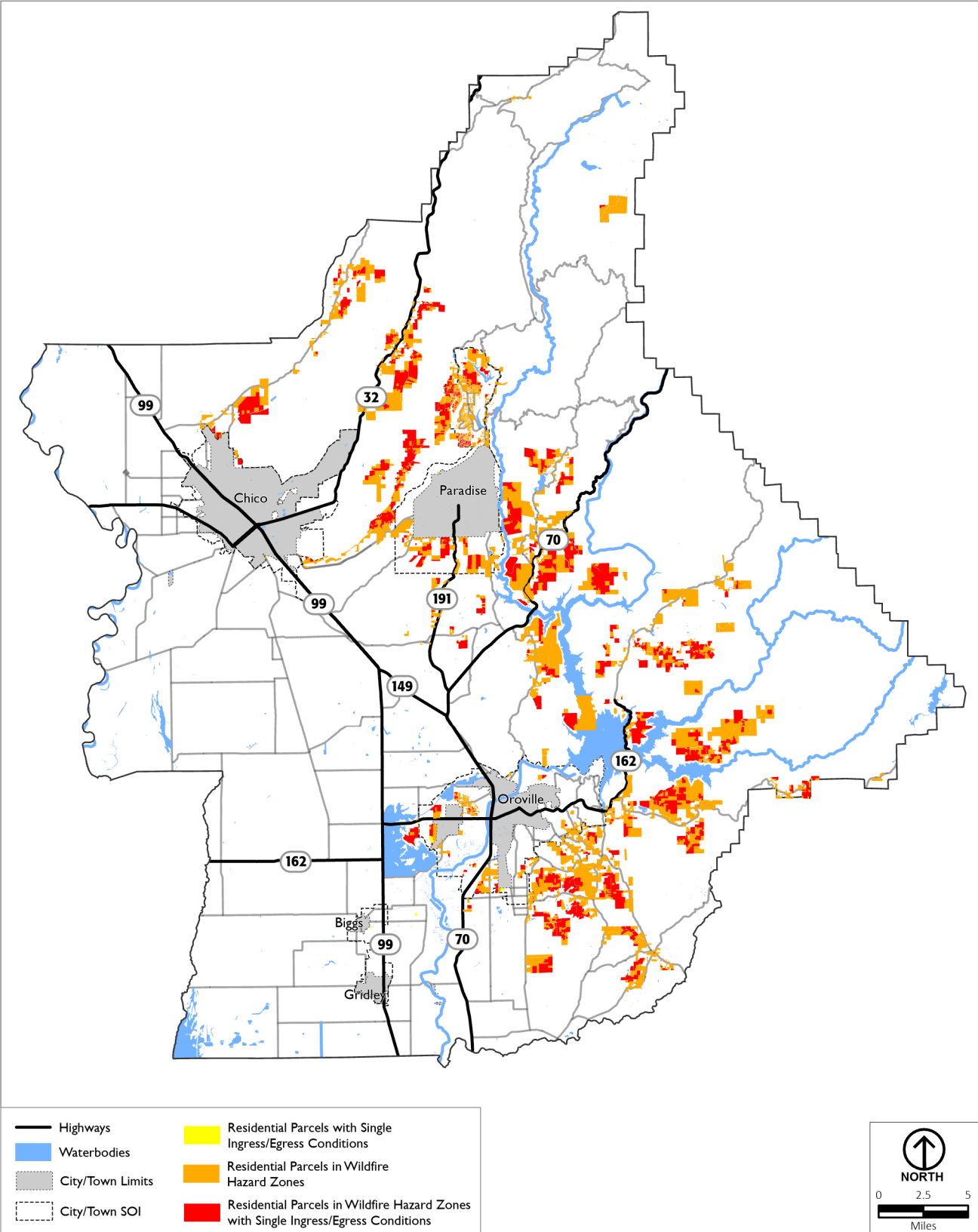
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<sup>9</sup> Zimmerman, Joseph. 2020. Service Assessment November 2018 Camp Fire, NOAA, <https://www.weather.gov/media/publications/assessments/sa1162SignedReport.pdf>.



Source: Butte County, 2012; PlaceWorks, 2021; FEMA 2019; DWR 2008

**FIGURE HS-15  
EVACUATION CONSTRAINED AREAS IN FLOOD HAZARD ZONES  
RPC 2(b)(v)**



Source: Butte County, 2012; PlaceWorks, 2021.

**FIGURE HS-16**  
**SINGLE INGRESS/EGRESS CONDITIONS IN WILDFIRE HAZARD ZONES**  
RPC 2(b)(v)

## *B. Goals, Policies, and Actions*

**Goal HS-16** Ensure communities are prepared for and able to respond to emergency situations and disasters with changing future conditions.

### Policies

- HS-P16.1 The County shall conduct continuous advance planning to anticipate potential threats and improve emergency response effectiveness, including updating the Emergency Operations Plan regularly and integrating new science for hazardous conditions, emergent threats, and emergency management best practices.
- HS-P16.2 The County shall continue multi-agency preparedness coordination and mutual-aid agreements among agencies to provide emergency services during disasters.
- HS-P16.3 The County shall ensure emergency services can adequately serve the existing and future needs of residents and visitors.
- HS-P16.4 Critical emergency response facilities such as fire, police, emergency service facilities, and utilities shall be sited to minimize their exposure to flooding, seismic effects, fire, or explosion.
- HS-P16.5 Emergency access routes shall be kept free of traffic impediments.
- HS-P16.6 Streets and developed properties shall be clearly marked to enable easy identification.
- HS-P16.7 A variety of real-time technology and other methods for emergency notifications shall be used to ensure residents and visitors receive emergency messages when the power is out and options for safe and expedient response.
- HS-P16.8 The County shall help residents and businesses to be able to adapt to extreme weather events and unforeseen weather conditions.
- HS-P16.9 The County shall work with retail establishments and other economic sectors to ensure they have adequate backup power supplies and training on emergency response efforts to protect their businesses.

HS-P16.10 The County shall integrate the Climate Change Vulnerability Assessment into County decisions.

Actions

HS-A16.1 Conduct assessments and projections of future emergency service needs, considering an increase in hazards due to climate change.

HS-A16.2 Create a series of equitably located resilience hubs that can serve as gathering places during emergencies and interruptions of services, providing access to water, electricity, and other necessary services.

HS-A16.3 Integrate a virtual, online resilience hub system associated with physical resilience hubs, building off existing community websites and communication systems, to provide the community with a trusted educational source during disasters or hazardous events.

HS-A16.4 Conduct targeted public outreach and education about cooling strategies for those populations sensitive to higher temperatures, especially seniors and those who work outdoors, lack permanent shelter, and lack air conditioning.

HS-A16.5 Update the Climate Change Vulnerability Assessment using best available data and tools during each update to this Health and Safety Element.

HS-A16.6 Develop a post-disaster public outreach program to support residents in the recovery and rebuilding process, including through mental and public health services to support youth, children, and adults through the trauma of disasters.

HS-A16.7 Maintain the Butte County Sherriff's Office Community Emergency Response Team program to ensure community members are prepared and can help others in an emergency.

**Goal HS-17 Ensure communities are connected and informed about climate hazard risks, preparedness, and response.**

Policies

- HS-P17.1 The County shall provide alerts about potential, developing, and ongoing emergencies through extensive alert and warning systems, including radio, television, social media, website, email, and telephone, that convey information to all residents, in multiple languages and formats, to ensure it is widely accessible.
- HS-P17.2 The County shall ensure residents are able to receive notifications through one or more services.
- HS-P17.3 The County supports the expansion of communication services in remote areas of the county, including cell towers and call boxes.

Actions

- HS-A17.1 Seek funding to develop community awareness and education programs for citizens that describe procedures and evacuation routes to be followed in the event of a disaster.
- HS-A17.2 Conduct surveys and interviews to understand how emergency information is currently received and identify barriers to accessing information so that feasible and accessible resources, services, and systems can be developed and provided.
- HS-A17.3 Develop a dynamic evacuation guidance and direction system that is mobile device application-based with a connection to the phone alert system to provide real-time evacuation guidance based on road capacity and the location of the hazard.

**Goal HS-18 Ensure communities have safe and reliable evacuation capabilities.**

Policies

- HS-P18.1 The County shall coordinate evacuation planning with all county jurisdictions, surrounding counties, and the California Department of Transportation (Caltrans).

- HS-P18.2 The County shall require new development to demonstrate access to adequate evacuation routes during potential hazard events that have capacity for residents, workers, and visitors to effectively evacuate. Evacuation routes shall demonstrate consistency with the SRA Fire Safe Regulations and Section 4290 of the California Public Resources Code.
- HS-P18.3 Areas identified as evacuation constrained in the Countywide Evacuation Study and/or on Figures HS-15 and HS-16 shall be prioritized for provision of evacuation routes that have capacity for residents, workers, and visitors to evacuate safely are designed consistent with evacuation route standards listed in Policy HS-P18.2.
- HS-P18.4 The County shall work with private, state, and federal property owners to investigate opportunities for private roads to serve as publicly accessible evacuation routes.
- HS-P18.5 The County shall consider funding opportunities, such as special districts, County Service Areas, or other mechanisms, to support the identification and improvement, as applicable, of primary and secondary evacuation routes in accordance with applicable evacuation plans.
- HS-P18.6 The County shall prioritize roadway improvements on evacuation routes to improve emergency evacuation and access functions, where feasible, including paving, regrading, adding passing zones and pull-outs, and clearing vegetation.
- HS-P18.7 Outdoor recreation areas shall incorporate places of refuge and/or markers to support location identification if emergency evacuation assistance is needed.

#### Actions

- HS-A18.1 Plan for roadway connections to convert dead-end roads into continuous routes where feasible, providing access for both every day and emergency functions.
- HS-A18.2 Evaluate the capacity of evacuation routes for the number of residents and visitors that may need to evacuate and implement recommended improvements.



- HS-A18.3 Make up-to-date printed and electronic evacuation route maps available to all community members.
- HS-A18.4 Conduct community-level virtual evacuation exercises.
- HS-A18.5 Establish an evacuation planning program to assist people with access and functional needs during evacuation events.
- HS-A18.6 Create and distribute educational materials on the importance, availability, and requirements of evacuation routes for those living in High or Very High Fire Hazard Severity Zones, the Wildland-Urban Interface, and 100-/200-/500-year floodplains.

## VII. COMMUNITY HEALTH

### A. *Background Information*

Community planning can directly enhance the wellness of a community. Land use planning has become a recognized tool for increasing individuals' physical activity rates, access to healthy foods, and access to health care. Such benefits are particularly important in Butte County, where the leading causes of death are cancer, coronary heart disease, lower respiratory disease, and stroke. Improving physical fitness and eating healthy foods can significantly reduce the risks for these diseases and conditions.

Public health and planning professionals recognize that increasing individuals' physical activity is paramount for the nation's health, and that planning communities that are more conducive to active modes of transportation can have an enormous impact on increasing physical activity rates.

Goals, policies, and actions that promote active modes of transportation are also found in the Land Use Element and Circulation Element.

In addition to physical activity and healthy food and water, access to health care is an important community health factor that is affected by land use planning. The County operates two health clinics. The Chico Clinic is on Oleander Avenue in Chico and the Oroville Clinic is on Table Mountain Boulevard in Oroville. Both clinics are fully serviced by licensed medical professionals and offer communicable disease screening, breast cancer early detection services, tuberculosis testing, immunizations, well-child exams, and family planning services.



*A Butte County farmers' market. Photo courtesy of the Butte County Department of Development Services.*

## *B. Goals, Policies, and Actions*

Policies related to community health are also addressed in other sections of this General Plan, including:

- ◆ Environmental justice in the Environmental Justice Element.
- ◆ Fire and police services in the Public Facilities and Services Element.
- ◆ Parks and recreational opportunities in the Public Facilities and Services Element.
- ◆ Water and air quality in the Conservation and Open Space Element.
- ◆ Public safety issues throughout this Health and Safety Element.

**Goal HS-19 Provide for the health, safety, and well-being of the county's present and future residents.**

### Policies

- HS-P19.1 The County supports physical infrastructure that encourages active transportation, such as bike paths, walking paths, and trails to promote public health.
- HS-P19.2 The County shall promote opportunities for physical activities, such as walking and biking, and encourage patterns of new development that promote physical activity and encourage bicycling, walking, and transit.
- HS-P19.3 Where feasible, new or remodeled public recreation facilities shall be designed with features that are accessible to individuals of all ages and abilities.
- HS-P19.4 The County supports programs for youth physical activity and senior mobility.
- HS-P19.5 The County shall work with the incorporated municipalities and private landowners to improve access to markets, gardens, parks, and transportation.
- HS-P19.6 The County supports and encourages community gardens and farmers' markets as a means to provide access to healthy and local foods, including on school grounds. Farmers' markets are encouraged to accept EBT (Electronic Benefits Transfer) to maximize access.

- HS-P19.7 High-quality grocery stores are encouraged in areas with limited access to healthy food.
- HS-P19.8 Efforts to improve food security and eliminate hunger, such as food assistance and nutrition programs, shall be continued.
- HS-P19.9 Alcohol, tobacco, and cannabis retail stores are discouraged in areas that already have high concentrations of these uses.
- HS-P19.10 The County shall continue to work collaboratively with vector control, Mosquito Abatement Districts, and other agencies to protect public health in Butte County.
- HS-P19.11 Available state-generated community health information, such as incidence of diabetes or heart disease, shall be considered when making decisions about the built environment that could affect community health.
- HS-P19.12 County offices and County-sponsored events shall promote healthy communities by modeling healthy practices, for example, by offering safe and ample bicycle parking at County offices or by offering healthy food choices at County events.
- HS-P19.13 The County shall encourage the provision of basic health and medical services in schools.
- HS-P19.14 The County encourages the development of integrated and collaborative projects that provide whole-person care (i.e., embedded mental health, substance use disorder, and primary care in the same building).
- HS-P19.15 The County shall work with local medical providers and hospitals to ensure that medical facilities are prepared to meet any increased demand from hazardous events.

### Actions

- HS-A19.1 Seek grant funding for program planning and interventions to improve access to and consumption of healthy food and physical activity.
- HS-A19.2 Inventory and map food deserts in the unincorporated county and develop a plan to address identified gaps.

- HS-A19.3 Identify and eliminate barriers in the permitting process for mobile farmers' markets.
- HS-A19.4 Identify funding opportunities to sustain and/or expand free and reduced-price meal programs for low-income youth year-round.
- HS-A19.5 Coordinate with existing agencies and organizations to develop a program to deliver meals to low-income youth during school closure events.
- HS-A19.6 Consider development of a Tobacco Retail Licensing Ordinance to establish a local licensing fee that would be used to fund tobacco-related compliance and enforcement work.
- HS-A19.7 Develop and implement programs to promote smoke-free multifamily housing and reduce the incidence of second-hand and third-hand smoke exposure.
- HS-A19.8 Provide regular staff-level reports to the Board of Supervisors with recommendations on ways that the County may address newly emerging public health concerns.
- HS-A19.9 Hold regular meetings between Department of Development Services staff and Department of Public Health staff to review emerging health issues.
- HS-A19.10 Develop a program to conduct education and outreach to inform Butte County residents about the services offered at the two County health clinics.
- HS-A19.11 Amend the Zoning Ordinance to minimize barriers and streamline the permitting process for the development of medical facilities.
- HS-A19.12 Seek legislative reform of the Lanterman-Petris-Short (LPS) Act, which regulates involuntary civil commitments to mental health institutions, to improve the ability for counties to provide mental health care to those in need.

## VIII. CLIMATE CHANGE ADAPTATION AND RESILIENCE

In 2021, Butte County updated the 2018 Draft Climate Change Vulnerability Assessment to be consistent with Government Code Section 65302(g)(4), as part of the update to this Health and Safety Element. This analysis assesses the extent to which the diverse populations and assets in Butte County are vulnerable to different emergencies and hazardous conditions that may be created or made worse by climate change. The primary categories of populations and assets assessed include populations, buildings and infrastructure, economic drivers, ecosystems and natural resources, and key services. Populations and assets were evaluated for their vulnerability to seven hazards, including agriculture and forestry pests and diseases, drought, extreme heat, human health hazards, severe wind, severe storms, and wildfire. The assessment follows the recommended process in the updated California Adaptation Planning Guide, which is the state’s guidance for how local communities should conduct climate adaptation planning efforts, including vulnerability assessments. As defined by the California Adaptation Planning Guide, climate change vulnerability is the degree to which natural, built, and human systems are susceptible to harm from exposure or stresses associated with climate change and from the absence of capacity to adapt.

### *A. Background Information*

#### **1. Climate Change Vulnerability Assessment**

Changes to the global climate system are expected to affect future occurrences of natural hazards in and around Butte County. Many hazards that already affect Butte County—including high heat, extreme storms, wildfire, drought, and flooding—are projected to become more frequent and more intense in coming years and decades. In some cases, these trends have already begun. This section discusses some of the anticipated effects of climate change in Butte County. More information on these effects and the harm they may pose to the community can be found in the Climate Change Vulnerability Assessment. The following list summarizes the climate change hazards assessment in the Climate Change Vulnerability Assessment.

- ◆ Projections show that warmer temperatures will cause an increase in average annual extreme heat events. Depending on future greenhouse gas (GHG) emission levels, the countywide number of extreme heat days is expected to rise from a historical average of 5 annually to up to 29 extreme heat days by the middle of the century on average, and up to 59 extreme heat days on average by the end of the century. In addition to increases in extreme heat events, all of Butte County is also expected to see an increase in average daily high temperatures.

- ◆ Both droughts and floods are expected to become more frequent as periods of very high and very low precipitation become more common. Warmer temperatures are expected to increase the rate of snowmelt in the Sierra during spring, which may also contribute to greater flooding at that time of year. This shift in snowmelt timing, coupled with the higher likelihood of precipitation falling as rain instead of snow, may reduce water availability later in the year, increasing the risk of drought in the late summer and autumn.
- ◆ Hotter, drier weather is expected to lead to an increase in wildfires in Butte County. Historically, an average of 5,306 acres burned annually. This is expected to increase to an annual average of 8,961 acres burned per year by midcentury and an annual average of 13,939 acres burned per year by end of the century. Across the region, smoke from more frequent and intense wildfires may also increase poor air quality. Wildfire conditions can be exacerbated by strong winds associated with strong storm systems. These winds can also cause Public Safety Power Shutoff (PSPS) events throughout the county.
- ◆ Climate change is expected to cause an increase in intense rainfall, which is usually associated with strong storm systems. Heavy rainfall may also contribute to an increased risk of landslides in the mountain regions of Butte County. Compared to their historical average, the average number of extreme precipitation events is projected to approximately double by the end of this century. Severe winter weather, such as heavy snowfall, ice storms, or extreme cold, may also become more frequent and intense because of climate change.
- ◆ Climate change is associated with several threats to human and ecosystem health. Changes in temperatures and precipitation patterns may cause pests and diseases that have historically not been present in Butte County to expand their ranges into the area. There are a number of diseases that are linked to climate change and can be harmful to the health of Butte County community members, such as hantavirus pulmonary syndrome, Lyme disease, West Nile fever, and influenza. Many of these diseases are carried by animals such as mice and rats, ticks, and mosquitos. Warmer temperatures earlier in the spring and later in the fall can cause these animals to be active for longer periods, increasing the time that these diseases can be transmitted.

## 2. Climate Change Vulnerability Assessment Results

The Climate Change Vulnerability Assessment indicates that Butte County's populations and assets are most vulnerable to wildfire, severe storms, extreme heat, and severe wind.



While many aspects of climate change are expected to affect community health and well-being in Butte County, populations in the eastern portion of the county are most vulnerable to wildfires and populations in the western portion of the county are most vulnerable to severe storms, including flooding. Countywide, nearly all populations are highly vulnerable to extreme heat. Financial limitations, access, and function needs, those more exposed to the outdoors, and lack of access to communication or community services cause the most vulnerable populations to be low-resourced people of color, outdoor workers, households in poverty, immigrant communities, persons experiencing homelessness, and seniors living alone. The homes that these populations live in, especially those in fire hazard, landslide, or flood zones, are highly vulnerable to direct damage from these hazards, as well as indirect damage from forestry pests and diseases that can weaken trees and cause them to fall on properties during severe wind or storm events. These populations most often face challenges with evacuating during emergencies due to lack of vehicles, inability to drive, or isolated nature of their residence or place of employment.

Countywide, the electricity transmission system is vulnerable to multiple hazards, including severe wind, severe storms, wildfire, and extreme heat. Severe wind can trigger PSPS events, extreme heat can reduce the capacity and strain the system, and wildfires can damage the system, disrupting energy service. Extreme heat can lead to power outages by causing mechanical failure of grid equipment, heat damage to power lines, and a high demand for electricity to power air conditioners, all of which places stress on the electrical grid and may lead to service disruptions. Severe storm and severe wind conditions can also damage communication infrastructure, decreasing network capacity. There may be a higher demand for communication services during severe weather, potentially putting stress on the network and increasing the risk of service interruptions.

PSPS events can also create vulnerabilities for Butte County community members. The vast majority of homes and businesses do not have backup power supplies, so a loss of electricity can cause a loss of refrigeration for food and medical supplies, limited cooking, limited or no heating or cooling (particularly dangerous during extreme heat or cold events), no lighting, and limited or no access to the Internet or other information systems. Many businesses are forced to close during a PSPS event, causing economic hardships and depriving community members of important services, such as grocery stores, gas stations, and banks/ATMs. PSPS events may also be harmful to people who depend on electrically powered medical devices. Some property owners have purchased backup power generators; however, these produce high levels of noise, pollution, and odors.

Key infrastructure, such as major roads, highways, and single-accessed roads, can become impassable due to severe wind, severe storms, and wildfire, isolating populations in remote areas of the county and disrupting services to those areas. This can also prevent effective evacuations during emergencies such as wildfire, landslides, and flooding. Water and wastewater treatment services may also be impacted by severe storm events, which may damage water infrastructure and interrupt service, especially shallow septic systems and water wells that could be impacted during flooding. Floodwaters can overwhelm the septic systems, causing them to overflow and contaminate drinking water supplies. This can cause disruptions in both water and wastewater infrastructure and services.

Butte County's agricultural industry is the most vulnerable economic driver in the county, with high vulnerability to all seven hazards evaluated in the Climate Change Vulnerability Assessment. Severe weather and severe wind can harm or kill crops or livestock and damage infrastructure, reducing agricultural yields and necessitating costly repairs. Drought can reduce the amount of water available and raise water prices, reducing agricultural profits and/or requiring that farmers change their irrigation methods. Extreme heat can damage a number of different crops and can result in widespread animal illnesses or even death of livestock. Extreme heat, human health hazards, and smoke from wildfires can harm the outdoor workers in the agricultural sector, causing adverse health effects to farmworkers. As a result, agricultural yields and the cost of operations will likely be affected and impact local economies.

An increase in forestry pests and diseases, droughts, extreme heat, and wildfire create higher vulnerability for the county's natural environments, including conifer forests, oak woodland, open water, and wetland ecosystems. Drought and extreme heat can stress trees, weakening or killing them. Weakened trees are more susceptible to forestry pests, creating a risk of further damage. Droughts and extreme heat may imperil aquatic and wetland ecosystems. These changes can also affect local economic activities in Butte County, such as outdoor recreation and visiting the county's national forests.

### *B. Goals, Policies, and Actions*

Policies related to climate change resilience for forests, agricultural lands, and water supply are also provided in the timber resources section of the Conservation and Open Space Element, Agriculture Element, and Water Resources Element, respectively.

**Goal HS-20 Ensure communities can continue to function and thrive with an increase in average temperatures and extreme heat days.**

#### Policies

- HS-P20.1 The County shall coordinate with the California Division of Occupational Safety and Health to ensure agricultural, timber, construction, recreation, and other outdoor industries provide adequate drinking water, shade, and alternative work hours to prevent workers from getting heat-related illness.
- HS-P20.2 Facilities, such as parks and community centers, shall be equipped with adequate water stations, cooling stations, and shady outdoor spaces to provide refuge from extreme heat, and should have effective systems in place to notify community members about these resources.
- HS-P20.3 The County encourages the Butte County Association of Governments (BCAG) to establish a countywide shuttle system to operate during extreme heat events with specific pickup points, providing access to local cooling centers for persons who are unable to drive or lack access to a vehicle.

#### Actions

- HS-A20.1 Develop an extreme heat response plan that sets equitable locations for cooling centers, temperature triggers for when they open, and extreme heat education programs for residents and visitors.
- HS-A20.2 Partner with local community-based organizations to pursue grant funding opportunities to provide financial assistance or reduced costs for energy retrofits, cooling, ventilation, or other adaptation measures to help protect low-income households, senior citizens, and other vulnerable persons against extreme heat events.
- HS-A20.3 Work with federal, state, or regional agencies to install water stations and shade structures at trail heads, parks, and open space areas.

- HS-A20.4 Conduct outreach and educational programs about extreme heat for senior centers, community groups, schools, churches, and sports organizations.
- HS-A20.5 Work with the Butte County Association of Governments (BCAG) to establish a transportation working group consisting of public, private, volunteer, and service organizations to develop a plan to ensure vulnerable populations are provided transportation to cooling centers.
- HS-A20.6 Identify and connect with local groups and organizations to engage youth in climate change resilience planning.

**Goal HS-21 Ensure utilities, buildings, and infrastructure are climate resilient and able to meet vital community needs during and after severe storm events.**

### Policies

- HS-P21.1 The County supports the development of community and neighborhood microgrids that use renewable energy sources, including energy storage, which can provide sustainable and reliable electricity supply that is not shut off during PSPS events.
- HS-P21.2 The County encourages internet and telephone communication providers to install redundant facilities, improve service coverage, and reduce the chance of service outages, emphasizing emergency communication services.
- HS-P21.3 At least one emergency generator shall be maintained in all critical facilities that could be used as an emergency public assembly area.
- HS-P21.4 Capital Improvement Projects shall include facility and infrastructure upgrades that address key vulnerabilities identified in the Climate Change Vulnerability Assessment and Local Hazard Mitigation Plan and be designed to resist future climate projections with a high level of risk aversion.

Actions

- HS-A21.1 Work with the Pacific Gas and Electric Company (PG&E) to underground electrical transmission and distribution lines in new and existing development, prioritizing lines in areas at highest risk for wildfire and with high winds.
- HS-A21.2 Coordinate with PG&E to conduct regular evaluations and retrofits of energy transmission and delivery infrastructure.
- HS-A21.3 Work with PG&E to ensure the areas below and adjacent to power lines are kept clear of plant matter and other accumulated debris.
- HS-A21.4 Coordinate with PG&E to establish equitably located community resource or resilience centers for use during PSPS and other hazard events.
- HS-A21.5 Evaluate County-owned emergency management facilities and utility systems for susceptibility to PSPS events and install backup battery storage systems, generators, or other backup systems if facilities and systems are susceptible.
- HS-A21.6 Streamline the permitting process to support private property conversion to solar with battery backup systems or the ability to wire electrical panels for whole-house generator services.
- HS-A21.7 Publicize available incentives and explore additional opportunities to encourage private building owners to install solar panels and backup battery storage systems.
- HS-A21.8 Coordinate with Caltrans, BCAG, and municipalities within the county to make repairs and upgrades to transportation infrastructure that improve resilience to climate change, including roads and bridges maintained by the County and those maintained by other agencies.
- HS-A21.9 Seek funding, such as Hazard Mitigation Grants, California Resilience Challenge Grants, Better Together Communities Grants, or Building Resilient Infrastructure and Communities (BRIC) Grants, to develop an infrastructure resilience plan that addresses vulnerable infrastructure and considers climate change hazards.

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