Annex B City of Chico

B.1 Introduction

This Annex details the hazard mitigation planning elements specific to the City of Chico, a previously participating jurisdiction to the 2014 Butte County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the City. This Annex provides additional information specific to the City of Chico, with a focus on providing additional details on the risk assessment and mitigation strategy for this community.

B.2 Planning Process

As described above, the City of Chico followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Butte County Hazard Mitigation Planning Committee (HMPC), the City formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table B-1. Additional details on plan participation and City representatives are included in Appendix A.

Table B-1 City of Chico – Planning Team

Name	Position/Title	How Participated
Jesse Alexander	Division Chief – Chico Fire Department	Provided data on past occurrences and status of past actions. Attended meetings. Provided input during plan development. Provided documents. Provided information for capability assessment. Reviewed Drafts.
Brendan Ottoboni	Public Work Director-Engineering	Provided Mitigation Action Worksheets on Bruce Road Bridge Retrofit, BD Drainage Ditch, and Intelligent Transportation System. Reviewed Draft.
Brendan Vieg	Director Community Development, Planning and Housing	Provided details on Chico Climate Change Vulnerability Assessment and General Plan. Reviewed Draft.
Linda Herman	Park & Natural Resource Manager	Provided Mitigation Action Worksheets for Upper Bidwell Park Fuel Reduction and Lindo Channel Defensible Space Project

Coordination with other community planning efforts is paramount to the successful implementation of this Plan. This section provides information on how the City integrated the previously approved 2014 Plan into existing planning mechanisms and programs. Specifically, the City incorporated into or implemented the 2014 LHMP through other plans and programs shown in Table B-2.

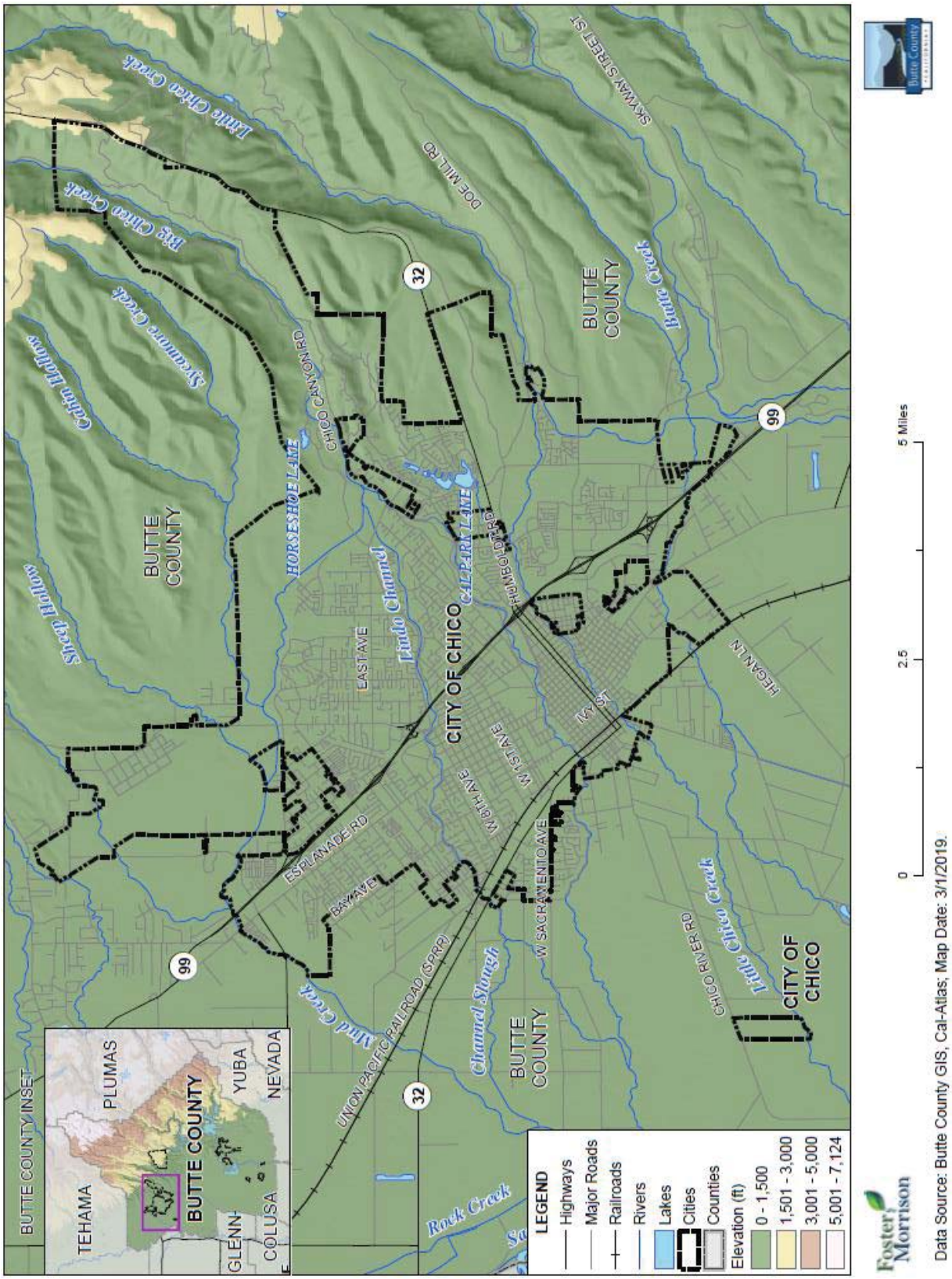
Table B-2 2014 LHMP Incorporation

Planning Mechanism 2014 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
Chico Climate Change Vulnerability Assessment	Development of Climate Action Plan (CAP) resulting in a City Sustainability Task Force

B.3 Community Profile

The community profile for the City of Chico is detailed in the following sections. Figure B-1 displays a City map and the location of the City of Chico within Butte County.

Figure B-1 City of Chico



B.3.1. Geography and Climate

Chico is located at the northeast edge of the Sacramento Valley, one of the richest agricultural areas in the world. The Sierra Nevada mountains lie to the East, with Chico's city limits venturing several miles into the foothills. To the west, the Sacramento River lies five miles from the city limit.

Chico sits on the Sacramento Valley floor close to the foothills of the Cascade Range and the Sierra Nevada range with Big Chico Creek being the demarcation line between the Cascade Range (to the north) and the Sierra Nevada range (to the south). The City terrain is on the whole very flat with increasingly hilly terrain beginning at the eastern city limits.

According to the United States Census Bureau, the City has a total area of 27.8 square miles of which 27.7 square miles of it is land and 0.04% is water. The City is bisected by Bidwell Park, which runs five miles from the City center to the foothills of the Cascade Range.

The City is also traversed by two creeks and a flood channel, which feeds the Sacramento River. They are named Big Chico Creek, Little Chico Creek, and Lindo Channel (also known as Sandy Gulch, locally). The City is traversed also by Mud Creek, Sycamore Creek, Comanche Creek, Dead Horse Slough, and Butte Creek.

B.3.2. History

The original inhabitants of the area now known as Chico were the Mechoopda Maidu Native Americans. The first recorded Europeans arrived in 1832. That same year, approximately 75 percent of the Indian population in California died from epidemics of disease brought by the Europeans.

The City of Chico was founded in 1860 by John Bidwell, a member of one of the first wagon trains to reach California in 1843. During the American Civil War, Camp Bidwell (named for John Bidwell, by then a Brigadier General of the California Militia), was established a mile outside Chico, by Lt. Col. A. E. Hooker with a company of cavalry and two of infantry, on August 26, 1863. By early 1865 it was being referred to as Camp Chico when a post called Camp Bidwell was established in northwest California, later to be Fort Bidwell. The City became incorporated January 8, 1872. Chico was home to a significant Chinese American community when it was first incorporated, but arsonists burned Chico's Chinatown in February 1886, driving Chinese Americans out of town.

Historian W.H. "Old Hutch" Hutchinson identified five events as the most seminal in Chico history. They included the arrival of John Bidwell in 1850, the arrival of the California and Oregon Railroad in 1870, the establishment of the Northern Branch of the State Normal School in 1887, the purchase of the Sierra Lumber Company by the Diamond Match Company in 1900, and the development of the Army Air Base, which is now the Chico Municipal Airport.

Several other significant events have unfolded in Chico more recently. These include the construction and relocation of Highway 99E through town in the early 1960s, and the establishment of a "Green Line" on the western City limits as protection of agricultural lands.

B.3.3. Economy and Tax Base

US Census estimates show economic characteristics for the City of Chico. These are shown in Table B-3 and Table B-4. Mean household income in the City was $64,769. Median household income in the City was $45,337.

Table B-3 City of Chico – Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	921	2.1%
Construction	1,935	4.4%
Manufacturing	2,799	6.4%
Wholesale trade	710	1.6%
Retail trade	6,619	15.0%
Transportation and warehousing, and utilities	1,085	2.5%
Information	976	2.2%
Finance and insurance, and real estate and rental and leasing	2,783	6.3%
Professional, scientific, and management, and administrative and waste management services	4,666	10.6%
Educational services, and health care and social assistance	12,244	27.8%
Arts, entertainment, and recreation, and accommodation and food services	5,365	12.2%
Other services, except public administration	2,376	5.4%
Public administration	1,551	3.5%

Source: US Census Bureau American Community Survey 2013-2017 Estimates

Table B-4 City of Chico – Income and Benefits

Income Bracket	Population	Percent
<$10,000	3,937	11.0%
$10,000 – $14,999	2,954	8.3%
$15,000 - $24,9999	4,108	11.5%
$25,000 – $34,999	3,391	9.5%
$35,000 – $49,999	4,739	13.3%
$50,000 – $74,999	5,706	16.0%
$75,000 – $99,999	3,850	10.8%
$100,000 – $149,999	3,956	11.1%
$150,000 – $199,999	1,677	4.7%
$200,000 or more	1,350	3.8%

Source: US Census Bureau, 2010

The City of Chico s the economic center of the Northern Sacramento Valley. Much of Chico's economy is powered by the California State University, Chico. Agriculture is also a significant part of the economy.

Almonds, rice, olives, kiwis, peaches and plums are the major crops. The major employers are the government, education, social services, arts and entertainment, recreation, healthcare and accommodation and food service. The largest employers in Chico are:

- Butte Community Insurance Agency
- California State University Chico
- Cascade Auto Glass
- Chico High School
- Enloe Homecare
- Enloe Medical Center
- Home & Health Care Management
- Knife River Corp
- S-S Organic Produce-Natural
- United Healthcare
- Walmart
- Wittmeier Chevrolet
- Work Training Ctr Inc

B.3.4. Population

The California Department of Finance estimated the January 1, 2019 total population for the City of Chico was 112,111.

B.4 Hazard Identification

Chico's planning team identified the hazards that affect the City and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to Chico (see Table B-5).

Table B-5 City of Chico—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	Low	–
Dam Failure	Significant	Occasional	Critical	Medium	Medium
Drought & Water shortage	Significant	Likely	Limited	High	High
Earthquake and Liquefaction	Extensive	Occasional	Critical	High	Low
Floods: 100/200/500 year	Significant	Occasional	Critical	High	Medium
Floods: Localized Stormwater	Significant	Likely	Limited	Medium	Medium
Hazardous Materials Transportation	Extensive	Occasional	Limited	Medium	Low
Invasive Species: Aquatic	Limited	Unlikely	Limited	Low	Low
Invasive Species: Pests/Plants	Significant	Likely	Limited	Low	Low
Landslide, Mudslide, and Debris Flow	Significant	Occasional	Limited	Medium	Medium
Levee Failure	Limited	Occasional	Limited	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Likely	Limited	Medium	High
Severe Weather: Freeze and Winter Storm	Limited	Occasional	Limited	Medium	Medium
Severe Weather: Heavy Rain and Storms (Hail, Lightning, Wind)	Significant	Highly Likely	Limited	High	Medium
Severe Weather: Wind and Tornado	Limited	Occasional	Limited	Medium	Low
Stream Bank Erosion	Significant	Likely	Limited	Low	Low
Volcano	Significant	Unlikely	Critical	Low	Low
Wildfire	Significant	Highly Likely	Critical	High	High

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Climate Change Influence
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

B.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile Chico's hazards and assess the City's vulnerability separate from that of the Planning Area as a whole, which has already been assessed in Sections 4.2 Hazard Profiles and 4.3 Vulnerability Assessment in the Base Plan. The hazard profiles in the Base Plan discuss overall impacts to the Planning Area and describes the hazard problem description, hazard location and extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the City is included in this Annex. This vulnerability assessment analyzes the property, population, critical facilities, and other assets at risk to hazards ranked of medium or high significance specific to the City and also includes a vulnerability assessment to the three primary hazards to the State of California: earthquake, flood, and wildfire. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

B.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section B.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard affects the City and includes information on past hazard occurrences. The intent of this section is to provide jurisdictional specific information on hazards and further describe how the hazards and risks differ across the Planning Area.

B.5.2. Vulnerability Assessment and Assets at Risk

This section identifies Chico's total assets at risk, including values at risk, populations at risk, critical facilities and infrastructure, natural resources, and historic and cultural resources. Growth and development trends are also presented for the community. This data is not hazard specific, but is representative of total assets at risk within the community.

Values at Risk

The following data from the Butte County Assessor's Office is based on the 3/28/2019 (post-Camp Fire) Assessor's data. The methodology used to derive property values is the same as in Section 4.3.1 of the Base Plan. This data should only be used as a guideline to overall values in the County, as the information has some limitations. The most significant limitation is created by Proposition 13 and the Williamson Act as detailed in the Base Plan. Instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is most likely low and does not reflect current market value of properties within the County. It is also important to note, in the event of a disaster, it is generally the value of the infrastructure or improvements to the land that is of concern or at risk. Generally, the land itself is not a loss. However, depending on the type of hazard and impact of any given hazard event, land values may be adversely affected; thus, land values are included as appropriate. Table B-6 shows the 3/28/2019 Assessor's values (e.g., the values at risk) broken down by property type for the City of Chico.

Table B-6 City of Chico – Total Values at Risk by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	23	4	$683,709	$271,477	$57,958	$271,477	$1,289,594
Commercial	2,087	1,732	$605,649,324	$1,443,726,949	$46,677,852	$1,443,726,949	$3,103,973,488
Industrial	360	286	$74,990,957	$173,110,896	$7,462,437	$259,666,344	$508,890,547
Residential	23,620	22,532	$2,448,579,133	$4,354,452,062	$187,732	$2,177,226,031	$8,753,615,340
Unknown	407	6	$783,739	$1,038,475	$0	$0	$1,800,465
City of Chico Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: Butte County 3/28/2019 Parcel/Assessor's Data

Population and Special Populations at Risk

General Population

As previously described in the community profile, based on California Department of Finance estimates, the current January 1, 2019 total population for the City of Chico was 112,111, all of which are potentially vulnerable to hazard events.

Special Populations and Disadvantaged Communities

The City HMPC noted that Chico has a large population residing in assisted living facilities. Some of these assisted living facilities are large structures with over 100 residents. This population is vulnerable to egress concerns with structure fires. In addition, a significant population is college-age and live in dense neighbors within older structures. These structures are usually balloon framed construction with multiple levels.

The Chico Climate Change Vulnerability Assessment noted other special populations in the City. Currently, 25.2% of Chico's residents are living in poverty (United State Census Bureau, 2017). These people are more likely to experience infrastructural limitations, more likely to have one or more chronic medical conditions, and less likely to own cars that can provide mobility to avoid deleterious climate effects. A large portion of Chico's population is students who attend the community's local colleges. Many students live in the neighborhoods north and south of the CSU, Chico campus, which are older neighborhoods with older housing stock and limited heating and cooling systems.

Critical Facilities and Infrastructure

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

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

A critical facility is classified by the following categories: (1) Essential Services Facilities, (2) At-Risk Populations Facilities, and (3) Hazardous Materials Facilities, as discussed in Section 4.3.1 of the Base Plan.

An inventory of critical facilities in the City of Chico from Butte County GIS is shown on Figure B-2. Table B-7 gives summary information about the critical facilities in the City. Table B-8 details the facility categories and breaks them down by facility type. Details of critical facility definition, type, name, address, and jurisdiction by hazard zone are listed in Appendix F. The critical facility inventory and associated maps for the City only include the first two categories of facility types; a GIS layer of Hazardous Materials Facilities was not available.

Figure B-2 City of Chico – Critical Facilities

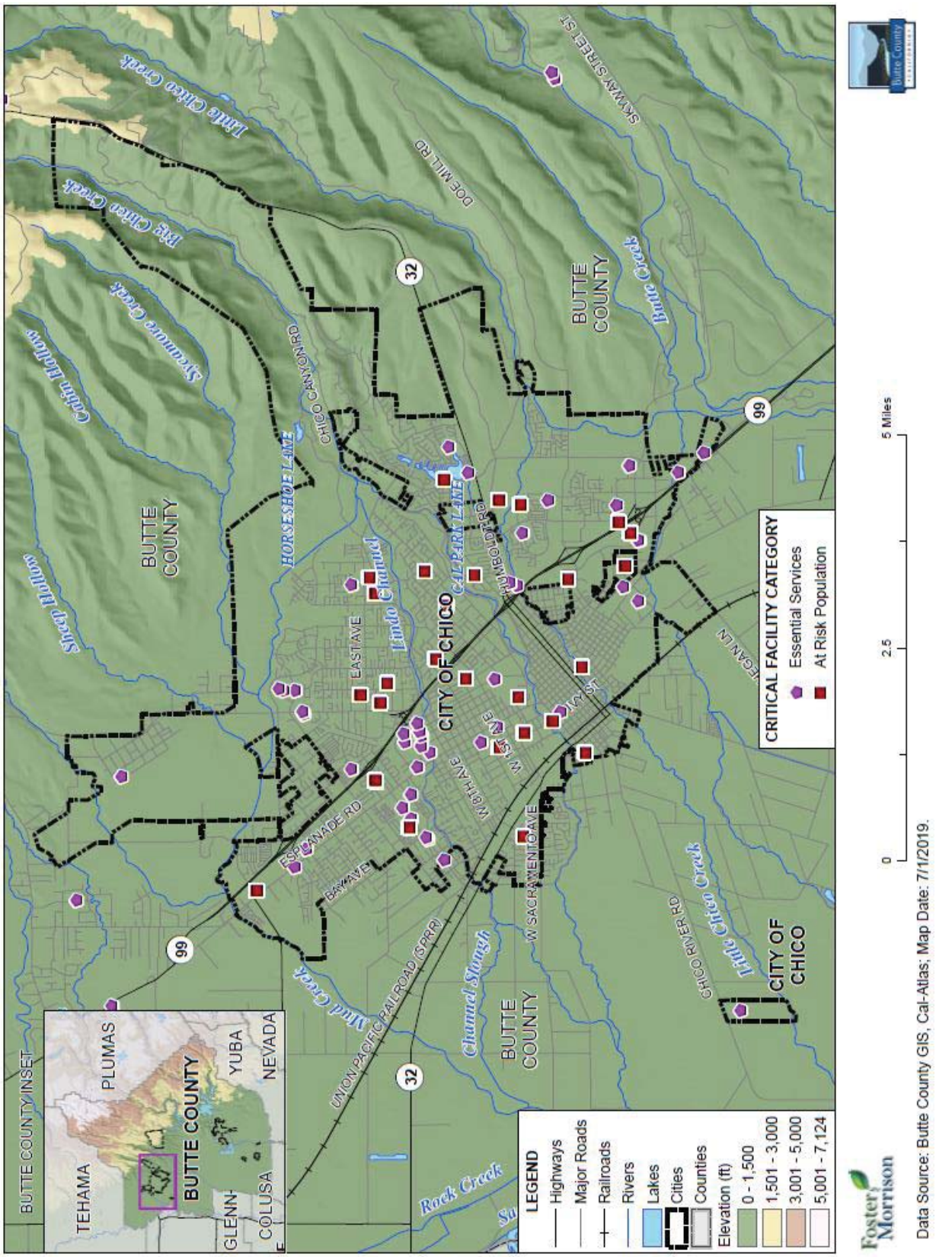


Table B-7 City of Chico – Critical Facility Summary

Critical Facility Category / Jurisdiction	Facility Count
Essential Services Facilities	50
At Risk Population Facilities	31
City of Chico Total	**81**

Source: Butte County GIS

Table B-8 City of Chico – Critical Facilities by Facility Type

Facility Type	Facility Count
Essential Services Facilities	
Wastewater Treatment Plant	1
Fire	3
Health Care	38
Law Enforcement	4
Public Assembly Point / Evacuation Center	1
Radio Sites	1
Dam	1
Logistics Hub	1
Essential Services Facilities Total	**50**
At Risk Population Facilities	
School	31
At Risk Population Facilities Total	**31**
Grand Total	**81**

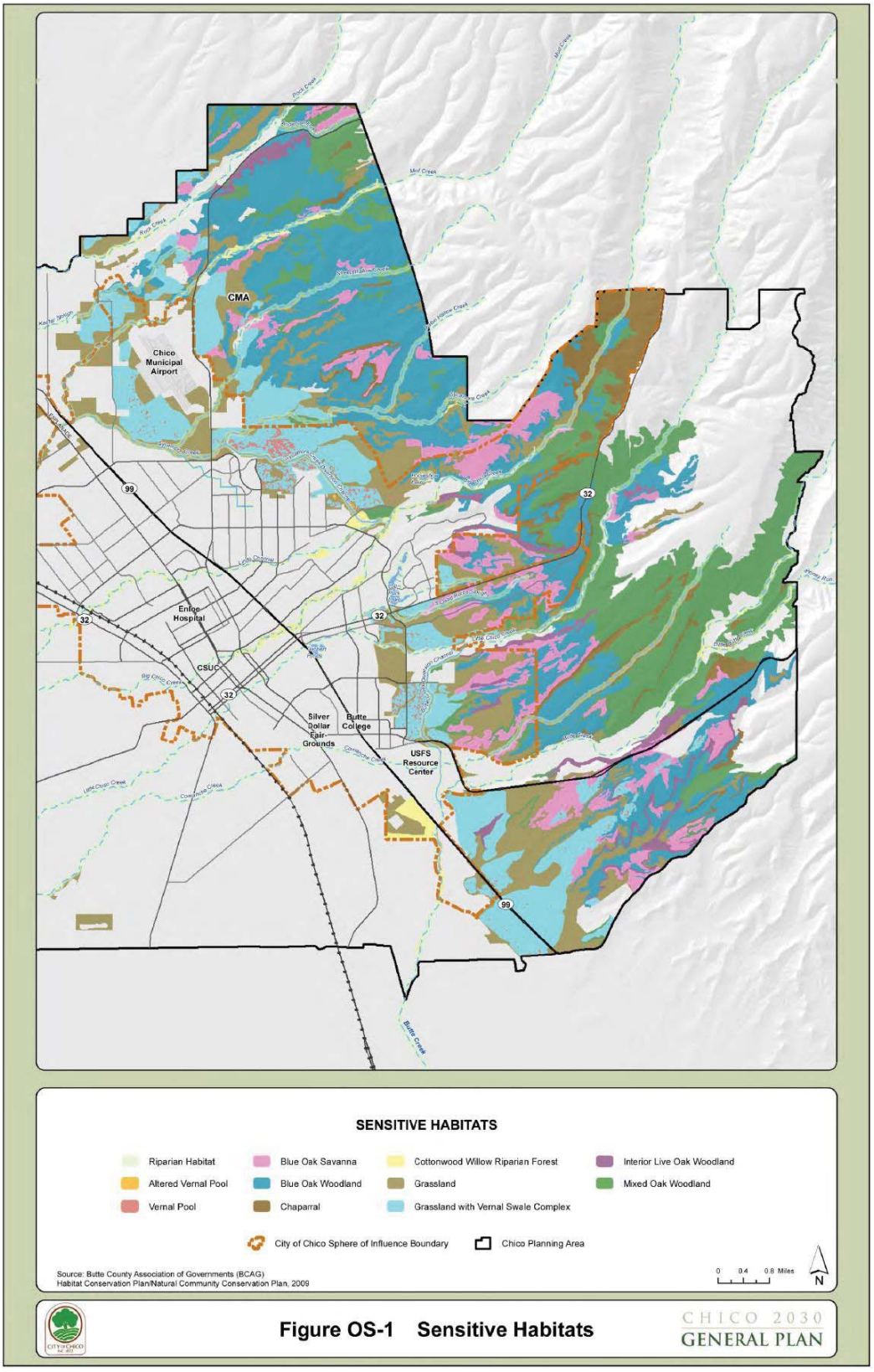
Source: Butte County GIS

Natural Resources

The City includes a rich and diverse range of biological resources. The most notable natural habitat types include annual grassland, riparian woodland, permanent wetland, vernal pools/seasonal wetlands, and valley oak woodlands. Many of these habitats deserve special consideration due to their limited distribution, particular sensitivity, or the presence of one or more rare, threatened, or endangered species.

A number of species listed as rare, threatened or endangered by state or federal agencies are known to occur within the Planning Area. Notable species include Butte County meadowfoam, Valley Elderberry Longhorn beetle, hairy orcutt and slender orcutt grasses, Greene's tuctoria, Chinook salmon, and the yellow-billed cuckoo. Other sensitive species of regional importance include Butte County checkerbloom, Swainson's hawk, Giant Garter snake, and various anadromous fish. It should be noted that these are not exhaustive lists, but were lists used for the City of Chico General Plan. Figure B-3 shows sensitive habitats that support a majority of the special status species in the City Planning Area.

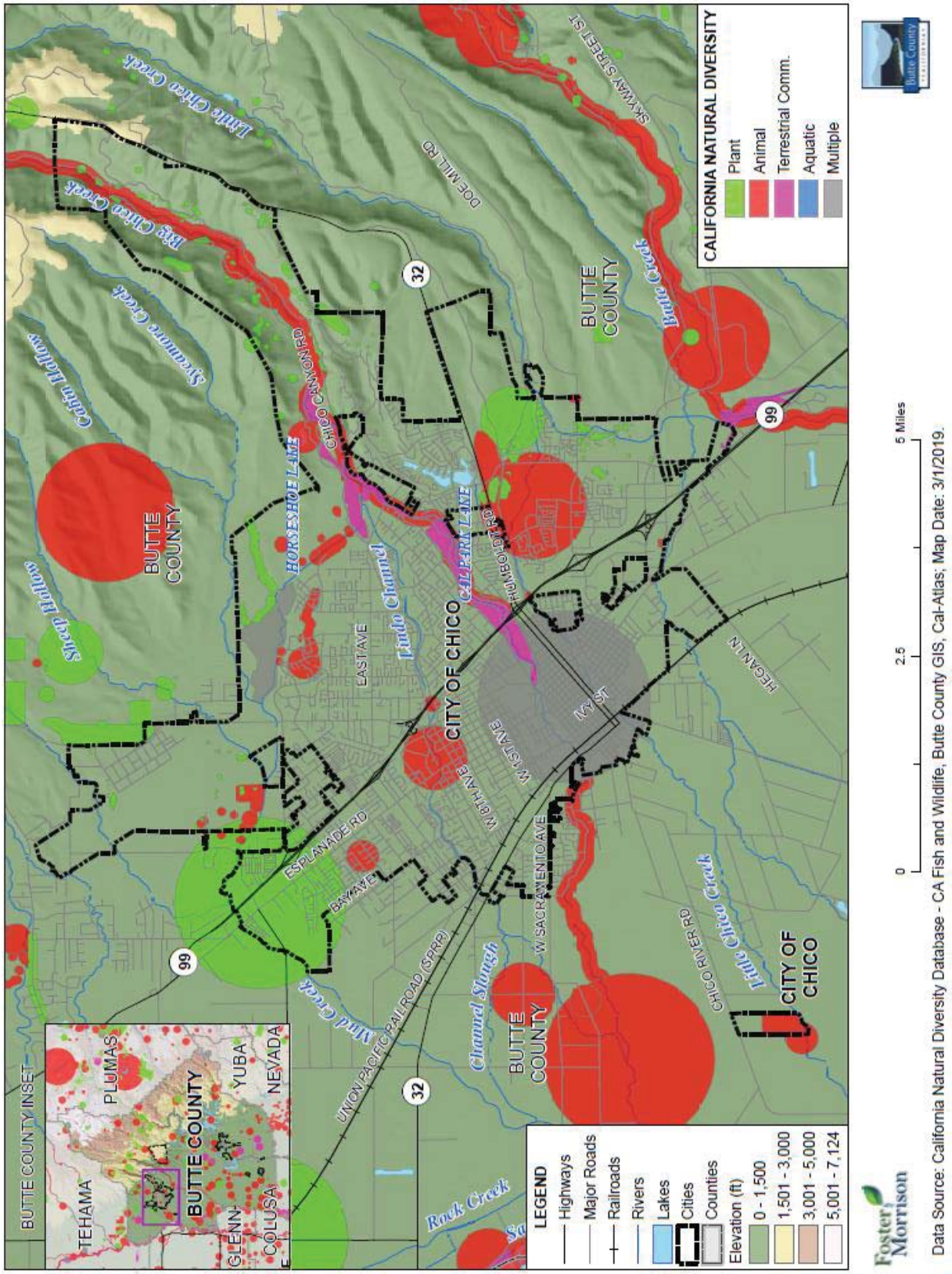
Figure B-3 Sensitive Habitats in the City of Chico



Source: City of Chico 2030 General Plan

The California Natural Diversity Database (CNDDB) is a "natural heritage program" and is part of a nationwide network of similar programs overseen by NatureServe (formerly part of The Nature Conservancy). All natural heritage programs provide location and natural history information on special status plants, animals, and natural communities to the public, other agencies, and conservation organizations. The data help drive conservation decisions, aid in the environmental review of projects and land use changes, and provide baseline data helpful in recovering endangered species and for research projects. Spatial information regarding these program areas in the City of Chico is shown on Figure B-4.

Figure B-4 City of Chico Natural Diversity Map



Historic and Cultural Resources

The City of Chico has a stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the HMPC collected information from a number of sources. The California Department of Parks and Recreation Office of Historic Preservation (OHP) was the primary source of information. The OHP is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of California's irreplaceable archaeological and historical resources. OHP administers the National Register of Historic Places, the California Register of Historical Resources, California Historical Landmarks, and the California Points of Historical Interest programs. Each program has different eligibility criteria and procedural requirements. These requirements are detailed in Section 4.3.1 of the Base Plan and are shown in Table B-9.

Table B-9 City of Chico – Historical Resources

Resource Name (Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City/ Community
14 Mile House Site (P636)				X	11/16/1984	Chico
A H Chapman House / "The Little Chapman Mansion" (P573)				X	9/11/1981	Chico
Allen--Sommer--Gage House (N481)	X				4/13/1977	Chico
Bidwell Mansion (N165)	X				3/24/1972	Chico
Bidwells Mill Site, Bidwell Millstones (P90)				X	6/7/1968	Chico
Chapman, A. H., House (N1008)	X				1/28/1982	Chico
Chico African Methodist Episcopal Church South (P792)				X	3/11/1994	Chico
Chico Forestry Station and Nursery (840)		X			3/20/1970	Chico
Gianella Bridge, Br #12-54 Site (P812)				X	8/23/1995	Chico Hamilton City
Honey Run Covered Bridge (N1562)	X				6/23/1988	Chico
Hooker Oak (313)		X			7/12/1939	Chico
Mud Creek Canyon (N254)	X				8/14/1973	Chico
Patrick Ranch House (N149)	X				2/23/1972	Chico
Patrick Rancheria (N150)	X				2/23/1972	Chico
Rancho Chico and Bidwell Adobe (329)		X			8/8/1939	Chico
Richardson Springs Resort Hotel, Lodge, And Home (P650)				X	3/19/1985	Chico
Silberstein Park Building (N1177)	X				2/17/1983	Chico
South of Campus Neighborhood (N1700)	X				6/24/1991	Chico
Southern Pacific Depot (N1477)	X				1/29/1987	Chico

Resource Name (Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City/ Community
St. John's Episcopal Church (N999)	X				1/21/1982	Chico
Stansbury House (N366)	X				6/5/1975	Chico
US Post Office–Chico Midtown Station (N1320)	X				1/11/1985	Chico

Source: California Department of Parks and Recreation Office of Historic Preservation

It should be noted that these lists may not be complete, as they may not include those currently in the nomination process and not yet listed. Additionally, as defined by the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by CEQA and NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

Growth and Development Trends

Chico has seen slow and steady growth. Chico has seen increasing growth rates as shown in Table B-10. The City saw large growth between 1970 and 2019. Much of the 2019 growth is attributed to the movement of people into Chico from Paradise due to the Camp Fire.

Table B-10 City of Chico – Population Changes Since 1950

Year	Population	Change	% Change
1950	12,272	–	–
1960	14,757	2,485	20.2%
1970	19,580	4,823	32.7%
1980	26,716	7,136	36.4%
1990	40,079	13,363	50.0%
2000	59,954	19,925	49.6%
2010[1]	86,187	26,233	43.8%
2019[2]	112,111	25,924	30.1%

Source: [1]US Census Bureau, [2]California Department of Finance

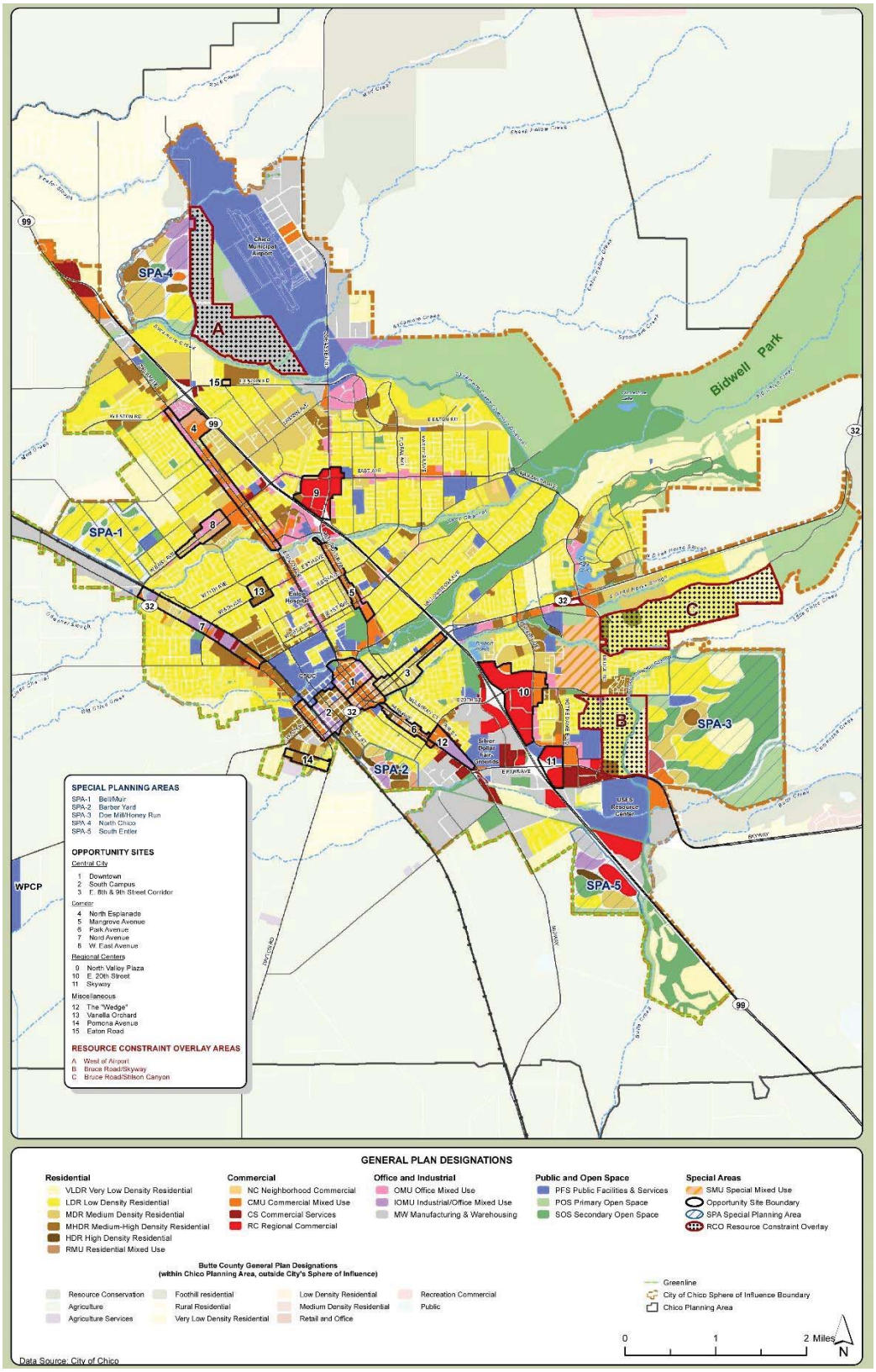
Land Use

The City currently uses a conventional land use system whereby the land use designations relate to the general use of land and broad definitions of density/intensity. For instance, the designations include agricultural exclusive; rural residential; residential low and medium density; residential multi-family; residential, professional; retail, heavy, and highway commercial; light and heavy manufacturing; open space; public use; and urban reserve. Similarly, the zoning ordinance is largely based on use types, such as residential one-family, two-family, and multiple-family. With a focus on the use of land there are few or

no provisions in either the General Plan or development regulations that affect the character of development.

Future land use for the City of Chico from the 2030 City of Chico General Plan is shown on Figure B-5.

Figure B-5 City of Chico – Land Use Designations



Source: 2030 City of Chico General Plan

Development since 2014 Plan

The City Building Department tracked total building permits issued since 2014 for the City. These are tracked by total development, property use type, and hazard risk area. These are shown in Table B-11 and Table B-12. All development in the identified hazard areas, including the 1% annual chance floodplains, and moderate or higher wildfire risk areas, were completed in accordance with all current and applicable development codes and standards and should be adequately protected. Thus, with the exception of more people living in the area potentially exposed to natural hazards, this growth should not cause a significant change in vulnerability of the City to identified priority hazards.

Table B-11 City of Chico – Total Development Since 2014

Property Use	2014	2015	2016	2017	2018
Agricultural	0	0	0	0	0
Commercial	12	16	25	23	25
Industrial	1	0	0	0	2
Residential	385	522	515	638	448
Unknown	0	0	0	0	0
Total	**398**	**538**	**540**	**661**	**475**

Source: City of Chico Building Department

Table B-12 City of Chico – Development in Hazard Areas since 2014

Property Use	1% Annual Chance Flood	Landslide Susceptibility Area	Wildfire Risk Area[1]	Other
Agricultural	0	0	0	0
Commercial	0	0	0	0
Industrial	0	0	0	0
Residential	0	0	86	0
Unknown	0	0	0	0
Total	**0**	**0**	**86**	**0**

Source: City of Chico Building Department

[1]Moderate or higher wildfire risk area

Future Development

The future development section of this Annex considers two different types of growth:

- Future population growth – an estimate of future population numbers defined by the increase residential populations.
- Future development/redevelopment GIS analysis – a quantitative analysis defined by the increase of developed parcels.

Future Population Growth

Approximately every four years, the Butte County Association of Governments (BCAG) prepares long-term regional growth forecasts of housing, population, and employment for the Butte County area. The forecasts have been developed by BCAG in consultation with its Planning Directors Group which consists of representatives from each of BCAG's local jurisdiction members and the Butte Local Agency Formation Commission. A low, medium, and high scenario has been developed for each forecast of housing, population, and employment. The 2018 process has been delayed due to the regional population re-distribution and uncertain re-population timeline associated with the 2018 Camp Fire. At this time, it is anticipated that the new forecasts will be available near the end of 2019. The medium scenario for the City in the 2014-2040 Regional Transportation Plan is shown in Table B-13.

Table B-13 City of Chico – Future Population Estimates (Medium Scenario)

Jurisdiction	2020	2025	2030	2035	2040
Chico	93,603	100,519	110,552	120,099	126,009

Source: Butte County Association of Governments 2014-2040 Regional Transportation Plan

The City HMPC noted that based upon an unexpected increase in population due to the Camp Fire, Chico City is suffering from a storage of affordable housing. It is expected that there will be an immediate increase in middle to low income housing in the near future. Based upon the Green Line constraints and environmental issues, Chico development is regulated to infill or expansion on the North/South ends of the City Limits. It is expected this massive increase in development will lead to increased strain on City provided services, such as Fire, Police, and Public Works.

Future Development/Redevelopment Projects

Using GIS, the following methodology was used in determining parcel counts and values associated with future development and redevelopment projects in the City of Chico.

GIS Analysis

Butte County's 3/21/2019 Assessor Data and the County's GIS parcel data were used as the basis for the inventory of assessed values for both improved and unimproved parcels within the City. The City of Chico provided a table containing the assessor parcel numbers (APNs) for the 805 parcels. Using the GIS parcel spatial file and the APNs, the 765 residential and 40 commercial parcels associated with future development projects for which the analysis was to be performed was identified. Utilizing the future development project spatial layer, the parcel centroid data was intersected to determine the parcel counts within each area.

Future residential development is shown on Figure B-6 and detailed by type in Table B-14. Future commercial development is shown on Figure B-7 and detailed by type in Table B-15.

Figure B-6 City of Chico – Future Residential Development

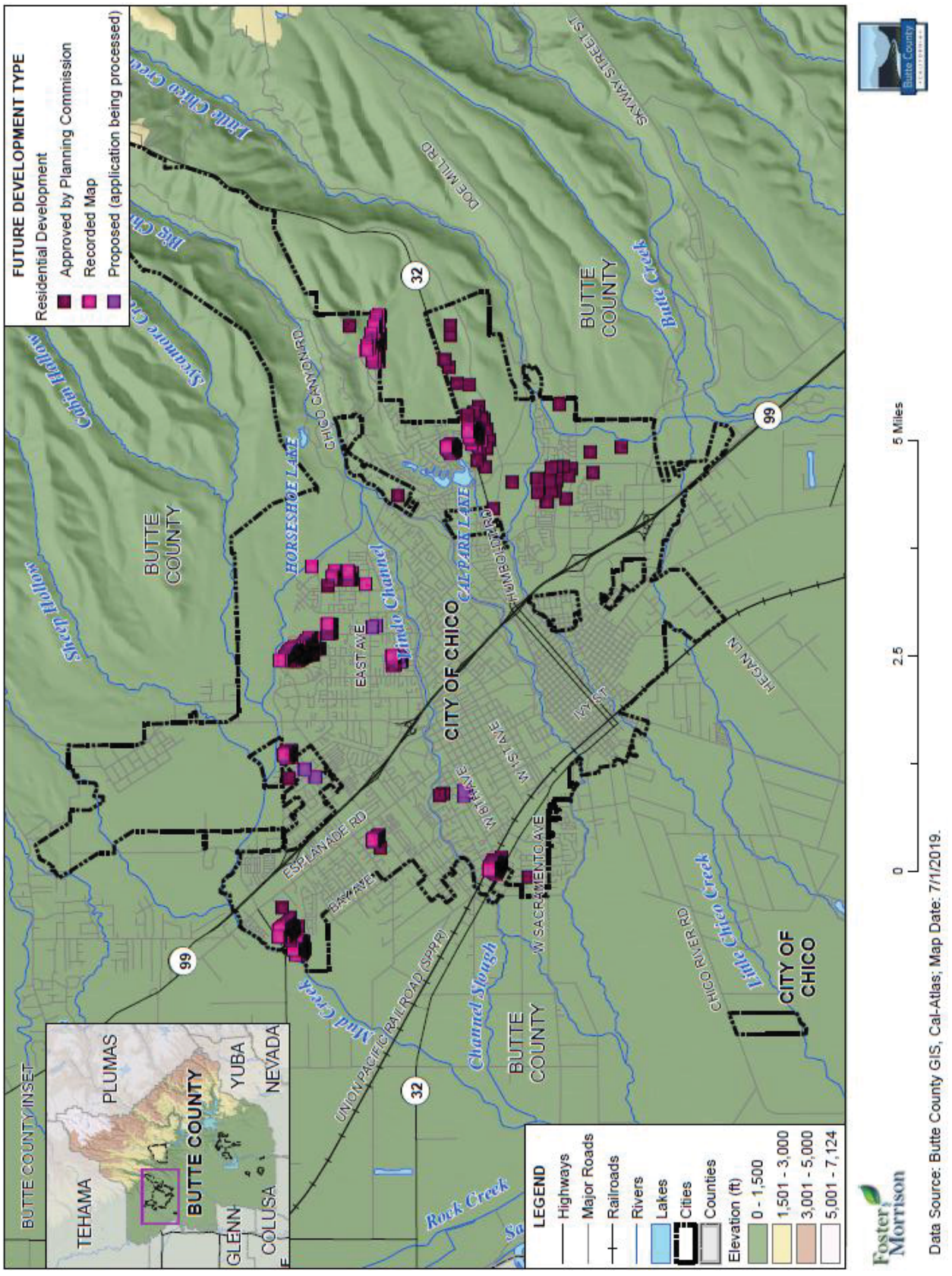


Table B-14 City of Chico – Future Residential Development Parcel and Acre Counts

Future Development Area/Status	Total Parcel Count	Improved Parcel Count	Total Acres
Approved by Planning Commission			
Amber Lynn Estates	1	0	18
Avila Estates	1	1	7
Belvedere Heights 2	1	0	22
Carlene Place	1	1	3
Creekside Landing	1	0	23
Hideaway Park	2	1	1
Innsbrook Sub 2	1	0	5
Lassen Village	1	0	3
Lipton Manor	1	1	1
Marigold Heights	1	0	5
Meriam Park Remain	14	0	138
Mission Vista Rch 2	1	1	3
Montecito Place	2	0	14
Mountain Vista	1	0	7
Oak Valley	17	1	309
Stonegate	3	0	204
Twin Creeks	1	0	68
Westside Place 2	1	0	8
Approved by Planning Commission Total	**51**	**6**	**839**
Recorded Map			
Burnap Subdivision	25	0	3
Creekside Landing	57	0	11
Crossroads	13	0	3
Foothill Park E 8A	1	0	
Harmony Park Circle	19	1	3
Hopeful Heights	20	0	2
Lassen Subdivision	14	8	2
Mariposa Manor	34	0	3
Mountain Vista	171	55	29
Oak Valley 1	80	26	17
Ruthie Subdivision	1	1	1
Schill Subdivision	56	8	11
Siena @ Canyon Oaks	69	47	45

Future Development Area/Status	Total Parcel Count	Improved Parcel Count	Total Acres
Sierra Gardens Townh	49	0	6
Westside Place 1	94	41	7
Recorded Map Total	**703**	**187**	**143**
Proposed (application being processed)			
Boeger Subdivision	1	0	3
Drake Estates	4	4	3
Magnolia Gardens	2	0	4
Morseman Estates	1	0	3
Plottel	3	3	3
Proposed (application being processed) Total	**11**	**7**	**15**
Grand Total	**765**	**200**	**998**

Source: City of Chico

Figure B-7 City of Chico – Future Commercial Development

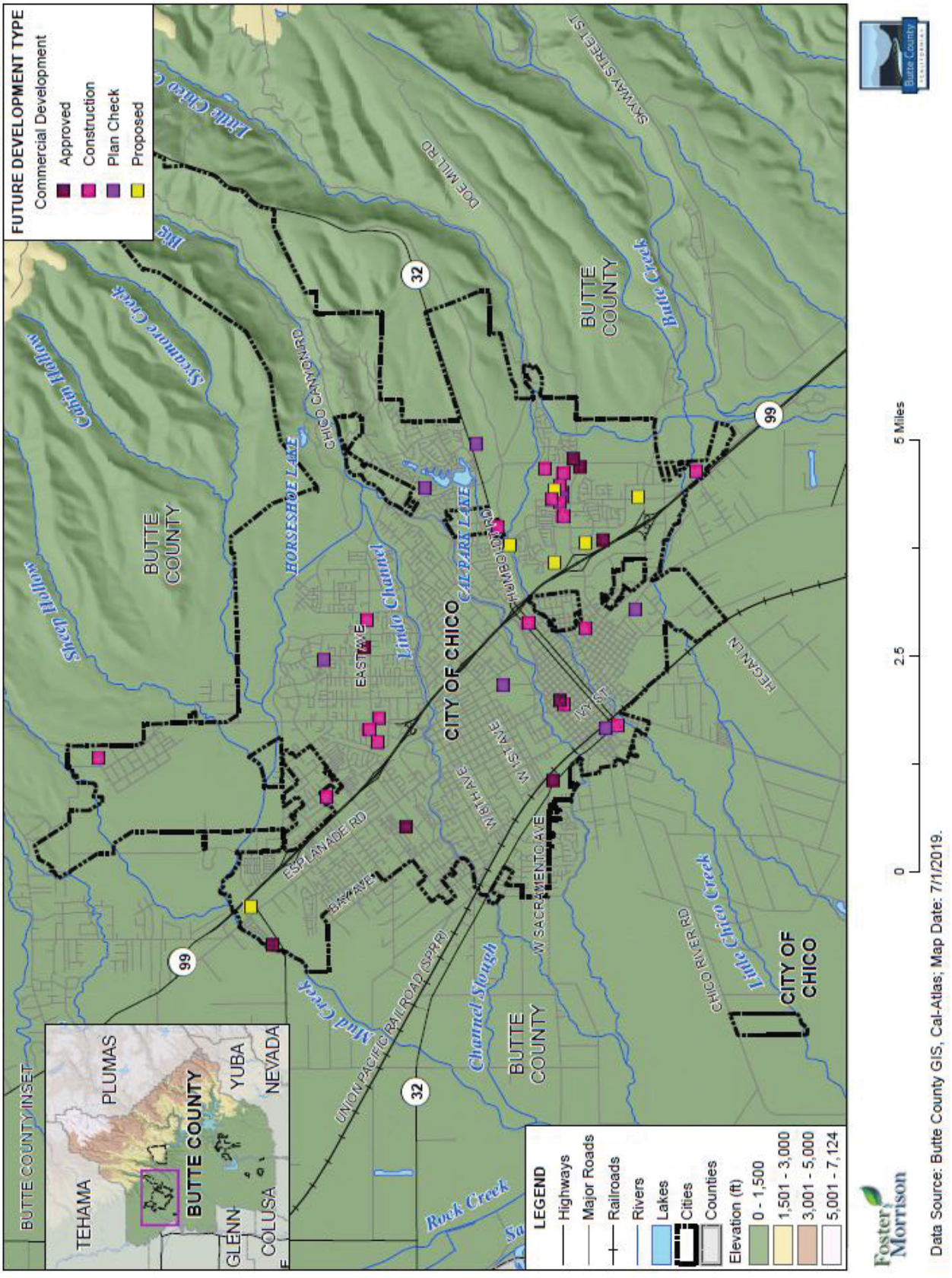


Table B-15 City of Chico – Future Commercial Development Parcel and Acre Counts

Future Development /Status	Total Parcel Count	Improved Parcel Count	Total Acres
Approved			
Enloe Medical Care	1	0	5.1
Heritage Landing Apts	1	0	12.6
Jennings Building	1	1	0.1
Pabbi Nord Apts	1	1	0.8
Stonegate Apts	1	0	48.1
The Enclave	1	1	2.6
Veteran's Village Housing	1	0	2.5
WalMart Expansion	1	0	11.1
Approved Total	**8**	**3**	**82.8**
Construction			
Chase Bank	1	1	0.9
Chico Nissan Remodel	1	1	0.7
CORE Butte Charter School	1	0	27.9
Culinaria @ Meriam Park	1	0	1.0
FifthSun Addition	1	0	1.5
Holiday Inn Hotel	1	0	1.4
Hotel Expansion/Remodel	1	1	0.2
Humboldt Oak Apts	1	0	2.2
Joshua Tree Domiciles II	1	0	2.9
Notre Dame Quads	1	0	5.2
NVP Facade / BC Offices Infill	1	1	10.8
Office Building	2	1	0.9
Salvation Army Complex	1	1	0.5
Sierra Central Bank	1	1	0.5
Tank District Apts	1	0	2.9
Thrive Office Building	1	0	0.2
VA Clinic	1	0	7.1
Walnut St Apt	1	0	0.7
Construction Total	**19**	**7**	**67.3**
Plan Check			
Channel Apts I & II	1	1	7.1
McGuire Apts	1		0.2
Mini Storage	1		3.3
Native Oak Apartments	1		5.4
Skyline Condos	1		5.6

Future Development /Status	Total Parcel Count	Improved Parcel Count	Total Acres
Tank District Retail	1		0.3
Tri Counties Bank	1	1	3.7
Plan Check Total	**7**	**2**	**25.6**
Proposed			
Eagle Plaza Specific Plan	1		9.9
Hampton Inn	1		2.5
Humboldt Apt	1		1.4
Oxford Suites Expansion	1	1	5.3
Restaraunt w/drive thru	1	1	0.5
Springfield Apts	1		11.7
Proposed Total	**6**	**2**	**31.2**
Grand Total	**40**	**14**	**206.9**

Source: City of Chico

More general information on growth and development in Butte County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Butte County Vulnerability and Assets at Risk of the Base Plan.

B.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table B-5 as high or medium significance hazards. Impacts of past events and vulnerability of the City to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Butte County Planning Area). Methodologies for calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

An estimate of the vulnerability of the City to each identified priority hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- **Low**—Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**—Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**—Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.
- **Extremely High**—Very widespread with catastrophic impact.

Depending on the hazard and availability of data for analysis, this hazard specific vulnerability assessment also includes information on values at risk, critical facilities and infrastructure, populations at risk, and future development.

Dam Failure

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

Dams are manmade structures built for a variety of uses including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they are usually engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped or fail. Overtopping is the primary cause of earthen dam failure in the United States.

Location and Extent

Chico is downstream of multiple dams. Flows from the failure of these dams could inundate non-urban portions of the Planning Area. These dams and their inundation areas are discussed in greater detail in the vulnerability section below. Dam failure is a natural disaster from two perspectives. First, the inundation from released waters resulting from dam failure is related to naturally occurring floodwaters. Second, dam failure would most probably happen as a consequence of the natural disaster triggering the event. There is no scale with which to measure dam failure. While a dam may fill slowly with runoff from winter storms, a dam break has a very quick speed of onset. The duration of dam failure is not long – only as long as it takes to empty the reservoir of water the dam held back. The City would be affected for as long as the flood waters from the dam failure took to drain downstream. Geographical flood extent from the Cal OES dam inundation zones is shown in Table B-16. Note, the Cal OES dam inundation data did not include inundation mapping of all dams of concern to the Butte County Planning Area; thus the below analysis reflects information based on available data. Other dams may be identified as a concern to the City.

Table B-16 City of Chico – Geographical Dam Inundation Extents

Dam Inundation Area /	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Magalia	46	0.22%	45	0.21%	1	0.00%
Paradise	46	0.22%	45	0.21%	1	0.00%
Shasta	126	0.60%	0	0.00%	126	0.60%

Source: Cal OES

Past Occurrences

The HMPC noted the Oroville Dam event on February 7, 2017 that affected the City. The Oroville Dam threated to be overtopped, and the spillway failed. Significant economic impacts were felt in the City of Chico. Evacuation centers where established in the City Limits with the primary being at the Silver Dollar Fairgrounds. Highway 99 was closed southbound. The City EOC was established at the Chico Fire Training Center. FEMA and OES relief funding were provided for reimbursement for Emergency Response and staffing, as well as for operating the Countywide EOC.

Vulnerability to Dam Failure

Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding. The 2030 City of Chico General Plan Safety Element noted that portions of the Planning Area lie within the inundation limits of Black Butte, Whiskeytown, and Shasta dams. Inundation data was not available for Black Butte or Whiskeytown. Flows from the failure of these dams could inundate non-urban portions of the Planning Area. Based on data from the City's General Plan and the dam analysis provided below, it is apparent that a major dam failure could have a significant impact on the City.

Impacts

Impacts to the City from a dam failure flood include damage to residential and commercial property, damage to critical facilities, damage to infrastructure, damage to levees that protect the City, and injuries or deaths to citizens of the City.

Values at Risk

Based on the dam inundation analysis, it is apparent that a major dam failure could have a significant impact on the City, primarily from a Shasta dam failure. While not included in this analysis, the City also has assets at risk within the Black Butte and Whiskeytown Dams. Based on data obtained by Cal OES, the City is located in three mapped dam inundation areas as described in Section 4.3.4 of the Base Plan. These three dams are:

- Paradise (an extremely high hazard dam, as seen on Figure B-8)
- Magalia (a high hazard dam, as seen on Figure B-9)
- Shasta (a high hazard dam, as seen on Figure B-9)

Figure B-8 City of Chico – Extremely High Dam Inundation Areas

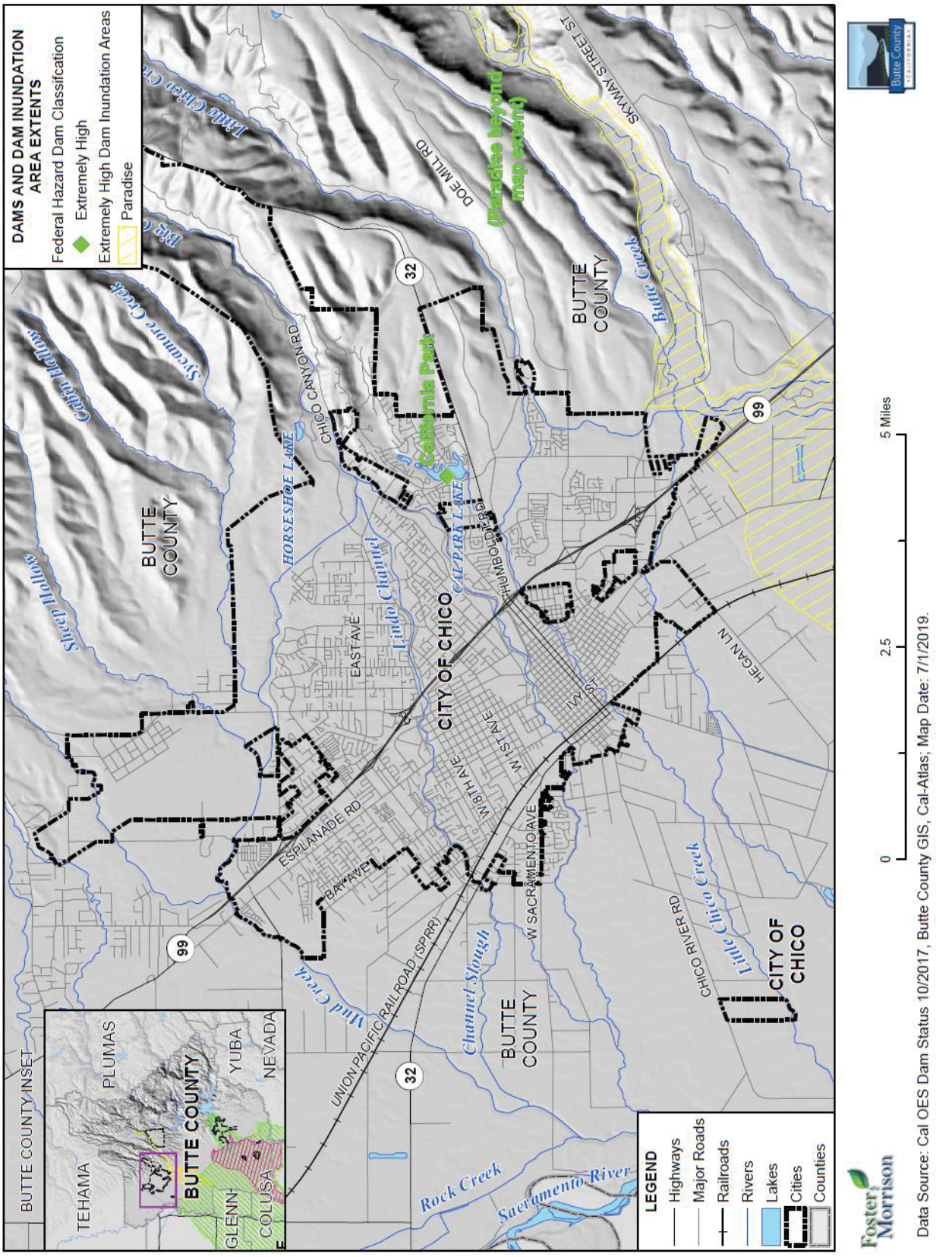
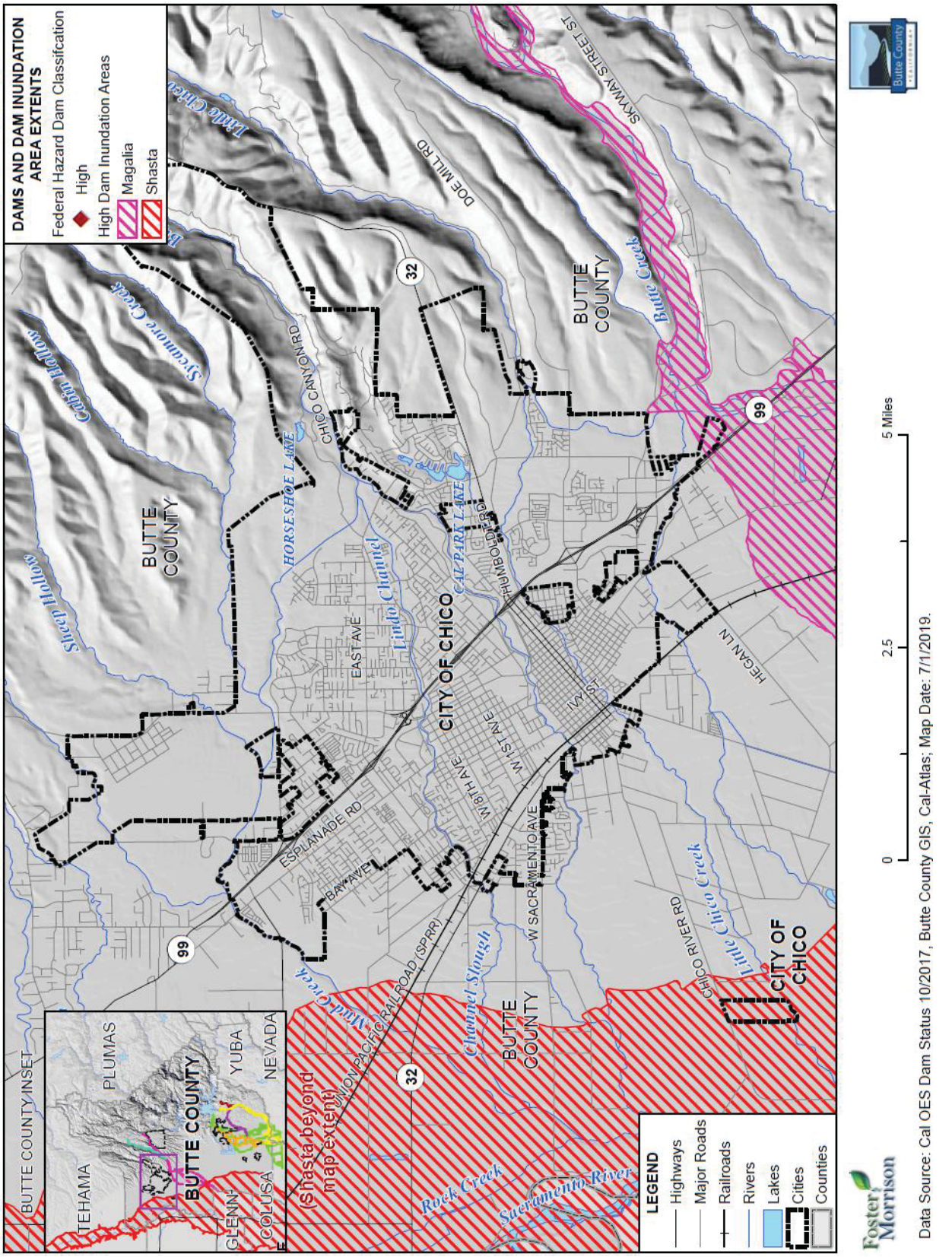


Figure B-9 City of Chico – High Dam Inundation Areas



GIS was used to determine the possible impacts of dam failure flooding within the City of Chico. The methodology described in Section 4.3.4 of the Base Plan was followed in determining structures and values at risk. Multiple analysis tables were created:

- Table B-17 shows the total parcel counts, improved parcel counts, their improved structure and land values in extremely high hazard dam inundation areas.
- Table B-18 shows the total parcel counts, improved parcel counts, their improved structure and land values in both high hazard dam inundation areas.
- Table B-19 shows the total parcel counts, improved parcel counts, their improved structure and land values in the Paradise inundation areas.
- Table B-20 shows the total parcel counts, improved parcel counts, their improved structure and land values in the Magalia dam inundation area
- Table B-21 shows the total parcel counts, improved parcel counts, their improved structure and land values in the Shasta dam inundation area

Table B-17 City of Chico – Count and Value of Parcels in All Extremely High Hazard Dam Inundation Areas

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Chico	1	1	$1,752,395	$1,118,618	$0	$1,677,927	$4,548,940

Source: Cal OES, Butte County 3/28/2019 Parcel/Assessor's Data

Table B-18 City of Chico – Count and Value of Parcels in All High Hazard Dam Inundation Areas

Jurisdiction	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
City of Chico	1	1	$1,752,395	$1,118,618	$0	$1,677,927	$4,548,940

Source: Cal OES, Butte County 3/28/2019 Parcel/Assessor's Data

Table B-19 City of Chico – Count and Value at Risk in Paradise Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	0	0	$0	$0	$0	$0	$0
Industrial	1	1	$1,752,395	$1,118,618	$0	$1,677,927	$4,548,940
Residential	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
City of Chico Total	**1**	**1**	**$1,752,395**	**$1,118,618**	**$0**	**$1,677,927**	**$4,548,940**

Source: Cal OES, Butte County 3/28/2019 Parcel/Assessor's Data

Table B-20 City of Chico – Count and Value at Risk in Magalia Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	0	0	$0	$0	$0	$0	$0
Industrial	1	1	$1,752,395	$1,118,618	$0	$1,677,927	$4,548,940
Residential	0	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
City of Chico Total	**1**	**1**	**$1,752,395**	**$1,118,618**	**$0**	**$1,677,927**	**$4,548,940**

Source: Cal OES, Butte County 3/28/2019 Parcel/Assessor's Data

Table B-21 City of Chico – Count and Value at Risk in Shasta Dam Inundation Area by Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	0	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Residential	2	0	$0	$0	$0	$0	$0
Unknown	0	0	$0	$0	$0	$0	$0
City of Chico Total	**2**	**0**	**$0**	**$0**	**$0**	**$0**	**$0**

Source: Cal OES, Butte County 3/28/2019 Parcel/Assessor's Data

Population at Risk

The dam inundation areas were overlayed on the parcel layer. Those residential parcel centroids that intersect the flood zones were counted and multiplied by the 2010 Census Bureau average household factors for Chico – 3.02. According to this analysis, there is a total population of 0 residents of the City at risk to dam failure flooding from these three dams. This is shown in Table B-41.

Table B-22 City of Chico – Count of Improved Residential Parcels and Population by Flood Zone

Jurisdiction	Paradise Dam Inundation Area		Magalia Dam Inundation Area		Shasta Dam Inundation Area	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Chico	0	0	0	0	0	0

Source: FEMA DFIRM 1/6/2011, Butte County 3/28/2019 Parcel/Assessor's Data, US Census Bureau

Critical Facilities at Risk

An analysis was performed on the critical facility inventory in Chico in identified dam inundation areas. GIS was used to determine whether the facility locations intersects a dam inundation area. Details of critical facilities in high hazard dam inundation areas in the City of Chico are shown in Figure B-10 and detailed in Table B-23. Details of critical facility definition, type, name and address and jurisdiction by flood zone are listed in Appendix F.

Figure B-10 City of Chico - Critical Facilities in High Hazard Dam Inundation Areas

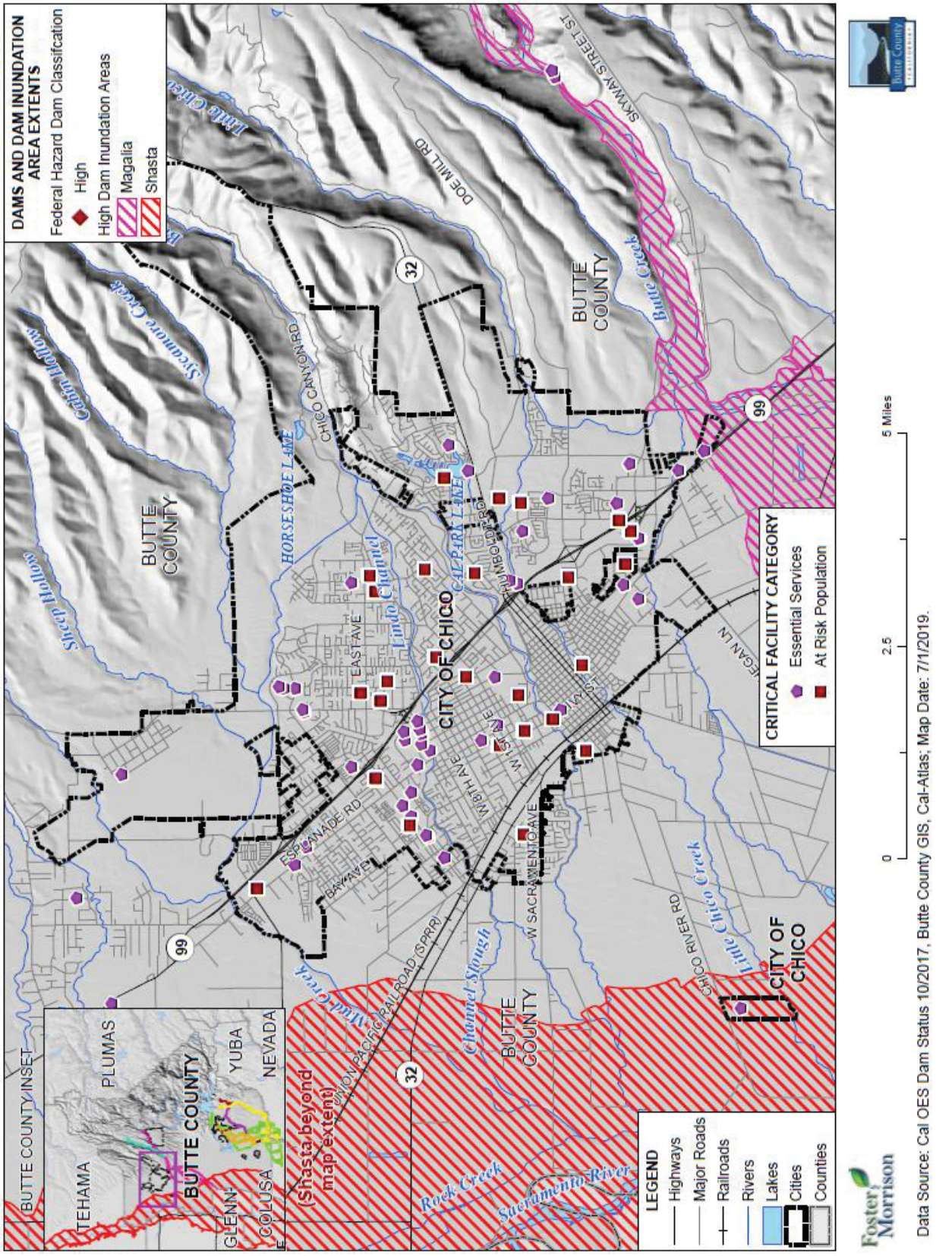


Table B-23 City of Chico – Critical Facilities in High Hazard Dam Inundation Areas

Critical Facility Category	Facility Count
Essential Services Facilities	1
At Risk Population Facilities	0
City of Chico Total	**1**

Source: Cal OES, Butte County GIS

Future Development

Future dam failures are considered unlikely. However, given the number of affected parcels, future development in the City could be affected by dam failures and associated flooding. Siting of future development areas should take dam failure flooding into account.

GIS Analysis

Butte County's 3/21/2019 Assessor Data and the County's GIS parcel data were used as the basis for the inventory of assessed values for both improved and unimproved parcels within the City. Two separate development types were provided: Residential and Commercial. Using GIS, the 765 residential and 40 commercial parcels associated with future development projects for which the analysis was to be performed was identified. As shown on Figure B-11 and Figure B-12, no residential or commercial development falls in dam inundation areas. As such, no tabular analysis was performed.

Figure B-11 City of Chico – Future Residential Development in Dam Inundation Areas

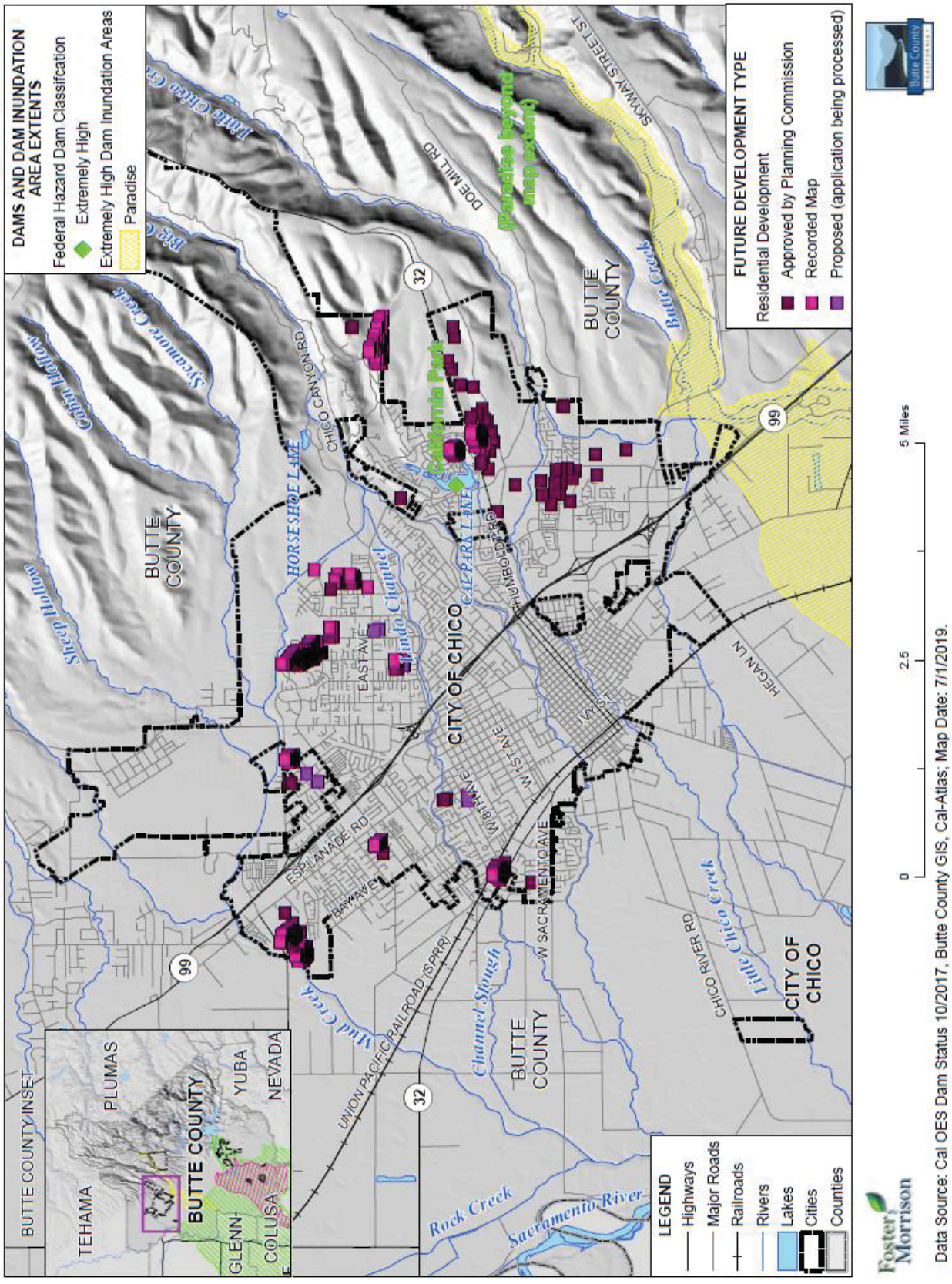
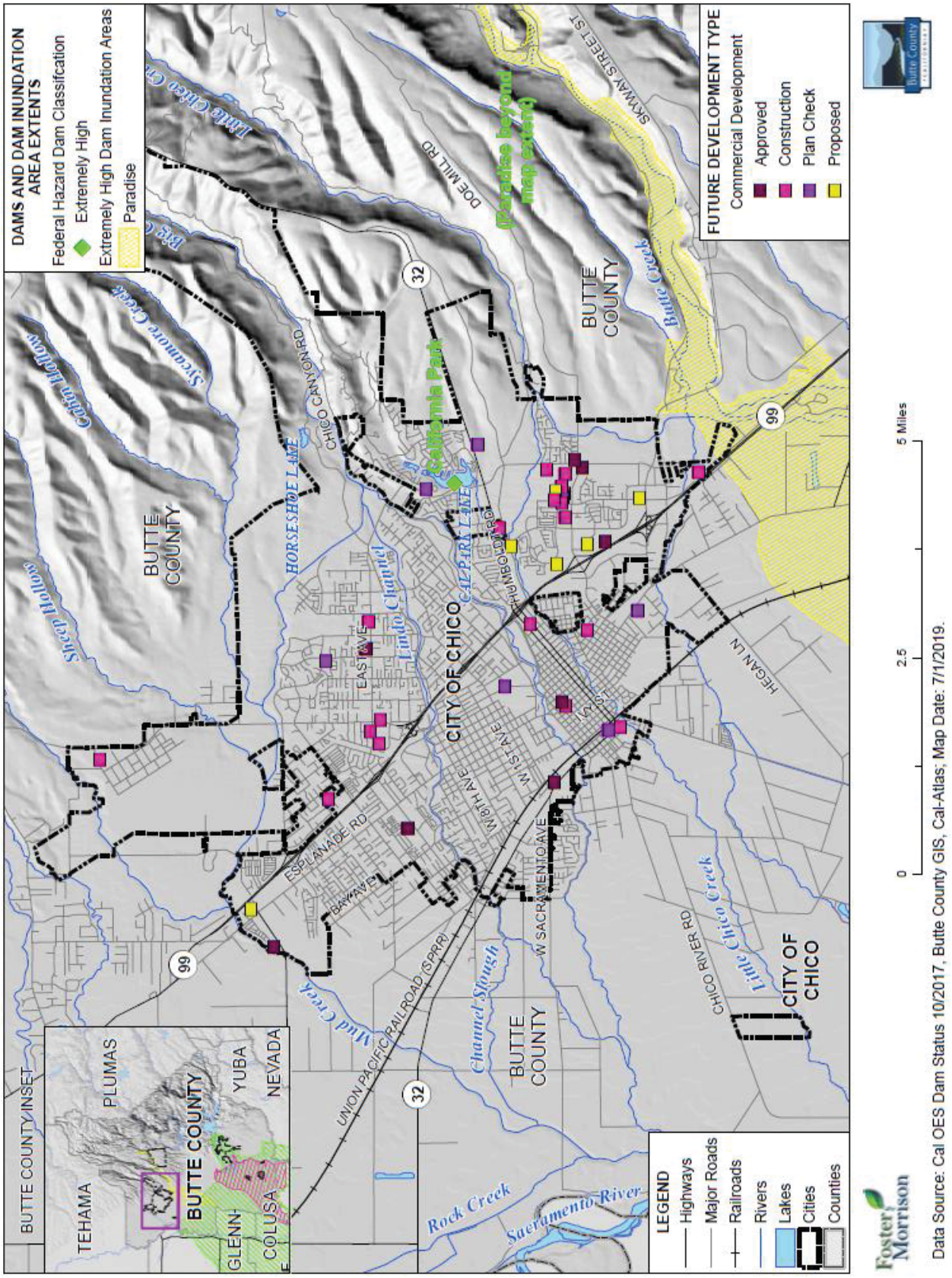


Figure B-12 City of Chico – Future Commercial Development in Dam Inundation Areas



Drought and Water Shortage

Likelihood of Future Occurrence–Unlikely
Vulnerability–High

Hazard Profile and Problem Description

Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water is the most critical issue for agricultural, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Northern Sacramento Valley counties, including Butte County, generally have sufficient groundwater and surface water supplies to mitigate even the severest droughts of the past century. Many other areas of the State, however, also place demands on these water resources during severe drought.

Location and Extent

Water service in the City is provided by the California Water Service Company (Cal Water). Cal Water is a private company whose Chico District was formed in 1926. Residents not supplied by Cal Water obtain water through private wells. Cal Water currently uses a system of 65 wells which deliver approximately 27 million gallons of water to customers each day. The delivery system is composed of over 355 miles of pipeline, seven storage tanks and six booster pumps.

Cal Water maintains two primary management plans for the Chico area water system, as required by state law. Their Urban Area Management Plan, adopted in 2007, provides an overview of Cal Water and the Chico area water system, establishes policies and programs concerning water delivery and treatment, as well as water conservation and management practices. The Water Supply and Facilities Master Plan, adopted in 2008, guides the growth and development of their water delivery system to meet the community's future needs.

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

Past Occurrences

Based on historical information, the occurrence of drought in California, including Butte County, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Past

occurrences of the 5 major drought in the past 85 years for the County may be found in Section 4.2.9 of the Base Plan.

Vulnerability to Drought and Water Shortage

According to Cal Water's 2015 Urban Water Management Plan (UWMP) for the Chico-Hamilton City District, climate change is expected to bring higher average temperatures and greater variability in weather, with the potential for more frequent and deeper droughts. However, discussed in in Chapter 6 of the UWMP, Cal Water is projecting that, under all hydrologic conditions, its groundwater supply for the Chico-Hamilton District will fully meet future demands. Storage in the groundwater basin will provide a buffer against years with decreased precipitation while wetter years will recharge natural supplies.

Impacts

The most significant qualitative impacts associated with drought in the Planning Area are those related to water intensive activities such as wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Mandatory conservation measures are typically implemented during extended droughts. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

The drawdown of the groundwater table is one factor that has been recognized to occur during repeated dry years. Lowering of groundwater levels results in the need to deepen wells, which subsequently lead to increased pumping costs. These costs are a major consideration for residents relying on domestic wells and agricultural producers that irrigate with groundwater and/or use it for frost protection. Land subsidence can also occur when the groundwater table is depleted.

With more precipitation likely falling as rain instead of snow in the Sierra's, and warmer temperatures causing decreased snowfall to melt faster and earlier, water supply is likely to become more unreliable. In addition, drought and water shortage is predicted to become more common. This means less water available for use over the long run, and additional challenges for water supply reliability, especially during periods of extended drought.

Future Development

As the population in the area continues to grow, so will the demand for water. Water shortages in the future may be worsened by drought, as the City relies on groundwater for its water source. Increased planning will be needed to account for population growth and increased water demands.

Earthquake (minor/major) and Liquefaction

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–High

Hazard Profile and Problem Description

The State of California has identified five areas of critical seismic concern including surface ruptures, ground shaking, ground failure, tsunamis, and seiches. Each of these is caused by earthquake activity thereby creating hazards for life and property, which has the potential anywhere in California. Chico is not at risk for tsunamis or seiches due to its inland location and the absence of nearby large bodies of water. Earthquakes can cause liquefaction within the City. Liquefaction is a process whereby soil is temporarily transformed to a fluid formed during intense and prolonged ground shaking.

Location and Extent

Since earthquakes are regional events, the whole of the City is at risk to earthquake. Chico and the surrounding area are relatively free from significant seismic and geologic hazards. There are no known or inferred active faults within the City. The only known active fault in Butte County is the Cleveland Hills fault, the site of the August 1975 Oroville earthquake. This earthquake had a Richter magnitude of 5.7. Due to the proximity of the City to the nearby Cleveland Hills Fault, the City can expect low to medium intensity shocks from time to time.

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales, as discussed in Section 4.2.10 of the Base Plan.

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. The City is located in an area where few earthquakes of significant magnitude occur, so both magnitude and intensity of earthquakes are expected to remain low.

Geographical liquefaction potential extents for the City of Chico from the Butte County 2030 General Plan are shown in Table B-24.

Table B-24 City of Chico – Geographical Extent of Liquefaction Potential

Liquefaction Potential	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Generally High	0	0.00%	0	0.00%	0	0.00%
Generally Moderate	10,159	48.44%	6,376	30.40%	3,783	18.04%
Generally Low	8,478	40.42%	1,661	7.92%	6,818	32.51%

Source: Butte County General Plan 2030

Past Occurrences

As shown in the Base Plan, only the 1975 federal disaster declarations have occurred in the County due to earthquake. No damages were reported in the City. The HMPC noted no other past occurrences of earthquakes or liquefaction that affected the City in any meaningful way.

Vulnerability to Earthquake and Liquefaction

Seismic events can have particularly negative effects on older buildings constructed of unreinforced masonry (URM), including materials such as brick, concrete and stone. The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. The City of Chico is within the less hazardous Zone 3.

The combination of plate tectonics and associated California coastal mountain range building geology essentially guarantees earthquake as a result of the periodic release of tectonic stresses. Butte County's mountainous terrain lies in the center of the North American and Pacific tectonic plate activity. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future of the California north coastal mountain region. The Cleveland Hills fault poses one of the more significant impact to Butte County as it has the capabilities of producing a quake in the upwards of 6.5 or greater.

Impacts from Earthquake and Liquefaction

Fault ruptures itself contributes very little to damage unless the structure or system element crosses the active fault; however, liquefaction can occur further from the source of the earthquake. In general, newer construction is more earthquake resistant than older construction due to enforcement of improved building codes. Manufactured housing is very susceptible to damage because their foundation systems are rarely braced for earthquake motions. Locally generated earthquake motions and associated liquefaction, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry, as was seen in the Oroville earthquake.

Earthquake vulnerability is primarily based on population and the built environment. Urban areas in high seismic hazard zones are the most vulnerable, while uninhabited areas are less vulnerable. Most of Downtown Chico in the Business District consists of URM construction, with multistory and basements. Approximately 75 structures in the area are URM. CSU Chico has many auditorium style structures that are unreinforced masonry, consisting of approximately 10 structures. The City HMPC noted that a database of these properties does not currently exist.

In addition, the City HMPC noted that there are a relatively small number of soft story buildings within City Limits. Most consist of store fronts in the Downtown Business district and/or apartment complexes with garage parking on the first floor, which is normally located in our College housing district. No current database available for determining an exact number; however, it is estimated at approximately 20 structures.

Earthquake Analysis

Due to the limited amount of earthquake risk in the County and City, Hazus earthquake analysis was performed on a countywide basis only. This can be found in Section 4.3.6 of the Base Plan.

Liquefaction GIS Analysis

GIS was used to determine the possible impacts of liquefaction within the City of Chico. The methodology described in Section 4.3.6 of the Base Plan was followed in determining structures and values at risk to the earthquake-based liquefaction.

Values at Risk

Liquefaction potential areas for the City of Chico are shown on Figure B-13. As seen on this map, much of the City is in the Generally Moderate zone, while eastern portions of the City are in Generally Low zones. Table B-25 gives a summary of parcel counts and values in the liquefaction areas in the City of Chico. Table B-26 shows the property use, improved parcel count, improved values, estimated contents, total values and estimated loss of parcels that fall in a liquefaction area in the City.

Figure B-13 City of Chico – Liquefaction Potential Areas

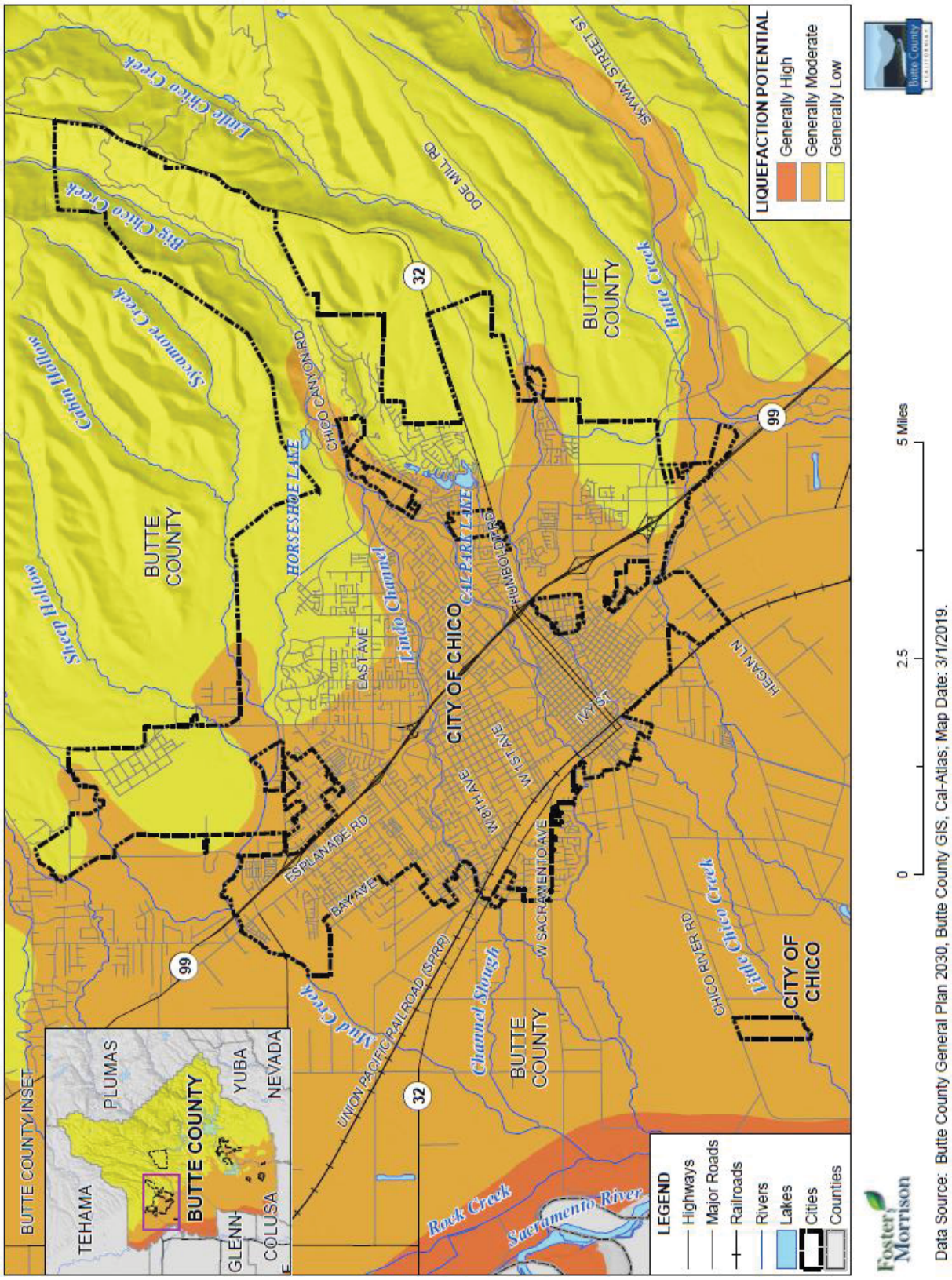


Table B-25 City of Chico – County and Value of Parcels by Liquefaction Potential Area

Liquefaction Potential	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Generally Moderate	20,716	19,426	$2,410,756,564	$4,716,041,251	$51,146,572	$3,090,712,181	$9,636,661,035
Generally Low	5,781	5,134	$719,930,298	$1,256,558,608	$3,239,407	$790,178,621	$2,732,908,400
City of Chico Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: Butte County 3/28/2019 Parcel/Assessor's Data, Butte County 2030 General Plan

Table B-26 City of Chico – County and Value of Parcels by Liquefaction Potential Area and Property Use Type

Liquefaction Potential/ Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Generally Moderate							
Agricultural	15	3	$458,773	$195,090	$57,958	$195,090	$913,541
Commercial	1,815	1,517	$503,640,623	$1,232,255,786	$44,046,832	$1,232,255,786	$2,585,901,334
Industrial	253	205	$57,135,392	$116,734,773	$6,869,827	$175,102,160	$352,348,717
Residential	18,321	17,697	$1,849,054,900	$3,366,318,290	$171,955	$1,683,159,145	$6,696,513,655
Unknown	312	4	$466,876	$537,312	$0	$0	$983,788
Generally Moderate Total	**20,716**	**19,426**	**$2,410,756,564**	**$4,716,041,251**	**$51,146,572**	**$3,090,712,181**	**$9,636,661,035**
Generally Low							
Agricultural	8	1	$224,936	$76,387	$0	$76,387	$376,053
Commercial	272	215	$102,008,701	$211,471,163	$2,631,020	$211,471,163	$518,072,154
Industrial	107	81	$17,855,565	$56,376,123	$592,610	$84,564,185	$156,541,831
Residential	5,299	4,835	$599,524,233	$988,133,772	$15,777	$494,066,886	$2,057,101,685
Unknown	95	2	$316,863	$501,163	$0	$0	$816,677
Generally Low Total	**5,781**	**5,134**	**$719,930,298**	**$1,256,558,608**	**$3,239,407**	**$790,178,621**	**$2,732,908,400**
City of Chico Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: Butte County Assessor's Office, Butte County 2030 General Plan

Population at Risk

The liquefaction potential areas were overlayed on the parcel layer. Those residential parcel centroids that intersect the flood zones were counted and multiplied by the 2010 Census Bureau average household factors for Chico – 3.02. According to this analysis, there is a total population of 53,445 residents of the City at

risk to liquefaction in the Generally Moderate area, with no population in the Generally High area. This is shown in Table B-27. The remainder of the population falls in the Generally Low area.

Table B-27 City of Chico – Count of Improved Residential Parcels and Population by Liquefaction Area

Jurisdiction	Generally Moderate		Generally High	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Chico	17,697	53,445	0	0

Source: Butte County 2030 General Plan, Butte County 2017 Parcel/Assessor's Data, US Census Bureau

Critical Facilities at Risk

An analysis was performed on the critical facility inventory in Chico in identified liquefaction potential areas. GIS was used to determine whether the facility locations intersects a USGS liquefaction area. Details of critical facilities in a liquefaction potential areas in the City of Chico are shown in Figure B-14 and detailed in Table B-28. Details of critical facility definition, type, name and address and jurisdiction by liquefaction potential area are listed in Appendix F.

Figure B-14 City of Chico – Critical Facilities in Liquefaction Potential Areas

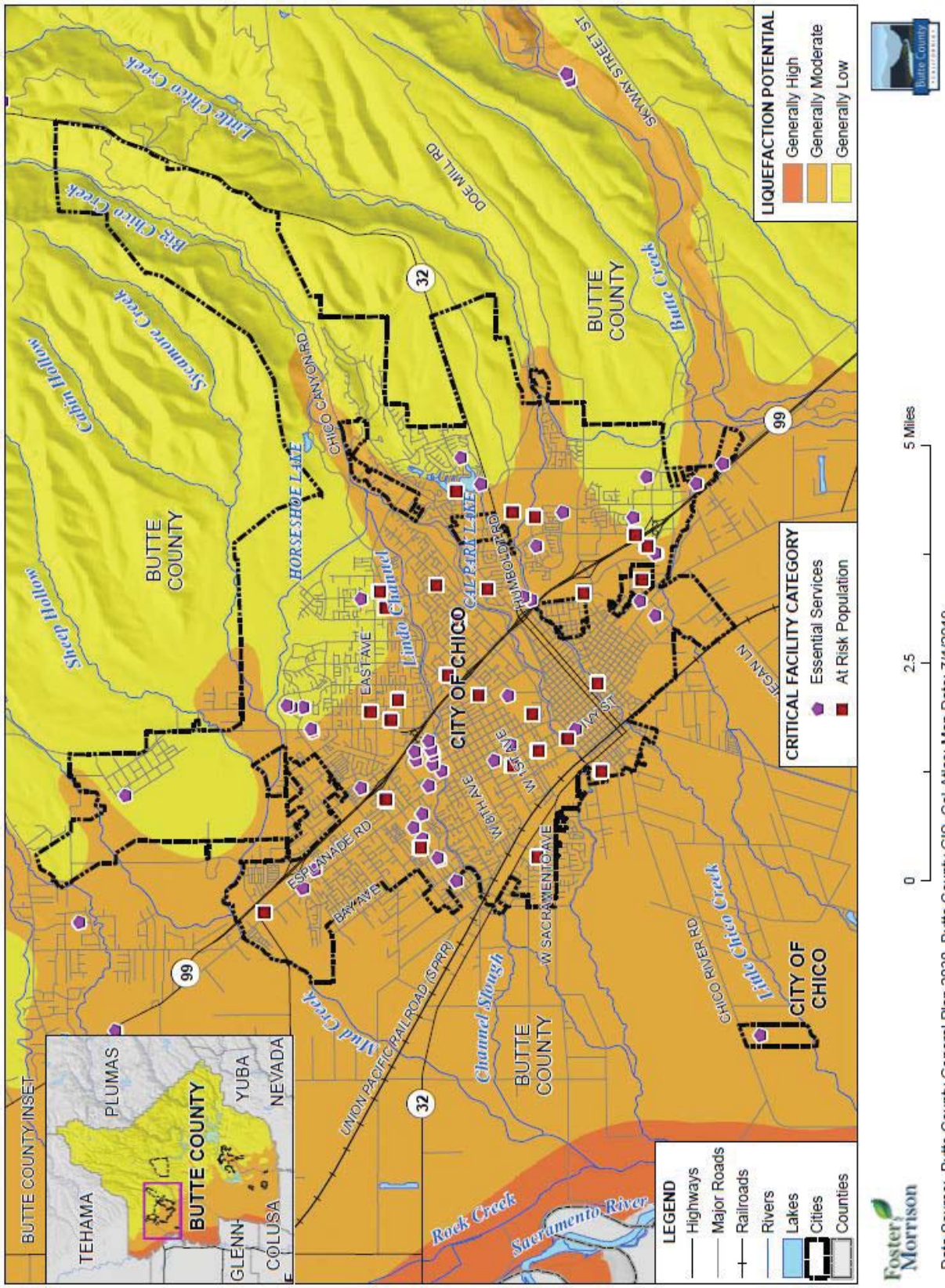


Table B-28 City of Chico – Critical Facilities by Liquefaction Potential Area

Liquefaction Potential/ Critical Facility Category / Critical Facility Type	Facility Count
Generally Moderate	
Essential Services Facilities	
Wastewater Treatment Plant	1
Fire	2
Health Care	30
Law Enforcement	4
Public Assembly Point / Evacuation Center	1
Radio Sites	1
Dam	1
Logistics Hub	1
Essential Services Facilities Total	**41**
At Risk Population Facilities	
School	31
At Risk Population Facilities Total	**31**
Generally Moderate Total	**72**
Generally Low	
Essential Services Facilities	
Fire	1
Health Care	8
Essential Services Facilities Total	**9**
Generally Low Total	**9**
Grand Total	**81**

Source: Butte County 2030 General Plan, Butte County GIS

Future Development

Although new growth and development corridors would fall in the area affected by earthquake and liquefaction, given the small chance of major earthquake and the building codes in effect, development in the earthquake area will continue to occur. The City enforces the state building code, which mandates construction techniques that minimize seismic hazards. Future development in the City is subject to these building codes.

GIS Analysis

Butte County's 3/21/2019 Assessor Data and the County's GIS parcel data were used as the basis for the inventory of assessed values for both improved and unimproved parcels within the City. Two separate development types were provided: Residential and Commercial. Using GIS, the 765 residential and 40

commercial parcels associated with future development projects for which the analysis was to be performed was identified. Future development in residential areas affected by liquefaction can be seen on Figure B-15 and are detailed in Table B-29. Future development in commercial areas affected by liquefaction can be seen on Figure B-16 and are detailed in Table B-30

Figure B-15 City of Chico – Future Residential Development in Liquefaction Potential Areas

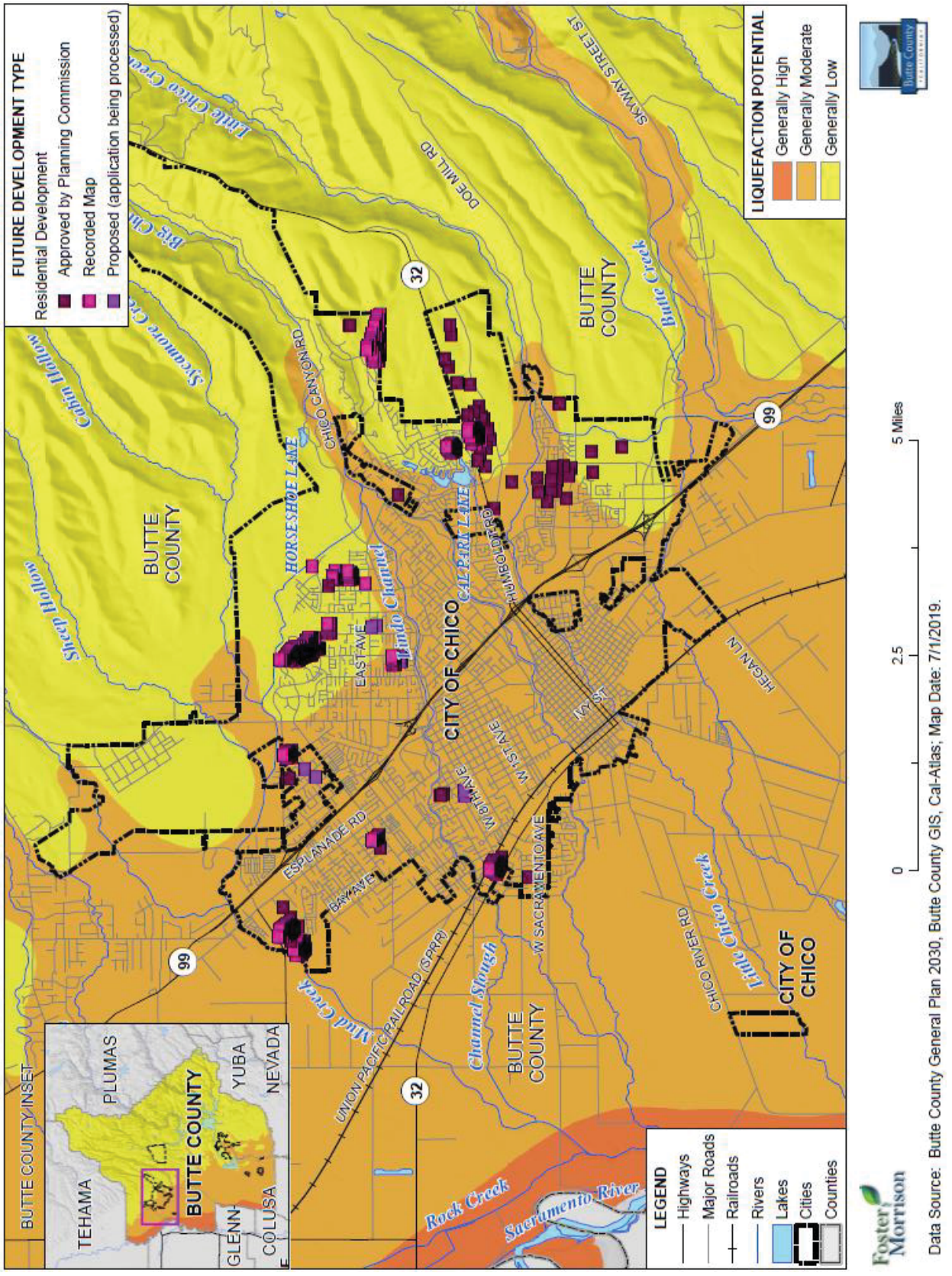


Table B-29 City of Chico – Future Residential Development Parcels and Acres in Liquefaction Potential Areas

Future Development Status /Liquefaction Potential / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Approved by Planning Commission			
Generally Moderate			
Amber Lynn Estates	1	0	18
Avila Estates	1	1	7
Carlene Place	1	1	3
Creekside Landing	1	0	23
Hideaway Park	2	1	1
Innsbrook Sub 2	1	0	5
Lassen Village	1	0	3
Lipton Manor	1	1	1
Meriam Park Remain	14	0	138
Mission Vista Rch 2	1	1	3
Montecito Place	2	0	14
Westside Place 2	1	0	8
Generally Moderate Total	**27**	**5**	**224**
Generally Low			
Belvedere Heights 2	1	0	22
Marigold Heights	1	0	5
Mountain Vista	1	0	7
Oak Valley	17	1	309
Stonegate	3	0	204
Twin Creeks	1	0	68
Generally Low Total	**24**	**1**	**615**
Approved by Planning Commission Total	**51**	**6**	**839**
Recorded Map			
Generally Moderate			
Burnap Subdivision	25	0	3
Creekside Landing	57	0	11
Hopeful Heights	20		2
Lassen Subdivision	14	8	2
Schill Subdivision	56	8	11
Westside Place 1	94	41	7
Generally Moderate Total	**266**	**57**	**36**
Generally Low			

Future Development Status /Liquefaction Potential / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Crossroads	13	0	3
Foothill Park E 8A	1		
Harmony Park Circle	19	1	3
Mariposa Manor	34	0	3
Mountain Vista	171	55	29
Oak Valley 1	80	26	17
Ruthie Subdivision	1	1	1
Siena @ Canyon Oaks	69	47	45
Sierra Gardens Townh	49	0	6
Generally Low Total	**437**	**130**	**107**
Recorded Map Total	**703**	**187**	**143**
Proposed (application being processed)			
Generally Moderate			
Boeger Subdivision	1	0	3
Drake Estates	4	4	3
Morseman Estates	1	0	3
Plottel	3	3	3
Generally Moderate Total	9	7	12
Generally Low		0	
Magnolia Gardens	2	0	4
Generally Low Total	**2**	**0**	**4**
Proposed (application being processed) Total	**11**	**7**	**15**
Grand Total	**765**	**200**	**998**

Source: Butte County 2030 General Plan, City of Chico GIS

Figure B-16 City of Chico – Future Commercial Development in Liquefaction Potential Areas

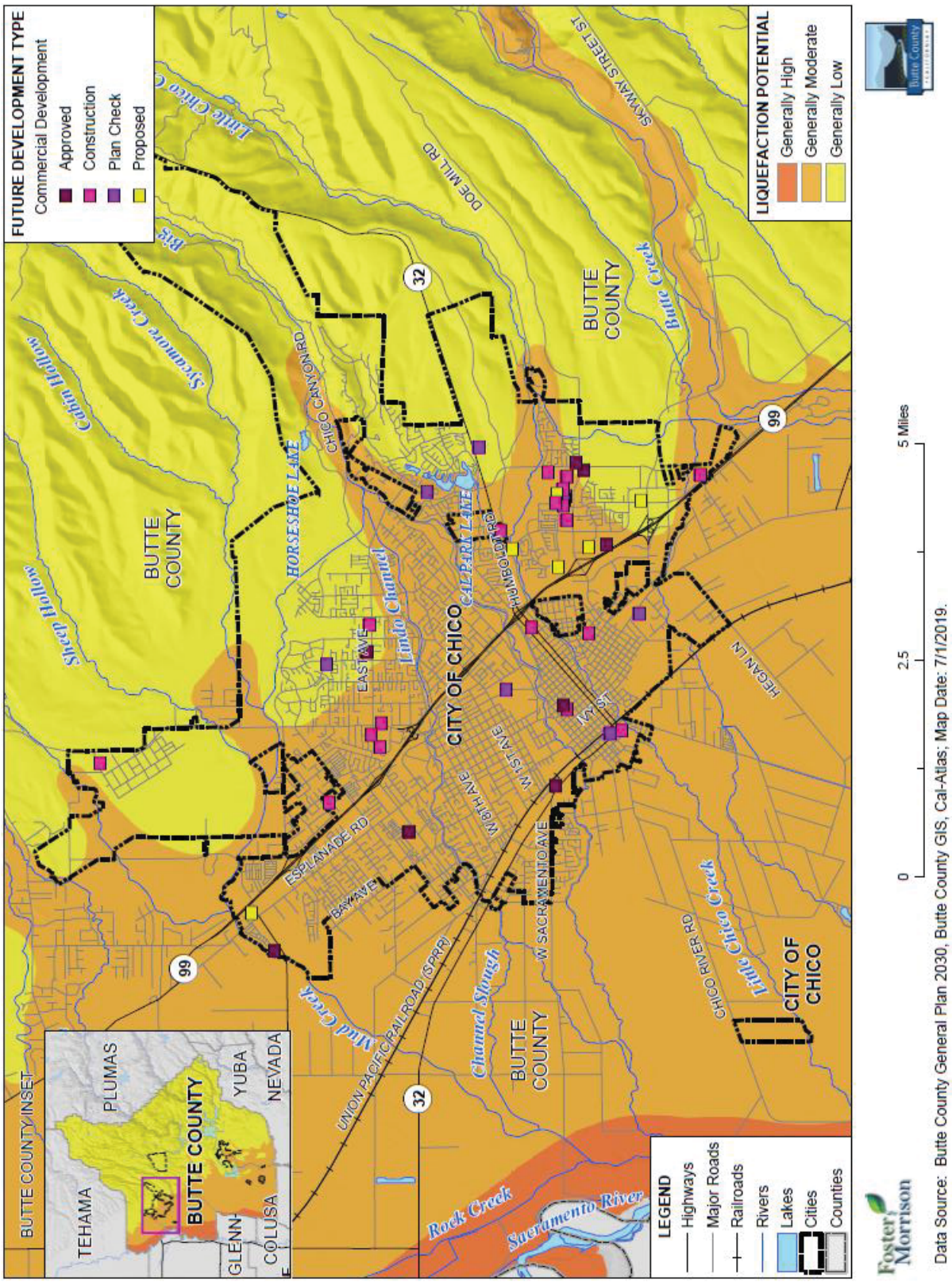


Table B-30 City of Chico – Future Commercial Development Parcels and Acres in Liquefaction Potential Areas

Future Development Status /Liquefaction Potential / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Approved			
Generally Moderate			
Enloe Medical Care	1	0	5.1
Heritage Landing Apts	1	0	12.6
Jennings Building	1	1	0.1
Pabbi Nord Apts	1	1	0.8
WalMart Expansion	1	0	11.1
Generally Moderate Total	**5**	**2**	**29.7**
Generally Low			
Stonegate Apts	1	0	48.1
The Enclave	1	1	2.6
Veteran's Village Housing	1	0	2.5
Generally Low Total	**3**	**1**	**53.1**
Approved Total	**8**	**3**	**82.8**
Construction			
Generally Moderate			
Chase Bank	1	1	0.9
Chico Nissan Remodel	1	1	0.7
CORE Butte Charter School	1	0	27.9
Culinaria @ Meriam Park	1	0	1.0
Holiday Inn Hotel	1	0	1.4
Hotel Expansion/Remodel	1	1	0.2
Humboldt Oak Apts	1	0	2.2
Joshua Tree Domiciles II	1	0	2.9
Notre Dame Quads	1	0	5.2
NVP Facade / BC Offices Infill	1	1	10.8
Office Building	2	1	0.9
Salvation Army Complex	1	1	0.5
Tank District Apts	1	0	2.9
Thrive Office Building	1	0	0.2
VA Clinic	1	0	7.1
Walnut St Apt	1	0	0.7

Future Development Status /Liquefaction Potential / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Generally Moderate Total	17	6	65.4
Generally Low			
FifthSun Addition	1	0	1.5
Sierra Central Bank	1	1	0.5
Generally Low Total	**2**	**1**	**1.9**
Construction Total	**19**	**7**	**67.3**
Plan Check			
Generally Moderate			
McGuire Apts	1	0	0.2
Mini Storage	1	0	3.3
Skyline Condos	1	0	5.6
Tank District Retail	1	0	0.3
Tri Counties Bank	1	1	3.7
Generally Moderate Total	**5**	**1**	**13.0**
Generally Low			
Channel Apts I & II	1	1	7.1
Native Oak Apartments	1	0	5.4
Generally Low Total	**2**	**1**	**12.6**
Plan Check Total	**7**	**2**	**25.6**
Proposed			
Generally Moderate			
Eagle Plaza Specific Plan	1	0	9.9
Hampton Inn	1	0	2.5
Humboldt Apt	1	0	1.4
Oxford Suites Expansion	1	1	5.3
Springfield Apts	1	0	11.7
Generally Moderate Total	**5**	**1**	**30.7**
Generally Low			
Restaraunt w/drive thru	1	1	0.5
Generally Low Total	**1**	**1**	**0.5**
Proposed Total	**6**	**2**	**31.2**
Grand Total	**40**	**14**	**206.9**

Source: Butte County 2030 General Plan, City of Chico GIS

Flood: 100/200/500-Year

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–High

Hazard Profile and Problem Description

As previously described in Section 4.2.11 of the Base Plan, the Butte County Planning Area and the City of Chico have been subject to historical flooding. Chico is traversed by several stream systems and is at risk to the 1% and 0.2% flood as well as to localized stormwater flooding.

The 2030 General Plan Safety Element noted that flood control in the Chico area is provided by federal, state, and local agencies. The general purpose for these agencies is to identify potential flood hazard areas and devise preventive programs, policies, and structures to avoid or minimize flood damage. The Federal Emergency Management Agency (FEMA) produces Flood Insurance Rate Maps, which identify areas of potential flood hazards, and designates 100-year floodplain zones. A 100- year floodplain is the area that has a one percent chance of being flooded in any one year. FEMA also manages the National Flood Insurance Program, which provides insurance to the public based on the predicted 100-year flood event.

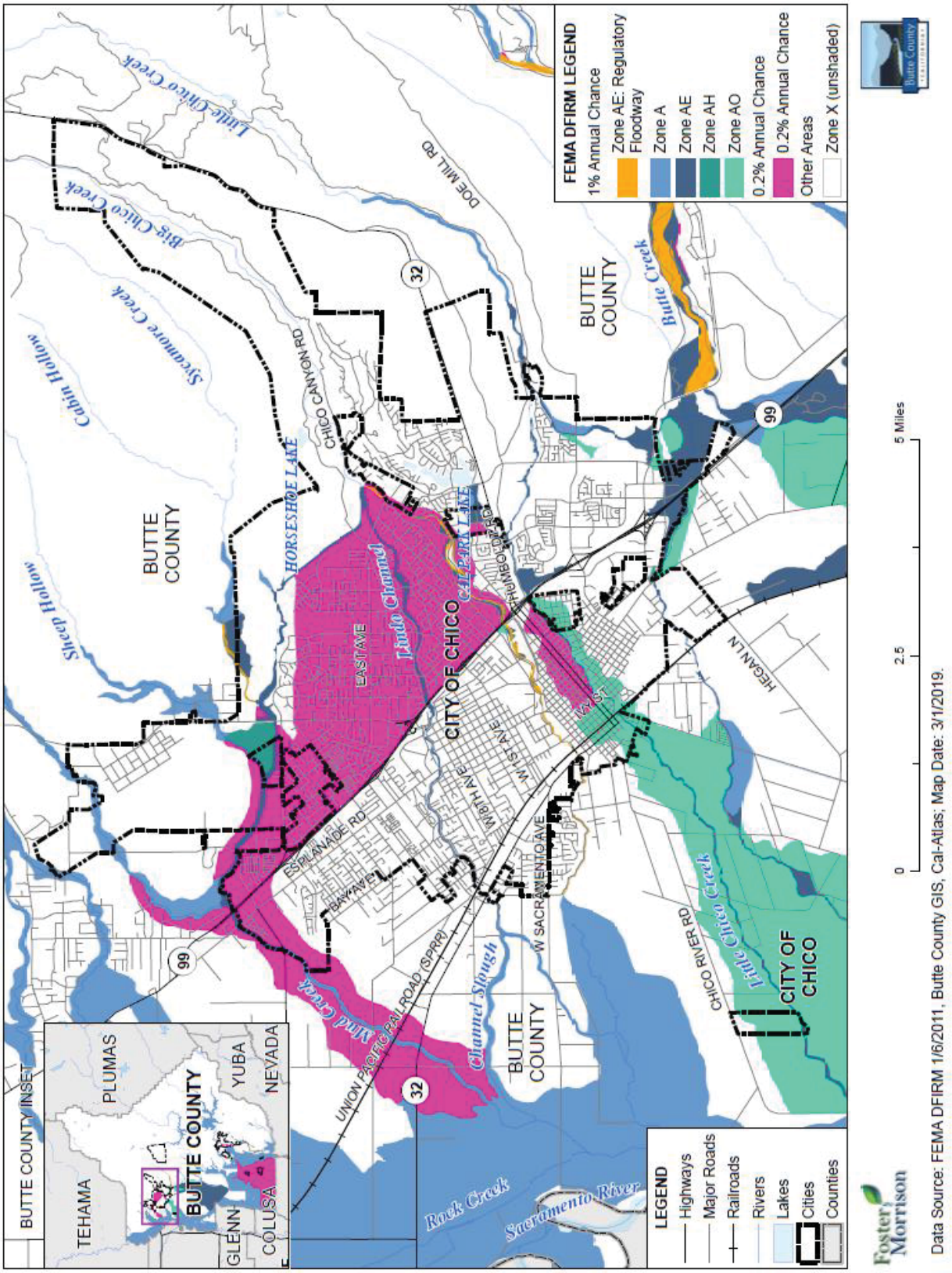
Certain locations within the Chico Sphere of Influence are subject to periodic, localized flooding as a result of intense stormwater runoff. Figure B-17 depicts the current FEMA floodplain mapping data for a 100-year flood event in the Chico area. Flood control projects on Little Chico Creek, Big Chico Creek, and Lindo Channel have helped attenuate the amount of runoff that flows through the City, reducing potential flooding problems. However, portions of the City adjacent to Little Chico Creek are identified as being at risk to flooding during a 100-year event.

FEMA and DWR are in the process of evaluating whether various flood control infrastructure meet 100-year flood protection standards. These agencies have taken the position that various levees and flood control structures, for which adequate data is unavailable, cannot be certified or accredited as adequate to provide the required 100-year level of flood protection.

Location and Extent

Portions of the City are located inside of the 1% and 0.2% annual chance flood zones as defined by the Federal Emergency Management Agency (FEMA). This is seen in Figure B-17.

Figure B-17 City of Chico – FEMA DFIRM Flood Zones



As shown in Figure B-17, the City of Chico is subject to areas of 1% and 0.2% annual chance floods. Additionally, flood extents can be measured in velocity of flood waters and depths of flooding. Expected flood depths in the City vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the City tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Flooding in the City tends to have a shorter speed of onset, due to the amount of water that flows through the City. Geographical flood extent from the FEMA DFIRMs is shown in Table B-31.

Table B-31 City of Chico – Geographical Flood Hazard Extents in FEMA DFIRM Flood Zones

Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
1% Annual Chance Flood Hazard	1,270	6.06%	295	1.41%	975	4.65%
0.2% Annual Chance Flood Hazard	3,408	16.25%	2,505	11.94%	903	4.31%
Other Areas	13,959	66.55%	5,237	24.97%	8,722	41.58%

Source: Butte County 1/16/2011 DFIRM

Past Occurrences

A list of state and federal disaster declarations for Butte County from flooding is shown on Table B-32. These events also affected Chico.

Table B-32 Butte County – State and Federal Disaster Declaration from Flood 1950-2018

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	17	1955, 1958, 1962, 1964, 1969, 1970, 1982, 1986, 1995 (twice), 1997, 1998, 2005, 2017 (three times), 2019	17	1950,1955, 1958 (twice), 1962, 1963, 1969, 1970, 1982, 1986, 1990, 1995 (twice), 1997, 1998, 2008, 2017

Source: Cal OES, FEMA

The City also noted that the following events had affects and damages to the City:

- The City HMPC noted that in 2017, minor/moderate flooding occurred in and around the City; however, no significant damage to infrastructure, critical facilities, or residential and commercial properties was reported.

Vulnerability to Flood

The 2030 City of Chico General Plan Safety Element noted that flood control projects on Little Chico Creek, Big Chico Creek, and Lindo Channel have helped attenuate the amount of runoff that flows through

the City, reducing potential flooding problems. However, portions of the City adjacent to Little Chico Creek are identified as being at risk to flooding during a 100-year event.

Impacts

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. A car will float in less than two feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than anywhere else. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream which can damage or remove stationary structures, such as dam spillways. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be of critical importance to reduce life and safety impacts from any type of flooding.

Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures in the City. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage. Flooding has occurred both within the 1% and 0.2% annual chance floodplains and in other localized areas. The vulnerability of the City to severe flooding is high as it can result in significant life safety, property damage, environmental, and economic impacts to the City.

Based on the vulnerability of Chico to the flood hazard, the sections that follow describes significant assets at risk in the City of Chico.

Values at Risk

GIS was used to determine the possible impacts of flooding within the City of Chico, based on FEMA DFIRMs. The methodology described in Section 4.3.7 of the Base Plan was followed in determining structures and values at risk to the 1% (100-year) and 0.2% (500-year) annual chance flood event. Analysis is presented in two parts:

- Summarized for the City by DFIRM Flood Zone
- Grouped by watershed and DFIRM Flood Zone

Values for Chico Summarized by DFIRM Flood Zone

Table B-33 is a summary table for the City of Chico. Parcel counts, values, estimated contents, and total values in the City are shown for the 1% and 0.2% annual chance flood zones, as well as for those properties that fall outside of the mapped FEMA DFIRM flood zones. Table B-34 breaks down Table B-33 and shows the property use, improved parcel count, improved values, estimated contents, and total values that fall in each floodplain in the City.

Table B-33 City of Chico – Count and Value of Parcels at Risk in Summary DFIRM Flood Zones

Flood Zone	Total Parcel Count	Improved Parcel Count*	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard	1,093	947	$117,274,854	$217,681,041	$3,034,290	$137,805,361	$447,749,040
0.2% Annual Chance Flood Hazard**	9,488	8,870	$987,627,038	$1,689,343,088	$3,522,563	$963,823,454	$3,531,988,125
Other Areas	15,916	14,743	$2,025,784,970	$4,065,575,730	$47,829,126	$2,779,261,987	$8,389,832,270
City of Chico Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: Butte County 1/16/2011 DFIRM, Butte County Assessor's Office

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Table B-34 City of Chico – Count and Values of Parcels at Risk by Detailed Flood Zone and Property Use

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count*	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard							
Agricultural	3	0	$0	$0	$0	$0	$0
Commercial	117	94	$23,564,142	$32,573,678	$773,413	$32,573,678	$87,053,332
Industrial	47	36	$7,688,760	$12,723,086	$2,260,267	$19,084,629	$43,698,916
Residential	870	816	$85,952,171	$172,294,108	$610	$86,147,054	$316,836,242
Unknown	56	1	$69,781	$90,169	$0	$0	$160,550
1% Annual Chance Total	**1,093**	**947**	**$117,274,854**	**$217,681,041**	**$3,034,290**	**$137,805,361**	**$447,749,040**
0.2% Annual Chance Flood Hazard**							
Agricultural	3	-	$208,786	$0	$0	$0	$208,786
Commercial	453	378	$111,688,524	$229,499,613	$3,461,815	$229,499,613	$538,913,233
Industrial	17	14	$2,540,170	$4,486,016	$19,800	$6,729,024	$13,854,210
Residential	8,930	8,476	$872,850,533	$1,455,189,633	$40,948	$727,594,817	$2,978,513,394
Unknown	85	2	$339,025	$167,826	$0	$0	$498,502
0.2% Annual Chance Total	**9,488**	**8,870**	**$987,627,038**	**$1,689,343,088**	**$3,522,563**	**$963,823,454**	**$3,531,988,125**

Flood Zone / Property Use	Total Parcel Count	Improved Parcel Count*	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Other Areas							
Agricultural	17	4	$474,923	$271,477	$57,958	$271,477	$1,080,808
Commercial	1,517	1,260	$470,396,658	$1,181,653,658	$42,442,624	$1,181,653,658	$2,478,006,923
Industrial	296	236	$64,762,027	$155,901,794	$5,182,370	$233,852,691	$451,337,421
Residential	13,820	13,240	$1,489,776,429	$2,726,968,321	$146,174	$1,363,484,161	$5,458,265,705
Unknown	266	3	$374,933	$780,480	$0	$0	$1,141,413
Other Areas Total	**15,916**	**14,743**	**$2,025,784,970**	**$4,065,575,730**	**$47,829,126**	**$2,779,261,987**	**$8,389,832,270**
Grand Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: FEMA DFIRM, Butte County 2017 Parcel/Assessor's Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

Table B-35 summarizes Table B-34 above and shows City of Chico loss estimates and shows improved values at risk by FEMA 1% and 0.2% annual chance flood zones.

Table B-35 City of Chico – Flood Loss Estimates

Flood Zone	Total Parcel Count	Improved Parcel Count*	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value	Loss Estimate	Loss Ratio
1% Annual Chance	1,093	947	$117,274,854	$217,681,041	$3,034,290	$137,805,361	$358,520,692	$71,704,138	0.78%
0.2% Annual Chance**	9,488	8,870	$987,627,038	$1,689,343,088	$3,522,563	$963,823,454	$2,656,689,105	$531,337,821	5.80%
Grand Total	**10,581**	**9,817**	**$1,104,901,892**	**$1,907,024,129**	**$6,556,853**	**$1,101,628,815**	**$3,015,209,797**	**$603,041,959**	**6.59%**

Source: FEMA DFIRM 1/6/2011, Butte County 3/28/2019 Parcel/Assessor's Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance flood zone, exclusive of the 1% annual chance flood zone. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance flood zone.

According to Table B-34 and Table B-35, the City of Chico has 947 improved parcels and $358 million of structure and contents value in the 1% annual chance floodplain, and 8,870 improved parcels and $2.7 billion of structure and contents values in the 0.2% annual chance floodplain. These values can be refined a step further. Applying the 20 percent damage factor as previously described in Section 4.3.6 of the Base Plan, there is a 1% chance in any given year of a flood event causing roughly $71.7 million in damage in the, and a 0.2% chance in any given year of a flood event causing $531.3 million in damage in the City of

Chico. The loss ratio of 0.78% indicates that losses in Chico to flood would be relatively minor for 1% annual chance flooding. The loss ratio of 5.80% indicates that flood losses for 0.2% annual chance flooding would be greater, and more difficult to recover from.

Values for Chico by Watershed

Analysis was performed to determine DFIRM Flood Zones and which watershed they are located in. This analysis is presented in three tables:

- Table B-36 breaks the parcels and values of the City into the two watersheds that fall in the City.
- Table B-37 breaks down Table B-36 to show the parcels and values in each watershed in each FEMA DFIRM flood zone
- Table B-38 breaks down Table B-37 into property use categories. This table shows the watershed by both DFIRM flood zone and property use type.

Table B-36 City of Chico – Count and Value of Parcels by Watershed

Watershed	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Big Chico Creek Watershed	18,923	17,715	$2,102,648,686	$4,141,092,709	$38,132,477	$2,611,271,476	$8,334,215,392
Little Chico Creek Watershed	7,574	6,845	$1,028,038,176	$1,831,507,150	$16,253,502	$1,269,619,325	$4,035,354,042
City of Chico Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: FEMA DFIRM 1/6/2011, Butte County 3/28/2019 Parcel/Assessor's Data

Table B-37 City of Chico – Count and Value of Parcels by Watershed and Summary DFIRM Zones

Watershed / Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Big Chico Creek Watershed							
1% Annual Chance Flood Hazard	70	40	$4,750,002	$7,352,496	$0	$4,358,659	$14,978,417
0.2% Annual Chance Flood Hazard	8,716	8,154	$916,949,094	$1,579,501,325	$3,253,182	$893,913,322	$3,292,352,917
Other Areas	10,137	9,521	$1,180,949,590	$2,554,238,888	$34,879,295	$1,712,999,495	$5,026,884,058
Big Chico Creek Watershed Total	**18,923**	**17,715**	**$2,102,648,686**	**$4,141,092,709**	**$38,132,477**	**$2,611,271,476**	**$8,334,215,392**
Little Chico Creek Watershed							

Watershed / Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
1% Annual Chance Flood Hazard	1,023	907	$112,524,852	$210,328,545	$3,034,290	$133,446,702	$432,770,623
0.2% Annual Chance Flood Hazard	772	716	$70,677,944	$109,841,763	$269,381	$69,910,132	$239,635,208
Other Areas	5,779	5,222	$844,835,380	$1,511,336,842	$12,949,831	$1,066,262,492	$3,362,948,212
Little Chico Creek Watershed Total	**7,574**	**6,845**	**$1,028,038,176**	**$1,831,507,150**	**$16,253,502**	**$1,269,619,325**	**$4,035,354,042**
City of Chico Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: FEMA DFIRM 1/6/2011, Butte County 3/28/2019 Parcel/Assessor's Data

Table B-38 City of Chico – Count and Value of Parcels by Watershed, DFIRM Flood Zone, and Property Use

Watershed / Property Use / Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Big Chico Creek Watershed							
1% Annual Chance Flood Hazard							
Agricultural	3	0	$0	$0	$0	$0	$0
Commercial	4	3	$447,666	$1,454,991	$0	$1,454,991	$2,075,415
Industrial	2	0	$264,935	$0	$0	$0	$264,935
Residential	45	36	$3,967,620	$5,807,336	$0	$2,903,668	$12,477,517
Unknown	16	1	$69,781	$90,169	$0	$0	$160,550
1% Annual Chance Flood Hazard Total	**70**	**40**	**$4,750,002**	**$7,352,496**	$0	**$4,358,659**	**$14,978,417**
0.2% Annual Chance Flood Hazard							
Agricultural	3	0	$208,786	$0	$0	$0	$208,786
Commercial	334	283	$95,719,810	$202,031,087	$3,212,234	$202,031,087	$472,073,185
Industrial	11	8	$1,999,545	$3,231,029	$0	$4,846,544	$10,077,118
Residential	8,293	7,861	$818,681,928	$1,374,071,383	$40,948	$687,035,692	$2,809,495,327
Unknown	75	2	$339,025	$167,826	$0	$0	$498,502
0.2% Annual Chance Flood Hazard Total	**8,716**	**8,154**	**$916,949,094**	**$1,579,501,325**	**$3,253,182**	**$893,913,322**	**$3,292,352,917**
Other Areas							

Watershed / Property Use / Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Agricultural	14	4	$474,923	$271,477	$57,958	$271,477	$1,080,808
Commercial	985	869	$228,256,036	$754,761,211	$33,755,955	$754,761,211	$1,390,669,567
Industrial	136	98	$19,713,503	$58,515,850	$925,850	$87,773,775	$164,523,123
Residential	8,843	8,548	$932,319,588	$1,740,386,064	$139,532	$870,193,032	$3,470,134,734
Unknown	159	2	$185,540	$304,286	$0	$0	$475,826
Other Areas Total	**10,137**	**9,521**	**$1,180,949,590**	**$2,554,238,888**	**$34,879,295**	**$1,712,999,495**	**$5,026,884,058**
Big Chico Creek Watershed Total	**18,923**	**17,715**	**$2,102,648,686**	**$4,141,092,709**	**$38,132,477**	**$2,611,271,476**	**$8,334,215,392**
Little Chico Creek Watershed							
1% **Annual Chance Flood Hazard**							
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	113	91	$23,116,476	$31,118,687	$773,413	$31,118,687	$84,977,917
Industrial	45	36	$7,423,825	$12,723,086	$2,260,267	$19,084,629	$43,433,981
Residential	825	780	$81,984,551	$166,486,772	$610	$83,243,386	$304,358,725
Unknown	40	0	$0	$0	$0	$0	$0
1% Annual Chance Flood Hazard Total	**1,023**	**907**	**$112,524,852**	**$210,328,545**	**$3,034,290**	**$133,446,702**	**$432,770,623**
0.2% Annual Chance Flood Hazard							
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	119	95	$15,968,714	$27,468,526	$249,581	$27,468,526	$66,840,048
Industrial	6	6	$540,625	$1,254,987	$19,800	$1,882,481	$3,777,093
Residential	637	615	$54,168,605	$81,118,250	$0	$40,559,125	$169,018,067
Unknown	10	0	$0	$0	$0	$0	$0
0.2% Annual Chance Flood Hazard Total	**772**	**716**	**$70,677,944**	**$109,841,763**	**$269,381**	**$69,910,132**	**$239,635,208**
Other Areas							
Agricultural	3	0	$0	$0	$0	$0	$0
Commercial	532	391	$242,140,622	$426,892,447	$8,686,669	$426,892,447	$1,087,337,356
Industrial	160	138	$45,048,524	$97,385,944	$4,256,520	$146,078,916	$286,814,298
Residential	4,977	4,692	$557,456,841	$986,582,257	$6,642	$493,291,129	$1,988,130,971
Unknown	107	1	$189,393	$476,194	$0	$0	$665,587
Other Areas Total	5,779	5,222	$844,835,380	$1,511,336,842	$12,949,831	$1,066,262,492	$3,362,948,212

Watershed / Property Use / Flood Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Little Chico Creek Watershed Total	**7,574**	**6,845**	**$1,028,038,176**	**$1,831,507,150**	**$16,253,502**	**$1,269,619,325**	**$4,035,354,042**
City of Chico Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: FEMA DFIRM 1/6/2011, Butte County 3/28/2019 Parcel/Assessor's Data

Values for Chico in 200-Year Floodplain

In addition to FEMA 100- and 500-year flooding, the City of Chico is also subject to 200-year flooding, as defined by the California Department of Water Resources. The California Department of Water Resources (DWR) developed the Urban Level of Flood Protection Criteria to fulfill the requirements outlined in the 2007 California Flood Legislation and amended by subsequent legislation; specifically, California Government Code Section 65007(n):

> *"Urban level of flood protection" means the level of protection that is necessary to withstand flooding that has a 1-in-200 chance of occurring in any given year using criteria consistent with, or developed by, the Department of Water Resources. "Urban level of flood protection" shall not mean shallow flooding or flooding from local drainage that meets the criteria of the national Federal Emergency Management Agency standard of flood protection.*

Using 200-year mapping for the City of Chico obtained from Butte County Department of Water Resources, GIS was used to determine the possible impacts of 200-year (0.5% annual chance) flooding within the City of Chico. The methodology described in Section 4.3.7 of the Base Plan was followed in determining structures and values at risk to the 200-year (0.5% annual chance) flood event. Figure B-18 shows the 200-year floodplain in the City. Table B-39 summarizes the values and parcels at risk in the City of Chico to 200-year flooding.

Figure B-18 City of Chico – 200-year Floodplain

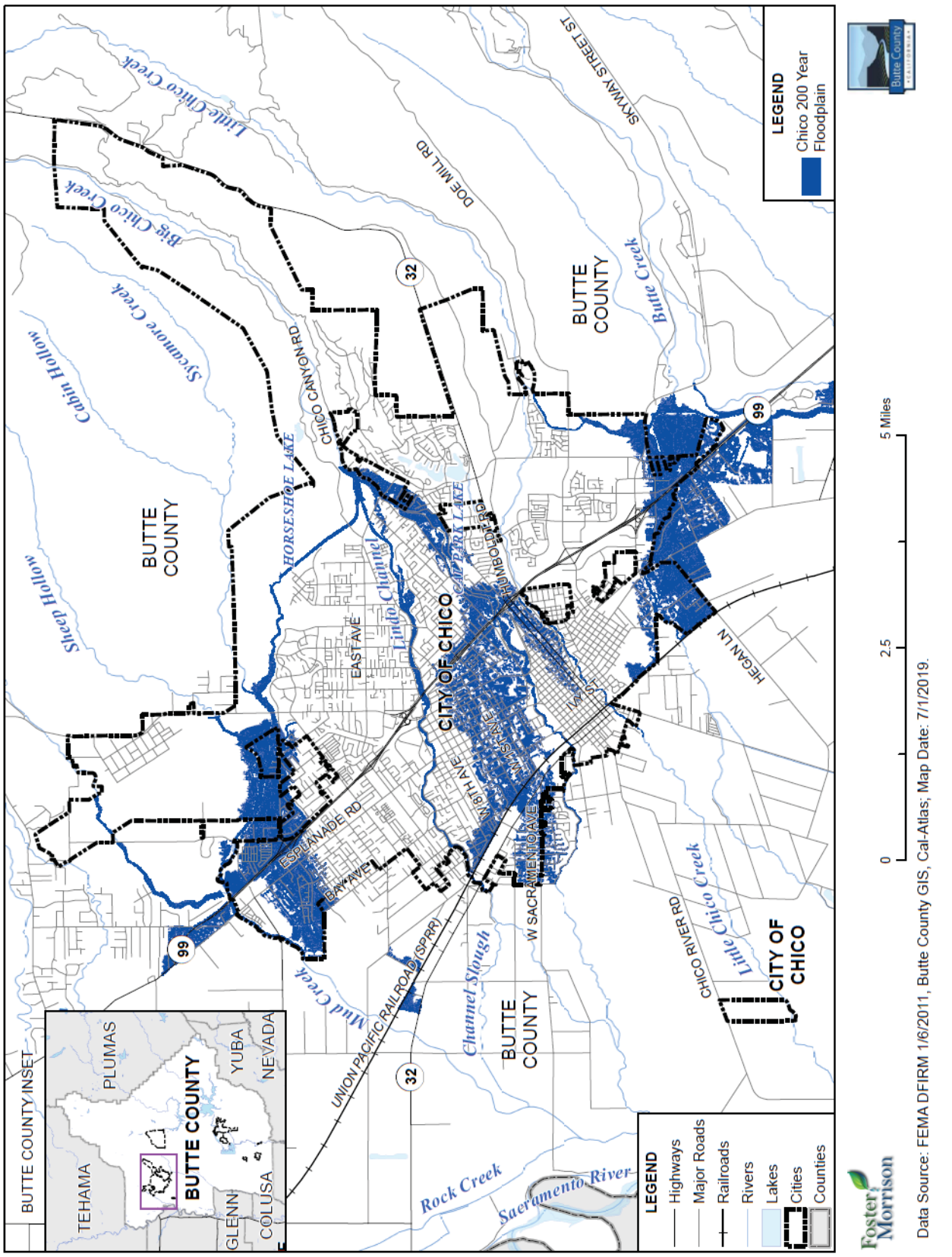


Table B-39 City of Chico – Count and Value of Parcels in 200-Year Floodplain by Watershed

Watershed	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Big Chico Creek Watershed							
Inside 200-Year Floodplain	3,360	3,108	$387,327,998	$750,475,730	$30,329,601	$446,474,480	$1,505,090,749
Little Chico Creek Watershed							
Inside 200-Year Floodplain	506	434	$59,063,724	$109,016,780	$5,355,141	$116,872,884	$276,982,672

Source: Butte County GIS, Butte County 3/28/2019 Parcel/Assessor's Data

Flooded Acres

Also of interest is the land area affected by the various flood zones. The following is an analysis of flooded acres in the City in comparison to total area within the City limits. The same methodology, as discussed in Section 4.3.8 of the Base Plan, was used for the City of Chico as well as for the County as a whole. Table B-40 represents a detailed and summary analysis of total acres for each FEMA DFIRM flood zone in the City.

Table B-40 City of Chico – Flooded Acres

Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
1% Annual Chance Flood Hazard						
Zone A	5,254	0.36%	125	0.02%	5,130	0.56%
Zone AE	6,985	0.48%	421	0.08%	6,565	0.72%
Zone AE Floodway	3,385	0.23%	29	0.01%	3,356	0.37%
Zone AH	1,208	0.08%	8	0.00%	1,200	0.13%
Zone AO	569	0.04%	216	0.04%	353	0.04%
1% Annual Chance Flood Hazard Total	**17,402**	**1.20%**	**798**	**0.15%**	**16,604**	**1.82%**
0.2% Annual Chance Flood Hazard						
Zone X (shaded)	9,044	0.62%	2,672	0.50%	6,372	0.70%
0.2% Annual Chance Flood Hazard Total	**9,044**	**0.62%**	**2,672**	**0.50%**	**6,372**	**0.70%**
Other Areas						
Zone X (unshaded)	17,380	1.20%	5,448	1.02%	11,932	1.31%

Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Other Areas Total	17,380	1.20%	5,448	1.02%	11,932	1.31%
City of Chico Total	**43,826**	**3.03%**	**8,919**	**1.66%**	**34,907**	**3.82%**

Source: FEMA DFIRM 1/6/2011

Population at Risk

The DFIRM flood zones were overlayed on the parcel layer. Those residential parcel centroids that intersect the flood zones were counted and multiplied by the 2010 Census Bureau average household factors for Chico – 3.02. According to this analysis, there is a total population of 2,464 and 25,598 residents of the City at risk to flooding in the 1% and 0.2% annual chance floodplains, respectively. This is shown in Table B-41.

Table B-41 City of Chico – Count of Improved Residential Parcels and Population by Flood Zone

Jurisdiction	1 % Annual Chance Flooding		0.2% Annual Chance Flooding	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Chico	816	2,464	8,476	25,598

Source: FEMA DFIRM 1/6/2011, Butte County 3/28/2019 Parcel/Assessor's Data, US Census Bureau

Critical Facilities at Risk

An analysis was performed on the critical facility inventory in Chico in DFIRM flood zones. GIS was used to determine whether the facility locations intersects a DFIRM flood zone and, if so, what zone it intersects. Details of critical facilities in a DFIRM flood zones in the City of Chico are shown in Figure B-19 and detailed in Table B-42. Details of critical facility definition, type, name and address and jurisdiction by flood zone are listed in Appendix F.

Figure B-19 City of Chico – Critical Facilities in DFIRM Flood Zones

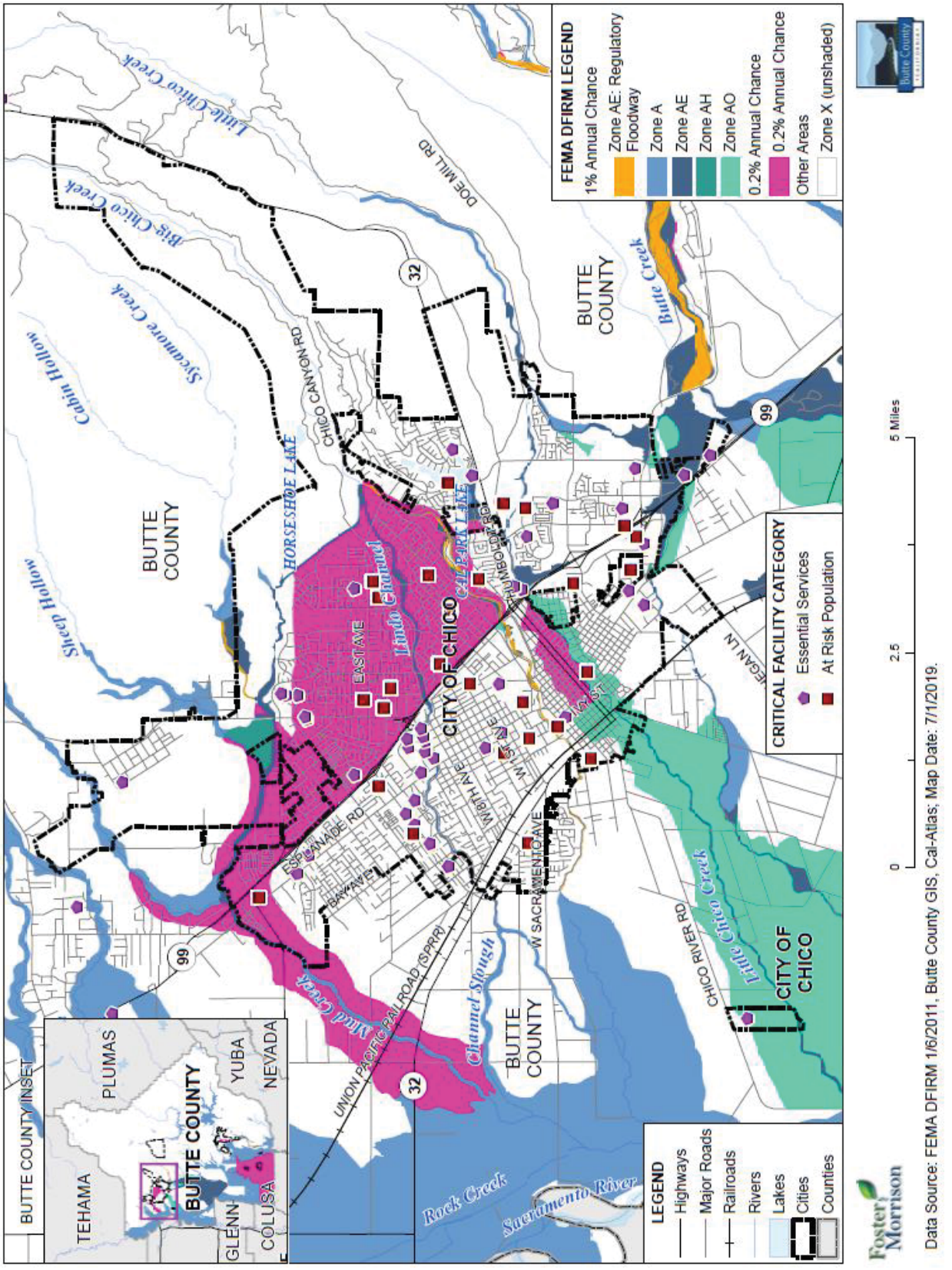


Table B-42 City of Chico – Critical Facilities in DFIRM Flood Zones

Flood Zone/ Critical Facility Category / Critical Facility Type	Facility Count
1% Annual Chance Flood Hazard	
Zone AE	
Essential Services Facilities	
Public Assembly Point / Evacuation Center	1
Essential Services Facilities Total	**1**
Zone AE Total	**1**
Zone AO	
Essential Services Facilities	
Wastewater Treatment Plant	1
Essential Services Facilities Total	**1**
At Risk Population Facilities	
School	1
At Risk Population Facilities Total	**1**
Zone AO Total	**2**
1% Annual Chance Flood Hazard Total	**3**
0.2% Annual Chance Flood Hazard	
Essential Services Facilities	
Fire	1
Health Care	5
Essential Services Facilities Total	**6**
At Risk Population Facilities	
School	10
At Risk Population Facilities Total	10
Zone X (shaded) Total	**16**
0.2% Annual Chance Flood Hazard Total	**16**
Other Areas	
Zone X (unshaded)	
Essential Services Facilities	
Fire	2
Health Care	33
Law Enforcement	4
Radio Sites	1
Dam	1
Logistics Hub	1
Essential Services Facilities Total	**42**
At Risk Population Facilities	

Flood Zone/ Critical Facility Category / Critical Facility Type	Facility Count
School	20
At Risk Population Facilities Total	20
Zone X (unshaded) Total	**62**
Other Areas Total	**62**
Grand Total	**81**

Source: FEMA DFIRM 1/6/2011, Butte County GIS

Insurance Coverage, Claims Paid, and Repetitive Losses

The City of Chico joined the National Flood Insurance Program (NFIP) on June 11,1997. The City does not participate in CRS program. NFIP data indicates that as of July 19, 2018, there were 592 flood insurance policies in force in the City with $148,798,300 of coverage. Of the 592 policies, 567 were residential (single-family homes) and 25 were nonresidential; 354 of the policies were in A zones; the remaining 238 were in B, C, and X zones. The GIS parcel analysis detailed above identified 945 improved parcels in the 100-year flood zone. 354 policies for 947 improved parcels in the 100-year floodplain equates to insurance coverage of 37.3 percent.

There have been 10 historical claims for flood losses totaling $243,679.18; all located in B, C, or X zones. 8 of these were for pre-FIRM structures; 2 were for post-FIRM structures. NFIP data further indicates that there is 1 repetitive loss (RL) and no severe repetitive loss (SRL) buildings within the City of Chico.

California Department of Water Resources Best Available Maps (BAM)

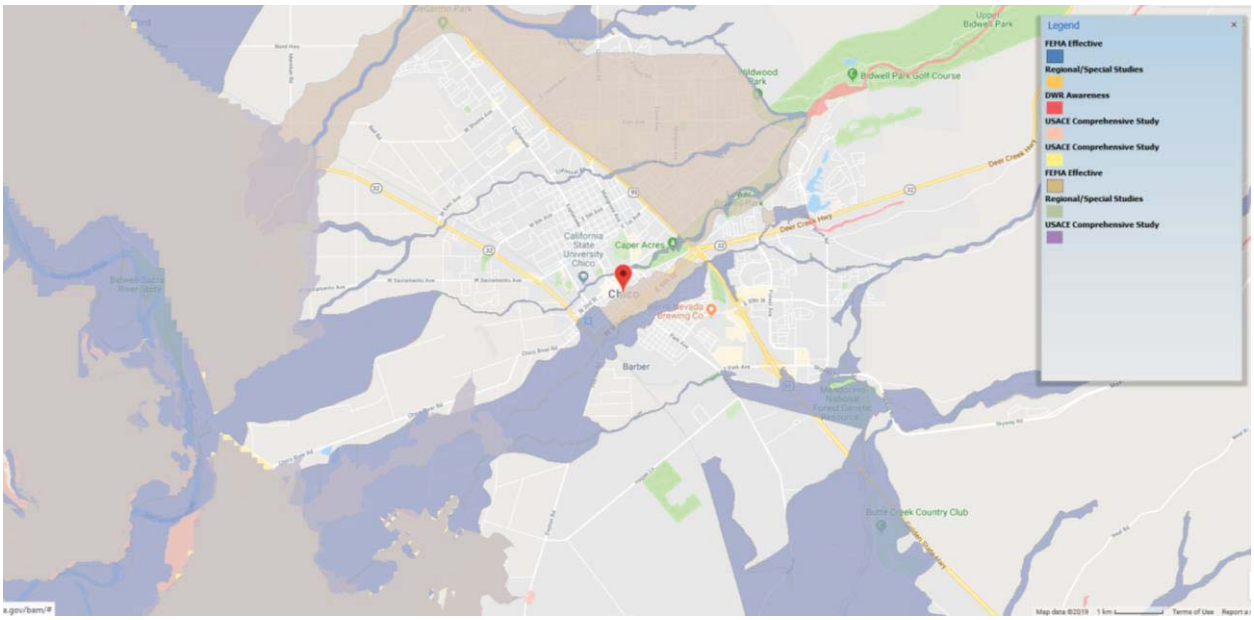
The FEMA regulatory maps provide just one perspective on flood risks in Butte County. Senate Bill 5 (SB 5), enacted in 2007, authorized the California DWR to develop the Best Available Maps (BAM) displaying 100- and 200-year floodplains for areas located within the Nevada-San Joaquin (SAC-SJ) Valley watershed. This effort was completed by DWR in 2008. DWR has expanded the BAM to cover all counties in the State and to include 500-year floodplains.

Different than the FEMA DFIRMs which have been prepared to support the NFIP and reflect only the 100-year event risk, the BAMs are provided for informational purposes and are intended to reflect current 100-, 200-(as applicable), and 500-year event risks using the best available data. The 100-year floodplain limits on the BAM are a composite of multiple 100-year floodplain mapping sources. It is intended to show all currently identified areas at risk for a 100-year flood event, including FEMA's 100-year floodplains. The BAM are comprised of different engineering studies performed by FEMA, Corps, and DWR for assessment of potential 100-, 200-, and 500-year floodplain areas. These studies are used for different planning and/or regulatory applications, and for each flood frequency may use varied analytical and quality control criteria depending on the study type requirements.

The value in the BAMs is that they provide a bigger picture view of potential flood risk to the City than that provided in the FEMA DFIRMs. This provides the community and residents with an additional tool for understanding potential flood hazards not currently mapped as a regulated floodplain. Improved

awareness of flood risk can reduce exposure to flooding for new structures and promote increased protection for existing development. Informed land use planning will also assist in identifying levee maintenance needs and levels of protection. By including the FEMA 100-year floodplain, it also supports identification of the need and requirement for flood insurance. The BAM map for Chico is shown in Figure B-20.

Figure B-20 City of Chico Best Available Map



Source: California DWR

Legend explanation: Blue - FEMA 1%, Orange – Local 1% (developed from local agencies), Red – DWR 1%r (Awareness floodplains identify the 1% annual chance flood hazard areas using approximate assessment procedures.), Pink – USACE 1% (2002 Sac and San Joaquin River Basins Comp Study), Yellow – USACE 0.5% (2002 Sac and San Joaquin River Basins Comp Study), Tan – FEMA 0.2%, Grey – Local 0.2% (developed from local agencies), Purple – USACE 0.2%(2002 Sac and San Joaquin River Basins Comp Study).

Future Development

Future development will largely occur as new infill projects and redevelopment. Projects will be expected to improve the aesthetic character and economic health of this historic district. Expansion of existing uses will be encouraged to include high-density residential units. Future development will increase the amount of impervious surface areas in the City while decreasing natural vegetation. Such conditions limit water percolation and, without adequate mitigation, can increase stormwater runoff and decrease the time required to reach peak discharge rates. The City is committed to minimizing damage due to flood hazards by identifying floodplain boundaries and limiting development in areas where flooding is likely to occur. The City will continue to enforce its floodplain ordinance to reduce future risk of flood damage.

GIS Analysis

Butte County's 3/21/2019 Assessor Data and the County's GIS parcel data were used as the basis for the inventory of assessed values for both improved and unimproved parcels within the City. Two separate development types were provided: Residential and Commercial. Using GIS, the 765 residential and 40 commercial parcels associated with future development projects for which the analysis was to be performed

was identified. Future development in residential areas in DFIRM flood zones can be seen on Figure B-21 and are detailed in Table B-43. Future development in commercial areas in DFIRM flood zones can be seen on Figure B-22 and are detailed in Table B-44.

Figure B-21 City of Chico – Future Residential Development in DFIRM Flood Zones

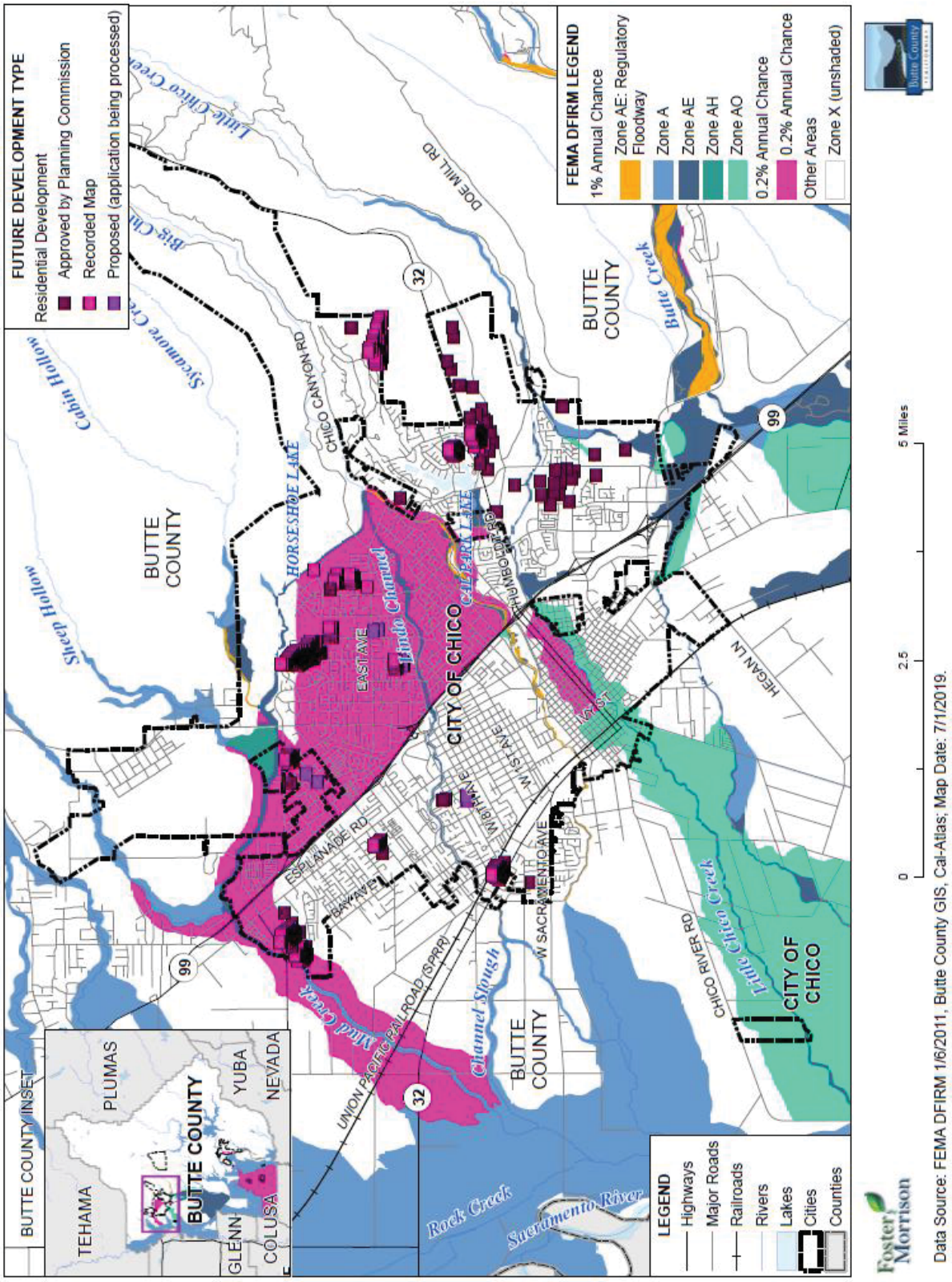


Table B-43 City of Chico – Future Residential Development Parcel and Acre Counts in DFIRM Flood Zones

Future Development Status / Flood Zone / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Approved by Planning Commission			
1% Annual Chance Flood Hazard			
Stonegate	1	0	54
1% Annual Chance Flood Hazard Total	**1**	**0**	**54**
0.2% Annual Chance Flood Hazard			
Amber Lynn Estates	1	0	18
Creekside Landing	1	0	23
Lassen Village	1	0	3
Marigold Heights	1	0	5
0.2% Annual Chance Flood Hazard Total	**4**	**0**	**49**
Recorded Map			
1% Annual Chance Flood Hazard			
Creekside Landing	1	0	4
1% Annual Chance Flood Hazard Total	**1**	**0**	**4**
0.2% Annual Chance Flood Hazard			
Burnap Subdivision	25	0	3
Creekside Landing	56	0	8
Crossroads	13	0	3
Foothill Park E 8A	1	0	
Harmony Park Circle	19	1	3
Hopeful Heights	20	0	2
Mariposa Manor	34	0	3
Mountain Vista	129	55	20
Ruthie Subdivision	1	1	1
Schill Subdivision	56	8	11
0.2% Annual Chance Flood Hazard Total	**354**	**65**	**54**
Proposed (application being processed)			
0.2% Annual Chance Flood Hazard			
Boeger Subdivision	1	0	3
Drake Estates	4	4	3

Future Development Status / Flood Zone / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Magnolia Gardens	2	0	4
Morseman Estates	1	0	3
0.2% Annual Chance Flood Hazard Total	**8**	**4**	**12**
Grand Total	**368**	**69**	**173**

Source: FEMA 1/6/2011 DFIRM, City of Chico GIS

Figure B-22 City of Chico – Future Commercial Development in DFIRM Flood Zones

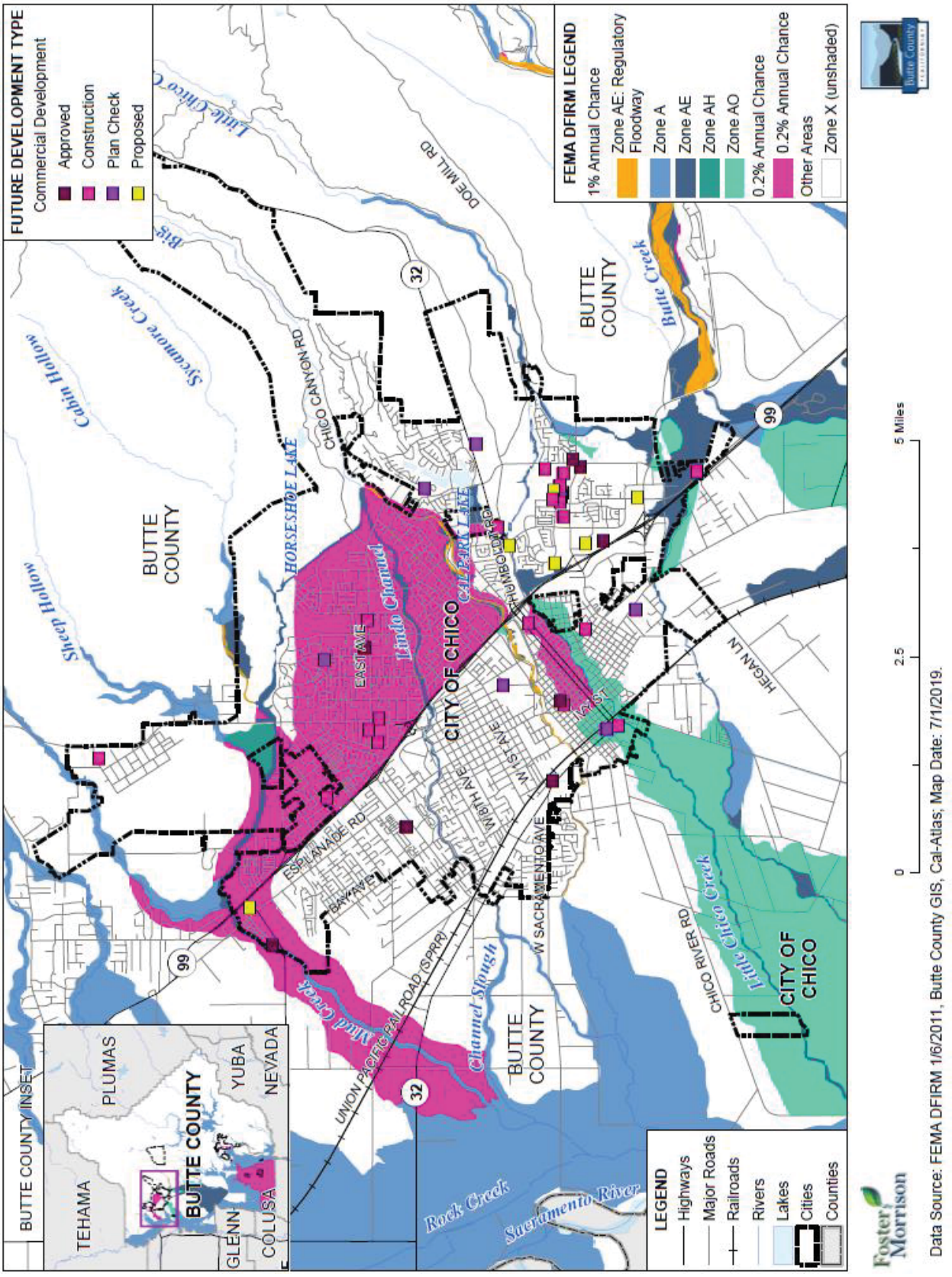


Table B-44 City of Chico – Future Commercial Development Parcel and Acre Counts in DFIRM Flood Zones

Future Development Status / Flood Zone / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Approved			
0.2% Annual Chance Flood Hazard			
Heritage Landing Apts	1	0	12.6
The Enclave	1	1	2.6
0.2% Annual Chance Flood Hazard Total	**2**	**1**	**15.2**
Other Areas (Outside of Floodplain)			
Enloe Medical Care	1	0	5.1
Jennings Building	1	1	0.1
Pabbi Nord Apts	1	1	0.8
Stonegate Apts	1	0	48.1
Veteran's Village Housing	1	0	2.5
WalMart Expansion	1	0	11.1
Other Areas Total	**6**	**2**	**67.6**
Approved Total	**8**	**3**	**82.8**
Construction			
1% Annual Chance Flood Hazard			
CORE Butte Charter School	1	0	27.9
Walnut St Apt	1	0	0.7
1% Annual Chance Flood Hazard Total	**2**	**0**	**28.6**
0.2% Annual Chance Flood Hazard			
Chase Bank	1	1	0.9
Chico Nissan Remodel	1	1	0.7
Joshua Tree Domiciles II	1	0	2.9
NVP Facade / BC Offices Infill	1	1	10.8
Office Building	1	1	0.3
Sierra Central Bank	1	1	0.5
0.2% Annual Chance Flood Hazard Total	**6**	**5**	**16.0**
Other Areas (Outside of Floodplain)			
Culinaria @ Meriam Park	1	0	1.0
FifthSun Addition	1	0	1.5

Future Development Status / Flood Zone / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Holiday Inn Hotel	1	0	1.4
Hotel Expansion/Remodel	1	1	0.2
Humboldt Oak Apts	1		2.2
Notre Dame Quads	1		5.2
Office Building	1		0.5
Salvation Army Complex	1	1	0.5
Tank District Apts	1		2.9
Thrive Office Building	1		0.2
VA Clinic	1		7.1
Other Areas Total	**11**	**2**	**22.6**
Construction Total	**19**	**7**	**67.3**
Plan Check			
1% Annual Chance Flood Hazard			
McGuire Apts	1	0	0.2
1% Annual Chance Flood Hazard Total	**1**	**0**	**0.2**
0.2% Annual Chance Flood Hazard			
Channel Apts I & II	1	1	7.1
0.2% Annual Chance Flood Hazard Total	**1**	**1**	**7.1**
Other Areas			
Mini Storage	1	0	3.3
Native Oak Apartments	1	0	5.4
Skyline Condos	1	0	5.6
Tank District Retail	1	0	0.3
Tri Counties Bank	1	1	3.7
Other Areas Total	**5**	**1**	**18.3**
Plan Check Total	**7**	**2**	**25.6**
Proposed			
0.2% Annual Chance Flood Hazard			
Eagle Plaza Specific Plan	1	0	9.9
0.2% Annual Chance Flood Hazard Total	**1**	**0**	**9.9**
Other Areas (Outside of Floodplain)			
Hampton Inn	1	0	2.5
Humboldt Apt	1	0	1.4

Future Development Status / Flood Zone / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Oxford Suites Expansion	1	1	5.3
Restaraunt w/drive thru	1	1	0.5
Springfield Apts	1	0	11.7
Other Areas Total	**5**	**2**	**21.3**
Proposed Total	**6**	**2**	**31.2**
Grand Total	**40**	**14**	**206.9**

Source: FEMA 1/6/2011 DFIRM, City of Chico GIS

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

While flooding happens in the City from time to time in the FEMA floodplains, areas outside of the floodplain can experience intermittent flooding as well. Localized flooding and other issues caused by severe weather events, primarily heavy rains and severe storms, can often pose a risk to the community. Primary concerns include impacts to infrastructure that provides a means of ingress and egress throughout the community.

Stormwater runoff has, at times, created localized flooding problems in the City of Chico and the agricultural area west of the City. City of Chico is prone to localized flooding due to Big Chico Creek and Little Chico Creek, specifically in low-lying areas along Lower Bidwell Park and Western Chico. Lindo Channel and Sycamore Drainage are diversion Channels which assist with alleviating increased flooding along the two main creeks; however, both diversion Channels are prone to localized flooding as a result, in Western and Northern Chico. Stormwater concerns are prevalent along the Western section of Lindo Channel, where stormwater is prevented from entering the Channel. Eastern Chico is built on lava cap, which results in localized flooding during heavy thunderstorms.

Location and Extent

As described above, the City is subject to localized flooding throughout the City. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the City vary by location. Flood durations in the City tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Localized flooding in the City tends to have a shorter speed of onset, especially when antecedent rainfall has soaked the ground and reduced its capacity to absorb additional moisture.

Past Occurrences

The City noted that localized flooding occurs every year to varying degrees. No specific dates of events where damages could be recalled.

Vulnerability to Localized Flooding

Several issues cause drainage problems that lead to flooding in the City. Ditches and storm drains are needed to convey stormwater away from developed areas; however, in some areas the topography prevents surface water from draining quickly to a ditch, stream, or storm drain. Typically, storm drainage systems are designed to handle storm runoff for events smaller than the 100-year event, such as a 10-year event. This is a conscious operational design used primarily in low traffic/risk areas. Water is stored in part of the street for less than an hour during high volume rain events. These events do not materially affect streets. This also reduces peak flows in receiving streams. Runoff increases as a watershed is developed; as a result, older storm sewers designed to convey a 10-year storm or less may become inadequate as additional development takes place. Storm drains, ditches, and other waterways can be blocked by debris, resulting in the ponding of stormwater prior to the sewer clearing. Many roads not in the FEMA-designated floodplain have undergone damage in the past due to flooding caused by such blockages.

The City tracks localized flooding areas. Affected localized flood areas identified by the County in the City of Chico are summarized in Table B-45.

Table B-45 City of Chico– Road List of Localized Flooding Problem Areas

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris	Downed Trees
W. Sacramento Ave	Y	Y	N	Y	N	N	Y
Chico River Rd	Y	Y	N	Y	N	N	N
Walnut St	Y	Y	N	Y	N	Y	N
Pomona Ave	Y	Y	N	Y	N	Y	N
Cohasset Rd	Y	Y	N	Y	N	Y	N
E. Eaton	Y	Y	N	N	N	N	N
Bancroft Dr	Y	Y	N	N	N	N	N
Yosemite Dr	Y	Y	N	N	N	N	N
W. Lindo Ave	Y	Y	N	N	N	N	Y

Source: City of Chico

Impacts

Localized flooding and other issues caused by severe weather events, primarily heavy rains and thunderstorms, can often pose a risk to the community. Primary concerns include impacts to infrastructure and roads that provides a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to structures and infrastructure. Objects can also be buried

or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits.

Future Development

Future development in the City will add more impervious surfaces and the continued need to drain those waters. The City will need to be proactive to ensure that increased development has proper siting and drainage for stormwaters. The risk of localized flooding to future development can also be minimized by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the localized stormwater flooding will reduce future risks of losses.

Hazardous Materials Transportation

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

According to the Environmental Protection Agency (EPA), a hazardous material is any item or agent (biological, chemical, physical) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Hazardous materials can be present in any form; gas, solid, or liquid. Environmental or atmospheric conditions can influence hazardous materials if they are uncontained.

The significance of environmental or human exposure to hazardous materials depends on the type, location, and quantity of the material released. In the Chico area, hazardous materials may be transported via roadways, railways, and airways. Hazardous materials and wastes are regulated by federal and state laws and are required to be recycled or properly disposed. Transport of hazardous materials is also heavily regulated. However, unintentional releases of hazardous materials from leaks and accidents can still occur.

Location and Extent

In the City of Chico, a transportation related release of hazardous materials is most likely to occur along Highways 32, 99, and along the Union Pacific railroad tracks. Trucks and rail cars that use these transportation corridors commonly carry a variety of hazardous materials including gasoline, other petroleum products, and other chemicals known to cause human health problems. As such, the speed on onset of hazardous materials spill can be short should an accident occur. The duration and severity of the event depends on multiple factors, including the type and amount of material spilled, the volatility of the chemical spilled, and the method of dispersion.

Past Occurrences

The United States Department of Transportation Pipeline and Hazardous Materials Safety Administration's (PHMSA) Office of Hazardous Materials Safety performs a range of functions to support the safe transport of hazardous material. One of these functions is the tracking of hazardous materials incidents in the United States. The database was searched for hazardous materials incidents in Chico. A summary of rail and

highway incidents since 1970 in the City are shown in Table B-46. 8 separate events were contained in the database.

Table B-46 City of Chico – Hazardous Materials Incidents by Jurisdiction Since 1970

Date of Incident	Incident City	Incident Route	Mode of Transportation	Commodity Short Name	Quantity Released	Amount of Damages
11/29/1995	Chico	East Ave Hwy 32	Highway	Tetrachloroethylene	15 gallons	$152
2/2/2003	Chico	Midway and Speedway	Highway	Petroleum Gases Liquefied	9,145 gallons	$76,402
10/30/2003	Chico	14300 St Hwy 99/Meridian Rd	Highway	Gasoline	1,500 gallons	$138,296
9/18/2006	Chico	State Hwy 32 @ Butte Meadows	Highway	Gasoline	700 gallons	$228,000
9/19/2007	Chico	–	Highway	Compounds Cleaning Liquids	15 gallons	$41,500
6/9/2009	Chico	401 Otterson Dr.	Highway	–	1.1 lbs.	$0
5/5/2010	Chico	1000 Ft. North Of 99but44.320	Highway	Gasoline	4,000 gallons	$14,6700
5/4/2015	Chico	–	Highway	Oxygen Refrigerated Liquid	3740.26	$2,500

Source: PHMSA Database – Search dates 01/01/1970 – 05/01/2019

Vulnerability to Hazardous Materials

It is often quite difficult to quantify the potential losses from human-caused hazards. While the facilities themselves have a tangible dollar value, loss from a human-caused hazard often inflicts an even greater toll on a community, both economically and emotionally. The impact to identified assets will vary from event to event and depend on the type, location, and nature of a specific hazardous material incident. Given the difficulty in quantifying the losses associated with technological hazards such as this, this section focuses on analyzing key City assets relative to the hazardous materials transportation corridors (highway and rail).

Impacts

Impacts from hazardous materials vary by location and severity of any given event and will likely only affect certain areas of the City during specific times. Impacts in the City include damage to properties, critical facilities, and infrastructure. In addition, injuries or deaths may result, depending on location and severity of the spill.

Values at Risk

An analysis of the potential vulnerability of the City to a transportation-related hazardous materials release was conducted using GIS within identified transportation corridors. To evaluate the areas most vulnerable, a one-mile buffer was applied to both sides of State Routes 32 and 99; as well as the Union Pacific railroad tracks. The result is a two-mile buffer zone around each transportation corridor that is used for risk-analysis.

More information on this methodology can be found in Section 4.3.9 of the Base Plan. The buffer zone is shown on Figure B-23. Results of the risk analysis are summarized on Table B-47. Table B-48 breaks down Table B-47 by to show parcels and values at risk broken down by property use type.

Figure B-23 City of Chico – Hazardous Material Buffer Zones

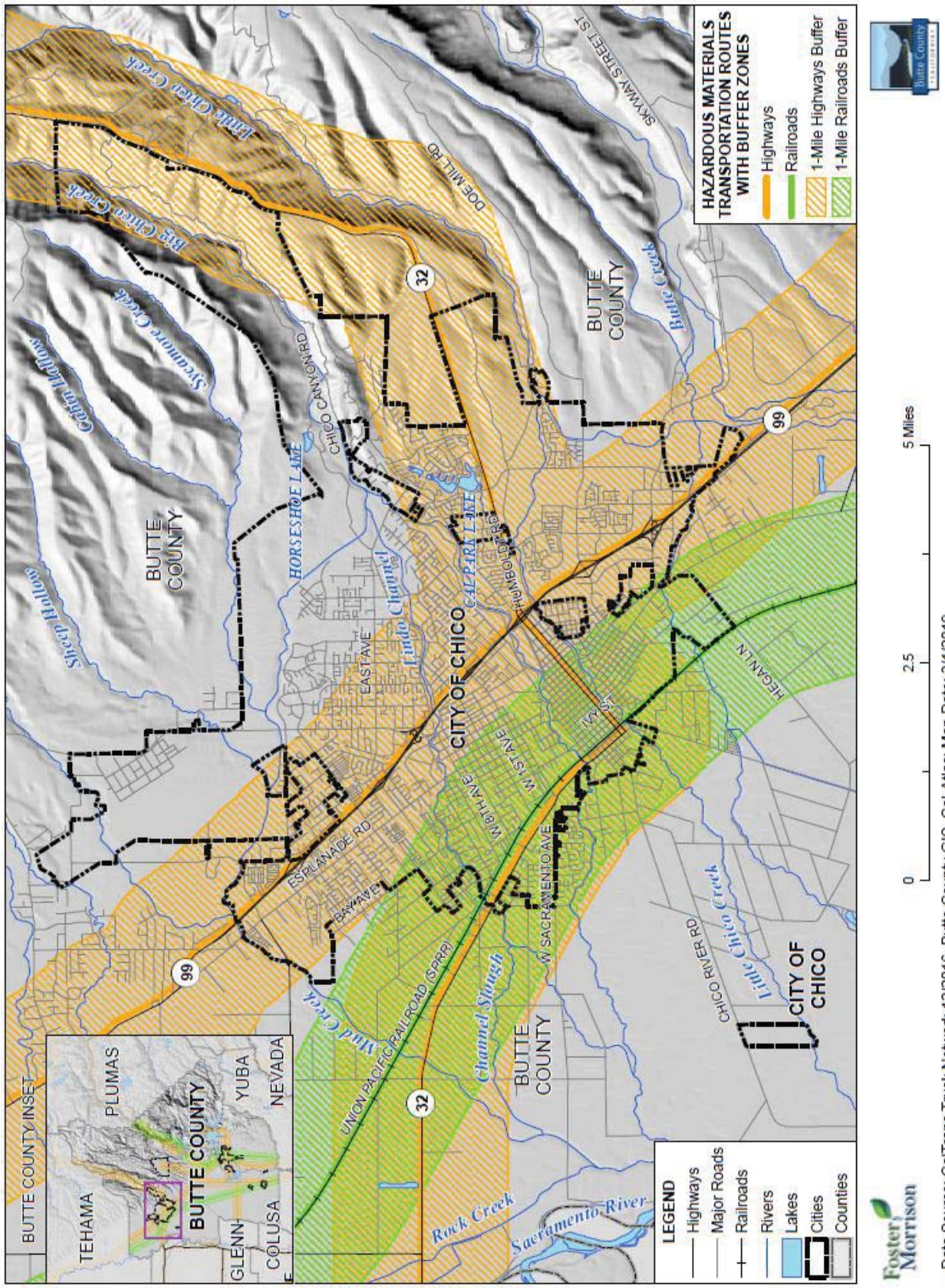


Table B-47 City of Chico – Count and Value of Parcels in Hazardous Material Buffer Zones by Route Type

Hazardous Materials Transportation Routes	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Highways	14,627	13,631	$1,803,530,620	$3,232,082,534	$16,106,441	$2,072,884,209	$6,904,865,474
Highways and Railroads	7,353	6,873	$786,565,935	$1,733,389,824	$35,511,018	$1,143,867,646	$3,291,598,587
Railroads	71	58	$23,868,742	$70,421,765	$1,069,190	$100,494,609	$187,486,110
City of Chico Total	**22,051**	**20,562**	**$2,613,965,297**	**$5,035,894,123**	**$52,686,649**	**$3,317,246,463**	**$10,383,950,170**

Source: CalTrans, Butte County 3/28/2019 Parcel/Assessor's Data

Table B-48 City of Chico – Count and Value of Parcels in Hazardous Material Buffer Zones by Route Type and Property Use

Hazardous Materials Transportation Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Highways							
Agricultural	12	1	$410,788	$76,387	$0	$76,387	$563,562
Commercial	1,194	964	$444,236,976	$847,977,181	$13,259,759	$847,977,181	$2,066,058,436
Industrial	71	58	$22,992,540	$33,277,826	$2,739,420	$49,916,739	$113,571,802
Residential	13,156	12,604	$1,335,303,828	$2,349,827,803	$107,262	$1,174,913,902	$4,723,182,849
Unknown	194	4	$586,488	$923,337	$0	$0	$1,488,825
Highways Total	**14,627**	**13,631**	**$1,803,530,620**	**$3,232,082,534**	**$16,106,441**	**$2,072,884,209**	**$6,904,865,474**
Highways and Railroads							
Agricultural	5	3	$249,987	$195,090	$57,958	$195,090	$704,755
Commercial	739	641	$124,426,712	$497,924,025	$32,320,233	$497,924,025	$815,808,494
Industrial	113	99	$13,067,884	$28,158,261	$3,061,217	$42,237,392	$86,754,238
Residential	6,351	6,129	$648,751,571	$1,207,022,279	$71,610	$603,511,140	$2,388,170,551
Unknown	145	1	$69,781	$90,169	$0	$0	$160,550
Highways and Railroads Total	**7,353**	**6,873**	**$786,565,935**	**$1,733,389,824**	**$35,511,018**	**$1,143,867,646**	**$3,291,598,587**
Railroads							
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	3	3	$1,434,773	$10,276,078	$0	$10,276,078	$21,986,929
Industrial	66	55	$22,433,969	$60,145,687	$1,069,190	$90,218,531	$165,499,181
Residential	0	0	$0	$0	$0	$0	$0

Hazardous Materials Transportation Routes / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Unknown	2	0	$0	$0	$0	$0	$0
Railroads Total	**71**	**58**	**$23,868,742**	**$70,421,765**	**$1,069,190**	**$100,494,609**	**$187,486,110**
City of Chico Total	**22,051**	**20,562**	**$2,613,965,297**	**$5,035,894,123**	**$52,686,649**	**$3,317,246,463**	**$10,383,950,170**

Source: CalTrans, Butte County 3/28/2019 Parcel/Assessor's Data

Populations at Risk

To determine the populations at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS to determine the residential population that resides within the two-mile buffer zone of the highway and railroad corridors. Using GIS, the buffered corridor was overlaid on the improved residential parcel data and results tabulated for the City of Chico as found in Table B-49. Those parcel centroids that intersect the buffered corridor were counted and multiplied by the 2010 Census Bureau average household factors for the City.

Table B-49 City of Chico – Populations at Risk in Hazardous Material Buffer Zones

Route	Improved Residential Parcels	Population
Hwy 32	6,712	20,270
Hwy 32 and Hwy 99	4,936	14,907
Hwy 99	7,085	21,397
Railroads Only	6,129	18,509

Source: Cal Trans, Butte County GIS, US Census Bureau

* Census Bureau 2010 average household sizes are: Chico – 3.02

Critical Facilities

To determine the critical facilities at risk from a transportation-related hazardous materials release within identified transportation corridors, an analysis was performed using GIS to determine the facilities located within the two-mile buffer zone of the highway and railroad corridors. Using GIS, the buffered corridor was overlaid on the critical facilities layer and results tabulated for the City, shown in Figure B-24 and detail in Table B-50. There are 71 facilities in the buffered corridor in the Planning Area. It should be noted that there are

Figure B-24 City of Chico– Critical Facilities in Hazardous Material Buffer Zones

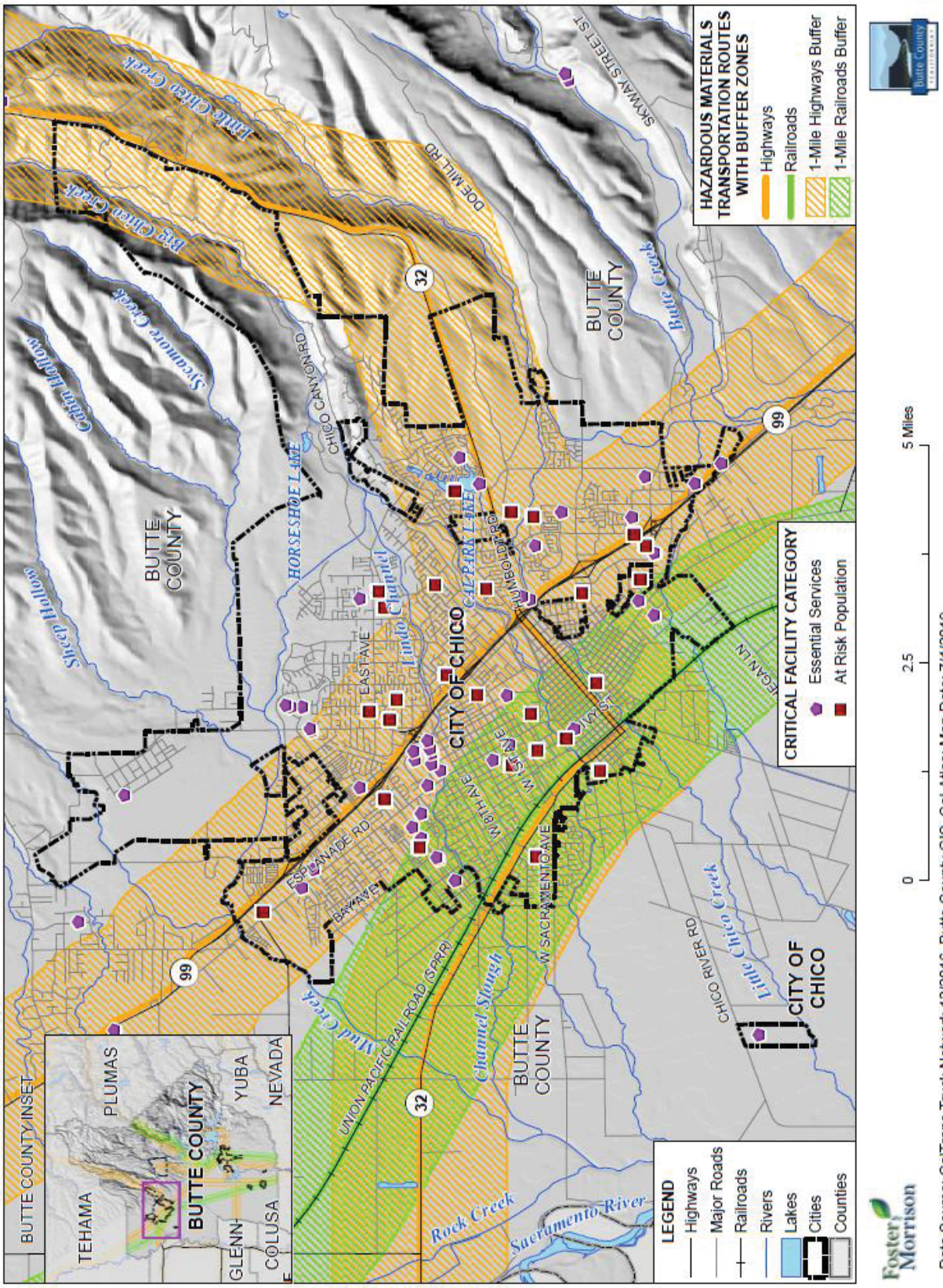


Table B-50 City of Chico– Critical Facilities in Hazardous Material Buffer Zones

Hazardous Materials Route/ Critical Facility Category / Critical Facility Type	Facility Count
Hwy 32	
Essential Services Facilities	
Health Care	4
Law Enforcement	1
Dam	1
Essential Services Facilities Total	**6**
At Risk Population Facilities	
School	8
At Risk Population Facilities Total	**8**
Hwy 32 Total	**14**
Hwy 32 and Hwy 99	
Essential Services Facilities	
Health Care	6
Law Enforcement	1
Essential Services Facilities Total	**7**
At Risk Population Facilities	
School	8
At Risk Population Facilities Total	**8**
Hwy 32 and Hwy 99 Total	**15**
Hwy 99	
Essential Services Facilities	
Fire	2
Health Care	23
Law Enforcement	2
Public Assembly Point / Evacuation Center	1
Radio Sites	1
Logistics Hub	1
Essential Services Facilities Total	**30**
At Risk Population Facilities	
School	12
At Risk Population Facilities Total	**12**
Hwy 99 Total	**42**
Grand Total	**71**

Source: Cal Trans, National Pipeline Mapping System 2016, Butte County GIS

Future Development

Development will continue to happen within hazardous materials transportation zones. Those who choose to develop in these areas should be made aware of the risks associated with living within close proximity to a hazardous materials transportation route.

GIS Analysis

Butte County's 3/21/2019 Assessor Data and the County's GIS parcel data were used as the basis for the inventory of assessed values for both improved and unimproved parcels within the City. Two separate development types were provided: Residential and Commercial. Using GIS, the 765 residential and 40 commercial parcels associated with future development projects for which the analysis was to be performed was identified. Future development in residential areas in the hazardous materials transportation zones can be seen on Figure B-25 and are detailed in Table B-51. Future development in commercial areas in the hazardous materials transportation zones can be seen on Figure B-26 and are detailed in Table B-52.

Figure B-25 City of Chico – Future Residential Development in Hazardous Material Buffer Zones

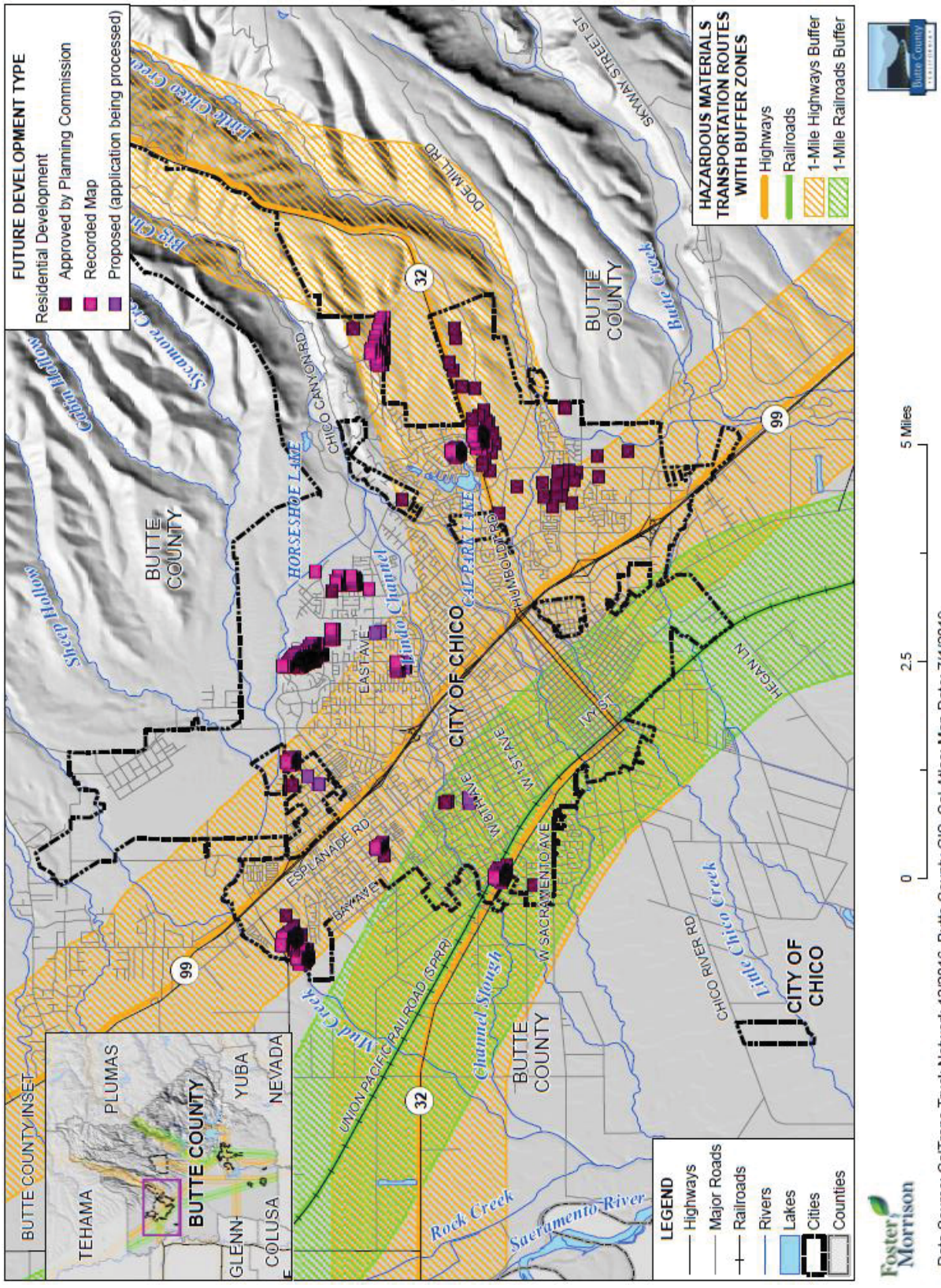


Table B-51 City of Chico – Future Residential Development Parcel and Acre Count in Hazardous Material Buffer Zones

Future Development Status / Hazardous Materials Transportation Route / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Approved by Planning Commission			
Highways			
Amber Lynn Estates	1	0	18
Avila Estates	1	1	7
Carlene Place	1	1	3
Creekside Landing	1	0	23
Innsbrook Sub 2	1	0	5
Lassen Village	1	0	3
Meriam Park Remain	14	0	138
Mission Vista Rch 2	1	1	3
Montecito Place	2	0	14
Oak Valley	17	1	309
Stonegate	3	0	204
Twin Creeks	1	0	68
Highways and Railroads			
Hideaway Park	2	1	1
Lipton Manor	1	1	1
Westside Place 2	1	0	8
Approved by Planning Commission Total	**48**	**6**	**806**
Recorded Map			
Highways			
Burnap Subdivision	25	0	3
Creekside Landing	57	0	11
Hopeful Heights	20	0	2
Lassen Subdivision	14	8	2
Oak Valley 1	80	26	17
Schill Subdivision	56	8	11
Siena @ Canyon Oaks	69	47	45
Sierra Gardens Townh	49	0	6
Highways and Railroads			
Westside Place 1	94	41	7
Recorded Map Total	**464**	**130**	**104**

Future Development Status / Hazardous Materials Transportation Route / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Proposed (application being processed)			
Highways			
Boeger Subdivision	1	0	3
Drake Estates	4	4	3
Magnolia Gardens	1	0	3
Morseman Estates	1	0	3
Highways and Railroads			
Plottel	3	3	3
Proposed (application being processed) Total	**10**	**7**	**15**
Grand Total	**522**	**143**	**925**

Source: Cal Trans, City of Chico GIS

Figure B-26 City of Chico – Future Commercial Development in Hazardous Material Buffer Zones

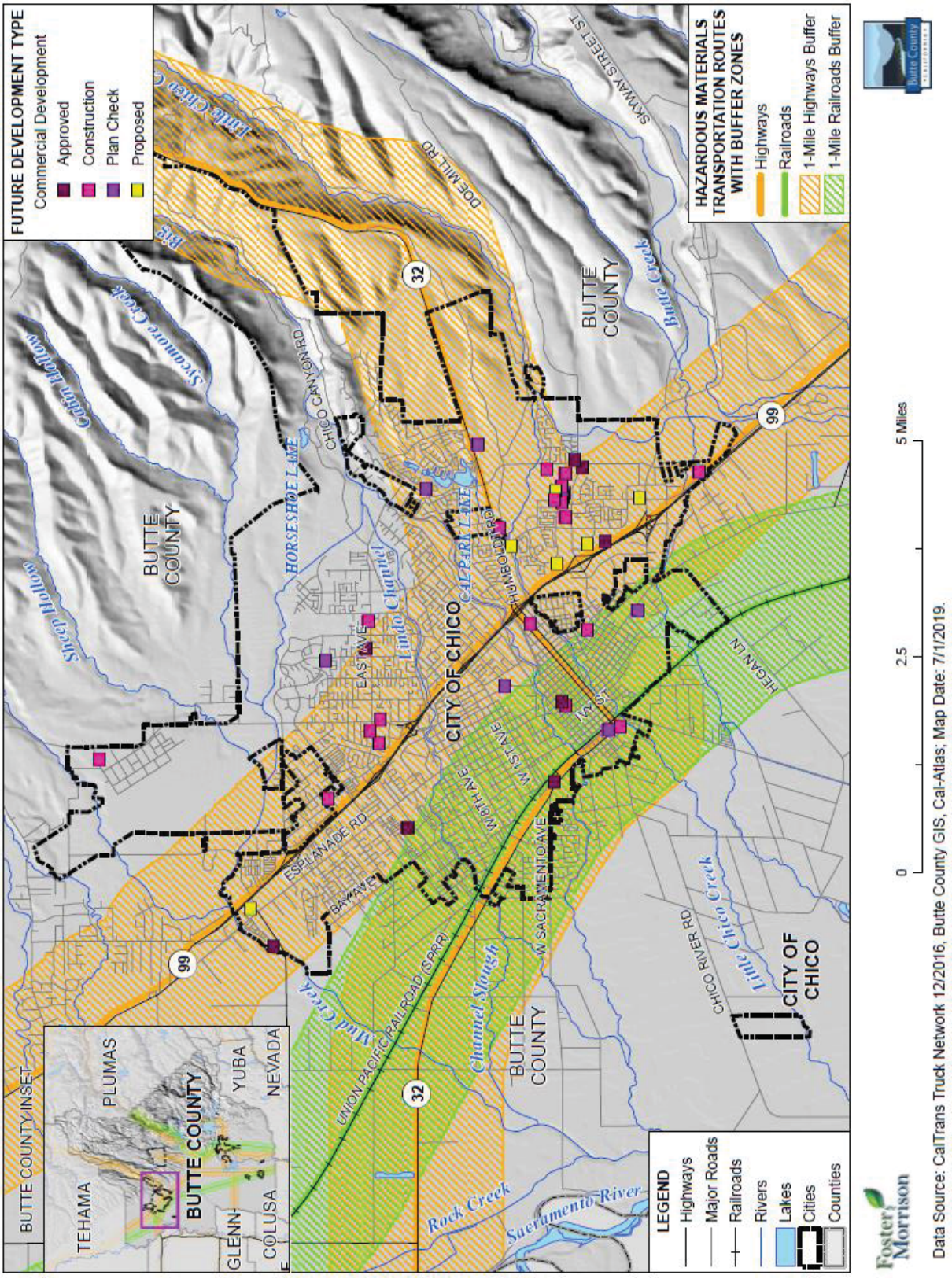


Table B-52 City of Chico – Future Commercial Development Parcel and Acre Count in Hazardous Material Buffer Zones

Future Development Status / Hazardous Materials Transportation Route / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Approved			
Highways			
Enloe Medical Care	1	0	5.1
Heritage Landing Apts	1	0	12.6
Stonegate Apts	1	0	48.1
The Enclave	1	1	2.6
WalMart Expansion	1	0	11.1
Highways Total	**5**	**1**	**79.4**
Highways and Railroads			
Jennings Building	1	1	0.1
Pabbi Nord Apts	1	1	0.8
Highways and Railroads Total	**2**	**2**	**1.0**
Approved Total	**7**	**3**	**80.3**
Construction			
Highways			
Chase Bank	1	1	0.9
Chico Nissan Remodel	1	1	0.7
CORE Butte Charter School	1	0	27.9
Culinaria @ Meriam Park	1	0	1.0
Holiday Inn Hotel	1	0	1.4
Humboldt Oak Apts	1	0	2.2
Joshua Tree Domiciles II	1	0	2.9
Notre Dame Quads	1	0	5.2
NVP Facade / BC Offices Infill	1	1	10.8
Office Building	2	1	0.9
Tank District Apts	1	0	2.9
Thrive Office Building	1	0	0.2
VA Clinic	1	0	7.1
Highways Total	14	4	64.0
Highways and Railroads			
Hotel Expansion/Remodel	1	1	0.2
Salvation Army Complex	1	1	0.5
Walnut St Apt	1	0	0.7
Highways and Railroads Total	**3**	**2**	**1.4**

Future Development Status / Hazardous Materials Transportation Route / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Construction Total	**17**	**6**	**65.4**
Plan Check			
Highways			
Native Oak Apartments	1	0	5.4
Skyline Condos	1	0	5.6
Tank District Retail	1	0	0.3
Tri Counties Bank	1	1	3.7
Highways Total	**4**	**1**	**15.0**
Highways and Railroads			
McGuire Apts	1	0	0.2
Mini Storage	1	0	3.3
Highways and Railroads Total	**2**	**0**	**3.5**
Plan Check Total	**6**	**1**	**18.5**
Proposed			
Highways			
Eagle Plaza Specific Plan	1	0	9.9
Hampton Inn	1	0	2.5
Humboldt Apt	1	0	1.4
Oxford Suites Expansion	1	1	5.3
Restaraunt w/drive thru	1	1	0.5
Springfield Apts	1	0	11.7
Highways Total	**6**	**2**	**31.2**
Proposed Total	**6**	**2**	**31.2**
Grand Total	**36**	**12**	**195.4**

Source: Cal Trans, City of Chico GIS

Landslide, Mudslide, and Debris Flow

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

According to the California Geological Survey, landslides refer to a wide variety of processes that result in the perceptible downward and outward movement of soil, rock, and vegetation under gravitational influence. Common names for landslide types include slump, rockslide, debris slide, lateral spreading,

debris avalanche, earth flow, and soil creep. Landslides may be triggered by both natural and human-induced changes in the environment that result in slope instability.

Location and Extent

In the City, the eastern portion of the City along the foothills are at risk to landslide. The legend on the figure in the Location and Extent in Section 4.2.15 of the Base Plan shows the measurement system that the California Geological Survey uses to show the possible magnitude of landslides. It is a combination of slope class and rock strength. The speed of onset of landslide is often short, especially in post-wildfire burn scar areas, but it can also take years for a slope to fail. Landslide duration is usually short, though digging out and repairing landslide areas can take some time. Geographical landslide potential extent from the Butte County 2030 General Plan is shown in Table B-53.

Table B-53 City of Chico – Geographical Extent in Landslide Potential Areas

Landslide Potential	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
High	0	0.00%	0	0.00%	0	0.00%
Moderate to High	0	0.00%	0	0.00%	0	0.00%
Moderate	6,429	30.65%	334	1.59%	6,096	29.06%
Low to Moderate	0	0.00%	0	0.00%	0	0.00%
Low to None	18,932	90.26%	7,885	37.59%	11,047	52.67%

Source: Butte County 2030 General Plan

Past Occurrences

The HMPC could recall no events of past landslide that affected the City.

Vulnerability to Landslide, Mudslide, and Debris Flow

Landslide potential is influenced by a number of factors, including geology, water influences, and topography. There is potential for landslides in the foothill portions of the community. The City HMPC noted that landslides and mudslides are minimal, except with the potential from burn scars in the Upper Bidwell Park region. These have not occurred on a large scale, but would affect Little Chico Creek and flood control gates along Big Chico Creek.

Impacts

Impacts in the City from landslide include property damage, critical facility damage, infrastructure damage, as well as risk of injury and death to residents of the City.

Values at Risk

GIS was used to determine the possible impacts of landslide within the City of Chico. The methodology described in Section 4.3.12 of the Base Plan was followed in determining structures and values at risk to landslide.

Figure B-27 shows the landslide potential areas in the City of Chico. Table B-54 is a summary table for values at risk to landslide in the City of Chico. Parcel counts, values, estimated contents, and total values in the City are shown for the landslide potential areas. Table B-55 breaks down Table B-54 and shows the property use, improved parcel count, improved values, estimated contents, and total values that fall in each landslide potential area in the City.

Figure B-27 City of Chico – Landslide Potential Areas

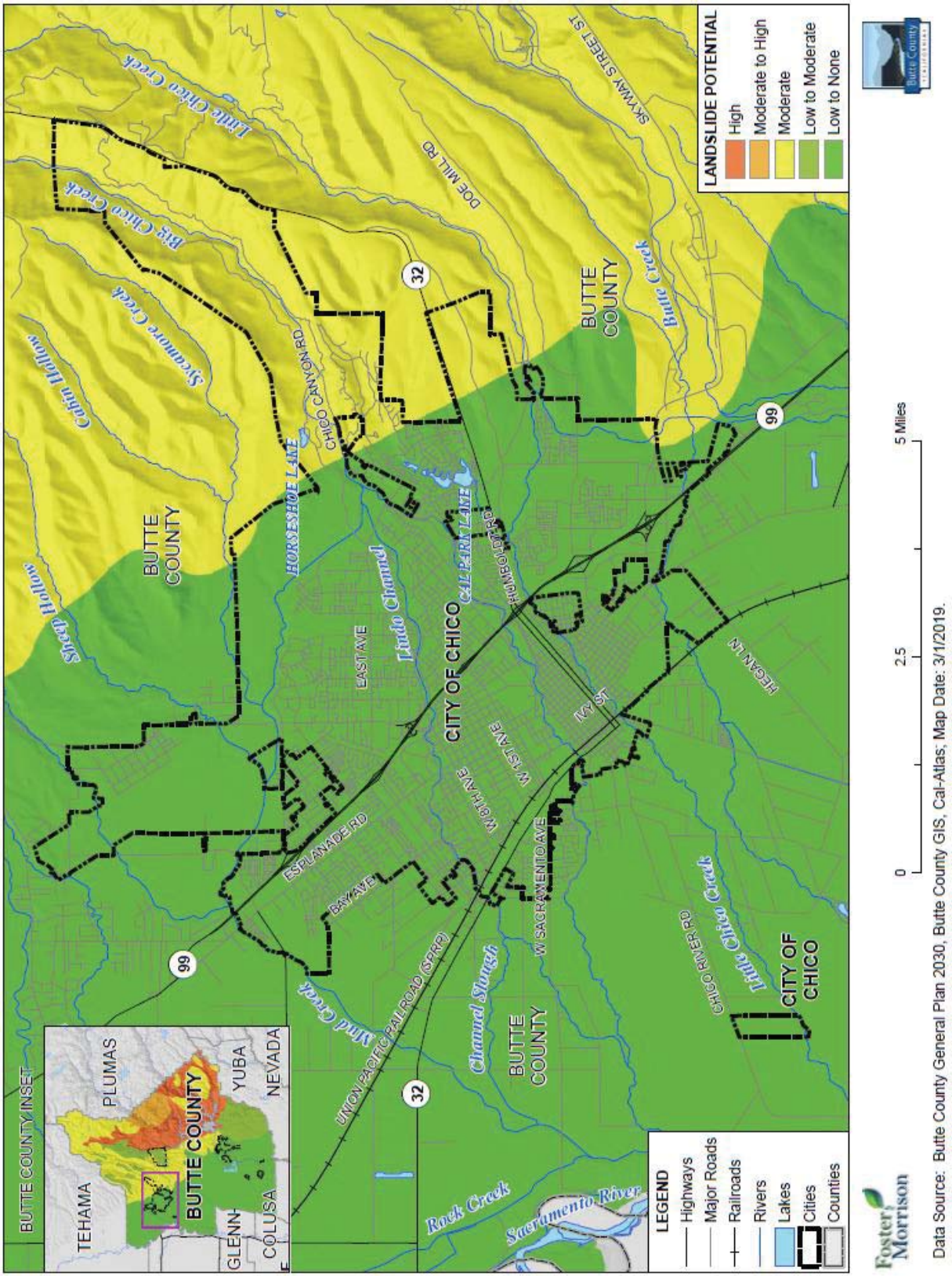


Table B-54 City of Chico – Count and Value of Parcels by Landslide Potential Area

Landslide Potential	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Moderate	428	322	$76,690,490	$144,939,321	$0	$72,934,189	$292,699,942
Low to None	26,069	24,238	$3,053,996,372	$5,827,660,538	$54,385,979	$3,807,956,613	$12,076,869,493
City of Chico Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: Butte County 3/28/2019 Parcel/Assessor's Data, Butte County 2030 General Plan

Table B-55 City of Chico – Count and Value of Parcels at Risk from Landslide by Property Type

Landslide Potential/ Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Moderate							
Agricultural	3	0	$0	$0	$0	$0	$0
Commercial	3	2	$684,576	$1,405,250	$0	$1,405,250	$3,495,076
Industrial	0	0	$0	$0	$0	$0	$0
Residential	392	319	$75,816,521	$143,057,877	$0	$71,528,939	$288,539,279
Unknown	30	1	$189,393	$476,194	$0	$0	$665,587
Moderate Total	**428**	**322**	**$76,690,490**	**$144,939,321**	**$0**	**$72,934,189**	**$292,699,942**
Low to None							
Agricultural	20	4	$683,709	$271,477	$57,958	$271,477	$1,289,594
Commercial	2,084	1,730	$604,964,748	$1,442,321,699	$46,677,852	$1,442,321,699	$3,100,478,412
Industrial	360	286	$74,990,957	$173,110,896	$7,462,437	$259,666,344	$508,890,547
Residential	23,228	22,213	$2,372,762,612	$4,211,394,185	$187,732	$2,105,697,093	$8,465,076,062
Unknown	377	5	$594,346	$562,281	$0	$0	$1,134,878
Low to None Total	**26,069**	**24,238**	**$3,053,996,372**	**$5,827,660,538**	**$54,385,979**	**$3,807,956,613**	**$12,076,869,493**
City of Chico Total	**26,497**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: Butte County 3/28/2019 Parcel/Assessor's Data, Butte County 2030 General Plan

Population at Risk

The landslide potential areas were overlayed on the parcel layer. Those residential parcel centroids that intersect the landslide potential areas were counted and multiplied by the 2010 Census Bureau average household factors for Chico – 3.02. According to this analysis, there is a total population of 963 in the moderate landslide potential, with none in the moderate to high or high areas. This is shown in Table B-56.

Table B-56 City of Chico – Count of Improved Residential Parcels and Population by Landslide Potential

Jurisdiction	Moderate		Moderate to High		High	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Chico	319	963	0	0	0	0

Source: Butte County 3/28/2019 Parcel/Assessor's Data, Butte County 2030 General Plan, US Census Bureau

Critical Facilities at Risk

To determine the critical facilities at risk from a potential landslide, an analysis was performed using GIS to determine the facilities located within the landslide potential areas. Using GIS, landslide potential areas were overlaid on the critical facilities layer and results tabulated for the City, shown in Figure B-24 and detail in Table B-50.

Figure B-28 City of Chico– Critical Facilities in Landslide Potential Areas

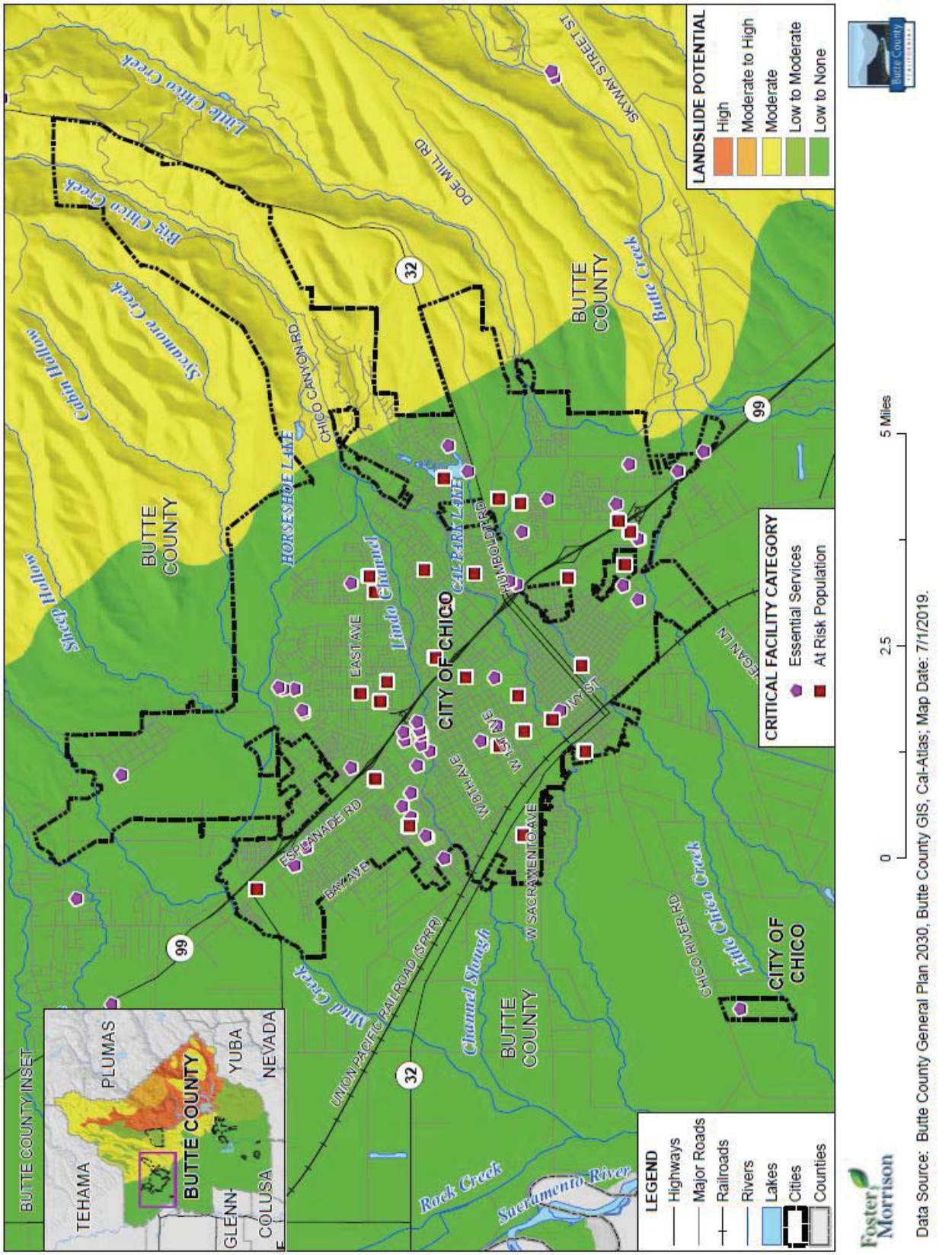


Table B-57 City of Chico – Critical Facilities in Landslide Potential Areas

Landslide Incidence and Susceptibility Areas/ Critical Facility Category / Critical Facility Type	Facility Count
Low to None	
Essential Services Facilities	
Wastewater Treatment Plant	1
Fire	3
Health Care	38
Law Enforcement	4
Public Assembly Point / Evacuation Center	1
Radio Sites	1
Dam	1
Logistics Hub	1
Essential Services Facilities Total	**50**
At Risk Population Facilities	
School	31
At Risk Population Facilities Total	**31**
Low to None Total	**81**
Grand Total	**81**

Source: Cal Trans, National Pipeline Mapping System 2016, Butte County GIS

Future Development

Although new growth and development corridors could fall in the area affected by moderate risk of landslide, given the small chance of a major landslide and the building codes and erosion ordinance in effect, development in the landslide areas will continue to occur.

GIS Analysis

Butte County's 3/21/2019 Assessor Data and the County's GIS parcel data were used as the basis for the inventory of assessed values for both improved and unimproved parcels within the City. Two separate development types were provided: Residential and Commercial. Using GIS, the 765 residential and 40 commercial parcels associated with future development projects for which the analysis was to be performed was identified. Future development in residential areas in landslide potential areas can be seen on Figure B-29 and are detailed in Table B-58. Future development in commercial areas in landslide potential areas can be seen on Figure B-30 and are detailed in Table B-59.

Figure B-29 City of Chico – Future Residential Development in Landslide Potential Areas

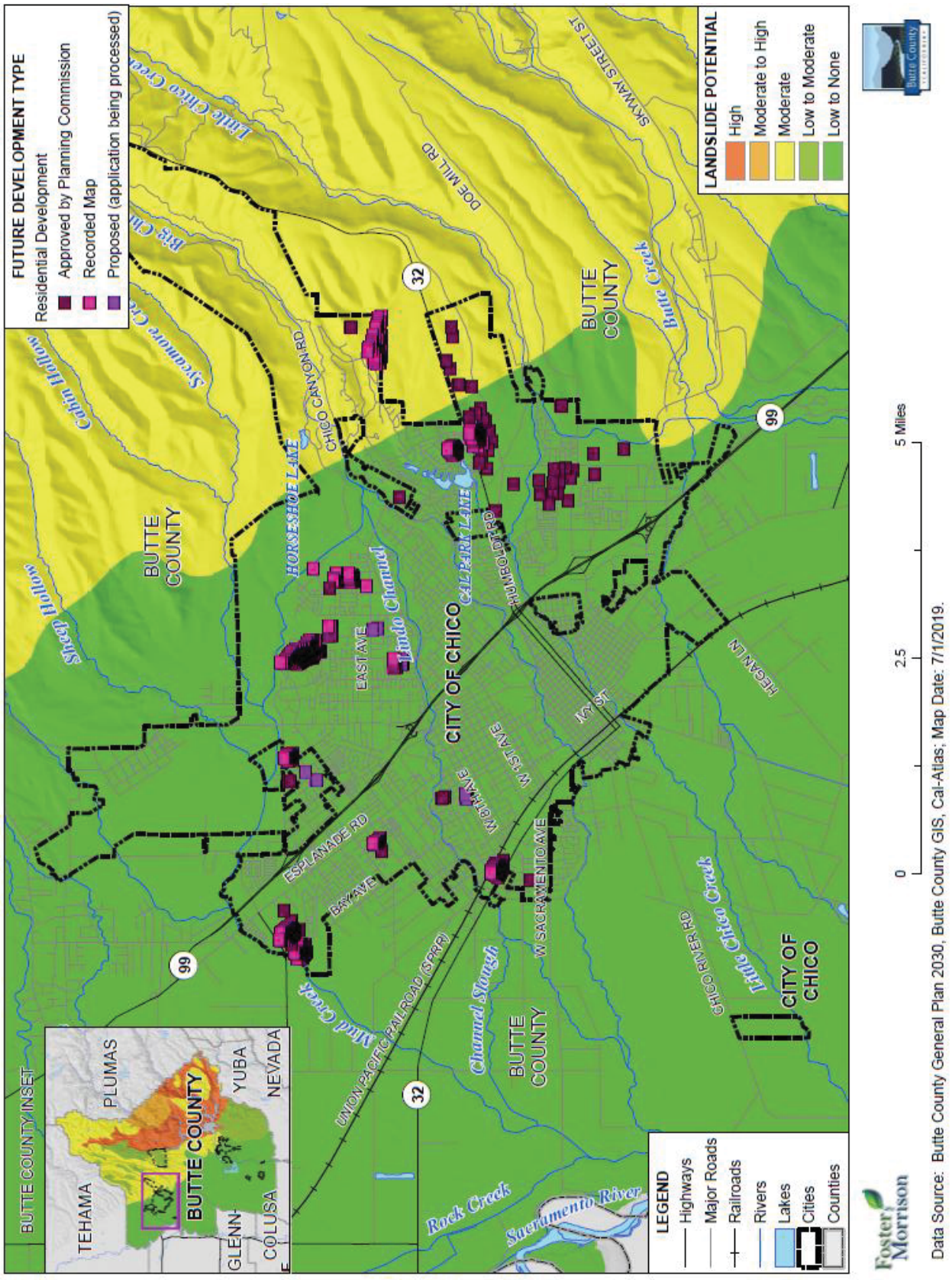


Table B-58 City of Chico – Future Residential Development Parcel and Acre Counts in Landslide Potential Areas

Future Development Status /Landslide Potential / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Approved by Planning Commission			
Moderate			
Oak Valley	6	1	212
Twin Creeks	1	0	68
Moderate Total	**7**	**1**	**280**
Low to None			
Amber Lynn Estates	1	0	18
Avila Estates	1	1	7
Belvedere Heights 2	1	0	22
Carlene Place	1	1	3
Creekside Landing	1	0	23
Hideaway Park	2	1	1
Innsbrook Sub 2	1	0	5
Lassen Village	1	0	3
Lipton Manor	1	1	1
Marigold Heights	1	0	5
Meriam Park Remain	14	0	138
Mission Vista Rch 2	1	1	3
Montecito Place	2	0	14
Mountain Vista	1	0	7
Oak Valley	11	0	97
Stonegate	3	0	204
Westside Place 2	1	0	8
Low to None Total	**44**	**5**	**559**
Approved by Planning Commission Total	**51**	**6**	**839**
Recorded Map			
Moderate			
Siena @ Canyon Oaks	69	47	45
Moderate Total	**69**	**47**	**45**
Low to None			
Burnap Subdivision	25	0	3
Creekside Landing	57	0	11

Future Development Status /Landslide Potential / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Crossroads	13	0	3
Foothill Park E 8A	1	0	
Harmony Park Circle	19	1	3
Hopeful Heights	20	0	2
Lassen Subdivision	14	8	2
Mariposa Manor	34	0	3
Mountain Vista	171	55	29
Oak Valley 1	80	26	17
Ruthie Subdivision	1	1	1
Schill Subdivision	56	8	11
Sierra Gardens Townh	49	0	6
Westside Place 1	94	41	7
Low to None Total	**634**	**140**	**99**
Recorded Map Total	**703**	**187**	**143**
Proposed (application being processed)			
Low to None			
Boeger Subdivision	1	0	3
Drake Estates	4	4	3
Magnolia Gardens	2	0	4
Morseman Estates	1	0	3
Plottel	3	3	3
Low to None Total	**11**	**7**	**15**
Proposed (application being processed) Total	**11**	**7**	**15**
Grand Total	**765**	**200**	**998**

Source: Butte County 2030 General Plan, City of Chico GIS

Figure B-30 City of Chico – Future Commercial Development in Landslide Potential Areas

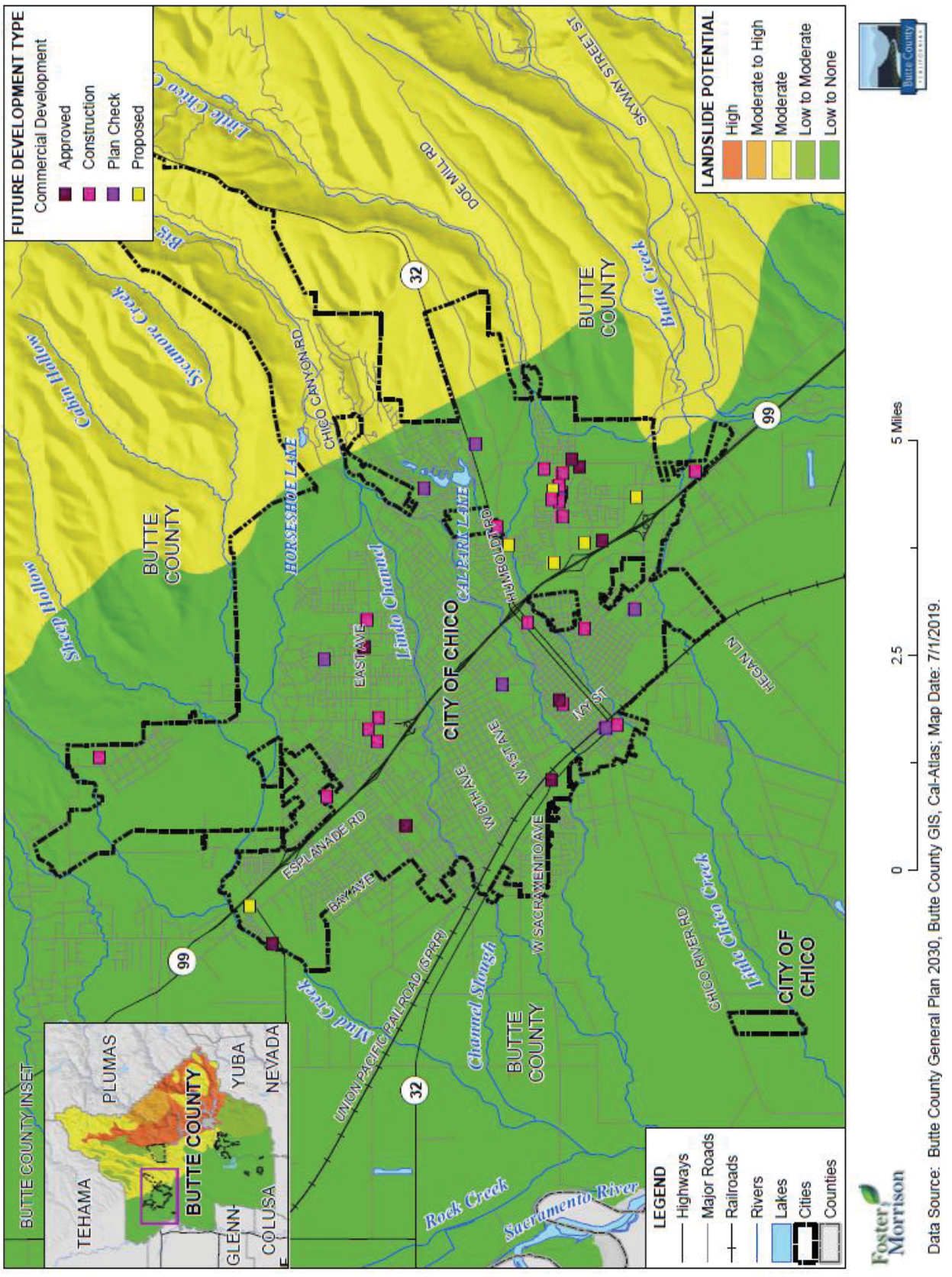


Table B-59 City of Chico – Future Commercial Development Parcel and Acre Counts in Landslide Potential Areas

Future Development Status /Landslide Potential / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Low to None			
Approved			
Enloe Medical Care	1	0	5.1
Heritage Landing Apts	1	0	12.6
Jennings Building	1	1	0.1
Pabbi Nord Apts	1	1	0.8
Stonegate Apts	1	0	48.1
The Enclave	1	1	2.6
Veteran's Village Housing	1	0	2.5
WalMart Expansion	1		11.1
Approved Total	**8**	**3**	**82.8**
Construction			
Chase Bank	1	1	0.9
Chico Nissan Remodel	1	1	0.7
CORE Butte Charter School	1	0	27.9
Culinaria @ Meriam Park	1	0	1.0
FifthSun Addition	1	0	1.5
Holiday Inn Hotel	1	0	1.4
Hotel Expansion/Remodel	1	1	0.2
Humboldt Oak Apts	1	0	2.2
Joshua Tree Domiciles II	1	0	2.9
Notre Dame Quads	1	0	5.2
NVP Facade / BC Offices Infill	1	1	10.8
Office Building	2	1	0.9
Salvation Army Complex	1	1	0.5
Sierra Central Bank	1	1	0.5
Tank District Apts	1	0	2.9
Thrive Office Building	1	0	0.2
VA Clinic	1	0	7.1
Walnut St Apt	1	0	0.7
Construction Total	**19**	**7**	**67.3**
Plan Check			

Future Development Status /Landslide Potential / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Channel Apts I & II	1	1	7.1
McGuire Apts	1	0	0.2
Mini Storage	1	0	3.3
Native Oak Apartments	1	0	5.4
Skyline Condos	1	0	5.6
Tank District Retail	1	0	0.3
Tri Counties Bank	1	1	3.7
Plan Check Total	**7**	**2**	**25.6**
Proposed			
Eagle Plaza Specific Plan	1	0	9.9
Hampton Inn	1	0	2.5
Humboldt Apt	1	0	1.4
Oxford Suites Expansion	1	1	5.3
Restaraunt w/drive thru	1	1	0.5
Springfield Apts	1	0	11.7
Proposed Total	**6**	**2**	**31.2**
Low to None Total	**40**	**14**	**206.9**
Grand Total	**40**	**14**	**206.9**

Source: Butte County 2030 General Plan, City of Chico GIS

Levee Failure

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower steam channel, levees can also increase the speed of the water. Levees can be natural or man-made. A natural levee is formed when sediment settles on the stream bank, raising the level of the land around the stream. To construct a man-made levee, workers place dirt or concrete along the stream banks, creating an embankment. This embankment is flat at the top, and slopes at an angle down to the water. For added strength, sandbags are sometimes placed over dirt embankments.

Location and Extent

There is not a scientific scale or measurement system in place for levee failure. The Chico 2030 General Plan Safety Element note that as part of the flood remapping effort for Butte County, FEMA has indicated that areas of the City previously mapped as protected from flooding such as Sycamore Creek and Mud Creek will be reclassified as subject to a one percent per year chance of flooding unless the levees are accredited. The reclassification of these areas would result in the imposition of flood insurance requirements on property owners and enhanced building permit requirements for areas in a mapped floodplain. The City, along with the County, has entered into a Provisionally Accredited Levee (PAL) agreement with FEMA in order to postpone a reclassification of flood hazard areas until the levees are accredited.

The speed of onset is slow as the river rises, but if a levee fails the warning times are short for those in the inundation area. The duration of levee failure risk times can be hours to weeks, depending on the river flows that the levee holds back. The HMPC noted that since dredging the river bottom has been discontinued, the bottom of the river has become higher, thus the water levels reach higher on the banks of the levees. When northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees. The potential for levee breaches and erosion damage has increased.

Past Occurrences

The City Planning Team noted no past occurrences of levee failures.

Vulnerability to Levee Failure

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

Impacts

Should the levees fail, all of the area protected by the levees would be at risk to flooding causing property damage and life safety concerns. Business losses could be large as facilities would be flooded. Additional issues include dewatering of the levee protected areas, as well as the rebuilding of the levees. Road closures would occur, and would impede both evacuation routes and ability of first responders to quickly respond to calls for aid.

Future Development

Future development built in the areas protected by levees is subject to being built to the standards in the City of Chico Floodplain Ordinance. As described above, Chico is also evaluating the feasibility of projects to bring some area levees up to a 0.1% and 0.5% annual chance or greater level of protection which will also change future development standards in levee protected areas. Future development in levee protected areas may be affected by this hazard, thus there will always be some level of concern.

Severe Weather: Extreme Heat

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile and Problem Description

According to FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In extreme heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature." Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat. Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of a prolonged heat wave than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, which can produce higher nighttime temperatures known as the urban heat island effect.

Location and Extent

Heat is a regional phenomenon and affects the whole of the City. Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. Heat waves do not strike victims immediately, but rather their cumulative effects slowly take the lives of vulnerable populations. Heat waves do not generally cause damage or elicit the immediate response of floods, fires, earthquakes, or other more "typical" disaster scenarios.

The NWS has in place a system to initiate alert procedures (advisories or warnings) when extreme heat is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. The NWS HeatRisk forecast provides a quick view of heat risk potential over the upcoming seven days. The heat risk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale which is similar in approach to the Air Quality Index (AQI) or the UV Index. This can be seen in Section 4.2.2 of the Base Plan.

Past Occurrences

The City Planning Team note that since extreme heat is a regional phenomenon, events that affected the County also affected the City. Those past occurrences were shown in the Base Plan in Section 4.2.2.

Vulnerability to Extreme Heat

Health impacts are the primary concern with this hazard, though economic impacts are also an issue. Heat can exacerbate drought and can increase wildfire risk.

Impacts

The elderly and individuals below the poverty level are the most vulnerable to extreme temperatures. Nursing homes and elder care facilities are especially vulnerable to extreme heat events if power outages occur and air conditioning is not available. In addition, individuals below the poverty level may be at increased risk to extreme heat if use of air conditioning is not affordable. This is especially true of homeless people and the transient population.

Reliance on air conditioning causes a strain on the electrical energy in the City. Occasionally peak demands outweigh supply and a condition known as brown-out occurs. This is an extremely dangerous situation for electrical equipment as it operates without the needed electricity causing damage to the systems. Days of extreme heat have been known to result in medical emergencies, civil unrest, and unpredictable human behavior. Periods of extended heat and dryness (droughts) can have major economic, agricultural, and water resources impacts. Extreme heat can also dry out vegetations, making it more vulnerable to wildfire ignitions.

Future Development

Vulnerability to extreme heat will increase as the average age of the population in each City shifts. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme heat and in the event of a Public Safety Power Shutoff. Low income residents and homeless populations are also vulnerable. Cooling centers for these populations should be utilized when necessary. However, many of the residents of the City are accustomed to living with extreme heat and take precautions to guard against the threat of extreme heat.

Severe Weather: Freeze and Winter Storm

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

According to the National Weather Service (NWS) and the Western Regional Climate Center (WRCC), extreme cold often accompanies a winter storm or is left in its wake. Winter snowstorms can include heavy snow, ice, and blizzard conditions.

Location and Extent

Freeze and winter storms are regional issues, meaning the entire City is at risk to freeze and winter storm. While there is no scale (i.e. Richter, Enhanced Fujita) to measure the effects of freeze, temperature data from the County from the WRCC indicates that there are 21.8 days that fall below 32°F in western Butte County. Freeze has a slow onset and can be generally be predicted in advance for the County. Freeze events can last for hours (in a cold overnight), or for days to weeks at a time. Snowfall is measured in snow depths. It is rare for snow to fall in the City, and even rarer that snow accumulates in the City. Snowfall has an onset that is similar to freeze in the City.

Past Occurrences

The City Planning Team note that since freeze and winter storm is a regional phenomenon, events that affected the lower elevations of the County also affected the City. Those past occurrences were shown in the Base Plan in Section 4.2.3.

Vulnerability to Severe Weather: Freeze and Winter Storms

The City experiences temperatures below 32 degrees during the winter months. The temperature moves to the teens in rather extreme situations.

Impacts

Freeze normally does not impact structures, but is a life safety issue. Secondary impacts of extreme cold can affect the supporting mechanisms or systems of a community's infrastructure. For example, when extreme cold is coupled with high winds or ice storms, power lines may be downed, resulting in an interruption in the transmission of that power shutting down electric furnaces, which may lead to frozen pipes in homes and businesses.

Occasionally, winter storms with snow and ice can affect the City. Transportation networks, communications, and utilities infrastructure are the most vulnerable physical assets in the City. The ability for the City to continue to operate during periods of winter storm and freeze is paramount. The elderly population in the planning area is most vulnerable to temperature extremes. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. It is encouraged that such facilities have emergency plans or backup power to address power failure during times of extreme cold. Transient and homeless populations are also at risk to freeze.

Future Development

Future development built to code should be able to withstand snow loads from severe winter storms. Pipes at risk of freezing should be mitigated be either burying or insulating them from freeze as new facilities are improved or added. Vulnerability to extreme cold will increase as the average age of the population in the County shifts. Greater numbers of future senior citizens will result from the large number of baby boomers in the planning area. The elderly are more at risk to the effects of freeze. However, many of the residents of the City are accustomed to living with freeze and take precautions to guard against the threat of freeze.

Severe Weather: Heavy Rain and Storms (Hail, Lightning, Wind)

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

Hazard Profile and Problem Description

Storms in the City of Chico occur annually and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when

it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the City falls mainly in the fall, winter, and spring months.

Location and Extent

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the City. All portions of the City are at risk to heavy rains. Most of the severe rains occur during the winter months. There is no scale by which heavy rains and severe storms are measured. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of severe storms in California, Butte County, and the City is often short, ranging from minutes to hours. In some cases, rains can continue for days at a time. Information on precipitation extremes can be found in Section 4.2.4 of the Base Plan.

Past Occurrences

The HMPC noted no heavy rain events in the past 5 year that caused damages in the City. It was noted that most of the past 5 years were under drought conditions.

Vulnerability to Heavy Rain and Storms

According to historical hazard data, severe weather is an annual occurrence in the City. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and severe storms are the most frequent type of severe weather occurrences in the City. Wind and lightning often accompany these storms and have caused damage in the past. Hail is rare in the City.

Impacts

Actual damage associated with the primary effects of severe weather have been limited. It is the secondary hazards caused by weather, such as floods, fire, and agricultural losses that have had the greatest impact on the City. Impacts to property, critical facilities (such as utilities), and life safety are expected. The risk and vulnerability associated with these secondary hazards are discussed in the flood and localized flood sections of this Annex.

Future Development

New critical facilities such as communications towers and others should be built to withstand hail damage, lightning, and thunderstorm winds. While deaths have occurred in the planning area in the past due to lightning, it is difficult to quantify future deaths and injuries due to lightning. Future losses to new development should be minimal.

Severe Weather: Wind and Tornado

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

High winds can cause significant property damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration.

Tornadoes, though rare, are another severe weather hazard that, though rare, can affect areas in the Valley in the Butte County Planning Area, primarily during the rainy season in the late fall and early spring. Tornadoes form when cool, dry air sits on top of warm, moist air. Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes are the most powerful storms that exist.

Location and Extent

The entire City is subject to significant, non-tornadic (straight-line), winds. Each area of the City is at risk to high winds. Magnitude of winds is measured often in speed and damages. These events are often part of a heavy rain and storm event, but can occur outside of storms. The speed of onset of winds can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of winds in California is often short, ranging from minutes to hours. The Beaufort scale is an empirical measure that relates wind speed to observed conditions at sea or on land. Its full name is the Beaufort wind force scale. The Beaufort Scale was shown in Section 4.2.5 of the Base Plan.

Tornadoes, while rare, can occur at any location in the County. The areas in the Valley in the County, where the City is located, tend to be at greater risk than the areas in the foothills and at elevation. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. The F Scale and EF Scale were shown in Section 4.2.5 of the Base Plan.

Past Occurrences

The City Planning Team note that since high winds is a regional phenomenon, events that affected the lower elevations of the County also affected the City. Those past occurrences were shown in the Base Plan in Section 4.2.5.

Vulnerability to Severe Weather: Wind and Tornado

High winds are common occurrences in the City throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered. Wind can also drive wildfire flames, spreading wildfires quickly. High winds are also a precursor to red flag days, which can cause PG&E to enact the Public Safety Power Shutdowns.

Impacts

Future losses from straight line winds include:

- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs

Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Livestock that may be contained in these structures may be injured or killed, causing economic harm to the rancher who owns both the structure and the livestock. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents.

Future Development

Future development projects will consider windstorm hazards at the planning, engineering and architectural design stage with the goal of reducing vulnerability. The City enforces the state building code and other ordinances, which regulate construction techniques that minimize damage from windstorms. Future development in the City is subject to these building codes.

Wildfire

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Extremely High

Hazard Profile and Problem Description

Wildland fire is an ongoing concern for the City of Chico. Generally, the fire season extends from early spring through late fall of each year during the hotter, dryer months. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds. Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire suppression practices have affected the natural cycle of the ecosystem.

Location and Extent

Wildfire can affect all areas of the City. CAL FIRE has estimated that the risk varies across the Town and has created maps showing risk variance. Following the methodology described in Section 4.3.16, two wildfire maps for the City of Chico were created.

- Figure B-31 shows the CAL FIRE FHSZ in the City. On this map, all zones are depicted.
- Figure B-32 shows only the Very High FHSZ (VHFSZ) in the City. California Government Code Section 51178 requires the California Department of Forestry and Fire Protection (CAL FIRE) to identify and map very high fire hazard areas statewide. California Government Code Section 51179 states, "*A local agency shall designate, by ordinance, very high fire hazard severity zones in its jurisdiction within 120 days of receiving recommendations from the director pursuant to subdivisions (b) and (c) of Section 51178. A local agency shall be exempt from this requirement if ordinances of the local agency, adopted on or before December 31, 1992, impose standards that are equivalent to, or more restrictive than, the standards imposed by this chapter*."

As shown on the maps, wildfire threat within the City ranges from minimal to very high. The areas of increased wildfire threat are located in the portions of the north and west where elevation changes occur. A small area of the northeast portion of the City in a canyon is considered a very high FHSZ.

Figure B-31 City of Chico – Fire Hazard Severity Zones

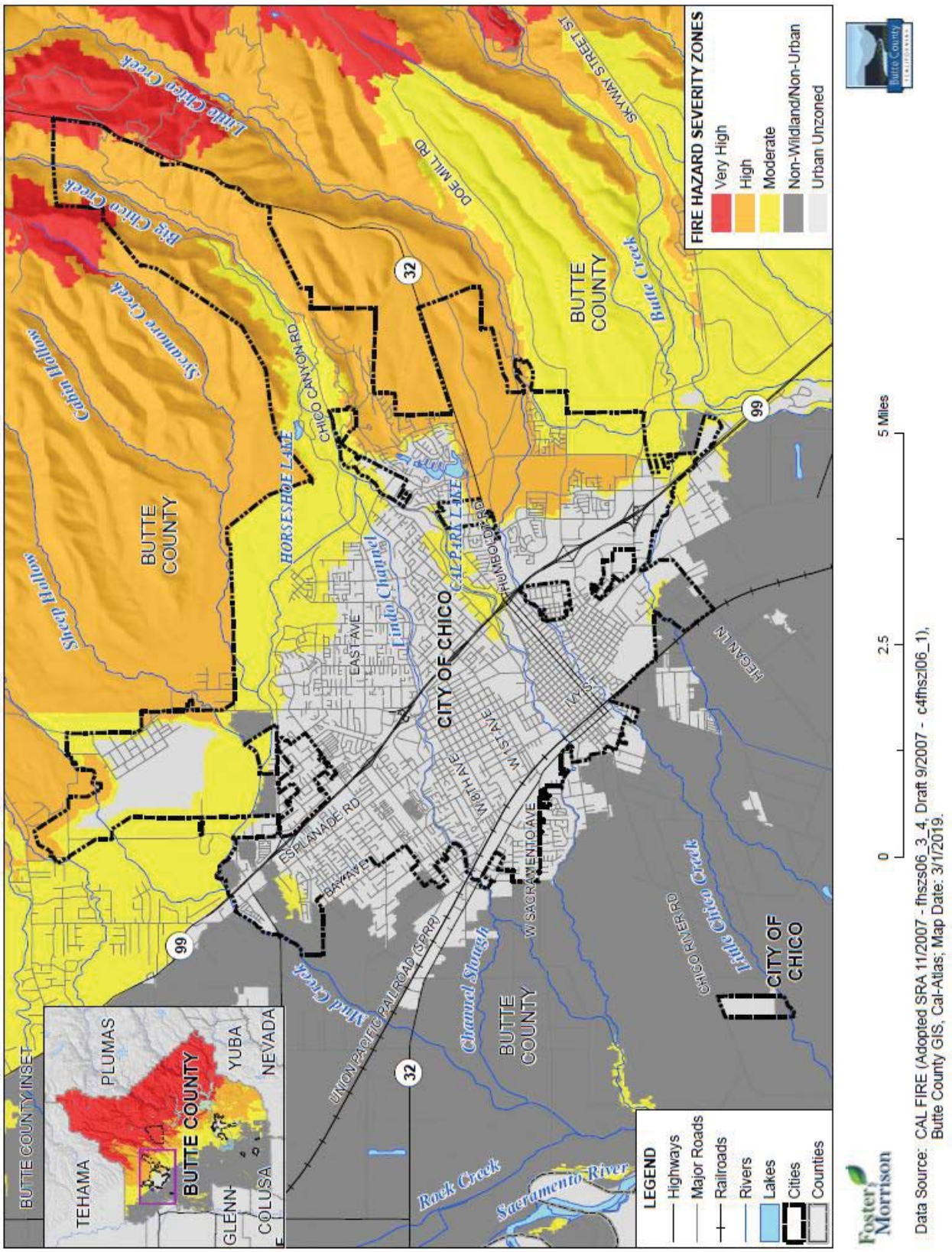
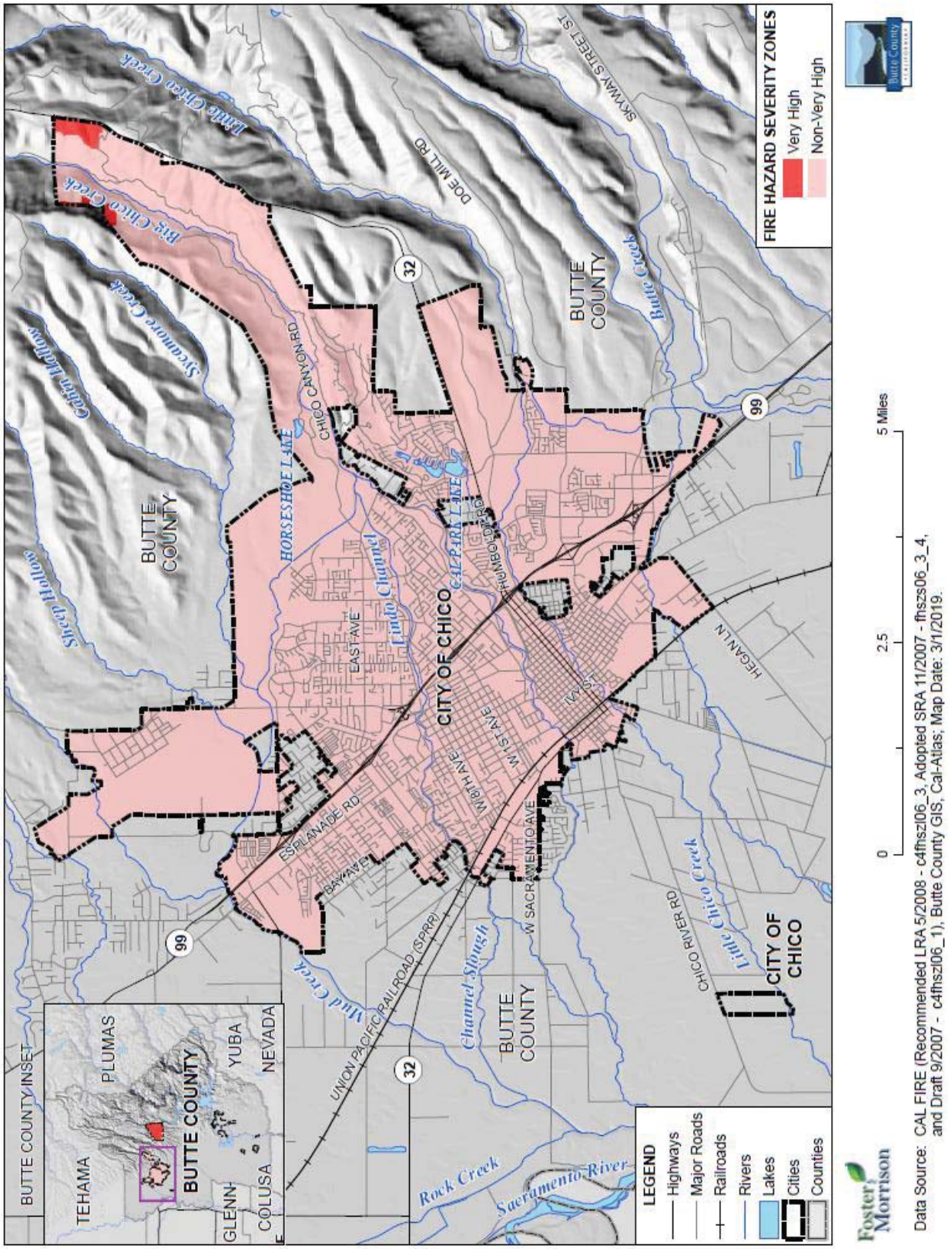


Figure B-32 City of Chico – Very High Fire Hazard Severity Zones



Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on acres burned. Fires can have a quick speed of onset, especially during periods of drought. Fires can burn for a short period of time, or may have durations lasting for a week or more. Geographical FHSZ extent from CAL FIRE is shown in Table B-60.

Table B-60 City of Chico – Geographical Fire Hazard Severity Zone Extents

Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Very High	124	0.59%	0	0.00%	2,066	9.85%
High	4,743	22.61%	679	3.24%	206	0.98%
Moderate	4,455	21.24%	811	3.87%	77	0.37%
Non-Wildland/Non-Urban	657	3.13%	240	1.14%	0	0.00%
Urban Unzoned	8,660	41.29%	6,308	30.08%	0	0.00%

Source: CAL FIRE

Past Occurrences

In addition to those past occurrences shown in Section 4.2.19 of the Base Plan, the Chico Fire Department has recorded hundreds of fires in Bidwell Park over the decades, citing dry fuels, heavy use, and presence of vehicles. The HMPC noted that there have been major fires in the City:

- Stoney Fire- 7/12/18-7/19/18 – 962 acres burned -$129,083 in damages
- Santos Fire - 8/26/16-8/31/16 – 83 acres burned - $20,000 in damages

The HMPC noted effects in the City due to the Camp Fire. From November 8, 2018-November 25, 2018, the City of Chico was affected by the Fire. The EOC was opened at the Chico Fire Training Center for the duration of the incident. 10 injuries were treated at UC Davis Medical Center. 86 deaths occurred. Fortunately, no damages occurred in the City; however, multiple structures were destroyed within the surrounding Chico Urban Area. Significant economic impacts occurred, based upon the establishment of Evacuation Centers within City Limits, resulting in a serious housing shortage. Sale tax revenue was down during 4th Quarter of 2018. In addition, school closures occurred for over 10 days. Road closures of Skyway and Honey Run impacted traffic. Increase in traffic has led to a higher than usual deterioration of Chico roadways.

Vulnerability to Wildfire

Risk and vulnerability to the City from wildfire is of concern, with some areas of the City being at greater risk than others as described further in this section. During the May to October fire season, the dry vegetation and hot and sometimes windy weather, combined with continued growth in the WUI areas, results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire. As development continues throughout the City, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

Much of Chico is adjacent to the foothills and therefore is subject to the threat of wildland fires. The grass oak woodland in these areas can produce flame lengths exceeding 20 feet on hot summer days. Bruce Road is the boundary where fires to the east receive a substantial first alarm augmentation because of the wildland fire risk. In addition, there are ongoing wildfire problems in Bidwell Park. The CFD has recorded hundreds of fires in Bidwell Park over the decades, citing dry fuels, heavy use, and presence of vehicles. Some of the areas within Upper Bidwell Park are inaccessible by road and would require specialized wildland firefighting resources such as air tankers, helicopters, bulldozers, and hand crews. According to the City's Master Environmental Assessment completed in 1994, Bidwell Park, Lindo Channel, and numerous vacant parcels throughout the City represent nearly 8,000 acres of dry vegetation during the summer months.

Upper Park managers currently burn 40-100+ acres of grasslands a year, with the aim of benefiting the native plants that have evolved to be fire adapted. The current burning program aims to control yellow star thistle as well as reduce fuel loads that accumulate in the park. Most of the burns conducted in the park are financed with training dollars from the various agencies that conduct the burns.

Impacts

Wildfires can cause short-term and long-term disruption to the County and City of Chico, as evidenced by the Camp Fire in Paradise and the resultant increase in the population in Chico. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the County by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires may result in casualties and can destroy buildings and infrastructure.

Although the physical damages and casualties arising from wildland-urban interface fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. In some cases, the economic impact of this loss of services may be comparable to the economic impact of physical damages or, in some cases, even greater. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Fires can also cause major damage to power plants and power lines needed to distribute electricity to operate facilities.

Based on the vulnerability of the City of Chico to the wildfire hazard, the sections that follow describes significant assets at risk in the City.

Values at Risk

GIS was used to determine the possible impacts of wildfire within the City of Chico. The methodology described in Section 4.3.19 of the Base Plan was followed in determining structures and values at risk in fire hazard severity zones. Summary analysis results for Chico are shown in Table B-61, which summarizes total parcel counts, improved parcel counts and their structure values by fire hazard severity zone.

Table B-61 City of Chico – Count and Value of Parcels by Fire Hazard Severity Zone

Fire Hazard Severity Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Very High	2	0	$0	$0	$0	$0	$0
High	1,746	1,456	$261,066,900	$460,398,694	$993,626	$268,202,017	$964,650,077
Moderate	2,891	2,544	$348,043,760	$621,461,838	$195,720	$350,270,557	$1,306,476,874
Non-Wildland/Non-Urban	598	450	$102,846,266	$216,058,964	$1,048,440	$156,056,889	$451,032,523
Urban Unzoned	21,262	20,110	$2,418,729,936	$4,674,680,363	$52,148,193	$3,106,361,338	$9,647,409,960
City of Chico Total	**26,499**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: CAL FIRE, Butte County 3/28/2019 Parcel/Assessor's Data

Table B-62 breaks out the Table B-61 by adding the property use details by fire hazard severity zone for the City. As shown in both of these tables, the City has no properties in the very high or high fire hazard severity zone.

Table B-62 City of Chico – Count and Value of Parcels by Fire Hazard Severity Zone and Property Use

Fire Hazard Severity Zone / Property Use /	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Very High							
Agricultural	1	0	$0	$0	$0	$0	$0
Commercial	0	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0	$0
Unknown	1	0	$0	$0	$0	$0	$0
Very High Total	**2**	**0**	**$0**	**$0**	**$0**	**$0**	**$0**
High							
Agricultural	3	0	$0	$0	$0	$0	$0
Commercial	132	62	$42,700,025	$58,807,690	$979,786	$58,807,690	$162,424,229
Industrial	38	27	$3,911,635	$8,836,922	$9,750	$13,255,383	$22,919,818
Residential	1,516	1,366	$214,265,847	$392,277,888	$4,090	$196,138,944	$778,640,443
Unknown	57	1	$189,393	$476,194	$0	$0	$665,587
High Total	**1,746**	**1,456**	**$261,066,900**	**$460,398,694**	**$993,626**	**$268,202,017**	**$964,650,077**
Moderate							
Agricultural	9	1	$433,722	$76,387	$0	$76,387	$584,839
Commercial	68	53	$27,080,261	$56,109,633	$169,410	$56,109,633	$138,336,117

Fire Hazard Severity Zone / Property Use /	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Industrial	39	22	$5,522,105	$11,529,315	$20,750	$17,293,973	$34,403,403
Residential	2,729	2,467	$314,916,097	$553,581,129	$5,560	$276,790,565	$1,132,902,567
Unknown	46	1	$91,575	$165,374			$249,949
Moderate Total	**2,891**	**2,544**	**$348,043,760**	**$621,461,838**	**$195,720**	**$350,270,557**	**$1,306,476,874**
Non-Wildland/Non-Urban							
Agricultural	4	0	$0	$0	$0	$0	$0
Commercial	6	2	$2,353,269	$10,021,818	$0	$10,021,818	$22,396,905
Industrial	33	25	$15,463,086	$43,016,498	$1,048,440	$64,524,747	$115,387,315
Residential	546	423	$85,029,911	$163,020,648	$0	$81,510,324	$313,248,303
Unknown	9	0	$0	$0	$0	$0	$0
Non-Wildland/Non-Urban Total	**598**	**450**	**$102,846,266**	**$216,058,964**	**$1,048,440**	**$156,056,889**	**$451,032,523**
Urban Unzoned							
Agricultural	7	3	$249,987	$195,090	$57,958	$195,090	$704,755
Commercial	1,881	1,615	$533,515,769	$1,318,787,808	$45,528,656	$1,318,787,808	$2,780,816,237
Industrial	250	212	$50,094,131	$109,728,161	$6,383,497	$164,592,242	$336,180,012
Residential	18,829	18,276	$1,834,367,278	$3,245,572,397	$178,082	$1,622,786,199	$6,528,824,028
Unknown	295	4	$502,771	$396,907			$884,929
Urban Unzoned Total	**21,262**	**20,110**	**$2,418,729,936**	**$4,674,680,363**	**$52,148,193**	**$3,106,361,338**	**$9,647,409,960**
City of Chico Total	**26,499**	**24,560**	**$3,130,686,862**	**$5,972,599,859**	**$54,385,979**	**$3,880,890,801**	**$12,369,569,434**

Source: CAL FIRE, Butte County 3/28/2019 Parcel/Assessor's Data

Population at Risk

The Fire Hazard Severity Zone dataset was overlayed on the parcel layer. Those residential parcel centroids that intersect the severity zones were counted and multiplied by the 2010 Census Bureau average household factors for the City of Chico – 3.02. According to this analysis, there is a total population of 7,450 and 4,125 residents of Chico at risk to moderate and high FHSZs respectively. There are no improved residential parcels in the very high FHSZ. This is shown in Table B-63.

Table B-63 City of Chico – Count of Improved Residential Parcels and Population by Fire Hazard Severity Zone

Jurisdiction	Moderate		High		Very High	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Chico	2,467	7,450	1,366	4,125	0	0

Source: CAL FIRE, Butte County 3/28/2019 Parcel/Assessor's Data, US Census Bureau

Critical Facilities at Risk

An analysis was performed on the critical facility inventory in Chico in identified FHSZs facilities in a FHSZ in the City of Chico are shown in Figure B-33 and detailed in Table B-64. Details of critical facility definition, type, name and address and jurisdiction by flood zone are listed in Appendix F.

Figure B-33 City of Chico – Critical Facilities in Fire Hazard Severity Zones

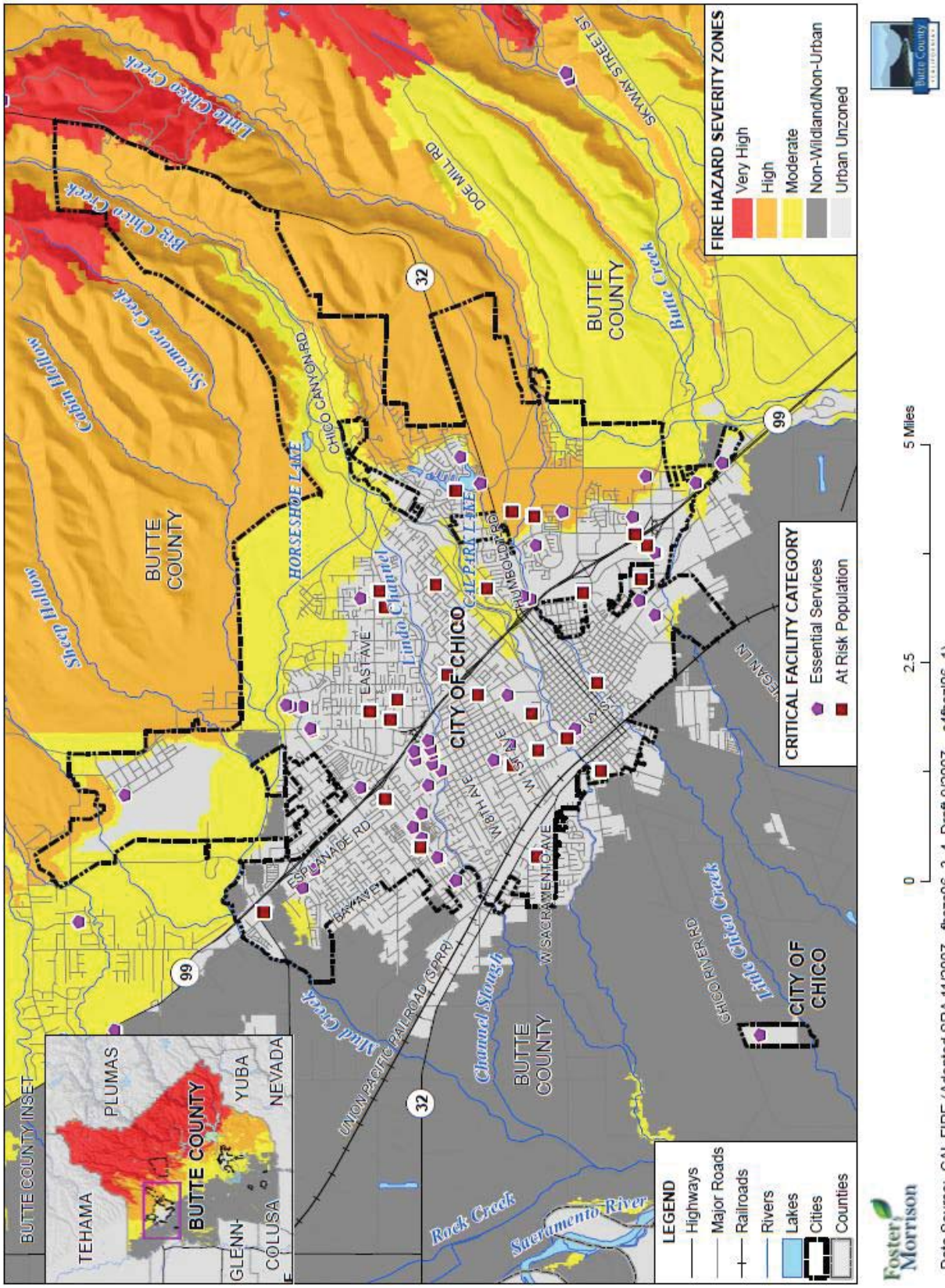


Table B-64 City of Chico – Critical Facilities by Fire Hazard Severity Zone

Fire Hazard Severity Zone/ Critical Facility Category / Critical Facility Type	Facility Count
Non-Very High	
Essential Services Facilities	
Fire	3
Health Care	38
Law Enforcement	4
Public Assembly Point / Evacuation Center	1
Radio Sites	1
Dam	1
Logistics Hub	1
Essential Services Facilities Total	**49**
At Risk Population Facilities	
School	31
At Risk Population Facilities Total	**31**
Non-Very High Total	**80**
Urban Unzoned	
Essential Services Facilities	
Wastewater Treatment Plant	1
Essential Services Facilities Total	**1**
Urban Unzoned Total	**1**
Grand Total	**81**

Source: CAL FIRE, Butte County

Future Development

Additional growth and development within moderate or higher fire hazard severity zones in the City would place additional values at risk to wildfire. City building codes are in effect to reduce this risk.

GIS Analysis

Butte County's 3/21/2019 Assessor Data and the County's GIS parcel data were used as the basis for the inventory of assessed values for both improved and unimproved parcels within the City. Two separate development types were provided: Residential and Commercial. Using GIS, the 765 residential and 40 commercial parcels associated with future development projects for which the analysis was to be performed was identified. Future development in residential areas in CAL FIRE FHSZs can be seen on Figure B-34 and are detailed in Table B-65. Future development in commercial areas in CAL FIRE FHSZs can be seen on Figure B-35 and are detailed in Table B-66. As shown, none of the future development (residential or commercial) falls into the VHFSZ.

Figure B-34 City of Chico – Future Residential Development in Fire Hazard Severity Zones

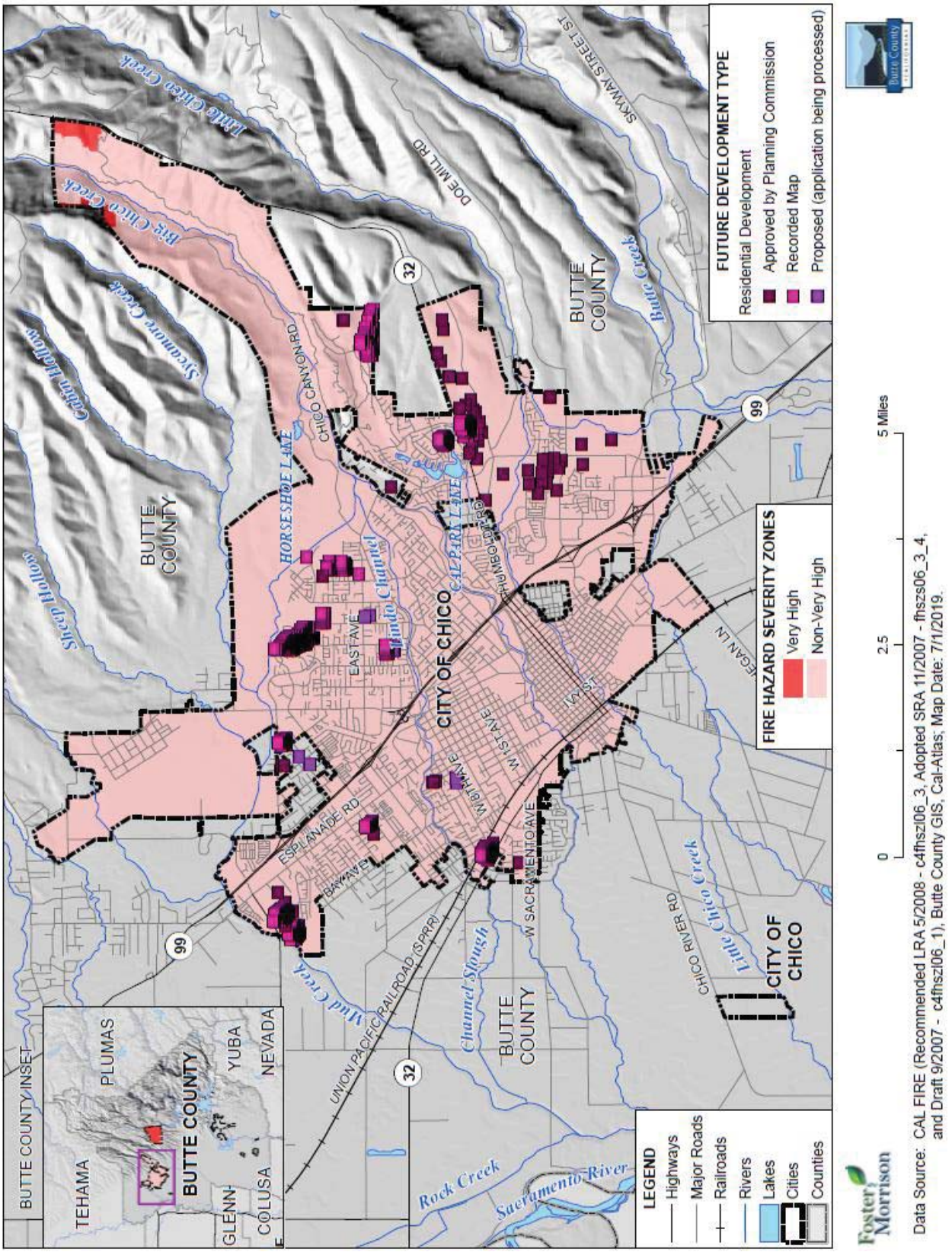


Table B-65 City of Chico – Future Residential Development Parcel and Acre Counts in FHSZs

Future Development Status /FHSZ Fire Hazard Severity Zone / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Approved by Planning Commission			
Non-Very High			
Amber Lynn Estates	1	0	18
Belvedere Heights 2	1	0	22
Carlene Place	1	1	3
Creekside Landing	1	0	23
Hideaway Park	2	1	1
Innsbrook Sub 2	1	0	5
Lassen Village	1	0	3
Lipton Manor	1	1	1
Marigold Heights	1	0	5
Meriam Park Remain	14	0	138
Mission Vista Rch 2	1	1	3
Montecito Place	2	0	14
Mountain Vista	1	0	7
Oak Valley	17	1	309
Stonegate	3	0	204
Twin Creeks	1	0	68
Westside Place 2	1	0	8
Non-Very High Total	**50**	**5**	**832**
Urban Unzoned			
Avila Estates	1	1	7
Urban Unzoned Total	**1**	**1**	**7**
Approved by Planning Commission Total	**51**	**6**	**839**
Recorded Map			
Non-Very High			
Burnap Subdivision	25	0	3
Creekside Landing	57	0	11
Crossroads	13	0	3
Foothill Park E 8A	1	0	
Harmony Park Circle	19	1	3
Hopeful Heights	20	0	2

Future Development Status /FHSZ Fire Hazard Severity Zone / Future Development Project	Total Parcel Count	Improved Parcel Count	Total Acres
Lassen Subdivision	14	8	2
Mariposa Manor	34	0	3
Mountain Vista	171	55	29
Oak Valley 1	80	26	17
Ruthie Subdivision	1	1	1
Schill Subdivision	56	8	11
Siena @ Canyon Oaks	69	47	45
Sierra Gardens Townh	49	0	6
Westside Place 1	94	41	7
Non-Very High Total	**703**	**187**	**143**
Recorded Map Total	**703**	**187**	**143**
Proposed (application being processed)			
Non-Very High			
Drake Estates	4	4	3
Magnolia Gardens	2	0	4
Plottel	3	3	3
Non-Very High Total	9	7	10
Urban Unzoned		0	
Boeger Subdivision	1	0	3
Morseman Estates	1	0	3
Urban Unzoned Total	**2**	**0**	**6**
Proposed (application being processed) Total	**11**	**7**	**15**
Grand Total	**765**	**200**	**998**

Source: CAL FIRE, City of Chico GIS

Figure B-35 City of Chico – Future Commercial Development in FHSZs

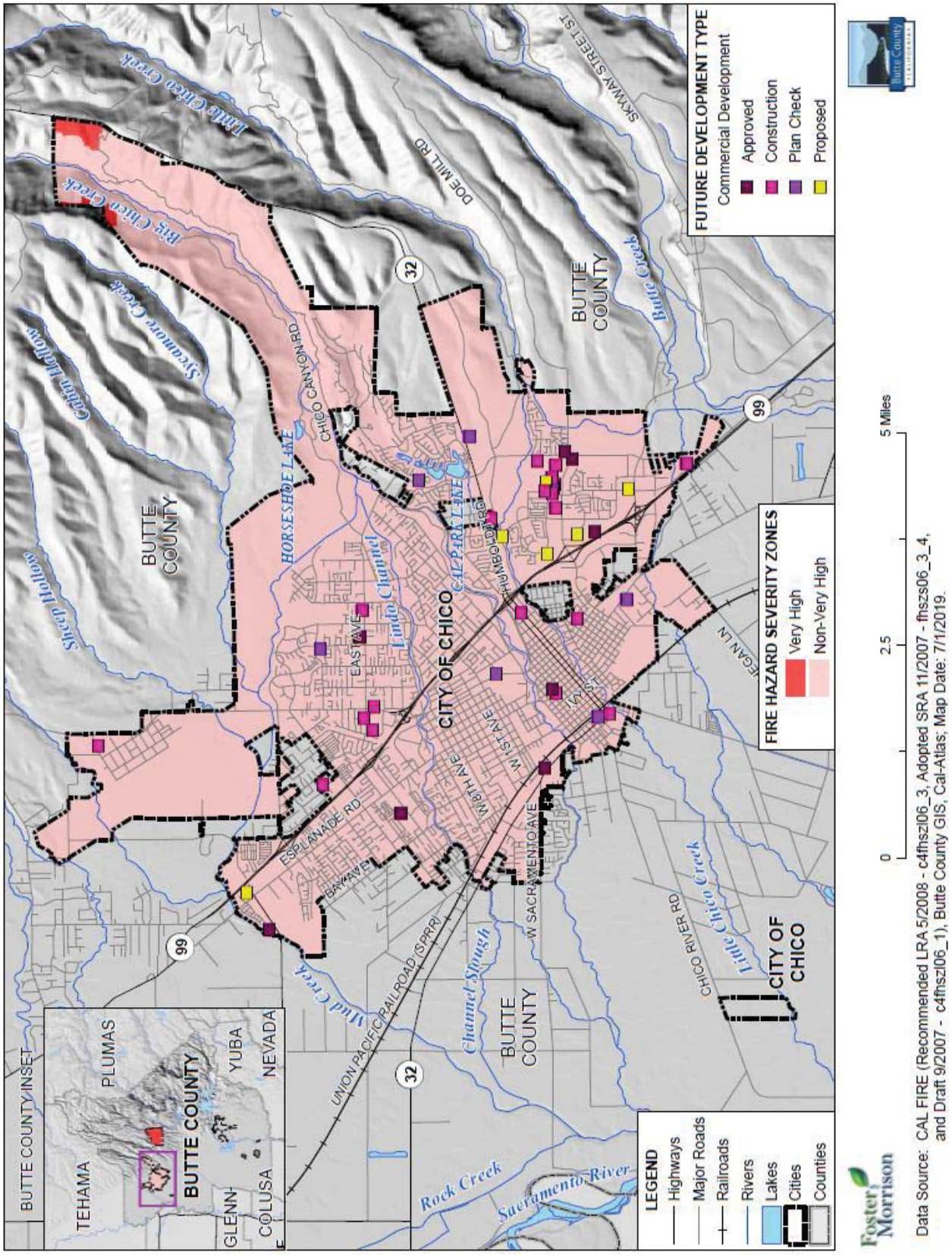


Table B-66 City of Chico – Future Commercial Development Parcel and Acre Counts in FHSZs

Future Development /VHFHSZ Fire Hazard Severity Zone / Status	Total Parcel Count	Improved Parcel Count	Total Acres
Approved			
Non-Very High			
Enloe Medical Care	1	0	5.1
Heritage Landing Apts	1	0	12.6
Jennings Building	1	1	0.1
Pabbi Nord Apts	1	1	0.8
Stonegate Apts	1	0	48.1
The Enclave	1	1	2.6
Veteran's Village Housing	1	0	2.5
WalMart Expansion	1	0	11.1
Non-Very High Total	**8**	**3**	**82.8**
Approved Total	**8**	**3**	**82.8**
Construction			
Non-Very High			
Chase Bank	1	1	0.9
Chico Nissan Remodel	1	1	0.7
CORE Butte Charter School	1	0	27.9
Culinaria @ Meriam Park	1	0	1.0
FifthSun Addition	1	0	1.5
Holiday Inn Hotel	1	0	1.4
Hotel Expansion/Remodel	1	1	0.2
Humboldt Oak Apts	1	0	2.2
Joshua Tree Domiciles II	1	0	2.9
Notre Dame Quads	1	0	5.2
NVP Facade / BC Offices Infill	1	1	10.8
Office Building	2	1	0.9
Salvation Army Complex	1	1	0.5
Sierra Central Bank	1	1	0.5
Tank District Apts	1	0	2.9
Thrive Office Building	1	0	0.2
VA Clinic	1	0	7.1
Walnut St Apt	1	0	0.7

Future Development /VHFHSZ Fire Hazard Severity Zone / Status	Total Parcel Count	Improved Parcel Count	Total Acres
Non-Very High Total	**19**	**7**	**67.3**
Construction Total	**19**	**7**	**67.3**
Plan Check			
Non-Very High			
Channel Apts I & II	1	1	7.1
McGuire Apts	1	0	0.2
Mini Storage	1	0	3.3
Native Oak Apartments	1	0	5.4
Skyline Condos	1	0	5.6
Tank District Retail	1	0	0.3
Tri Counties Bank	1	1	3.7
Non-Very High Total	**7**	**2**	**25.6**
Plan Check Total	**7**	**2**	**25.6**
Proposed			
Non-Very High			
Eagle Plaza Specific Plan	1	0	9.9
Hampton Inn	1	0	2.5
Humboldt Apt	1	0	1.4
Oxford Suites Expansion	1	1	5.3
Restaraunt w/drive thru	1	1	0.5
Springfield Apts	1	0	11.7
Non-Very High Total	**6**	**2**	**31.2**
Proposed Total	**6**	**2**	**31.2**
Grand Total	**40**	**14**	**206.9**

Source: CAL FIRE, City of Chico GIS

B.6 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation education, outreach, and partnerships, and other mitigation efforts.

B.6.1. Regulatory Mitigation Capabilities

Table B-67 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City of Chico.

Table B-67 City of Chico Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan/General Plan	Y 2011	Yes, although it uses existing hazard mitigation documentation. Plan was amended in March of 2017
Capital Improvements Plan	Y	Yes
Economic Development Plan	N/A	
Local Emergency Operations Plan	Y 2011	Yes, Yes, and Yes
Continuity of Operations Plan	No	
Transportation Plan	Yes	Unknown
Stormwater Management Plan/Program		Unknown
Engineering Studies for Streams	No	
Community Wildfire Protection Plan	No	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Yes 2018	The City prepared a vulnerability assessment using a methodology created by the State.
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	Y	Version/Year: 2016 CBC
Building Code Effectiveness Grading Schedule (BCEGS) Score		Score:
Fire department ISO rating:	Y	Rating: 3
Site plan review requirements	Y	Y
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance	Y	Yes
Subdivision ordinance	Y	Yes
Floodplain ordinance	No	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	Yes
Flood insurance rate maps	Yes	Yes
Elevation Certificates	Unknown	

Acquisition of land for open space and public recreation uses	Yes	Creek Green Way Development Impact Fee
Erosion or sediment control program	Yes	Yes
Other		
How can these capabilities be expanded and improved to reduce risk?		
The City is seeking to develop additional mitigation related plans. The Climate Adaptation Plan will be updated in the coming years.		

Source: City of Chico

2030 City of Chico General Plan Program, 2011 (amended March 2017)

The City of Chico General Plan Program serves as the blueprint for future growth and development and provides comprehensive planning for the future. It encompasses what the City is now, and what it intends to be, and provides the overall framework of how to achieve this future condition (see the discussion in Section 4.3.1 Growth and Development Trends).

The General Plan includes a Safety Element that focuses on safety issues to be considered in planning for the present and future development of the Chico Planning Area. Identified hazards include wildfire, geologic/seismic, flooding, and other natural and man-made hazards (such as hazardous materials). Mitigation-related goals and policies are as follows:

- **Goal S-1**: Minimize the loss of life and property resulting from natural and human-caused hazards.
  - ✓ Policy S-1.1 (Emergency Preparedness) – Promote public safety from hazards that may cause death, injury, or property damage through emergency preparedness and awareness.
  - ✓ Policy S-1.2 (Adaptation to Climate Change) – Support public education, adaptation, and emergency response services in response to the potential long-term impacts of climate change.

- **Goal S-2**: Minimize the threat to life and property from flooding and inundation.
  - ✓ Policy S-2.1 (Potential Flood Hazards) - When considering areas for development, analyze and consider potential impacts of flooding.

- **Goal S-3**: Protect lives and property from seismic and geologic hazards.
  - ✓ Policy S-3.1 (Potential Structural Damage) – Prevent damage to new structures caused by seismic, geologic, or soil conditions.

- **Goal S-4** - Continue to provide effective and efficient fire protection and prevention services to Chico area residents.
  - ✓ Policy S-4.1 (Fire Safety Staffing) - Maintain adequate fire suppression and prevention staffing levels.
  - ✓ Policy S-4.2 (Interagency Coordination) - Continue to maintain interagency relationships to maximize fire protection services and support programs that reduce fire hazards.
  - ✓ Policy S-4.3 (Fire Safety Standards and Programs) – Support the development and implementation of standards and programs to reduce fire hazards and review development and building applications for opportunities to ensure compliance with relevant codes.
  - ✓ Policy S-4.4 (Vegetation Management) - Support vegetation management and weed abatement programs that reduce fire hazards.

- **Goal S-5**: Provide a safe, secure environment with responsive police services for the community.
  - ✓ Policy S-5.1 (Police Services) – Continue to provide fundamental police services based upon rapid response to emergencies and response, control and intervention in conduct that threatens life and property.
  - ✓ Policy S-5.2 (Public Confidence in Police) – Maintain and increase public confidence in the ability of the Police Department to provide quality police services.
  - ✓ Policy S-5.3 (Community Policing) - Reduce crime by strengthening police/community partnerships and providing community-oriented policing services that are responsive to citizens' needs.
  - ✓ Policy S-5.4 (Collaboration and Coordination) – Maintain strong relationships with local and state law enforcement agencies, and participate in joint disaster preparedness planning.
  - ✓ Policy S-5.5 (Design to Deter Crime) – Support the deterrence of crime through site planning and community design.

- **Goal S-6**: Support safe airport operations and maximize public safety in the vicinity of airports.
  - ✓ Policy S-6.1 (Airport Operations) – Promote safe air operations by limiting the height of structures and regulating uses that would have adverse impacts on airport safety.
  - ✓ Policy S-6.2 (Safety in Airport Vicinity) – Continue to consider relevant public safety factors prior to approving development projects in the vicinity of airports.

- **Goal S-7**: Enhance the safety of railroad crossings.
  - ✓ Policy S-7.1 (Railroad Crossings) – Enhance the safety of railroad crossings in the City.

- **Goal S-8**: Reduce the potential for public exposure to hazardous materials or the accidental releases of toxic or hazardous substances.
  - ✓ Policy S-8.1 (Hazardous Materials Safety Coordination) - Support efforts to reduce the potential for accidental releases of toxic and hazardous substances.
  - ✓ Policy S-8.2 (Reduce Toxic Materials Use) – Reduce the use of hazardous and toxic materials in City operations.

- **Goal S-9**: Protect the community from risks posed by climate change.
  - ✓ Policy S-9.1 (Climate Adaptation and Resiliency) - Promote public safety through the development of climate adaptation and resiliency strategies to reduce risks associated with climate change.

Climate Change Vulnerability Assessment (2018)

In 2015, Governor Schwarzenegger signed Senate Bill (SB) 379, which states that local governments need to address climate adaptation and resiliency's in their general plan's safety element by 2022. The first step in meeting this requirement is to conduct a Climate Change Vulnerability Assessment to identify the risks that climate change poses to the local jurisdiction and the geographic regions most at risk from climate change. Consistent with the City's adopted Climate Action Plan, the City's Sustainability Task Force identified compliance with SB 379 and preparation of a Vulnerability Assessment as a high priority to promote climate change adaptation and resiliency for the community.

The Vulnerability Assessment provides both a quantitative and qualitative analysis of how climate change may impact the City of Chico through 2100. Direct impacts of climate change to the City include an increase

in average temperature and changes in annual precipitation. Secondary impacts include increased frequency, intensity, and duration of extreme heat days and heat waves/events; increased flooding; increased wildfire; and, loss of snowpack and decreased water supplies. Over the long term, these changes create the potential for a wide variety of secondary consequences, including human health and safety risks, economic disruptions, shifts in ecosystem function and habitat qualities, and difficulties with provision of public services.

The biggest climate change threats to Chico are an increase in extreme heat events and increased flooding events. The City's roadways, infrastructure in flood zones, disadvantaged communities, and sensitive species habitat are among the most vulnerable to climate change impacts. Disaster recovery efforts require extreme measures and commitment to the development of healthy, organized responses to chaotic situations. Every region has a unique need. If a jurisdiction is not in synch with current regulation it may not only miss opportunities for State and federal funding, but it may leave a jurisdiction more vulnerable to the threats of climate change induced natural disasters. City staff intends to use this assessment as a guide bolstering the City's adaptive capacity to respond to these impacts. This Vulnerability Assessment provides an initial analysis of how climate change might impact the City of Chico and where the greatest risks lie.

Emergency Response Plan

The City of Chico and Butte County have both adopted Emergency Response Plans which include prearranged emergency response procedures and mutual aid agreements for emergency assistance within the Planning Area. Emergency routes for evacuation of Chico are Highway 99 and State Route 32.

The objectives of the emergency plans are to prepare for and coordinate effective responses to emergencies and to provide adequate assistance to other jurisdictions as needed. The plans specify actions to coordinate operations, manage resources, and direct governmental and nongovernmental organization's responsibilities during emergency events. The Safety Element addresses the planning for emergency response through policies that commit the City to maintaining an emergency management plan and policies that reaffirm the City's commitment to working with other agencies and emergency response providers.

Chico Urban Area Fire Rescue Agreement

The State Master Mutual Aid Agreement, signed by Butte County and the five cities, establishes a framework that allows agencies to share resources when they have exhausted their own. The giving of mutual aid is voluntary with the decision normally based on the ability of the giving agency to maintain reasonable protection of its own jurisdiction. Most agencies provide short-term mutual aid for free so that they will receive it in the same way when they inevitably have a major emergency. It is the normal practice that mutual aid resources are released from an emergency before the resources of the jurisdictional agency.

The Board of Supervisors and the Chico City Council unanimously entered into CUAFRA in June of 1999. The key components of the Agreement are:

- Closest engine response to all emergencies within the service area
- Sharing of specialized emergency resources such as aerial ladder trucks, fire bulldozers, water tenders, wildland fire engines, and volunteer firefighters.
- Staffing of City Fire Station 6 on the west side of the railroad tracks at Highway 32 and W. East Avenue.

- Establishment of ideal future City and County fire station locations for the northwest corner of the county that avoids facility and staffing duplication.
- Guidelines for a logical transition of the Urban Area from county to city fire protection, as station first due areas become majority-incorporated population.

An Operational Letter of Understanding approved by the Fire Chiefs, City Manager and Chief Administrative Officer guides daily functioning of the Agreement.

Mitigation Related Ordinances

Office of Emergency Services (Chapter 2.68)

This chapter is adopted pursuant to the municipal affairs provisions of the City Charter for the purposes of adopting the Standardized Emergency Management System for specified city emergency services operations pursuant to the requirements for such adoption contained in the provisions of the California Emergency Services Act, providing for emergency services not otherwise provided for in the city charter and other provisions of this code, establishing the emergency services organization of the city, authorizing the preparation and implementation of plans for the protection of persons and property within the city in the event of an emergency and assuring the coordination of the emergency services of the city with those of other public and private agencies and persons involved in the provision of such services during the occurrence of emergencies.

Whenever an emergency occurs within the city, the conditions of which are, or are likely to be, beyond the control of the services, personnel, equipment, facilities and resources of the city and which will require, or is likely to require, the assistance and resources of other public or private local, regional or state agencies to combat, a local emergency may be declared by the mayor or the director of emergency services. Further, dependent upon the extent, nature and seriousness of the emergency, the mayor or the director may request the governor or the director of the state office of emergency services to declare a state of emergency.

In the event of the unavailability of the mayor or the director, the following officers of the city are authorized to make such a declaration or request in the order shown below.

- The vice mayor.
- The deputy director of emergency services.
- The fire chief.

Any such declarations shall be confirmed by the city council at a meeting held within 72 hours of the action. During the existence of a local emergency, state of emergency or state of war emergency, the seat of government of the city shall be the Chico Municipal Center. In the event such Center cannot be utilized as the seat of government due to severe damage or destruction, the director of emergency service shall provide an alternate seat of government, which may be located either within or outside the corporate limits of the city.

Weed and Rubbish Abatement (Chapter 8.20)

For the purpose of providing regulations covering the control of weeds as defined by Section 39561.5 of the Government Code of the state of California, growing upon or existing in front of properties within the

city of Chico, there is hereby adopted by reference and incorporated herein as part of this code, Article 2 entitled "Alternative Procedures" of Chapter 13 entitled "Weed and Rubbish Abatement" of Title IV, Division 3, Part 2, of the Government Code of the state of California, as the same now exists or as hereafter amended, except wherein the provisions thereof are specifically changed or amended by the provisions of this title.

Storm Drainage (Chapter 15.04)

Except as hereinafter provided in this chapter, all rainwater, storm drainage or other water which is not required to be conveyed to the city's sanitary sewer system or a private sewage disposal system pursuant to this code shall be conveyed to the city's storm drainage system or drainage channel. Where the public works director determines that storm drainage cannot be conveyed to the city's storm drainage system or drainage channel because facilities are not available, the director may authorize installation of a temporary leach field- type storm drainage system, in accordance with the design criteria adopted by resolution of the city council, provided that the property owner(s) shall also install all drainage facilities necessary to make connection to the city's storm drainage facilities or drainage channel when said facilities are available. Any other type of disposal system, such as drainage wells, shall be prohibited.

Building and Construction (Chapter 16)

The purpose of the building regulations adopted by this title is to safeguard life, health, and safety by regulating the following:

- The design, construction, type of materials, use, occupancy, and maintenance of all buildings and structures within the city;
- The design, location, construction, installation, type of materials, use, operation, and maintenance of all building service equipment within the city, including all electrical equipment, mechanical equipment, and plumbing equipment; and
- The design, location, construction, installation, type of materials, and maintenance of all signs within the city.

The building official shall be primarily responsible for administration of the building regulations adopted by this title, subject to the overall direction and control of the director.

Basic Building Standards

Basic Building Standards. The following regulations, hereby adopted by reference and incorporated herein, shall constitute the basic building standards of the city and shall apply to and govern the construction, alteration, moving, demolition, repair, use, and occupancy of any building or structure in the city in accordance with the provisions of Section 16.06.020 of this code.

All regulations adopted in the 2016 California Building Code, as promulgated in Part 2, Volumes 1 and 2, Appendix J (Grading), Title 24 of the California Code of Regulations ("CBC"), including all regulations adopted in the CBC amending or repealing a volume, chapter, section or appendix of the International Building Code ("IBC"), which regulations shall take precedence over the amended or repealed volume, chapter, section or appendix of the IBC; and

All regulations adopted in this chapter, including any regulations adopted in this chapter which amend or repeal a volume, chapter, section or appendix of either the IBC or CBC , which regulations shall take precedence over the amended or repealed volume, chapter, section or appendix of the IBC or CBC .

Existing Building Code

The following regulations, hereby adopted by reference and incorporated herein, shall constitute the minimum standards to promote public safety and welfare, including those regulations adopted to reduce the risk of death or injury that may result from the effects of earthquakes on existing unreinforced masonry bearing walls. All regulations set forth in the following volumes, chapters, sections, parts or appendices of the 2016 CBC Part 10 of Title 24 based on the 2015 International Existing Building Code:

- Appendix A Chapters A1, A3, and A4; and
- Appendix A Chapter A6 Referenced Standards.

Historic Building Code

The following regulations, hereby adopted by reference and incorporated herein, shall constitute the standards for the preservation, restoration, rehabilitation, relocation or reconstruction of buildings or properties designated as qualified historical buildings or properties.

All regulations set forth in the following volumes, chapters, sections, parts or appendices of the 2016 CBC Part 8 of Title 24:

- Chapter 8-1, excluding Section 8-104, entitled "Review and Appeals";
- Chapter 8-2 through 8-10; and
- Appendix A.

Floodplain Regulations (Chapter 16.34)

he floodplain regulations set forth in this title are adopted pursuant to the municipal affairs provisions of the City Charter for the purpose of regulating the construction and installation of buildings, structures and other development occurring within special flood hazard areas of the city in a manner which insures that such development is properly elevated, floodproofed, or otherwise protected from flood damage, and in a manner which prevents obstructions in such flood hazard areas which cause or contribute to an increase in flood heights and velocities, all in order to minimize private and public losses due to flood conditions and otherwise protect the public's health, safety and welfare. The floodplain regulations set forth in this title are also adopted in accordance with the provisions of the National Flood Insurance Program so that flood insurance may be made available to the owners and occupants of property within the city at reasonable rates.

The building official shall determine the exact location of floodplain boundaries and elevations from the Flood Insurance Rate Map and other approved floodplain maps and reports provided by the Federal Emergency Management Agency and Federal Insurance Administration and on file in the office of the building division. However, where the exact location of floodplain boundaries or elevations cannot be determined from such map, for example, where there appears to be a conflict between the map and actual field conditions, the building official shall make such determinations from the best available evidence.

In the absence of a Flood Insurance Rate Map or other approved floodplain map or report provided or approved by the Federal Emergency Management Agency or Federal Insurance Administration, the building official shall determine the exact location of floodplain boundaries and elevations from any base flood elevation and floodway data available from any other federal agency, state agency or reliable source.

The building official shall maintain on file in the office of the building division copies of the following documents evidencing the location and type of floodplain development, all of which are to be made available to members of the general public for inspection, review and copying:

- All elevation certificates filed with the building official in the manner required by the floodplain standards adopted by or pursuant to Section 16.37.100 of this title; and
- All notices of a variance from the floodplain standards adopted by or pursuant to this title.

In the event the city proposes to cause or permit the relocation or alteration of a watercourse, the director shall serve the California Department of Water Resources, the County of Butte and any adjoining communities with a notice of such relocation or alteration, and shall provide evidence of such notification to the Federal Emergency Management Agency and Federal Insurance Administration. In addition, in the event the city proposes to cause or permit the relocation or alteration of a watercourse, the director shall assure that the flood carrying capacity within the altered or relocated watercourse shall be maintained.

Subdivision Regulations (Chapter 18)

The purpose of these regulations, and the intent of the city in their adoption, is as follows:

- To provide policies, standards, requirements and procedures to regulate and control the design and improvement of all subdivisions within the city;
- To assist in implementing the objectives, policies and programs of the general plan by ensuring that all proposed subdivisions, together with the provisions for their design and improvement, are consistent with the general plan and all applicable specific plans of the city;
- To preserve and protect, to the maximum extent possible, the unique and valuable natural resources and amenities of the city's environment, including topographic and geologic features, open space lands, stream recreational areas, fish and wildlife habitats, historical and cultural places, and scenic vistas and attractions; and, to maximize the public's access to and enjoyment of such resources and amenities through the dedication or continuance of applicable easements thereto;
- To relate land use intensity and population density to existing development, street capacity and traffic access, the slope of the natural terrain, and the availability of public facilities, utilities and open space;
- To provide lots of sufficient size and appropriate design for the purposes for which they are to be used;
- To provide streets of adequate capacity and design and to ensure maximum safety for pedestrians and vehicles;
- To ensure adequate access to each building site;
- To provide sidewalks, and where needed, pedestrian ways, bike paths, and equestrian and hiking trails for the safety, convenience and enjoyment of the residents of new developments;
- To provide adequate systems of water supply, sanitary sewage disposal, storm drainage, street lighting, and other utilities needed for the public health, safety and convenience;
- To provide adequate sites for public facilities needed to serve the residents of new developments;
- To ensure that the costs of providing land for streets, alleys, pedestrian ways, easements, and other rights-of-way, and for the improvements needed to serve new developments, are the responsibility of the subdivider;

- To prevent land which is actually or potentially dangerous by reason of flood hazard, inundation, proximity to excessive noise, inadequate access, inadequate water supply or fire protection, insufficient sewerage facilities, hazardous geological conditions, or critical soil conditions from being subdivided for any use or in any manner tending to create an increased detriment to the public health, safety or welfare;
- To ensure that, insofar as possible, land is subdivided in a manner that will promote the public health, safety, convenience, and general welfare in conformance with the general plan;
- To reduce the hardships on tenants displaced when multi-residential buildings are converted to condominium projects and to protect the purchasers of dwelling units in such condominium projects.

These regulations are adopted pursuant to the Subdivision Map Act (Title 7, Division 2, Government Code) as a "local ordinance" as said term is used in said act and are supplemental to the provisions thereof. All provisions of the Subdivision Map Act and future amendments thereto not incorporated in these regulations shall, nevertheless, apply to all subdivisions, subdivision maps and proceedings under these regulations. Nothing in this section shall be read to limit the right of the city, as a charter city, to enact such further provisions concerning the division of land as are deemed necessary to protect the public health, safety and welfare.

Land Use and Development Regulations (Chapter 19)

The purpose of the city in enacting, amending, and administering these Regulations is to promote and protect the public health, safety, and general welfare by adopting a Zoning Map (Section 19.01.040) and regulations generally providing for:

- The classification of areas of the city, including future annexations, into several zoning districts;
- The protection of the established character of the various zoned areas within the city and orderly development by regulating the uses of land, and the location, size, and character of structures or improvements erected or placed on the land, including alterations or additions to existing structures or improvements;
- The implementation of the policies and goals in the Chico General Plan to achieve the arrangement of uses described in that plan and foster convenient, compatible, and workable relationships among these land uses;
- The promotion of economic stability of existing land uses consistent with the economic development policies of the General Plan;
- The preservation and enhancement of environmental resources and sensitive natural habitats, consistent with the resource management policies of the General Plan; and
- The fostering of development patterns that promote energy conservation and efficient land use, and offer alternatives to automobile use by establishing densities and intensities that provide transit feasibility, and thereby also provide air quality benefits.

The Council hereby adopts the City of Chico Zoning Map (hereafter referred to as the "Zoning Map") and the Chico Municipal Airport Zoning Map (hereafter referred to as the "Airport Zoning Map"), which are on file with the City of Chico community development department.

B.6.2. Administrative/Technical Mitigation Capabilities

Table B-68 identifies the City department(s) responsible for activities related to mitigation and loss prevention in Chico.

Table B-68 City of Chico's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	Yes	Yes
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	In the process	
Mutual aid agreements	Yes	Statewide coordination system. Extremely effective.
Other		
Staff	**Y/N FT/PT**	**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Chief Building Official	Yes/FT	No, Yes, and Yes
Floodplain Administrator	Yes/FT	No, Yes, and Yes
Emergency Manager	Yes/FT	No, No, and Yes
Community Planner	Yes/FT	Yes, Yes, and Yes
Civil Engineer	Yes/FT	Yes, Yes, and Yes
GIS Coordinator	Yes/FT	No, Yes, and Yes
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	CodeRED, using Cell and Text Messaging, Yes
Hazard data and information	Yes	Yes
Grant writing	Yes	Implemented on a Dept. basis. Yes
Hazus analysis	Yes	Vulnerability Study, Yes
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional training is needed. NIMS training would be useful.		

Source: City of Chico

B.6.3. Fiscal Mitigation Capabilities

Table B-69 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table B-69 City of Chico's Fiscal Mitigation Capabilities

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Yes	Yes, and Yes

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Authority to levy taxes for specific purposes	Yes	Unknown and Yes
Fees for water, sewer, gas, or electric services	Yes	Yes, Unknown, and Yes
Impact fees for new development	Yes	Unknown
Storm water utility fee	No	
Incur debt through general obligation bonds and/or special tax bonds	Yes	Yes and Yes
Incur debt through private activities	No	
Community Development Block Grant	Yes	Unknown
Other federal funding programs	Yes	Yes, multiple, and yes
State funding programs	Yes	Yes, multiple, and yes
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional training and personnel are needed.		

Source: City of Chico

B.6.4. Mitigation Education, Outreach, and Partnerships

Table B-70 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table B-70 City of Chico's Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	No	
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Limited	
Natural disaster or safety related school programs	No	
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	No	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional Staffing		

Source: City of Chico

B.6.5. Other Mitigation Efforts

The City of Chico has many other completed or ongoing mitigation efforts that include the following:

- The City of Chico entered into the Chico Urban Area Fire and Rescue Agreement (CUAFRA) in June of 1999. The CUAFRA provides for automatic aid, meaning that for a call within the designated service area (including areas outside the City's Sphere of Influence), the closest fire engine is routed to the emergency as the first due response, regardless of the jurisdiction of the engine. The CUAFRA also includes provisions for sharing of specialized emergency resources such as aerial ladder trucks, fire bulldozers, water tenders, wildland fire engines, and staffing of City Fire Station 6; the establishment of ideal future City and County fire station locations; and guidelines for a logical transition of the Urban Area from County to City fire protection services. In 2006, the City of Chico Fire Department provided 481 automatic aid responses and received 1,264 automatic aid responses.
- In areas not covered by the CUAFRA, Butte County and the Chico Fire Department can still call each other for backup "mutual aid" in addition to their first due response engine. Mutual aid is requested when a jurisdictional agency has insufficient resources immediately available to handle an emergency situation and assistance is requested from neighboring fire departments. The State Master Mutual Aid Agreement, signed by Butte County and the five cities including the City of Chico, establishes a framework for mutual aid.
- The City prepared a City of Chico Vulnerability Assessment consistent with guidance from the State of California. Further, the City's Sustainability Task Force meetings have provided a consistent venue over the past 5+ years to enhance public awareness of natural hazard considerations and the need for preparedness.
- Early Warning System: Chico Fire Department has conducted multiple outreach programs, including a 200 person Town Hall Event, to educate the residents regarding CodeRED, which is the City's Early Alert Warning System. We are conducting a CodeRED Test on September 27, 2019, and CodeRED currently identifies 38,694 contacts enrolled in this area Chico Urban Area.
- In 2019, the City funded a cooling and heating center for its more vulnerable populations.
- 2011 City of Chico Emergency Operations Plan
- Chico Municipal Airport Emergency Plan (AEP)
- California Disaster and Civil Defense Master Mutual Aid Agreement
- California OES Mutual Aid Plan

B.7 Mitigation Strategy

B.7.1. Mitigation Goals and Objectives

The City of Chico adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

B.7.2. NFIP Mitigation Strategy

The City of Chico joined the National Flood Insurance Program (NFIP) on June 11, 1997. As a participant of the NFIP, the City of Chico has administered floodplain management regulations that meet the minimum requirements of the NFIP. The management program objective is to protect people and property within the City. The City of Chico will continue to comply with the requirements of the NFIP in the future.

The City of Chico Building and Development Services Department provides public outreach activities which include map information services, public awareness, public hazard disclosure, and flood protection information. This information is readily available to the public and consists of current and accurate flood mapping. In addition, the Building and Development Services Department provides information about our stormwater management program and up-to-date information related to the maintenance of the City's drainage system.

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS which are to reduce flood losses, facilitate accurate insurance rating, and promote the awareness of flood insurance. The City of Chico is not a current participant in the CRS program.

More information about the floodplain administration in the City of Chico can be found in Table B-71.

Table B-71 City of Chico Compliance with NFIP

NFIP Topic	Comments
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	592 policies $444,136 in premiums $148,798,300 in coverage
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	10 paid claims $243,679.18 in paid clams 0 substantial damage claims
How many structures are exposed to flood risk within the community?	954 in 1% annual chance floodplain 8,873 in 0.2% annual chance floodplain
Repetitive Loss (RL) and Severe Repetitive Loss Properties (SRL)	1 RL 0 SRL
Describe any areas of flood risk with limited NFIP policy coverage	South/East & South/West Chico
Staff Resources	
Is the Community Floodplain Administrator or NFIP Coordinator certified?	No on Coordinator, but certified staff
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Permit Review, GIS Mapping, Education, Outreach, Inspections, Engineering
What are the barriers to running an effective NFIP program in the community, if any?	Design Cost
Compliance History	
Is the community in good standing with the NFIP?	Y
Are there any outstanding compliance issues (i.e., current violations)?	N
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	CAV 4/27/2016
Is a CAV or CAC scheduled or needed?	N

NFIP Topic	Comments
Regulation	
When did the community enter the NFIP?	6/11/1997
Are the FIRMs digital or paper?	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Meet
Provide an explanation of the permitting process.	Application, Plan Review, Comments, Issuance
Community Rating System	
Does the community participate in CRS?	NO
What is the community's CRS Class Ranking?	N/A
What categories and activities provide CRS points and how can the class be improved?	N/A
Does the plan include CRS planning requirements?	N/A

B.7.3. Mitigation Actions

The planning team for the City of Chico identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included. The following hazards were considered a priority for purposes of mitigation action planning:

- Dam Failure
- Drought and Water Shortage
- Earthquake and Liquefaction
- Floods: 100/200/500 year
- Floods: Localized Stormwater
- Hazardous Materials Transportation
- Landslide, Mudslide, and Debris Flow
- Levee Failure
- Severe Weather: Extreme Heat
- Severe Weather: Freeze and Winter Storm
- Severe Weather: Heavy Rain and Storms (Hail, Lightning, Wind)
- Severe Weather: Wind and Tornado
- Wildfire

It should be noted that many of the projects submitted by each jurisdiction in Table 5-4 in the Base Plan benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the countywide public outreach action, as well as many of the emergency services actions, apply to all hazards regardless of hazard priority. Collectively, this multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this plan. It should further be noted, that although a jurisdiction may not have specific

projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Multi-Hazard Actions

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

Hazards Addressed: Multi-hazard (Climate Change, Dam Failure, Drought & Water shortage, Earthquake and Liquefaction, Floods: 100/200/500 year, Floods: Localized Stormwater, Hazardous Materials Transportation, Invasive Species: Aquatic, Invasive Species: Pests/Plants, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Heat, Severe Weather: Freeze and Winter Storm, Severe Weather: Heavy Rain and Storms (Hail, Lightning), Severe Weather: Wind and Tornado, Stream Bank Erosion, Volcano, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8, 9

Issue/Background: Local jurisdictional reimbursement for mitigation projects and cost recovery after a disaster is guided by Government Code Section 8685.9 (AB 2140). Specifically, this section requires that each jurisdiction adopt a local hazard mitigation plan (LHMP) in accordance with the federal Disaster Mitigation Act of 2000 as part of the Safety Element of its General Plan. Adoption of the LHMP into the Safety Element of the General Plan may be by reference or incorporation.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be Implemented: Safety Element of General Plan

Responsible Office: City of Chico Planning Department

Priority (H, M, L): High

Cost Estimate: Jurisdictional board/staff time

Potential Funding: Local budgets

Benefits (avoided Losses): Incorporation of an adopted LHMP into the Safety Element of the General Plan will help jurisdictions maximize the cost recovery potential following a disaster.

Schedule: As soon as possible

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

Hazards Addressed: Multi-hazard (Climate Change, Dam Failure, Drought & Water shortage, Earthquake and Liquefaction, Floods: 100/200/500 year, Floods: Localized Stormwater, Hazardous Materials

Transportation, Invasive Species: Aquatic, Invasive Species: Pests/Plants, Landslide, Mudslide, and Debris Flow, Levee Failure, Severe Weather: Extreme Heat, Severe Weather: Freeze and Winter Storm, Severe Weather: Heavy Rain and Storms (Hail, Lightning), Severe Weather: Wind and Tornado, Stream Bank Erosion, Volcano, Wildfire)

Goals Addressed: 1, 2, 3, 4, 5

Issue/Background: The City and County play a key role in public outreach/education efforts to communicate the potential risk and vulnerability of their community to the effects of natural hazards. A comprehensive multi-hazard public education program will better inform the community of natural hazards of concern and actions the public can take to be better prepared for the next natural disaster event.

Project Description: A comprehensive multi-hazard outreach program will ascertain both broad and targeted educational needs throughout the community. The City will work with the County and other agencies as appropriate to develop timely and consistent annual outreach messages in order to communicate the risk and vulnerability of natural hazards of concern to the community. This includes measures the public can take to be better prepared and to reduce the damages and other impacts from a hazard event. The public outreach effort will leverage and build upon existing mechanisms, will include elements to meet the objectives of Goal 3 of this LHMP Update, and will consider:

- Using a variety of information outlets, including websites, local radio stations, news media, schools, and local, public sponsored events;
- Creating and distributing (where applicable) brochures, leaflets, water bill inserts, websites, and public service announcements;
- Displaying public outreach information in County office buildings, libraries, and other public places and events;
- Developing public-private partnerships and incentives to support public education activities.

Location of Project: Citywide

Other Alternatives: Continue public information activities currently in place.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing County outreach programs will be reviewed for effectiveness and leveraged and expanded upon to reach the broader region.

Responsible Office: City of Chico in partnership with the County

Participating Jurisdictions: County and all cities.

Priority (H, M, L): High

Cost Estimate: Annual costs to be determined, and will depend on the scope and frequency of activities and events as well as volunteer participation

Benefits (Losses Avoided): Increase residents' knowledge of potential hazards and activities required to mitigate hazards and be better prepared. Protect lives and reduce damages, relatively low cost to implement.

Potential Funding: Local budgets, grant funds

Timeline: Ongoing/Annual public awareness campaign

Action 3. Chico Municipal Airport Generator

Hazards Addressed: Hazards that cause a power outage for a critical facility (Dam Failure, Earthquake, Flood, Landslide, Levee Failure, Wildfire, Severe Weather).

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8, 9

Issue/Background: The Chico Municipal Airport (CMA) is owned by the City of Chico and is located at 150 Airpark Blvd, four miles north of Downtown Chico. The airport covers 1,475 acres, has two runways and one helipad. Currently, the CMA supports over 100 general aviation uses, but provides important service to large organizations such as Enloe Hospital, Sierra Nevada Brewery and many other private services. But more importantly, the CMA is a critical Cal Fire Air Attack Base and the US Forest Service contracts with firefighting contractors who are also based out of the CMA. In 2018 there were 36,281 airport operations deployed at the CMA

In addition, the CMA is indexed as Class III, Level A by the FAA which requires the CMA to meet staffing and equipment criteria when commercial passenger operations resume. The CMA also serves as a base camp during natural disasters and it is imperative that there is adequate power supply for all of these operations.

Project Description: This project proposes to replace a 125 KW generator with a larger 250 KW generator, two Automatic Transfer Switches (ATS) units, and other necessary and related equipment at the Chico Municipal Airport.

Other Alternatives: A second, slightly less costly, alternative could be to install a smaller than 250 KW generator. This would not provide all of the power needed during an outage, but would be better than the existing insufficient 125 KW unit.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Local Hazard Mitigation Plan and FAA requirements.

Responsible Office/Partners: City of Chico Public Works Department Operations and Maintenance

Cost Estimate: $240,000

Benefits (Losses Avoided): Unknown at this time.

Potential Funding: City of Chico Equipment and Fleet Replacement Fund as local match.

Timeline: 14-month implementation period

Project Priority: High

Action 4. Chico Fire Station 2 Generator

Hazards Addressed: Hazards that cause a power outage for a critical facility (Dam Failure, Earthquake, Flood, Landslide, Levee Failure, Wildfire, Severe Weather).

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8, 9

Issue/Background: Chico Fire Department's historical risks are concentrated most heavily in the Southwest portions of Chico and in the downtown areas surrounding Chico State University (CSUC). These areas are served primarily by Fire Stations 1 and 2. Fire Station 2 is located at 182 E. 5th Avenue in the center of Chico, which is near Enloe Hospital, and a residential area consisting of larger older homes. It is also in close proximity to downtown and CSUC. The Station also houses/staffs a Type 2 Rescue apparatus that is equipped and used for technical rescue incidents, such as swift water, high angle, confined space, and other types of rescues. Engine 2 is also the most utilized unit for EMS calls, which comprises of over 63% of the total service calls in the Chico Urban Area.

Fire Station 2 was built in 1960 and the current 17.5 kilowatt (KW) standby generator is now woefully undersized for this high-use critical Station. The generator can only provide minimal power for lights and a portion of the facility during power outages.

Project Description: This project proposes to replace the existing 17.5 KW generator with a larger 60 KW generator, two Automatic Transfer Switches (ATS) units, and other necessary and related equipment at Fire Station 2.

Other Alternatives: A second, slightly less costly, alternative could be to install a smaller than 60 KW generator. This would not provide all of the power needed during an outage but would be better than the existing minimally sufficient 17.5 KW unit.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Local Hazard Mitigation Plan and the Automatic/Mutual Aid Agreement between the City and Butte County for the Chico Urban Area,

Responsible Office/Partners: City of Chico Public Works Department Operations and Maintenance/Chico Fire Department

Cost Estimate: $95,000

Benefits (Losses Avoided): Increased level of service and response during times of power outage. Reduced risk to residents that are served by the Fire Department.

Potential Funding: City of Chico Equipment and Fleet Replacement Fund as local match.

Timeline: 14-month implementation period

Project Priority: High

Action 5. Intelligent Transportation System (ITS)

Hazards Addressed: Flood, Fire, Earthquake, and related response times to reduce loss of property and life

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8, 9

Issue/Background: Outdated infrastructure relating to traffic circulation. An ITS system would provide an adaptive traffic signal network to provide an advanced system to reduce response times of emergency personnel, as well as circulation during evacuations. These types of "Smart Cities" applications have proven to reduce emergency personnel response times, as well as reduce greenhouse gas emissions through reduced idling vehicles which are the largest contributors to climate change.

Project Description: Install traffic signal hardware and software to provide an adaptive traffic signal network.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: N/A

Responsible Office/Partners: Butte County, Butte County Association of Governments, City of Chico – Police Dept, Fire Dept.

Cost Estimate: $12,000,000.00

Benefits (Losses Avoided): Better response times will lead to reduced risk to people and property in the City of Chico.

Potential Funding: HMGP

Timeline: Within 5 years.

Project Priority: High

Flood, Localized Flood, Levee Failure, and Dam Failure Actions

Action 6. Bruce Road Bridge Retrofit

Hazards Addressed: Flood, Heavy Rain and Storm

Goals Addressed: 1, 2, 3, 4, 6, 7, 9

Issue/Background: The Bruce Road bridge at Little Chico Creek is an old Butte County bridge that was not built to modern needs relating to adequate freeboard. The bridge sits approximately three feet below the 200-year storm event, which makes it susceptible to flooding during peak events. This is a major thoroughfare and utilized as a regional evacuation route.

Project Description: Demolition of the existing bridge structure and construct a widened and raised bridge to meet the needs based on hydraulic and traffic studies performed. In order to facilitate, raise transition grades at the north and south approaches as well.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: 2016 bridge hydraulic analysis.

Responsible Office/Partners: Butte County, Butte County Association of Governments, City of Chico – Police Dept, Fire Dept.

Cost Estimate: $5,000,000.00

Benefits (Losses Avoided): Reduced risk to the bridge. Increased number of ingress and egress routes during periods of evacuation.

Potential Funding: HMGP or Local Development Impact Fees (Partial)

Timeline: Within 5 years.

Project Priority: High

Action 7. BD Drainage Ditch @ Fair Street Detention Pond

Hazards Addressed: Flood, Localized Flood, Heavy Rain and Storm

Goals Addressed: 1, 2, 3, 4, 6, 7, 9

Issue/Background: Inadequate capacity to service the tributary areas served by this drainage channel. In the past, flooding has occurred to adjacent parcels.

Project Description: Provide capacity enhancements by replacing undersized culverts, channel geometric improvements and capacity enhancements via box culverts and flood walls.

Other Alternatives: Mid-stream detention facility to handle peak flows.

Existing Planning Mechanism(s) through which Action Will Be Implemented: In 2015, the City hired a consultant to provide hydraulic analysis of this channel specifically, which identified the capacity issues and areas of concern.

Responsible Office/Partners: Private property owners, Chico Unified School District (adjacent property owner)

Cost Estimate: $3,000,000.00

Benefits (Losses Avoided): $4,500,000.00 of property would be at less risk with these changes.

Potential Funding: HMGP or local development impact fees (partial)

Timeline: Within 5 years.

Project Priority: High

Action 8. De-silt drainage channels from just north of 5-mile through Chico City Limits

Hazards Addressed: Flooding, (public/private property damage), Levee Failure, Dam Failure, Localized Flooding

Goals Addressed: 1, 2, 3, 4, 6, 7, 9

Issue/Background: From the Sandy Gulch (Lindo Channel) Resource Inventory document (2001):

During high flow periods, Upper Big Chico Creek leaves the narrow foothill canyon at high velocities carrying substantial bed load (course materials that are dragged along the bed of a stream) until it encounters the Five-Mile Area stilling basin. At this point, the velocity and bed load mobilizing capacity are significantly reduced, causing larger sediment to fall out of the water column depositing gravel just upstream of the Five-Mile Area flow control structures.

The Corp's Chico, Mud, and Sandy Gulch Channel Improvement and Levee Construction project involved a maximum allowable flow down Big Chico Creek through the Big Chico Culvert at 1,500 cfs. Where Sandy Gulch splits off at Five-Mile the flow capacity is 14,500 cfs, until the Sycamore Diversion split which is capable of receiving 8,500 cfs, leaving the remaining flow in Sandy Gulch with the design capacity of 6,000 cfs (US Army Corps, 1961). The purpose of the flood control project was, and remains, to carry potentially damaging peak flood flows around the central portion of the City of Chico. The flood control structures are operated and maintained by Butte County in conjunction with the California Department of Water Resources (DWR).

FLOOD CONTROL STRUCTURE MAINTENANCE AND FLOW CONSTRAINTS

Flood control improvements within the Chico Urban Area are maintained primarily by Butte County. Sandy Gulch improvement projects are funded by County Service Area #24, and administered by Butte County Public Works.

Historically, approximately every three years a large gravel bar that formed at the bifurcation of Big Chico and Sandy Gulch (Five Mile Area) was removed (up to approximately 200 yards of materials), or the channel reshaped to maintain the proper flow (EIP, 2000). However, more recently, according to the Butte County Public Works Department (Edell, pers. comm., April 2001), the California Department of Fish and Game (CDFG), has requested that Public Works no longer remove gravel at Five Mile due to aquatic resource concerns. As long as the concrete sill, located within the stilling basin, remains relatively clear of gravel, the 1965 flood control flow split system appears to function as planned (McCullom, pers. comm., April 2001). According to Butte County's former Public Works Director, Jim Schultz, from the 1960s through the 1970s, after water levels receded, Sandy Gulch between Manzanita Avenue and Longfellow Avenue was cleared of large woody debris and the channel was straightened, flattened, and recontoured (Schultz, pers. comm., April 2001). The yearly clearing was performed to maximize water conveyance and ensure stream capacity. Much of Sandy Gulch's current configuration, including the raised banks in the upper channel, are a reflection of the early instream work conducted by the Butte County Public Works Department during these two decades.

Lower Sandy Gulch Gravel Extraction

In 1987, DWR removed approximately ten to twelve thousand cubic yards of gravel from lower Sandy Gulch between Highway 32 and Grape Way (Corry, pers. comm., April 2001). According to Jim Schultz (2001), former Butte County Public Works Director, the channel was "cleaned out" in an effort to increase flow capacity to levels compatible with the 1965 flood control project.

Project Description: De-silt drainage channels from just north of 5-mile through Chico City Limits

Other Alternatives: Reduce the flow through Lindo Channel

Existing Planning Mechanism(s) through which Action Will Be Implemented: Unknown

Responsible Office/Partners: DWR (primary), Butte County, City of Chico

Cost Estimate: To be determined.

Benefits (Losses Avoided): Reduced risk to people and property.

Potential Funding: Grants from Cal OES and FEMA.

Timeline: To be determined when funding is available.

Project Priority: Medium

Wildfire Actions

Action 9. Lindo Channel Defensible Space Project

Hazards Addressed: Wildfire (fire risk through both defensible space measures and hazardous fuel reduction), Drought, Severe Weather, Extreme Heat, Severe Weather: Wind

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8, 9

Issue/Background: Many of Chico's channels and drainage areas are filled with non-native plants and brush that contribute to increased fire danger. In Lindo Channel, a flood channel and greenbelt, vegetation on the banks, combined with the recent structural development, creates a fire suppression situation that would overwhelm local fire resources in high wind conditions. The entire Lindo Channel corridor is approximately six miles in length, and ranges between 200 – 1000 feet in width. Homes and fencing abut the vegetated area and access to the channel is very limited for large fire equipment in the few places it is possible. Further, homeless populations are an ignition concern in the channel; previous fires have been limited in damage, but with the highly likely probability of fire starts combined with proximity of residences in a vegetated area, mitigation through defensible clearing is critical. This project reduces fuels and threats throughout the project period and employs a long-term strategy of reducing invasive species associated with increased fire behavior to reduce maintenance costs and labor.

Project Description: The Project Area includes an open space area called Lindo Channel, which starts at Manzanita Avenue, and continues west to the Highway 99 overpass in Chico CA. The project is sub-divided into 5 units with designated treatments per sub-unit that include an initial thinning, elevation, and removal of vegetation over approximately 44 acres, and follow up grazing treatments on 96 acres/year for 3 years. The goal is to provide an average of up to 200 feet of defensible space for approximately 214 parcels that align this portion of the Channel. This phased approach will significantly reduce the current fuel loading and contiguous arrangement; with the intent to structurally change the vegetation palette to decrease the spread and intensity of wildfire that could impact the area. It is hoped that seasonal deployment of livestock will reduce invasive seedbeds, and help eliminate the threat of wildfire in the urban interface areas of Lindo Channel.

Other Alternatives: The City considered using a masticator to remove the vegetation as an option, but the noise, flying debris, and rocky terrain makes this not feasible or unsafe. Mechanical removal by mowing/trimming would be the other option, but that would have a negative effect on the neighbors, visitors to the area, and likely a poor result of coverage through the rocky and uneven areas.

Existing Planning Mechanism(s) through which Action Will Be Implemented: CEQA and Vegetation Management best practices. The City is also working on a comprehensive Vegetation Management Plan for all City parks and greenways, which when complete will be a guiding planning mechanism for this project.

Responsible Office/Partners: City of Chico Park Division is primary responsible office for this project

Cost Estimate: $251,000

Benefits (Losses Avoided): $950,125

Potential Funding: City of Chico in-kind labor, volunteer labor, and the use of CA Conservation Corps and/or Alliance for Work Force Development crews as local match.

Timeline: 36 months implementation period in three Phases

Project Priority: High

Action 10. Upper Bidwell Park Fuel Reduction

Hazards Addressed: Wildfire, Drought, Severe Weather, Extreme Heat, Severe Weather: Wind

Goals Addressed: 1, 2, 3, 4, 5, 6, 7, 8, 9

Issue/Background: Much of Chico is adjacent to the foothills and therefore is subject to the threat of wildland fires. Bidwell Park (3670 acres) is one of the only accessible areas between vast areas of wild lands and rural foothill communities. The park is a large section of natural lands, adjacent to extensive new developments and surrounded by rough and inaccessible terrain around the north and eastern city perimeter. The growth is especially prominent in the eastern part of the city where most of the new residential construction is taking place and the most immediate area to wild lands that would be treated with mitigation.

Furthermore, invasive species are present over much of the project area, and create higher fuel loading, flame-lengths, and a higher difficulty of control. Promoting an oak-woodland structure with reduced fuels and strategic buffers to housing and infrastructure will mitigate the potential impacts of wildfire including loss of life and property.

According to the 2015 Butte County Community Wildfire Protection Plan (Butte CWPP), north wind events are consistent with red flag warning conditions and provide the highest potential for impacts to the perimeters of the city. A wind event could produce an urban-conflagration situation whereby local resources would be overwhelmed in initial suppression efforts. Wind is the primary factor for large fire spread in the Chico area. Large fires in or around Chico include the Skyway Fire which burned 425 acres in 2006, the Humboldt Fire which burned over 23,000 acres in 2008, the Stoney Fire which burned 956 acres on the south side of Upper Bidwell Park in July 2018, and the devastating Camp Fire in Paradise and surrounding areas in November 2018. .

Project Description: This proposed project includes reducing hazardous fuels in Upper Bidwell Park by using various treatment methods, such as vegetation thinning, mowing, and grazing. The total project area is 386 acres. The scope of work includes treatment of meadows and open areas currently hosting a large starthistle population to reduce seasonal fuel loading. Where annual grasses cannot compete with invasive populations, fuel heights are more than double and thus flame-lengths, rate of spread, and difficulty to control metrics are all increased. Starthistle can be controlled well using methods to reduce the seed bank.

The work also includes thinning of the Oak woodlands to reduce surface fuel loading and the vertical arrangement of fuels that would increase rate and spread of a wildfire. Treatments will reduce the difficulty to control fires by reducing the potential for vertical growth and torching.

Other Alternatives: Prescribed burns were also considered as an additional treatment method, particularly for Starthistle.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Bidwell Park Master Management Plan and CEQA.

Responsible Office/Partners: City of Chico Park Division is the principle responsible office for this project.

Cost Estimate: $361,000

Benefits (Losses Avoided): Over $195 million estimated valuation of structures within a 2-mile radius of the project area.

Potential Funding: City of Chico in-kind labor, volunteer labor, and the use of CA Conservation Corps and/or Alliance for Work Force Development crews as local match.

Timeline: 36 months implementation period

Project Priority: High