Annex E Town of Paradise

E.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Town of Paradise, 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 Town. This Annex provides additional information specific to the Town of Paradise, with a focus on providing additional details on the risk assessment and mitigation strategy for this community.

E.2 Planning Process

As described above, the Town of Paradise 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 Town formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table E-1. Additional details on plan participation and Town representatives are included in Appendix A.

Table E-1 Town of Paradise – Planning Team

Name	Position/Title	How Participated
Lauren Gill	Town Manager	Attended meetings and provided guidance on Town's Annex.
John Messina	Assistant Chief – Town of Paradise Fire	Provided Hazard Identification table. Attended meetings. Provided feedback on plan development. Assisted with wildfire mitigation actions.
Greg Eaton	Recovery Advisor	Updated Annex, drafted HMGP Projects, attended meetings, and provided feedback on plan development.
Gina Will	Administrative Services Director/Town Treasurer	Updates to Annex, review of LHMP, and guidance on Town's Annex.
Laura Page	Disaster Recovery Manager	Updates to Annex, review of LHMP, and guidance on Town's Annex.
Susan Hartman	Acting Community Development Director	Updates to annex, review of LHMP, and guidance on Town's Annex.
Callie Jane Deanda	Fire Safe Council	Provided input on wildfire. Provided input on mitigation actions.

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

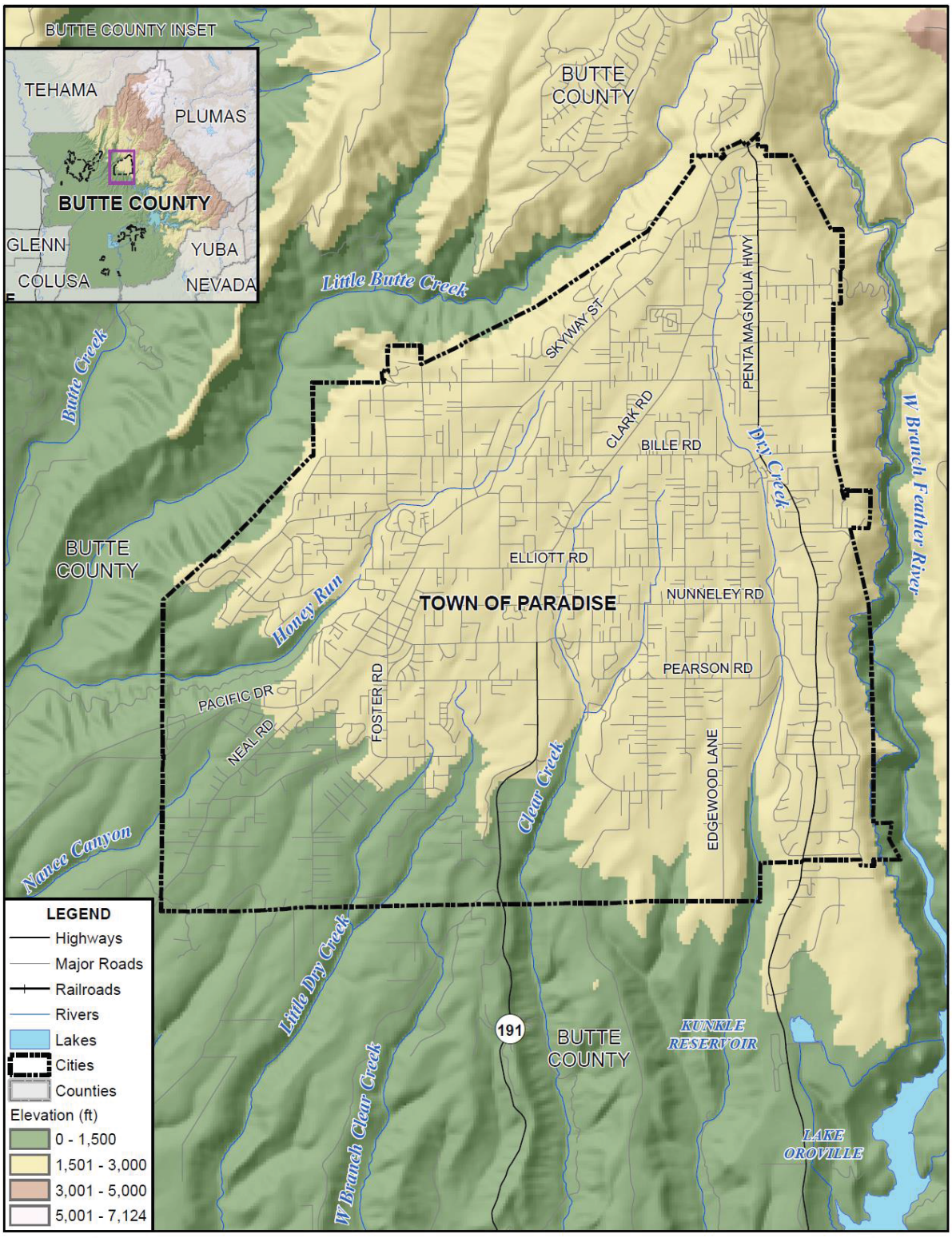
Table E-2 2014 LHMP Incorporation

Planning Mechanism 2014 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
Camp Fire Long Term Community Recovery Plan	The 2014 LHMP was used in the overall development of the Town's Long-Term Community Recovery Plan. In the months after the devastating fire, the Town leadership began the planning process for the development of the recovery of the Town. The 2014 LHMP was used in the beginning stages of the development of this plan.
Storm water Mitigation Notice of Interest	The Town submitted a Notice of Interest for a Storm Water Master Plan based on the likely occurrence and medium vulnerability of localized flooding due to storm water. The master plan, if approved, will assist the town in better storm water management and mitigating the vulnerability of localized flooding in the Town.

E.3 Community Profile

The community profile for the Town of Paradise is detailed in the following sections. Figure E-1 displays a Town map and the location of the Town of Paradise within Butte County.

Figure E-1 Town of Paradise



Data Source: Butte County GIS, Cal-Atlas; Map Date: 3/1/2019.

E.3.1. Geography and Climate

The Town of Paradise is located at the juncture of the western slopes of the Cascade and Sierra Nevada systems in north central Butte County. Topography and drainage patterns have had a major influence on development patterns in the area. This area is defined by steep canyons - to the east by the West Branch of the Feather River drainage, and to the northwest by the Butte Creek-Little Butte Creek drainage. The Town of Paradise occupies an area identified as the Lower Ridge, which ranges from 2,200 feet in the north to 1,500 feet at the town's southern boundary. The area encompassing Paradise has a hot-summer Mediterranean climate according to the Köppen climate classification system.

E.3.2. History

Incorporated in 1979, the Town of Paradise is nestled in the foothills of Northern California's Sierra Nevada Mountains and sits astride a ridge top with elevations ranging from 1,200 to 2,400 feet above sea level. Originally settled during the Gold Rush era, the Town of Paradise and surrounding area grew very slowly during the first half of this century. The Town of Paradise is predominately residential in character, and most of its dwelling units are single-family units. Multi-family units, at densities ranging from 8 to 12 units per acre, are found primarily in central Paradise, near commercial uses and along major arterial streets.

The Town's central business district consists of a narrow band of commercial uses along both sides of the Skyway generally between Black Olive Drive and Maxwell Drive. The town contains relatively little industrial development. Agricultural uses, including vineyards, orchards, and grazing land, are located primarily in the southern third of the town.

E.3.3. Economy and Tax Base

US Census estimates show economic characteristics for the Town of Paradise. These are shown in Table E-3 and Table E-4. Mean household income in the Town was $64,409. Median household income in the Town was $48,831.

Table E-3 Town of Paradise – Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	231	2.3%
Construction	548	5.4%
Manufacturing	511	5.0%
Wholesale trade	255	2.5%
Retail trade	1,379	13.6%
Transportation and warehousing, and utilities	312	3.1%
Information	220	2.2%
Finance and insurance, and real estate and rental and leasing	474	4.7%
Professional, scientific, and management, and administrative and waste management services	763	7.5%

Industry	Estimated Employment	Percent
Educational services, and health care and social assistance	3,316	32.8%
Arts, entertainment, and recreation, and accommodation and food services	972	9.6%
Other services, except public administration	591	5.8%
Public administration	552	5.5%

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

Table E-4 Town of Paradise – Income and Benefits

Income Bracket	Population	Percent
>$10,000	674	6.3%
$10,000 – $14,999	588	5.5%
$15,000 - $24,9999	1,442	13.4%
$25,000 – $34,999	1,246	11.6%
$35,000 – $49,999	1,561	14.5%
$50,000 – $74,999	2,233	20.8%
$75,000 – $99,999	1,113	10.4%
$100,000 – $149,999	1,300	12.1%
$150,000 – $199,999	287	2.7%
$200,000 or more	304	2.8%

Source: US Census Bureau, 2010

As the Town continues to recovery from the impacts of the devastating Camp Fire, the demographics in the Town will be different from the Town of Paradise pre-fire. The employment of the civilian population will change as well as the income levels and largest employers in Town. Prior to the fire, the largest employer was the community's hospital. Post fire, the employment composition of the Town will take shape in the years ahead as the community completes the response to the fire, removing debris, addressing standing burnt trees, and many other of the challenges of recovery. These response steps are critical as the community must be safe before Paradise residents return and new families settle into Paradise. It is also likely that the makeup of the community will change throughout the recovery. The employment and employers will ebb and flow as the community rebuilds, critical infrastructure is restored, the community grows, and the needs of the community change through the recovery process.

E.3.4. Population

The California Department of Finance estimated the January 1, 2019 total population for the Town of Paradise was 4,590.

E.4 Hazard Identification

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

Table E-5 Town of Paradise—Hazard Identification Assessment

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

E.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile Paradise's hazards and assess the Town'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 Town 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 Town 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.

E.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section E.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard affects the Town 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.

E.5.2. Vulnerability Assessment and Assets at Risk

This section identifies Paradise'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 2018 (pre-Camp Fire) and 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. The following tables show assets at risk in the Town:

- Table E-6 shows the 2018 Assessor's values (e.g., the values at risk) broken down by property type for the Town of Paradise. This shows the Town values pre-fire.
- Table E-7 shows the 3/28/2019 Assessor's values (e.g., the values at risk) broken down by property type for the Town of Paradise. This shows the Town values post-fire.

- Table E-8 shows a comparison of pre-fire improved structure values to post-fire improved structure values.

Table E-6 Town of Paradise – Pre-Fire 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	5	1	$161,851	$47,386	$21,977	$47,386	$278,600
Commercial	720	595	$102,680,834	$316,510,370	$14,110,259	$316,510,370	$749,811,833
Industrial	18	16	$2,598,809	$3,868,153	$165,000	$5,802,230	$12,434,192
Residential	10,653	9,986	$676,349,581	$1,278,626,102	$196,518	$639,313,051	$2,594,485,252
Unknown	104	4	$853,209	$1,517,195	$0	$0	$2,370,404
Town of Paradise Total	**11,500**	**10,602**	**$782,644,284**	**$1,600,569,206**	**$14,493,754**	**$961,673,037**	**$3,359,380,281**

Source: Butte County 2018 Parcel/Assessor's Data

Table E-7 Town of Paradise – Post-Fire 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	5	1	$161,851	$24,379	$11,631	$24,379	$222,240
Commercial	724	597	$103,002,892	$273,582,659	$13,392,101	$273,582,659	$525,827,820
Industrial	16	14	$2,525,218	$3,598,536	$165,000	$5,397,804	$11,782,558
Residential	10,646	9,979	$676,226,190	$745,996,179	$106,299	$372,998,090	$1,740,765,982
Unknown	110	3	$426,672	$137,487	$	$0	$562,197
Town of Paradise Total	**11,501**	**10,594**	**$782,342,823**	**$1,023,339,240**	**$13,675,031**	**$652,002,932**	**$2,279,160,797**

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

Table E-8 Town of Paradise – Pre-Fire vs Post Fire Total Values at Risk by Property Use

Property Use	Pre-fire Improved Structure Value	Post-fire Improved Structure Value	Value Change	% change
Agricultural	$47,386	$24,379	-$23,007	-48.6%
Commercial	$316,510,370	$273,582,659	-$42,927,711	-0.135628134
Industrial	$3,868,153	$3,598,536	-$269,617	-7.0%
Residential	$1,278,626,102	$745,996,179	-$532,629,923	-41.7%
Unknown	$1,517,195	$137,487	-$1,379,708	-90.9%
Town of Paradise Total	**$1,600,569,206**	**$1,023,339,240**	**-$577,229,966**	**-36.1%**

Source: Butte County 2018 and 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 Town of Paradise was 4,590, all of which are potentially vulnerable to hazard events.

Special Populations and Disadvantaged Communities

The Town of Paradise prior to the Camp Fire had a median age of 50.2, with nearly 30% of the Town over 60 years old, according to the 2010 census. The 2017 American Community Survey (ACS) estimates that 18.9% of the pre fire population had an annual income of less than $25,000 and 45% of the population had and annual income of less than $50,000. Overall, 6.9% of the pre fire population was below the poverty level.

The post fire population will be even more vulnerable with lack of critical services available in the Town with the medical services in Town being greatly reduced. The ambulance service in Town is no longer operating in Town with the reduced population. The medical facilities in Town are also evaluating the need and ability of the post fire population to support their businesses. The reduction in critical services as a result of the Camp Fire will result in special populations being even more vulnerable.

Critical Facilities and Infrastructure

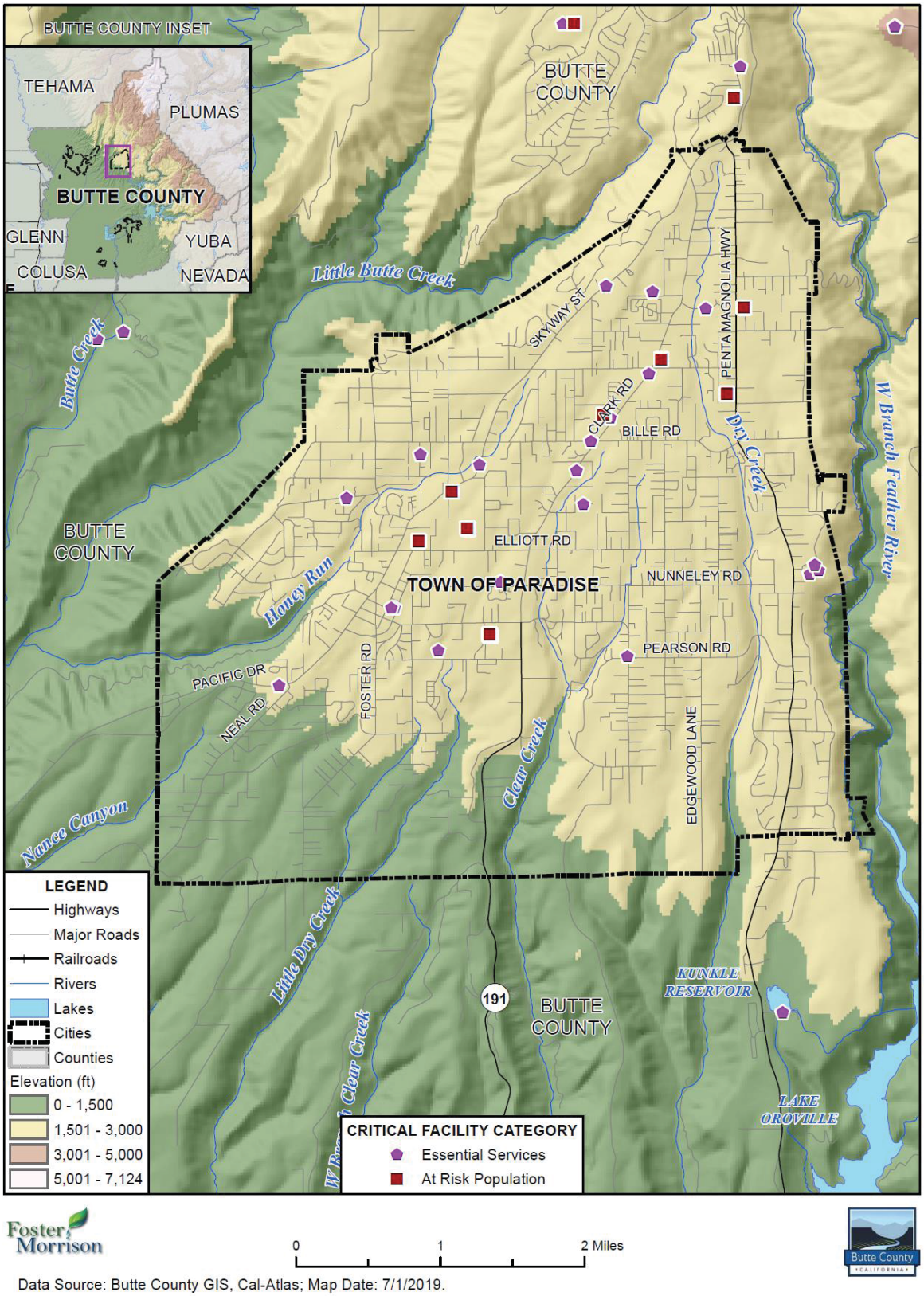
For purposes of this plan, a critical facility is defined as:

> *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 and (2) At-Risk Populations Facilities, and (3) Hazardous Materials Facilities as discussed in Section 4.3.1 of the Base Plan.

An inventory of mapped critical facilities in the Town of Paradise from Butte County GIS is shown on Figure E-2. Table E-9 gives summary information about the critical facilities in the City. Table E-10 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 E-2 Town of Paradise – Critical Facilities



Data Source: Butte County GIS, Cal-Atlas; Map Date: 7/1/2019.

Table E-9 Town of Paradise – Critical Facility Summary

Critical Facility Category	Facility Count
Essential Services Facilities	21
At Risk Population Facilities	12
Town of Paradise Total	**33**

Source: Butte County GIS

Table E-10 Town of Paradise – Critical Facilities by Facility Type

Critical Facility Category / Facility Type	Facility Count
Essential Services Facilities	
Fire	3
Health Care	15
Law Enforcement	1
Public Assembly Point / Evacuation Center	2
Essential Services Facilities Total	**21**
At Risk Population Facilities	
School	12
At Risk Population Facilities Total	**12**
Grand Total	**33**

Source: Butte County GIS

Natural Resources

Several natural vegetation communities occur within the Paradise study area, including chaparral, nonnative grassland, riparian woodland, Great Valley cottonwood riparian forest, foothill woodland, digger pine - oak woodland, Ponderosa pine forest, and northern hardpan vernal pool. Several sensitive plant species occur in association with the northern hardpan vernal pool community: Hoover's spurge (*Chamaesyce hooverii*, federal-Category 1; state-none), Green's tuctoria (*Tuctoria greenei*, federal-candidate Category 1; state-rare), and Shippee meadowfoam (*Limnanthes floccosa ssp. californica*, federal-Category 1; state-endangered).

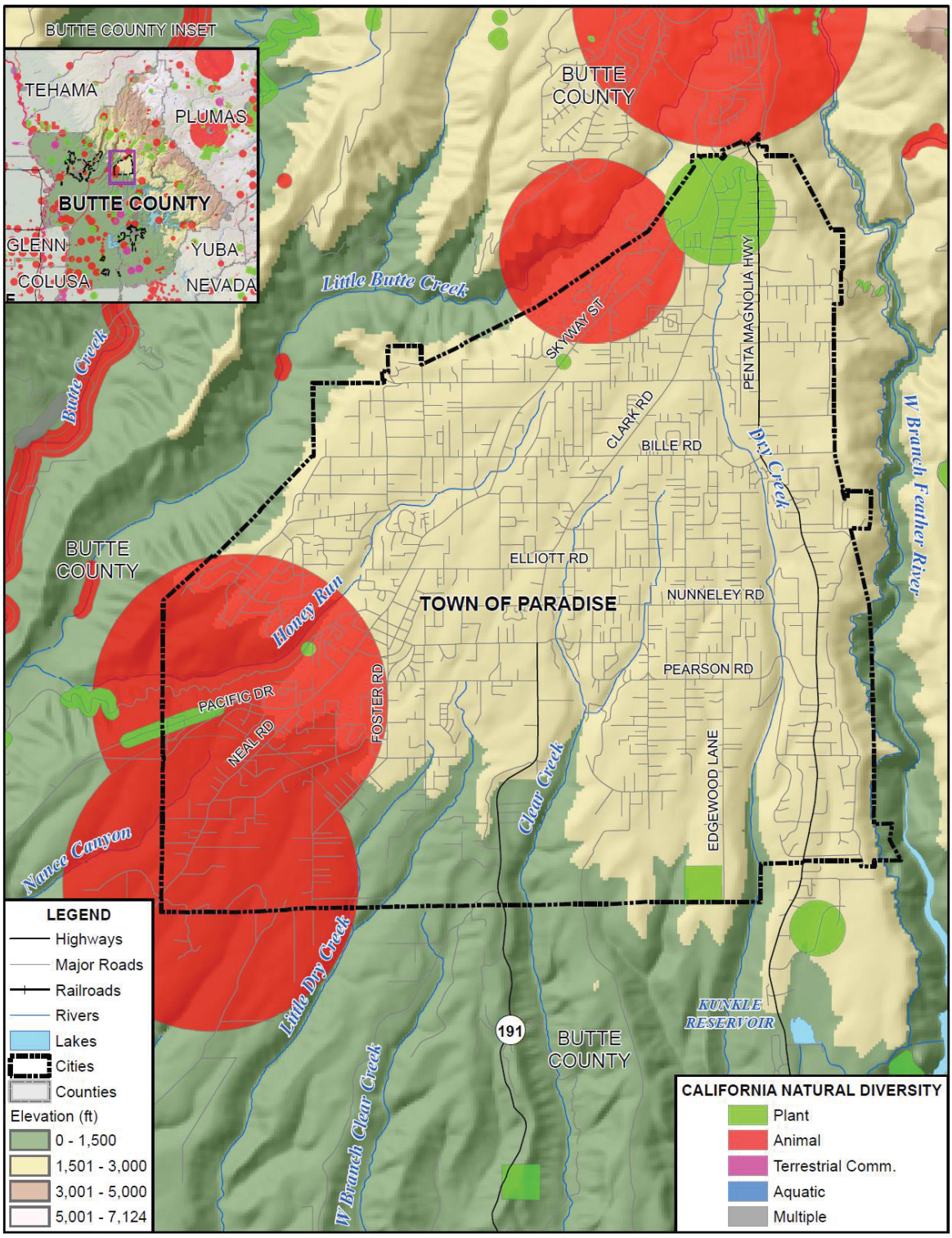
Other sensitive species with reported occurrences within or near the study area include California hibiscus (*Hibiscus californicus*, federal-Category 2; state-none), which occurs in moist, freshwater-soaked river banks and low peat islands in sloughs, marshes and swamps; Butte County checkerbloom (*Sidalcea robusta*, federal-Category 2; state-none), which occurs in small draws and rocky crevices in chaparral and cismontane woodland communities; California besked-rush (*Khynchospora californica*, federal-Category 2; state-none), occurring in freshwater seeps.

Sensitive plant species with the potential to occur within or near the study area include Ahart's paronychia (*Paronychia ahartii*, federal-Category 2; state-none), which occurs in stony, nearly barren clay of swales and higher ground around vernal pools in valley and foothill grassland communities; and veiny monardella

(*Monardella douglasiivar*. *venosa*, federal-Category 2; state-none), which also occurs in valley and foothill grasslands; adobe lily ifritillaria pluriflora); Butte County fritillary (*Fritillaria eastwoodias*); Red Bluff dwarf rush (*Juncus leioipermus var*. *leiospermus*); Bidwell's knotweed (*Polygonum bidwelliae*); Butte morning glory (*Cailystegia atriplicifolius*); clustered lady slipper orchid (*Cypripediumfasciculatum*); Butte County (*Shippee*) meadowfoam (*Limnanthes floccosa* sp. *Californica*, State-Endangered); and Greene's Orcutt Grass (*Tuctoria greenei*, State-Rare).

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 Town of Paradise is shown on Figure E-3.

Figure E-3 Town of Paradise Natural Diversity Map



Historic and Cultural Resources

The Town of Paradise 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. Historic properties in Paradise are shown in Table E-11. It should be noted that the inventory was done prior to the Camp Fire, and has not yet been updated.

Table E-11 Town of Paradise – Historic Properties

Resource Name (Plaque Number)	National Register	State Landmark	California Register	Point of Interest	Date Listed	City/ Community
BR #12C-8 / Honey Run Covered Bridge (P3)				X	8/5/1966	Paradise
Butte County Railroad Depot (P575)				X	12/21/1981	Paradise
Centerville Schoolhouse (P185)	X			X	1/19/1971	Paradise
Forks of Butte (N2220)	X				1/2/2004	Paradise

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

Growth and Development Trends

Prior to the 2018 Camp Fire, Paradise had seen steady growth. Paradise growth rates are shown in Table E-12. The Town saw large growth between 1960 and 2000, with a small dip between 2000 and 2010. Much of the 2019 loss is attributed to the movement of people away from Paradise due to the Camp Fire.

Table E-12 Town of Paradise – Population Changes Since 1960

Year	Population	Change	% Change
1960	8,268	–	–
1970	14,539	6,271	75.8%
1980	22,571	8,032	55.2%
1990	25,408	2,837	12.6%
2000	26,408	1,000	3.9%
2010[1]	26,218	-192	-0.7%
2019[2]	4,590	-21,628	-82.5%

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

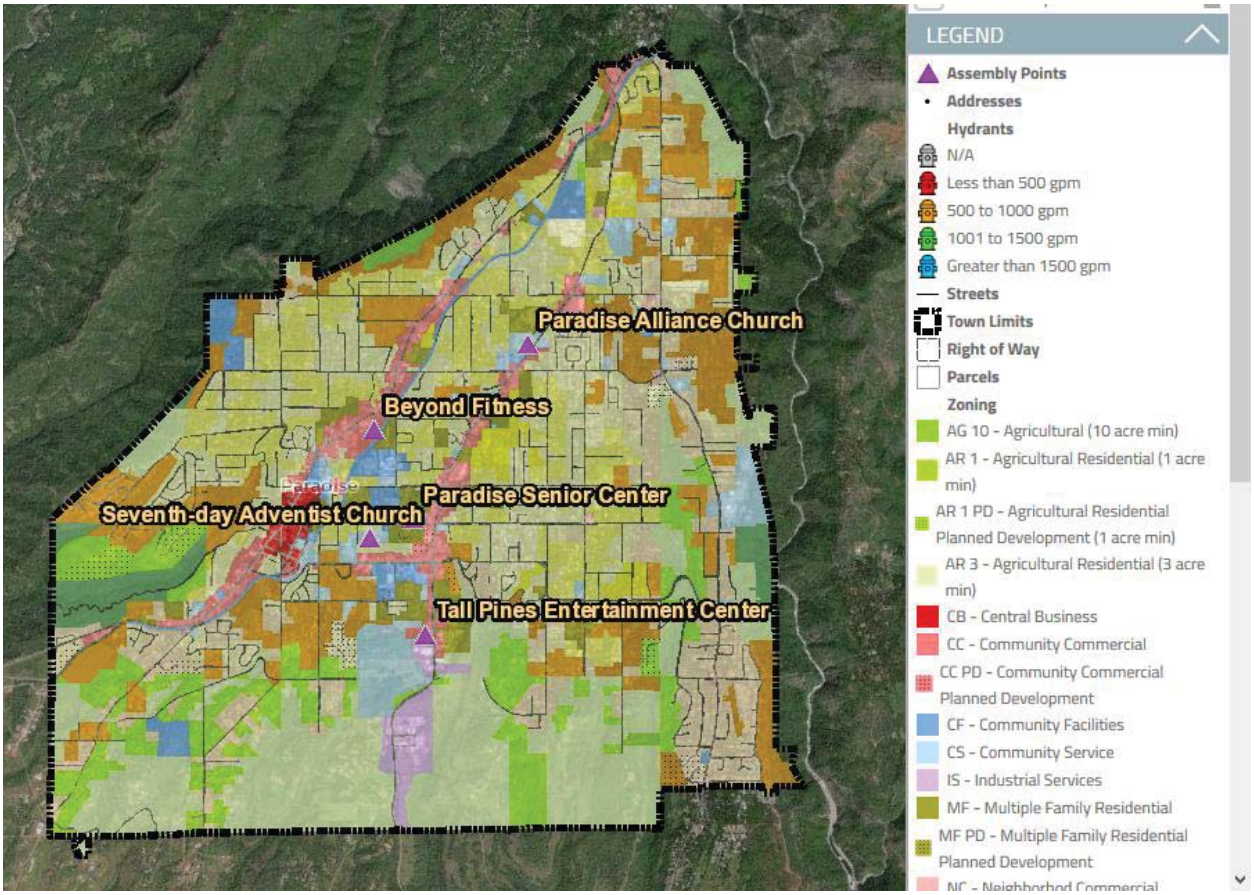
Land Use

As required by California Government Code Section 65302(a) and Public Resources Code Section 2762(a), the Land Use Element of the General Plan addresses the following issues:

- Distribution, location and extent of the uses of land for housing, business, industry, open space, natural resources, recreation, and enjoyment of scenic beauty, education, public buildings and grounds and other categories of public and private uses of land.
- Standards of population density and building intensity for the land use designations.

Figure E-4 illustrates existing land uses in the Town of Paradise.

Figure E-4 Town of Paradise – Land Use Diagram



Source: Town of Paradise – Interactive Land Use Viewer

Development since 2014 Plan

The Town Building Department tracked total building permits issued since 2014 for the Town. These are tracked by total development, property use type, and hazard risk area. These are shown in Table E-13 and Table E-14. 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 Town to identified priority hazards.

Table E-13 Town of Paradise – Total Development Since 2014

Property Use	2014	2015	2016	2017	2018
Agricultural					
Commercial	6	2	9	3	2
Industrial	2				
Residential	48	72	58	62	67
Unknown					
Total	**56**	**74**	**67**	**65**	**69**

Source: Town of Paradise Building Department

Table E-14 Town of Paradise – Development in Hazard Areas since 2014

Property Use	1% Annual Chance Flood	Landslide Susceptibility Area	Wildfire Risk Area[1]	Other
Agricultural				
Commercial			22	
Industrial			2	
Residential			307	
Unknown				
Total				

Source: Town of Paradise Building Department

[1]Moderate or higher wildfire risk area

Future Development

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 Town in the 2014-2040 Regional Transportation Plan is shown in Table E-15. Due to the Camp Fire, these numbers seem non-sensical. The value of these estimates is to help show the differences between the previous expected growth for the Town. New estimates of future populations will take some time to be developed, as the Town is still reeling from the affects from the fire and recovery is in its infancy.

Table E-15 Town of Paradise – Future Population Estimates

Jurisdiction	2020	2025	2030	2035	2040
Paradise	26,109	27,192	28,294	30,669	31,347

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

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.

E.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table E-5 as high or medium significance hazards. Impacts of past events and vulnerability of the Town 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 Town 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.

Drought and Water Shortage

Likelihood of Future Occurrence–Likely
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 and is critical for manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Location and Extent

As discussed in the Base Plan, drought and water shortage are regional phenomenon. The whole of the County, as well as the whole of the Town, is at risk. Drought has a slow speed of onset and a variable duration. Drought can last for a short period of time, which does not usually affect water shortages. Should a drought last for a long period of time, water shortage becomes a larger issue.

Past Occurrences

Since drought is a regional phenomenon, past occurrences of drought for Paradise are the same as those for the County. Those past occurrences can be found in Section 4.2.8 of the Base Plan.

Vulnerability to Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including the Town of Paradise, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts is often extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users.

Impacts

The vulnerability of the Town of Paradise to drought is Town-wide, but impacts may vary and include reduction in water supply and an increase in dry fuels. The increased dry fuels result in an increased fire danger. Areas of Paradise are in the foothill interface and become more susceptible to wildfire as drought conditions increase. Residents of these areas are often times dependent upon ground water (water wells) for their water supply. As these water wells begin to fail during periods of drought, the ability of the residents to water landscaping decreases, and fire fuel loads increase. Other qualitative impacts associated with drought in the planning area are those related to water intensive activities such as wildfire protection, municipal usage, commerce, tourism, and recreation. Voluntary conservation measures are typically implemented during extended droughts. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

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. These and other impacts are thoroughly evaluated in the Paradise Irrigation District's 2015 Urban Water Management Plan, including a Water Shortage Contingency Plan and a Catastrophic Supply Interruption Plan. The District's 2012 updated Water System Emergency Response plan includes an Emergency Action Plan (EAP) for dam failure as well as EAPs for other natural disaster and man-made malevolent events.

Future Development

Post fire, the Paradise Irrigation District is restoring potable water to standing homes, permitted homes, businesses, and Town buildings. While the process will take time, the District is working diligently to restore water to the community. It appears there is plenty of water to serve the current community in addition to the growth that is/will be occurring in Town.

In addition, the Town's Recovery Plan has a project for the development of a wastewater system in the Town. As this Recovery project takes shape, a sewer system in the commercial areas would incentivize economic growth and reduce environmental impacts in the Town. A byproduct of the sewer system could potentially be used for the reclaimed water to further alleviate any potential drought. This reclaimed water could potentially be used for landscape irrigation and fire suppression, which would create green zones to mitigate the impacts of drought in the community as well as enhancing the fire suppression capabilities of the Town.

Earthquake (minor/major) and Liquefaction

Likelihood of Future Occurrence–Occasional/Unlikely/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. Paradise is not at risk for tsunamis or seiches due to its inland location and the absence of nearby large bodies of water. Due to the proximity of the Town to the Cleveland Hills Fault, the Town can expect low to medium intensity shocks from time to time. These earthquakes can cause liquefaction within the Town. Liquefaction is a process whereby soil is temporarily transformed to a fluid formed during intense and prolonged ground shaking.

Location and Extent

There are a number of faults within Butte County and a large number of relatively nearby faults that could be considered potentially active, based either on the fairly restrictive criteria developed by the California

Mining and Geology Board. Following is a description of the active faults in or near the Magalia Dam. These faults are detailed below and shown in Figure 4.24 of the base plan and include the following:

- Magalia Fault. The Magalia Fault is located near the northern end of the Foothill Fault System, a system of northwest trending east dipping normal fault formed along the margin of the Great Valley and the Sierra Nevada provinces. The DSD, based on Fault Activity Guidelines in 2001 reclassified the Magalia Fault as conditionally active. The Paradise Irrigation District commissioned a study by Holdrege & Kull, dated January 2007 to evaluate the Magalia Fault.
- Foothills Shear Zone. The Foothills shear zone extends into southern Butte County. A possible magnitude 7.0 earthquake in this zone would result in intensities as high as IX in Butte County

Since earthquakes are regional events, the whole of the Town is at risk to earthquake. Paradise and the surrounding area are relatively free from significant seismic and geologic hazards. There are no known or inferred active faults within the Town. 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. Aerial liquefaction potential extents for the Town of Paradise from the Butte County 2030 General Plan are shown in Table E-16.

Table E-16 Town of Paradise – Geographical Extents 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	0	0.00%	0	0.00%	0	0.00%
Generally Low	10,780	98.90%	8,431	77.35%	2,349	21.55%

Source: Butte County General Plan 2030

Past Occurrences

While the 1975 Oroville earthquake was the most significant event in the County, it did not produce enough damages in the area to result in a Federal Declaration. The most significant earthquake in the immediate vicinity of the Town of Paradise was the 2.6 magnitude earthquake in 1988, according to the USGS.

Otherwise, the HMPC noted no other past occurrences of earthquakes or liquefaction that affected the Town 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 Town of Paradise is within the less hazardous Zone 3.

Impacts

Earthquake vulnerability is primarily based on population and the built environment. Urban areas in high seismic hazard zones are the most vulnerable, while uninhabited areas are less vulnerable. There are minimal numbers of URM buildings within the Town of Paradise and all of those buildings are privately owned.

The HMPC noted that an aging water distribution system comprised of steel pipe requires ongoing replacement that is vulnerable to earthquake damage due to corrosion issues. District personnel installed 29,821 feet of mainline in the last five years. In addition, grant funding helped with the installation of 8,774 feet of mainline installed by a contractor. While the total fell short of the goal to complete the replacement of 75,000 feet of line, a deferral of mainline installation was realized with the freezing of three full-time positions and a dispute with the union over temporary worker status. Avoidance of unnecessary water losses that deplete water storage supply and increase operations costs are being sought. The high cost for unplanned pipeline repairs that damage public and private property can be avoided by replacing the steel pipes before they become problematic.

Also of concern during an earthquake event are the various dams located near the Town. The California Division of Safety of Dams is concerned that if the epicenter of an earthquake of significant magnitude were to occur nearby a dam, the likelihood of a structural failure is high. Local dams vulnerable to earthquake damage are hydraulic-filled embankment dams built with sluicing materials from an adjacent area and depositing the slurry into the embankment, such as the Magalia and De Salba Dams.

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 Analysis

Due to the limited amount of earthquake risk in the County and Town, 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

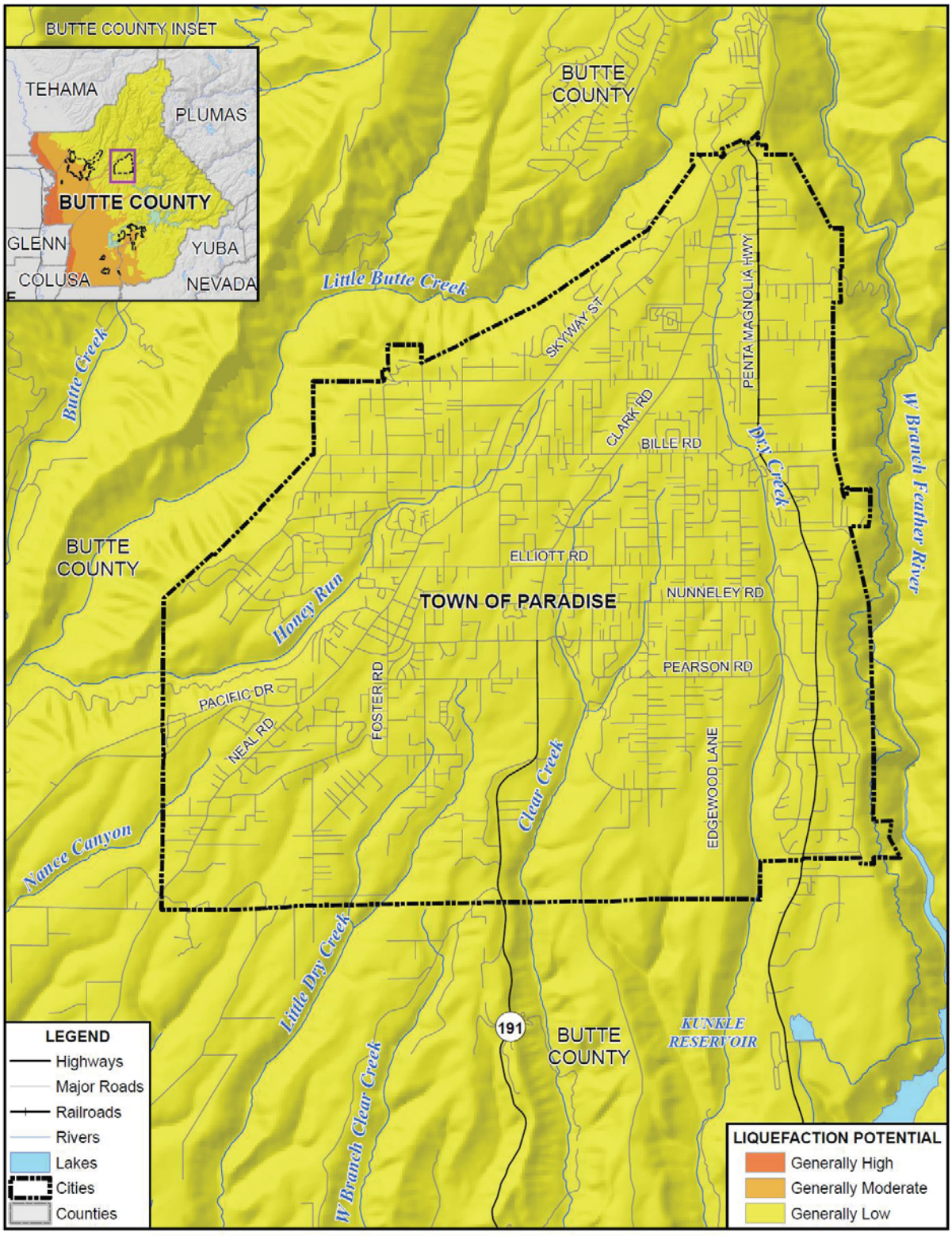
GIS was used to determine the possible impacts of liquefaction within the Town of Paradise. The methodology described in Section 4.3.6 of the Base Plan was followed in determining structures and values at risk to the earthquake-based liquefaction.

Values at Risk

Liquefaction potential zones for the Town of Paradise are shown on Figure E-5. As seen on this map, portions of the Town are in the Generally Low and Moderate zones. Analysis of Town values at risk to liquefaction is shown on four tables.

- Table E-17 gives a summary of pre-fire parcel counts and values in the liquefaction areas in the Town of Paradise.
- Table E-18 gives a summary of post-fire parcel counts and values in the liquefaction areas in the Town of Paradise.
- Table E-19 compares the pre-fire improved structure values in the liquefaction areas in the Town to the post-fire improved structure values.
- Table E-20 shows the post-fire property use, improved parcel count, improved values, estimated contents, total values and estimated loss of parcels that fall in a liquefaction area in the Town.

Figure E-5 Town of Paradise – Liquefaction Potential Areas



Data Source: Butte County General Plan 2030, Butte County GIS, Cal-Atlas; Map Date: 3/1/2019.

Table E-17 Town of Paradise – Pre-Fire Count and Value of Parcels by Liquefaction Potential

Liquefaction Potential /	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Generally Low	11,500	10,602	$782,644,284	$1,600,569,206	$14,493,754	$961,673,037	$3,359,380,281
Town of Paradise Total	**11,500**	**10,602**	**$782,644,284**	**$1,600,569,206**	**$14,493,754**	**$961,673,037**	**$3,359,380,281**

Source: Butte County 2030 General Plan, Butte County 2018 Parcel/Assessor's Data

Table E-18 Town of Paradise – Post-Fire Count and Value of Parcels by Liquefaction Potential

Liquefaction Potential	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
Generally Low	11,501	10,594	$782,342,823	$1,023,339,240	$13,675,031	$652,002,932	$2,279,160,797
Town of Paradise Total	11,501	10,594	$782,342,823	$1,023,339,240	$13,675,031	$652,002,932	$2,279,160,797

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

Table E-19 Town of Paradise – Comparison of Pre-Fire to Post-Fire Improved Structure Values at Risk by Liquefaction Potential

Liquefaction Potential	Pre-fire Improved Structure Value	Post-fire Improved Structure Value	$ Change	% change
Generally Low	$1,600,569,206	$1,023,339,240	-$577,229,966	-36.1%
Town of Paradise Total	**$1,600,569,206**	**$1,023,339,240**	**-$577,229,966**	**-36.1%**

Source: Butte County 2030 General Plan, Butte County 2018 and 3/28/2019 Parcel/Assessor's Data

Table E-20 Town of Paradise – Post-Fire Count and Value of Parcels by Liquefaction Potential 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 Low							
Agricultural	5	1	$161,851	$24,379	$11,631	$24,379	$222,240
Commercial	724	597	$103,002,892	$273,582,659	$13,392,101	$273,582,659	$525,827,820
Industrial	16	14	$2,525,218	$3,598,536	$165,000	$5,397,804	$11,782,558
Residential	10,646	9,979	$676,226,190	$745,996,179	$106,299	$372,998,090	$1,740,765,982
Unknown	110	3	$426,672	$137,487	$0	$0	$562,197
Generally Low Total	**11,501**	**10,594**	**$782,342,823**	**$1,023,339,240**	**$13,675,031**	**$652,002,932**	**$2,279,160,797**
Town of Paradise Total	**11,501**	**10,594**	**$782,342,823**	**$1,023,339,240**	**$13,675,031**	**$652,002,932**	**$2,279,160,797**

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

Population at Risk

The liquefaction potential zones were overlayed on the parcel layer. Those residential parcel centroids that intersect the landslide potential were counted and multiplied by the 2010 Census Bureau average household factors for Paradise – 2.17. According to this analysis, there is a total population of 0 residents of the Town at risk from liquefaction in the Generally Moderate Zone or Generally High area. This is shown in Table E-21. The majority of the population falls in the Generally Low area.

Table E-21 Town of Paradise – Count of Improved Residential Parcels and Population by Liquefaction Area

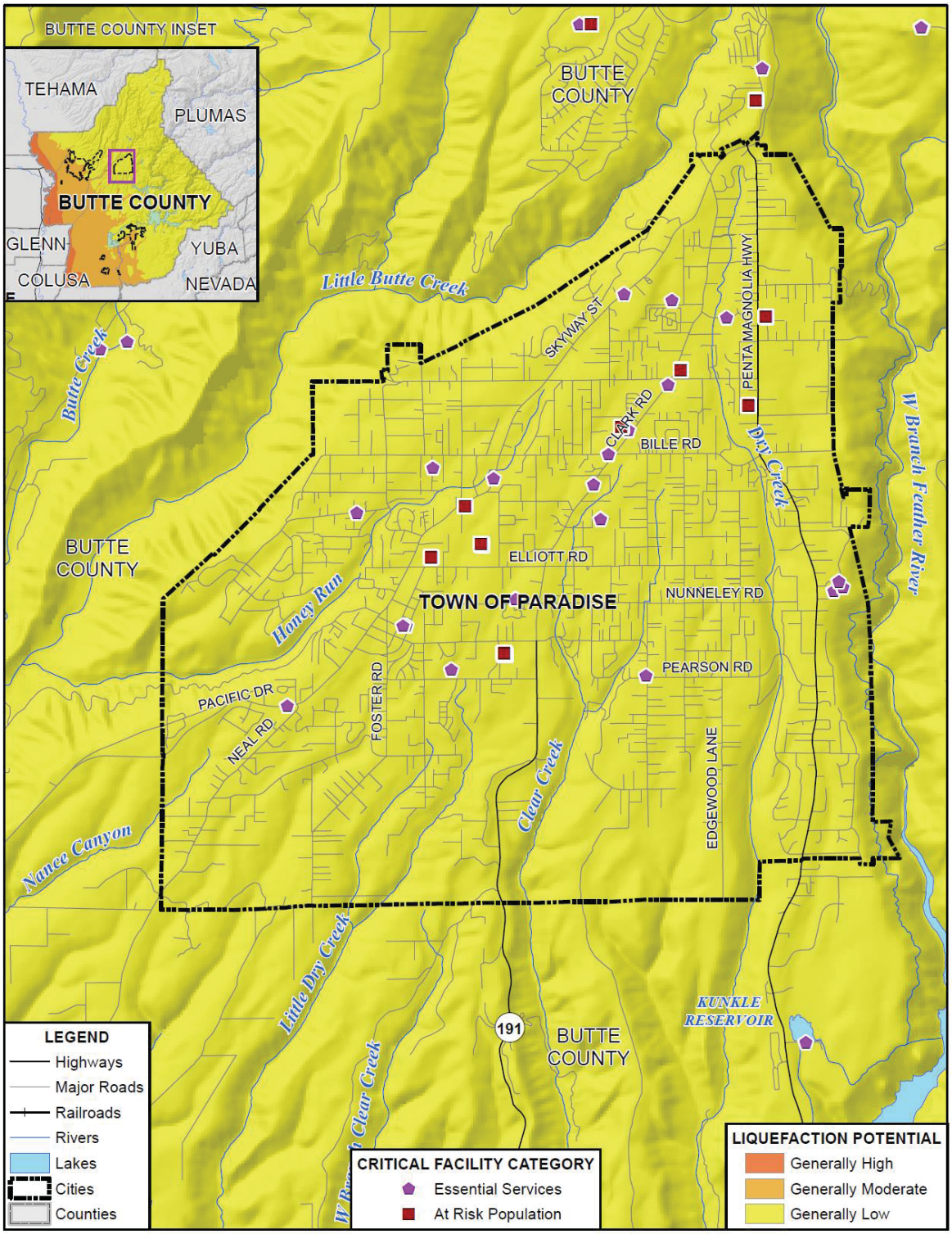
Jurisdiction	Generally Moderate		Generally High	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Paradise	0	0	0	0

Source: Butte County General Plan, 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 Paradise 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 Town of Paradise are shown in Figure E-6 and detailed in Table E-22. Details of critical facility definition, type, name and address and jurisdiction by liquefaction potential area are listed in Appendix F.

Figure E-6 Town of Paradise – Critical Facilities in Liquefaction Potential Areas



Data Source: Butte County General Plan 2030, Butte County GIS, Cal-Atlas; Map Date: 7/1/2019.

Table E-22 Town of Paradise – Critical Facilities by Liquefaction Potential

Liquefaction Potential/ Critical Facility Category / Critical Facility Type	Facility Count
Generally Low	
Essential Services Facilities	
Fire	3
Health Care	15
Law Enforcement	1
Public Assembly Point / Evacuation Center	2
Essential Services Facilities Total	**21**
At Risk Population Facilities	
School	12
At Risk Population Facilities Total	12
Generally Low Total	**33**
Grand Total	**33**

Source: Butte County 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 Town enforces the state building code, which mandates construction techniques that minimize seismic hazards. Future development in the Town is subject to these building codes.

Flood: 100/200/500-Year

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–Low

Hazard Profile and Problem Description

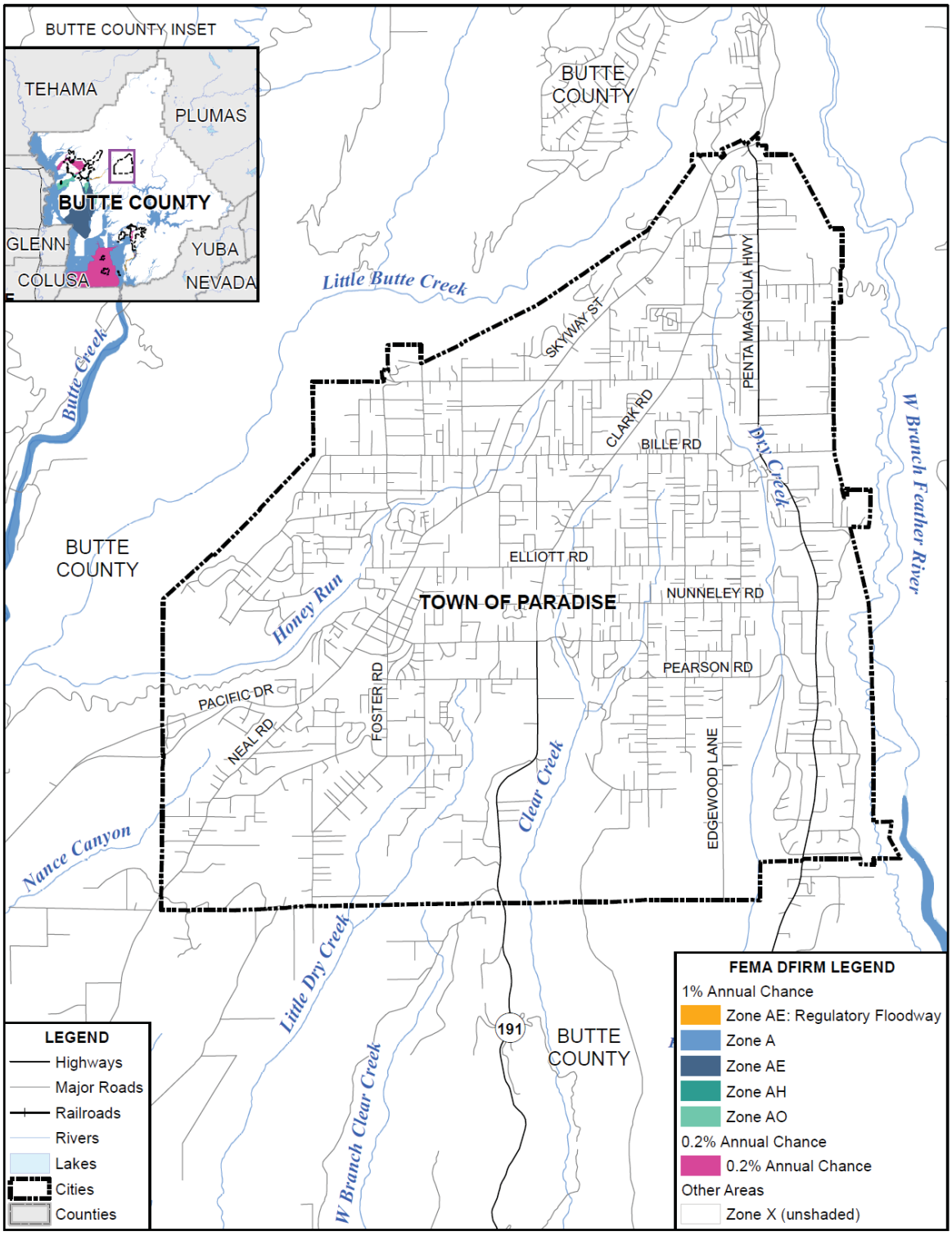
Note: Though considered a low hazard priority by the Town, due to its significance in the County and the State, flood is profiled here.

As previously described in Section 4.2.11 of the Base Plan, the Butte County Planning Area and the Town of Paradise have been subject to historical flooding. Paradise is traversed by several small streams. The Paradise General Plan Safety Element noted that all available sources of flooding information for the Paradise Planning Area conclude that the area is not subject to flooding from outside sources and that, because of the nature of the topography and the drainage basins in the Paradise Planning Area, any flooding that occurs is localized in nature, resulting from a temporary lack of capacity or blockage of a drainage basin.

Location and Extent

The entire Town of Paradise is located outside both the 1% and 0.2% annual chance flood zone as defined by the Federal Emergency Management Agency (FEMA). This is seen in Figure E-7.

Figure E-7 Town of Paradise – FEMA DFIRM Flood Zones



Data Source: FEMA DFIRM 1/6/2011, Butte County GIS, Cal-Atlas; Map Date: 3/1/2019.

Additionally, flood extents can be measured in depths of flooding. Expected flood depths in the are expected to be minimal. Flood durations in the City tend to be short term, lasting until either the storm drainage system can catch up. Aerial flood extent from the FEMA DFIRMs is shown in Table E-23.

Table E-23 Town of Paradise – 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	0	0.00%	0	0.00%	0	0.00%
0.2% Annual Chance Flood Hazard	0	0.00%	0	0.00%	0	0.00%
Other Areas	10,780	98.90%	8,431	77.35%	2,349	21.55%

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 E-24. These events most likely had a limited to negligible effect on Paradise.

Table E-24 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 Town also noted that the only past occurrences of flood were related to storm water and had minor affects and damages to the Town. Specific occurrences are noted Table E-25.

Vulnerability to Flood and Impacts

The vulnerability to flood in the Town is low, due to the fact that there are no floodplains. No values, populations, or critical facilities are located in floodplains.

Insurance Coverage, Claims Paid, and Repetitive Losses

The Town of Paradise joined the National Flood Insurance Program (NFIP) on June 8, 1998. The Town does not participate in CRS program. NFIP data indicates that as of July 19, 2018, there were 13 flood insurance policies in force in the Town with $4,170,000 of coverage. Of the 13 policies, 12 were residential (single-family homes) and 1 was non-residential. All 13 were in B, C, and X zones There has been 1

historical claim for flood losses totaling $14,957.23. 0 of these claims were substantial damage claims. NFIP data further indicates that there are no repetitive loss (RL) or severe repetitive loss (SRL) buildings within the Town.

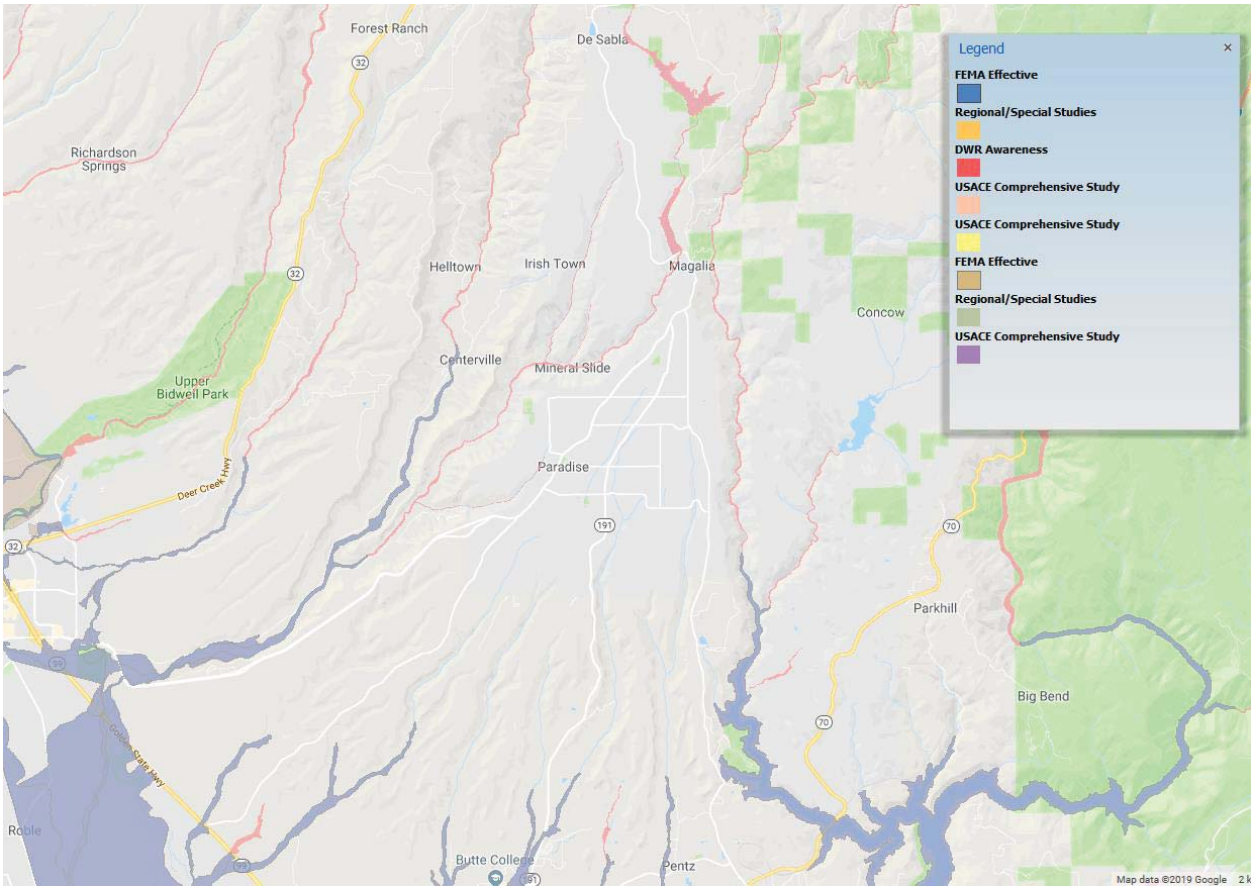
California Department of Water Resources Best Available Maps (BAM)

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 Town 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 Paradise is shown in Figure E-8.

Figure E-8 Town of Paradise – 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 in the City will take place outside of mapped DFIRM floodplains.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Likely
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.

During the Camp Fire, numerous culverts within the Town of Paradise were destroyed as a result of the wildfire. These culverts are imperative for controlling the flow of storm water through roads and other areas. Without the proper functioning of culverts, the Town of Paradise faces significant risks, such as roadways becoming compromised, large amounts of flooding, and danger to people and property.

As described in the LHMP, floods in the planning area are a result of heavy rains, limited drainage routes and along creeks that are prone to flash flooding in rain events up to and including a 100-year storm event. These smaller, more frequent storm events, while not mapped by FEMA as a flood event, have led to flooding of streets, homes, and buildings. Floods can be powerful enough to move large objects, such as branches and trees, swiftly into other objects, such as banks and bridges, cause damage to buildings and infrastructure, and weaken foundations and soils. Secondary impacts of flooding, including saturated soils and erosion from flooding events, can cause trees to weaken and collapse, increasing the potential for property damage and loss of life. All of these impacts make infrastructure more susceptible to sustained damage or collapse.

In a flash flood event, large volumes of water have the potential to cause extreme erosion over a short period of time. This can lead to road failure, bank destabilization and loss of property. In addition, increased sedimentation from heavy erosion can cause clogging and other issues in storm drain infrastructure and increase turbidity of the water, which damages the quality of the creek for fish and other wildlife.

The Town currently lacks any type of comprehensive understanding of the physical condition of the 100 miles of underground storm drain pipe and nearly 1,000 storm drain inlets and drainage structures. This lack of information prevents the Town from making informed strategic decisions to effectively reduce flooding risks and protect public safety, property and infrastructure.

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 Town noted that the only past occurrences of flood were related to storm water and had minor affects and damages to the Town. The following is a list of localized storm water flooding in the Town:

- 10/20/17 Heavy rain and localized flooding
- 12/15/16 Heavy rain and localized flooding
- 11/9/15 Localized flooding

Vulnerability to Localized Flooding and Impacts

Localized flooding impacts the Town of Paradise. The drainage patterns of the Paradise area reflect the uniqueness of its location on a gently sloping ridge surface. The Paradise area is dominated by a somewhat continuous overland runoff flow which is organized into local rills or depressions as the runoff is collected. The Paradise area is divided into fairly distinct drainage basins.

The drainage systems often coincide with groundwater seeps and springs which serve to increase the moisture availability beyond the intermittent flows directly related to storm runoff. Consequently, the drainage depressions and their downslope channels are often thickly vegetated.

As these areas are developed, the undergrowth and grass cover are often removed and channels are randomly excavated to suit the individual owner's or developer's interest. Often when this takes place, either through lack of knowledge, lack of funds or indifference, the resulting channel is inadequate in capacity and poses a real possibility of promoting damage. The Paradise General Plan Safety Element noted that while the soils and subsoils of the Paradise area do not markedly aggravate the runoff situation, they also do not prove to be highly permeable. This often results in localized flooding which can be exacerbated by such land use activities as grading operations, vegetation clearance, inattention to storm runoff from construction sites during the peak winter rainfall period, largescale paving and the lack of a collection system for storm waters. Storm runoff arrives at the principal drainage channels through overland flow for most of the Paradise area. Very few collector systems have been constructed and the primary form of collection has been through roadside ditches. Little Butte Creek conveys surface water and storm runoff into the Paradise Reservoir and Magalia Reservoir.

Although there are not any FEMA SFHAs in the Town of Paradise, inadequacies in the storm drainage facilities have resulted in areas of recurrent flooding. To solve this issue, the Town of Paradise has developed an "Interim Policy" to comply with FEMA policies and objectives. The areas that have repeatedly inundated during storm events are delineated as "Special Permit Zones." Any development in these Special Permit Zones requires a certified elevation certificate based on the determination of the 100-year base flood elevation per FEMA guidelines. This policy has proven effective for the residents in the Town of Paradise; however, it has not changed the repeated flooding during storm events. The Town tracks localized flooding areas. Affected localized flood areas identified by the County in the Town of Paradise are summarized in Table E-25.

Table E-25 Town of Paradise – Road List of Localized Flooding Problem Areas

Road Name	Flooding	Pavement Deterioration	Washout	High Water	Landslide/ Mudslide	Debris	Downed Trees
Honey Run Rd.					X		X
Jordan Hill			X				
New Skyway						X	
Skyway							X

Source: Town of Paradise

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 that provides a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to structures. 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 Town will add more impervious surfaces and need to drain those waters. The Town will need to be proactive to ensure that increased development has proper siting and drainage for stormwaters including the development of a storm water drainage master plan.

Invasive Species: Pests/Plants

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

Invasive species are organisms that are introduced into an area beyond their natural range and become a pest in the new environment. This hazard addresses the issues related to invasive pests including that pose a significant threat to the agricultural and recreational industries and are therefore a concern in the Butte County Planning Area and the Town of Paradise. This hazard does not address pest and plants that cause impacts to human health, as those issues are addressed in other planning mechanisms in the City. Post- fire the primary concerns are the bark battle and their damaging impacts to the Standing Burnt Trees throughout the community. Bark beetles are tiny insects with hard, cylindrical bodies that reproduce under the bark of trees. These insects attack and kill live trees, which exacerbate wildfire in and around the Town. Most species of bark beetles live in dead, weakened, or dying hosts, such as standing burnt trees.

Location and Extent

Invasive species occur throughout the County where lands are used for farming, grazing, and recreation. The County has large swaths of agricultural and open space lands, some of which are near the Town of Paradise. These are shown in the Land Use Map for the County on Figure E-4. There is no scale that measures invasive species. Agriculture and open space lands near the Town are at risk to many hazards: insects, weeds, severe weather, as well as downturns in commodity prices. Insects and weeds can have short or long onset, and short or long durations.

Past Occurrences

There are no know past occurrences of pests/ infestation in the Town. Pests have affected areas of the forested areas near the Town, which contributed fuel to the 2018 Camp Fire.

Vulnerability to Invasive Species Pests/Plants and Impacts

While the Town is not directly affected by invasive species, there have been indirect affects to the forest canopy and fuels load in the area around the Town. There is concern that in the burn scar of the 2018 Camp Fire, invasive species like scotch broom could take hold. This would increase wildfire risk in the Town.

Future Development

The critical aspect of combating an infestation of the bark beetle is removal of the standing burnt trees and then monitoring for the insects in the years to come.

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. In post-fire areas, landslide may be more prevalent as there is no root mass to keep hilly areas from sliding.

Location and Extent

In the Town, the areas surrounding of the Town where topography changes are at greater risk to landslide. These areas effectively surround the Town. 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. Aerial landslide susceptibility and incidence extent from the Butte County 2030 General Plan is shown in Table E-26.

Table E-26 Town of Paradise – Geographical Extent in Landslide Potential Areas

Landslide Incidence and Susceptibility	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
High	319	2.93%	282	2.59%	38	0.35%
Moderate to High	0	0.00%	0	0.00%	0	0.00%
Moderate	2,260	20.73%	1,303	11.95%	957	8.78%

Landslide Incidence and Susceptibility	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Low to Moderate	9,704	89.03%	7,596	69.69%	2,108	19.34%
Low to None	0	0.00%	0	0.00%	0	0.00%

Source: Butte County 2030 General Plan

Past Occurrences

The Town did not note any significant past occurrences of landslides or mudslides.

Vulnerability to Landslide, Mudslide, and Debris Flow and Impacts

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. According to the 1994 Town of Paradise General Plan, in Butte County, landslides frequently occur on slopes greater than fifteen percent, while slopes between five and fifteen percent exhibit very few landslides. Paradise and the surrounding study area are rated as having a low landslide potential. It is noted that detailed analysis of the complex interrelationships between the governing factors is needed to predict the stability of a specific area, and detailed on-site investigations are recommended to assess site-specific risks. Seismic shaking greatly increases landslide potential

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

Values at Risk

GIS was used to determine the possible impacts of landslide within the Town of Paradise. The methodology described in Section 4.3.12 of the Base Plan was followed in determining structures and values at risk to landslide. Figure E-9 shows the landslide potential areas in the Town of Paradise. Analysis results for pre-fire and post-fire landslide incidence and susceptibility areas in the Town are shown in the following four tables:

- Table E-27 shows pre-fire parcel counts, values, estimated contents, and total values in the Town by landslide incidence and susceptibility area.
- Table E-28 shows post-fire parcel counts, values, estimated contents, and total values in the Town by landslide incidence and susceptibility area.
- Table E-29 shows a comparison of pre-fire and post-fire improved structure values in the Town by landslide incidence and susceptibility area.
- Table E-30 breaks down Table E-28 and shows the property use, improved parcel count, improved values, estimated contents, and total values that fall in each landslide incidence and susceptibility area in the Town.

Figure E-9 Town of Paradise – Landslide Incidence and Susceptibility Areas

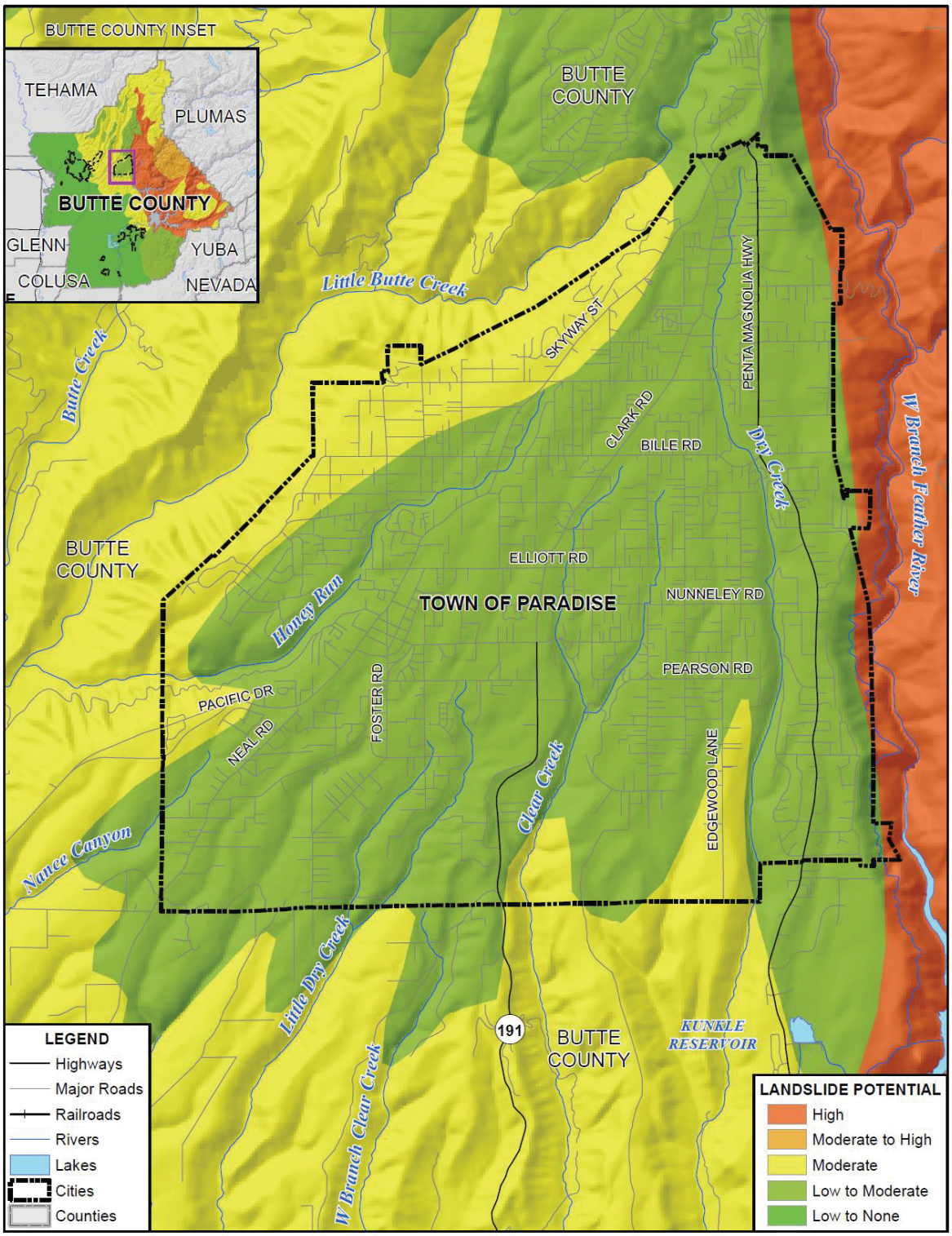


Table E-27 Town of Paradise – Pre-Fire Count and Value of Parcels by Landslide Incidence and Susceptibility Area

Landslide Incidence and Susceptibility	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
High	15	9	$850,153	$2,083,777	$0	$1,041,889	$3,975,819
Moderate	1,430	1,312	$93,564,919	$184,465,505	$332,148	$96,226,647	$374,589,219
Low to Moderate	10,055	9,281	$688,229,212	$1,414,019,924	$14,161,606	$864,404,502	$2,980,815,244
Town of Paradise Total	**11,500**	**10,602**	**$782,644,284**	**$1,600,569,206**	**$14,493,754**	**$961,673,037**	**$3,359,380,281**

Source: Butte County 2030 General Plan, Butte County 2018 Parcel/Assessor's Data

Table E-28 Town of Paradise – Post-Fire Count and Value of Parcels by Landslide Incidence and Susceptibility Area

Landslide Incidence and Susceptibility	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
High	15	9	$850,153	$893,297	$0	$446,649	$2,162,251
Moderate	1,430	1,310	$93,540,294	$102,867,382	$261,523	$53,649,847	$243,543,537
Low to Moderate	10,056	9,275	$687,952,376	$919,578,561	$13,413,508	$597,906,437	$2,033,455,010
Town of Paradise Total	**11,501**	**10,594**	**$782,342,823**	**$1,023,339,240**	**$13,675,031**	**$652,002,932**	**$2,279,160,797**

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

Table E-29 Town of Paradise – Comparison of Pre-Fire and Post-Fire Improved Structure Values by Landslide Incidence and Susceptibility Area

Landslide Incidence and Susceptibility	Pre-fire Improved Structure Value	Post-fire Improved Structure Value	$ change	% change
High	$2,083,777	$893,297	-$1,190,480	-57.1%
Moderate	$184,465,505	$102,867,382	-$81,598,123	-44.2%
Low to Moderate	$1,414,019,924	$919,578,561	-$494,441,363	-35.0%
Grand Total	**$1,600,569,206**	**$1,023,339,240**	**-$577,229,966**	**-36.1%**

Source: Butte County 2030 General Plan, Butte County 2018 and 3/28/2019 Parcel/Assessor's Data

Table E-30 Town of Paradise – Post-Fire Count and Value of Parcels at Risk from Landslide by Property Type

Property Use / Incidence and Susceptibility	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Other Value	Estimated Contents Value	Total Value
High							

Property Use / Incidence and Susceptibility	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	15	9	$850,153	$893,297	$0	$446,649	$2,162,251
Unknown	0	0	$0	$0	$0	$0	$0
High Total	**15**	**9**	**$850,153**	**$893,297**	**$0**	**$446,649**	**$2,162,251**
Moderate							
Agricultural	1	0	$42,929	$0	$0	$0	$42,929
Commercial	40	32	$3,694,410	$4,228,301	$226,913	$4,228,301	$11,878,297
Industrial	3	2	$311,922	$102,005	$0	$153,008	$566,935
Residential	1,371	1,276	$89,491,033	$98,537,076	$34,610	$49,268,538	$231,055,376
Unknown	15	0	$0	$0	$0	$0	$0
Moderate Total	**1,430**	**1,310**	**$93,540,294**	**$102,867,382**	**$261,523**	**$53,649,847**	**$243,543,537**
Low to Moderate							
Agricultural	4	1	$118,922	$24,379	$11,631	$24,379	$179,311
Commercial	684	565	$99,308,482	$269,354,358	$13,165,188	$269,354,358	$513,949,523
Industrial	13	12	$2,213,296	$3,496,531	$165,000	$5,244,797	$11,215,624
Residential	9,260	8,694	$585,885,004	$646,565,806	$71,689	$323,282,903	$1,507,548,355
Unknown	95	3	$426,672	$137,487	$0	$0	$562,197
Low to Moderate Total	**10,056**	**9,275**	**$687,952,376**	**$919,578,561**	**$13,413,508**	**$597,906,437**	**$2,033,455,010**
Town of Paradise Total	**11,501**	**10,594**	**$782,342,823**	**$1,023,339,240**	**$13,675,031**	**$652,002,932**	**$2,279,160,797**

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

Population at Risk

The landslide potential zones were overlayed on the parcel layer. Those residential parcel centroids that intersect the landslide potential zones were counted and multiplied by the 2010 Census Bureau average household factors for Paradise – 2.17. According to this analysis, there is a total population of 963 in the moderate landslide potential, with none in the moderate to high landslide potential, and 19 in the high potential areas. This is shown in Table E-31.

Table E-31 City of Paradise – Count of Improved Residential Parcels and Population by Landslide Incidence and Susceptibility Potential

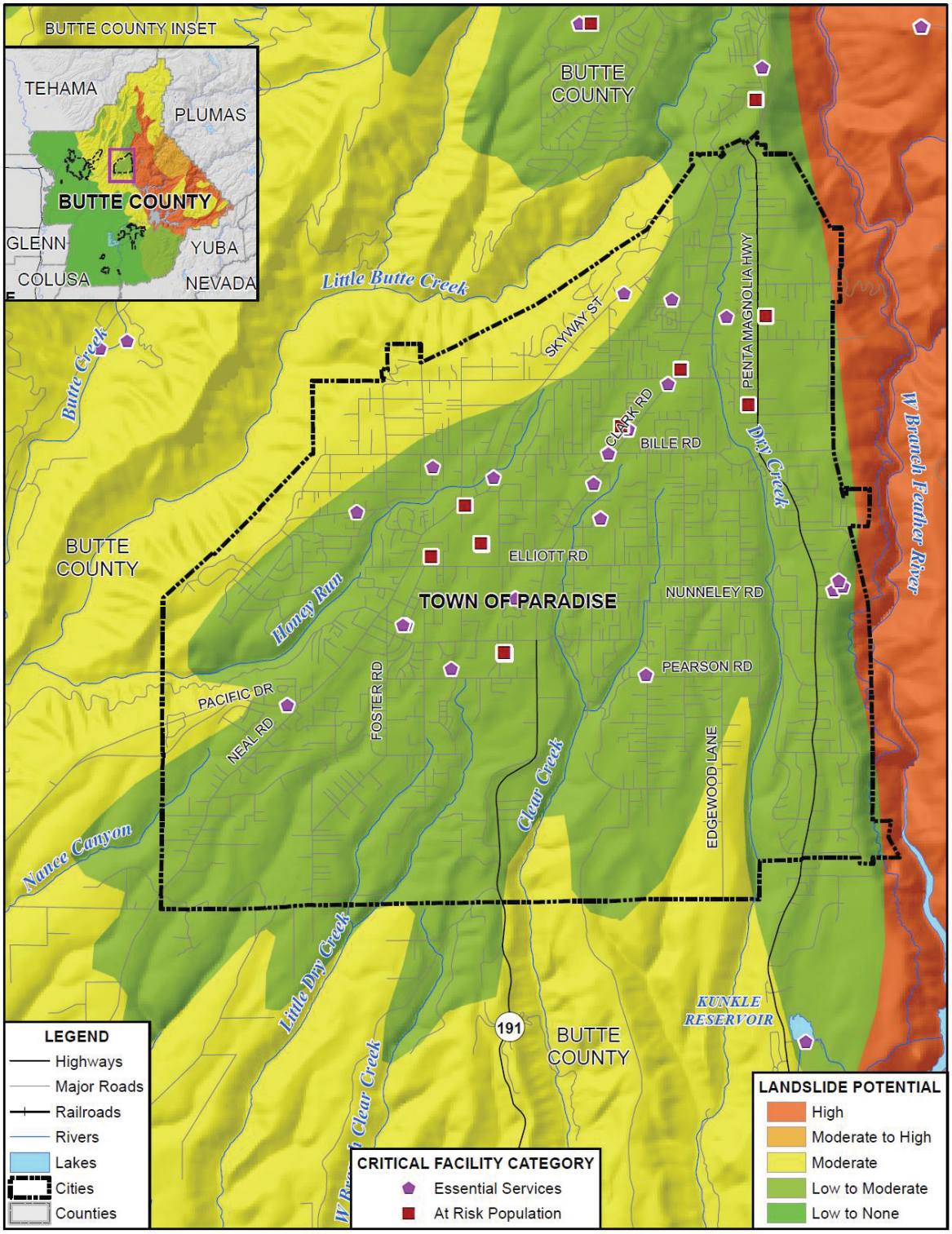
Jurisdiction	Moderate		Moderate to High		High	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Paradise	1,278	2,773	0	0	9	19

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

Critical Facilities at Risk

To determine the critical facilities at risk from landslide, an analysis was performed using GIS to determine the facilities located within the landslide incidence and susceptibility areas in the Town. Using GIS, the landslide potential was overlaid on the critical facilities layer and results tabulated for the Town, shown in Figure E-10 and detail in Table E-32.

Figure E-10 Town of Paradise– Critical Facilities in Landslide Incidence and Susceptibility Areas



Data Source: Butte County General Plan 2030, Butte County GIS, Cal-Atlas; Map Date: 7/1/2019.

Table E-32 Town of Paradise– Critical Facilities in Landslide Incidence and Susceptibility Areas

Landslide Incidence and Susceptibility Area / Critical Facility Category / Critical Facility Type	Facility Count
Moderate	
Essential Services Facilities	
Health Care	1
Essential Services Facilities Total	1
Moderate Total	**1**
Low to Moderate	
Essential Services Facilities	
Fire	3
Health Care	14
Law Enforcement	1
Public Assembly Point / Evacuation Center	2
Essential Services Facilities Total	20
At Risk Population Facilities	
School	12
At Risk Population Facilities Total	12
Low to Moderate Total	**32**
Grand Total	**33**

Source: Butte County General Plan, Butte County GIS

Future Development

As evidenced by the widespread devastation and loss of life in the 2018 Camp Fire, reseeding ground cover with quick-growing or native species is critical to, among other things, saving lives and property in restoration of the burn scar. Nearly the entire Town was impacted by the Camp Fire, and restoration of the burn scar through reseeding ground cover in public areas will reduce the risk of landslides, mudslides, and erosion of public areas throughout the Town. 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 area will continue to occur.

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 Town. 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 Town Planning Team note that since extreme heat is a regional phenomenon, events that affected the County also affected the Town. Those past occurrences were shown in the Base Plan in Section 4.2.2. The Town experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 100-110°F in rather extreme situations.

Vulnerability to Extreme Heat and Impacts

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 Town. 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. 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 Town are accustomed to living with extreme heat and take precautions to guard against the threat of extreme heat. In addition, the shading providing the numerous trees around town will be significantly different with the loss of an estimated 350,000 trees

Severe Weather: Freeze and Winter Storm

Likelihood of Future Occurrence–Likely
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. Prolonged exposure to cold can cause frostbite or hypothermia and can be life-threatening. Winter snowstorms can include heavy snow, ice, and blizzard conditions.

Location and Extent

Freeze and winter storms are regional issues, meaning the entire Town 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 eastern Butte County, with no days falling below 0°F. 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 Town, and even rarer that snow accumulates in the Town. Snowfall has an onset that is similar to freeze in the Town.

Past Occurrences

The Town 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 Town. Those past occurrences were shown in the Base Plan in Section 4.2.3. In addition, the following freeze and winter storms were noted:

- 2/22/2018 Snowstorm/Winter Storm (Road closures)
- 2/23/17 Freezing Temperatures

Vulnerability to Severe Weather: Freeze and Winter Storms and Impacts

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

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–Likely
Vulnerability–Medium

Hazard Profile and Problem Description

Storms in the Town of Paradise 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 Town 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 Town. All portions of the Town 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 Town 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

According to historical hazard data, severe weather is an annual occurrence in the Town of Paradise.

Vulnerability to Heavy Rain and Storms and Impacts

According to historical hazard data, severe weather is an annual occurrence in the Town. Damage and disaster declarations related to heavy rains and storms 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 Town. Wind and lightning often accompany these storms and have caused damage in the past. Hail is rare in the Town.

Actual damage associated with the primary effects of severe weather have been limited. It is the secondary hazards caused by weather, such fire, that have had the greatest impact on the Town. Impacts to property, critical facilities (such as utilities), and life safety can be 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–Likely
Vulnerability–High

Hazard Profile and Problem Description

High winds can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. These winds may occur as part of a seasonal climate pattern or in relation to other severe weather events such as thunderstorms.

Tornadoes are rare in the upper elevations and are not considered to be a threat to the Town.

Location and Extent

The entire Town is subject to significant, non-tornadic (straight-line), winds. Each area of the Town 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. It can be seen in Section 4.2.5 of the Base Plan.

Past Occurrences

According to historical hazard data, high winds are an annual occurrence in the Town of Paradise. These high wind events are typically expected 7-8 times year. The following severe storms were noted by the Town:

- 10/8/17 Wind event
- 4/6/2017 Wind event (Downed trees, localized Flooding)
- 1/20/2017 Wind event (Downed trees)
- 3/5/2016 Wind event (Downed trees)
- 10/3/2015 Wind event (Downed trees)
- 12/30/2014 Wind event (Downed trees, 2 fatalities, 17 blocked roads)
- 11/1/2014 Wind event (Downed trees)

Vulnerability to High Winds and Impacts

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. However, when high winds happen during times of wildfire, winds can fan the flames and spread fire quickly. This was the case during the 2018 Camp Fire. High winds are also a precursor to red flag days, which can cause PG&E to enact the Public Safety Power Shutdowns.

Impacts from straight line winds include:

- Increased wildfire risk
- Windblown weeds
- Downed trees
- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs

Future Development

The Town enforces the state building code and other ordinances, which regulate construction techniques that minimize damage from high winds. Future development in the Town is subject to these building codes. New critical facilities such as communications towers should be built to withstand high winds.

Wildfire

Likelihood of Future Occurrence–Likely
Vulnerability–Extremely High

Hazard Profile and Problem Description

Wildland fire is an ongoing concern for the Town of Paradise, as exemplified by the Camp Fire in 20108. 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.

The Town of Paradise is located in central Butte County; it's flanked by steep canyons to the northwest and east sides of the community and intermediary drainages to the south. At the southern end of Paradise, 1,600-foot elevation wildland fuels consist of light grass and brush with residential structures intermixed within the wildland fuels. The wildland fuels transition to heavy brush in the adjoining canyons and conifer forests through the majority of Town to the northern extent at 2,300-foot elevation. The climate in Butte County is Mediterranean which means summer conditions are warm, dry and often accompanied with wind. The topography, fuel conditions and Mediterranean climate combine to make the Town of Paradise and surrounding areas of Butte County a very high fire hazard severity zone. This coupled with the moderate to high density residential population of Paradise and the surrounding area present a unique wildland urban interface firefighting problem. The Town can best be described as a mix of high density wildland urban interface environment where structures on the northwest and eastern sides of Town abruptly adjoin the

wildland, and on the southern end of Town a moderate density wildland urban intermix where homes are intermixed with the wildland vegetation.

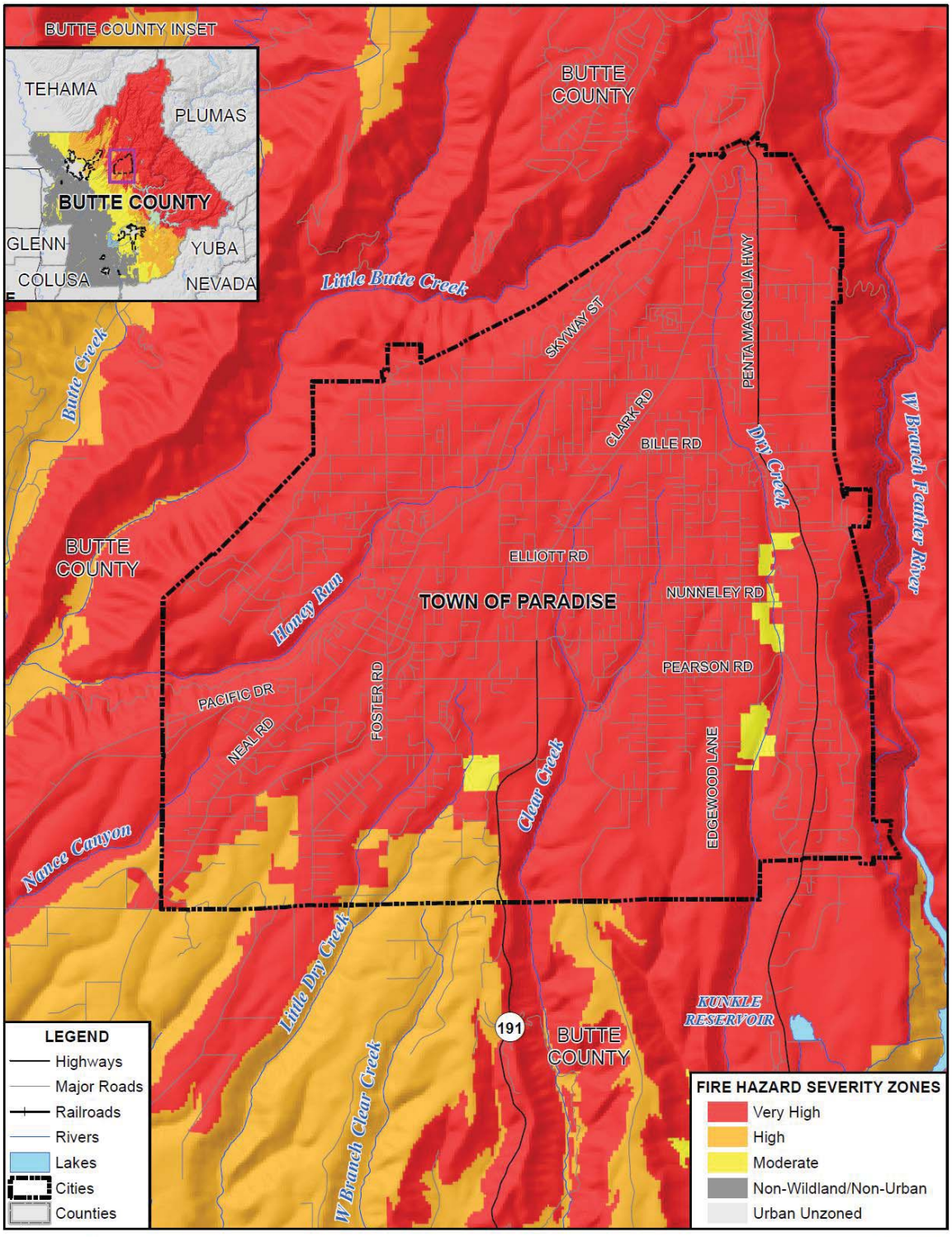
Location and Extent

Wildfire can affect all areas of the Town. 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 Town were created.

- Figure E-11 shows the CAL FIRE FHSZ in the Town. On this map, all zones are depicted.
- Figure E-12 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. The VHFSZ areas are subject to more stringent requirements. 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*."

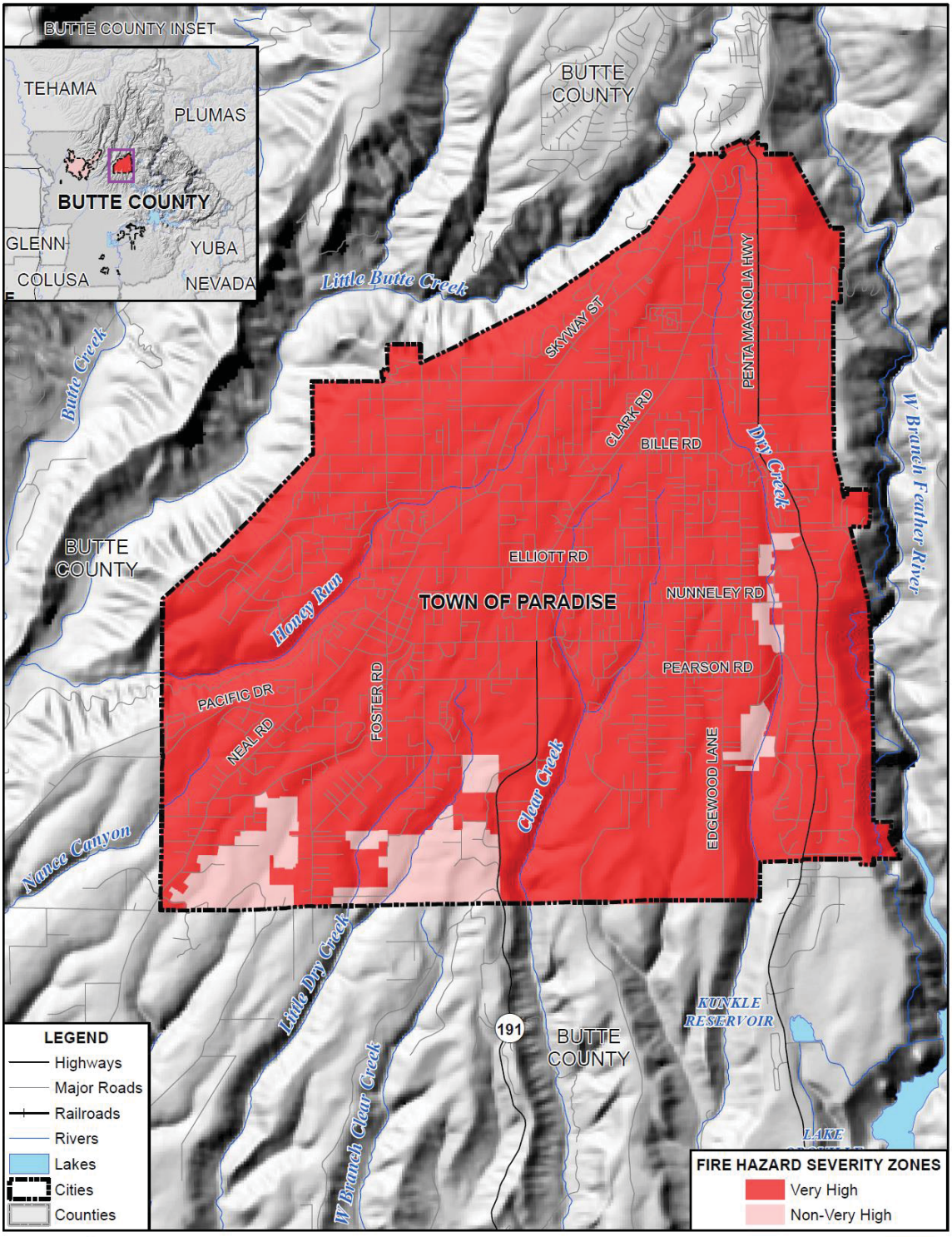
As shown on the maps, wildfire threat within the Town ranges from high to very high, with most of the City in a Very High FHSZ.

Figure E-11 Town of Paradise – Fire Hazard Severity Zones



Data Source: CAL FIRE (Adopted SRA 11/2007 - fhszs06_3_4, Draft 9/2007 - c4fhszl06_1), Butte County GIS, Cal-Atlas; Map Date: 3/1/2019.

Figure E-12 Town of Paradise – Very High Fire Hazard Severity Zones



Data Source: CAL FIRE (Recommended LRA 5/2008 - c4fhszl06_3, Adopted SRA 11/2007 - fhszs06_3_4, and Draft 9/2007 - c4fhszl06_1), Butte County GIS, Cal-Atlas; Map Date: 3/1/2019.

Wildfires tend to be measured in structure damages, injuries, and loss of life as well as 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. Aerial FHSZ extent from CAL FIRE is shown in Table E-33.

Table E-33 Town of Paradise – Geographical FHSZ Extents

Fire Hazard Severity Zones	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Very High	10,113	92.78%	8,046	73.82%	0	0.00%
High	528	4.84%	322	2.95%	0	0.00%
Moderate	140	1.28%	63	0.58%	0	0.00%
Non-Wildland/Non-Urban	236	2.17%	0	0.00%	236	2.17%
Urban Unzoned	0	0.00%	0	0.00%	252	2.31%

Source: CAL FIRE

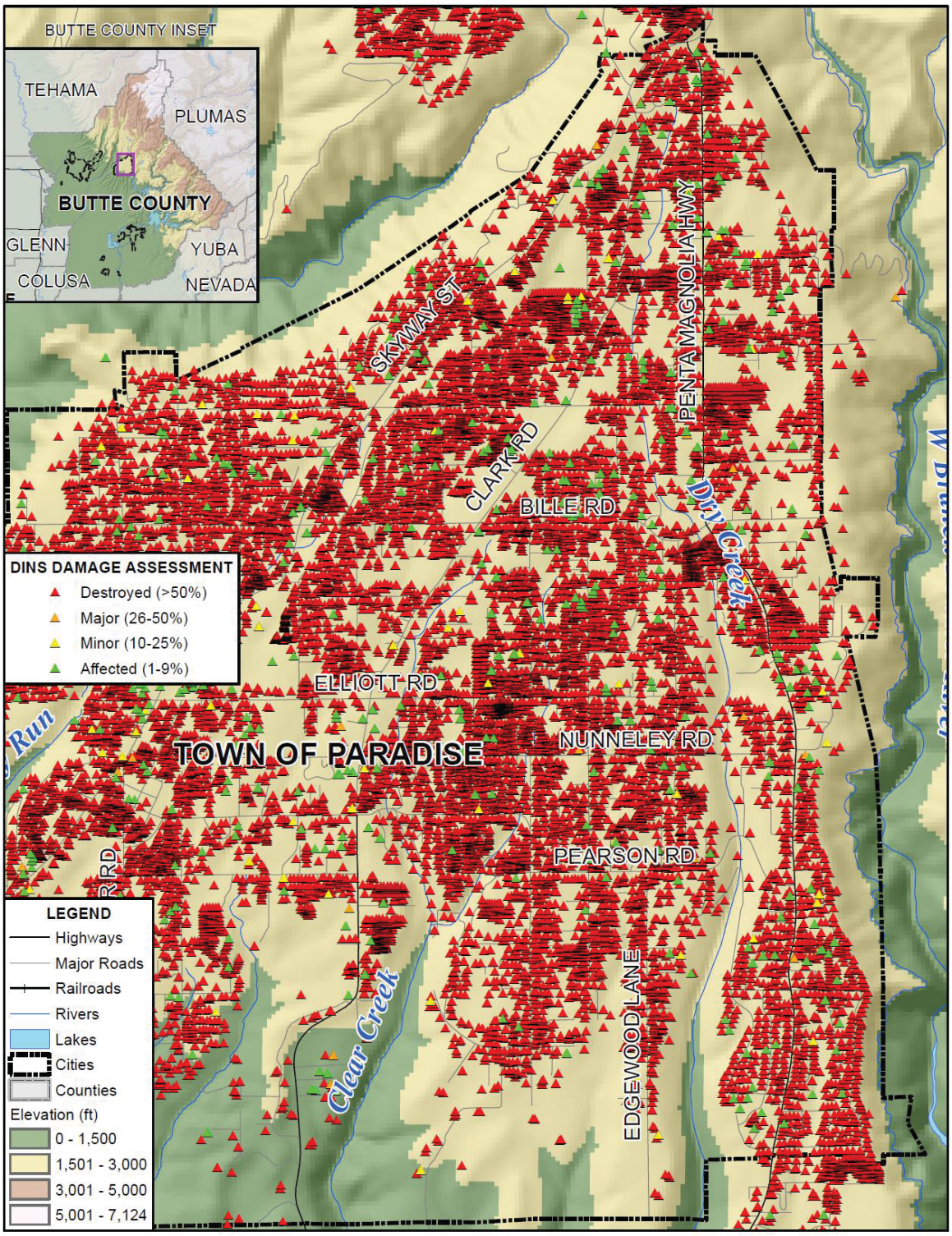
Past Occurrences

Additional past occurrences are shown in Section 4.2.19 of the Base Plan. The Planning Team noted that there have been multiple wildfires throughout Butte County's Wildland Urban Interface over the years. In addition to the recent Camp Fire, the Planning Team noted the following fires in the immediate vicinity of the Town:

- August 26, 2016 - Santos Incident – A small fire occurred off Highway 32 at Santos Ranch Road, south of Forest Ranch. Evacuation warnings were issued, but the fire was extinguished before evacuations became necessary.
- September 6, 2016 - Saddle Fire – On September 5th, a fire was started off Pentz Road and Lime Saddle Road south of the Town of Paradise. Sparks from a malfunctioning exhaust started the blaze. Evacuation orders were issued for residents on both sides of Pentz Road from Logo Vista to Messilla Valley Road. Evacuation shelters were opened, as were animal shelters. The blaze consumed 850 acres before being extinguished, causing 3 injuries and destroying 3 structures.
- July 2, 2017 – De Sabla Incident – A small fire occurring in the vicinity of De Sabla Powerhouse Rd and Humbug Rd. The fire burned 14 acres.
- 10/9/2017 Honey Fire (Active for 91 days, 150 acres burned)
- December 12, 2017 Fire (vicinity of Clark and Billie)
- September 24, 2018 – Minshew Incident – A small fire occurred in the vicinity of Nimshew Rd and Centerville Rd. the fire burned 33 acres and was active for 102 days.
- November 8, 2018 Camp Fire (Active for 229 days, 153,336 acres burned, 18,793 structures, 86 fatalities)

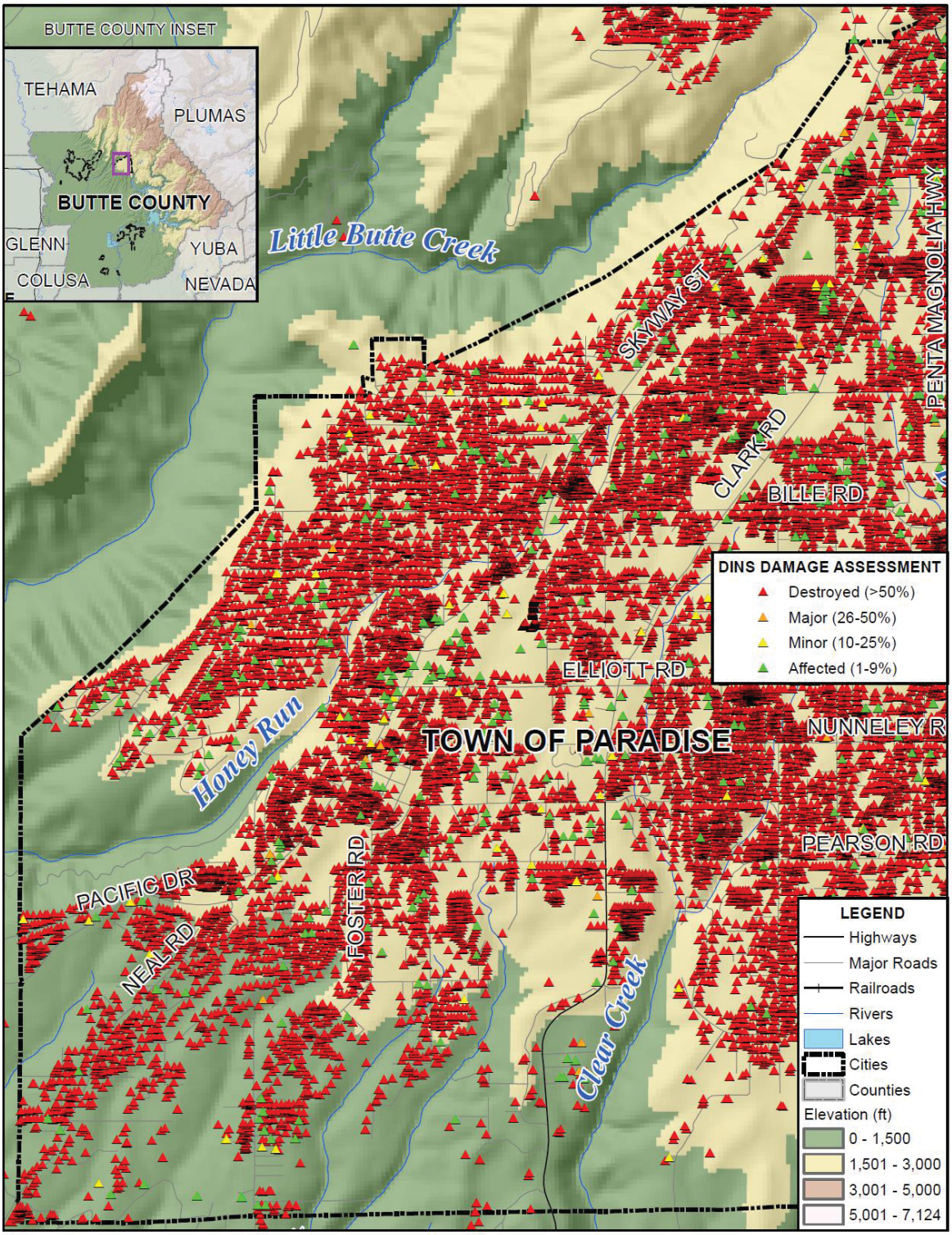
Using the DINS data, as discussed in Section 4.2.19 of the Base Plan, data for the Camp Fire was mapped in GIS and tabular analysis was created. Figure E-13 and Figure E-14 shows how the Camp Fire affected the east and west side of Paradise, respectively. Table E-34 shows the DINS criteria broken into a structure count by damage.

Figure E-13 Town of Paradise (East) – DINS Damage Assessment



Data Source: California DINS Data 11/2018, Camp Fire Perimeter 11/19/2018, Butte County GIS, Cal-Atlas; Map Date: 7/1/2019.

Figure E-14 Town of Paradise (West) – DINS Damage Assessment



Data Source: California DINS Data 11/2018, Camp Fire Perimeter 11/19/2018, Butte County GIS, Cal-Atlas; Map Date: 7/1/2019.

Table E-34 Town of Paradise – Structures Damaged in the Camp Fire by Level of Damage

Damage Assessment	Damaged Structure Count	% of Total Damaged Structure Count
Town of Paradise		
Destroyed (>50%)	16,845	64.0%
Major (26-50%)	26	0.1%
Minor (10-25%)	87	0.3%
Affected (1-9%)	545	2.1%
No Damage	1,633	6.2%
Town of Paradise Total	**19,136**	**72.7%**

Source: California DINS Data

Vulnerability to Wildfire and Impacts

Since the Town sits between various intermediate drainage and at the mouth of a major drainage, the Feather River Canyon which enhances foehn winds, it is extremely susceptible to rapidly moving wildfires. Couple with the it's interface with wildland vegetation and a large population base, the Town is at extreme risk of damaging and destructive wildfires. The 2018 Camp Fire has demonstrated the vulnerability wildfire.

Compounding the problem of susceptibility to wildfire is the lack of egress and ingress in the Town. Due to the sheer volume of people that can be affected at one time by a wildland fire, a number of potential traffic flow problems exist. These are complicated by the existence of only one north route out of town; only four south routes out of town, two of which could easily be affected by a single fire; and only three through east-west streets. The plan concludes that any fire in the Magalia area would have a major impact on the roads in Paradise because access is via a two-lane road. These issues proved true during the 2018 Camp Fire. The evacuation planning has been identified in the Town's Recovery Plan to study and improve the evacuation routes throughout the Town.

After the Camp Fire, the threat from a wildfire remains equally high. As the rebuilding of the community continues the threat (life safety, property damage) associated with a wildfire increases exponentially. Without comprehensive mitigation actions, Paradise's wildland urban interface/intermix problem will continue to pose a significant threat to the Town's residences, private property, infrastructure and economic sustainability.

Wildfires can cause short-term and long-term disruption to the County and Town of Paradise, as evidenced by the Camp Fire in Paradise and the resultant decrease in the population in Paradise. 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. Additional economic impacts to the Town stem from the loss of much of the property tax revenue the Town needs to operate. 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 Town of Paradise to the wildfire hazard, the sections that follow describes significant assets at risk in the Town.

Values at Risk

GIS was used to determine the possible impacts of flooding within the Town of Paradise. 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. Analysis results for Paradise are shown in the following 4 tables:

- Table E-35 summarizes pre-fire total parcel counts, improved parcel counts and their structure values by fire hazard severity zone.
- Table E-36 summarizes post-fire total parcel counts, improved parcel counts and their structure values by fire hazard severity zone.
- Table E-37 compares pre-fire and post-fire improved structure values by fire hazard severity zone.
- Table E-38 breaks out the Table E-36 by adding the property use details by fire hazard severity zone for the Town.

Table E-35 Town of Paradise – Pre-Fire 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	11,381	10,515	$772,241,810	$1,578,239,440	$14,483,408	$950,329,461	$3,315,294,119
High	75	56	$6,355,387	$13,842,961	$10,346	$6,945,174	$27,153,868
Moderate	44	31	$4,047,087	$8,486,805	$0	$4,398,403	$16,932,295
Town of Paradise Total	**11,500**	**10,602**	**$782,644,284**	**$1,600,569,206**	**$14,493,754**	**$961,673,037**	**$3,359,380,281**

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

Table E-36 Town of Paradise – Post-Fire 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	11,382	10,507	$771,940,349	$1,005,115,678	$13,675,031	$642,723,961	$2,241,782,496
High	75	56	$6,355,387	$11,866,158	$0	$5,945,269	$23,900,814
Moderate	44	31	$4,047,087	$6,357,404	$0	$3,333,702	$13,477,487
Town of Paradise Total	**11,501**	**10,594**	**$782,342,823**	**$1,023,339,240**	**$13,675,031**	**$652,002,932**	**$2,279,160,797**

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

Table E-37 Town of Paradise – Comparison of Pre-Fire and Post-Fire Improved Structure Values by Fire Hazard Severity Zone

Fire Hazard Severity Zone	Pre-Fire Improved Structure Value	Post Fire Improved Structure Value	$ change	% Change
Very High	$1,578,239,440	$1,005,115,678	-$573,123,762	-36.3%
High	$13,842,961	$11,866,158	-$1,976,803	-14.3%
Moderate	$8,486,805	$6,357,404	-$2,129,401	-25.1%
Town of Paradise Total	**$1,600,569,206**	**$1,023,339,240**	**-$577,229,966**	**-36.1%**

Source: CAL FIRE, Butte County 2018 and 3/28/2019 Parcel/Assessor's Data

Table E-38 Town of Paradise – 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	4	0	$130,248	$0	$11,631	$0	$141,879
Commercial	722	596	$102,599,032	$273,272,659	$13,392,101	$273,272,659	$524,803,960
Industrial	16	14	$2,525,218	$3,598,536	$165,000	$5,397,804	$11,782,558
Residential	10,532	9,894	$666,259,179	$728,106,996	$106,299	$364,053,498	$1,704,491,902
Unknown	108	3	$426,672	$137,487	$0	$0	$562,197
Very High Total	**11,382**	**10,507**	**$771,940,349**	**$1,005,115,678**	**$13,675,031**	**$642,723,961**	**$2,241,782,496**
High							
Agricultural	1	1	$31,603	$24,379	$0	$24,379	$80,361
Commercial	0	0	$0	$0	$0	$0	$0
Industrial	0	0	$0	$0	$0	$0	$0
Residential	73	55	$6,323,784	$11,841,779	$0	$5,920,890	$23,820,453
Unknown	1	0	$0	$0	$0	$0	$0
High Total	**75**	**56**	**$6,355,387**	**$11,866,158**	**$0**	**$5,945,269**	**$23,900,814**
Moderate							
Agricultural	0	0	$0	$0	$0	$0	$0
Commercial	2	1	$403,860	$310,000	$0	$310,000	$1,023,860
Industrial	0	0	$0	$0	$0	$0	$0
Residential	41	30	$3,643,227	$6,047,404	$0	$3,023,702	$12,453,627
Unknown	1	0	$0	$0	$0	$0	$0
Moderate Total	**44**	**31**	$4,047,087	$6,357,404	**$0**	$3,333,702	$13,477,487
Town of Paradise Total	**11,501**	**10,594**	**$782,342,823**	**$1,023,339,240**	**$13,675,031**	**$652,002,932**	**$2,279,160,797**

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 Town of Paradise – 2.17. According to this analysis, there is a total population in 21,654 residents of Paradise at risk to moderate or higher FHSZs. This is shown in Table E-39.

Table E-39 Town of Paradise – Count of Improved Residential Parcels and Population by Fire Hazard Severity Zone

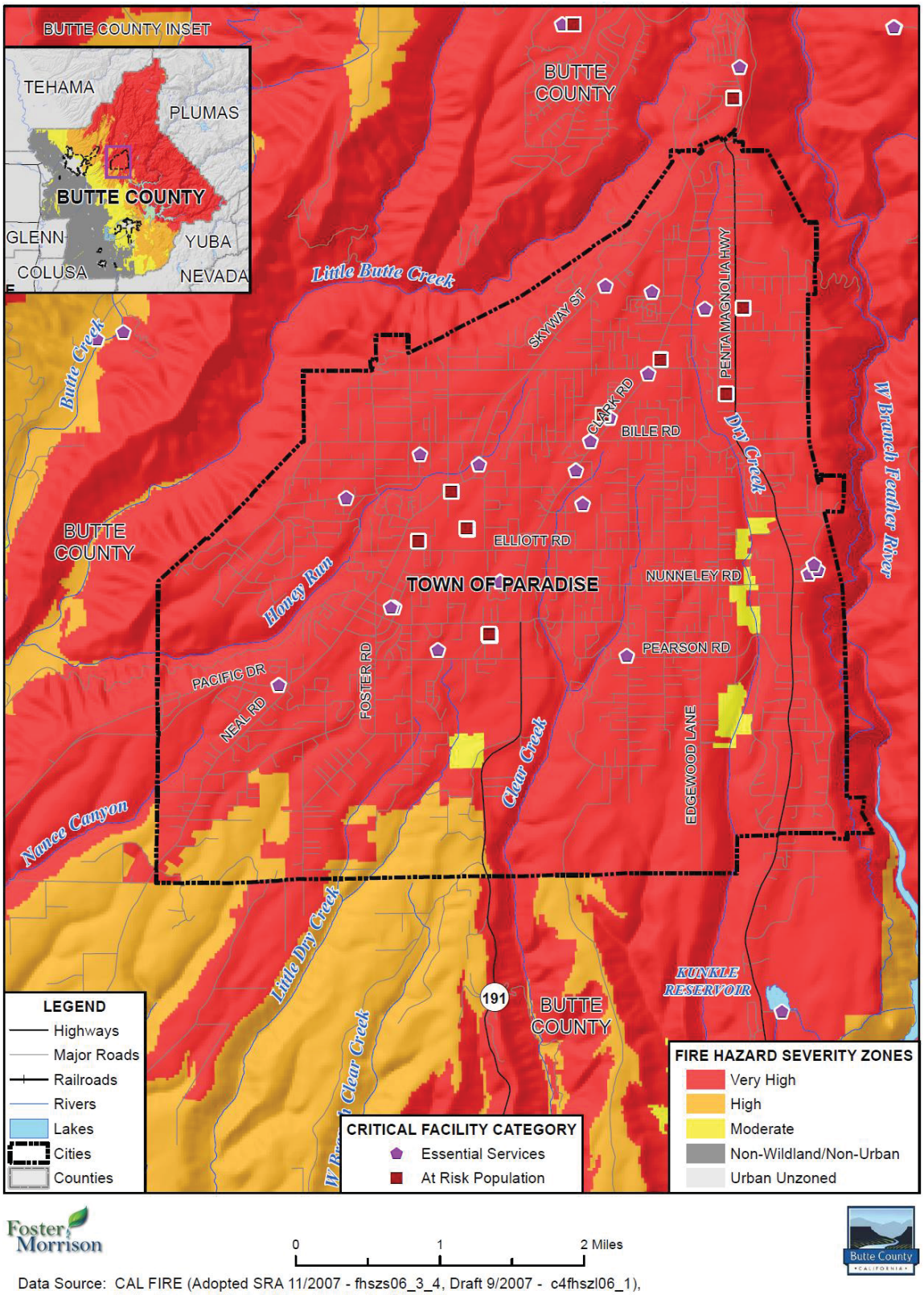
Jurisdiction	Moderate		High		Very High	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population	Improved Residential Parcels	Population
Paradise	30	65	55	119	9,894	21,470

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

Critical Facilities at Risk

An analysis was performed on the critical facility inventory in Paradise in identified FHSZs facilities in a FHSZ in the Town of Paradise are shown in Figure E-15 and detailed in Table E-40. Details of critical facility definition, type, name and address and jurisdiction by FHSZ are listed in Appendix F.

Figure E-15 Town of Paradise – Critical Facilities in Fire Hazard Severity Zones



Data Source: CAL FIRE (Adopted SRA 11/2007 - fhszs06_3_4, Draft 9/2007 - c4fhszl06_1), Butte County GIS, Cal-Atlas; Map Date: 7/1/2019.

Table E-40 Town of Paradise – Critical Facilities by Fire Hazard Severity Zone

Fire Hazard Severity Zone/ Critical Facility Category / Critical Facility Type	Facility Count
Very High	
Essential Services Facilities	
Fire	3
Health Care	15
Law Enforcement	1
Public Assembly Point / Evacuation Center	2
Essential Services Facilities Total	**21**
At Risk Population Facilities	
School	12
At Risk Population Facilities Total	**12**
Very High Total	**33**
Grand Total	**33**

Source: CAL FIRE, Butte County

Future Development

The Town has developed a Recovery Plan that will address the Camp Fire recovery and includes projects focused removal the standing burnt trees, improving building codes and standards, improving Town awareness of related to defensible space requirements, enforcement and education. The Town is also evaluating improvements to the building code post-Camp Fire. A significant contributor to rapid spread of the fire, as well as the destructive nature of the fire, was fuel on roofs and in eaves of residential homes. As a result, the Town is taking proactive steps to enhance the resilience of residential buildings by enhancing building codes and incentivizing residents to modify existing structures and rebuilding to higher standards to mitigate the risk of such a deadly event in the future.

E.6 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This 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.

E.6.1. Regulatory Mitigation Capabilities

Table E-41 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 Town of Paradise.

Table E-41 Town of Paradise 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	Yes 2014	Adopted 1994 the Housing Element was updated 2014 and the Safety Element in 2019. While the General Plan does address some hazards, this is an identified project in the Town's Recovery Plan to update the General Plan, which will assist the Town in long term implementation of mitigation actions.
Capital Improvements Plan	Yes	The 2019-2020 Capital Improvements Program addresses various projects throughout the Town such as roads improvements, development of a sewer system for the downtown area, public communication systems and other related projects
Economic Development Plan	No	
Local Emergency Operations Plan	Yes 2012	The Emergency Operations Plan does address all hazards and can be used in strategic alignment and implementation of mitigation actions.
Continuity of Operations Plan	Yes	The Town has a line of succession adopted by resolution.
Transportation Plan	No	
Stormwater Management Plan/Program	Yes 1979	Yes, the plan does address the hazard, however the plan is outdated. Yes, one of the projects identified is updating the Storm Drain Master Plan. Yes, the updated plan will assist the Town in implementing mitigation actions.
Engineering Studies for Streams	No	While the Town does not have engineering studies for streams, the Storm Drain Master Plan would provide adequate data in management of storm water.
Community Wildfire Protection Plan	Yes 2015	The Community Wildfire Protection Plan does address wildfire and some related projects. Yes, the plan can be used for strategic planning and implementation of mitigation actions.
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Yes 2019	The Long-Term Community Recovery Plan was developed in June 2019, following the devastating impacts of the Camp Fire. This plan does address multiple hazards, especially wildfire. It includes projects for the long-term recovery of the Town, both in recovery and economically. The Recovery plan sets the priorities in implementing mitigation actions.
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	Yes	Version/Year: State of California 2016 Building Code. The Town is the process adapting the 2019 Building Codes. Yes, the town has an inspection and enforcement component of the Planning Department for Town wide oversight of building codes.
Building Code Effectiveness Grading Schedule (BCEGS) Score	Y	Score: 3
Fire department ISO rating:	Yes	Rating: 2-2x

Site plan review requirements	Yes	Site plans are review through the permitting process through the Planning Department, which ensures enforcement of the zoning requirements.
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	Yes	These ordinances are enforced through permitting and code enforcement by the Planning Department, which ensures adequate administration of Town requirements.
Subdivision ordinance	Yes	These ordinances are enforced through permitting and code inspection and enforcement by the Planning Department.
Floodplain ordinance	Yes	The Town has an ordinance that address development of land areas prone to flood hazards. It is the purpose of the ordinance to promote the public health, safety and general welfare, and to minimize public and private losses due to flood conditions. The Engineering Division administers and enforces the Town's ordinance.
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	The Town has policies that address storm water and wildfire. These are effective in reducing impacts from natural disasters, administered, and enforced.
Flood insurance rate maps	Yes	The Town participates in the NFIP even though the entire Town of Paradise is located outside both the 1% and 0.2% annual chance flood zone as defined by the Federal Emergency Management Agency (FEMA).
Elevation Certificates	Yes	Required for building permits within identified special permit zones in the Town. Enforcement is adequately administered through the planning.
Acquisition of land for open space and public recreation uses	No	
Erosion or sediment control program	No	
Other	No	
How can these capabilities be expanded and improved to reduce risk?		
The Town has included projects in the Long-Term Recovery Plan that include updating the General Plan, several of the wildfire related building codes, and updating the storm water master plan. Updating these plans are priorities for the Town to expand and improve Town ordinances and guidance.		

Source: Town of Paradise

Town of Paradise 2030 General Plan

California Law requires that every City and County in the State have a General Plan. The Town of Paradise General Plan was adopted in 1994. The Housing Element was updated in 2014. The General Plan is the most important policy and planning document in the Town, and is used by virtually every department. The General Plan is the Town's statement of its vision for the future. The General Plan contains policies covering every aspect of the Town: land use (how land can be developed), circulation, noise, air quality, housing, open space and conservation, and health and safety.

Mitigation Related Ordinances

The Town of Paradise has many ordinances related to mitigation.

Zoning (Title 17)

The zoning ordinance is enacted for the following purposes:

- To promote and ensure the public health, safety and general welfare of the town and its residents;
- To attain and implement the goals, objectives and policies of the general plan by providing a precise delineation of permitted land uses, precluding land-use conflicts, and by establishing general site development standards.

The intent of the Town is that this ordinance be consistent with the general plan, and with any supplemental land use and community development policies which may be adopted by the Town Council.

Slope Limitations (Title 17, Chapter 6.8)

Site development regulations modifying the basic provisions applicable to a steeply sloping site are intended to alleviate or mitigate potentially harmful effects of soil erosion, increased stormwater runoff, and excessive grading, and to ensure development that is consistent with acceptable environmental standards.

Subdivision (Title 16)

The purpose and intent of these regulations are to provide for regulation and control of design and improvement of subdivisions with proper consideration of its relation to surrounding areas, to permit orderly, reasonable, and beneficial growth, to discourage overdevelopment, to protect and enhance in every way possible the public health, safety and general welfare of the citizens, to conserve the outstanding resources of land, water, air, forest, scenic beauty, and to require the subdivider to do original work placing streets in proper condition before maintenance thereof is taken over by the town, and to relieve the public to this extent of burden that would otherwise exist.

The provisions of this title are adopted to regulate the subdivision of land and real property within the town for the purposes of sale, lease or financing in all instances except those which are exempt under the provisions of the Subdivision Map Act of the state of California as set forth in Title 7 of the California Government Code.

Building Code (Title 15)

The 2016 California Building Standards Code, Part 2, Volumes 1 and 2, including Appendix "B", "F", "G", "H", "I", "J", known as the California Building Code, as published and adopted by the California Building Standards Commission, including the town's amendments set forth in this chapter, is hereby adopted by this section of the Town of Paradise Municipal Code.

Fire Code (Title 15, Chapter 9)

The 2016 California Building Standards Code, Title 24, Part 9, including Appendix "B", "C", "D", "I", known as the California Fire Code, as published and adopted by the California Building Standards Commission, including the town's amendments, is hereby adopted by reference and incorporated herein as if fully set forth.

Floodplain (Title 8, Chapter 55)

It is the purpose of this chapter to promote the public health, safety and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone and sewer lines; and streets and bridges located in areas of special flood hazard;
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage;
- Ensure that potential buyers are notified that property is in an area of special flood hazard; and
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions

E.6.2. Administrative/Technical Mitigation Capabilities

Table E-42 identifies the Town department(s) responsible for activities related to mitigation and loss prevention in Paradise.

Table E-42 Town of Paradise's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	Yes	The Planning Commission meets monthly and engaged in improved zoning and ordinance development.
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	The Public Works Department has regular maintenance programs ranging from Town infrastructure to fuel reduction.
Mutual aid agreements	Yes	The Town used extensive Mutual Aid during the Camp Fire response.
Other	No	
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	The Chief Building Official serves in this role and is trained, coordinates with other departments, and provides enforcement of regulations.

Floodplain Administrator	Yes	While the Town does not have any Special Flood Hazard Areas, the Town's Engineers serves as the Floodplain Administrator.
Emergency Manager	Yes FT	The Town Manager serves this role. In addition, the Town recently hired a Disaster Recovery Manager to coordinate the Camp Fire recovery and a consulting firm to provide Recovery assistance across the various grant programs. These components bring coordination, mitigation, and effective oversight to the various programs.
Community Planner	Yes FT	The Planning Department Manager serves in this role and is trained, coordinates with other departments, and provides enforcement of regulations.
Civil Engineer	Yes FT	Public Works Director is a Civil Engineer and coordinates with other departments and provides enforcement of regulations.
GIS Coordinator	Yes	Through a cooperative agreement with Chico State University
Other	No	
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	Code Red Warning System and AM radio warning system (Not operational due to Camp Fire) are the two systems currently in place. The Town has identified an Early Warning System has a high priority project in the Town's Recovery Plan.
Hazard data and information	No	
Grant writing	Yes	Grant writing is performed by various department is effective in the right staff is working on grants applicable their department.
Hazus analysis	No	
Other	No	
How can these capabilities be expanded and improved to reduce risk?		
The Town's Recovery Plan identified an Early Warning System as a top priority project to enhance the early warning capability throughout the Town.		

Source: Town of Paradise

E.6.3. Fiscal Mitigation Capabilities

Table E-43 identifies financial tools or resources that the Town could potentially use to help fund mitigation activities.

Table E-43 Town of Paradise'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	The Town has an establish Capital Improvement Plan for road improvements, public communication systems, development of a sewer system, and various other projects throughout the Town. Additional funding would expedite and expand these opportunities.

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	The Town has passed an additional Tax, Measure V, which was passed in November 2018, to increase Town revenue. Currently, Measure V is approximately 9% of the Town's operating budget. These funding does provide significant funding for the Capital Improvement Plan budget.
Fees for water, sewer, gas, or electric services	No	Currently, the Town does not provide these services.
Impact fees for new development	Yes	Development Impact Fees generate provide funding for Capital improvement projects included above.
Storm water utility fee	Yes	Water Shed Drainage revenue for maintenance and improvements to the Storm Water systems throughout Town, typically coupled with road projects in culvert modifications or changes.
Incur debt through general obligation bonds and/or special tax bonds	No	
Incur debt through private activities	No	
Community Development Block Grant	Yes	The Town does manage CDBG funds for multiple programs throughout the Town. This includes housing programs, several law enforcement programs, and several road programs
Other federal funding programs	Yes	Public Assistance through DR-4407-CA, including potential 406 mitigation opportunities
State funding programs	Yes	The State has provided a Property Tax backfill for lost revenue. This funding will be used for the operating costs of the Town.
Other	No	
How can these capabilities be expanded and improved to reduce risk?		
This funding does fund many capital improvement projects throughout the Town. While the various funding sources do provide the needed revenue for these capital improvements, the budget is small with significant needs and opportunities for improvements in the Town. Expanding funding will greatly expand the opportunities for mitigation and betterment projects.		

Source: Town of Paradise

E.6.4. Mitigation Education, Outreach, and Partnerships

Table E-44 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table E-44 Town of Paradise'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.	Yes	The Town has Zone Captains that blanket the Town and are focused on communication, cooperation, and community involvement following the Camp Fire. This communication has led to greater resiliency following the Camp Fire.
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	Typically, education and outreach through the Fire Safe Council. Post Camp Fire Cal Fire has provided education and outreach through training and education at community meetings. In addition, the Town has submitted a HMGP Project to provide additional education and training to the community at large.
Natural disaster or safety related school programs	No	
StormReady certification	No	
Firewise Communities certification	Yes 2016	In cooperation with the Butte County Fire Safe Council, the Town is certified as a Firewise Community. These is enhanced through the active partnership with the Fire Safe Council and helps identify and implement mitigation measures in the Town.
Public-private partnership initiatives addressing disaster-related issues	No	
Other	No	
How can these capabilities be expanded and improved to reduce risk?		
Additional Staffing would provide additional resources for expanding education and training opportunities.		

Source: Town of Paradise

E.6.5. Other Mitigation Efforts

The Town of Paradise has many other completed or ongoing mitigation efforts that include the following:

- The Town partners with both the Paradise Irrigation District and the Butte Fire Safe Council on hazard reduction activities.
- Road improvement and storm water drainage projects to mitigate ongoing problems through the Town. In addition, the Town submitted applications for 12 projects that are critical to the Town recovery from the Camp Fire

E.7 Mitigation Strategy

E.7.1. Mitigation Goals and Objectives

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

E.7.2. NFIP Mitigation Strategy

The Town of Paradise joined the National Flood Insurance Program (NFIP) on September 24, 1984. As a participant of the NFIP, the Town of Paradise 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 Town. The Town of Paradise will continue to comply with the requirements of the NFIP in the future.

As a participant of the National Flood Insurance Program (NFIP), the Town of Paradise 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 Town. The Town of Paradise will continue to comply with the requirements of the NFIP in the future.

With no mapped floodplains, most flood concerns are related to stormwater flooding issues. The Town will continue to monitor compliance with the NFIP and will evaluate the expansion of their floodplain management program as changing conditions may warrant.

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 Town of Paradise is not a current participant in the CRS program.

More information about the floodplain administration in the Town of Paradise can be found in Table E-45.

Table E-45 Town of Paradise Compliance with NFIP

NFIP Topic	Comments
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	13 policies $6,033 in premiums $4,170,000 in coverage
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	1 paid claim $14,957.23 in paid clams 0 substantial damage claims
How many structures are exposed to flood risk within the community?	0 in 1% annual chance floodplain 0 in 0.2% annual chance floodplain

NFIP Topic	Comments
Repetitive Loss (RL) and Severe Repetitive Loss Properties (SRL)	0 RL 0 SRL
Describe any areas of flood risk with limited NFIP policy coverage	No SFHA in the Town
Staff Resources	
Is the Community Floodplain Administrator or NFIP Coordinator certified?	No, The Town does not have any Special Flood Hazard Areas.
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Not Applicable
What are the barriers to running an effective NFIP program in the community, if any?	No
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 3/5/2003 GTA 9/12/2016
Is a CAV or CAC scheduled or needed?	N
Regulation	
When did the community enter the NFIP?	6/8/1998
Are the FIRMs digital or paper?	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	No
Provide an explanation of the permitting process.	Permits are issued through the Building Division and included site plan reviews, which would be applicable to a review for any Special Permit Zones.
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

E.7.3. Mitigation Actions

The planning team for the Town of Paradise 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:

- Drought and Water Shortage
- Earthquake and Liquefaction
- Floods: Localized Stormwater
- Invasive Species: Pests/Plants
- Landslide, Mudslide, and Debris Flow
- 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 5-2 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 of priority. Collectively, this multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capabilities of the Town 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 capabilities of the Town to implement.

Multi-Hazard Actions

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

Hazards Addressed: Multi-hazard (Drought and Water Shortage, Earthquake and Liquefaction, Floods: Localized Stormwater, Invasive Species: Pests/Plants, Landslide, Mudslide, and Debris Flow, 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)

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

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: Town of Paradise 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: Agricultural Hazards; Climate Change; Dam Failure; Drought & Water Shortage; Earthquake (non-priority County hazard; primary CA hazard); Flood: 1%/0.2% annual chance; Flood: Localized/Stormwater; Hazardous Materials Transportation; Landslides, Mudslide, and Debris Flows; Levee Failure; Severe Weather: Extreme Cold and Freeze; Severe Weather: Heavy Rains and Storms (wind, hail, lightning); Severe Weather: High Winds and Tornadoes; Severe Weather: Extreme Heat; Stream Bank Erosion; Subsidence; 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 Biggs 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. Early Warning System

Hazards Addressed: Multi-hazard (Drought and Water Shortage, Earthquake and Liquefaction, Floods: Localized Stormwater, Invasive Species: Pests/Plants, Landslide, Mudslide, and Debris Flow, 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)

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

Issue/Background: As evidenced by the widespread devastation and loss of life in the 2018 Camp Fire, early detection and rapid notification of impending wildfire is critical to, among other things, saving lives and property. Wildfires often grow and move rapidly and unpredictably, and relying upon word of mouth, reverse 9-1-1 and public media is inadequate when vulnerable populations must be warned rapidly. For this threat and others, more methods of alert and notification will greatly increase the chances of alerting the public and allowing the residents of Paradise to seek safety.

Project Description: Install and implement a network of emergency warning systems for the purpose of rapid hazard notification. The system will be linked to a hazard monitoring and warning implementation operation managed by the Town of Paradise's Fire Department (Cal Fire), which will be responsible for implementing warnings. The system will be effective at providing real-time warnings of impending wildfire (and other) hazards to vulnerable populations.

Other Alternatives: The Town of Paradise can reply on word of mouth, reverse 9-1-1 and public media (TV & radio) for emergency alerts. However, these methods are inadequate and put public safety in great danger.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $120,000

Benefits (Losses Avoided): By installing and implementing a network of emergency warning systems for the purpose of rapid hazard notification, the Town can effectively provide real-time warnings of impending wildfire (and other) hazards to vulnerable populations, and protect and save life and property.

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 36 months

Project Priority: Medium

Action 4. Public Works Signs

Hazards Addressed: Multi-hazard (Drought and Water Shortage, Earthquake and Liquefaction, Floods: Localized Stormwater, Invasive Species: Pests/Plants, Landslide, Mudslide, and Debris Flow, 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)

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

Issue/Background: The Camp Fire was the deadliest and most destructive wildfire in California history. It is also the deadliest wildfire in the United States since the Cloquet fire in 1918, and is high on the list of the world's deadliest wildfires; it is the sixth-deadliest U.S. wildfire overall. It was the world's costliest natural disaster in 2018. The fire started on November 8, 2018 in Butte County. After exhibiting extreme fire behavior through the community of Concow, an urban firestorm formed in the densely populated foothill town of Paradise. The fire caused at least 85 civilian fatalities, and covered an area of 153,336 acres (almost 240 sq. miles), and destroyed 18,804 structures, with most of the damage occurring within the first four hours. Total damage from the Camp Fire is estimated at $16.5 billion.

Numerous public works signs that are instrumental to the Town of Paradise were damaged or destroyed during the wildfire. Without the presence of these signs, especially during an emergency, significant issues can occur, such as uncontrolled traffic, citizens not being warned of dangers, and the inability to have an effective evacuation.

Project Description: In order to ensure that public works signage is continuously present and functioning through a variety of challenging conditions and especially during an emergency, the Town of Paradise plans to augment signage around the Town with mobile, electronic signage. This supports a stronger and more resilient type of system to support and mitigate messaging to the public to augment fixed signage. For signs involving electronics, there will be installations of protection such as surge suppressors and wiring able to sustain water submersion.

Other Alternatives: The Second Action alternative is to replace the public works signs with the same materials. The Camp Fire has proved that the previous public works signs were not resilient enough, and it has caused 85 civilian fatalities.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $270,000

Benefits (Losses Avoided): Life-safety

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 28 months

Project Priority: Low

Flood and Localized Flood Actions

Action 5. Storm Drain Master Plan

Hazards Addressed: Flood and Localized Flood

Goals Addressed: 1, 2, 3, 6

Issue/Background: The Camp Fire was the deadliest and most destructive wildfire in California history. It is also the deadliest wildfire in the United States since the Cloquet fire in 1918, and is high on the list of the world's deadliest wildfires; it is the sixth-deadliest U.S. wildfire overall. It was the world's costliest natural disaster in 2018. The fire started on November 8, 2018 in Butte County. After exhibiting extreme fire behavior through the community of Concow, an urban firestorm formed in the densely populated foothill town of Paradise. The fire caused at least 85 civilian fatalities, and covered an area of 153,336 acres (almost 240 sq. miles), and destroyed 18,804 structures, with most of the damage occurring within the first four hours. Total damage from the Camp Fire is estimated at $16.5 billion.

Numerous culverts within the Town of Paradise were destroyed as a result of the wildfire. These culverts are imperative for controlling the flow of storm water through roads and other areas. Without the proper functioning of culverts, the Town of Paradise faces significant risks, such as roadways becoming compromised, large amounts of flooding, and danger to people and property.

As described in the LHMP, floods in the planning area are a result of heavy rains, limited drainage routes and along creeks that are prone to flash flooding in rain events up to and including a 100-year storm event. These smaller, more frequent storm events, while not mapped by FEMA as a flood event, have led to flooding of streets, homes, and buildings. Floods can be powerful enough to move large objects, such as branches and trees, swiftly into other objects, such as banks and bridges, cause damage to buildings and infrastructure, and weaken foundations and soils. Secondary impacts of flooding, including saturated soils and erosion from flooding events, can cause trees to weaken and collapse, increasing the potential for property damage and loss of life. All of these impacts make infrastructure more susceptible to sustained damage or collapse.

In a flash flood event, large volumes of water have the potential to cause extreme erosion over a short period of time. This can lead to road failure, bank destabilization and loss of property. In addition, increased sedimentation from heavy erosion can cause clogging and other issues in storm drain infrastructure and increase turbidity of the water, which damages the quality of the creek for fish and other wildlife.

The Town currently lacks any type of comprehensive understanding of the physical condition of the 100 miles of underground storm drain pipe and nearly 1,000 storm drain inlets and drainage structures. This lack of information prevents the Town from making informed strategic decisions to effectively reduce flooding risks and protect public safety, property and infrastructure.

Project Description: Over 80% of the Town burned during the Camp Fire, the associated increased risk of flooding within the burn areas and downstream due to the fire related impacts amplifies the need for the completion of a SDMP. The Town of Paradise needs to fully understand the risk to public safety, property and infrastructure and determine appropriate mitigation measures in order protect the public and reduce

those risks. The proposed SDMP would evaluate the current condition of Paradise's 100 miles of storm drain pipe that make up the Town's drainage system.

The project would include a field condition assessment by Closed Circuit TV (CCTV), data computation, development of issue ranking and project prioritization criteria, updated and additional flood risk modeling for 10 and 100-year storm events, evaluation of drainage system condition and capacity deficiencies, and preparation of the SDMP report. The field evaluation and modeling effort would be conducted on a representative portion of the Town to allow for the timely completion of the SDMP. The flood risk modeling for high-frequency storms is particularly important to the Town as it recovers from the fires and begins to update and re-evaluate its flood mitigation strategies after the fire. Such modeling can and will be used to support a much more rigorous, risk-based approach to identifying and developing mitigation projects that are appropriate to the current situation in the Town.

Development of a SDMP for the Town of Paradise is essential in order to determine the most beneficial actions to implement in order to effectively reduce the risk of flooding of existing properties and guide future development in Paradise; and providing essential protection of life, health, safety, property and critical infrastructure in our community.

In order to ensure the proper functioning of culverts through disasters such as a wildfire, the Town of Paradise would repair and replace damaged culverts with stronger and more durable materials. In addition, relief culverts would be added where necessary in order to provide alternate routes for the flow of water when the main culverts reach over capacity.

Additional measures to be taken include the following:

- Where the alignment of a culvert is inconsistent with existing water flow, realign the culvert vertically or horizontally or relocate the culvert to improve hydraulics and minimize erosion and scour.
- Extend the culvert discharge to mitigate erosion and scour by extending the discharge end beyond the toe of the embankment.
- Install a debris barrier to prevent debris blockage or fins designed to orient floating debris for passage through the culvert.
- Install a debris barrier riser to allow debris to float up with the rising floodwaters without blocking flow into the culvert.

Other Alternatives: The Second Action alternative is to reduce the scale of flood risk modeling by conducting the assessment on a smaller representative portion of the Town. The reduced scale is risky to the accuracy of the flood risk modeling, and might produce predictions that mislead the Town's efforts in mitigating flood risks by selecting the less effective mitigation projects. The Town of Paradise needs to fully understand the risk to public safety, property and infrastructure and determine appropriate mitigation measures in order protect the public and reduce those risks. A relatively comprehensive assessment is essential for the effectiveness of the flood mitigation projects.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $6,000,000

Benefits (Losses Avoided): Development of a SDMP for the Town of Paradise is essential in order to determine the most beneficial actions to implement in order to effectively reduce the risk of flooding of existing properties and guide future development in Paradise; and providing essential protection of life, health, safety, property and critical infrastructure in our community.

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 36 months

Project Priority: High

Landslide and Mudslide Actions

Action 6. Reseeding Program

Hazards Addressed: Landslides and Mudslides

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

Issue/Background: As evidenced by the widespread devastation and loss of life in the 2018 Camp Fire, reseeding ground cover with quick-growing or native species is critical to, among other things, saving lives and property in restoration of the burn scar. Nearly the entire Town was impacted by the Camp Fire, and restoration of the burn scar through reseeding ground cover in public areas will reduce the risk of landslides, mudslides, and erosion of public areas throughout the town. The Disaster Recovery Reform Act of 2018 authorized this in order to conduct activities to help reduce the risk of future damage, hardship, loss, or suffering in any area affected by a wildfire.

Project Description: Phase I of the project would scope the areas for reseeding and the types and methods to be used for reseeding. In addition, this phase would prioritize critical areas to be reseeded throughout the Town. Phase II would be coordinating and performing the reseeding activities and maintenance of reseeded areas for success growth of the new planted seed.

Other Alternatives: The second action alternative is to reduce the reseeding area. The reduced scale of the project will be less optimal as the Town has been severely burnt.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $850,000

Benefits (Losses Avoided): Restoration of the burn scar through reseeding ground cover in public areas will reduce the risk of landslides, mudslides, and erosion of public areas throughout the town.

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 36 months

Project Priority: Low

Wildfire Actions

Action 7. Building Inspectors

Hazards Addressed: Fire

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

Issue/Background: On November 8, 2018, the most destructive wildfire in California history began in Butte County, California and quickly spread to the Town of Paradise. After burning for over three weeks, the fire ultimately destroyed, within the Town limits alone, over 9,000 residential structures, 400 commercial structures and 3,000 accessory structures with an estimated property loss of over $9 billion.

The Town of Paradise (Town) is Butte County's second largest incorporated jurisdiction with a population of 26,682. This loss of housing displaced over 10 percent of the entire county's population. It is critical the Town expeditiously facilitate the rebuilding of destroyed homes and businesses.

With normal staffing conditions for the Town's Community Development Department would support review and processing of 25-35 single family homes and a handful of commercial permits annually. Currently, the Town's in-house staffing is far less than normal and seeks support from qualified professionals to deliver a successful rebuild in the most resident-focused, expedient, and cost-effective manner.

Project Description: The proposed plan would be to have qualified building inspectors perform plan reviews and regular inspections of buildings and structures throughout the Town of Paradise in order to enforce compliance with applicable codes for fire hazards. This system will be effective at identifying noncompliance with codes and providing insight into the Town of Paradise's exposure to fire hazards.

Other Alternatives: The second action alternative is to reduce the proposed staffing budget in half. The building permit issuance will may have significant delays and hinder the Town's recovery process.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Expanding the implementation of the current building permit processes.

Responsible Office/Partners: Town of Paradise

Cost Estimate: $7,000,000

Benefits (Losses Avoided): The additional staffing resources for the Town's Community Development Department will support review and processing residential and commercial permits for the rebuilding of destroyed homes and business. The project will expedite the Town's recovery progress by delivering a successful rebuild in the most resident-focused, expedient, and cost-effective manner.

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 8 years

Project Priority: High

Action 8. Standing Burnt Tree Removal

Hazards Addressed: Fire, High Winds, Extreme Heat, Drought, Invasive Species

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

Issue/Background: The Camp Fire was the deadliest and most destructive wildfire in California history. It is also the deadliest wildfire in the United States since the Cloquet fire in 1918, and is high on the list of the world's deadliest wildfires; it is the sixth-deadliest U.S. wildfire overall. It was the world's costliest natural disaster in 2018. The fire started on November 8, 2018 in Butte County. After exhibiting extreme fire behavior through the community of Concow, an urban firestorm formed in the densely populated foothill town of Paradise. The fire caused at least 85 civilian fatalities, and covered an area of 153,336 acres (almost 240 sq. miles), and destroyed 18,804 structures, with most of the damage occurring within the first four hours. Total damage from the Camp Fire is estimated at $16.5 billion.

Removing standing burned trees was authorized through the Disaster Recovery Reform Act of 2018 and will be critical to the Town of Paradise's Recovery as there are numerous standing burned trees throughout the Town. The remaining standing burned trees are predominately on private property. In order for the Town to recover, including property owners that can safely rebuild homes on their properties, these standing burned trees will have to be removed.

Project Description: This project will be focused on removing standing burned trees on private property that threaten improved property (e.g. Homes). This includes numerous trees throughout the town and defining the number of trees in this category will be defined in the scoping of this project.

- Phase 1 will be the scoping of the universe of trees, geo coding the trees, and an arborist assessment of the health of the tree. The intent is to remove the trees that are dying and will fall in the next 1 to 5 years.
- Phase 2 will be the felling and removal of the trees.

Other Alternatives: The second action alternative would be to remove 50% of the trees in scope. The reduced scale will further reduce the area of the community and limit the residents' choice of location for reconstruction. The public will continue to have serious concerns about individual and property safety, and will be unwilling to move back to the Town.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $200,000,000

Benefits (Losses Avoided): Removing standing burned trees was authorized through the Disaster Recovery Reform Act of 2018 and will be critical to the Town of Paradise's Recovery as there are numerous standing burned trees throughout the Town. The remaining standing burned trees are predominately on

private property. In order for the Town to recover, including property owners that can safely rebuild homes on their properties, these standing burned trees will have to be removed.

Potential Funding: Donated Resources, FEMA Public Assistance, FEMA Hazard Mitigation Grant Program

Timeline: 36 months

Project Priority: High

Action 9. Chipper Program

Hazards Addressed: Fire, High Winds, Extreme Heat, Drought, Invasive Species

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

Issue/Background: The Town of Paradise has identified significant issues regarding the defensible space of properties located in the Town limits. Defensible space is an area around a home where trees, shrubs and other vegetation are cleared or reduced to slow the spread of wildfire toward the building. Defensible space creates a safe zone for firefighters to carry out their work, and it reduces the chance that a structure fire will move to the surrounding forest. The Camp Fire destroyed or damaged a significant portion of residential and non-residential structures across the Town. The establishment of a formal vegetation management and inspection program will help public safety personnel, Town executives, emergency managers, and citizens to plan and prepare for wildfire hazards thereby protecting and saving life and property. There are a number of cities and counties in California that have implemented successful chipping and vegetation management programs which have reduced the number of wildfire casualties and property destruction. The program that the Town hopes to implement will include the chipping aspect along with education and inspections to mitigate losses in the future.

Project Description: In the wake of the most destructive wildfires in California's history, the Town of Paradise will establish a vegetation management and Inspection Program to help protect Town properties. The target location would be the Wildland-Urban Interface areas which encompasses the entire Town. This includes over 11,500 parcels with an estimated pre-fire population of 26,000.

In the aftermath of the Camp Fire, the fire prevention techniques and mitigation measures will have completely changed. The Town will need to use more mechanical measures versus chemical of clearing brush and creating defensible space throughout the Town. The vegetative landscape will be grasses, brush, and small trees as opposed to the pre-fire state of large trees. This change throughout makes this project even more important in creating a chipper program to manage hazardous fuels and creating defensible space.

The mitigation program will be established in two phases as described below:

- Phase I of the project is scoping and inspections of properties throughout the town in order to establish the normal inspection process and assessing the defensible space around standing structures throughout the town. In addition, through the assessing and scoping, the equipment needed to conduct phase II

would be defined and purchased, including chippers and masticators in order to execute the project in clearing and mitigating vegetative growth that would infringe on defensible space and reducing hazardous fuels.
- Phase II would be conducting inspections throughout the Town and clearing and mitigating vegetative growth that would infringe on defensible space and reducing hazardous fuels.

Other Alternatives: The second action alternative would be to create defensible space via chemical and biological methods. While this is a possible solution to the rapid spread of wildfires, it can be more costly and difficult to implement than the mechanical approach that is the subject of the proposed action.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $2,500,000

Benefits (Losses Avoided): A significant contributor to the rapid spread of the fire, as well as the destructive nature of the fire, was the hazardous fuels and vegetation surrounding structures within the Town. By implementing a program that tries to create defensible space throughout the Town, the risk to life and property can be effectively reduced in the event of disaster such as a wildfire.

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 36 months

Project Priority: Medium

Action 10. Commercial Ignition Resistant Improvement Program

Hazards Addressed: Fire, High Winds, Extreme Heat, Drought, Invasive Species

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

Issue/Background: The Wildland-Urban Interface (WUI) aims to mitigate wildfire risks, reduce risks to people, and help minimize property loss to wildfire. The Camp Fire was the deadliest and most destructive wildfire in California history. It is also the deadliest wildfire in the United States since the Cloquet fire in 1918, and is high on the list of the world's deadliest wildfires; it is the sixth-deadliest U.S. wildfire overall. It was the world's costliest natural disaster in 2018. The fire started on November 8, 2018 in Butte County. After exhibiting extreme fire behavior through the community of Concow, an urban firestorm formed in the densely populated foothill town of Paradise. The fire caused at least 85 civilian fatalities, and covered an area of 153,336 acres (almost 240 sq. miles), and destroyed 18,804 structures, with most of the damage occurring within the first four hours. Total damage from the Camp Fire is estimated at $16.5 billion.

A significant contributor to rapid spread of the fire, as well as the destructive nature of the fire, was fuel on roofs and in eaves of residential homes. As a result, the Town is taking proactive steps to enhance the resilience of commercial buildings by enhancing building codes and incentivizing commercial property

owners to modify existing structures and rebuilding to higher standards to mitigate the risk of such a deadly event in the future.

Project Description: This project is split between two phases. Phase one is to scope the codes and standards that will be required by the town. This will, in part, be defined by the Recovery Strategy that is in the process of being drafted to establish comprehensive codes and standards that will be required in the massive rebuilding effort across the Town. In addition, this phase will establish the process required to accept applications, establish priorities and the criteria in accepting applications, and submitting approved applications to Cal OES and FEMA for approval of each application.

Phase Two would include accepting and approval of applications through completion of the actual project. This phase would include an outreach program to educate the community of the program, open the application period to receive applications from residents of the Town of Paradise. The Town will vet the applications, prepare a parcel packet that will include a specific scope of work for each property, and then submit each packet to CalOES and FEMA for program eligibility and Environmental & Historic Preservation (EHP) review. This will allow FEMA to determine eligibility and EHP to formally approve and clear each property on a case by case basis. Upon Town receipt of FEMA approval of a property, the Town will notify the business owner to proceed with the approved scope of work. With FEMA approval and Town's notification, the application would be approved and the business owner could begin the work on their structure.

Ignition Resistant Improvements would be eligible for the incentive program as long as the mitigation measures meet or exceed the specifications set forth by the Town of Paradise, through the Town's Recovery Strategy and establish codes and standards, and compliant with the Wildfire Urban Interface Standards. Applicants may have ignition resistant enhancements installed in a new or existing structure. The program will be limited to $40,000 per applicant based on specified ignition resistant improvements, such as ignition resistant roofs, permanent foundations for manufactured housing, and fire-resistant windows, as an example. Each component of the program would be limited to a dollar figure and each applicant would be limited to the program limit. For example, if the fire-resistant roof component was limited to $30,000 and the fire-resistant windows was limited to $15,000 (as defined in phase 1 of the program), the applicant could include both components in their application, but the overall limit would be the program limit of $25,000 per applicant. As previously addressed, phase 1 of the project would determine the exact limitations. The program limit reimbursement would be based on actual cost up to the program limit of $40,000 per application.

The program would be limited to 500 approved applications in order to complete the program within a four-year time period.

The eligibility rules for the Commercial Ignition Resistant Improvement Program would establish guidelines, rules, and criteria for administering the program and accepting applications that will l be defined in phase one of the Program.

- To be eligible, the Commercial Ignition Resistant Improvements must be installed on property owned by the applicant.
- Retrofitting or repairing an existing structure to meet Town specifications is eligible for the Commercial Ignition Resistant Improvement Program.

- Commercial structures in a floodplain that have flood insurance may be eligible for the Ignition Resistant Improvement Program. However, more information may be required for FEMA approval of the specific situation
- Commercial structures on historic property, or in a historic district may be eligible for the Ignition Resistant Improvement Program. However, FEMA will have to approve each specific situation.
- If your commercial structures were destroyed in by the Camp Fire and you plan to rebuild your business in a different location than your previous location, an applicant could be eligible for this Commercial Ignition Resistant Improvement Program, as long as they are building in the Town of Paradise.
- The applicant must pay the total invoice for the Ignition Resistant Improvement Program and installation in order to receive reimbursement, as well as provide copies of the cleared check or credit card statement.

Other Alternatives: No alternatives identified.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $20,000,000

Benefits (Losses Avoided): By incentivizing commercial property owners to modify existing structures and rebuilding to higher standards, the Town will mitigate the risk of deadly wildfire in the future.

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 48 months

Project Priority: High

Action 11. Education and Outreach Program

Hazards Addressed: Fire, High Winds, Extreme Heat, Drought, Invasive Species

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

Issue/Background: The Town of Paradise has identified significant issues regarding the defensible space of properties located in the Town limits. Defensible space is an area around a home where trees, shrubs and other vegetation are cleared or reduced to slow the spread of wildfire toward the building. Defensible space creates a safe zone for firefighters to carry out their work, and it reduces the chance that a structure fire will move to the surrounding forest. The Camp Fire destroyed or damaged a significant portion of residential and non-residential structures across the Town. The establishment of a formal vegetation management and inspection program will help public safety personnel, Town executives, emergency managers, and citizens to plan and prepare for wildfire hazards thereby protecting and saving life and property. There are a number of cities and counties in California that have implemented successful education and outreach programs for vegetation management which have reduced the number of wildfire casualties and property destruction. The program that the Town hopes to implement will include the chipping aspect along with education and outreach to mitigate losses in the future.

Project Description: In the wake of the most destructive wildfires in California's history, the Town of Paradise will establish a vegetation management and Inspection Program to help protect Town properties. The target location would be the Wildland-Urban Interface areas which encompasses the entire Town. This includes over 11,500 parcels with an estimated pre-fire population of 26,000. The mitigation program will be established on a three-year plan as described below.

The first year of the program will consist of education provided to Home Owner Associations, neighborhoods, schools and senior communities. The focus of the education will be geared towards fuel modification, establishing and maintaining defensible spaces, home hardening techniques, preparedness and evacuation planning as well as discussing the Ready Set Go program based on a California State preparedness and prevention program and discussing the Firewise Community program based on the National Fire Protection Association program. History and lessons learned will be shared, educating all the target groups about forest management techniques and encouraging neighborhoods to look to become Firewise Communities and to focus on a long-term effort within their community, creating behavior change at a community level. This year will conclude with an evaluation/survey of the program delivery and requests for suggestions of how we can better serve or address the needs of residents within the WUI areas.

The second year of the program will be focused on the inspection of properties. The outreach coordinator will instruct property owners and residents in self-inspection techniques for their properties or shared properties. This year will key in on actions property owners can take to establish fuel zones around their homes. Starting at the home or the Home Ignition Zone and working out 10 feet, there will be removal of combustible vegetation and combustible materials. The inspection program will be looking for replacement items that are designed to resist ember and flame intrusion from an approaching vegetation fire. Home hardening techniques and materials will be re-introduced to help homeowners with formulating plans for modifying their structures with current building materials that comply with WUI building code requirements. There will also be further meetings provided to discuss disaster planning and emergency responder access to all areas of the WUI. The outreach coordinator will look at the establishment of defensible spaces for shared common areas and individual properties as a component of the inspection program, and provide planning strategies and management techniques for the future. This year will conclude with input from all willing members of these WUI areas completing a survey, and gauging the level of community interest in the Fire Department establishing a Vegetation Management Ordinance that would provide for defined requirements to be met by property owners within the WUI areas.

The third year of the program will be dedicated to revisiting all the WUI areas; following up with Home Owner Associations, neighborhoods, property owners, schools and senior community. We will also look to leverage communities who have become Firewise Communities over this grant period to seek more participation to formulate more Firewise Communities. Sustainability of the fuel modification program and chipper services will continue to be a focus, also home hardening and evacuation planning will be a key takeaway from the successful implementation of this program. The final step will be a conclusive report that addresses the actions taken over the three-year period, listing failures and successes of the program as well as recognition of key figures who helped to deliver this vital community program.

Other Alternatives: No alternatives identified.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $200,000

Benefits (Losses Avoided): The Program will help citizens to plan and prepare for wildfire hazards thereby protecting and saving life and property. There are a number of cities and counties in California that have implemented successful education and outreach programs for vegetation management which have reduced the number of wildfire casualties and property destruction.

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 36 months

Project Priority: Medium

Action 12. Generator for Fire Station #82

Hazards Addressed: Fire, High Winds, Extreme Heat, Drought, Invasive Species

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

Issue/Background: The Camp Fire was the deadliest and most destructive wildfire in California history. It is also the deadliest wildfire in the United States since the Cloquet fire in 1918, and is high on the list of the world's deadliest wildfires; it is the sixth-deadliest U.S. wildfire overall. It was the world's costliest natural disaster in 2018. The fire started on November 8, 2018 in Butte County. After exhibiting extreme fire behavior through the community of Concow, an urban firestorm formed in the densely populated foothill town of Paradise. The fire caused at least 85 civilian fatalities, and covered an area of 153,336 acres (almost 240 sq. miles), and destroyed 18,804 structures, with most of the damage occurring within the first four hours. Total damage from the Camp Fire is estimated at $16.5 billion.

Fire Station #82 would greatly benefit from a generator in order to provide essential and continued supply of power to the station during emergencies. If power to this fire station is compromised during an emergency, the fire station may lose its ability to properly function, and the fire department may not be able to effectively respond to hazards to people and property within the Town of Paradise.

Project Description: In order to ensure the continuous supply of power to Fire Station #82 during disasters such as a wildfire or flood, a whole house emergency power will be installed to provide a suitable back up power source during instances of the commercial power loss. The project will require the engagement of professional engineering to accurately determine the need. An analysis will be completed by a qualified and experienced electrical company using a year of peak usage data from the local power company and a meter recording of use over a period of three days and it is estimated that the generator must supply an appropriate power supply as defined by the analysis. The design to include the installation of a standby generator system and the replacement and update of the automatic power transfer switch and panel.

Other Alternatives: No alternatives identified.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $200,000

Benefits (Losses Avoided): The project reduces the risk of the fire station being compromised in the hazardous events. A back-up generator will enhance the Town's capacity to protect its citizens and properties.

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 36 months

Project Priority: Low

Action 13. Fire Station #3

Hazards Addressed: Fire, High Winds, Extreme Heat, Drought, Invasive Species

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

Issue/Background: Fire Station #3, which is currently located at 1250 Wagstaff Road, was completely destroyed by the 2018 Camp Fire. This station, among the other fire stations, serves a pivotal role in emergency situations. Without the proper functioning of this fire station, firefighters and emergency response teams are limited in their ability to effectively respond to hazards. For example, a compromised fire station can severely limit the use of emergency apparatus necessary for public safety and the prevention of damage to property. In addition, a firehouse susceptible to hazards, such as fire and flooding, can create extremely dangerous situations for personnel occupying the building.

Project Description: The first part of the proposed plan is to relocate Fire Station #3 to the intersection of Pentz Road and Pearson Road, which will be funded by other assistance programs, including insurance and public assistance. The second part is to rebuild Fire Station #3 with newer, stronger ignition resistant materials. This new location and rebuild can potentially reduce Fire Station #3 and its inhabitants' exposure to hazards including fire and flood.

The third part of the plan is to equip the fire station with a backup generator in the event of a power outage. Implementing these items into the fire station can ensure the effective operation and functioning of the fire station during an emergency.

Other Alternatives: The second action alternative is to reduce the budget on ignition resistant materials.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $500,000

Benefits (Losses Avoided): The project reduces the risk of the fire station being compromised in the hazardous events. This new location and rebuild of Fire Station #3 will enhance the Town's capacity to protect its citizens and properties.

Potential Funding: FEMA Public Assistance, FEMA Hazard Mitigation Grant Program, Insurance

Timeline: 36 months

Project Priority: Medium

Action 14. Residential Ignition Resistant Improvement Program

Hazards Addressed: Fire, High Winds, Extreme Heat, Drought, Invasive Species

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

Issue/Background: The Wildland-Urban Interface (WUI) aims to mitigate wildfire risks, reduce risks to people, and help minimize property loss to wildfire. The Camp Fire was the deadliest and most destructive wildfire in California history. It is also the deadliest wildfire in the United States since the Cloquet fire in 1918, and is high on the list of the world's deadliest wildfires; it is the sixth-deadliest U.S. wildfire overall. It was the world's costliest natural disaster in 2018. The fire started on November 8, 2018 in Butte County. After exhibiting extreme fire behavior through the community of Concow, an urban firestorm formed in the densely populated foothill town of Paradise. The fire caused at least 85 civilian fatalities, and covered an area of 153,336 acres (almost 240 sq. miles), and destroyed 18,804 structures, with most of the damage occurring within the first four hours. Total damage from the Camp Fire is estimated at $16.5 billion.

A significant contributor to rapid spread of the fire, as well as the destructive nature of the fire, was fuel on roofs and in eaves of residential homes. As a result, the Town is taking proactive steps to enhance the resilience of residential buildings by enhancing building codes and incentivizing residents to modify existing structures and rebuilding to higher standards to mitigate the risk of such a deadly event in the future.

Project Description: This project is split between two phases. Phase one is to scope the codes and standards that will be required by the town. This will, in part, be defined by the Recovery Strategy that is in the process of being drafted to establish comprehensive codes and standards that will be required in the massive rebuilding effort across the Town. In addition, this phase will establish the process required to accept applications, establish priorities and the criteria in accepting applications, and submitting approved applications to Cal OES and FEMA for approval of each application.

Phase Two would include accepting and approval of applications through completion of the actual project. This phase would include an outreach program to educate the community of the program, open the application period to receive applications from residents of the Town of Paradise. The Town will vet the applications, prepare a parcel packet that will include a specific scope of work for each property, and then submit each packet to CalOES and FEMA for program eligibility and Environmental & Historic Preservation (EHP) review. This will allow FEMA to determine eligibility and EHP to formally approve and clear each property on a case by case basis. Upon Town receipt of FEMA approval of a property, the

Town will notify the homeowner to proceed with the approved scope of work. With FEMA approval and Town's notification, the application would be approved and the homeowner could begin the work on their residence.

Ignition Resistant Improvements would be eligible for the incentive program as long as the mitigation measures meet or exceed the specifications set forth by the Town of Paradise. These specifications are in the process of being established through the Town's Recovery Strategy enhance the Town's codes and standards, and be compliant with the Wildfire Urban Interface Standards. Applicants may have ignition resistant enhancements installed in a new or existing home. The program will be limited to $40,000 per applicant based on specified ignition resistant improvements, such as ignition resistant roofs, permanent foundations for manufactured housing, and fire-resistant windows, as an example. Each component of the program would be limited to a dollar figure and each applicant would be limited to the program limit. For example, if the fire resistant roof component was limited to $30,000 and the fire resistant windows were limited to $16,000 (as defined in phase 1 of the program), the applicant could include both components in their application, but the overall limit would be the program limit of $25,000 per applicant. As previously addressed, phase 1 of the project would determine the exact limitations and the reimbursement would be based on actual cost up to the program limit.

The program would be limited to 2,000 approved applications in order to complete the program within a four-year time period.

Other Alternatives: No alternatives identified.

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

Responsible Office/Partners: Town of Paradise

Cost Estimate: $56,000,000

Benefits (Losses Avoided): By incentivizing homeowners to modify existing structures and rebuilding to higher standards, the Town will mitigate the risk of deadly wildfire in the future.

Potential Funding: FEMA Hazard Mitigation Grant Program

Timeline: 48 months

Project Priority: High

Action 15. Firewise Communities and Education Program

Hazards Addressed: Fire hazard / Fuel reduction

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

Issue/Background: Butte County has experienced many damaging wildland fires during the past century. Dense vegetative fuel loading provides the potential for future catastrophic wildland fires and damage to communities and assets at risk.

Project Description: Provide multiple forms of community outreach to youth, families and wildland urban interface residents about defensible space, evacuation preparedness, home hardening, ember storms, forest health, Firewise USA program and fire safe council programs.

Other Alternatives:

- Increased number of initial attack resources
- Public education to reduce ignitions
- Nothing

Existing Planning Mechanism(s) through which Action Will Be Implemented: Butte Unit Fire Plan/Community Wildfire Protection Plan

Responsible Office/Partners: CAL FIRE/Butte County Fire Department in cooperation with the Butte County Fire Safe Council

Cost Estimate: $80,000 for prevention staffing

Benefits (Losses Avoided):

- Reduced fire intensity within the fuel reduction zone.
- Increased probability of containing a fire within the fuel reduction zone.
- Reduced risk to public safety, property, environment and other assets at risk.

Potential Funding: Grant funding

Timeline: 2019 and ongoing

Project Priority: High

Action 16. Fuels Reduction Chipper Program

Hazards Addressed: Fire hazard / Fuel reduction

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

Issue/Background: Butte County has experienced many damaging wildland fires during the past century. Dense vegetative fuel loading provides the potential for future catastrophic wildland fires and damage to communities and assets at risk.

Project Description: Provide no cost or low cost service for chipping fire hazardous vegetation throughout the Wildland Urban Interface to improve defensible space and ingress/egress.

Other Alternatives:

- Increased number of initial attack resources
- Public education to reduce ignitions
- Nothing

E**xisting Planning Mechanism(s) through which Action Will Be Implemented**: Butte Unit Fire Plan/Community Wildfire Protection Plan

Responsible Office/Partners: CAL FIRE/Butte County Fire Department in cooperation with the Butte County Fire Safe Council

Cost Estimate: 500 acres at total of $500,000

Benefits (Losses Avoided):

- Reduced fire intensity within the fuel reduction zone.
- Increased probability of containing a fire within the fuel reduction zone.
- Reduced risk to public safety, property, environment and other assets at risk.

Potential Funding: Grant funding

Timeline: 2019 and ongoing

Project Priority: High

Action 17. Residents Assistance Program - Fuels Reduction and Defensible Space

Hazards Addressed: Fire hazard / Fuel reduction

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

Issue/Background: Butte County has experienced many damaging wildland fires during the past century. Dense vegetative fuel loading provides the potential for future catastrophic wildland fires and damage to communities and assets at risk.

Project Description: Provide no cost or low cost service for creating and improving defensible space and ingress/egress for elderly, low income and disabled residents in the Wildland Urban Interface.

Other Alternatives:

- Increased number of initial attack resources
- Public education to reduce ignitions
- Nothing

Existing Planning Mechanism(s) through which Action Will Be Implemented: Butte Unit Fire Plan/Community Wildfire Protection Plan

Responsible Office/Partners: CAL FIRE/Butte County Fire Department in cooperation with the Butte County Fire Safe Council

Cost Estimate: 150 acres at total of $300,000

Benefits (Losses Avoided):

- Reduced fire intensity within the fuel reduction zone.
- Increased probability of containing a fire within the fuel reduction zone.
- Reduced risk to public safety, property, environment and other assets at risk.

Potential Funding: Grant funding

Timeline: 2019 and ongoing

Project Priority: High

Action 18. Camp Fire Hazard Tree Removal - Fuels Reduction

Hazards Addressed: Fire hazard / Fuel reduction

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

Issue/Background: Butte County has experienced many damaging wildland fires during the past century. Dense vegetative fuel loading provides the potential for future catastrophic wildland fires and damage to communities and assets at risk.

Project Description: Assist in efforts to improve community safety from hazard trees caused by the November 8, 2018 Camp Fire by cutting small and large diameter dead and dying trees near homes, roadways and community locations. As well as removal of brush and stump regrowth from trees killed or removed.

Other Alternatives:

- Increased number of initial attack resources
- Public education to reduce ignitions
- Nothing

Existing Planning Mechanism(s) through which Action Will Be Implemented: Butte Unit Fire Plan/Community Wildfire Protection Plan

Responsible Office/Partners: CAL FIRE/Butte County Fire Department in cooperation with the Butte County Fire Safe Council

Cost Estimate: 200,000 trees estimated at 60 million dollars in removal and processing

Benefits (Losses Avoided):

- Reduced fire intensity within the fuel reduction zone.
- Increased probability of containing a fire within the fuel reduction zone.
- Reduced risk to public safety, property, environment and other assets at risk.

Potential Funding: FEMA, Local, State and Private Grant funding

Timeline: 2019 and ongoing

Project Priority: High