



Annex J Feather River Recreation and Park District

J.1 Introduction

This Annex details the hazard mitigation planning elements specific to Feather River Recreation and Park District (FRRPD or District), a new 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 District. This Annex provides additional information specific to the District, with a focus on providing additional details on the risk assessment and mitigation strategy for the District.

J.2 Planning Process

As described above, the FRRPD 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 District 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 J-1. Additional details on plan participation and FRRPD representatives are included in Appendix A.

Table J-1 Feather River Recreation and Park District Planning Team

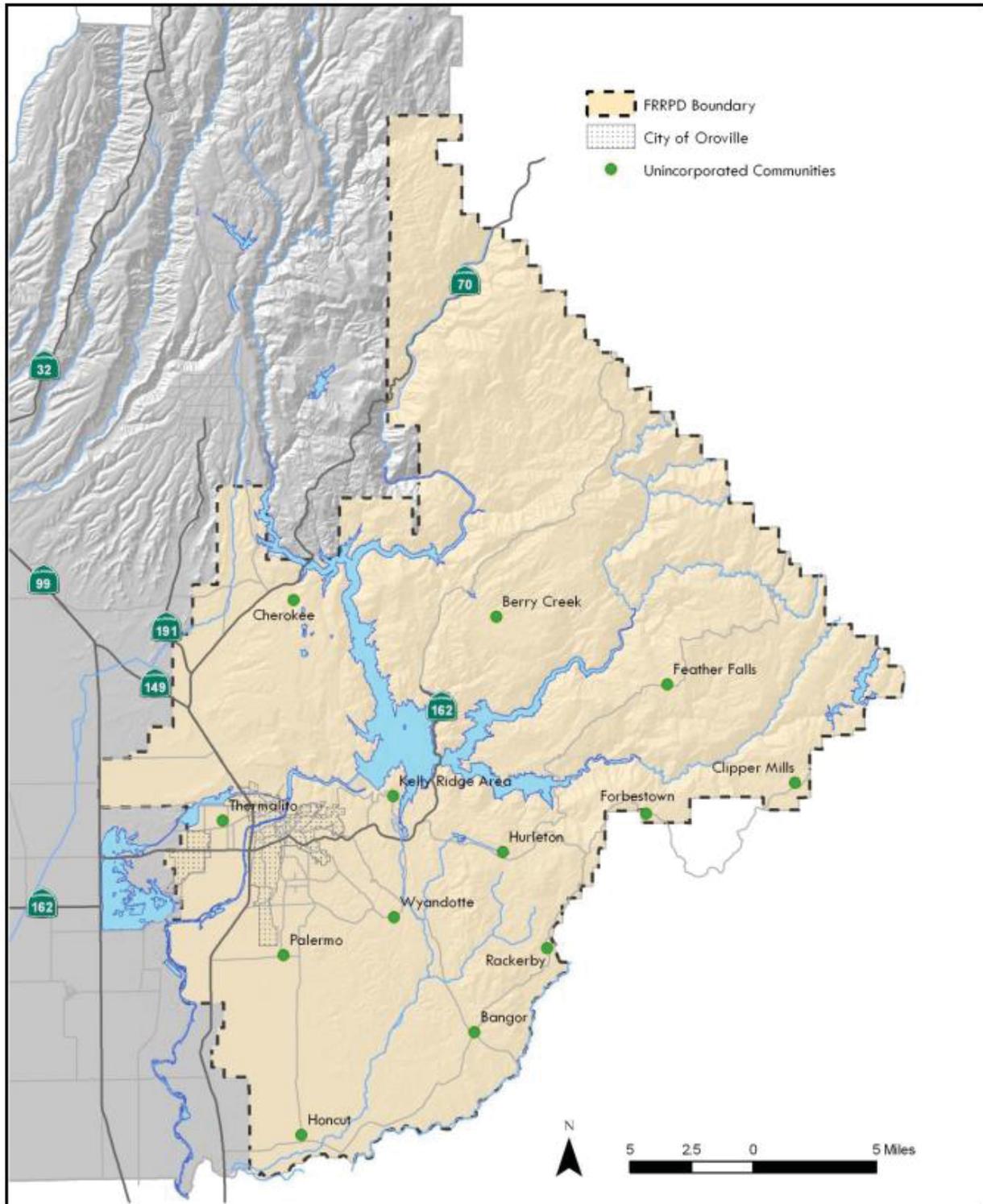
Name	Position/Title	How Participated
Scott Thompson	Park Supervisor	Attended HMPC meetings. Provided info on hazards of concern to the District. Provided input on past occurrences and capabilities. Reviewed Drafts.
Randy Murphy	General Manager	Attended HMPC meetings. Provided info on hazards of concern to the District. Provided input on past occurrences and capabilities. Reviewed Drafts.
Brian Wilson	Interim General Manager	Attended HMPC meetings. Provided info on hazards of concern to the District. Provided input on past occurrences and capabilities. Reviewed Drafts.

Source: FRRPD

J.3 District Profile

The community profile for the FRRPD is detailed in the following sections. Figure J-1 displays a map and the location of the District within Butte County.

Figure J-1 Feather River Recreation and Park District



Source: FRRPD

J.3.1. Overview and Background

FRRPD is an independent special district governed by a five-member Board of Directors elected by the public. The District was formed by a joint resolution signed by Butte County and the City of Oroville in 1951 with the first board of directors elected in November of that year, with the authority to provide recreation and park services for the residents of the District.

Today, the Feather River Recreation and Park District encompasses an area of 730 square miles in South-eastern Butte County, which comprises approximately 42 percent of the geographical area of the County and nearly 24 percent of the County's population. Population in the District is approximately 51,455 people. Although Oroville is the hub of the District and the vast majority of services are centered there, programs and facilities are also provided in the various rural communities ranging from the valley floor into the mountains. Along with the greater Oroville area, other District communities include Palermo, Bangor, and Honcut in the valley, and the mountain areas of Berry Creek, Feather Falls, Forbestown, Pentz, and Concow. The latter two are served in cooperation with the Paradise Recreation and Park District.

J.4 Hazard Identification

FRRPD's planning team identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to the District (see Table J-2).

Table J-2 Feather River Recreation and Park District – Hazard Identification Assessment

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	Medium	–
Dam Failure	Extensive	Occasional	Catastrophic	High	Medium
Drought & Water Shortage	Extensive	Likely	Critical	Medium	High
Earthquake and Liquefaction	Extensive	Unlikely	Catastrophic	Medium	Low
Floods: 100/200/500 year	Significant	Likely	Critical	High	Medium
Floods: Localized Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Hazardous Materials Transportation	Significant	Likely	Limited	Medium	Low
Invasive Species: Aquatic	Limited	Likely	Limited	Medium	Low
Invasive Species: Pests/Plants	Extensive	Highly Likely	Limited	Medium	Low
Landslide, Mudslide, and Debris Flow	Significant	Likely	Critical	Medium	Medium
Levee Failure	Significant	Occasional	Critical	High	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Freeze and Winter Storm	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: Heavy Rain and Storms (Hail, Lightning)	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: Wind and Tornado	Extensive	Highly Likely/Likely	Critical	Medium	Low
Stream Bank Erosion	Significant	Highly Likely	Limited	Medium	Low
Volcano	Extensive	Unlikely	Negligible	Low	Low
Wildfire	Extensive	Highly Likely	Catastrophic	High	High
<p>Geographic Extent Limited: Less than 10% of planning area Significant: 10-50% of planning area Extensive: 50-100% of planning area</p> <p>Probability of Future Occurrences Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.</p> <p>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</p> <p>Significance Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact</p> <p>Climate Change Impact: Low: Not likely to increase the probability of this hazard. Medium: Is likely to increase the probability of this hazard. High: Is very likely to increase the probability of this hazard.</p>					

J.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile the FRRPD’s hazards and assess the District’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 extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the District is included in this Annex. This vulnerability assessment analyzes the property and other assets at risk to hazards ranked of medium or high significance specific to the District. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

J.5.1. Hazard Profiles

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

J.5.2. Vulnerability Assessment and Assets at Risk

This section identifies the District’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 District. This data is not hazard specific but is representative of total assets at risk within the District.

Assets at Risk and Critical Facilities

This section considers the FRRPD’s assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this LHMP. Critical facilities are defined for this Plan 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.

Table J-3 lists particular critical facilities and other District assets identified by the FRRPD planning team as important to protect in the event of a disaster. FRRPD’s physical assets, valued at over \$28 million, consist of the buildings and infrastructure to support FRRPD’s operations.

Table J-3 Feather River Recreation and Park District Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value
Activity Center	Multi-use	\$3,743,451.30
Bangor	Park	\$4,882.08
Berry Creek	Park	\$39,627.00
Bedrock Park	Multi-use	\$343,192.86
Maintenance Shop	Shop/Office	\$389,674.42
Martin Luther King Jr. Park	Multi-use	\$157,136.88
Municipal Auditorium	Auditorium	\$2,795.50
Nelson Park	Multi-use	\$35,125.34
Nelson Pool	Pool	\$68,048.51
Nolan Complex	Multi-use	\$26,804.45
Palermo Park	Multi-use	\$131,873.71
Palermo Pool	Pool	\$198,009.75
Riverbend Park	Park	\$7,449,767.79
Structures Owned	Structures	\$3,171,652.64
Structures Leased	Structures	\$455,669.37
Land	Land	\$11,845,205.60
Total		\$28,062,917.20

Source: FRRPD

Natural Resources

FRRPD has a variety of natural resources of value to the District. These natural resources parallels that of the southern County as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Historic and Cultural Resources

FRRPD has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallels that of the southern County as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Growth and Development Trends

According to the 2020 FRRPD Master Plan, FRRPD’s service area population in the 2000 Census was estimated to be 48,313 which represented nearly 24 percent of Butte County’s entire population (Butte County LAFCo, 2004). Approximately two-thirds of the District’s population lives in four communities: Oroville (population of 13,004), South Oroville (population of 7,695), Thermalito (population of 6,045) and Palermo (population of 5,720). The District’s 2005 service population was estimated to be 51,455.

Special Populations

According to the 2020 FRRPD Master Plan, Butte County has a large population of senior citizens. According to the 2000 Census, 16 percent of Butte County's residents were 65 years or older which is far higher than the comparable statewide proportion of 10.7 percent. The County has a slightly lower than average youth population, with approximately 24 percent of its residents below the age of 18 compared to a statewide proportion of approximately 27 percent.

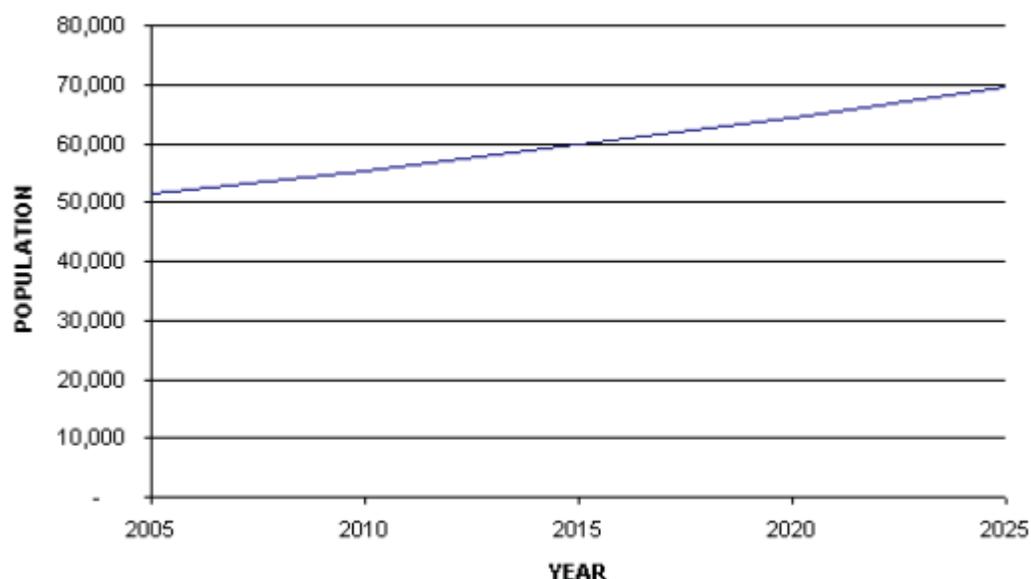
Butte County and the District both have a high proportion of low-income residents. In 2002, the median household income for Butte County was \$32,124 which is approximately 67.9 percent of the State of California's median household income level of \$47,323. In addition, an estimated 16.4 percent of Butte residents were in poverty compared to a statewide proportion of 13.3 percent (U.S. Census, 2004).

According to the most recent poverty statistics available, most of the communities within the District are far poorer than the rest of the County and have a greater proportion of individuals with income levels below the poverty level. In 1999, the median household income of Oroville residents was approximately 68.9 percent of the County's, with approximately a third of its population determined to be living below the poverty level. While South Oroville had a slightly higher median household income level, nearly 35 percent of its residents were living below the poverty level. Thermalito and Palermo's median household incomes were more comparable to the County average, but more than a quarter of the residents were living with annual incomes below the poverty level.

Future Development

Future changes in the District's user population will affect the demand for recreation within FRRPD. This can result from changes in the total number of the District's service population and also from changes in its service population's demographic composition. Butte County LAFCo's population projections for the District are shown in Figure J-2. By 2015, the population within the District's boundaries is expected to increase to 59,718 and reach 69,426 by 2025. These projections include Oroville's anticipated strong annual growth rate. The majority of the population growth is expected to occur around the communities of Oroville, Thermalito and Palermo.

Figure J-2 Feather River Recreation and Park District – Future Populations



Source: 2020 FRRPD Master Plan

Generally, population growth results in increased recreational demand. Therefore, as the District’s population increases, recreational demand and use will also be expected to rise within the District. However, changes in the composition or character of the District’s service population may also substantially affect the future recreational use and demand, given that different age groups will have considerably different recreational demands and use patterns.

J.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment for those hazards identified above in Table J-2 as high or medium significance hazards. Impacts of past events and vulnerability of the FRRPD 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).

An estimate of the vulnerability of the District 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.

Climate Change

Likelihood of Future Occurrence—Likely

Vulnerability—Medium

Hazard Profile and Problem Description

Climate change is the distinct change in measures of weather patterns over a long period of time, ranging from decades to millions of years. More specifically, it may be a change in average weather conditions such as temperature, rainfall, snow, ocean and atmospheric circulation, or in the distribution of weather around the average. While the Earth’s climate has cycled over its 4.5-billion-year age, these natural cycles have taken place gradually over millennia, and the Holocene, the most recent epoch in which human civilization developed, has been characterized by a highly stable climate – until recently.

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the County and the District. There is no scale to measure the extent of climate change. Climate change exacerbates other hazard, such as drought, extreme heat, flooding, wildfire, and others. The speed of onset of climate change is very slow. The duration of climate change is not yet known but is feared to be tens to hundreds of years.

Past Occurrences

The District Planning Team noted no past occurrences of climate change but did note that the strength of storms do seem to be increasing and the temperatures seem to be getting hotter. In addition, the District Planning Team noted that large rain events are more frequent requiring more water to be released from the Dam, and more flooding of Riverbend Park and the Feather River Bicycle Trail.

Vulnerability and Impacts to Climate Change

The APG: Defining Local and Regional Impacts focuses on understanding the ways in which climate change can affect a community. According to this APG, climate change impacts (temperature, precipitation, sea level rise, ocean acidification, and wind) affect a wide range of community structures, functions and populations. These impacts further defined by regional and local characteristics are discussed by secondary impacts and seven sectors found in local communities: Public Health, Socioeconomic, and equity impacts; Ocean and Coastal Resources; Water Management; Forest and Rangeland; Biodiversity and Habitat; Agriculture; and Infrastructure.

The APG: Understanding Regional Characteristics identified the following impacts specific to the Northern Central Valley region in which the Butte County Planning Area is part of:

- Temperature increases – particularly nighttime temperature

- Reduced precipitation
- Flooding – increase flows, snowmelt, levee failure in the Delta
- Reduced agricultural productivity (e.g., nut trees, dairy)
- Reduced water supply
- Wildfire in the Sierra foothills
- Public health and heat
- Reduced tourism
- Increased homeless population

Assets at Risk

Riverbend is the primary asset at risk from flood and fire damage, both influenced by climate change. Vandalism and homeless camps have also increased after flood events.

Future Development

Climate change may affect future development in the District. The District will need to be cognizant of its effects when siting future District facilities. The District Planning Team noted that the height of the flood waters from the emergency release of the Oroville Dam in 2017 is now the high-water mark to build above. This is about 8-feet higher than the previous 100-year flood line. New structures will only be built above this flood elevation. All building doors and utility infrastructure are designed to be vandal resistant. Low and mid-story vegetation is cleared more often to limit the potential for homeless camps and fires.

Dam Failure

Likelihood of Future Occurrence—Occasional

Vulnerability—High

Hazard Profile and Problem Description

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

Location and Extent

FRRPD boundaries and dam inundation areas can be seen on Figure J-3, Figure J-4, and Figure J-5.

Figure J-3 Feather River Recreation and Park District – Extremely High Hazard Dam Inundation Areas

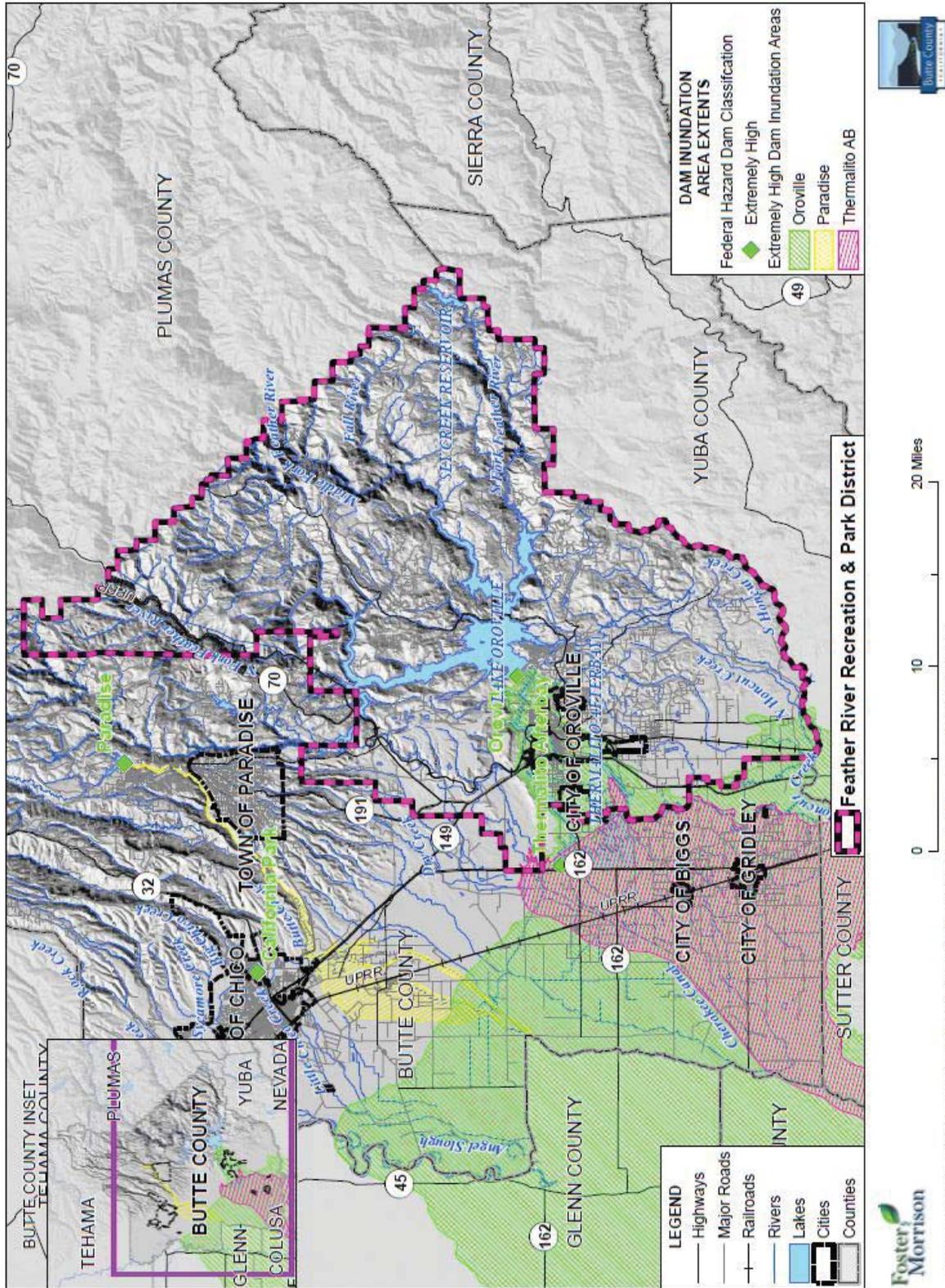


Figure J-4 Feather River Recreation and Park District – High Hazard Dam Inundation Areas

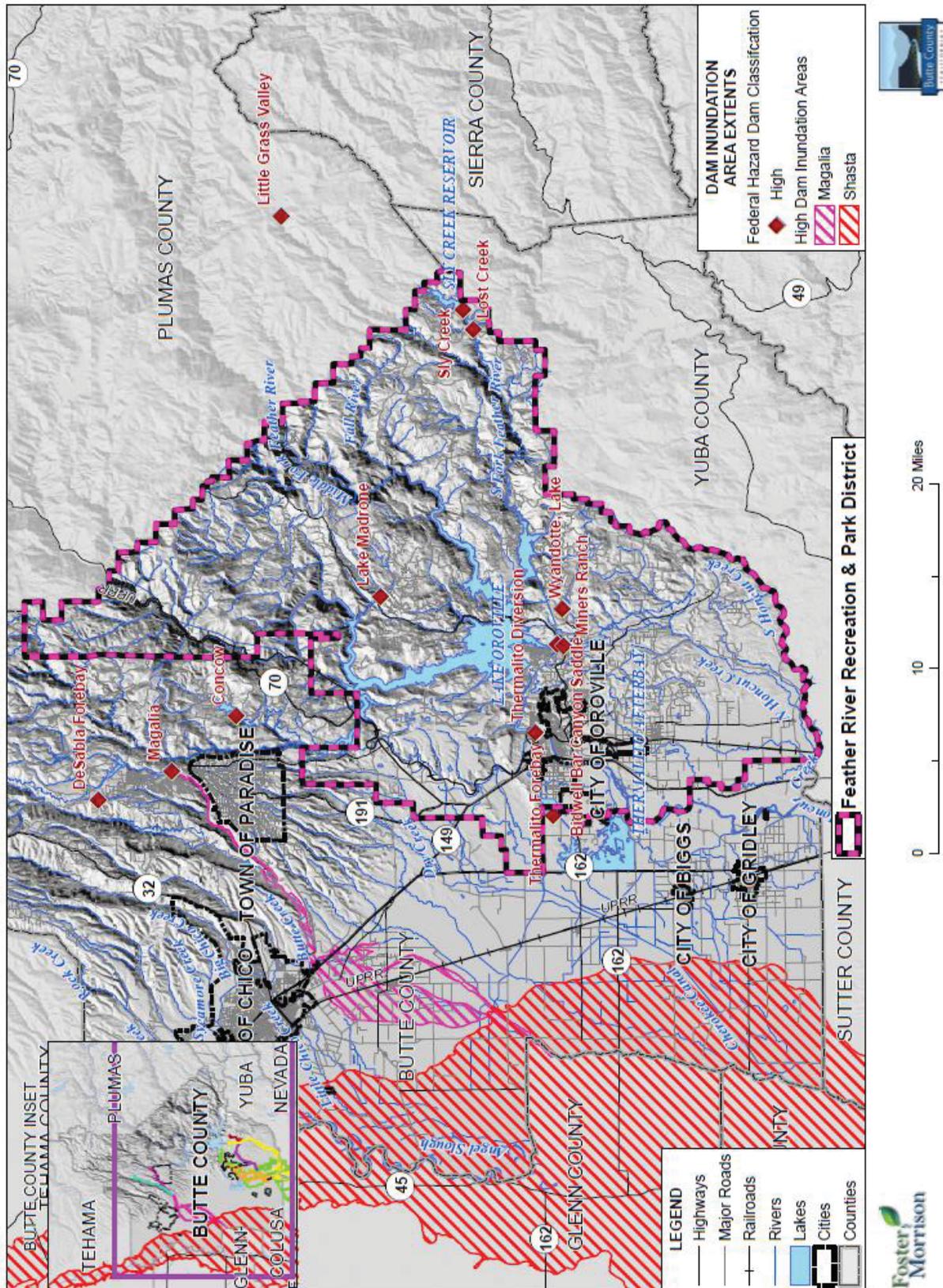
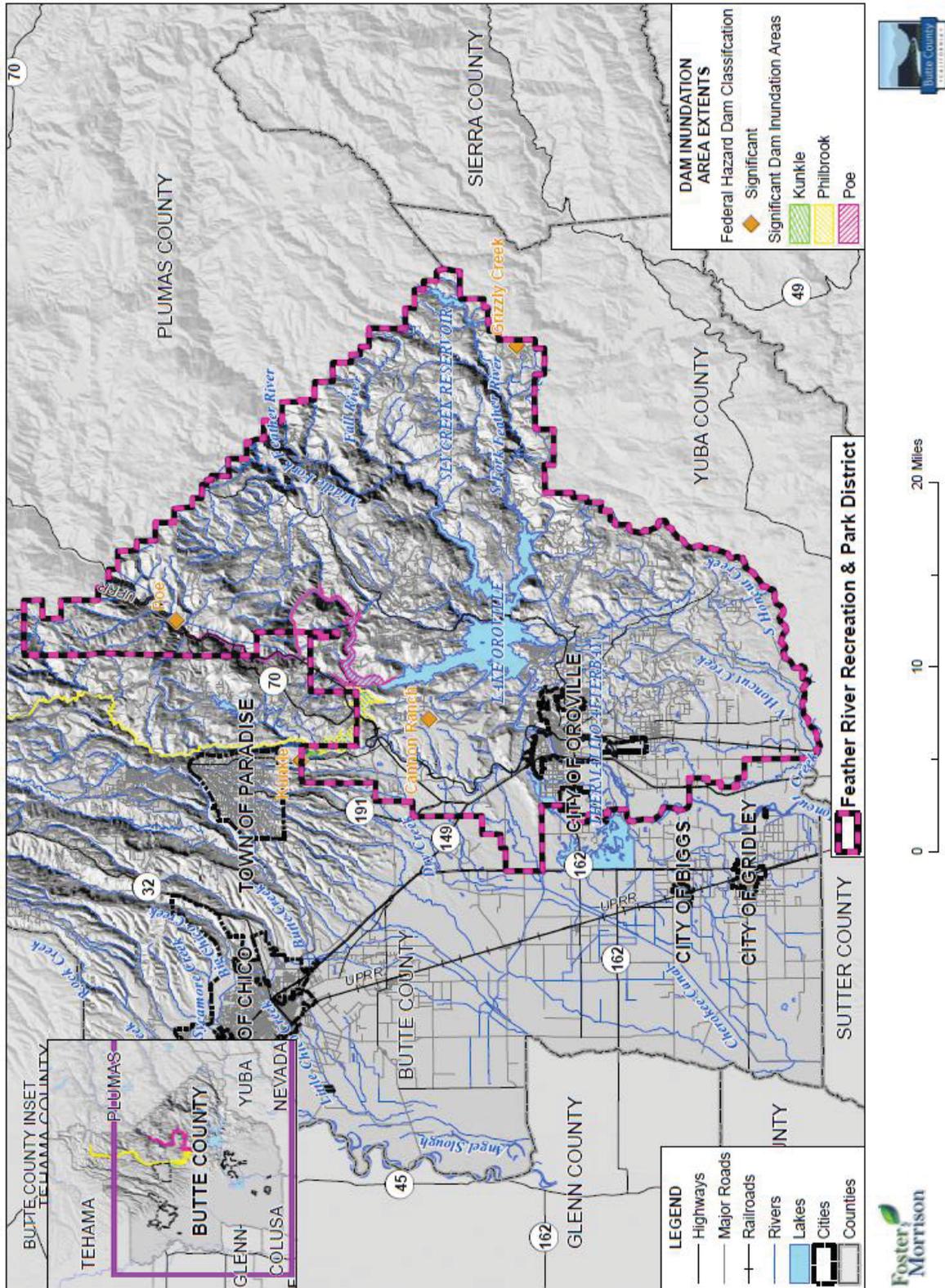


Figure J-5 Feather River Recreation and Park District – Significant Hazard Dam Inundation Areas



There is no scale with which to measure dam failure, just the Hazard Classification system for the actual dams. While a dam may fill slowly with runoff from winter storms, a dam break can have a very quick speed of onset. The duration of dam failure is generally not long – only as long as it takes to empty the reservoir of water the dam held back. The District Planning Team noted that FRRPD is most concerned about the potential failure of the Oroville Dam.

Past Occurrences

Most of Riverbend Park was flooded during the Oroville Spillway Incident in February of 2017. Much of the Park continued to be underwater as DWR continued to release extra water from the Dam through May of 2017. The District is about 85% through a projected \$8,000,000 in park repairs and restoration.

Before construction started in August of 2017, Riverbend Park was closed to assess the damage and complete construction documents for repairs. While the park was closed, numerous illegal homeless camps were created. Some structures were also damaged from arson and most the park's electrical system was stripped of copper, including most of the main serviced panel meters, circuit breakers and cabinets. The District is in the process of contemplating the need for continued hiring of security personnel in the Park.

Vulnerability and Impacts to Dam Failure

Dam failure flooding can occur as the result of partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall and flooding. The primary danger associated with dam failure is the high velocity flooding of those properties downstream of the dam.

A dam failure can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to dam failures is generally confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility and associated revenues that accompany those functions. Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding.

Dam failure flooding presents a threat to life and property, including buildings, their contents, and their use. Large flood events can affect crops and livestock as well as lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies. Impacts to the FRRPD from dam failure include damage to property and facilities, as noted above in the Past Occurrences. The loss of use of recreational areas can also occur.

Assets at Risk

District assets at risk from this hazard include Riverbend Park and the Feather River Bike Trail. Dam failure would put all Oroville, Thermalito, and Palermo assets at risk.

Future Development

The height of the flood waters from the emergency release of the Oroville Dam in 2017 is now the high-water mark to build above. This is about 8-feet higher than the previous 100-year flood line. New structures will only be built above this flood elevation. All building doors and utility infrastructure are designed to

be vandal resistant. Low and mid-story vegetation is cleared more often to limit the potential for homeless camps and fires.

Drought & Water Shortage

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or wildfires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

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 FRRPD, 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 the FRRPD are similar to those for the County. The County recorded 5 events in 85 years. Those past occurrences can be found in Section 4.2.8 of the Base Plan.

Vulnerability and Impacts to Drought and Water Shortage

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

The most significant qualitative impacts associated with drought in the District 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 water quality deterioration and soil to compact and not absorb water well, potentially making an area more susceptible to flooding. Extreme periods of droughts can also impact the recreational areas and parks within the District.

Assets at Risk

All District parks are at risk from this hazard. District facilities at risk include the Activity Center, Forbestown Hall, the Palermo Pool, Nelson Pool, the Berry Creek Restroom and the Yuba Feather Museum.

Future Development

The District Planning Team noted that drought would be taken into account when siting new facilities. Low and mid-story vegetation is cleared more often to limit the potential for fires. Landscape is limited to mostly drought tolerant species. Facility design is based on low water use fixture and systems.

Earthquake and Liquefaction

Likelihood of Future Occurrence–Unlikely

Vulnerability–Medium

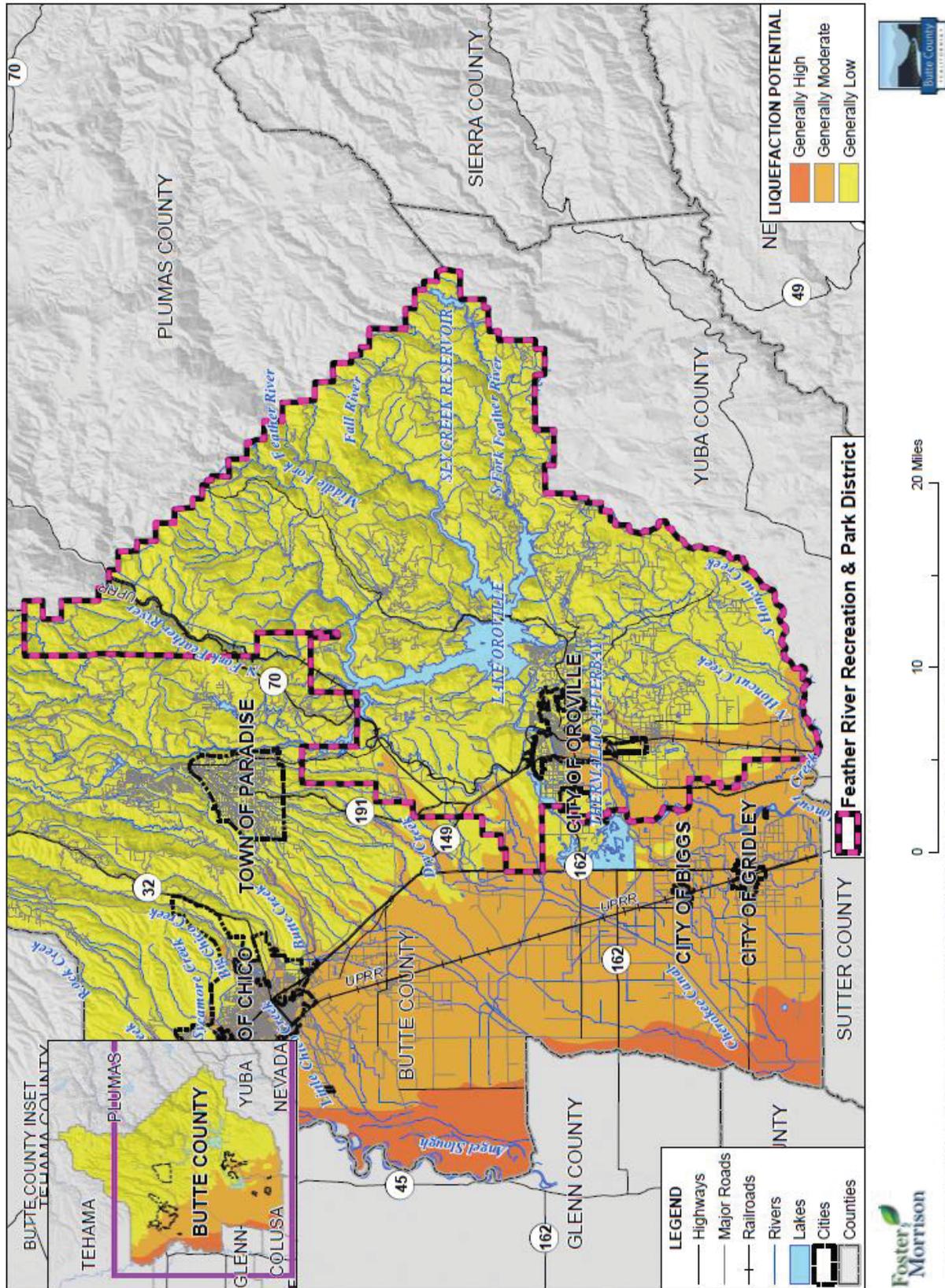
Hazard Profile and Problem Description

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. The District 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 District to the Cleveland Hills Fault, the District is at risk to an earthquake occurring on this fault. These earthquakes can cause liquefaction within the District. Liquefaction is a process whereby soil is temporarily transformed to a fluid formed during intense and prolonged ground shaking.

Location and Extent

Since earthquakes are regional events, the whole of the District is at risk to earthquake. This was shown in the Hazus analysis in the Base Plan in Section 4.3.6. FRRPD and the surrounding area is located in a region of relatively low to moderate risk of earthquake occurrence. The only known active fault in Butte County is the Cleveland Hills fault, the site of the August 1975 5.7 Richter magnitude Oroville earthquake. Additionally, based on USGS data, the District is potentially at risk to liquefaction from earthquake shaking should an earthquake occur. A map of liquefaction potential and District locations is shown on Figure J-6.

Figure J-6 Feather River Recreation and Park District – Liquefaction Areas



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. Earthquake and liquefaction both have a short onset period, and the duration of shaking and liquefaction is short as well.

Past Occurrences

As shown in the Base Plan, only the 1975 5.7 magnitude Oroville earthquake that resulted in a federal disaster declaration has occurred in the County. The HMPC noted no other past occurrences of earthquakes or liquefaction that affected the District in any meaningful way.

Vulnerability and Impacts to Earthquake and Liquefaction

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. The primary impacts of concern are life safety, property damage, and impacts to critical facilities and infrastructure, including the road system.

Ground shaking is the primary earthquake hazard. Many factors affect the survivability of structures and systems from earthquake-caused ground motions. These factors include proximity to the fault, direction of rupture, epicentral location and depth, magnitude, local geologic and soils conditions, types and quality of construction, building configurations and heights, and comparable factors that relate to utility, transportation, and other network systems.

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. Butte County is within the less hazardous Zone 3.

There are URM buildings in the District:

- MLK Park – Stage/storage building. Restroom building.
- Nolan Park – Restroom/storage building. 6 block dugouts.
- Nelson Park – 6 dugouts. Restroom/storage building.
- Nelson Pool – Restroom/shower/storage building.
- Palermo Pool – Restroom/storage building. 2 block dugouts.

Impacts to the District included damage to facilities and parks.

Assets at Risk

All District parks are at risk from this hazard. District facilities at risk include the Activity Center, Forbestown Hall, the Palermo Pool, Nelson Pool, the Berry Creek Restroom and the Yuba Feather Museum.

Future Development

The District noted that all new construction will be built to the most recent California Building Code, which contains requirements on building structures with earthquake resistant methods. The District is seeking to replace all older URM buildings, including materials such as brick, concrete and stone. All new construction will be according to the State Building Code which adheres to local seismic codes.

Floods: 100/500-year

Likelihood of Future Occurrence–Occasional/Unlikely

Vulnerability–Medium

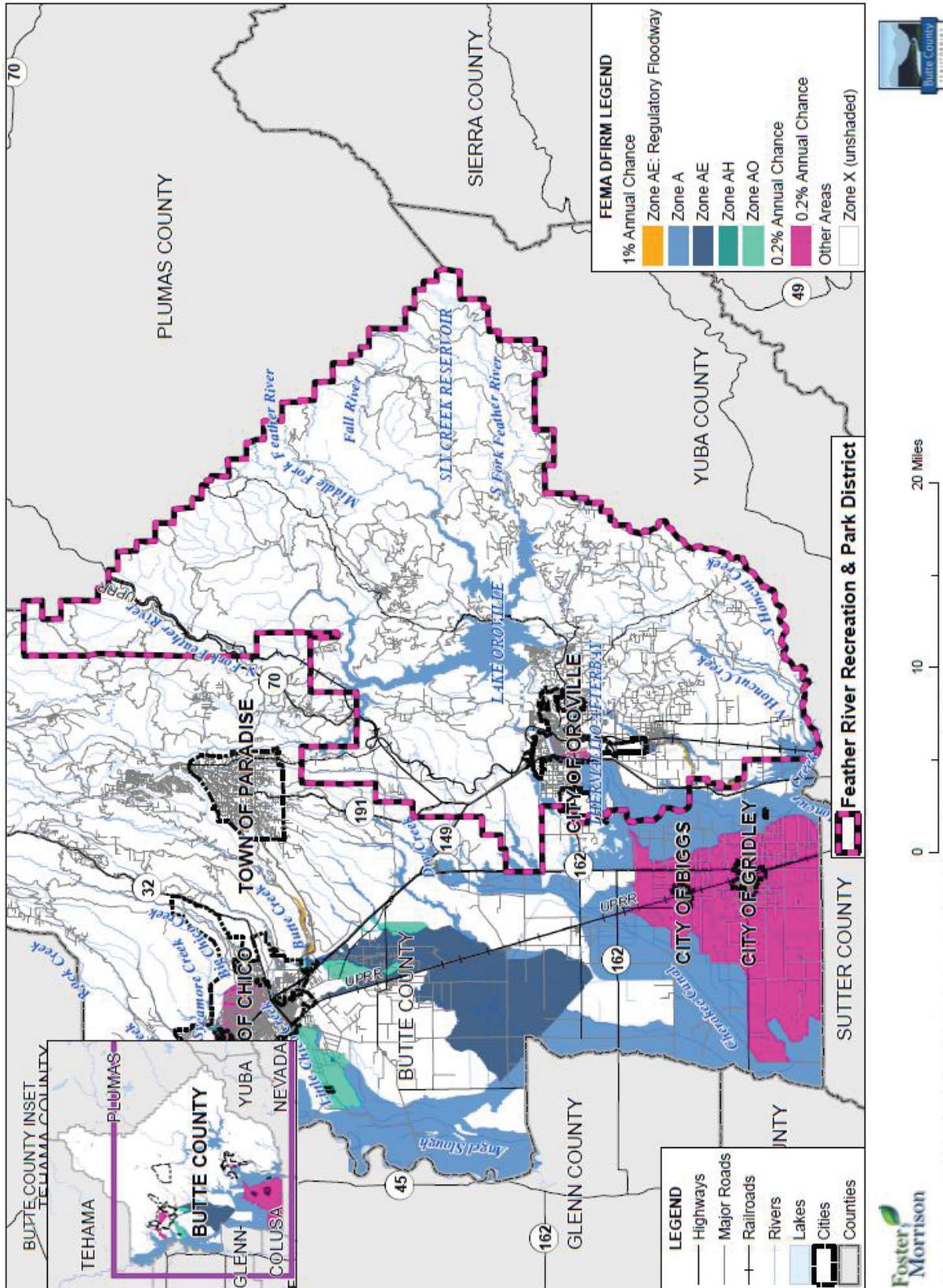
Hazard Profile and Problem Description

As previously described in Section 4.2.11 of the Base Plan, southern Butte County and portions of the District have been subject to historical flooding. The area is traversed by several stream systems and is at risk to the 1% annual chance floods.

Location and Extent

Areas of the FRRPD fall in the 1% annual chance floodplains. These areas of the District and its flood zones are shown on Figure J-7.

Figure J-7 Feather River Recreation and Park District – DFIRM Flood Zones



Flood extents can be measured by flood zones and in depths of flooding. Expected flood depths in the District vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Flooding in the District tends to have a shorter speed of onset, due to the amount of water that flows through the District.

Past Occurrences

February 2017 – The Feather River was inundated with water let out from Oroville dam due to too much water filling the lake during the Oroville Spillway incident. The City of Oroville was evacuated, flooding damage was extensive on the District Riverside Park, with estimates approaching 8 million dollars. Bank erosion occurred during this flooding. The park was closed for a year after the event. Some road closures are still in effect. Schools were closed due to evacuation. FEMA funding is still in question, potentially covering \$250,000 in damages. The District noted that this could potentially happen again, dependent upon actions of DWR and state water contractors.

Vulnerability and Impacts to Flood

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. FRRPD has a large network of parks. Many of these FRRPD parks experience seasonal flooding that can be exacerbated by extreme weather events:

- Palermo Park – Palermo: This area has a very high water table, which causes slow drainage of entire area in general. Flooding is slow and fairly manageable; however, it can leave the area cut off due to roads being submerged.
- Nelson Park – Thermalito: This park is right in the path of the Oroville dam if there was a failure, the forebay and afterbay in the area are directly affected by dam water levels. Local ground water flooding occurs occasionally.
- Riverbend Park – Oroville: Right on the Feather River, directly affected by dam water releases. Experienced extensive flooding in 2017 causing \$8,000,000 in damages. This is an active floodplain with a high water table due to its proximity to the river. Water will pool in low areas during high rain winters.

Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits.

Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures in the District. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage. Flooding has occurred both within the 1% annual chance floodplains and in other localized areas. Impacts to the District from flooding can also result in property damage, environmental, and economic impacts to the District.

Assets at Risk

District assets at risk from this hazard include Palermo Park, Nelson Park, Riverbend Park and the Feather River Bike Trail. Dam failure flooding would put all Oroville, Thermalito and Palermo assets at risk.

Future Development

The height of the flood waters from the emergency release of the Oroville Dam in 2017 is now the high-water mark to build above. This is about 8-feet higher than the previous 100-year flood line. New structures will only be built above this flood elevation.

Floods: Localized Stormwater

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile and Problem Description

Localized flooding and other issues caused by severe weather events, primarily heavy rains and severe storms, are an annual occurrence in the District. Normally storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. Occasionally, extended heavy rains result in floodwaters that overwhelm the drainage system. Primary concerns include impacts to infrastructure and roadways that provides a means of ingress and egress throughout the District.

Location and Extent

The District is subject to localized flooding. Certain areas in the District are problematic and are tracked by the District. These are shown in Table J-4.

Table J-4 Feather River Recreation and Park District – Localized Flood Areas

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/Creek Crossing	Landslides/Mudslides	Debris	Downed Trees
Palermo Park	Yes	Potentially	Potentially	Yes	Potentially	Potentially	Potentially
Nelson Park	Yes	Potentially	Potentially	No	Potentially	Potentially	Potentially
Riverbend Park	Yes	Yes	Yes	Yes	Potentially	Yes	Yes

Source: FRRPD

The extent of localized flooding is usually measured in volume, velocity, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District 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 District 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 District could note no specific past occurrences that affected District facilities.

Vulnerability and Impacts to Localized Flood

Localized flooding occurs throughout the District primarily during the winter and spring months during periods of heavy rains. Localize flooding can cause road closures, pavement deterioration, washouts, landslides/mudslides, debris areas, and downed trees. The amount and type of damage or flooding that occurs varies from year to year and storm to storm, depending on the quantity of runoff. Heavy rains may produce ponding around storm drains and in low lying areas, but these events are short in duration and do not typically cause property damage.

FRRPD has a large network of parks. Many of these parks experience seasonal and localized flooding that can be exacerbated by extreme weather events.

Impacts to the District from localized flood include possible damage to facilities and infrastructure. Localized flooding can also affect transportation routes that District personnel must take to get to District facilities.

Assets at Risk

All District assets are at risk from this hazard.

Future Development

The District will take localized flooding into account when siting new facilities. In addition, the District will work with City and County storm water management plans to best keep water away from facilities during localized flood events.

Hazardous Materials Transportation

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

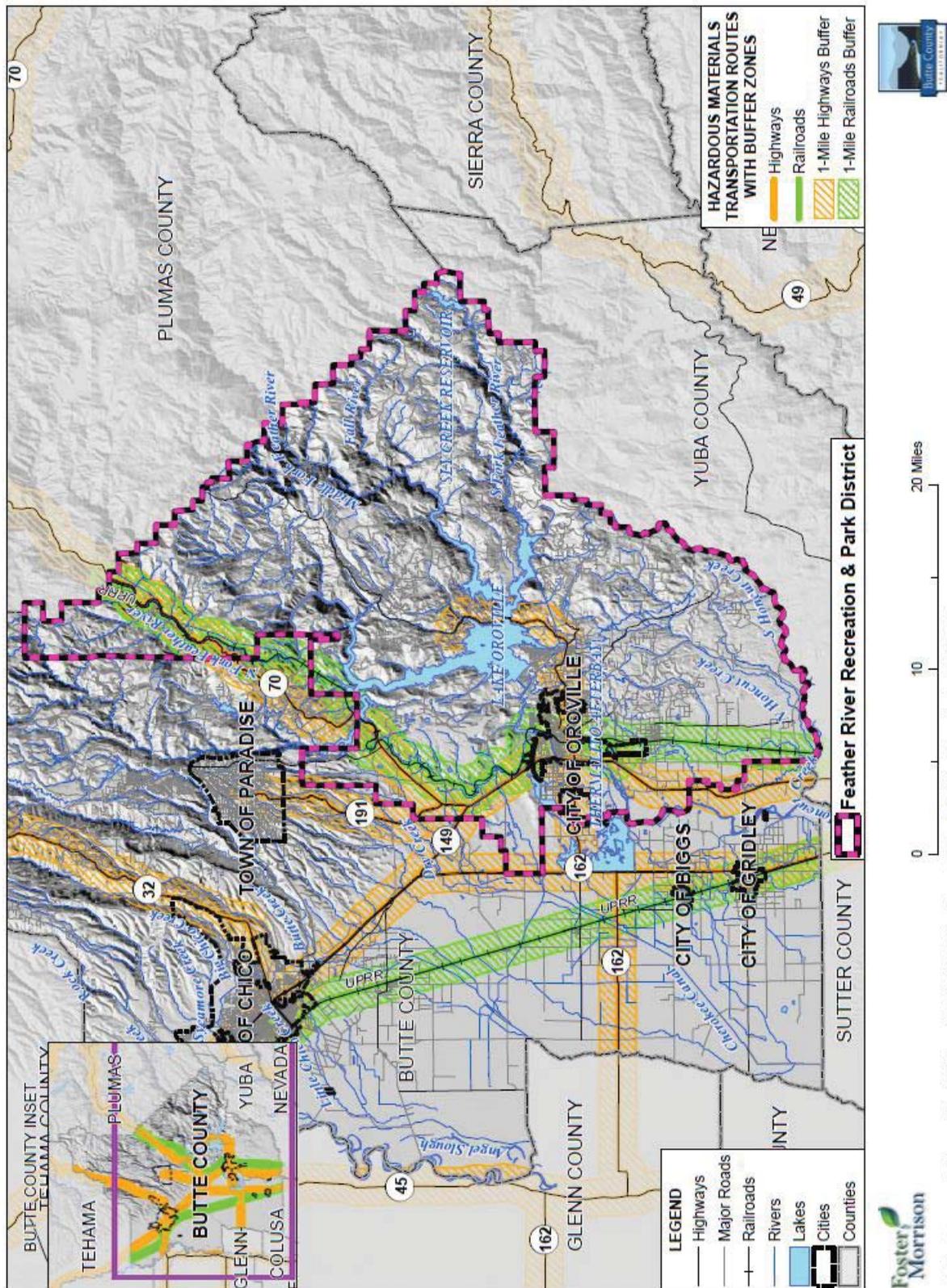
Hazard Profile and Problem Description

The release of hazardous materials during a transportation related incident is a concern to the Butte County Planning Area and the FRRPD. The significance of environmental or human exposure to a hazardous materials release depends on the type, location, and quantity of the material. Hazardous materials can be present in any form; gas, solid, or liquid. Environmental or atmospheric conditions can influence hazardous materials if they are uncontained. A release or spill of bulk hazardous materials could result in fire, explosion, toxic cloud or direct contamination of water, people, and property. The effects may involve a local site or many square miles. Health problems may be immediate, such as corrosive effects on skin and lungs, or be gradual, such as the development of cancer from a carcinogen. Damage to property could range from immediate destruction by explosion to permanent contamination by a persistent hazardous material.

Location and Extent

In the FRRPD, a hazardous materials transportation event is most likely to occur along Highways 99, 149, and 162 and along the Union Pacific railroad tracks. Hazardous materials buffer zones, from Section 4.3.9 of the Base Plan, along with District areas are shown on Figure J-8.

Figure J-8 Feather River Recreation and Park District – Hazardous Materials Routes and Buffer Zones



Trucks and rail cars that use these transportation corridors commonly carry a variety of hazardous materials including gasoline, other petroleum products, and other hazardous materials and waste known to cause human health problems. The speed on onset of a hazardous materials spill is short. The duration of the event depends on multiple factors, including the type and amount of material spilled and the properties of the material spilled.

Past Occurrences

The District noted no past occurrences that have affected the District.

Vulnerability and Impacts to Hazardous Materials Transportation

It is often quite difficult to quantify the potential losses from human-caused hazards. While the facilities impacted by a specific event have a tangible dollar value, loss from a human-caused hazard can inflict an even greater toll on a community, both economically and emotionally. The impact to the District and District assets will vary from event to event and depend on the type, location, and nature of the specific hazardous material incident.

Impacts from hazardous materials transportation spills vary by location and severity of any given event and will most likely only affect the immediate area of the District where the spill occurred. Impacts in the District include damage to properties, critical facilities, and infrastructure. Life safety can also be an issue during larger spills.

Assets at Risk

All District assets are at risk from this hazard.

Future Development

Future development will be according to local and state requirements.

Invasive Species: Aquatic

Likelihood of Future Occurrence—Likely

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. The terms: —Marine Invasive Species and —Non-native Aquatic Species (NAS) are used interchangeably.

This hazard addresses the economic and environmental issues related to invasive pests of an aquatic and freshwater nature, particularly euryhaline organisms. These are species having the ability to tolerate a wide range of salinity and can transition in and out of fresh and saltwater. There are two forms: anadromous and catadromous species.

Location and Extent

All freshwater lakes, streams, and rivers are potentially at risk from aquatic invasive species. There is no established scale for these invasive species. Magnitude is measured by the presence and counts of aquatic invasive species in waterways in Butte County. Speed of onset of these invasive species is short, as it only takes a careless boater or visitor to the area to accidentally introduce an invasive species. However, the duration is long as once established they can take years to eradicate, if at all.

Past Occurrences

Invasive algae occur in the Riverbend Park Ponds on an annual basis when the Feather River is low enough that it no longer flushes out the ponds.

Vulnerability and Impacts to Invasive Aquatics

The introduction of NAS into rivers and lakes can cause significant and enduring economic and environmental impacts. One of the most widespread mechanisms by which introductions occur is through transport of ballast water in boats. Ballast water is taken on and released by a vessel during cargo loading and discharging operations to maintain the vessel's trim and stability. Ships ballast water obtained from some other foreign location (outside the County) can include non-native organisms, untreated sewage, and other contaminants. Once introduced, NAS are likely to become a permanent part of an ecosystem and may flourish, creating environmental imbalances and economic havoc.

Aquatic invasive species can jeopardize and damage any part of the entire system ranging from human economy dependent infrastructure to natural aquatic, riparian and wetland habitat. Entire watersheds can be affected when an aggressive invasive species infests the rivers, shorelines, tributaries, drainage, irrigation and domestic delivery systems. Impacts to the District are mostly related to water recreation activities that may be hampered by these invasive species.

Assets at Risk

Riverbend Park, Nelson Park and the Feather River Trail are at risk from this hazard.

Future Development

The District plans to work with DWR and grant programs to remove and prevent against invasive species where possible.

Invasive Species: Pests/Plants

Likelihood of Future Occurrence—Highly Likely

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. 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 County.

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. These are shown in the Land Use Map for the County on in the Base Plane in Section 4.3.1. Areas not as greatly affected by insects and pests are the cities in the County, which contain fewer agricultural and open space acres.

There is no scale that measures invasive species. Agriculture, open space, and rural lands in the County 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

Invasive plants occur at all District parks and facilities. Primary invasive plants are ailanthus, privet and blackberry. The occurrence of invasive pests has not been researched within the District.

Vulnerability and Impacts to Pest and Plants

Given the importance of agriculture and recreation to Butte County, impacts from insect pests continue to be an ongoing concern. Impacts include competition with native plants, increased maintenance costs and increased use of pesticides and herbicides. Invasive species can also contribute to wildfire by adding vegetation that turns into fuels for wildfire.

Assets at Risk

All District parks and facilities are at risk from this hazard.

Future Development

Landscape design is limited to hardy plants that do not attract pests, planters are covered with weed barrier materials, (fabric, bark mulch or cobble) and a regular maintenance plan is put in place to maintain ground covers, install pre-emergent and spray for pests and invasive plants.

Landslide, Mudslide, and Debris Flow

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

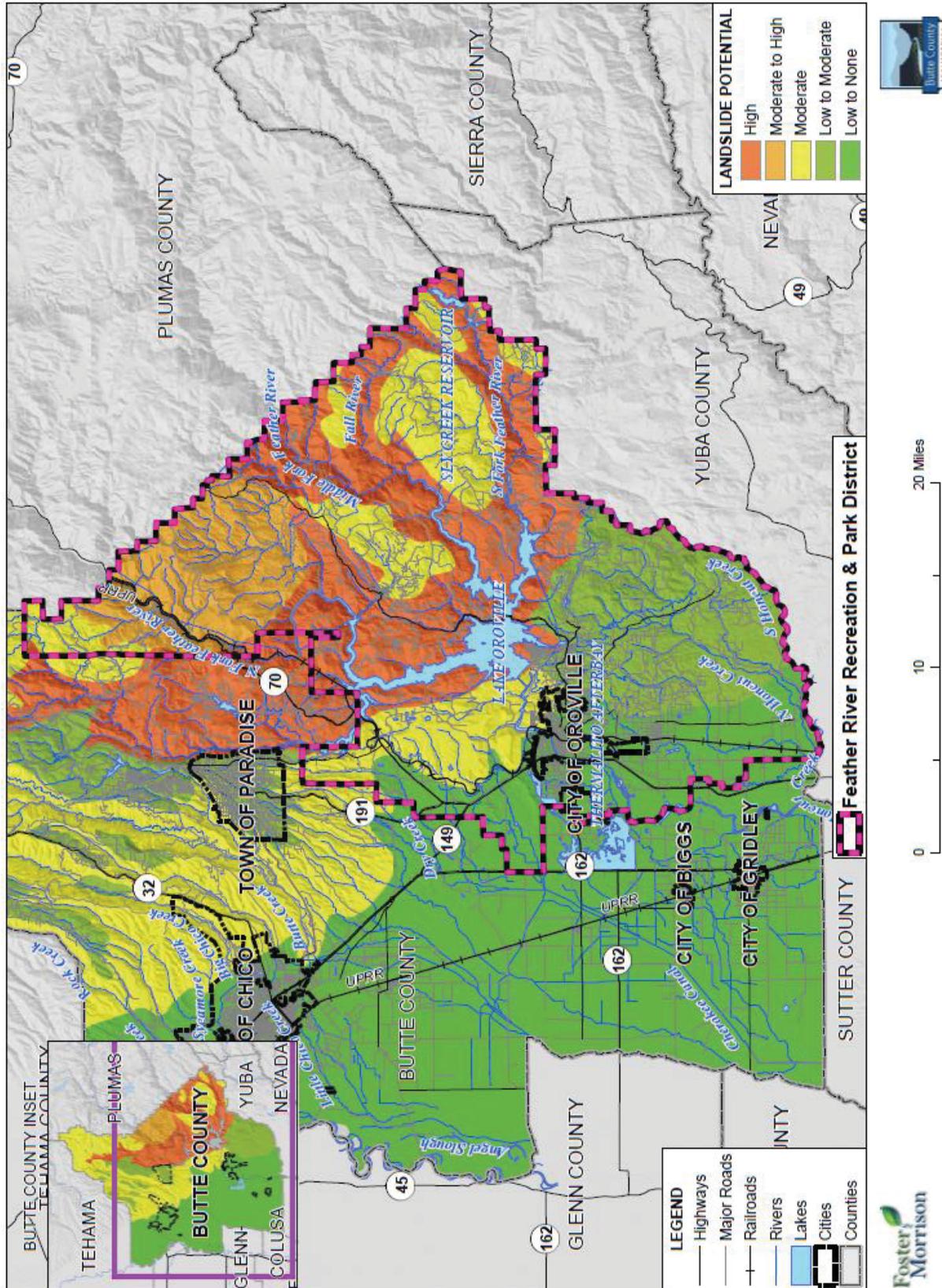
According to the California Geological Survey, landslides refer to a wide variety of processes that result in the perceptible downward and outward movement of soil, rock, and vegetation under gravitational influence. Common names for landslide types include slump, rockslide, debris slide, lateral spreading,

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

Location and Extent

Areas in and around the FRRPD where topography changes are at risk to landslide. The legend Figure J-9 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. Mapped landslide potential areas and District locations are shown on Figure J-9.

Figure J-9 Feather River Recreation and Park District – Landslide Potential Areas



Riverbend Park has the potential for hillside erosion and landslide, as evidenced during the 2017 Oroville dam incident. When too much water is released from the dam, the river swells and can take away large chunks of the hillside, as well as large rocks, concrete tables and benches, etc. This can also occur during periods of heavy flooding. This also causes secondary damages downstream as these heavy items tear up the riverbanks and any close trees and vegetation, as well as any structures.

Past Occurrences

2017 – The Riverbend Park area experience hillside erosion and landsliding as a result of the release of too much water from the Oroville dam spillway incident.

Vulnerability and Impacts to Landslide, Mudslide, and Debris Flow

Although landslides are primarily associated with slopes greater than 15 percent, they can also occur in relatively flat areas and as cut-and-fill failures, river bluff failures, lateral spreading landslides, collapse of wine-waste piles, failures associated with quarries, and open-pit mines. The potential for landslides increases with heavy rains and flooding.

Impacts in the District from landslide include damage to facilities and infrastructure, as well as some of the park grounds.

Assets at Risk

Riverbend Park and the Feather River Bike Trail are at risk from this hazard.

Future Development

Development will not occur near areas prone to landslides. Existing hazards are mitigated by grading, retaining walls, rip-rap and plant cover.

Levee Failure

Likelihood of Future Occurrence—Occasional

Vulnerability—High

Hazard Profile and Problem Description

A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower stream channel, levees can also increase the speed of the water. Levees can be natural or man-made.

Location and Extent

The majority of levees in the Butte County Planning Area are non-federal levees, and they are concentrated along the Feather River, the western and southern fringes of the Thermalito Afterbay, and the southern

fringes of the Thermalito Forebay. Federal levees are located in the southwest portion of the Butte County Planning Area, between the Feather River and the Thermalito Afterbay.

The levees along the Feather River in Oroville are as old as the Dam, are only rock and earth filled and have been considered to need inspections and improvements similar to recent levee improvements done by the Sutter Butte Flood Control Agency (SBFCA) south of Oroville.

Past Occurrences

The District is not aware of any past occurrences of levee failure within the District.

Vulnerability and Impacts to Levee Failure

Levee failure flooding can occur as the result of partial or complete collapse of an impoundment, and often results from prolonged rainfall and flooding. The primary danger associated with dam or levee failure is the high velocity flooding of those properties downstream of the breach. Impacts from this include property damage, critical facility damage, and life safety issues.

A levee failure can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility and associated revenues that accompany those functions. Levee failure flooding would vary in the District depending on which structure fails and the nature and extent of the failure and associated flooding.

This flooding presents a threat to life and property, including buildings, their contents, and their use. Large flood events can affect lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, agricultural industry, and the local and regional economies. Should the levees fail, all of the area protected by the levees would be at risk to flooding causing property damage and infrastructure damage to the District.

Assets at Risk

All District parks and facilities in levee protected areas are at risk from this hazard.

Future Development

The District will work with the local and federal agencies to allocate or grant fund aging levee improvements.

Severe Weather: Extreme Heat

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile and Problem Description

Extreme heat happens in Butte County and the FRRPD each year. According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. According to the US Center for Disease Control, in a normal year, about 658 Americans succumb to the demands of summer heat. One of the most significant concerns with extreme heat is with vulnerable populations such as the elderly and low-income populations who might not be able to stay cool during extreme heat events. Extreme heat can also affect the operations of Butte County Districts such as the FRRPD. And in the Butte County planning area extreme heat can contribute to wildfire conditions and risk.

Location and Extent

Extreme heat events occur on a regional basis. The speed of onset and the duration of extreme heat events can vary. Extreme heat can occur in any location of the County and the District, though it is more prevalent in the lower elevations of the County. Extreme heat occurs throughout the Planning Area primarily during the summer months. 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.

Past Occurrences

Since extreme heat is a regional phenomenon, heat events that occurred in the County also would have affected the District. Past heat events were shown in Section 4.2.2 of the Base Plan.

Vulnerability and Impacts to Extreme Heat

Extreme heat happens in the Butte County Planning Area each year. Extreme heat may overload demands for electricity to run air conditioners in homes and businesses during prolonged periods of exposure and presents health concerns to individuals outside in the temperatures. Extreme heat may also be a secondary effect of droughts or may cause drought-like conditions. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist. Extreme heat can also affect the agricultural industry. Extreme heat normally does not impact structures.

The District has lost some natural forest area trees due to drought. Increased levels of grass and brush clearing are employed to avoid fire hazards. Additional water is used to irrigate landscape, especially large sports fields, adding water fees. Damaged landscape and turf also occurs in the District.

Assets at Risk

All District parks and facilities are at risk from this hazard.

Future Development

Landscape design is limited to drought tolerant plants and planters are covered with weed barrier materials, (fabric, bark mulch or cobble) and a regular maintenance plan is put in place to maintain ground covers. Low water use irrigation will be used. Solar panels to be included on structures and low energy cooling systems will be used.

Severe Weather: Freeze and Winter Storm

Likelihood of Future Occurrence–Highly 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. Winter storms in the District, while not typical, can include freezing temperatures, snow, and ice. Prolonged exposure to cold can cause frostbite or hypothermia and can be life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Freezing temperatures can cause significant damage to the agricultural industry.

Location and Extent

Freeze and winter storms are regional issues, meaning the entire District is at risk to freeze and winter storm, but to a lesser extent than higher elevations in the County. 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 southern Butte County, with no days falling below 0°F. Freeze and snow have a slow onset and can be generally be predicted in advance for the County. Freeze and snow events can last for hours (in a cold overnight), or for days to weeks at a time. Snowfall is measured in amount of snowfall and snow depths. It is rare for snow to fall, and even rarer that snow accumulates in the District. Snowfall has an onset that is similar to freeze in the District.

Past Occurrences

The 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 District. Those past occurrences were shown in the Base Plan in Section 4.2.3. Prolonged hard freezes have damaged trees and landscape at District parks and facilities.

Vulnerability and Impacts to Freeze and Storm

The District experiences temperatures below 32 degrees during the winter months. The temperature moves to the teens in rather extreme situations. Snow, though rare, can occur in the District. These winter conditions can cause downed trees and power lines, power outages, accidents, and road closures. District facilities can be affected by loss of electricity, structure, and landscape damage.

Assets at Risk

All District parks and facilities are at risk from this hazard.

Future Development

Changes in future development will mostly be relative to plumbing, irrigation, tree and landscape planning to avoid damage from the potential of prolonged hard freezes. Facility maintenance will need to be relative to projected weather forecast. Changes in structure design do not seem relative to this rare hazard but more research may be required.

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

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile and Problem Description

Storms in the District 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 District 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 District. All portions of the District 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 District 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

Heavy rain has caused flooding at Palermo Park, the Nelson Pool Facility and the Activity Center.

Vulnerability and Impacts to Heavy Rain and Storms

According to historical hazard data, severe weather is an annual occurrence in the County. 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 District. Wind and lightning often accompany these storms and have caused damage in the past. Hail is rare in the District.

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

Flooding and roof leaks have occurred at the facilities noted above in past occurrences. Roof and interior repairs have been required. Site improvements have been required to move water around sites; grading, swales and storm drains.

Assets at Risk

All District parks and facilities are at risk from this hazard.

Future Development

Stormwater capture for re-use and storm water systems to move water off site will be incorporated more in future development.

Severe Weather: Wind and Tornado

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile and Problem Description

High winds can cause significant property damage, threaten public safety, damage park equipment, have adverse economic impacts to the District, and cause 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 and funnel clouds can also occur during these types of severe storms. Tornadoes are another severe weather hazard that, though rare, can affect areas in the Valley in the Butte County Planning Area, primarily during the rainy season in the late fall and early spring. Tornadoes form when cool, dry air sits on top of warm, moist air. Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm.

Location and Extent

The entire Planning Area is subject to significant, non-tornadic (straight-line), winds. Each area of the County 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 and is shown in Section 4.2.5 of the Base Plan.

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

Past Occurrences

High winds have contributed to PG&E red flag power shutdown days. District specific facilities have also sustained wind damage to trees. Structural damage from wind and tornadoes has occurred in multiple parts of Butte County and within the District.

Vulnerability and Impacts to Wind and Tornado

The District is subject to potentially destructive straight-line winds and tornadoes. High winds are common throughout the area and can happen during most times of the entire year and outside of a severe storm event. Tornadoes are less common and tend to occur mostly in the western portion of the County. Straight line and tornadoes winds are primarily a public safety and economic concern. Windstorms and tornadoes can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind or tornado events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Impacts to the District from wind and tornado include damage to District facilities. When high winds occur during red flag days, they can spread fires very quickly. Programming and income opportunities are lost during shutdowns, including loss of wages for employees. Wildfire impacts are discussed in the wildfire vulnerability below.

Assets at Risk

All District Parks and facilities are at risk from this hazard.

Future Development

It does not appear that changes will occur in future development, but additional research may be required.

Stream Bank Erosion

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile and Problem Description

According to the Department of Water Resources (DWR), any flowing body of water (brook, creek, stream, river) is a stream. Stream flows vary tremendously with time; the volume and velocity of stream flow usually determine the impact or damage to streambanks in the form of erosion. Many factors affect the nature and extent of stream bank erosion such as the amount of rainfall and snowmelt contributing to full streams as well as stream bank characteristics such as soil type, slope and vegetation.

Location and Extent

Stream bank erosion occurs on rivers, streams, and other moving waterways, including leveed areas (shown in Section 4.2.16 of the Base Plan), in the County. As noted above, since the construction of the Oroville Dam and Thermalito Afterbay, sediment loads from waters discharged from the dams into the Feather River have decreased significantly. This lack of suspended sediment in the river has caused the river to become more erosive in the northern portion of the alignment, transporting the mining debris and older alluvium downstream. The speed of onset of this erosion is slow, as the erosion takes place over periods of years. Duration of erosion is extended. Greater erosion occurs during periods of high stream flow and during storm and wind events when wave action contributes to the extent and speed of streambank erosion.

The Feather River Trail and Riverbend Park are the primary areas of the District that are subject to streambank (riverbank) erosion.

Past Occurrences

Bank erosion has occurred along the Feather River Trail and Riverbend Park during Feather River floods during the winter of 1996 to 1997 and the winter and spring floods from the Oroville Dam Emergency in 2017.

Vulnerability and Impacts to Streambank Erosion

Riverbend Park has the potential for hillside erosion and landslide, as evidenced during the 2017 Oroville dam spillway incident. When too much water is released from the dam, the river swells and can take away large chunks of the hillside, as well as large rocks, concrete tables and benches, etc. This also causes secondary damages downstream as these heavy items tear up the riverbanks and any close trees and vegetation, as well as any structures.

Assets at Risk

Riverbend Park and the asset labeled Land are at risk from this hazard.

Future Development

Future development will incorporate either bank protection measures or floodplain mitigation to take this hazard into account.

Wildfire

Likelihood of Future Occurrence–Highly Likely

Vulnerability–High

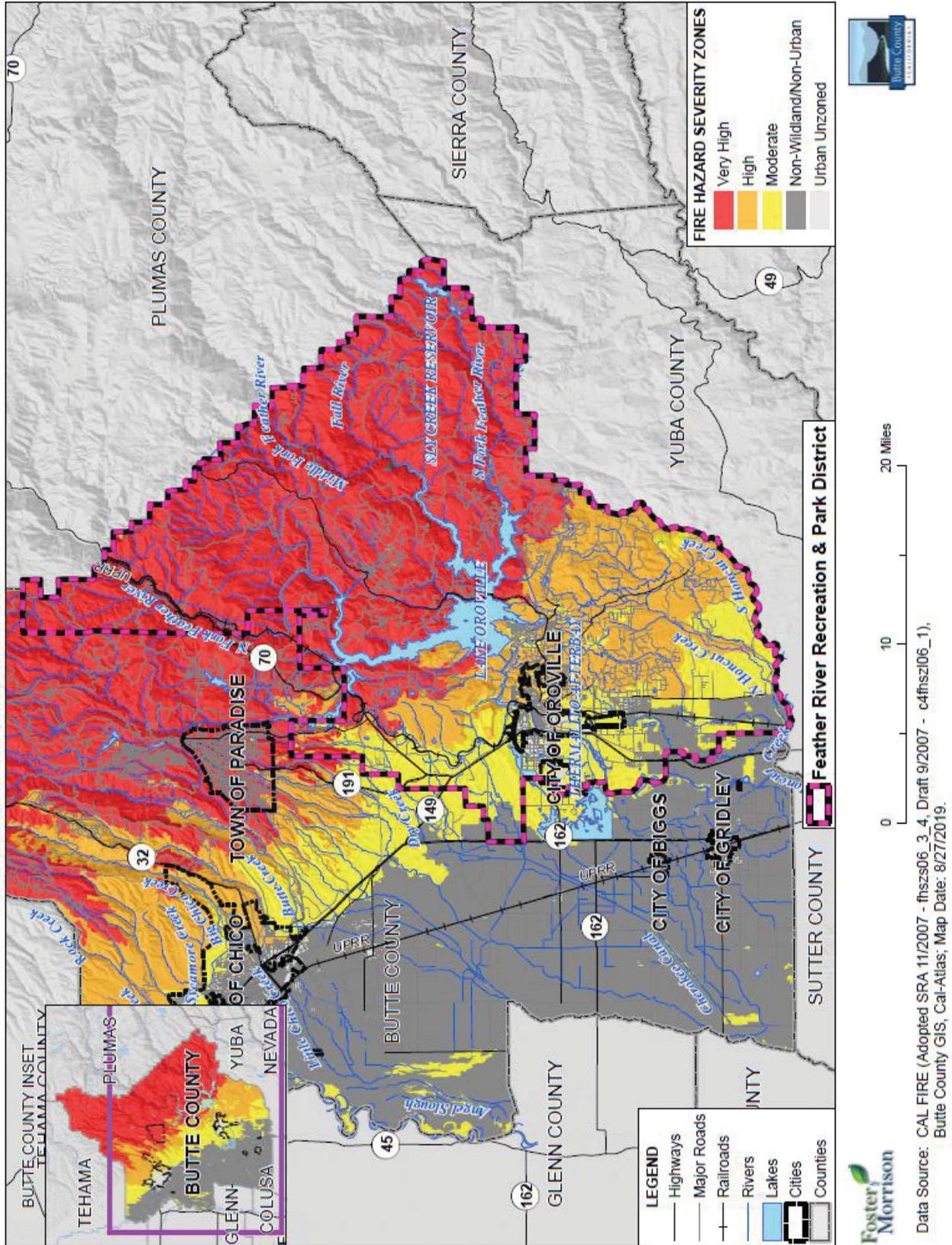
Hazard Profile and Problem Description

Wildland fire is an ongoing concern for the District. 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. While the fire season was considered to be predominantly May through October, it has now become a year around concern. Complicating the issue, PG&E shutdowns can occur during red flag days, which affects the District. Programming and income opportunities are lost during shutdowns, including loss of wages for employees.

Location and Extent

CAL FIRE has defined areas of greater wildfire risk through Fire Hazard Severity Zones (FHSZ). The District lies in multiple zones – from the Non-wildland/Non-Urban to Very High FHSZ. District locations and FHSZ are shown on Figure J-10.

Figure J-10 Feather River Recreation and Park District – Fire Hazard Severity Zones



Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on acres burned. Fires can have a quick speed of onset, especially during periods of drought. Fires can burn for a short period of time or may have durations lasting for a week or more.

Past Occurrences

The regional wildfires of 2008 and 2018 were the last two major wildfires that affected the District. The Camp Fire of 2018 caused power losses, smoke in the valley, loss of programming and park use, closed facilities, loss of homes and work time for staff, increase in local population and camping in parks.

Vulnerability to Wildfire

Risk and vulnerability to the Butte County Planning Area and the District from wildfire is of significant concern, with some areas of the planning area being at greater risk than others. High fuel loads in the planning area, along with geographical and topographical features, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and sometimes catastrophic fires. During the May to November fire season, the dry vegetation and hot and sometimes windy weather, combined with continued growth in the WUI areas, results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire. As development continues throughout the Planning Area, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

The FRRPD is not immune to numerous types of grass and brush fires and any one of them may accelerate into a large urban interface wildfire. Such a situation could lead to evacuation of large portions of the population and the potential for significant loss of property, structures and rangeland. The natural fuels available in or near the District vary in the rate and intensity of burning.

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

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

Assets at Risk

All District facilities are at risk to this hazard.

Future Development

Future development may be limited by location depending on the areas potential for wildfires. Structures and landscape will consider fire resistant material in construction.

J.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.

J.6.1. Regulatory Mitigation Capabilities

Table J-5 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table J-5 Feather River Recreation and Park District – 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?
General Plan	Y	Needs to be updated to consider recent floods, wildfires and this plan.
Capital Improvements Plan	Y	Needs to be updated to consider recent floods, wildfires and this plan.
Economic Development Plan	N	Needs to be updated to consider recent floods, wildfires and this plan.
Local Emergency Operations Plan	N	Needs to be updated to consider recent floods, wildfires and this plan.
Continuity of Operations Plan	N	Needs to be updated to consider recent floods, wildfires and this plan.
Transportation Plan	N	Needs to be updated to consider recent floods, wildfires and this plan.
Stormwater Management Plan/Program	N	Needs to be updated to consider recent floods, wildfires and this plan.
Engineering Studies for Streams	N	Needs to be updated to consider recent floods, wildfires and this plan.
Community Wildfire Protection Plan	N	Needs to be updated to consider recent floods, wildfires and this plan.
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)		The 2015 Oroville Urban Greening Plan incorporates storm water management and drought, but it also needs to be updated.

Building Code, Permitting, and Inspections		
	Y/N	Are codes adequately enforced?
Building Code	N	Needs to be updated to consider recent floods, wildfires and this plan.
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Needs to be updated to consider recent floods, wildfires and this plan.
Fire department ISO rating:	N	Needs to be updated to consider recent floods, wildfires and this plan.
Site plan review requirements	N	Needs to be updated to consider recent floods, wildfires and this plan.
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	N	Needs to be updated to consider recent floods, wildfires and this plan.
Subdivision ordinance	N	Needs to be updated to consider recent floods, wildfires and this plan.
Floodplain ordinance	N	Needs to be updated to consider recent floods, wildfires and this plan.
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N	Needs to be updated to consider recent floods, wildfires and this plan.
Flood insurance rate maps	Y	Needs to be updated to consider recent floods, wildfires and this plan.
Elevation Certificates	N	Needs to be updated to consider recent floods, wildfires and this plan.
Acquisition of land for open space and public recreation uses	Y	Needs to be updated to consider recent floods, wildfires and this plan.
Erosion or sediment control program	N	Needs to be updated to consider recent floods, wildfires and this plan.
Other		
How can these capabilities be expanded and improved to reduce risk?		
This is a complicated answer that will take a thorough review of each plan and an alignment with this mitigation plan.		

Source: FRRPD

J.6.2. Administrative/Technical Mitigation Capabilities

Table J-6 identifies the District staff/roles responsible for activities related to mitigation and loss prevention in the District.

Table J-6 Feather River Recreation and Park District – Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
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Planning Commission	Y	Staff would give direction to update planning guidelines such as the General Plan and Zoning ordinances. Plan updates would then provide them direction to implement for new projects.
Mitigation Planning Committee	Y	Besides police and fire, these local committees were recently created in response to this Mitigation Plan. Further planning will occur as a result of the plan and potential grant funding for mitigation efforts.
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	These efforts are currently in place. Maintenance budgets are low though and progress is slow and currently inadequate.
Mutual aid agreements	Y	Needs to be updated to consider recent floods, wildfires and this plan
Other		
Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?		
Staff	Y/N FT/PT	
Chief Building Official	Y	Needs additional training and more staff.
Floodplain Administrator	N	Need funding to create position.
Emergency Manager	Y	Needs additional training and more staff.
Community Planner	Y	Needs additional training and more staff.
Civil Engineer	N	Need funding to create position.
GIS Coordinator	N	Need funding to create position.
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	N	Need funding to create.
Hazard data and information	Y	Need to incorporate in staff positions and training.
Grant writing	Y	Needs additional training and more staff.
Hazus analysis	N	Need funding to create
Other		
How can these capabilities be expanded and improved to reduce risk?		
See answers above.		

Source: FRRPD

J.6.3. Fiscal Mitigation Capabilities

Table J-7 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table J-7 Feather River Recreation and Park District – 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	Y	Funding is used to purchase and/or build park and recreation facilities. The resource could be used to fund future mitigation actions.
Authority to levy taxes for specific purposes	Y	Would be according to County guidelines.
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	Y	Eligible for new park improvements.
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	Has not been used in the past, the District has access, but it would require a ballot measure.
Incur debt through private activities	Y	Yes, but funding not currently available.
Community Development Block Grant	Y	Funding has not been used but the District is eligible to apply for grants. Funding could most likely be used to fund future mitigation actions.
Other federal funding programs	Y	Grants are used to purchase and/or build park and recreation facilities. The resource could be used to fund future mitigation actions.
State funding programs	Y	Grants are used to purchase and/or build park and recreation facilities. The resource could be used to fund future mitigation actions.
Other		
How can these capabilities be expanded and improved to reduce risk?		
See answers above.		

Source: FRRPD

J.6.4. Mitigation Education, Outreach, and Partnerships

Table J-8 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. More information can be found below the table.

Table J-8 Feather River Recreation and Park District – 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.	Y	Volunteer organizations and events are currently used to remove weeds and overgrown brush.
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Y	Mostly on a state and county level. Local water ordinances are in place.
Natural disaster or safety related school programs	N	
StormReady certification	N	
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
The District will seek to proactively work with the County and surrounding cities on mitigation related education, outreach, and partnerships.		

Source: FRRPD

J.6.5. Other Mitigation Efforts

FRRPD has many other ongoing mitigation efforts and past projects that include the following:

- The development of Riverbend Park was built to withstand 100-year flood events when the first major phase of construction finished in 2004. Where possible, additional flood mitigation improvements were installed for the remodel after the Oroville Dam Emergency of 2017. Other previous and ongoing efforts include drought tolerant landscape and storm water capture for new park developments, brush and grassland management for wildfire abatement and the removal of invasive species. The District is also in the process of applying for grants to install solar panels, install energy efficient lights and re-build the Feather River Trail, which includes riverbank stabilization, the removal of invasive species and native habitat restoration.

J.7 Mitigation Strategy

J.7.1. Mitigation Goals and Objectives

Feather River Recreation and Park District adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

J.7.2. Mitigation Actions

The planning team for the FRRPD 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:

- Climate Change
- Dam Failure
- Drought and Water Shortage
- Earthquake and Liquefaction
- Flood: 100-/500-year
- Floods: Localized Stormwater
- Hazardous Materials Transportation
- Invasive Species: Aquatic
- Invasive Species: Pest/Plants
- Landslide, Mudslide, Debris Flow
- Levee Failure
- Severe Weather: Extreme Heat
- Severe Weather: Freeze and Winter Storm
- Severe Weather: Heavy Rain and Storms
- Severe Weather: Wind and Tornado
- Streambank Erosion
- Wildfire

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

Multi Hazard Actions

Action 1. Riverbend Park Mitigation

Hazards Addressed: Climate Change, Dam Failure, Drought and Water Shortage, Floods: 100/200/500-year, Localized Flooding, Invasive Species: Aquatic, Invasive Species: Pests/Plants, Landslide, Severe Weather Hazards, Stream Bank Erosion and Wildfire

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

Issue/Background: Riverbend Park is a 210-acre regional park on the Feather River in Oroville, CA. The park is downstream from the Oroville Dam. The park has been flooded in the past in a small extent during 10-year floods, to a medium extent during 100-year events and to a major extent during the Oroville Dam

Emergency in 2017. A riparian and upland forest covers approximately two-thirds of the Park and there are two ponds. The forest requires thinning to prevent wildfires and the removal of invasive species. There are also invasive plants and algae to remove from the ponds. Wildfires could cause landslides to occur.

Project Description: Master Plan to identify specific scope of construction. Construction Documents, Bid and Construction to limit flood damage, prevent wildfires and remove invasive species.

Other Alternatives: Continue with smaller phases, grants and partner agency outreach.

Existing Planning Mechanism(s) through which Action Will Be Implemented: District RFP process for consultant(s), District Bid process for construction.

Responsible Office/Partners: Feather River Recreation and Park District (FRRPD)

Cost Estimate: To be determined

Benefits (Losses Avoided): 2017 Dam Emergency caused approximately \$6,000,00 in damages. Reduce risk of wildfire and increase health of region with the removal of invasive species. Reduce the potential for loss of life.

Potential Funding: Local, state and federal grants. Slow limited match in funding from FRRPD

Timeline: Two-year process if fully funded.

Project Priority: High

Action 2. Feather River Trail Mitigation

Hazards Addressed: Floods: 100/200/500-year, Invasive Species: Aquatic, Invasive Species: Pests/Plants, Stream Bank Erosion and Wildfire

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

Issue/Background: The Feather River Trail is along the south bank of the Feather River next to downtown area of Oroville, CA, downstream of the Oroville Dam. The trail and surrounding park space have been flooded in the past in a small extent during 10-year floods, to a medium extent during 100-year events and to a major extent during the Oroville Dam Emergency in 2017. A riparian and upland forest surrounds the trail. The forest requires thinning to prevent wildfires and the removal of invasive species.

Project Description: Master Plan to identify specific scope of construction. Construction Documents, Bid and Construction to limit flood damage, prevent wildfires and remove invasive species.

Other Alternatives: Continue with smaller phases, grants and partner agency outreach.

Existing Planning Mechanism(s) through which Action Will Be Implemented: District RFP process for consultant(s), District Bid process for construction.

Responsible Office/Partners: Feather River Recreation and Park District (FRRPD)

Cost Estimate: To be determined

Benefits (Losses Avoided): Reduce loss of land and potential levee damage from flooding. Reduce risk of wildfire and increase health of region with the removal of invasive species. Reduce the potential for loss of life.

Potential Funding: Local, state and federal grants. Slow limited match in funding from FRRPD

Timeline: Two-year process if fully funded.

Project Priority: High

Action 3. Palermo Park – Storm Water Mitigation Plan

Hazards Addressed: Floods: Localized Stormwater, Earthquake Liquefaction, Levee Failure

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

Issue/Background: The storm water in the community of Palermo is managed by an antiquated ditches and culverts. Palermo Park is a 3.5-acre park that serves as a hub for the community with a baseball field, swimming pool, playgrounds, restrooms, horseshoe pits, group picnic areas and covered stage. The park floods most winters, damaging the park and making it unusable by the community.

Project Description: Master Plan to identify park specific scope of construction. Work in unison with ongoing Butte County plans for storm water system improvements. Construction Documents, Bid and Construction to manage storm water

Other Alternatives: Continue with smaller phases, grants and partner agency outreach.

Existing Planning Mechanism(s) through which Action Will Be Implemented: District RFP process for consultant(s). District Bid process for construction.

Responsible Office/Partners: Feather River Recreation and Park District (FRRPD) and the County of Butte

Cost Estimate: To be determined

Benefits (Losses Avoided): Use of the park during the winter. Eliminate damage to park.

Potential Funding: Local, state and federal grants. Slow limited match in funding from FRRPD

Timeline: 18-month process if fully funded.

Project Priority: High