



Annex N South Feather Water and Power Agency

N.1 Introduction

This Annex details the hazard mitigation planning elements specific to South Feather Water and Power Agency (SFWPA or Agency), 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 Agency. This Annex provides additional information specific to the Agency, with a focus on providing additional details on the risk assessment and mitigation strategy for the Agency.

N.2 Planning Process

As described above, the SFWPA 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 Agency 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 N-1. Additional details on plan participation and Agency representatives are included in Appendix A.

Table N-1 South Feather Water and Power Agency Planning Team

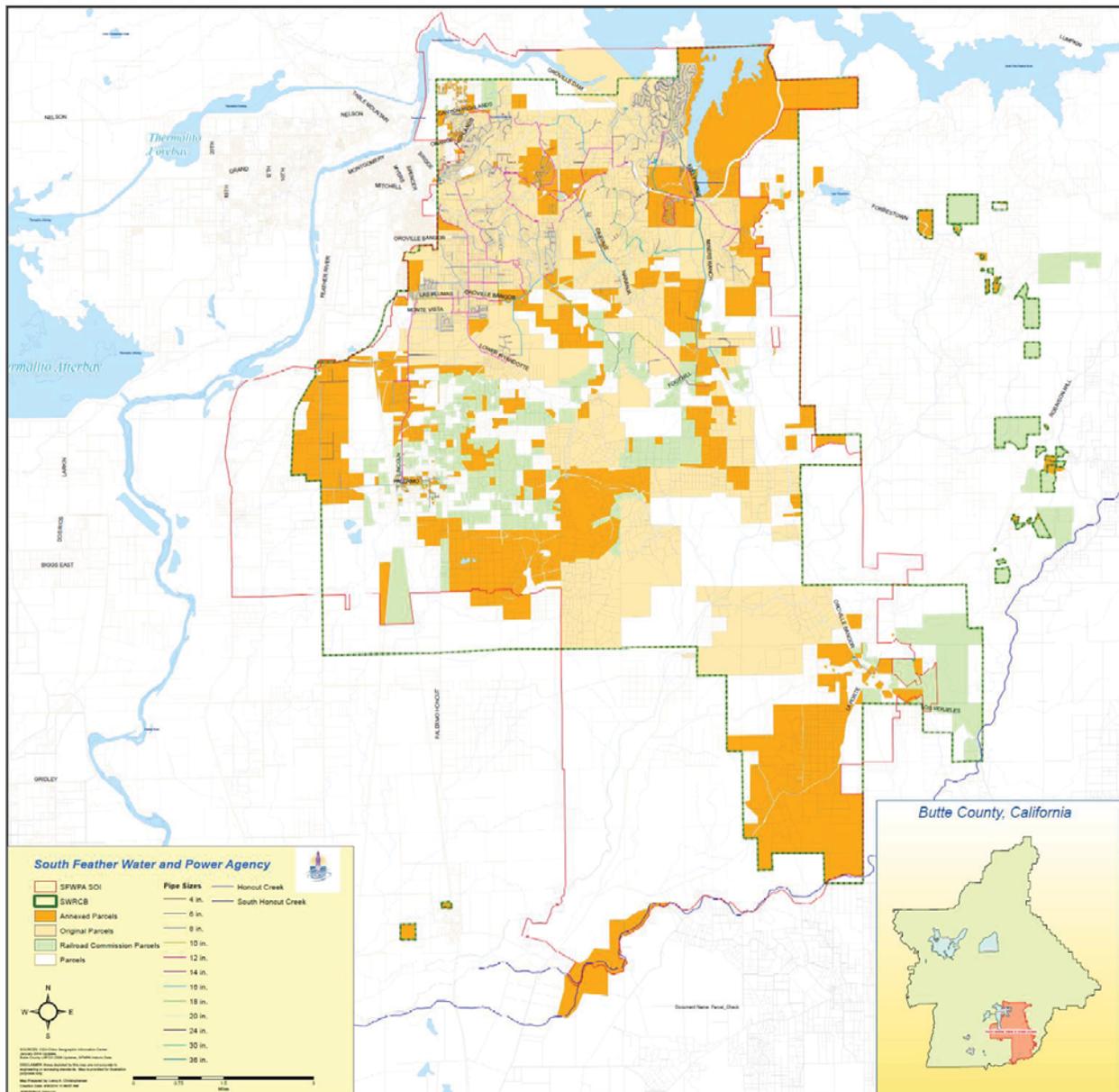
Name	Position/Title	How Participated
Jaymie Perrin	EH&S Manager	Provided hazard identification, hazard input, capability assessment, and attended meetings. Reviewed Drafts.

Source: SFWPA

N.3 Agency Profile

The community profile for the Agency is detailed in the following sections. Figure N-1 displays a map and the location of the SFWPA within Butte County.

Figure N-1 South Feather Water and Power Agency



Source: SFWPA

N.3.1. Overview and Background

South Feather Water and Power Agency is an independent special district formed under the Irrigation Code of the State of California. It provides treated water service to the communities of Oroville, Palermo and Bangor in southeast Butte County, as well as operates the South Feather Power Project, a FERC-licensed hydropower project. It is governed by a five-member elected board of directors.

The Agency is located 70 miles north of Sacramento on the east side of California’s Sacramento Valley in the Sierra foothills of southeast Butte County. FWPA’s service area is wholly within Butte County’s First

Supervisory Agency. In addition to the County of Butte, other public agencies with territory within SFWPA's boundaries are:

- City of Oroville;
- Oroville Union High School Agency;
- Oroville City Elementary School Agency;
- Palermo Elementary School Agency;
- Bangor Elementary School Agency;
- Oroville Mosquito Abatement Agency;
- Butte County Mosquito and Vector Control Agency;
- Lake Oroville Area Public Utility Agency (including SC-OR); and,
- Feather River Recreation and Park Agency.

South Feather Water and Power Agency – originally named Oroville Wyandotte Irrigation District (“OWID”) – has roots extending back to the California gold rush. The ditch system utilized by the Agency today to distribute its irrigation water is a modification and expansion of the ditch network constructed by early miners who diverted water from tributaries of the Feather River to their mining claims.

In 1852, a small ditch company was organized to construct a ditch from the South Fork of the Feather River to the mining sites at Forbestown, Wyandotte, Honcut, Ophir, and Bangor. The Palermo Ditch, completed in 1856 by the Feather River and Ophir Water Company, was a major impetus to the growth of gold mining within the area occupied by the present City of Oroville where rich gold deposits were discovered in 1849.

OWID was organized on November 17, 1919 and included 16,800 acres of land. The Agency was formed by assuming the old water rights from the South Feather Land and Water Company and the Palermo Land and Water Company. In July 1944, OWID initiated plans to sell water for domestic use, and between 1944 and 1967, approximately 80 miles of coal-tar lined and tar-paper wrapped steel pipe was installed.

The residential growth rate within the Agency was greatly accelerated by the housing demands associated with the construction of the Oroville Dam in the early 1960's. The irrigation system in the northern part of the Agency was slowly abandoned as the domestic pipeline system was expanded to meet the growing residential demand. By 1962, OWID served approximately 4,800 acres of agricultural land, with 8,000 AF of irrigation water delivered by the Agency. In addition to irrigation service, the district furnished water to approximately 2,500 residences.

As a result of the concern for an adequate water supply and for a revenue source to fund the Agency's expanding infrastructure, the Agency's board of directors proposed the construction of the South Feather Power Project (originally named South Fork Project, FERC License No. 2088). The South Feather Power Project, covering 82 square miles in three counties, consisted of eight dams, 9 tunnels, 21 miles of canals and conduits, four hydroelectric power plants and 21 miles of road. The first three hydropower plants were completed in 1963 at a cost of \$62 million and was financed through the sale of revenue bonds secured by the projected revenues from power generation. Those bonds were defeated in 2009. A fourth powerhouse was built in the early 1980s.

The Agency's hydropower project is located in Butte, Plumas and Yuba counties on the South Fork of the Feather River and Slate Creek, a tributary to the North Fork Yuba River, and mostly within the Plumas National Forest. The Project includes Little Grass Valley Reservoir, Sly Creek Reservoir, Lost Creek

Reservoir, Ponderosa Reservoir, and Miners Ranch Reservoir, with a combined storage of 164,577 acre-feet (af).

In 1975, Congress passed the Clean Water Act that enacted sweeping changes in domestic drinking water standards. No longer would unfiltered surface water be acceptable for drinking water. Faced with a building moratorium, OWID voters passed a revenue bond in 1978 that allowed for the construction of Miners Ranch Treatment Plant.

N.4 Hazard Identification

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

Table N-2 South Feather Water and Power Agency – Hazard Identification Assessment

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

N.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile SFWPA's hazards and assess the SFWPA'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 Agency 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 Agency. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

N.5.1. Hazard Profiles

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

N.5.2. Vulnerability Assessment and Assets at Risk

This section identifies the SFWPA'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 Agency. This data is not hazard specific but is representative of total assets at risk within the Agency.

Assets at Risk and Critical Facilities

This section considers the SFWPA's assets at risk, with a focus on key Agency assets such as critical facilities, infrastructure, and other Agency assets and their values. With respect to Agency assets, the majority of these assets are considered critical facilities as defined for this LHMP. Critical facilities are defined for this LHMP 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 N-3 lists particular critical facilities and other Agency assets identified by the SFWPA planning team as important to protect in the event of a disaster. SFWPA's physical assets, valued at over \$142 million, consist of the buildings and infrastructure to support SFWPA's operations.

Table N-3 South Feather Water and Power Agency Critical Facilities, Infrastructure, and Other Agency Assets

Name of Asset	Facility Type	Replacement Value	Hazard Info
Power Generation and Distribution	Buildings & Equipment	\$110,964,090.00	Fire, Flood, Drought, Landslide, Dam Failure
Water Treatment & Distribution	System Components	\$13,316,226.00	Earthquake, Dam Failure
Communications	Buildings & Components	\$4,189,310.00	Fire
Water Transmission	System Components	\$337,852.00	Fire, Flood, Earthquake
Water Storage Infrastructure	Various infrastructure	\$3,831,012.00	Fire, Flood, Earthquake, Dam Failure
District Business & Compliance	Buildings & Historic Files	\$9,731,468.00	Fire
Total		\$142,369,958.00	

Source: SFWPA

Natural Resources

SFWPA has a variety of natural resources of value to the Agency. These natural resources parallels that of the Oroville area as a whole. Information can be found in Section D.5.2 of the and Oroville Annex.

Historic and Cultural Resources

SFWPA has a variety of historic and cultural resources of value to the Agency. These historic and cultural resources parallels that of Oroville area as a whole. Information can be found in Section D.5.2 of the and Oroville Annex.

Growth and Development Trends

Growth in the SFWPA generally parallels that of the Oroville as a whole. Information can be found in Section D.5.2 of the and Oroville Annex.

SFWPA recently completed an expansion project at the Miners Ranch Treatment Facility that increased capacity from 12 million gallons a day to 21 million gallons a day. Since the Camp Fire, the Agency has seen an influx in connections along with a spike in title transfer requests. The data from Table N-4 through Table N-9 provides a snapshot of the customer base (both domestic & irrigation).

Table N-4 Miners Ranch Treatment Plant Customers: 2015 – 2019 (Treated Domestic)

Month	2015	2016	2017	2018	2019
1	6,672	6,704	6,711	6,717	6,807
2	6,674	6,696	6,706	6,712	6,789
3	6,678	6,705	6,726	6,717	6,775

Month	2015	2016	2017	2018	2019
4	6,694	6,722	6,719	6,712	6,778
5	6,688	6,714	6,717	6,717	6,795
6	6,706	6,723	6,740	6,712	6,788
7	6,704	6,721	6,723	6,717	6,801
8	6,700	6,733	6,739	6,712	
9	6,713	6,730	6,723	6,717	
10	6,717	6,724	6,736	6,712	
11	6,705	6,723	6,727	6,717	
12	6,698	6,723	6,715	6,712	
AVG.	6,696	6,718	6,724	6,717	

Source: SFWPA

Table N-5 Bangor Treatment Plant Customers: 2015 – 2019 (Treated Domestic)

Month	2015	2016	2017	2018	2019
1	24	24	23	18	22
2	25	24	23	19	23
3	24	25	23	19	23
4	23	24	23	20	22
5	23	24	23	21	22
6	23	25	25	22	22
7	23	26	23	22	22
8	23	24	23	22	
9	23	24	24	22	
10	23	23	17	23	
11	24	23	18	24	
12	23	23	18	22	
AVG.	23	24	22	21	22

Source: SFWPA

Table N-6 Community Line Water Customers: 2015 – 2019 (Irrigation Only)

Month	2015	2016	2017	2018	2019
1	71	71	70	68	69
2	70	71	70	68	68
3	69	73	68	68	69
4	70	73	68	67	68
5	71	75	69	67	68
6	72	76	70	69	68
7	74	74	70	71	71

Month	2015	2016	2017	2018	2019
8	75	74	70	73	
9	78	72	71	71	
10	75	73	70	71	
11	75	73	69	71	
12	74	72	69	71	
AVG.	73	73	70	70	69

Source: SFWPA

Table N-7 Forbestown Ditch Water Customers: 2015 – 2019 (Irrigation Only)

Month	2015	2016	2017	2018	2019
1	10	12	9	10	11
2	11	11	8	11	9
3	13	10	8	11	8
4	19	16	9	14	7
5	21	52	43	48	44
6	53	55	58	59	56
7	60	67	62	65	62
8	65	68	62	64	
9	66	65	63	59	
10	31	64	59	57	
11	20	27	25	24	
12	17	9	14	13	
AVG.	49	62	35	36	28

Source: SFWPA

Table N-8 Bangor Canal Water Customers: 2015- 2019 (Irrigation Only)

Month	2015	2016	2017	2018	2019
1	214	216	217	221	224
2	210	211	213	220	222
3	218	211	214	220	219
4	228	222	215	220	219
5	258	247	243	251	248
6	266	268	268	273	267
7	270	278	277	279	276
8	272	277	272	277	
9	274	276	271	279	
10	268	275	269	275	
11	256	243	258	265	

Month	2015	2016	2017	2018	2019
12	225	221	228	242	
AVG.	247	245	245	252	239

Source: SFWPA

Table N-9 PALERMO CANAL WATER CUSTOMERS: 2015 – 2019 (Irrigation Only)

Month	2015	2016	2017	2018	2019
1	101	104	94	100	107
2	97	102	95	100	88
3	101	103	93	101	87
4	155	102	89	99	87
5	206	193	171	187	154
6	224	220	213	213	207
7	228	222	229	221	219
8	233	231	235	221	
9	232	223	227	220	
10	209	199	211	202	
11	114	103	111	112	
12	107	101	109	108	
AVG.	167	159	156	157	136

Source: SFWPA

Future Development

There are multiple developments and proposals that have been introduced to the Agency over the years, however at this point in time, the developments remain stagnant. These developments include: Whisper Ridge, Lake Oroville Resort, Lake Wyandotte Campus, Rio D’ Oro, and Las Plumas. Overall, Nine developments have received approval for service and 30 are pending service. In some cases, the conception of these developments dates back to 2008.

The SFWPA has no control over future development in areas serviced by the Agency. Future development in these areas generally parallels that of Oroville area as a whole. More general information can be found in Section D.5.2 of the Oroville Annexes.

N.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table N-2 as high or medium significance hazards. Impacts of past events and vulnerability of the SFWPA 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 SFWPA 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. 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 SFWPA Planning Team noted no past occurrences of climate change but did note that the strength of storms does seem to be increasing and the temperatures seem to be getting hotter. While the Agency has not adopted any internal procedures to this risk, they continue to monitor the weather trends and the potential issues associated with this risk for all agency purposes.

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 Agency relies on annual precipitation to maximize our power project and provide sufficient water supply to our customer base. Temperature increases and reduced precipitation are operational challenges that both the power and water divisions must manage to maximize the available water within the District's portfolio to fuel our Hydroelectric plants along with conveying water to our domestic and irrigation water customers.

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

Assets at Risk

The Power Division assets would be the most threatened by increased wildfire as a result of climate change. The asset locations are all located in thick forest areas and are generally isolated along the South Fork of the Feather River. Reduced precipitation would lead to reduce fuel storage for our power project and would potentially lead to reduced water usage mandates at a state level. Both of these have economic repercussions to the Agency.

Future Development

The Agency Planning Team noted that the biggest threat would be reduction of water availability to efficiently fuel the Power Houses along with supplying the necessary amount of water to the customer base without being mandated at a state level to force water reduction efforts.

Dam Failure

Likelihood of Future Occurrence–Unlikely

Vulnerability–Extremely 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

The SFWPA owns and maintains several dams:

- Forbestown Diversion (a low hazard dam)
- Lost Creek (a high hazard dam)
- Miner’s Ranch (a high hazard dam)
- Ponderosa Diversion (a low hazard dam)
- Sly Creek (a high hazard dam)
- Lake Wyandotte (a high hazard dam)

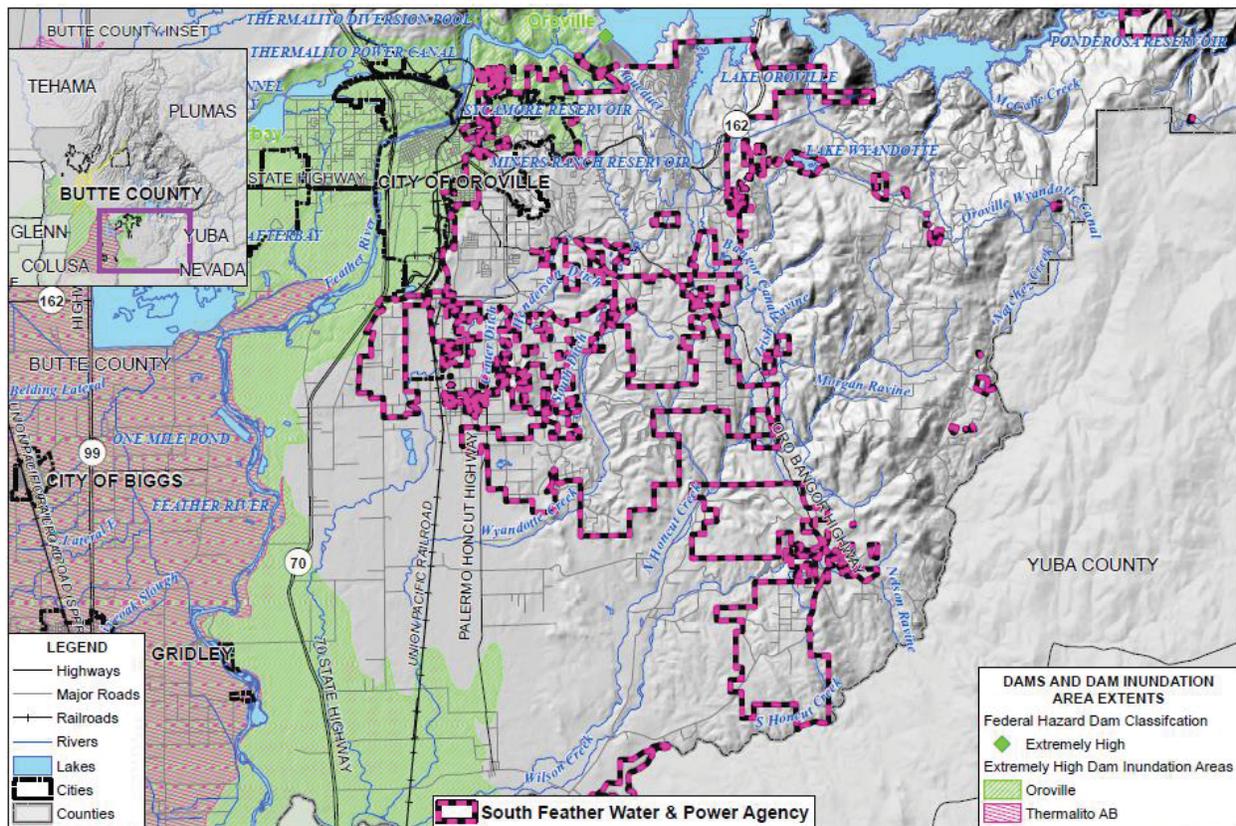
The Agency is committed to the Federal Energy Regulatory Commission (FERC) and California Division of Safety of Dams (DSOD) requirements. With that said, the agency partakes in annual inspections and various exercises to ensure the safety and stability of our dams. In addition to the preventative measures of Agency infrastructure, the Agency is also responsible for maintaining and updating Emergency Action Plans for both the Agency’s assets and that of the Lake Oroville complex operated by the Department of Water Resources and the state’s water project. In general, the impact of a partial or complete failure of an internal asset is provided above in terms of severity.

Only two of the dams owned by SFWPA had inundation mapping available through Cal OES. These two dams are Minor’s Ranch and Lake Wyandotte. However, other dams within the County with available inundation mapping that affect the Agency include Oroville and Miner’s Ranch.

The inundation area related to the Lake Oroville Dam and spillway(s) are relevant to the Agency when considering the location of Kelly Ridge Powerhouse, Miners Ranch Reservoir, and the Miners Ranch Treatment Plant. These assets were either heavily impacted or in the case of the Kelly Ridge Powerhouse severely flooded and abandoned for safety purposed during the 2017 Oroville Spillway event.

Agency boundaries and dam inundation areas can be seen on Figure N-2 and Figure N-3.

Figure N-2 SFWPA – Extremely High Hazard Dam Inundation Areas

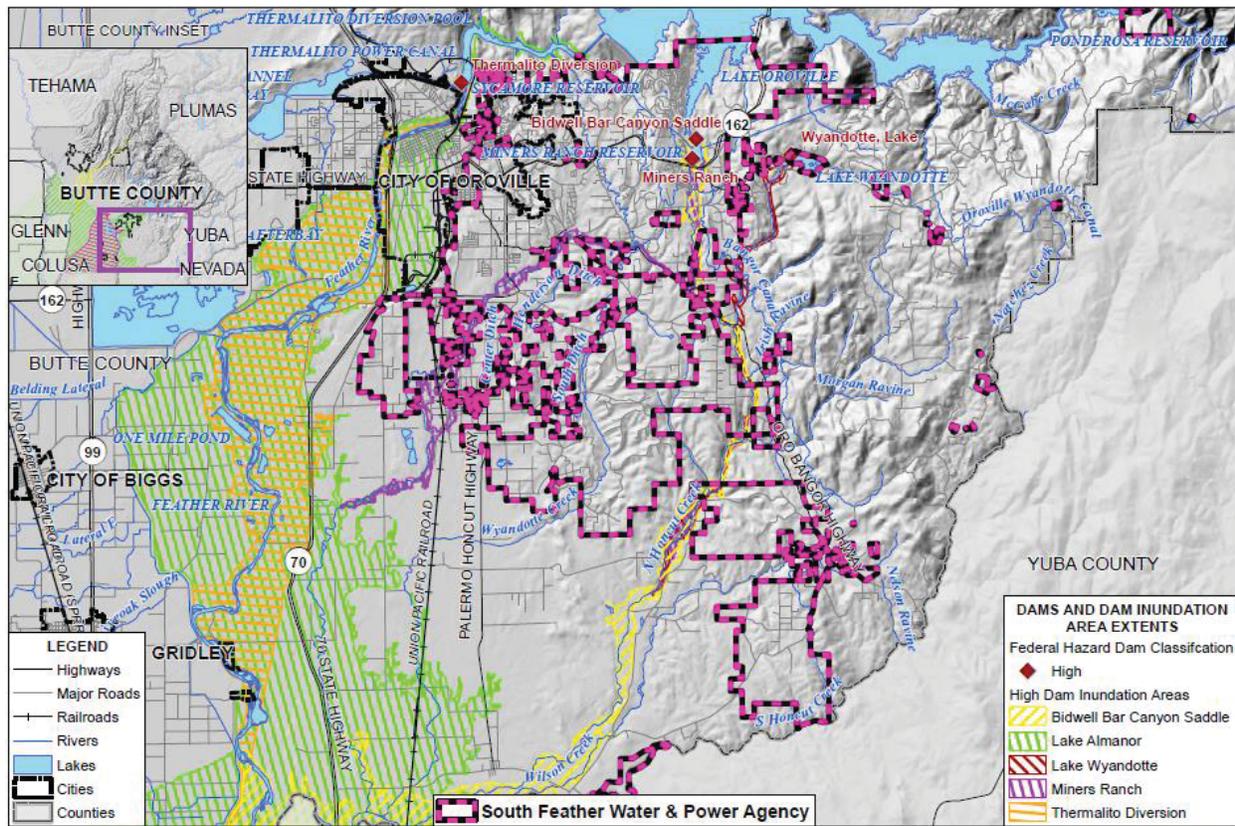


0 5 10 Miles

Data Source: Cal OES Dam Status 10/2017, Butte County GIS, Cal-Atlas; Map Date: 8/27/2019.



Figure N-3 SFWPA – High Hazard Dam Inundation Areas



Data Source: Cal OES Dam Status 10/2017, Butte County GIS, Cal-Atlas; Map Date: 8/27/2019.



There is no scale with which to measure dam failure. 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 not long – only as long as it takes to empty the reservoir of water the dam held back.

Past Occurrences

The agency owned dams are subject to inspections by FERC and DSOD as part of the agency’s regulatory compliance efforts. The Lost Creek Dam Modification Project was completed in November 2018 as an effort to maintain FERC compliance and ensure the safety and stability of this infrastructure.

The Spillway Emergency at Lake Oroville in 2017 caused severe flooding of the Kelly Ridge Power House along with impacting the daily operations at the Miners Ranch Reservoir that feeds the Miners Ranch Treatment Plant. Throughout the event, treatment plant operators monitored the reservoir elevation along with treating turbidity issues to ensure that the domestic water service was within water quality requirements.

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 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.

The Agency believes that the requirements set forth with FERC and DSOD reduce vulnerability to dam failure events. In addition to those requirements, the Power Division team is well-versed in monitoring, documenting, and maintaining their dam and spillway structures to recognize any conditions of weakness.

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 SFWPA from dam failure include damage to property and critical facilities. Costs to repair dams that fail would also fall to the SFWPA for any Agency owned dams.

Assets at Risk

All Agency assets would be at risk to dam failure flooding.

Future Development

The District will consider dam inundation areas when siting new facilities.

Drought & Water Shortage

Likelihood of Future Occurrence–Likely

Vulnerability–High

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 forest fires, 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. Water districts normally require at least a 10-year planning horizon to implement a multiagency improvement project to mitigate the effects of a drought and water supply shortage.

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 SFWPA, 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 SFWPA are the similar to those for the County. Those past occurrences can be found in Section 4.2.8 of the Base Plan. Unlike other agencies or districts in the surrounding area, SFWPA's water supply is completely made up of surface water. While consecutive years of drought would compromise standard operational procedures, the Planning Team for the Agency believes that the historic weather trends allow Agency infrastructure to recover in the wetter years.

Vulnerability and Impacts to Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including in the SFWPA, 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 SFWPA to drought is Agency-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 previous declared drought event did not pose significant threat to Agency infrastructure or operational well-being; however, it is believed that one more year of those conditions would have exposed the Agency to shifts in operational procedures and a stronger need to communicate to customers beyond the State mandate.

The most significant qualitative impacts associated with drought in the planning area are those related to water intensive activities such as wildfire protection, municipal usage, commerce, tourism, and recreation. Voluntary conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

In addition, the Agency noted that the flow of water (fuel) to maximize the power generation efforts would also have to correspond to ensure water delivery through the system is adequate to support the Agency's water demand.

Assets at Risk

The Agency Planning Team noted that power generation and distribution and water treatment and distribution would be the most affected assets in the event of a drought.

Future Development

Based on today's environmental and political climates, the Agency doesn't believe the power project would expand in the ways of additional dams or power houses. In terms of domestic and irrigation water, the Agency relies on consumption and storage data to ensure proper capacity needs and requirements.

Earthquake and Liquefaction

Likelihood of Future Occurrence—Occasional

Vulnerability—High

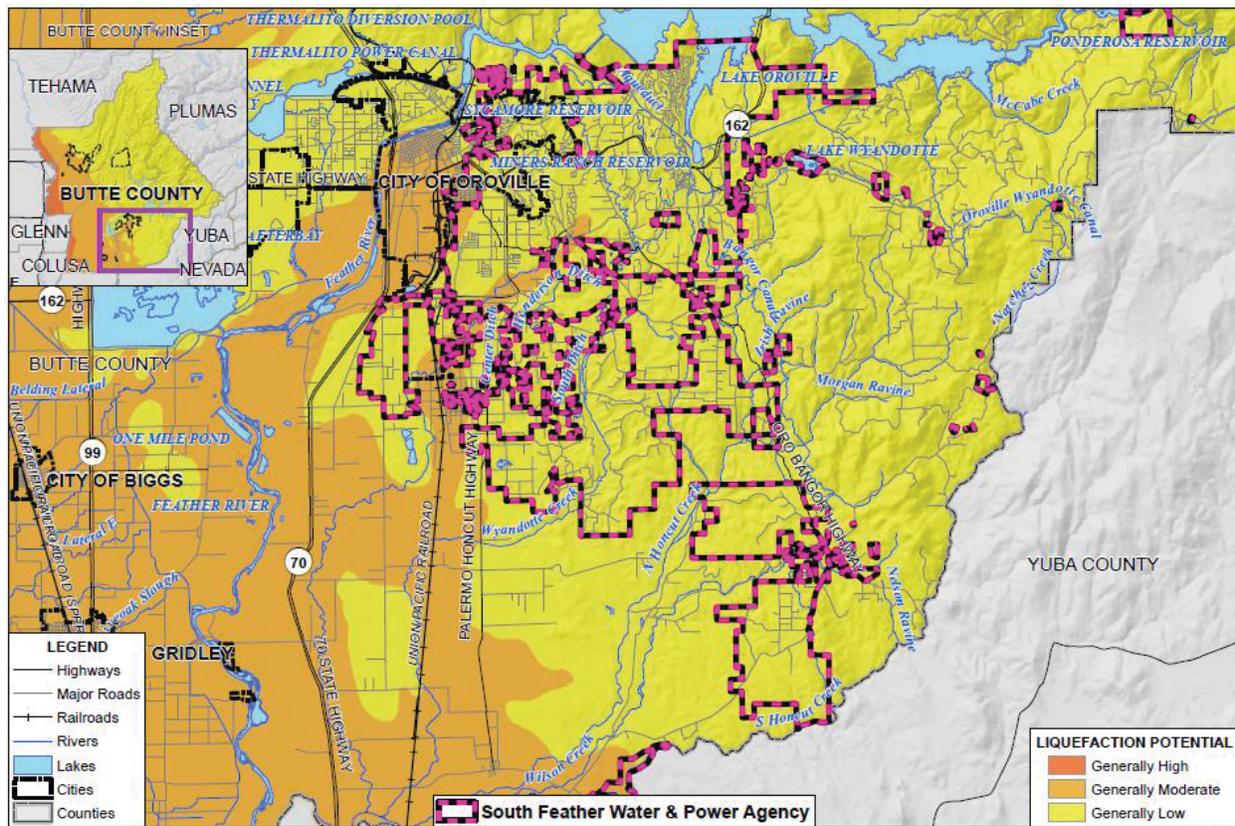
Hazard Profile and Problem Description

The State of California has identified five areas of critical seismic concern including surface ruptures, ground shaking, ground failure, tsunamis, and seiches. Each of these is caused by earthquake activity thereby creating hazards for life and property, which has the potential anywhere in California. The SFWPA 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 Agency to the Cleveland Hills Fault, the Agency is at risk to an earthquake occurring on this fault. These earthquakes can also cause liquefaction within the Agency. 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 Agency is at risk to earthquake. Results of Hazus earthquake scenarios for the region were shown in Section 4.3.6 of the Base Plan. SFWPA and the surrounding area is located in a region of relatively low to moderate risk of earthquake occurrence. Additionally, based on USGS data, the Agency is potentially at risk to liquefaction from earthquake shaking should an earthquake occur. A map of liquefaction potential and approximate Agency locations is shown on Figure N-4.

Figure N-4 SFWPA – Liquefaction Areas



Data Source: Butte County General Plan 2030, Butte County GIS, Cal-Atlas; Map Date: 8/27/2019.



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. The only known active fault in Butte County is the Cleveland Hills fault, the site of the August 1975 Oroville earthquake. This earthquake had a Richter magnitude of 5.7. 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 federal disaster declaration had occurred in the County from the 5.7 magnitude Oroville earthquake. The Agency Planning Team searched their records, including official board meeting minutes from the Agency. These did not indicate that there was any damage to agency infrastructure as a result of the Oroville earthquake. The HMPC noted no other past occurrences of earthquakes or liquefaction that affected the Agency. in any meaningful way.

Vulnerability and Impacts to Earthquake and Liquefaction

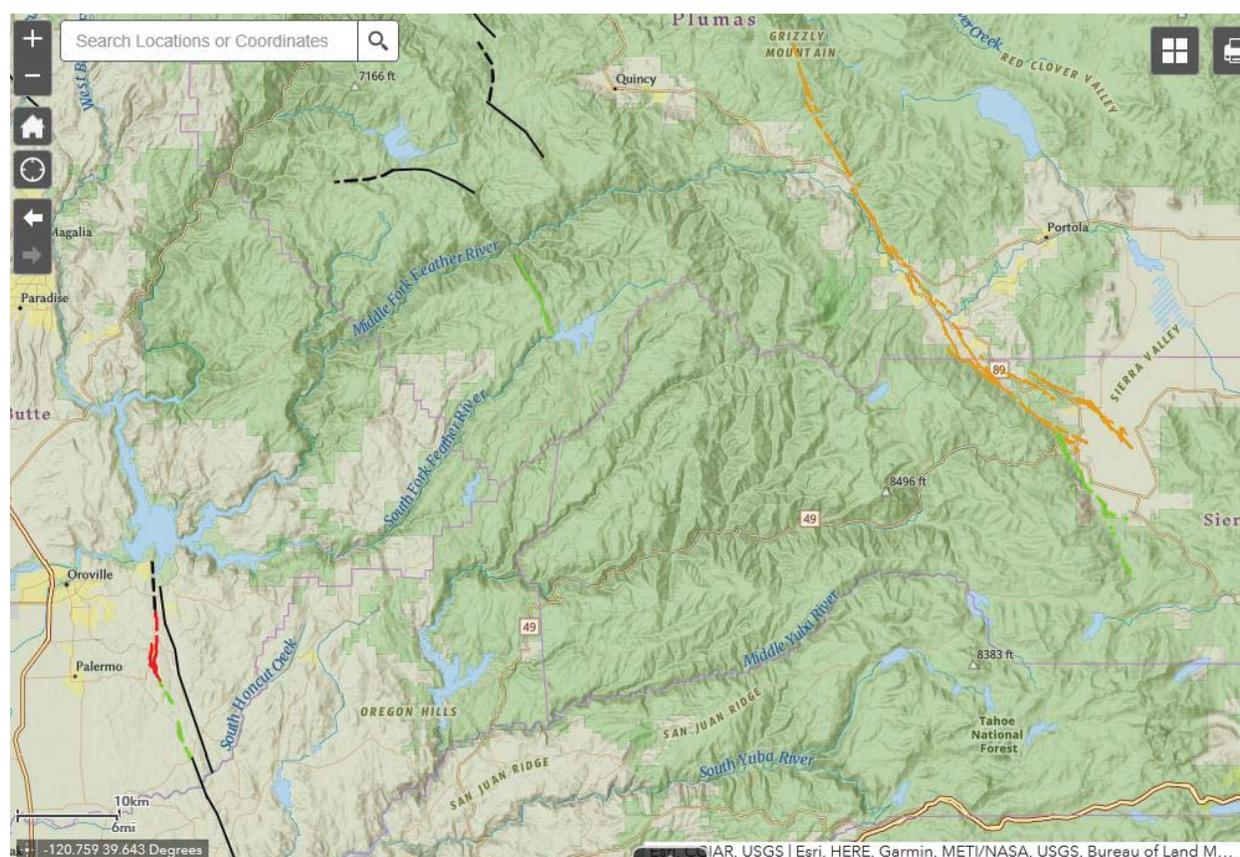
Earthquake vulnerability is primarily based on population and the built environment. Urban areas in high seismic hazard zones are the most vulnerable, while uninhabited areas are less vulnerable. The primary impacts of concern are life safety, property damage, and impacts to critical infrastructure and facilities.

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. Ground motions become structurally damaging when average peak accelerations reach 10 to 15 percent of gravity, average peak velocities reach 8 to 12 centimeters per second, and when the Modified Mercalli Intensity Scale is about VII (18-34 percent peak ground acceleration), which is considered to be very strong (general alarm; walls crack; plaster falls).

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 no URM buildings in the Agency.

The Agency is aware of the local fault lines and recognizes the potential risks associated with a seismic event. The distant span and varying topography for the Agency's assets are a concern for both the Power and Water Division respectfully. The green line in the middle of Figure N-5 is the Little Grass Valley fault, which is the start of the Agency's power project and water conveyance in Plumas County. Also note the green, black, and red fault lines towards the bottom left corner of the map that displays the Foothills Fault system that runs through a portion of the Agency's water distribution systems (both domestic and irrigation).

Figure N-5 Faults in or near Agency Boundaries



<https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf>

Studies around the rapid change in hydrostatic pressure at Lake Oroville would suggest that the greater Oroville area is impacted by seismic activity on a daily basis. This is known as induced seismicity. According to the UC Berkeley Seismology lab on February 16, 2017, “the current hypothesis goes as follows: During the winter of 1974/75, large amounts of water were released from the lake to make room for the snow melt in the spring of 1975. During the spring, the lake refilled very quickly. The theory is that the rapid change in hydrostatic pressure somehow affected a dormant fault south of the lake. A similar rapid change in the lake level has occurred in the past few weeks. After six years of drought, the lake level had fallen dramatically, only to rapidly increase due to the rainfall and runoffs in the last few weeks.

The Planning Team noted that if ground shaking happens, the modernized seismic station ORV will take notice. After 53 years it is still working and transmitting its data. In fact, during the 2017 Oroville Dam Spillway crisis, its sensitive seismic sensors recorded ground vibrations caused by the torrent of water roaring down the two spillways. These vibrations were so strong that they mask any weak signals of ground shaking that might be caused by tiny earthquakes.

In addition, a seismic survey was completed during the expansion project at the Miners Ranch Treatment Plant, which produced a report with no corrective actions needed. The Agency also requested funding in the 2014 NOI for spillway assessments, inspections, and investigations; however, those requests were denied.

Impacts to the Agency would vary significantly based on the location of the epicenter and magnitude of the event.

Assets at Risk

All Agency assets from Table N-3 would be at risk to earthquake and liquefaction.

Future Development

Based on today's environmental and political climates, the Agency doesn't believe the power project would expand in the ways of additional dams or power houses. In terms of domestic and irrigation water service, the Agency does not anticipate any major operational changes.

Floods: 100/500 year

Likelihood of Future Occurrence—Occasional/Unlikely
Vulnerability—High

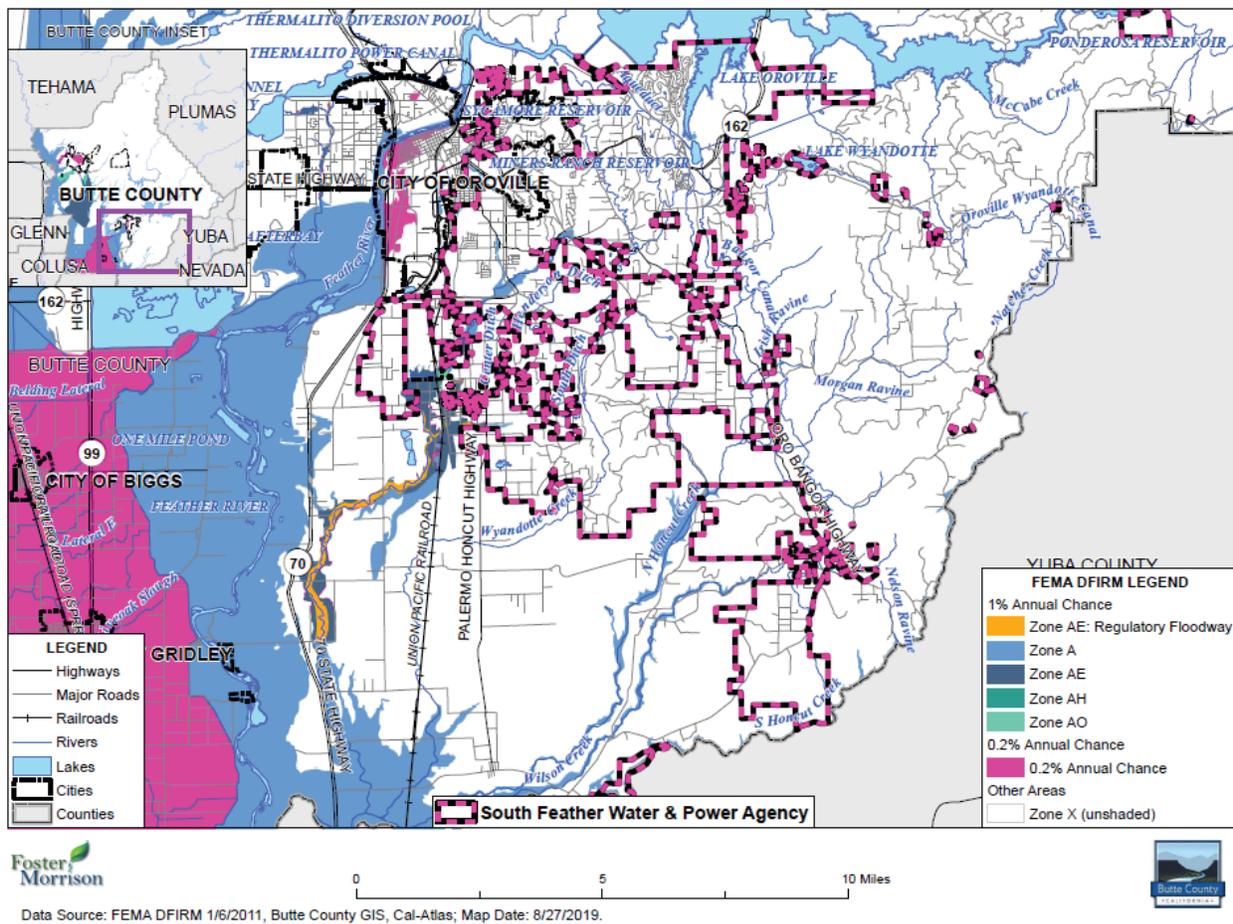
Hazard Profile and Problem Description

As previously described in Section 4.2.11 of the Base Plan, the Oroville area and areas of the SFWPA have been subject to historical flooding. Oroville and the Agency are 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% and 0.2% annual chance floodplains. The Agency and FEMA flood zones are shown on Figure N-6.

Figure N-6 South Feather Water and Power Agency – DFIRM Flood Zones



Flood extents can be measured by flood zones and in depths of flooding. Expected flood depths in the Agency vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the Agency 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 Agency tends to have a shorter speed of onset, due to the amount of water that flows through the Agency.

Past Occurrences

The Agency Planning Team noted no past flood events that have damaged facilities.

Vulnerability and Impacts to Flood

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide.

The General Plan Safety Element noted that the Oroville area has historically been subject to flooding from various rivers and creeks found within the Planning Area, most particularly from the Feather River and its tributaries. Flooding was much more prevalent prior to the construction of the Oroville Dam and its related flood control projects, which have helped to protect Oroville and many other areas of the County from

serious flooding in recent years. The Agency Planning Team noted that the Palermo area is prone to flooding, however the agency does not believe this to be an operational challenge at this point.

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floodwaters can transport large objects downstream which can damage or remove stationary structures, such as dam spillways. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services.

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 exceed normal high-water boundaries and cause damage. Flooding has occurred within the 1% annual chance floodplains and in other localized areas.

Assets at Risk

The Planning Team noted no Agency facilities at risk to flooding.

Future Development

The Agency noted that approved developments should plan to either build the areas up to reduce the risk of flooding or consider utility placement to support future development. Care will be taken in the future when siting and building future projects.

Floods: Localized Stormwater

Likelihood of Future Occurrence—Occasional
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 Agency. 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 SFWPA facilities and infrastructure that may affect Agency operations. Other localized flooding concerns include impacts to the roadways and bridges that provides a means of ingress and egress throughout the Agency.

Location and Extent

The SFWPA is subject to localized flooding. The extent of localized flooding is usually measured in volume, velocity, and depths of flooding. Expected flood depths in the SFWPA vary by location. Flood durations in the Agency 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 Agency 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

While localized flooding occurs every year, the Agency Planning Team noted no past occurrences of damages from localized flooding to Agency facilities.

Vulnerability and Impacts to Localized Flood

Localized flooding occurs throughout the Agency primarily during the winter and spring months during periods of heavy rains. Localized 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.

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

Assets at Risk

The Agency Planning Team noted that assets at risk to localized flood.

Future Development

Localized flood isn't expected to affect future Agency development.

Stream Bank Erosion

Likelihood of Future Occurrence–Likely

Vulnerability–High

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.

Past Occurrences

Erosion has occurred in areas of concern by the SFWPA in recent years. This can be seen in Table N-10.

Table N-10 Past Erosion Date and Issues

Location	Detail Nature and Extent of Erosion Issues
Miners Ranch Canal	2019 Winter Storms; Excessive rain fall
Miners Ranch Canal Access Road	2019 Winter Storms;
Miners Ranch Canal	2017 Winter Storms & Oroville Dam Spillway Emergency;
Miners Ranch Canal Access Road	2017 Winter Storms & Oroville Dam Spillway Emergency; Excessive floodwater runoff into Miners Ranch Canal led to the saturation of the canal road and eventually created slides and washouts of the canal road at four locations.

Source: FRWPA

Vulnerability and Impacts to Streambank Erosion

The Miners Ranch Canal is the water conveyance system that merges with the penstock to fuel the Kelly Ridge Hydroelectric Power House. The water conveyance system also travels to the raw water storage area at the Miners Ranch Treatment Plant for treatment and distribution to our domestic water account customers. The conveyance system is seven miles long and is built into the hillside, where concrete panels interlock at the floor and up the other side to create a flume like structure. Each panel is 20 feet long and thickness varies from 8 inches at the bottom to 4 inches at the top. The original construction was done over 100 years ago and the structure is emptied once a year for preventative maintenance. There are flow gauges along the canal that can send the proper notification when operational changes may become necessary. Outside of the conveyance structure is an access road that the agency uses to monitor and make repairs when necessary to the canal. This road is constructed on a California DWR easement that came as a result of the Lake Oroville water project.

Portions of the hillside and surrounding areas would suggest that the land has experienced multiple events of wildfire leaving them prone to burn scars followed by heavy winter storms that result in hillside erosion and debris flow issues. As detailed above, In the Agency, the canals and water conveyance system are at risk to streambank erosion, including those areas affected by past wildfire.

Assets at Risk

The Miner’s Ranch Canal is the most at risk asset for this particular hazard. During the summertime, the asset is extremely prone to wildfire events and as a steep hillside, it is then exposed to rapid erosion from rainfall in the winter months.

Future Development

The Agency will focus more on mitigating the existing structure and the risks it is exposed to than accounting for future development based on the general location and terrain.

Wildfire

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

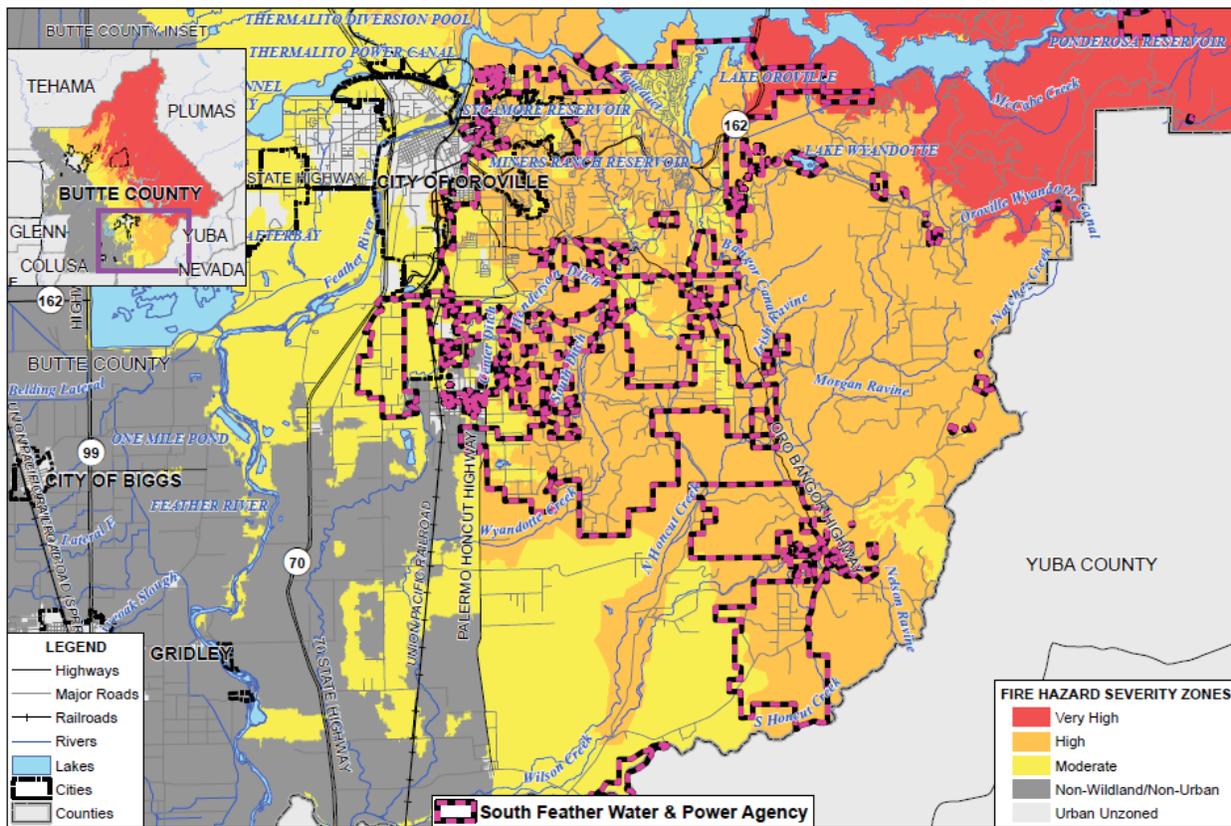
Hazard Profile and Problem Description

Wildland fire is an ongoing concern for the SFWPA. 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 Agency.

Location and Extent

CAL FIRE has defined areas of greater wildfire risk through Fire Hazard Severity Zones (FHSZ). The Agency lies in multiple zones, from Non-wildland/Non-Urban to Very High FHSZ. Agency boundaries and FHSZs are shown on Figure N-7.

Figure N-7 South Feather Water and Power Agency – FHSZs



Data Source: CAL FIRE (Adopted SRA 11/2007 - fhszs06_3_4, Draft 9/2007 - c4fhsz06_1), Butte County GIS, Cal-Atlas; Map Date: 8/27/2019.



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.

The Agency noted that, with the exception of Kelly Powerhouse, the entire Power Division is located in the very high hazard portion of the map provided above. In addition to power generation assets, the hillsides surrounding the Miners Ranch Canal are also extremely vulnerable to wildfire risks, which then cause soil erosion issues during the winter months.

Past Occurrences

The vast distance and topography where Agency assets are located has resulted in severe threats due to wildfire events (Ponderosa, Wall, Bangor, and Lumpkin Fires). Overall, the damage has been limited to melted communications equipment during the Ponderosa Fire.

The Agency was not directly impacted by the Camp Fire, but did engage in a Mutual Aid MOU with the Paradise Irrigation District within the first 48 hours of the disaster and provided equipment and personnel during the initial recovery efforts.

Vulnerability and Impacts 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 Agency is not immune to numerous types of grass and brush fires and any one of them may accelerate into an urban interface wildfire. Such a situation could lead to evacuation of large portions of the population and the potential for significant loss of personal property, structures, and rangeland. The natural fuels available in or near the Agency vary greatly in the rate and intensity of burning. Fires in heavy brush and stands of trees burn with great intensity but more slowly than in dry grass and leaves. Dense fuels will propagate fire better than sparse fuels.

Wildfires can cause short-term and long-term disruption to the County and Agency, as evidenced by the Camp Fire in Paradise and the resultant increase in populations in other Butte County communities. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the County and Agency 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

Based on the map, all Agency assets are either at High or Very High risk from the wildland fire hazard. Agency efforts to reduce the likelihood of a wildland event include daily ditch-tending along canal infrastructure, contracting fuel reduction work with the Butte County Sheriff Work Program, and environmental companies that offer goat grazing.

Future Development

The Agency anticipates that future housing developments that would require Agency irrigation or domestic water service be planned and built with Wildland-Urban Interface (WUI) firefighting tactics in mind, in addition to securing significant water sources nearby for fire protection.

N.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.

N.6.1. Regulatory Mitigation Capabilities

Table N-11 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 Agency.

Table N-11 South Feather Water and Power Agency – Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan	Y	General Operational Guidelines that support both Power and Water Divisions
Capital Improvements Plan	Y	Available funds are distributed for operational upgrades that vary from IT to Safety Equipment
Economic Development Plan	N	
Local Emergency Operations Plan	Y	Emergency Action Plans are written for both Water and Power Divisions
Continuity of Operations Plan	Y	Miners Ranch Treatment Plant and the Water Division for domestic water distribution
Transportation Plan	N	
Stormwater Management Plan/Program	Y	
Engineering Studies for Streams	N	
Community Wildfire Protection Plan	N	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	N	
Building Code, Permitting, and Inspections	Y/N	Are codes adequately enforced?
Building Code	N	Butte County or City of Oroville

Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Butte County or City of Oroville
Fire department ISO rating:	N	Butte County or City of Oroville
Site plan review requirements	N	Butte County or City of Oroville
Land Use Planning and Ordinances		
Zoning ordinance	N	Butte County or City of Oroville
Subdivision ordinance	N	Butte County or City of Oroville
Floodplain ordinance	N	Butte County or City of Oroville
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N	Butte County or City of Oroville
Flood insurance rate maps	N	Butte County or City of Oroville
Elevation Certificates	N	Butte County or City of Oroville
Acquisition of land for open space and public recreation uses	N	Butte County or City of Oroville
Erosion or sediment control program	N	Butte County or City of Oroville
Other	N	Butte County or City of Oroville
How can these capabilities be expanded and improved to reduce risk?		
Continue to grow communication and coordination with the jurisdiction responsible for the various tasks.		

Source: SFWPA

N.6.2. Administrative/Technical Mitigation Capabilities

Table N-12 identifies the SFWPA staff/roles responsible for activities related to mitigation and loss prevention in the Agency.

Table N-12 South Feather Water and Power Agency – Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N	Butte County and City of Oroville
Mitigation Planning Committee	N	Butte County and City of Oroville
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	Butte County Fire Safe Council; Fuel Reduction Grant Program; Fire Reduction Efforts through an MOU with Butte County Sheriff's Work Program, meet with Cal Fire to discuss priorities around fuel reduction efforts
Mutual aid agreements	Y	Paradise Irrigation Agency, Nevada Irrigation Agency, North Yuba Water Agency
Other	Y	Public Outreach for those properties that neighbor Agency canals and infrastructure
Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	N	Butte County and/or City of Oroville

Floodplain Administrator	N	Butte County and/or City of Oroville
Emergency Manager	Y	Within responsibilities of Environmental Health and Safety Manager
Community Planner	N	Butte County and/or City of Oroville
Civil Engineer	Y	Water Division Manager
GIS Coordinator	N	
Other	N	
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	E-Mail system is still fairly new, but the idea would support quickly getting a message out to those who have signed up
Hazard data and information	Y	Emergency Action Plans, Fire Plan (FERC License Requirement), Hazardous Substance Plan (FERC License Requirement),
Grant writing	N	
Hazus analysis	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
The agency would continue to promote our e-mail system and provide the customers that sign-up with the most current and accurate information possible, especially in the event of an emergency or outage. Again, continue to grow the coordination of efforts with other local jurisdictions.		

Source: SFWPA

N.6.3. Fiscal Mitigation Capabilities

Table N-13 identifies financial tools or resources that the Agency could potentially use to help fund mitigation activities.

Table N-13 South Feather Water and Power Agency – 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	Infrastructure Upgrades for both Water and Power Divisions
Authority to levy taxes for specific purposes	N	
Fees for water, sewer, gas, or electric services	Y	Operational expenses to provide domestic and irrigation water to customers
Impact fees for new development	Y	System Capacity Fees
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	Large Infrastructure upgrade projects; Most recently the Miners Ranch Treatment Plant and the Lost Creek Dam Modification Project
Incur debt through private activities	N	

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?
Community Development Block Grant	N	
Other federal funding programs	Y	Reviewing all available options for grant funding to increase water service capabilities
State funding programs	Y	Reviewing all available options for grant funding to increase water service capabilities
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
Continue to apply for various grants to improve infrastructure and better serve our customer base. Projects would also include limiting risks to our agency assets that would potentially cause an outage to our customer base.		

Source: SFWPA

N.6.4. Mitigation Education, Outreach, and Partnerships

Table N-14 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 N-14 South Feather Water and Power Agency – Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	No	
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	Our website and “e-mail blast” system sends
Natural disaster or safety related school programs	No	
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	No	
Other	Yes	The agency just completed two Public Workshops to educate our customers about how the agency operates and is funded
How can these capabilities be expanded and improved to reduce risk?		
Find a mechanism that increases the number of customers who want to sign up for our “e-mail blast” notification system.		

Source: SFWPA

N.6.5. Other Mitigation Efforts

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

- Emergency Action Plans, Hazardous Waste Plans, Environmental Studies, and Security plans are maintained and updated as needed by the Agency.

N.7 Mitigation Strategy

N.7.1. Mitigation Goals and Objectives

South Feather Water and Power Agency adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

N.7.2. Mitigation Actions

The planning team for the Agency 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
- Stream Bank 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.

Action 1. Wildfire Threat to the Surrounding Areas of Miners Ranch Reservoir and Miners Ranch Treatment Plant

Hazards Addressed: Wildfire, Extreme Heat, Climate Change, Streambank Erosion

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

Issue/Background: Supporting fuel management efforts around the perimeter of the reservoir and increasing the depth of the reservoir via dredging to support water supply efforts needed during a wildfire event in the foothills of Oroville, Forbestown, Hurleton, Wyandotte, and Bangor areas.

Project Description: Fuel Reduction and dredging the reservoir to enhance the availability of water needed during firefighting efforts (both aerial and drafting from fire apparatus). The body of water is highly secure and does not support recreation. Dredge the reservoir to increase water supply capabilities and manage fuels for ground access to firefighting apparatus

Other Alternatives: No other alternatives to support aerial water draws by Cal Fire

Existing Planning Mechanisms through which Action will be Implemented: None

Responsible Office: South Feather Water and Power Agency

Priority (H, M, L): Medium

Cost Estimate: \$400,000 - \$500,000

Potential Funding: Split between the agency and Hazard Mitigation Grant Funding

Benefits (avoided Losses): Managed water supply available for firefighting efforts throughout the southeastern foothills of Butte County

Schedule: When funding is available.

Action 2. Earthquake Vulnerability Assessment on Water Transmission Infrastructure

Hazards Addressed: Earthquake

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

Issue/Background: California has high susceptibility to earthquake events. Evaluate Agency infrastructure located in fault line and seismically active areas

Project Description: Overlay fault line and seismic activity maps with our infrastructure maps to evaluate a predictability curve. Potentially a project that could be completed by a U.C. or Cal State Engineering program.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be Implemented: None

Responsible Office: South Feather Water and Power Agency

Priority (H, M, L): Low

Cost Estimate: Approximately \$100,000

Potential Funding: Split between the agency and a FEMA Hazard Mitigation Grant

Benefits (avoided Losses): Understand vulnerable areas and ensure our system is capable of withstanding significant seismic/earthquake events

Schedule: When funding is available.

Hazards Addressed: Drought and Water Storage

Goals Addressed: Various dredging projects; Including the Miners Ranch Reservoir

Issue/Background: Years of sediment and debris build-up at varying spots throughout our entire project has resulted in impaired water flow. The Miners Ranch Reservoir could also storage capacity to ensure the treatment plant receives adequate supply under these conditions.

Project Description: Dredge to remove sediment and debris from specific locations throughout our entire water conveyance infrastructure.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be implemented: We are currently involved in a dredging project at our Forbestown Diversion asset and would use the experience of that project to evaluate and complete future dredging projects.

Responsible Office: South Feather Water and Power Agency

Priority (H, M, L): Low

Cost Estimate: \$600,000

Potential Funding: Split between the agency and a FEMA Hazard Mitigation Grant

Benefits (avoided Losses): Increase water conveyance to maximize our supply throughout the project along with adding capacity to the Miners Ranch Reservoir for our domestic water customers. The proposed dredging project at the Miners Ranch Reservoir was also captured in our Wildfire Action Mitigation as well.

Schedule: Within 5 years, depending on funding.

Action 3. Localized Drainage Issues

Hazards Addressed: Flooding and Localized Stormwater

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

Issue/Background: The Palermo area historically has issues around effective drainage infrastructure and we believe with some improvements to our canal and ditch system (empty during winter months) could assist with water conveyance and control of where the water could ultimately be sent to avoid populated low-lying areas.

Project Description: With slight improvements of our existing infrastructure (irrigation canals and ditches), we could assist with drainage issues in the Palermo area. Retrofit our existing infrastructure by widening, deepening, and using shot-crete type material to help convey the excessive water collected in low-lying portions of our service area.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be implemented: We have submitted an NOI through Cal OES and FEMA for the Flood Mitigation Assistance Grant Notice that closes on September 18, 2019.

Responsible Office: Work to be performed by South Feather Water and Power Agency

Priority (H, M, L): Medium

Cost Estimate: Total Project Cost \$316,000

Potential Funding: 75% through Cal OES / FEMA Grant Opportunity and 25% South Feather Water and Power Agency

Benefits (avoided Losses): Assist with drainage issues and avoid standing water in areas where residents are relying on both groundwater for drinking and septic tanks for waste.

Schedule: 24 months from time of grant being awarded

Action 4. *Increase capacity at Miner Ranch Reservoir to offset the impact of an outage along the Miners Ranch Canal.*

Hazards Addressed: Flood, Dam Failure, Stream Bank Erosion

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

Issue/Background: The Miners Ranch Canal runs along a hillside that neighbors Lake Oroville. The area has been prone to wildfire activity and over the most recent years, has sustained erosion damage during winter storms. The erosion causes debris to breach canal walls and in some cases erosion of the access road used to monitor the infrastructure. Ultimately, the canal must be emptied to make the necessary repairs, which cuts off the water supply to the Miners Ranch Reservoir and our treatment plant from there.

Project Description: The outages have historically been caused by erosion and the debris that follows. Increasing the capacity of the reservoir would allow us to mitigate the upstream erosion issue over a longer period of time. Dredge the reservoir to increase storage capacity that would increase water supply in the event of an outage from the Miners Ranch Canal

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be implemented: We maintain and monitor the canal and the access road; however, the canal is a seven (7) mile stretch that is built into a hillside that is relatively steep. For the first time this year, the Miners Ranch Canal was recognized as an option for insurance coverage with our insurance carrier, which we have secured as well.

Responsible Office: South Feather Water and Power Agency

Priority (H, M, L): Medium

Cost Estimate: \$600,000

Potential Funding: 75% Cal OES / FEMA Grant Opportunity / 25% South Feather Water and Power Agency

Benefits (avoided Losses): Increase supply at the Miners Ranch Reservoir in the event of an outage at the Miners Ranch Canal. Outages are often due to erosion and the debris that follows

Schedule: Within 5 years, depending on funding.