Annex I South Sutter Water District

I.1 Introduction

This Annex details the hazard mitigation planning elements specific to South Sutter Water District (SSWD or District), a new participating jurisdiction to the 2021 Yuba 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 SSWD, with a focus on providing additional details on the risk assessment and mitigation strategy for this District.

I.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Yuba 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 I-1. Additional details on plan participation and District representatives are included in Appendix A.

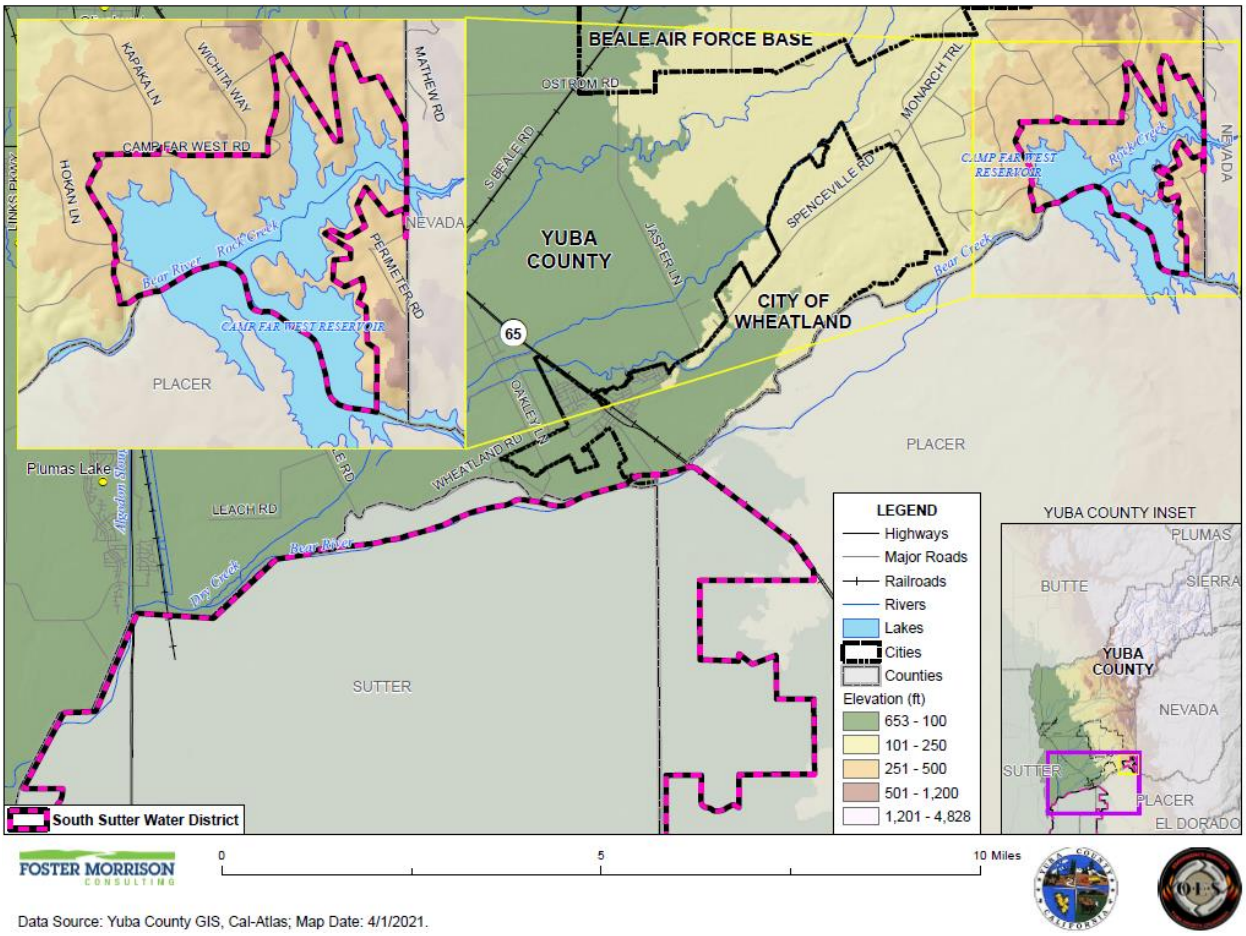
Table I-1 SSWD – Planning Team

Name	Position/Title	How Participated
Brad Arnold	General Manager	Provided information for annex
Hayden Cornwell	Assistant General Manager	General oversight of annex
Kyle Knutson, MBK Engineers	Engineer	Provided planning support to the District. Attended meetings.
Tom Engler, MBK Engineers	Engineer	Provided planning support to the District. Attended meetings.

I.3 District Profile

The District profile for the SSWD is detailed in the following sections. Figure I-1 displays a map and the location of the District within Yuba County.

Figure I-1 SSWD



I.3.1. Overview and Background

South Sutter Water District (SSWD) was established in May 1954 by a majority of landowners within the boundaries of the District and is located in the town of Trowbridge, California to develop, store, and distribute surface water to reverse the effects groundwater pumping was having on a dwindling aquifer.

SSWD is located along the western toe of the Sierra foothills just south of the lower reaches of the Bear River between the Camp Far West Reservoir and the Bear River's confluence with the Feather River in southern Sutter and western Placer Counties, located within the North American Subbasin. South Sutter Water District's service area encompasses a total gross area of 63,972 acres of which 6,960 acres are excluded for a net area of 57,012 acres of which approximately 40,107 acres are in Southern Sutter County and 16,905 acres are in Western Placer County, with approximately 1,920 acres residing within Yuba County.

In 1956, prior to the expansion of the Camp Far West Reservoir, approximately 20,955 acres (38% of the net SSWD area) was irrigated with approximately 109,000 acre-feet (af) of water. Approximately 90,000 af was pumped from the groundwater basin and the remainder from surface water sources. The development

of surface waters, primarily enlarging Camp Far West Reservoir and developing a distribution system, was an effort by SSWD landowners to augment and develop alternatives to a declining groundwater table that was being lowered by private agricultural wells within the service area. The groundwater basin was steadily declining 1 to 3 feet, or by as much as 10,000 to 11,000 af, per year.

In 1964, Camp Far West Reservoir was completed on the Bear River to serve SSWD and Camp Far West Irrigation District. New conveyance canals and some low-pressure pipelines allowed SSWD to deliver 63,630 af of surface water to farms in the region. With the exception of severe drought years, surface water deliveries over time have ranged from 70,000 af to over 130,000 af per year. The Dam and reservoir facilities are located in Yuba and Placer Counties and serve members in both Placer and Sutter Counties. SSWD owns and operates the dam and associated facilities to provide surface water, power generation, and recreational opportunities to the surrounding communities.

The purpose of the District is to bring 80,000 acre feet of surface water on an annual basis into the District to stop further depletion of the ground water basin. The average delivery per year from 1965 through 2016 is approximately 103,311 acre feet. This includes the drought year of 1977 when no water was delivered and the Drought years of 2012 to 2015 when the District delivered about 50% of the normal deliveries. The District has been able to stabilize the ground water basin even though a majority of the landowners have to continue pumping from that basin annually.

I.4 Hazard Identification

SSWD identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table I-2).

Table I-2 SSWD—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	High	–
Dam Failure	Extensive	Unlikely	Catastrophic	High	Medium
Drought & Water Shortage	Extensive	Likely	Limited	Medium	High
Earthquake	Extensive	Unlikely	Catastrophic	High	Low
Floods: 1%/0.5%/0.2% annual chance	Extensive	Occasional	Catastrophic	High	Medium
Floods: Localized Stormwater	Extensive	Likely	Critical	High	Medium
Levee Failure	Extensive	Likely	Catastrophic	High	Medium
Pandemic	Extensive	Likely	Limited	Low	Medium
Severe Weather: Extreme Cold and Freeze	Significant	Occasional	Negligible	Low	Medium
Severe Weather: Extreme Heat	Significant	Occasional	Negligible	Low	High
Severe Weather: Heavy Rains and Storms	Extensive	High	Critical	High	Medium
Severe Weather: High Winds and Tornadoes	Limited	Occasional	Limited	Low	Low
Wildfire	Limited	Occasional	Limited	Low	High

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

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

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

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

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

I.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile the District's hazards and assess the District's vulnerability separate from that of the Yuba County Planning Area as a whole, which has already been assessed in Section 4.3 Hazard Profiles and Vulnerability Assessment in the Base Plan. The hazard profiles in the Base Plan discuss overall impacts to the Yuba County Planning Area and describes the hazard problem description, hazard location and extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the 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.

I.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section I.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table I-2) affects the District and includes information on past hazard occurrences and the likelihood of future hazard occurrence. The intent of this section is to provide jurisdictional specific information on hazards and further describes how the hazards and risks differ across the Yuba County Planning Area.

I.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 SSWD'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 Plan. Critical facilities are defined for this Plan as:

> ***Critical Infrastructure describes the physical and cyber systems and assets that are so vital to the County of Yuba that their incapacity or destruction would have a debilitating impact on our physical or economic security or public health or safety. Critical infrastructure includes any location, facility, or infrastructure that are necessary to maintain normalcy in daily life, and that are essential for the delivery of vital services and for the protection of the community. Critical Facilities are further broken out into three Categories: 1) Essential Services Facilities, 2) Large Group and Vulnerable Populations Facilities, and 3) Infrastructure Facilities.***

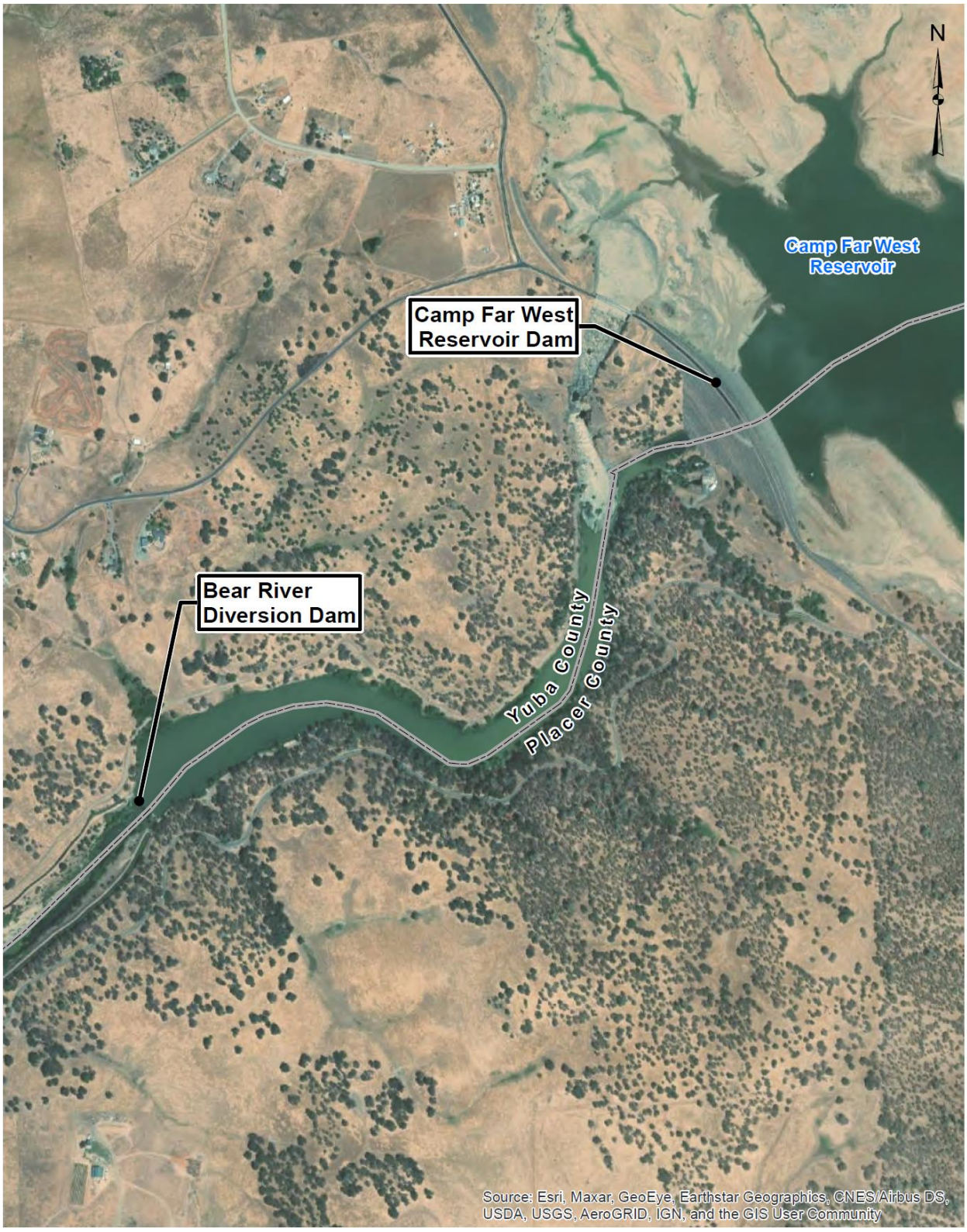
Table I-3 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. These are shown on Figure I-2. SSWD's physical assets, valued at over $87.5 million, consist of the buildings and infrastructure to support the District's operations.

Table I-3 SSWD Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Camp Far West Reservoir	Dam	$400,000,000	Dam Failure, Earthquake, Floods (1%, 0.5%, 0.2% annual Chance), and Severe Weather – Heavy Rains and Storms
Bear River Diversion Dam	Dam	$3,500,000	Dam Failure, Earthquake, Floods (1%, 0.5%, 0.2% annual Chance), and Severe Weather – Heavy Rains and Storms
Total		**$87,500,000**	

Source: SSWD

Figure I-2 SSWD – Facilities in Yuba County



Source: SSWD

Natural Resources

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

The Camp Far West reservoir provides recreational opportunity for the surrounding community with campgrounds, boat launches, and fishing opportunities in the lake. In addition, the dam includes a power plant that generates clean and renewable electricity and allows the District to provide downstream flows to support critical riparian and fishery habitats along the Bear River and downstream to the Sacramento and San Joaquin Delta.

Historic and Cultural Resources

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

Populations Served

Also potentially at risk should the District be affected by natural hazard events are the populations served by the District. SSWD provides services to roughly 180 farmers and property owners in the District service area who would be greatly affected by catastrophic damages to the facilities. In addition, if damaged or failure occurred the Camp Far West Dam would catastrophically inundate the City of Wheatland and other residents in Yuba County who are not in the SSWD boundaries, but are at risk form major hazard impacts from SSWD facilities.

Growth and Development Trends

General growth in the District parallels that of the Yuba County Planning Area as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Future Development

The District has no control over future development in areas the District services. Future development in these areas parallels that of the Yuba County Planning Area and the City of Wheatland. More general information on growth and development in Yuba County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Yuba County Vulnerability and Assets at Risk of the Base Plan and in Section B.5.2 of the City of Wheatland Annex.

I.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table I-2 as high or medium significance hazards. Impacts of past events and vulnerability of the District 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

Yuba County Planning Area). Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

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

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

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

Power Outage/Power Failure

An impact of almost all hazards below relates to power outage and/or power failures. The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the Department of Energy, major blackouts are on the upswing. Incredibly, over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. In addition to blackouts, brownouts can occur. A brownout is an intentional or unintentional drop in voltage in an electrical power supply system. Intentional brownouts are used for load reduction in an emergency. Electric power disruptions can be generally grouped into two categories: intentional and unintentional. More information on types of power disruptions can be found in Section 4.3.3 of the Base Plan. SSWD facilities are able to be controlled manually in the event of power outages so there are only very minor impacts associated with power failures.

Public Safety Power Shutoff (PSPS)

A new intentional disruption type of power outage/failure event has recently occurred in California. In recent years, several wildfires have started as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), are coordinating to prepare all Californians for the threat of wildfires and power outages during times of extreme weather. To help

protect customers and communities during extreme weather events, electric power may be shut off for public safety in an effort to prevent a wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3.3 of the Base Plan.

Climate Change

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile and Problem Description

Climate change adaptation is a key priority of the State of California. The 2018 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the District, Yuba County, and State of California. There is no scale to measure the extent of climate change. Climate change exacerbates other hazards, 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

Climate change has never been directly linked to any declared disasters. While the District noted that climate change is of concern, no specific impacts of climate change could be recalled. The District and HMPC members did, however, note that in Yuba County, the strength of storms does seem to be increasing and the temperatures seem to be getting hotter.

Vulnerability to and Impacts from Climate Change

The 2014 California Adaptation Planning Guide (APG) prepared by California OES and CNRA was developed to provide guidance and support for local governments and regional collaboratives to address the unavoidable consequences of climate change. California's APG: Understanding Regional Characteristics has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. Yuba County falls within the North Sierra Region characterized as a sparsely settled mountainous region where the region's economy is primarily tourism-based. The region is rich in natural resources, biodiversity, and is the source for the majority of water used by the state. This information can be used to guide climate adaptation planning in the District and Yuba County Planning Area.

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Sierra region in which the Yuba County Planning Area is part of:

- Temperature increases
- Decreased precipitation
- Reduced snowpack
- Reduced tourism
- Ecosystem change
- Sensitive species stress
- Increased wildfire

In terms of Dam safety and water supply, climate change increases uncertainties related to planning for and dealing with more extreme droughts and storm events that could impact the critical facilities in Yuba County.

Assets at Risk

The District noted that its facilities will be subject to impacts from climate change in the fact that extreme droughts or increased runoff from warmer storms would impact operations and could affect structural stability of the facilities. In general, uncertainty about future effects of climate change make it difficult to plan for operational changes to reduce impacts from these changes.

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

Dam failure is a natural disaster from two perspectives. First, the inundation from released waters resulting from dam failure is related to naturally occurring floodwaters. Second, a total dam failure would most probably happen as a consequence of the natural disaster triggering the event, such as an earthquake. There is no scale with which to measure dam failure. However, Cal DWR Division of Safety of Dams (DOSD) assigns hazard ratings to dams within the State that provides information on the potential impact should a dam fail. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in four categories that identify the

potential hazard to life and property: Low, Significant, High, and Extremely High. These were discussed in more detail in Section 4.3.7 of the Base Plan.

While a dam may fill slowly with runoff from winter storms, a dam break has a very quick speed of onset. The duration of dam failure is generally not long – only as long as it takes to empty the reservoir of water the dam held back. The District would be affected for as long as the flood waters from the dam failure took to drain downstream and downstream residents would be affected by the inundation from the increased flows resulting from the dam failure.

Extremely High Hazard Dams inside the County that can affect the District can be seen on Figure I-3. This is the Camp Far West dam which is owned by SSWD and discussed further below. No High Hazard Dams inside the County have inundation areas that affect the District. Extremely High Hazard Dams outside the County that can affect the District can be seen on Figure I-4. High Hazard Dams outside the County that can affect the District can be seen on Figure I-5.

Figure I-3 SSWD – Dam Inundation Areas from Extremely High Hazard Dams Inside the County

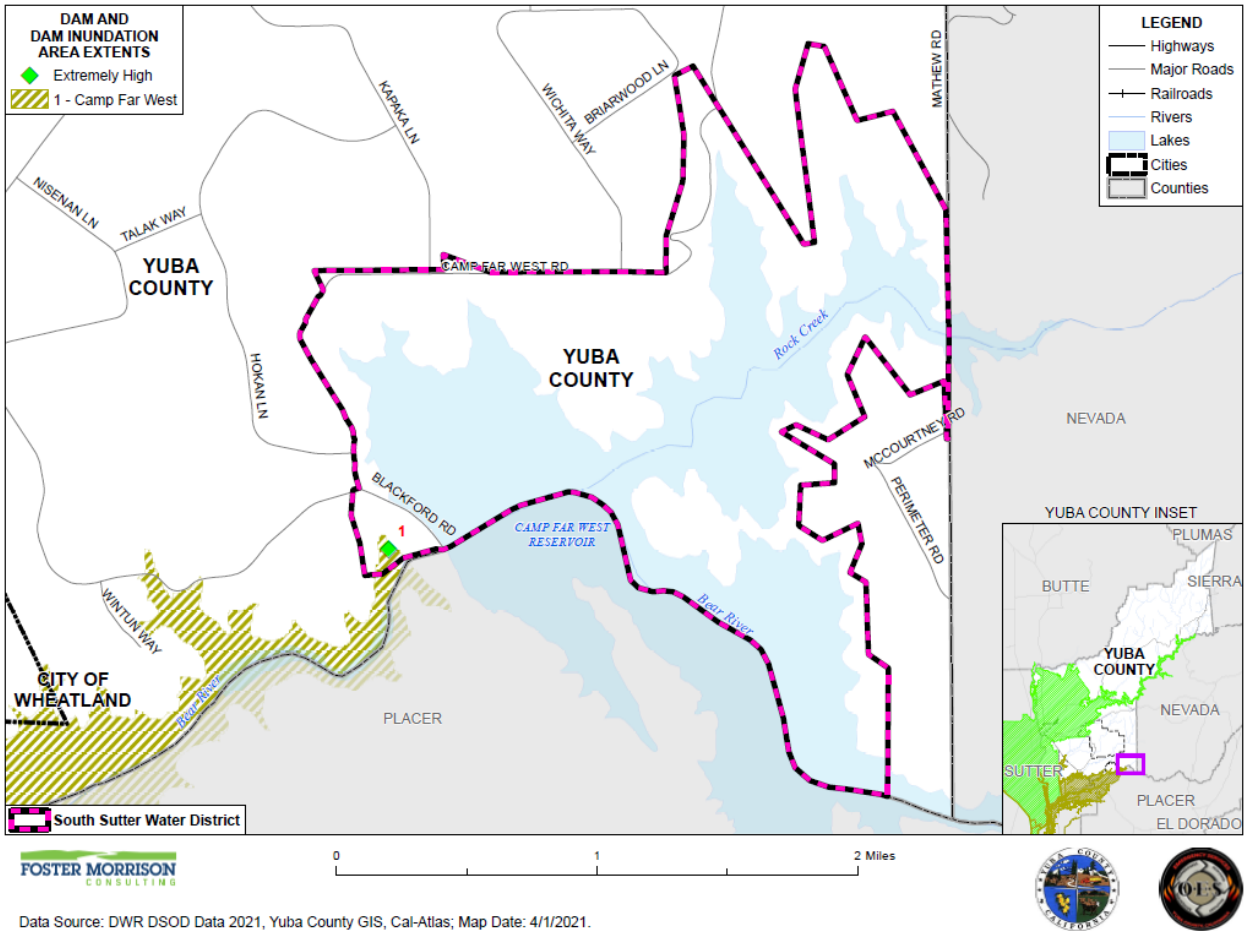
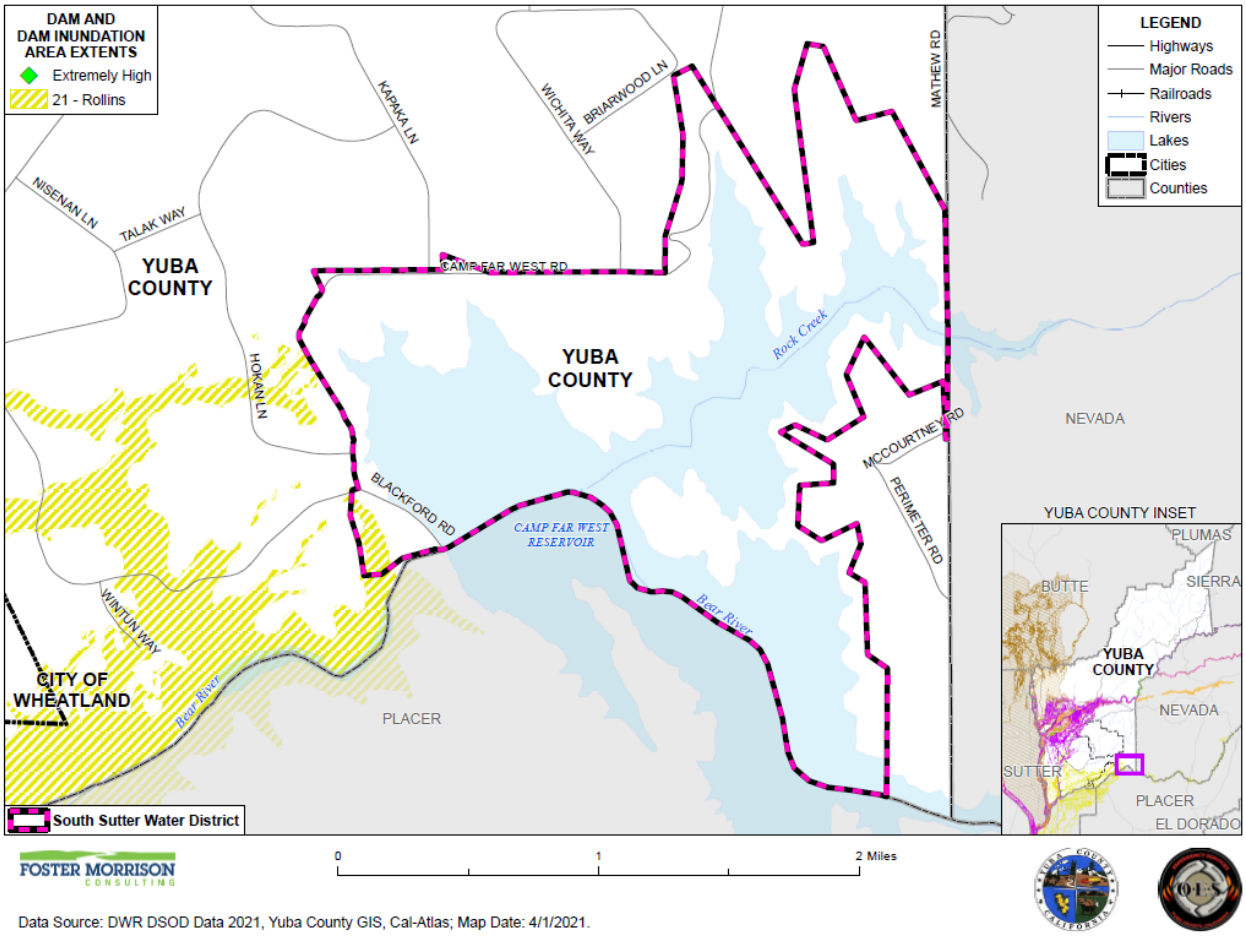
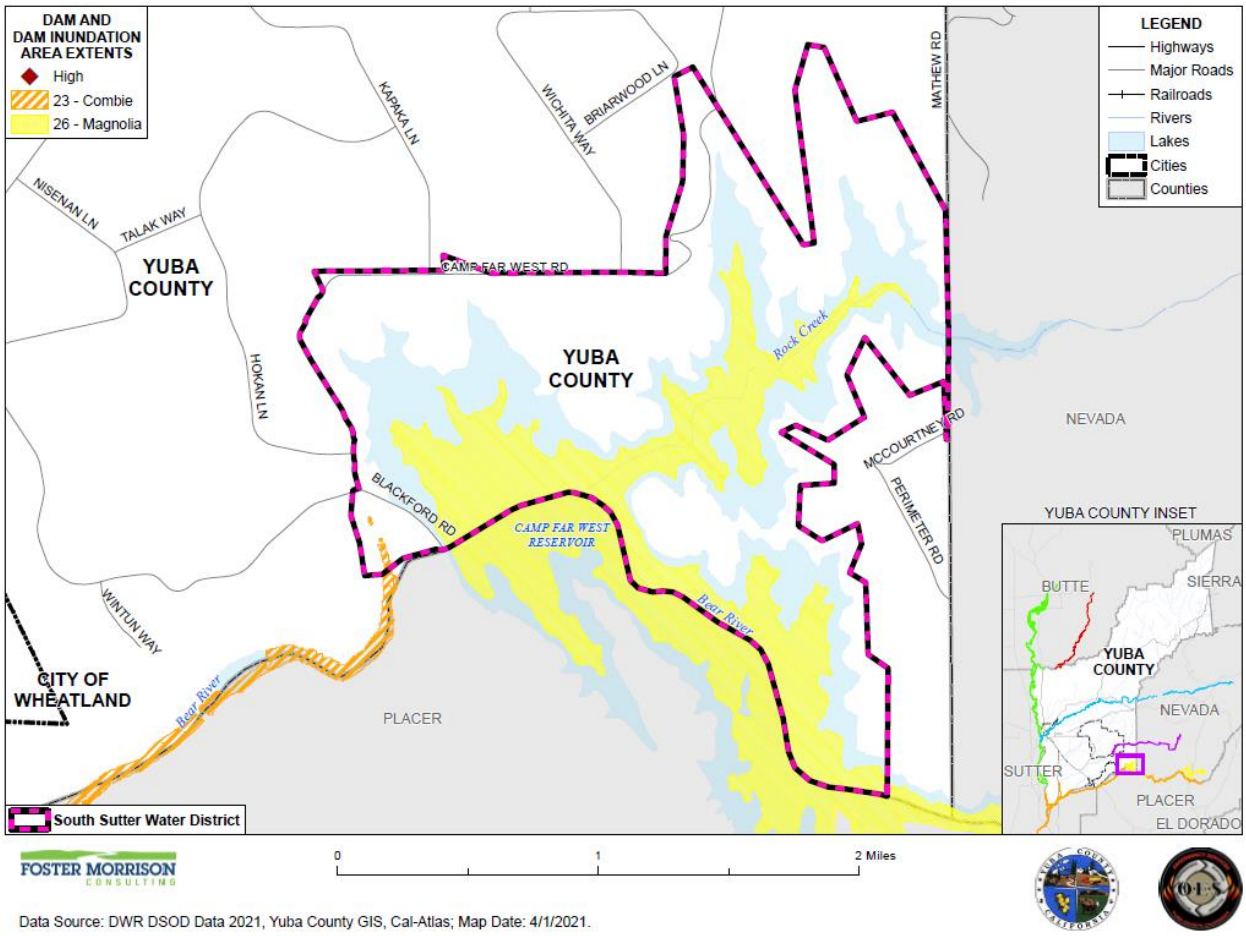


Figure I-4 SSWD – Dam Inundation Areas from Extremely High Hazard Dams Outside the County



Data Source: DWR DSOD Data 2021, Yuba County GIS, Cal-Atlas; Map Date: 4/1/2021.

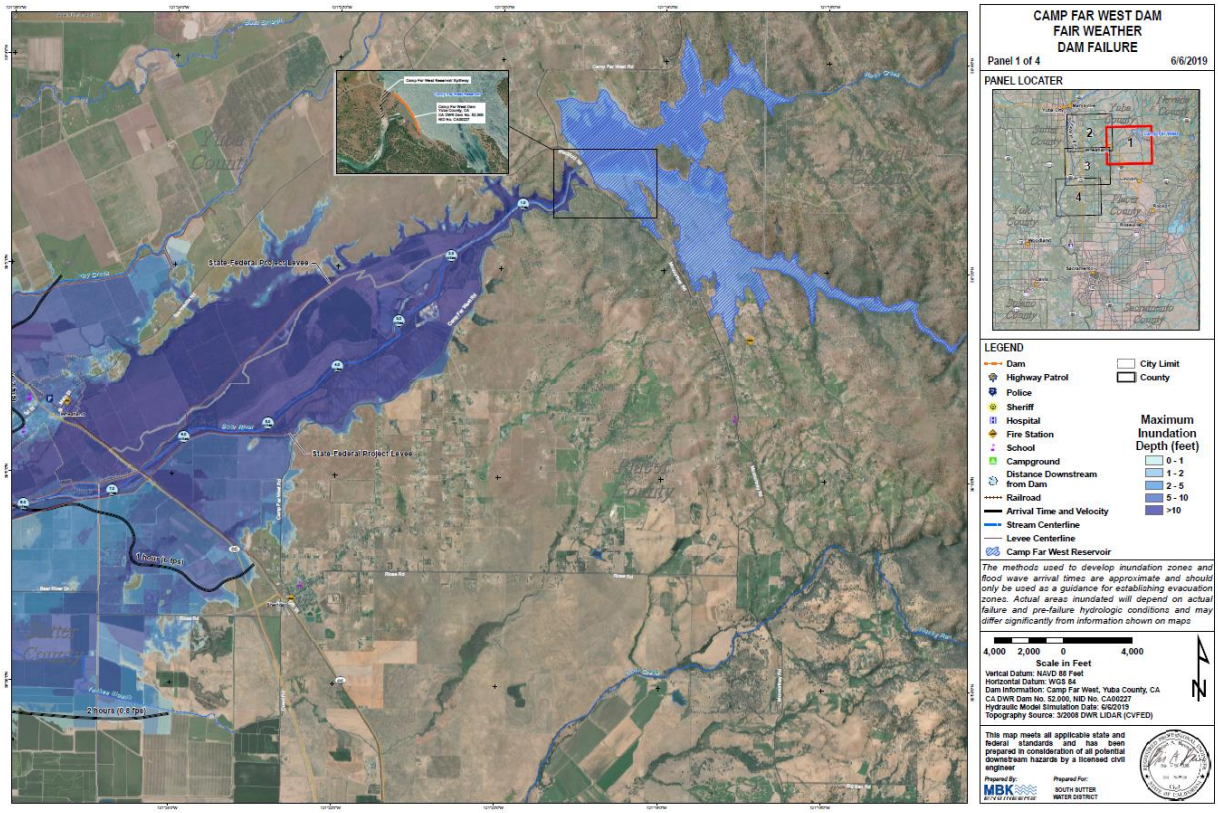
Figure I-5 SSWD – Dam Inundation Areas from High Hazard Dams Outside the County



In addition to the inundation maps from dams inside and outside the County, the District provided multiple maps of inundations for the Camp Far West Dam (which is owned by the District):

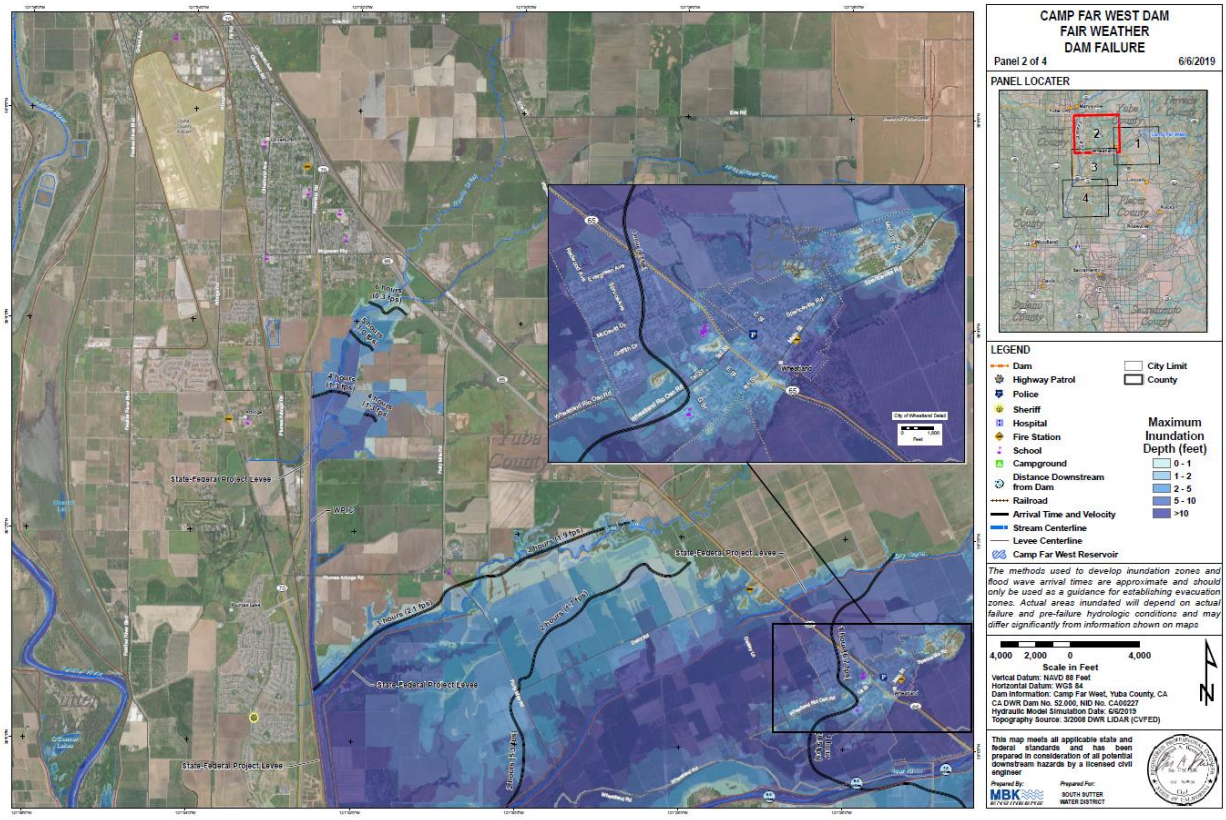
- Camp Far West Dam Fair Weather Dam Failure Time Series and Inundations
  - ✓ Panel 1 – Nearest inundations (Figure I-6)
  - ✓ Panel 2 – Second closest inundations (Figure I-7)
  - ✓ Panel 3 – Second furthest inundations (Figure I-8)
  - ✓ Panel 4 – Furthest inundation (Figure I-9)
- Camp Far West South Wing Fair Weather Dam Failure (Figure I-10)
- Camp Far West Dam Fair Weather Spillway Failure (Figure I-11)
- Camp Far West Diversion Dam Failure (Figure I-12)

Figure I-6 SSWD – Camp Far West Dam Fair Weather Failure Panel 1



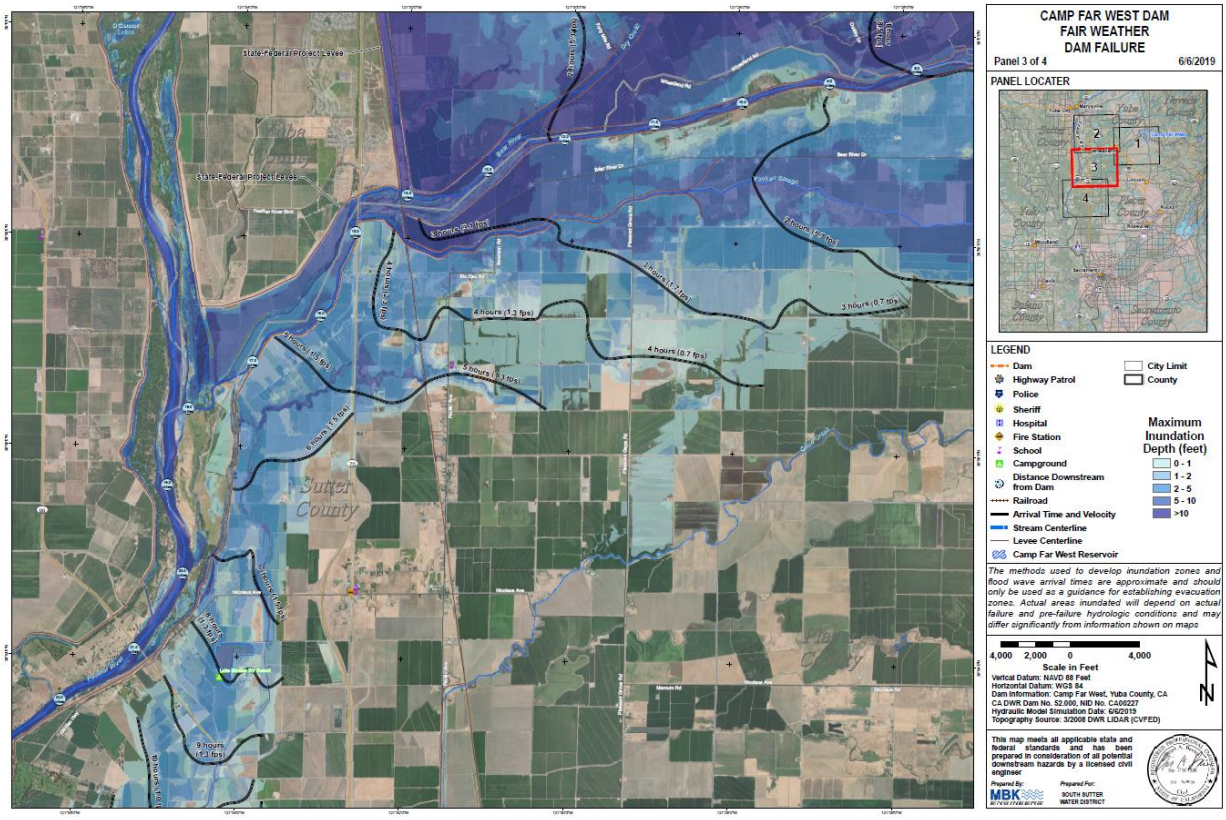
Source: SSWD

Figure I-7 SSWD – Camp Far West Dam Fair Weather Failure Panel 2



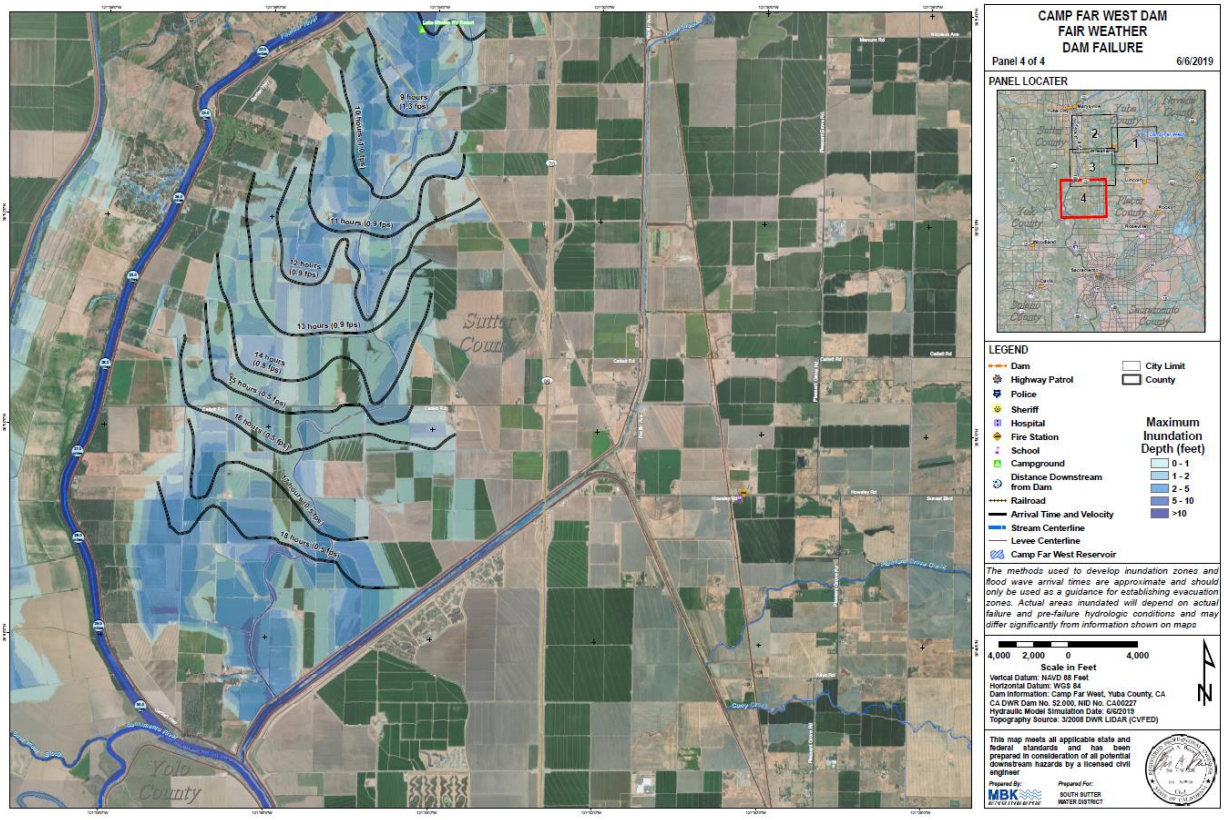
Source: SSWD

Figure I-8 SSWD – Camp Far West Dam Fair Weather Failure Panel 3



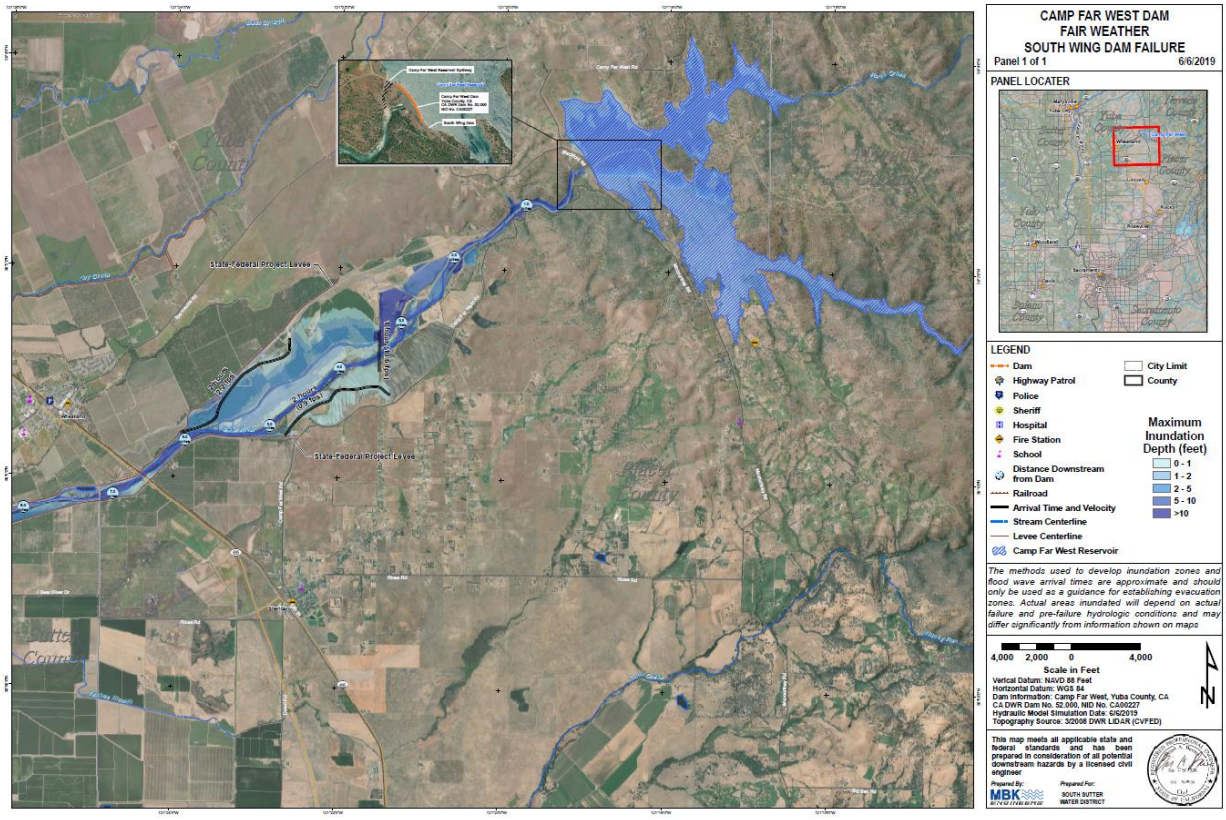
Source: SSWD

Figure I-9 SSWD – Camp Far West Dam Fair Weather Failure Panel 4



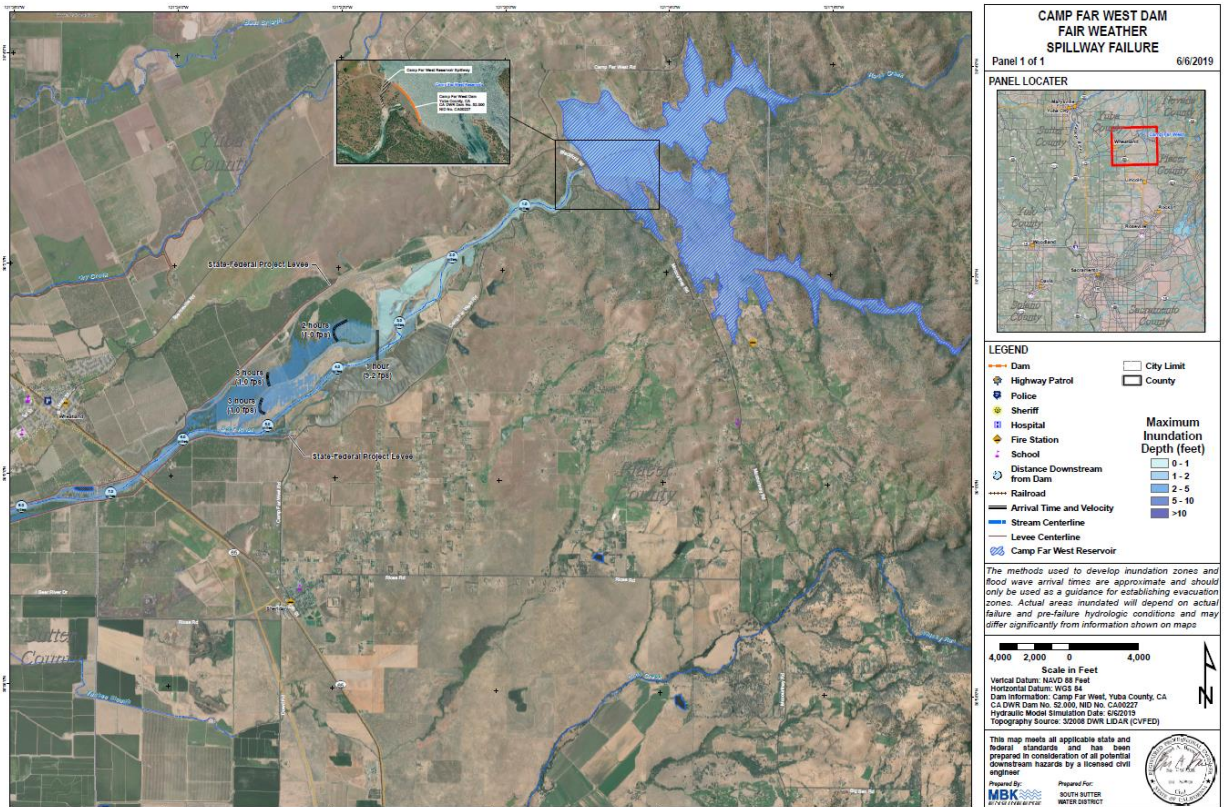
Source: SSWD

Figure I-10 SSWD – Camp Far West Dam Fair Weather South Wing Dam Failure



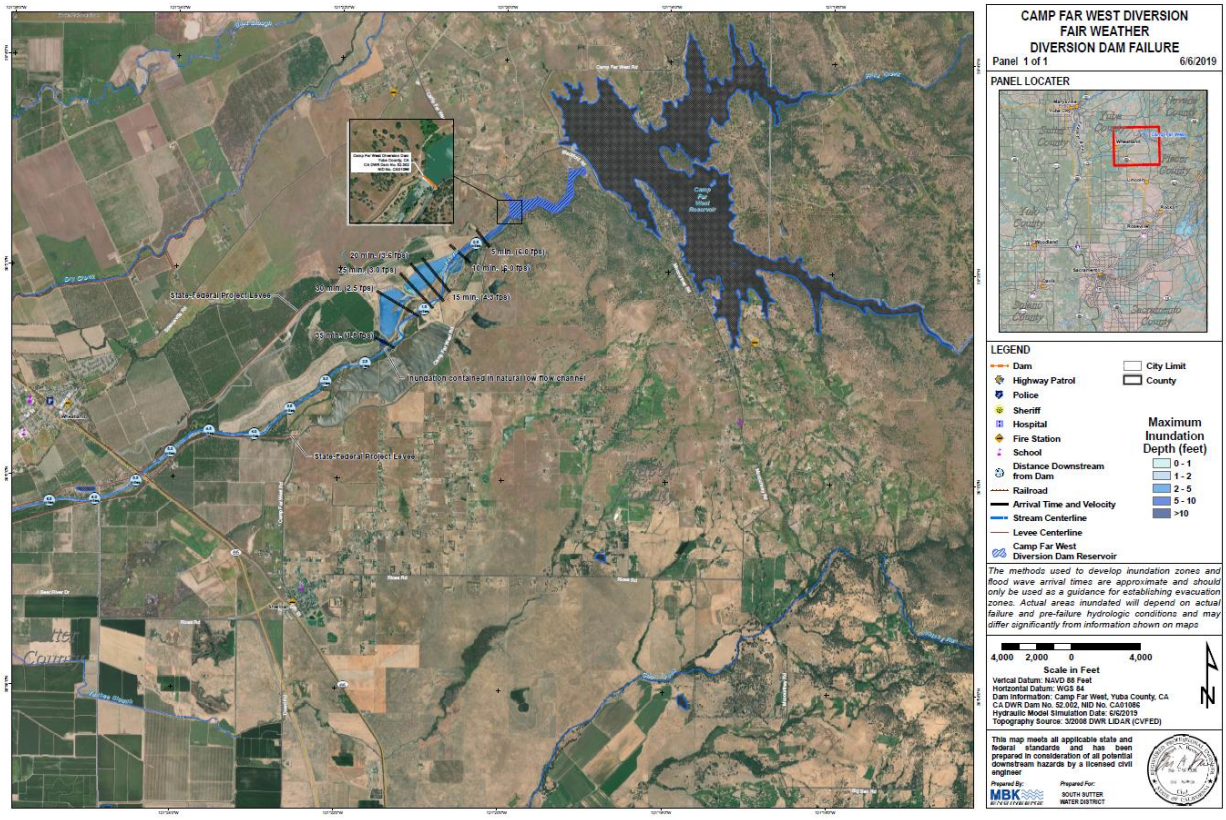
Source: SSWD

Figure I-11 SSWD – Camp Far West Dam Fair Weather Spillway Failure



Source: SSWD

Figure I-12 SSWD – Camp Far West Dam Diversion Dam Failure



Source: SSWD

Past Occurrences

There has been on federal or state disaster declarations for dam failure in the County, as shown on Table I-4. This was associated with the Oroville spillway incidence in Butte County. While the dam did not fail, mass evacuations were ordered resulting in significant economic and other impacts to Butte and neighboring counties.

Table I-4 Yuba County – State and Federal Disaster Declarations from Dam Failure 1950-2021

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Dam Failure	0	–	1	2017

Source: Cal OES, FEMA

The District noted no other dam failure occurrences that have affected the District. However, the Oroville Dam failure resulted in evacuation of many residents in SSWD causing localized economic impacts. The SSWD facilities were not directly affected by the Oroville spillway incident, but could be greatly affected by dam failures upstream on the Bear River if there were issues at Rollins Lake and or any PG&E reservoirs along the Bear River.

Vulnerability to and Impacts from Dam Failure

Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding. Impacts to the District from a dam failure flood could include loss of life and injury, flooding and damage to property and structures, damage to critical facilities and infrastructure, loss of natural resources, and all other flood related impacts. Additionally, mass evacuations and associated economic losses can also be significant.

SSWD owns and operates the Camp Far West Dam and Reservoir on the Bear River as well as a smaller irrigation diversion dam downstream from Camp Far West on the Bear River. As illustrated in Figure I-3 through Figure I-12 above, there is the potential for significant inundation to properties within SSWD as well as in neighboring communities, most notably the City of Wheatland. Failure of any critical portion of the Camp Far West facilities would have significant economic impacts and a high risk to loss of life for these communities.

Additionally, there are several dams upstream of Camp Far West on the Bear River. Failure from any of these facilities could quickly overwhelm the capacity of the Camp Far West reservoir and result in significant damage or possible failure of the Camp Far West and/or Diversion dams resulting in significant economic impacts and potential loss of life.

Assets at Risk

SSWD assets at risk from upstream dam failures would include both the camp Far West dam as well as the Bear River diversion dam.

Drought & Water Shortage

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile and Problem Description

Drought is a complex issue involving many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects. Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water is the most critical issue and is critical for agriculture, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Location and Extent

Drought and water shortage are regional phenomenon. The whole of the County, as well as the whole of the District, is at risk. The US Drought Monitor categorizes drought conditions with the following scale:

- None
- D0 – Abnormally dry
- D1 – Moderate Drought
- D2 – Severe Drought
- D3 – Extreme drought
- D4 – Exceptional drought

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 and for longer periods. Should a drought last for a long period of time, water shortage becomes a larger issue. Current drought conditions in the District and the County are shown in Section 4.3.8 of the Base Plan.

Past Occurrences

There has been one state and one federal disaster declaration due to drought since 1950. This can be seen in Table I-5.

Table I-5 Yuba County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	1	2014	1	1977

Source: Cal OES, FEMA

Since drought is a regional phenomenon, past occurrences of drought for the District are the same as those for the County and includes 5 multi-year droughts over an 85-year period. Details on past drought occurrences can be found in Section 4.3.8 of the Base Plan. Although drought has impacts to property owners within SSWD, none of the facilities included in this plan have been damaged by drought in the past.

Vulnerability to and Impacts from Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including 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 can be 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. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult.

The most significant qualitative impacts associated with drought in the Planning Area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Mandatory conservation measures are typically implemented during extended droughts. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. With a reduction in water, water supply issues based on water rights becomes more evident. Climate change may create additional impacts to drought and water shortage in the County and the District.

During periods of drought, vegetation can dry out which increases fire risk. Drought that occurs during periods of extreme heat and high winds can cause PSPS events to be declared in the County.

The purpose of the District through its operation of the Camp Far West Reservoir and the Bear River Diversion Dams is to bring 80,000 acre feet of surface water on an annual basis into the District to stop further depletion of the ground water basin. The average delivery per year from 1965 through 2016 is approximately 103,311 acre feet. This includes the drought year of 1977 when no water was delivered and the Drought years of 2012 to 2015 when the District delivered about 50% of the normal deliveries. The District has been able to stabilize the ground water basin even though a majority of the landowners have to continue pumping from that basin yearly.

Today, the annual available supply from the Camp Far West Reservoir is fully allocated each year. This amount represents only a portion (approximately 2 af per acre) of the users' demands. SSWD receives additional surface water from Yankee and Ping Sloughs, Coon Creek, Bunkham Slough, Markham and Auburn Ravines, King Slough, Pleasant Grove and Curry Creeks. SSWD's boundaries encompass a total net area of 57,012 acres of which only 35,645 acres have been irrigated in any given year with a combination of surface and groundwater. As many as 13,000 acres are reportedly irrigated with only groundwater. Groundwater continues to augment surface water deliveries, particularly during drier years. SSWD has operated the District to conjunctively manage surface water and groundwater resources to maximize the use of its water resources. The groundwater basin underlying the SSWD service area has functioned as both a conjunctive supply with the surface water, and as an important and reliable supply to augment surface water during shortages.

Currently, there are only private groundwater wells in the service area. The basin has demonstrated a strong groundwater recovery rate during periods of high surface water availability.

In February 2000, SSWD, Camp Far West Irrigation District, and C DWR) entered an agreement to meet the State Water Resource Control Board's (SWRCB) water quality objectives (Phase 8). In exchange for up to 4,400 af of water from Camp Far West reservoir in each Dry Year and Critical Year, SSWD agreed to assume all responsibility for all Bear River water rights holders' obligations to contribute to the implementation of the SWRCD water quality objectives for the Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary (May 1995).

During drought years the District is not able to provide the quantity of water that it normally provides. Therefore, District patrons either fallow or pump additional groundwater.

Assets at Risk

Although drought has impacts to property owners within SSWD, none of the facilities included in this plan are at risk of damage from drought.

Earthquake

Likelihood of Future Occurrence–Unlikely
Vulnerability–High

Hazard Profile and Problem Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. The degree of damage depends on many interrelated factors. Among these are: the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction.

Location and Extent

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). Yuba County is located within an area of relatively low seismic activity and is not located within a highly active fault zone. No Alquist-Priolo Earthquake Fault Zones are located in the County. Faults include primarily inactive faults of the Foothills Fault System, running south-southeastward near Loma Rica, Browns Valley, and Smartville. Faults include the Prairie Creek Fault Zone, the Spenceville Fault, and the Swain Ravine Fault.

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. The District is located in an area where few earthquakes of significant magnitude occur, so both magnitude and intensity of earthquakes are expected to remain low. Seismic shaking maps for the area show Yuba County and the District fall within a low to moderate shake risk, with most of the moderate risk in the Delta area of the County.

Past Occurrences

There have been no past federal or state disaster declarations from this hazard. The District noted no past occurrences of earthquakes or that affected the District in any meaningful way.

Vulnerability to and Impacts from Earthquake

Earthquake vulnerability is primarily based on population and the built environment. Urban areas in high seismic hazard zones are the most vulnerable, while uninhabited areas are less vulnerable. The primary impacts of concern are life safety and property damage. Although several faults are within and near the County, seismic hazard mapping indicates that the County has low seismic hazard potential. Additionally,

the County is not located within a delineated Alquist-Priolo Earthquake Fault Zone. The risks associated with earthquakes, such as surface fault rupture, within the County are considered low.

Fault ruptures itself contributes very little to damage unless the structure or system element crosses the active fault; however, liquefaction can occur further from the source of the earthquake. In general, newer construction is more earthquake resistant than older construction due to enforcement of improved building codes. Manufactured buildings can be very susceptible to damage because their foundation systems are rarely braced for earthquake motions. Locally generated earthquake motions and associated liquefaction, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry (URM) and soft story buildings. There are none of these buildings owned by the District.

The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. The SSWD is within the less hazardous Zone 3.

Impacts from earthquake in the District will vary depending on the fault that the earthquake occurs on, the depth of the earthquake strike, and the intensity of shaking. Large events could cause damages to infrastructure, critical facilities, residential and commercial properties, and possible injuries or loss of life.

Damage to CFW Dam or the Diversion Dam would be the main concern. Large earthquakes could theoretically cause structural damage to both assets. The District has several underground siphons that go underneath roads and highways that would have to be inspected following any major earthquake. However, no earthquake in the District's history has warranted such actions. Also, we don't have any concrete lined canals that would be affected from shifting ground levels.

Assets at Risk

The District assets at risk from Earthquakes would be CFW Dam and the Diversion Dam. The CFW dam is inspected regularly by Department of Dam Safety to monitor any movement or shift in its geological location. There have been no recommendations made for structural or nonstructural retrofitting.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–High

Hazard Profile and Problem Description

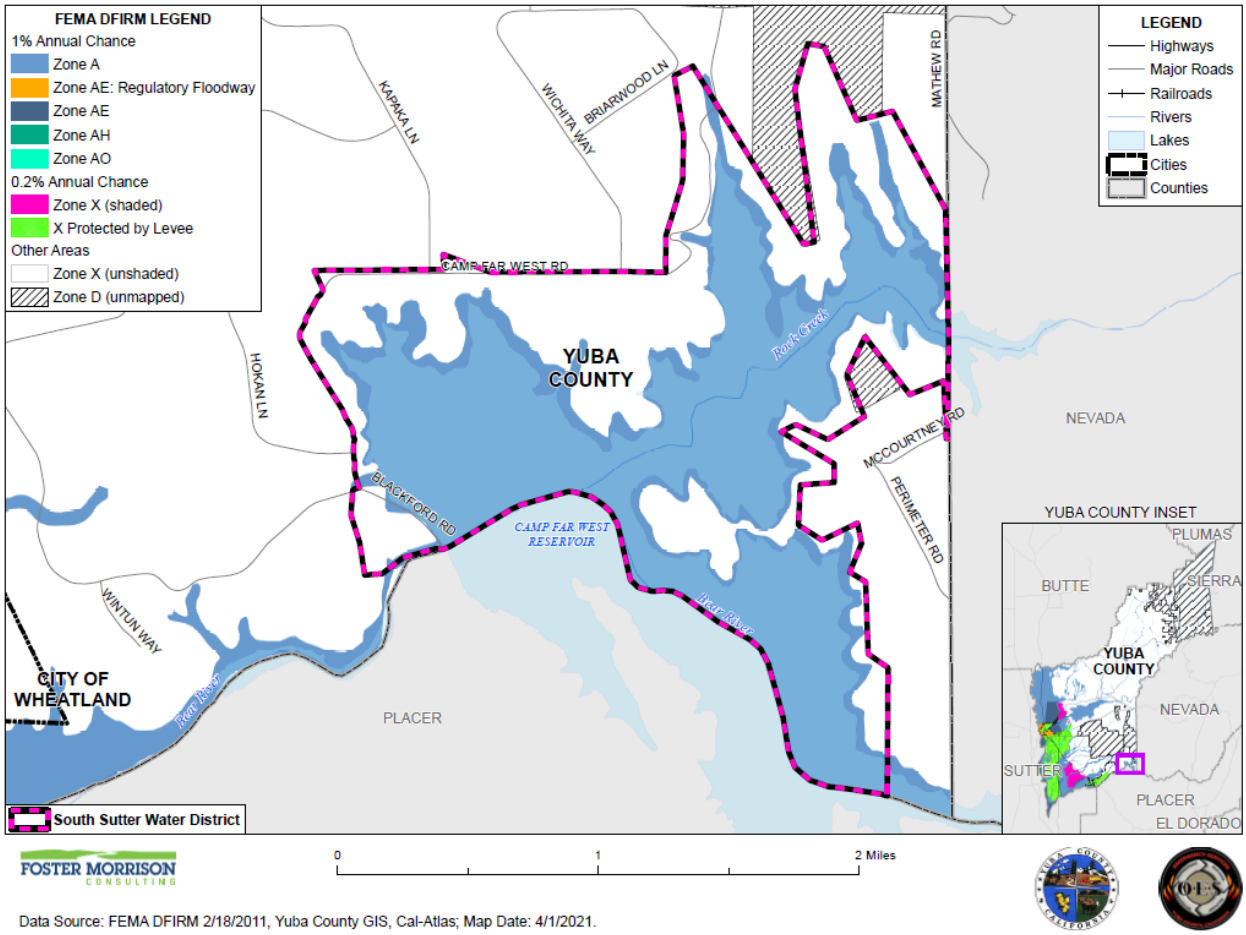
This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the District, and have caused damages in the past. Flooding is a significant problem in Yuba County and the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. 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. As previously described in Section 4.3.10 of the Base Plan, the Yuba County Planning Area and the SSWD have been subject to historical flooding.

Location and Extent

The SSWD has areas located in the 1% annual chance floodplain. This is seen in Figure I-13.

Figure I-13 SSWD – FEMA DFIRM Flood Zones



Data Source: FEMA DFIRM 2/18/2011, Yuba County GIS, Cal-Atlas; Map Date: 4/1/2021.

Table I-6 details the DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the District.

Table I-6 SSWD– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone Present in the District
A	1% annual chance flooding: No base flood elevations provided	X
AE	1% annual chance flooding: Base flood elevations provided	X
AE Floodway	1% annual chance flood: Regulatory floodway; Base flood elevations provided	
AH	1% annual chance flood areas of shallow flooding between one to three feet deep. Regulatory floodway; Base flood elevations provided	

Flood Zone	Description	Flood Zone Present in the District
AO	1% annual chance flooding: sheet flow areas. BFEs derived from detailed hydraulic analyses are shown in this zone.	
Shaded X	0.2% annual chance flooding: The areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	
X Protected by Levee	Areas protected by levees from 1% annual chance flood event. Levee protection places these areas in the 0.2% annual chance flood zone.	
X (unshaded)	No flood hazard	X

Source: FEMA

Additionally, flood extents can generally be measured in volume, velocity, and 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

A list of state and federal disaster declarations for Yuba County from flooding is shown on Table I-7. These events also likely affected the District to some degree.

Table I-7 Yuba County – State and Federal Disaster Declarations from Flood 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	16	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1973, 1982, 1983, 1986, 1995 (twice), 1997, 2008, 2017	15	1955, 1962, 1963, 1964, 1969, 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2006, 2017 (twice)

Source: Cal OES, FEMA

Past flood damages to District facilities have been minimal and include items that can either be repaired through routine maintenance or require infrequent major projects. These types of damage include sediment accumulation in the reservoir, debris buildup near the spillway, and occasional erosion along the spillway. High flows can also result in damage to the diversion dam from debris and erosion that must be repaired after the flood season and prior to the irrigation season.

Vulnerability to and Impacts from Flood

Floods have been a part of the District's historical past and will continue to be so in the future. During winter months, long periods of precipitation and the timing of that precipitation are critical in determining the threat of flood, and these characteristics further dictate the potential for widespread structural and property damages. Predominantly, the effects of flooding are generally confined to areas near the waterways of the County. As waterways grow in size from local drainages, so grows the threat of flood and dimensions of the threat. This threatens structures in the floodplain. Structures can also be damaged

from trees falling as a result of water-saturated soils. Electrical power outages happen, and the interruption of power causes major problems. Loss of power is usually a precursor to closure of governmental offices and community businesses. Roads can be damaged and closed, causing safety and evacuation issues. People may be swept away in floodwaters, causing injuries or deaths.

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

SSWD facilities are specifically vulnerable to floods as all dams are present to hold back flows. When large flows occur, the Dams are designed to safely pass the floods, but dams to experience damage from sedimentation, erosion, and debris flows in large flood events. Additionally, while dams are designed to pass floods of greater magnitude than the 1%, 0.5%, or even 0.2%, dams are always susceptible to floods that exceed design capacity. As a result, Camp Far West has been identified as a dam that requires upgrades to its spillway capacity to allow it to pass an event known as the Probable Maximum Flood meaning it is currently vulnerable to floods that exceed its existing spillway capacity of 104,500 cfs.

Assets at Risk

Both the Camp Far West and Bear River diversion dams are at risk of damage or failure from large floods.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile and Problem Description

Flooding occurs in areas other than the FEMA mapped 1% and 0.2% annual chance floodplains. Flooding may be from drainages not studied by FEMA, lack of or inadequate drainage infrastructure, or inadequate maintenance. Localized, stormwater flooding occurs throughout the County during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration.

Location and Extent

The SSWD is subject to localized flooding throughout the District. Flood extents are usually measured in areas affected, velocity of flooding, 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.

Although localized flooding occurs within the District, facilities included in this Plan Update are not susceptible to damage from localized flooding.

Past Occurrences

There have been no federal or state disaster declarations in the County due to localized flooding. The District noted no past occurrences of localized flooding.

Vulnerability to and Impacts from Localized Flooding

Historically, much of the growth in the District and County has occurred adjacent to streams, resulting in significant damages to property, and losses from disruption of community activities when the streams overflow. Additional development in the watersheds of these streams affects both the frequency and duration of damaging floods through an increase in stormwater runoff.

Primary concerns associated with stormwater flooding include impacts to infrastructure that provides a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Objects can also be buried or destroyed through sediment deposition. Floodwaters can break utility lines and interrupt services. Standing water can cause damage to crops, roads, and foundations. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

The District has no vulnerability to localized flooding for facilities within Yuba County.

Assets at Risk

No District assets are at direct risk from this hazard. Localized flooding that impacts roads may cause issues for District staff as they travel to inspect the dams.

Levee Failure

Likelihood of Future Occurrence–Likely
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 steam channel, levees can also increase the speed of the water. Levees can be natural or man-made.

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce, not eliminate, the risk to individuals and structures located behind them. A levee system failure or overtopping can create severe flooding and high water velocities. Levee failure can occur through overtopping or from seepage issues resulting from burrowing rodents, general erosion, excessive vegetation and root systems and other factors that compromise the integrity of the levee. No levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Location and Extent

There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District vary by event and location. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of levee failure risk times can be hours to weeks, depending on the river flows that the levee holds back. When northern California dams and reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees. There are no upstream levees that would cause damage to SSWD facilities located in this planning area. Though levees do not protect the District, the areas downstream of the dams owned by the District are at risk if the dam fails.

Past Occurrences

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

Vulnerability to and Impacts from Levee Failure

A levee failure can range from a small, uncontrolled release to a catastrophic failure. Levee failure flooding can occur as the result of prolonged rainfall and flooding. The primary danger associated with levee failure is the high velocity flooding of those properties outside and downstream of the breach.

Should a levee fail, some or all of the area protected by the levees would be at risk to flooding. Impacts from a levee failure include property damage, critical facility damage, and life safety issues. Business and economic losses could be large as facilities could be flooded and services interrupted. School and road closures could occur. Road closures would impede both evacuation routes and ability of first responders to quickly respond to calls for aid. Other problems connected with levee failure flooding include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

Assets at Risk

No District assets are protected by levees in Yuba County.

Severe Weather: Heavy Rains and Storms

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

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 fall, winter, and spring 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, Yuba County, and the District can range from minutes to hours to days. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

Past Occurrences

There have been past disaster declarations from heavy rains and storms, which were discussed in Past Occurrences of the flood section above. According to historical hazard data, severe weather, including heavy rains and storms, is an annual occurrence in the District. This is the cause of many of the federal disaster declarations related to flooding.

Vulnerability to and Impacts from Heavy Rain and Storms

Heavy rain and severe storms are the most frequent type of severe weather occurrences in the District. These events can cause localized flooding. Elongated events, or events that occur during times where the ground is already saturated can cause 1% and 0.2% annual chance flooding. Wind often accompanies these storms and has caused damage in the past. Hail and lightning are rare in the District.

Actual damage associated with the effects of severe weather include impacts to property, critical facilities (such as utilities), and life safety. Heavy rains and storms often result in localized flooding creating significant issues. Roads can become impassable and ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Floodwaters and downed trees can break utilities and interrupt services.

During periods of heavy rains and storms, power outages can occur. These power outages can affect pumping stations and lift stations that help alleviate flooding.

Assets at Risk

Both the Camp Far West and Bear River diversion dams are at risk of damage or failure from large floods.

I.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.

I.6.1. Regulatory Mitigation Capabilities

Table I-8 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 SSWD.

Table I-8 SSWD Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan/General Plan	Yes	The District has a running 5-year plan that identifies the major infrastructure that needs to be watched / repaired / replaced over the next 5 years.
Capital Improvements Plan	Yes	The running 5-year District plan includes several large capital improvements such as canal enlargement, spillway construction, and siphon relining
Economic Development Plan	N/A	
Local Emergency Operations Plan	Yes 2021	The District has an emergency action plan pertaining to our dam on Camp Far West Reservoir
Continuity of Operations Plan	N/A	
Transportation Plan	N/A	
Stormwater Management Plan/Program	N/A	
Engineering Studies for Streams	N/A	
Community Wildfire Protection Plan	N/A	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Y	The District is in the process of finalizing our Groundwater Sustainability Plan that will help ensure stable groundwater tables throughout the District in the face of drought and climate change
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	N/A	Version/Year:
Building Code Effectiveness Grading Schedule (BCEGS) Score	N/A	Score:

Fire department ISO rating:	N/A	Rating:
Site plan review requirements	N/A	
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/A	
Subdivision ordinance	N/A	
Floodplain ordinance	N/A	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N/A	
Flood insurance rate maps	N/A	
Elevation Certificates	N/A	
Acquisition of land for open space and public recreation uses	N/A	
Erosion or sediment control program	Y	The District has an engineering firm come out regularly and inspect canals and siphons, as well as our spillway, for erosion. The District has plans in place to prevent and repair erosion as problems arise.
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
The District will seek to implement the 5-Year Plan and their Erosion Program. This includes the following: The District currently has means of fixing small scale erosion problems on our infrastructure as they arise. The District would like to eventually reinforce the existing metal underground siphons with a sturdier material that would slow down the erosion process going forward. Additionally, the District is actively looking into enlarging areas in existing canals and lining them with a caster material to help prevent erosion. The District hopes to place rip rap rock in several highly erosion-susceptible areas as well.		

Source: SSWD

I.6.2. Administrative/Technical Mitigation Capabilities

Table I-9 identifies the District department(s) responsible for activities related to mitigation and loss prevention in SSWD.

Table I-9 SSWD's Administrative and Technical Mitigation Capabilities

Administration	**Y/N**	**Describe capability Is coordination effective?**
Planning Commission	No	
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	Tree Trimming, weed spraying, levee and canal mowing/brush clearing. Inspect canals for weak spots and leaks regularly
Mutual aid agreements	No	
Other	No	

Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	No	
Floodplain Administrator	No	
Emergency Manager	Yes (For Dam / Spillway)	Yes, GM, Dam Tender, and Office Manager are all trained on disaster management and activating our emergency action plan
Community Planner	No	
Civil Engineer	Yes	We don't have an in-house engineer. But we have several engineering firms that we work with on a continuous basis that advise us on projects in all facets of District operations.
GIS Coordinator	No	
Hazard Inspection	Y	The District's water operators as well as Assistant and General managers inspect district infrastructure on a daily basis to identify potential hazards as quickly as possible
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	Robo Call to all landowners in case of emergency, as well as manual call down lists
Hazard data and information	Yes	As part of this LHMP
Grant writing	Yes	District Engineer as well as Consulting firm on retainer
Hazard analysis	Yes	Regular inspections from DSOD / FERC on our dam. As well as periodic inspections from outside engineering firms on other infrastructure within our District i.e., canals, ditches, syphons etc.
Other	No	
How can these capabilities be expanded and improved to reduce risk?		
The District is a small local operation with 11 employees. Given the size, we outsource all of our engineering work, GIS work, etc. Our emergency planning is extensive. We work closely with local agencies and officials every year to practice a run through of our emergency action plan. The District wants to pursue additional grants in the future to expand these capabilities.		

Source: SSWD

I.6.3. Fiscal Mitigation Capabilities

Table I-10 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table I-10 SSWD's Fiscal Mitigation Capabilities

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	Federal, State, and Local grant programs have been used and continue to be sought for capital projects.

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Authority to levy taxes for specific purposes	N	
Fees for water, sewer, gas, or electric services	Y	Yes, this is the primary source of revenue for the District.
Impact fees for new development	N	
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	District can incur debt backed by user fees
Incur debt through private activities	N	
Community Development Block Grant	N	
Other federal funding programs	Y	Have not been used in the past, but could utilize infrastructure spending, FEMA hazard mitigation, BRIC, or PDM grants
State funding programs	Y	State Bond funded grant programs, IRWM, DSOD, etc. could be used.
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional grant funding could be sought. This could be FEMA, Cal OES, CA DWR, or other funding sources. The District will seek to find other avenues of funding as well.		

Source: SSWD

I.6.4. Mitigation Education, Outreach, and Partnerships

Table I-11 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table I-11 SSWD's Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	SSWD Participates in a Groundwater Sustainability Agency (GSA) within the North American Subbasin (NASb) with the primary goal being groundwater overdraft prevention. This helps with drought preparedness.
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	No	
Natural disaster or safety related school programs	No	
StormReady certification	No	
Firewise Communities certification	No	

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Public-private partnership initiatives addressing disaster-related issues	No	
Other	Yes	SSWD has an Emergency Action Plan that involves coordination with local agencies to prepare for natural disasters related to Camp Far West Reservoir
How can these capabilities be expanded and improved to reduce risk?		
Public school program regarding drought awareness or flood awareness would be beneficial. This could occur with additional revenue. This would expand capabilities and reduce risk.		

Source: SSWD

I.6.5. Other Mitigation Efforts

The District has many other completed or ongoing mitigation efforts that include the following:

SSWD has completed a major project to improve its conveyance canal to improve water use efficiency in the District and to conjunctively manage its water resources for maximum benefit. This process involved three phases, which are discussed below.

Conveyance Canal Improvement Plan

SSWD's existing main conveyance canal is approximately 21.6 miles in length and is designed to divert +410 cubic feet per second (cfs). The canal delivers water to eight principle lateral channels extending in a westerly direction so as to service nearly all the lands within SSWD by gravity. The size of the main canal is gradually reduced through the system to a capacity of 50 cfs at the terminus near Pleasant Grove Creek.

SSWD's Conveyance Canal Improvement Plan involves improvements to existing canal structures for the purpose of increasing the system capacity by approximately 23 percent (up to a total peak diversion of 505 cfs). The additional water for conveyance will be obtained from increases in diversion of stored water and water that is spilled from Camp Far West Reservoir.

The plan will involve three phases described below, which build upon the water rights settlement described above. Work on the project will progress down the existing conveyance canal: Phase I starts at the diversion dam and ends at the siphon under High 65 and the railroad, Phase II is the siphon replacement, and Phase III involves improving conveyance in laterals and canals on the downstream side of the siphon. In greater detail:

- Phase I – complete in Spring of 2003, Phase 1 involved the removal and replacement of large-diameter double corrugated metal culvert pipes along the existing Conveyance Canal (including earthwork, concrete inlet and outlet transition structures), stone protection, and surface restoration. Work also included installation of an automatic slide gate check structure, removal of existing pipes, replacement

of concrete abutments at various structures, and construction of a reinforced concrete pipe overflow for the existing Van Jop Hydroelectric Plant. The total cost for this phase was approximately $900,000.

- Phase II – An additional siphon pipe will be installed adjacent to the existing siphon at Highway 65, effectively doubling the capacity to move water in the canal under Highway 65 and the railroad. Phase II is estimated to cost $700,000 and construction is expected to begin in 2004.
- Phase III – The lateral canals and ditches, stemming from the main conveyance canal, will be enlarged and enhanced to provide additional flexibility and reliability throughout SSWD. An early cost estimate for Phase III totals $1.5 million. This is still in the planning phase as of May 2021

The estimated total project cost is $3.1 million.

Improving SSWD's Conveyance Canal will:

- Increase the flexibility, timing, and reliability of surface water supplies for SSWD.
- Replenish groundwater supplies for extraction in drier years.
- Recharge the groundwater basin to reduce the effect of declining groundwater levels.
- Provide the ability to meet additional water needs (including CALFED targeted benefits and other environmental objectives) outside of SSWD.
- Replace older conveyance structures currently in need of repair with advanced canal control technology, which will allow for increased flexibility of SSWD's system.
- Enhance SSWD's conjunctive water management activities.
- Reduce the need for cropping changes during drier water years.
- Increased power generation from hydroelectric generation/decreased usage for pumping.
- Increase water use efficiency by installing state-of-the-art water control and measurement structures that improve the accuracy and timing of flows through the system.

Relicensing of the Camp Far West Hydroelectric Project

The District is currently involved in the planning of constructing an auxiliary spillway at Camp Far West Reservoir. This auxiliary spillway will increase overall spillway capacity at the reservoir and relief pressure on Camp Far West Dam in high water events. This significantly reduces risk of dam failure/malfunction. The Auxiliary Spillway project is currently in its 90% design phase and is awaiting comments from the Federal Energy Regulatory Commission (FERC) and Department of Safety of Dams (DSoD). The District is in the process of the Federal Energy Regulatory Commission (FERC) relicensing of the powerhouse, this process can take 7 to 10 years to complete.

I.7 Mitigation Strategy

I.7.1. Mitigation Goals and Objectives

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

I.7.2. Mitigation Actions

The planning team for the SSWD 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 & Water Shortage
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Levee Failure
- Severe Weather: Heavy Rains and Storms

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

Multi-Hazard Actions

Action 1. Auxiliary Spillway

Hazards Addressed: Climate Change, Dam Failure, Drought and Water Shortage, Floods (1% and 0.2%), Localized Floods, Levee Failure, Severe Weather

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

Issue/Background: Camp Far West main spillway does not have efficient capacity for the probable maximum flood presented from FERC. Climate change is expected to make heavy rain events more severe. These events can cause flooding, dam failure, and levee failure issues.

Project Description: Relieves stress on existing spillway in high water events from heavy rains and storms. Significantly lowers risk of dam failure which lowers risk of downstream flooding and levee failure.

Other Alternatives: No action.

Existing Planning Mechanisms through which Action will be Implemented: Emergency Action Plan for Camp Far West Dam.

Responsible Office: South Sutter Water District

Priority (H, M, L): High

Cost Estimate: $12,000,000

Potential Funding: South Sutter Water District, FEMA Grants

Benefits (avoided Losses): High potential for economic disaster and loss of life for the City of Wheatland

Schedule: Estimated completion Fall 2022

Action 2. Ground Water Sustainability Agency

Hazards Addressed: Climate Change, Drought and Water Shortage

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

Issue/Background: State of CA is often in drought conditions and groundwater resources are overused in dry years.

Project Description: Closely monitor water use in the District and surrounding areas to deter groundwater overdraft. This will protect water supplies during times of drought. Climate change is thought to exacerbate drought.

Other Alternatives: No action.

Existing Planning Mechanisms through which Action will be Implemented: North American Subbasin GSA

Responsible Office: South Sutter Water District

Priority (H, M, L): H

Cost Estimate: Roughly $45,000 per year

Potential Funding: District, State Grants

Benefits (avoided Losses): Helps mitigate groundwater losses and related negative impacts to the environment and ecosystem

Schedule: ongoing