SACRAMENTO COUNTY
WATER AGENCY

Annex M Sacramento County Water Agency

M.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Sacramento County Water Agency (SCWA or District), a new participating jurisdiction to the 2021 Sacramento 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 SCWA, with a focus on providing additional details on the risk assessment and mitigation strategy for this community.

M.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 Sacramento 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 M-1. Additional details on plan participation and District representatives are included in Appendix A.

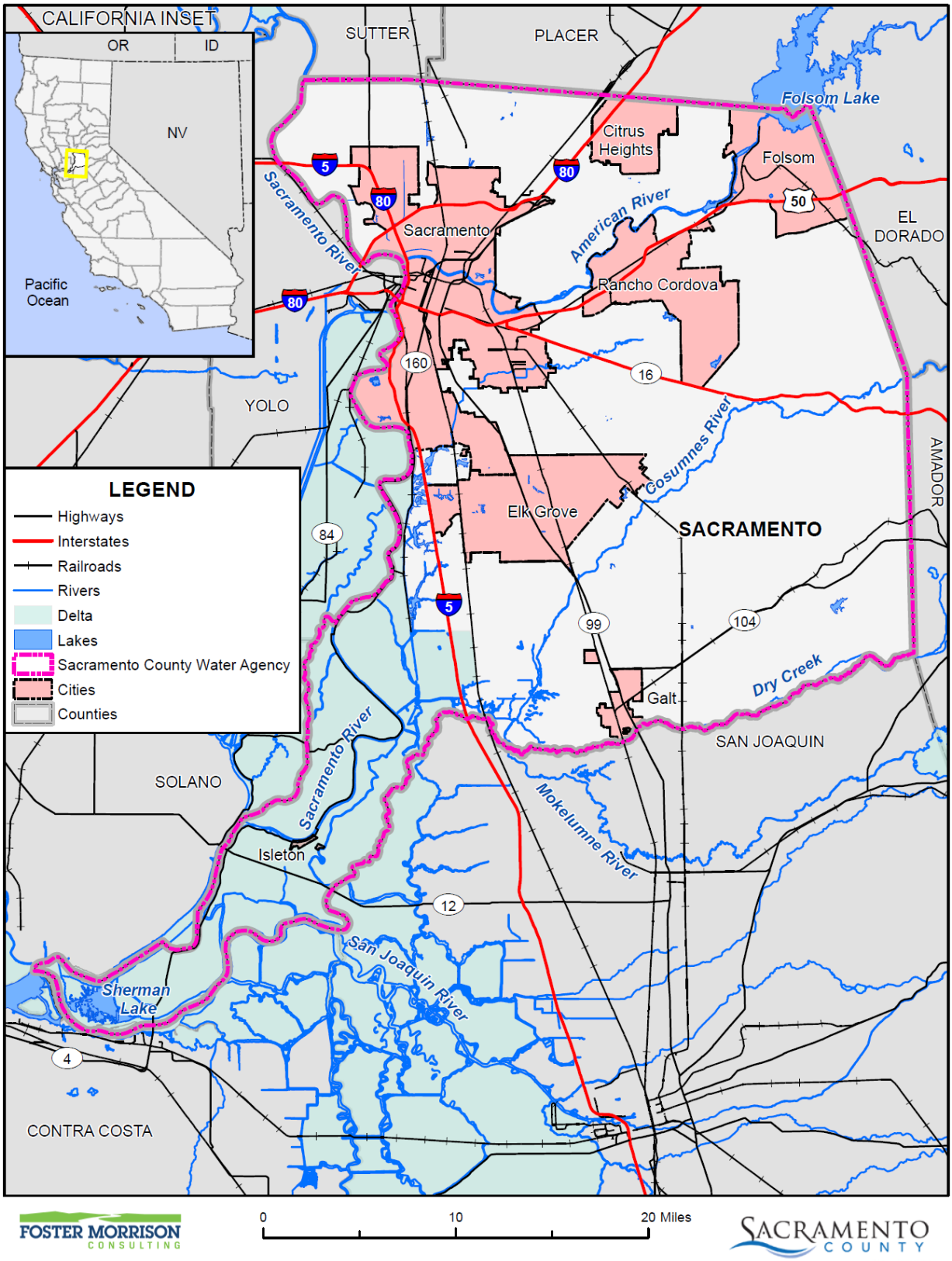
Table M-1 SCWA – Planning Team

Name	Position/Title	How Participated
Forrest Williams	Senior Engineer	Review documents, attend meetings
Carlos Smith	Associate. Engineer	Identify hazards and assets, draft text, attend meetings
Christian Bennett	Assistant Engineer	Collect and gather data, attend meetings

M.3 District Profile

The District profile for the SCWA is detailed in the following sections. Figure M-1 displays a map and the location of the District within Sacramento County.

Figure M-1 SCWA



Data Source: Sacramento County Water Agency, Sacramento County GIS, Cal-Atlas; Map Date: 04/2021.

M.3.1. Overview and Background

The Sacramento County Water Agency (SCWA) is dedicated to providing safe and reliable drinking water to over 55,000 homes and businesses in the following areas in Sacramento County:

- Laguna Vineyard (South Sacramento County)
- Mather-Sunrise
- Arden Park-Sierra Oaks
- Hood
- Northgate
- Southwest Tract
- Metro Air Park

Sacramento County Water Agency was formed in 1952 by a special legislative act of the State of California. The Sacramento County Board of Supervisors was designated to act as the ex-officio governing body or Board of Directors for SCWA. The Water Agency Act empowers the Board of Directors to create geographic zones with specific projects and benefits. Currently SCWA has the following zones:

- Zone 40 was created by the Water Agency Board of Directors on May 14, 1985 pursuant to Resolution No. 663 to fund the planning, design, and construction of major water supply facilities that benefit the Zone. Zone 40 revenue is provided from water development fees collected at the time of development and from Special User Fees included in bi-monthly water customer utility charges.
- Zone 13 was created by the Water Agency Board of Directors on May 5, 1987 to fund comprehensive long-range planning and engineering studies of flood control, water resources development, water supply management and water conservation beneficial to the Zone. Zone 13 includes all of Sacramento County excepting the cities of Sacramento, Folsom, Galt and Isleton, and its activities are funded by an annual per-parcel assessment on all real property within the Zone.
- Zone 41 was created by the Water Agency Board of Directors on June 13, 2000 pursuant to Resolution WA-2397, and constituted a reorganization of the Sacramento County Water Maintenance District. Zone 41 funds the operation and maintenance of a public drinking water system that includes water production, treatment, storage and distribution facilities, pursuant to permits issued by the California Department of Health Services. Revenue to fund Zone 41 activities is provided by utility charges, connection permit fees, construction water permits, and grants-all of which fund Water Supply Capital Facilities Design and Water Supply Facilities Operations and Administration. Zone 41 also provides wholesale water supply to the Elk Grove Water Service pursuant to the First Amended And Restated Master Water Agreement Between Sacramento County Water Agency And Florin Resources Conservation District/Elk Grove Water Service, June 28, 2002.
- Zone 50 was created by the Water Agency Board of Directors on June 1, 2004 pursuant to Resolution WA-2542. Zone 50 encompasses the Metro Air Park Special Planning Area, a commercial and industrial development adjacent to the Sacramento International Airport. Zone 50 funds certain capital facilities required to provide water supply to the Zone, as described in the Zone 50 Water Supply Master Plan adopted on October 25, 2005; Zone 50 revenue is provided from water development fees. Water for the Zone is purchased from the City of Sacramento pursuant to an October 12, 2004 Wholesale And/or Wheeling Water Service Agreement.

M.4 Hazard Identification

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

Table M-2 SCWA—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	Medium	–
Dam Failure	Limited	Occasional	Catastrophic	High	Low
Drought & Water Shortage	Extensive	Likely	Critical	High	High
Earthquake	Extensive	Occasional	Limited	High	Low
Earthquake Liquefaction	Limited	Unlikely	Limited	Low	Low
Floods: 1%/0.2% annual chance	Limited	Occasional	Catastrophic	Medium	Medium
Floods: Localized Stormwater	Limited	Occasional	Limited	Low	Medium
Landslides, Mudslides, and Debris Flow	Limited	Unlikely	Limited	Low	Medium
Levee Failure	Limited	Occasional	Critical	High	Medium
Pandemic	Extensive	Likely	Critical	Low	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Occasional	Limited	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Low	High
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Limited	Low	Medium
Severe Weather: Wind and Tornado	Extensive	Highly Likely	Limited	Low	Low
Subsidence	Limited	Unlikely	Limited	Low	Medium
Volcano	Extensive	Unlikely	Limited	Low	Low
Wildfire	Limited	Likely	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

M.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 Sacramento 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 Sacramento 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.

M.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section M.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table M-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 Sacramento County Planning Area.

M.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 SCWA'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:

> ***Any facility (a structure, infrastructure, equipment or service), that is adversely affected during a hazardous event may result in interruption of services and operations for the District at any time before, during and after the hazard event. A critical facility is classified by the following categories: (1) Essential Services Facilities, (2) At-risk Populations Facilities, (3) Hazardous Materials Facilities.***

Table M-3 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. SCWA's physical assets, valued at over $X million, consist of the buildings and infrastructure to support the District's operations. FILL OUT DISTRICT VALUES.

Table M-3 SCWA Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
FRWA Surface Water Intake Plant	Essential	TBD	Flood, Earthquake
FRWA Raw Water Pipeline	Essential	TBD	Earthquake
Vineyard Surface Water Treatment Plant	Essential	TBD	Wild Fire, Earthquake
Raw Water Treatment Plants	Essential	TBD	Flood (Levee/Dam), Earthquake, Wild Fire
Raw Water Wells	Essential	TBD	Flood (Levee/Dam), Wild Fire
Storage Tank & Booster Stations	Essential	TBD	Flood (Levee/Dam), Earthquake, Wild Fire
Direct Feed Wells	Essential	TBD	Flood (Levee/Dam)
Water Transmission Mains	Essential	TBD	Earthquake
Water Distributions Mains	Essential	TBD	Earthquake
Total		**$ 0**	

Source: SCWA

Natural Resources

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

Historic and Cultural Resources

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

Growth and Development Trends

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

Future Development

The District has limited control (water availability) over future development in areas the District services. Future development in these areas parallels that of the Sacramento County Planning Area. More general information on growth and development in Sacramento County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Sacramento County Vulnerability and Assets at Risk of the Base Plan.

The District noted that new facilities are constructed based on development demands. The 2016 Zone 40 Water System Infrastructure Plan identified new growth areas and the planned water facilities to support the new growth.

M.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table M-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 Sacramento 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 4.3.2 of the Base Plan.

The District noted no significant impacts to date. All major water production, treatment, and delivery facilities have fixed emergency standby generators. Most well sites have on site generations or portable emergency generators available. Most facilities have at least a minimum or 24-hours of continuous back up power before fuel or servicing becomes an issue.

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 4.3.2 of the Base Plan. The District has not been affected by PSPS events to date.

Climate Change

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

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, Sacramento 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 Sacramento 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. Sacramento 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 Sacramento County Planning Area.

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

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

Decreased precipitation and reduced snowpack leads to reduced/limited surface water availability. SCWA operates on a surface water/ground water conjunctive use program. Dry years further stress the ground water basin.

Assets at Risk

The District noted that most facilities will most likely not be at risk from climate change. ? The FRWA intake and pipeline facilities and Vineyard surface water treatment plant rely solely on the availability of Sacramento River water. Reduced snow pack and runoff minimizes the use of these major facilities.

Dam Failure

Likelihood of Future Occurrence–Occasional
Vulnerability–High

Hazard Profile and Problem Description

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

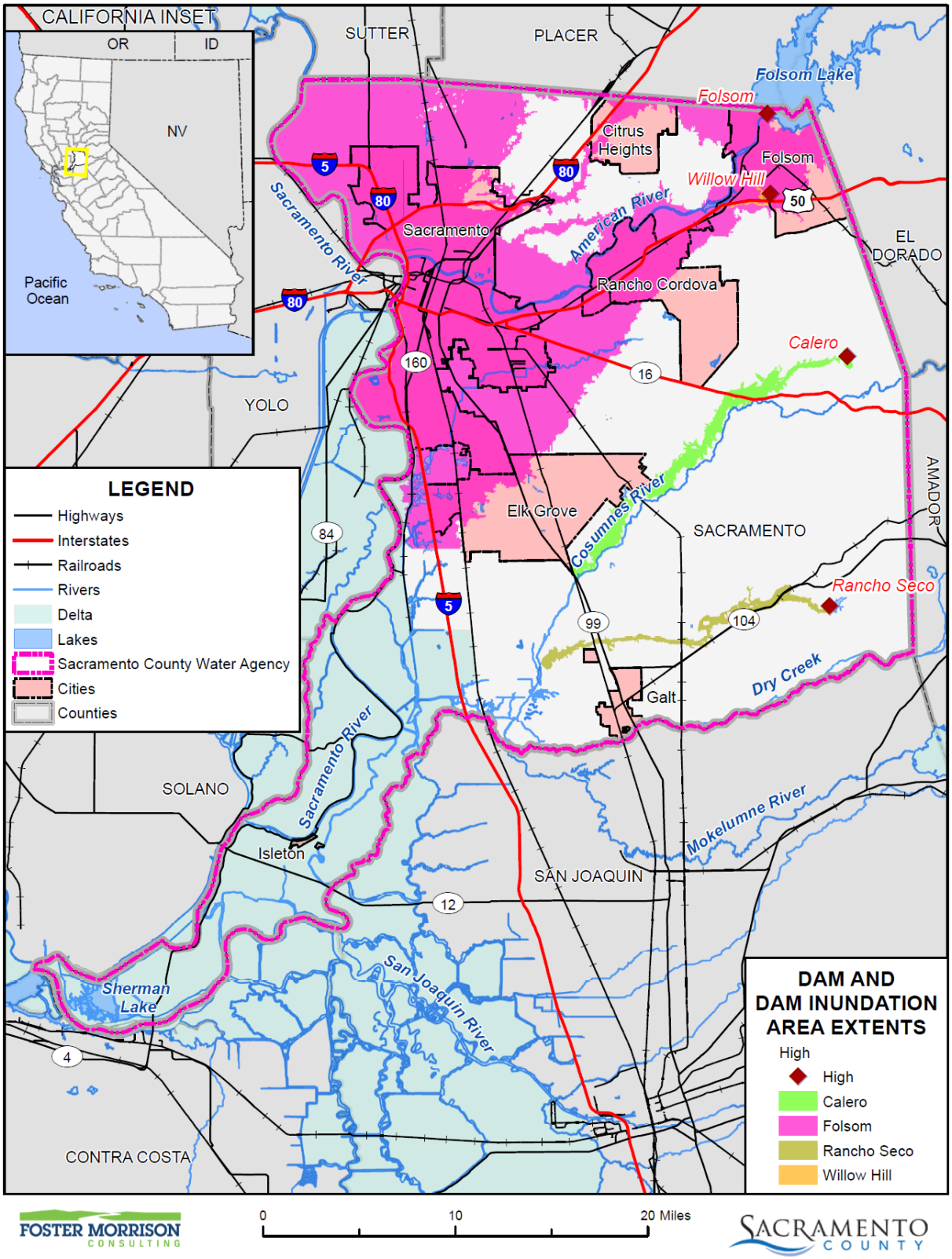
Location and Extent

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.

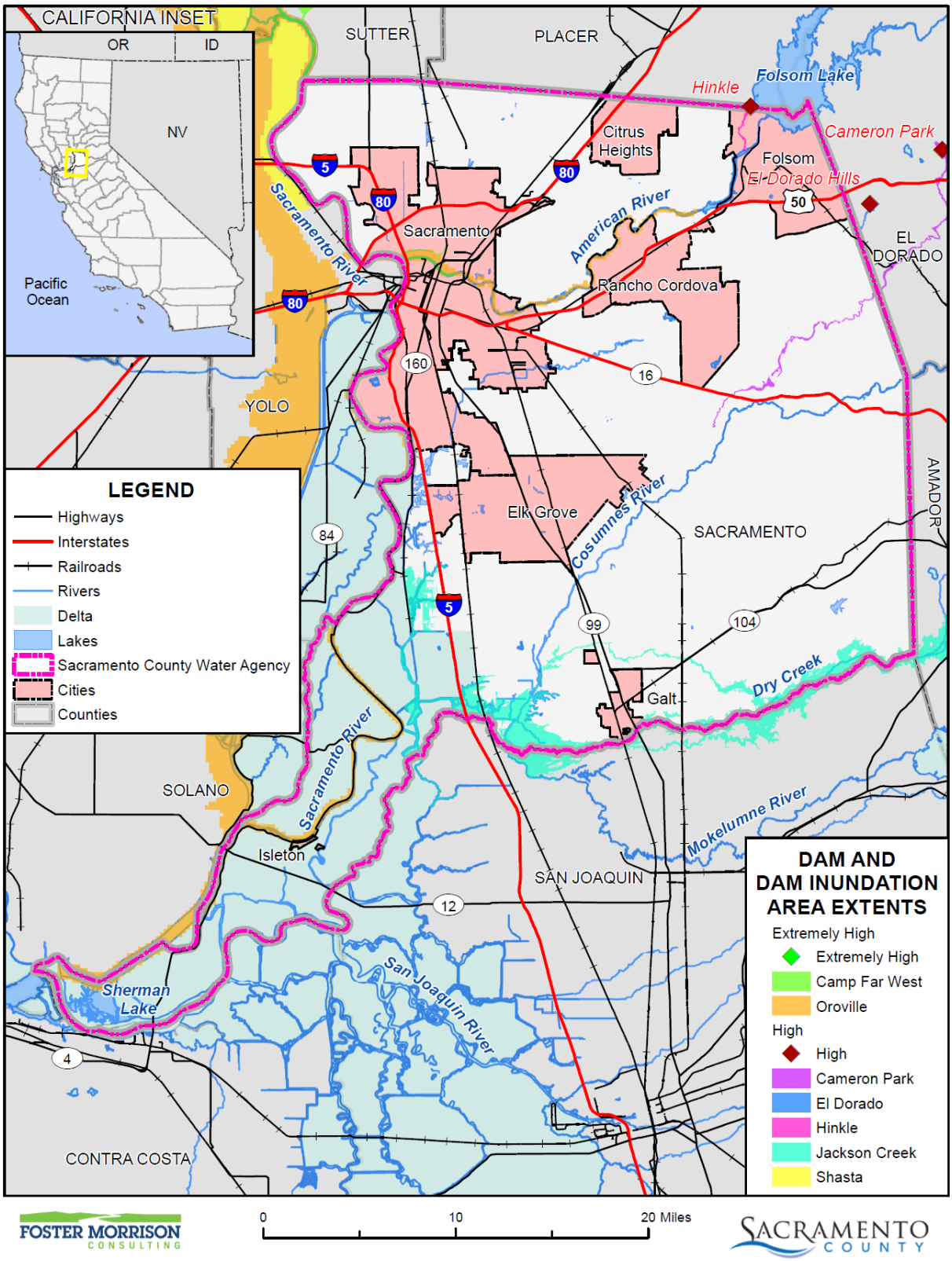
Dams inside the County that can affect the District can be seen on Figure M-2. Dams outside the County that can affect the District can be seen on Figure M-3. The Folsom Dam 235,000 cfs release is shown on Figure M-4. While Figure M-2 and Figure M-3 illustrate dam inundation areas from an actual dam failure, Figure M-3, the Folsom 235,000 cfs scenario reflects the likely inundation area associated with a possible "super" release of water from Folsom. This updated Folsom scenario reflects the Folsom dam improvements which make a dam failure unlikely, with any resulting downstream inundation from Folsom associated with an intentional release of water from the dam. It is anticipated that the worst case scenario would be a 235,000 cfs release, which is comparable to a 200-year flood.

Figure M-2 SCWA – Dam Inundation Areas from Dams Inside the County



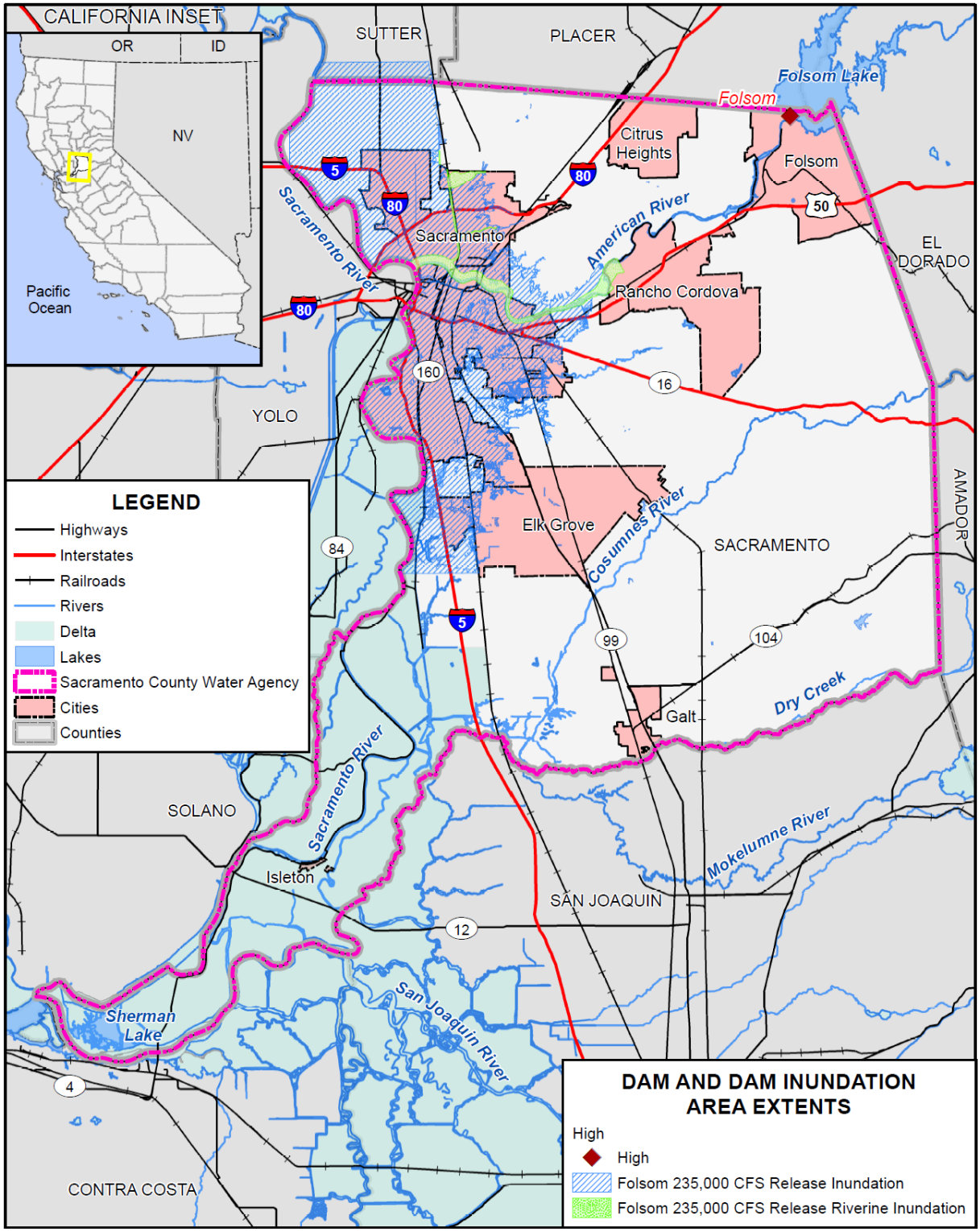
Data Source: County-provided dam inundation data (FOLSOM_DAM_INUNDATION_AREA.shp 2016), DWR DSOD Data 2020 and Cal OES Dam Status 10/2017, Sacramento County GIS, Cal-Atlas; Map Date: 04/2021.

Figure M-3 SCWA – Dam Inundation Areas from Dams Outside the County



Data Source: DWR DSOD Data 2020 and Cal OES Dam Status 10/2017, Sacramento County Water Agency, Sacramento County GIS, Cal-Atlas; Map Date: 04/2021.

Figure M-4 SCWA – Folsom Dam 235,000 cfs Scenario



Data Source: County-provided dam inundation data (CA_DWR_200YEAR_FLOODPLAIN.zip 2020), DWR DSOD Data 2020, Sacramento County GIS, Cal-Atlas; Map Date: 04/2021.

Past Occurrences

There has been no federal or state disaster declarations for dam failure in the County. The District noted no other dam failure occurrences that have affected the District.

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.

All water facilities serving the Metro Air Park and Northgate industrial service areas would be inundated and forced to shut down operations until floodwaters recede – catastrophic impacts. Equipment replacements most likely needed.

Three (3) direct feed water wells in the Arden Park Vista service area would be inundated and forced to shut down operations until floodwaters recede. Equipment replacements most likely needed. Loss of the 3 wells sites would be critical to the operation of the west end of water system, however provide all of the other water system wells sites are operational sufficient water supply is expected at reduced water pressures. Emergency inter-ties with adjacent water purveyors exist.

Zone 40 North Service Area – Mather main base water facilities are located on the edge of the flood inundation boundary. Insufficient information at this time to determine the extent of flood damage and impacts to the operations of the water facilities. Other nearby water facilities would be operational.

Zone 40 South Service Area - all facilities west of the UPRR tracks would be inundated and forced to shut down operations until floodwaters recede. Insufficient information at this time to determine the extent of flood damage and repairs needed to the water facilities. The Dwight Rd WTP and several well sites are also within the flood inundation boundary. Damage to these facilities is also expected. Other nearby water facilities would be operational to supply water to the area but at reduced water pressures.

The District also would be impacted by the loss of access to remote water facilities

Assets at Risk

The District noted the following assets at risk

- Arden Park Vista Service Area: 3 Direct Feed Wells.
- Zone 40 South Service Area: All water facilities west of the UPRR tracks, Dwight Rd WTP, several well sites.
- Zone 40 North Service Area: All water facilities on Mather main base area.
- Northgate Service Area: All water facilities (direct feed wells).
- Metro Air Park: All water facilities

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 two state and one federal disaster declaration due to drought since 1950. This can be seen in Table M-4.

Table M-4 Sacramento County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	2	2008, 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.

The District noted no specific physical damages but impacts (reduced use) to the operations of surface water facilities and reliance on more use of groundwater resources or water transfers. Water restrictions leads to reduced revenue for the District.

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 Public Safety Power Shutoff (PSPS) events to be declared in the County. More information on power outage and failure can be found in the discussion at the beginning of Section M.5.3, as well as in Section 4.3.3 of the Base Plan.

Declared water shortage/drought events trigger the implantation of the Sacramento County Water Agency Water Shortage Contingency Plan (ver 4-19-21) – water restrictions.

Assets at Risk

The FRWA intake and pipeline facilities and Vineyard surface water treatment plant rely solely on the availability of Sacramento river water. Reduced surface water allocations minimize the use of these major facilities.

Earthquake

Likelihood of Future Occurrence–Occasional
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). Seismologists have developed several magnitude scales, as discussed in Section 4.3.9 of the Base Plan. Geological literature indicates that no major active faults transect the County; however, there are several subsurface faults in the Delta. The Midland fault, buried under alluvium, extends north of Bethel Island in the Delta to the east of Lake Berryessa and is considered inactive but possibly capable of generating a near 7.0 (Richter Scale) earthquake. This magnitude figure is speculative based on a 1895 earthquake measuring 6.9 on the Richter Scale with an epicenter possibly in the Midland Fault vicinity. However, oil and gas companies exploring the area's energy potential have identified several subsurface faults, none of which show any recent surface rupture. A second, presumably inactive, fault is in the vicinity of Citrus Heights near Antelope Road. This fault's only exposure is along a railroad cut where offsetting geologic beds can be seen. Neither the lateral extent of the trace, the magnitude of the offset, nor the age of faulting has been determined. To the east, the Bear Mountain fault zone trends northwest-southeast through Amador and El Dorado Counties. Geologists believe this series of faults has not been active in historic time.

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 Sacramento 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 be 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

The combination of plate tectonics and associated California coastal mountain range building geology generates earthquake as a result of the periodic release of tectonic stresses. Sacramento County lies in the center of the North American and Pacific tectonic plate activity. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future of the California north coastal mountain region.

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 SCWA 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.

There is a limited impact on operations. A majority of the water system facilities are built after year 2000 and designed and construction to the latest seismic standards. Water production/treatment/stoarage facilites are open space facilities with most process equipment and tanks exposed, not housed in buildings. Most sites are unmanned. There is potential widespread / long-term loss of electrical power may affect the ability to operate all necessary water facilities with back up emergency generators. Access to remote facilities could be hampered.

Assets at Risk

The District noted the following assets at risk:

- Elevated water storage tanks in the North Service Area (Mather) need seismic retrofitting improvements. At risk of failure during a major earthquake event.
- Water transmission mains and distribution mains – potential pipe joint separation resulting in water leakage

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–Medium

Hazard Profile and Problem Description

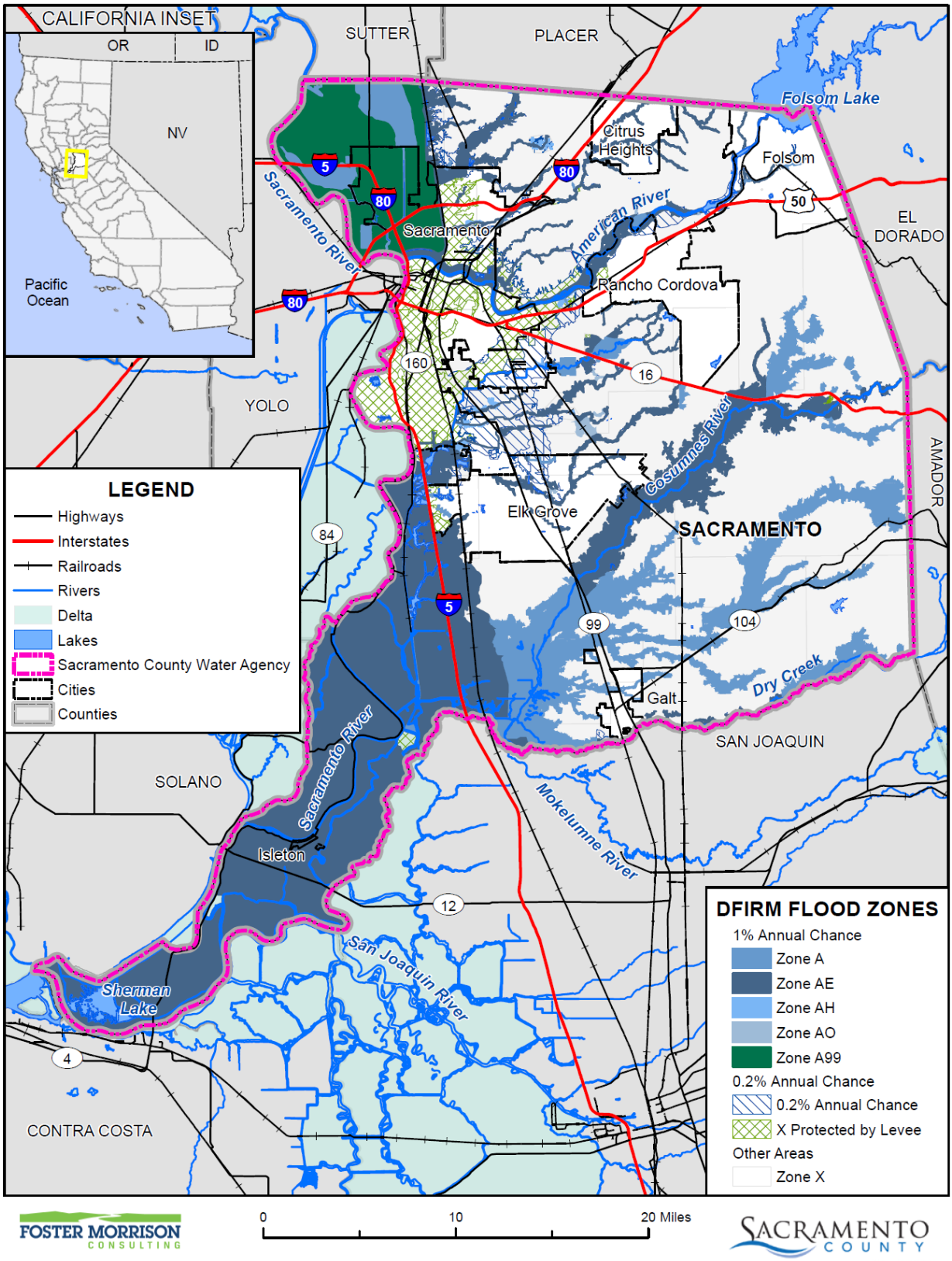
This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the District, and have caused damages in the past. Flooding is a significant problem in Sacramento County and the District. Historically, the District has been at 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 4.3.11 of the Base Plan, the Sacramento County Planning Area and the SCWA have been subject to historical flooding.

Location and Extent

The SCWA has areas located in the 1% and 0.2% annual chance floodplain. This is seen in Figure M-5.

Figure M-5 SCWA – FEMA DFIRM Flood Zones



Data Source: FEMA NFHL 07/19/2018, Sacramento County Water Agency, Sacramento County GIS, Cal-Atlas; Map Date: 04/2021.

Table M-5 details the DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the District.

Table M-5 SCWA– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone Present in the District
A	100-year Flood: No base flood elevations provided	X
AE	100-year Flood: Base flood elevations provided	X
AH	An area inundated by 1% annual chance flooding (usually an area of ponding), for which BFEs have been determined; flood depths range from 1 to 3 feet	X
AO	Areas subject to inundation by 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet	X
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones	X
Shaded X	500-year flood the areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	X
X Protected by Levee	An area determined to be outside the 500-year flood and protected by levee from 100-year flood	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 Sacramento County from flooding is shown on Table M-6. These events also likely affected the District to some degree.

Table M-6 Sacramento 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)	19	1950, 1955, 1958 (twice), 1963, 1969, 1982 (twice), 1983, 1986, 1995 (twice), 1996, 1997, 1998, 2008, 2017 (three times)	14	1955, 1958, 1964, 1969, 1983, 1986, 1995 (twice), 1997, 1998, 2006, 2017 (three times)

Source: Cal OES, FEMA

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.

Regional and local flooding may affect access to certain water facilities.

Assets at Risk

WHAT DISTRICT ASSETS (FROM Table M-3) ARE AT RISK FROM THIS HAZARD?

Levee Failure

Likelihood of Future Occurrence–Occasional
Vulnerability–High

Hazard Profile and Problem Description

A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower 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

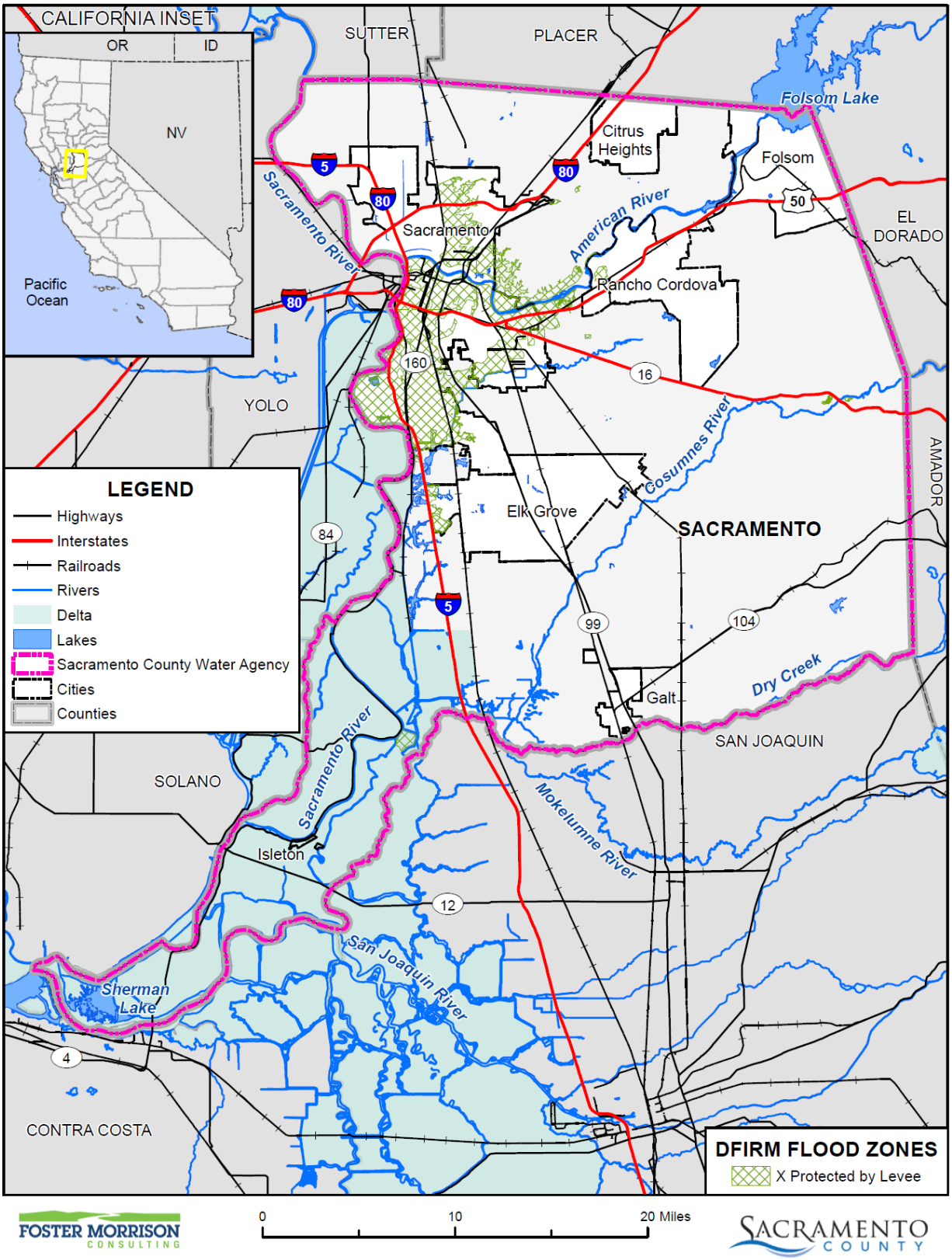
eliminate, the risk to individuals and structures located behind them. A levee system failure or overtopping can create severe flooding and high water velocities. Levee failure can occur through overtopping or from seepage issues resulting from burrowing rodents, general erosion, excessive vegetation 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.

Location of areas protected by areas are shown on Figure M-6.

Figure M-6 SCWA – DFIRM X Protected by Levee Areas



Data Source: FEMA NFHL 07/19/2018, Sacramento County Water Agency, Sacramento County GIS, Cal-Atlas; Map Date: 04/2021.

Past Occurrences

There have been no federal or state disaster declarations from levee failure. 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.

The District note that access to remote water facilities may be hampered.

Assets at Risk

The District noted the following assets at risk:

- All water facilities serving the Metro Air Park and Northgate industrial service areas are at risk of potential flood inundation due to levee failure (Zone A99) requiring shut down of all operations until floodwaters recede. Equipment replacements most likely needed.
- Three (3) direct feed water wells in the Arden Park Vista service area are at risk of potential flood inundation due to levee failure (Zone X / Protected by Levee) and force shut down of well operations until floodwaters recede. Equipment replacements most likely needed. Loss of the 3 wells sites would be critical to the operation of the west end of water system, however provide all of the other water system wells sites are operational sufficient water supply is expected at reduced water pressures. Emergency inter-ties with adjacent water purveyors exist.
- Zone 40 South Service Area – Two (2) raw water wells near I-5 are at risk of potential flood inundation due to levee failure (Zone X / Protected by Levee) and may force shut down of well operations until floodwaters recede.

M.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.

M.6.1. Regulatory Mitigation Capabilities

Table M-7 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 SCWA.

Table M-7 SCWA 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	N/A	
Capital Improvements Plan	N/A	
Economic Development Plan	N/A	
Local Emergency Operations Plan	N/A	
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	2020 Urban Water Management Plan Sacramento County Water Agency Water Shortage Contingency Plan SCWA Emergency Response Plan SCWA Risk and Resilience Assessments ZONE 40 WATER SUPPLY MASTER PLAN Zone 40 Water System Infrastructure Plan
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	N/A
Other	
How can these capabilities be expanded and improved to reduce risk?	
The District will look to expand upon existing plans to reduce hazard risks in the future.	

Source: SCWA

M.6.2. Administrative/Technical Mitigation Capabilities

Table M-8 identifies the District department(s) responsible for activities related to mitigation and loss prevention in SCWA. FILL OUT TABLE – ONLY SOME OF IT WILL APPLY TO YOU. FILL OUT WHAT YOU CAN. TRY TO FILL OUT THE LAST COLUMN AS YOU ARE ABLE. MAKE SURE TO FILL OUT THE LAST CELL.

Table M-8 SCWA's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission		
Mitigation Planning Committee		
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)		
Mutual aid agreements		
Other		
Staff	**Y/N FT/PT**	**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Chief Building Official		
Floodplain Administrator		
Emergency Manager		
Community Planner		
Civil Engineer		
GIS Coordinator		
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)		
Hazard data and information		
Grant writing		
Hazus analysis		
Other		

How can these capabilities be expanded and improved to reduce risk?
PROVIDE SPECIFIC DETAILS OF AREAS FOR IMPROVEMENT OF THESE TYPES OF CAPABILITIES AND HOW/WHY IT WILL HELP THE DISTRICT

Source: SCWA

M.6.3. Fiscal Mitigation Capabilities

Table M-9 identifies financial tools or resources that the District could potentially use to help fund mitigation activities. FILL OUT TABLE – ONLY SOME OF IT WILL APPLY TO YOU. FILL OUT WHAT YOU CAN. TRY TO FILL OUT THE LAST COLUMN AS YOU ARE ABLE. MAKE SURE TO FILL OUT THE LAST CELL.

Table M-9 SCWA'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		
Authority to levy taxes for specific purposes		
Fees for water, sewer, gas, or electric services		
Impact fees for new development		
Storm water utility fee		
Incur debt through general obligation bonds and/or special tax bonds		
Incur debt through private activities		
Community Development Block Grant		
Other federal funding programs		
State funding programs		
Other		
How can these capabilities be expanded and improved to reduce risk?		
PROVIDE SPECIFIC DETAILS OF AREAS FOR IMPROVEMENT OF THESE TYPES OF CAPABILITIES AND HOW/WHY IT WILL HELP THE DISTRICT		

Source: SCWA

M.6.4. Mitigation Education, Outreach, and Partnerships

Table M-10 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. FILL OUT TABLE – ONLY SOME OF IT WILL APPLY TO YOU. FILL OUT WHAT YOU CAN. TRY TO FILL OUT THE LAST COLUMN AS YOU ARE ABLE. MAKE SURE TO FILL OUT THE LAST CELL.

Table M-10 SCWA'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.		
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)		
Natural disaster or safety related school programs		
StormReady certification		
Firewise Communities certification		
Public-private partnership initiatives addressing disaster-related issues		
Other		
How can these capabilities be expanded and improved to reduce risk?		
PROVIDE SPECIFIC DETAILS OF AREAS FOR IMPROVEMENT OF THESE TYPES OF CAPABILITIES AND HOW/WHY IT WILL HELP THE DISTRICT		

Source: SCWA

M.6.5. Other Mitigation Efforts

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

- ANYTHING NOT CAPTURED ABOVE?

CAN THE DISTRICT PROVIDE A LIST OF MITIGATION TYPE PROJECTS/ACTIVITIES CONDUCTED BY THE DISTRICT?

M.7 Mitigation Strategy

M.7.1. Mitigation Goals and Objectives

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

M.7.2. Mitigation Actions

The planning team for the SCWA 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
- Earthquake
- Floods: 1%/0.2% annual chance
- Levee Failure

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.

WILL NEED MITIGATION ACTIONS RELATED TO THE ABOVE BULLETED LIST. REMEMBER THAT ONE ACTION CAN MITIGATE MORE THAN ONE HAZARD. ALL HAZARDS IN THE LIST ABOVE NEED TO BE A HAZARD ADDRESSED IN AT LEAST ONE MITIGATION ACTION.

Multi-Hazard Actions

Action 1.

Hazards Addressed:

Goals Addressed:

Issue/Background:

Other Alternatives:

Existing Planning Mechanisms through which Action will be Implemented:

Responsible Office:

Priority (H, M, L):

Cost Estimate:

Potential Funding:

Benefits (avoided Losses):

Schedule: