



Annex P Sacramento Area Sewer District

P.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Sacramento Area Sewer District (SASD or District), a previously participating jurisdiction to the 2016 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 SASD, with a focus on providing additional details on the risk assessment and mitigation strategy for this District.

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

Table P-1 SASD – Planning Team

Name	Position/Title	How Participated
Michael Redfern	Sr. Safety Specialist	Attended planning meetings, collected information, completed documents

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the District integrated the previously approved 2016 Plan into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2016 LHMP through other plans and programs shown in Table P-2.

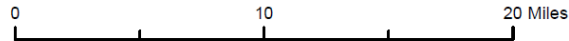
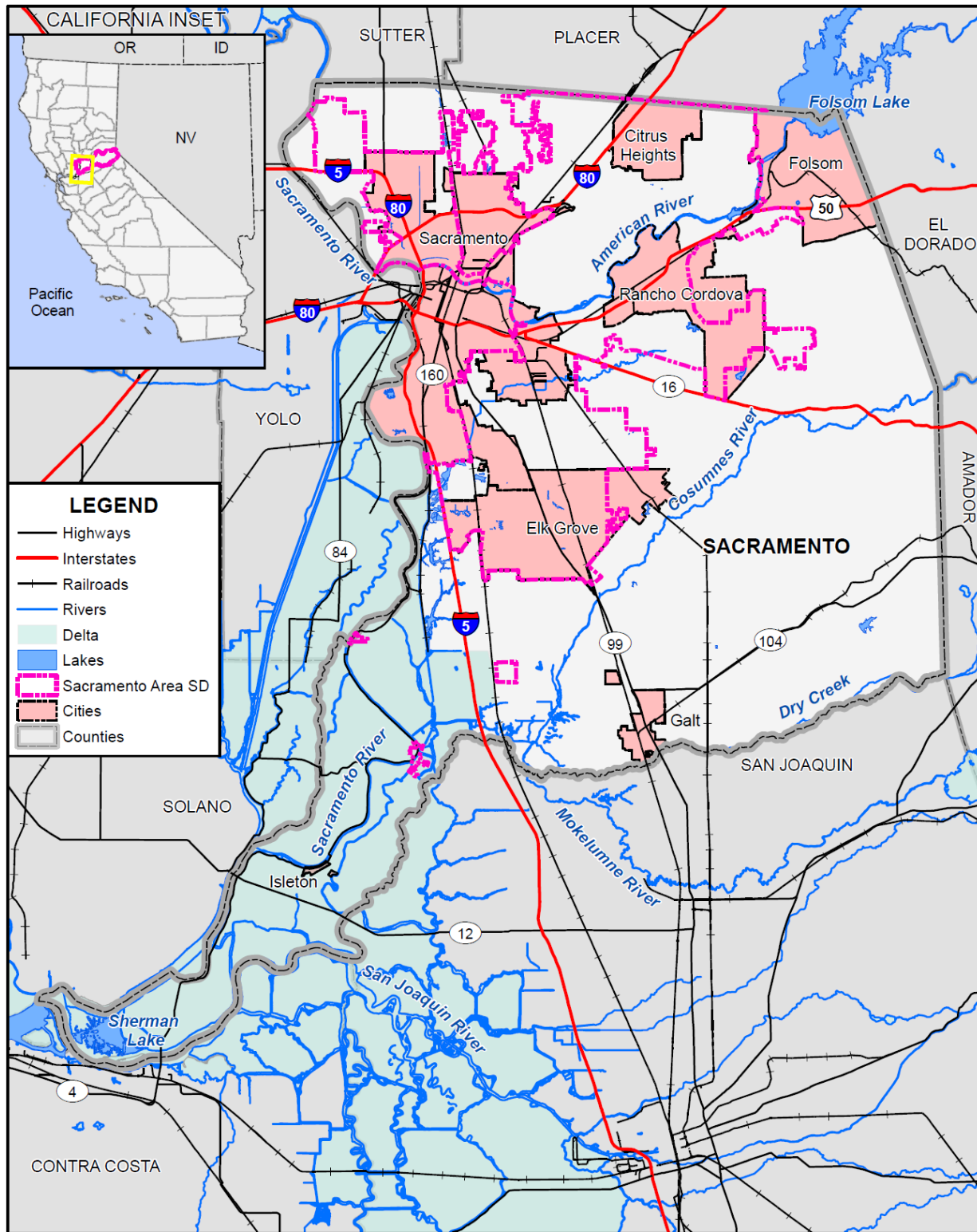
Table P-2 2016 LHMP Incorporation

Planning Mechanism 2016 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
N/A	No mitigation related planning mechanisms have been completed since 2016.

P.3 District Profile

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

Figure P-1 SASD



Data Source: Sacramento Area Sewer District, Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

P.3.1. Overview and Background

The SASD is a sewer utility providing service to more than one million people in the Sacramento region, including the unincorporated areas of Sacramento County; the cities of Citrus Heights, Rancho Cordova, and Elk Grove; as well as portions of the cities of Folsom and Sacramento. The District serves residential, commercial and industrial customers.

SASD owns and operates thousands of miles of lower lateral and main line pipes and is responsible for the day-to-day operations and maintenance of these sewer pipes. Once collected in the system, sewage flows into the Regional San interceptor system, where it is conveyed to the Sacramento Regional Wastewater Treatment Plant near Elk Grove.

SASD was formed in 1978 and is governed by a 10-member Board of Directors representing the various city and county jurisdictions in the District's service area.

P.4 Hazard Identification

SASD identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table P-3).

Table P-3 SASD—Hazard Identification Assessment

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

P.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.

P.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section P.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table P-3) 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.

P.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 SASD'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, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.

A critical facility is classified by the following categories: (1) Essential Services Facilities, (2) At-risk Populations Facilities, (3) Hazardous Materials and Solid Waste Facilities.

Table P-4 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. SASD's physical assets, valued at over \$6 billion, consist of the buildings and infrastructure to support the District's operations.

Table P-4 SASD Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
SACY	Essential	\$60,600,000	Minimal flood, airplane crash, fire
NACY	Essential	\$26,800,000	Minimal flood, fire
Main Lines	Essential	\$2,930,400,000	Minimal earthquake
Lower Laterals	Essential	\$2,335,753,000	Minimal earthquake
Manholes	Essential	\$647,695,000	Minimal earthquake
Pump Stations	Essential	\$97,200,000	Minimal fire, flood, earthquake
Total		\$6,098,448,000	

Source: SASD

Natural Resources

SASD has a variety of natural resources of value to the District. The District Planning Team noted Sacramento River, American River, creek habitats, and vernal pools are natural resources located in District boundaries. 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

SASD has a variety of historic and cultural resources of value to the District. T The District Planning Team noted the City of Locke as a historic resource. 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.

Development since 2016

Several new sewer pump stations have been constructed since 2016 but have not been constructed in identifiable hazard areas that are different than current pump station hazards. As such, a change in vulnerability is unlikely.

Future Development

The District has no control 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.

P.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table P-3 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 Sacramento Area Sewer District has stationary and portable generators that allow for operation of critical facilities in the event of a power outage.

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 Sacramento Area Sewer District has not been affected by a PSPS event to date and has stationary and portable generators to power critical facilities in the event of a PSPS.

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. 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.

During the past drought in 2012-2016, the SASD Five Year Strategic Plan noted that the District faced issues related to climate change. Lower flows increase the risk of debris stoppages, odor issues, and root intrusion in the collection system. Additionally, heavy storm cycles can lead to pump station power outages

and system surcharges. Both too little and too much water in the sewer system create challenges that need to be strategically considered with long-term planning.

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

Assets at Risk

The District noted that its facilities will most likely not be at risk from climate change.

Dam Failure

Likelihood of Future Occurrence–Unlikely

Vulnerability–Medium

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.

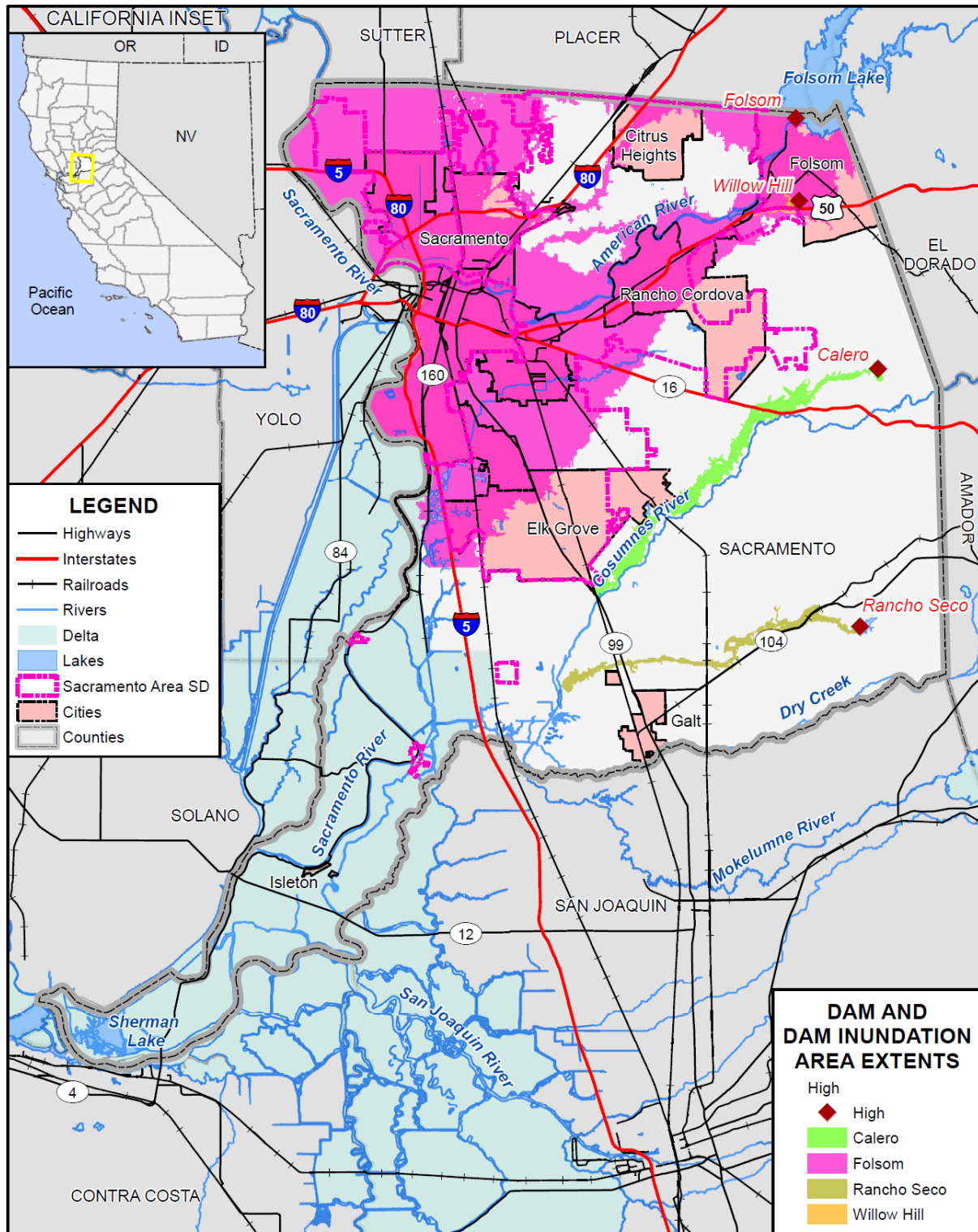
Location and Extent

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.

Based on dam inundation data obtained from CA DWR and Cal OES the was discussed in Section 4.3.7 of the Base Plan, dams inside the County that can affect the District can be seen on Figure P-2. Dams outside the County that can affect the District can be seen on Figure P-3. The District has areas that fall in the Folsom Dam 235,000 cfs scenario that can be seen on Figure P-4. While Figure P-2 and Figure P-3 illustrate dam inundation areas from an actual dam failure, Figure P-4, 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 P-2 SASD – Dam Inundation Areas from Dams Inside the County



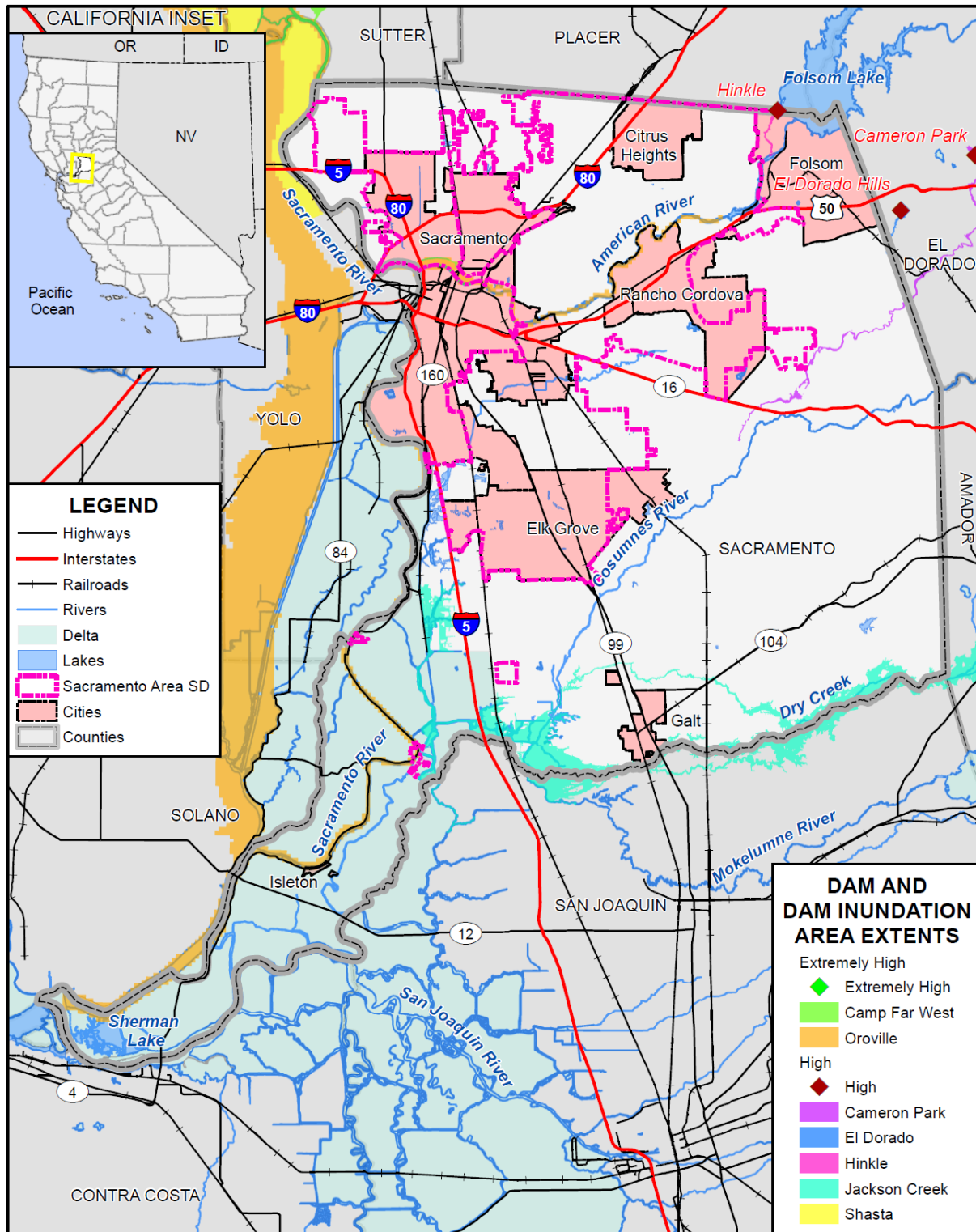
FOSTER MORRISON CONSULTING

0 10 20 Miles

SACRAMENTO 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: 03/2021.

Figure P-3 SASD – Dam Inundation Areas from Dams Outside the County

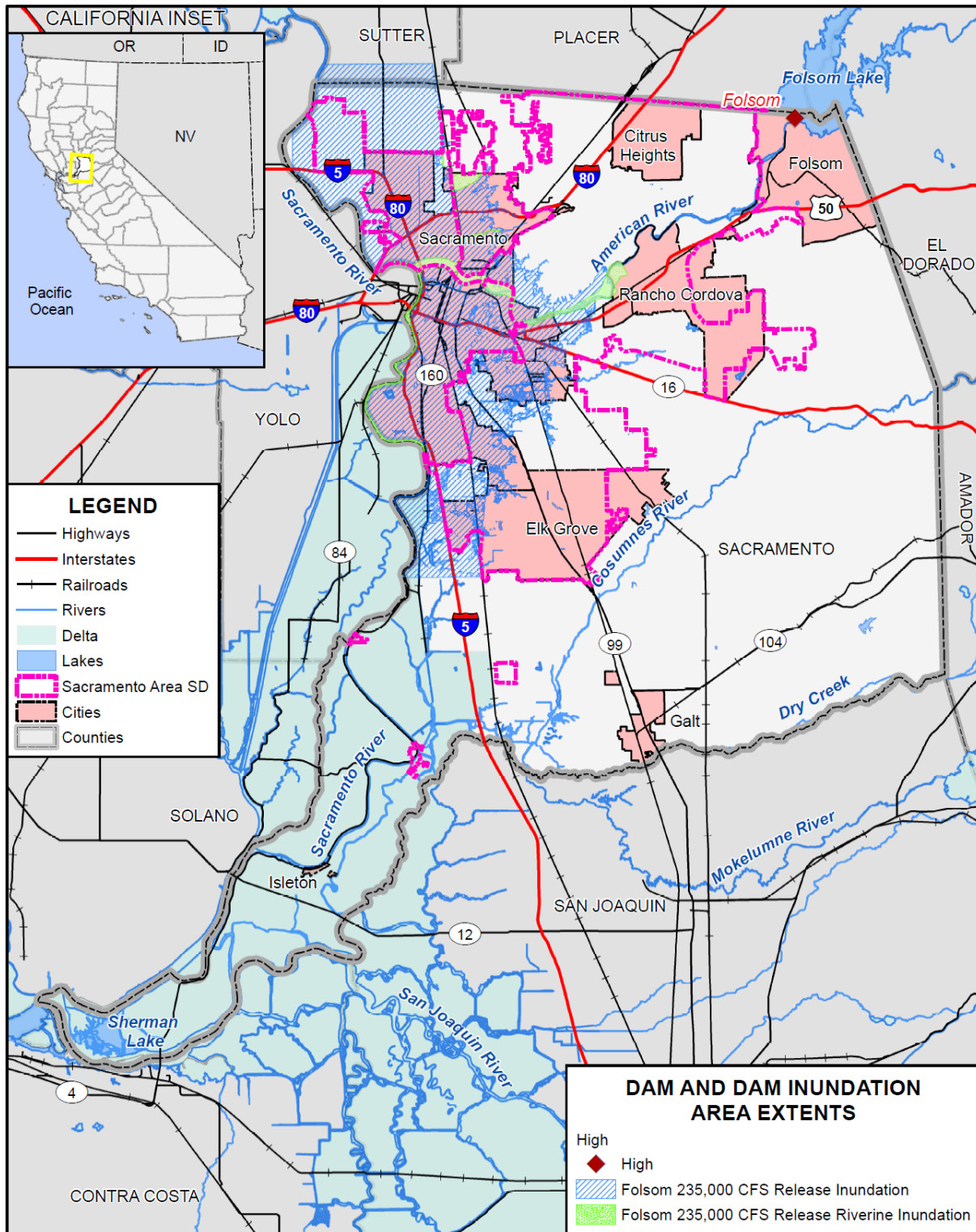


0 10 20 Miles



Data Source: DWR DSOD Data 2020 and Cal OES Dam Status 10/2017, Sacramento Area Sewer District, Sacramento County GIS, Cal-Atlas; Map Date: 03/2021.

Figure P-4 SASD – Dam Inundation Areas from Folsom 235,000 cfs Scenario



0 10 20 Miles



Data Source: County-provided dam inundation data (CA_DWR_200YEAR_FLOODPLAIN.zip 2020), DWR DSOD Data 2020, Sacramento County GIS, Cal-Atlas; Map Date: 03/2021.

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.

Folsom Dam is the major dam which affects the SASD and the populations in the inundation areas. Folsom Dam is owned by the US Bureau of Reclamation. The flood waters from a dam failure would likely affect the SASD's service area. Flood waters could inundate sewer pump stations, regional collector pipes, underground structures, and equipment, resulting in the inability to access or operate SASD's facilities within the flooded areas. A severe flood could jeopardize the operation of the regional sewer treatment plant. Access to the regional sewer treatment plant, affected pipe systems and pump station facilities to assess and restore operation could be limited until such time that the flood waters receded.

Assets at Risk

SASD assets at risk are sewer pump stations, main lines, lower laterals, and operational facilities.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence—Occasional/Unlikely

Vulnerability—High

Hazard Profile and Problem Description

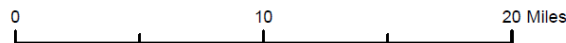
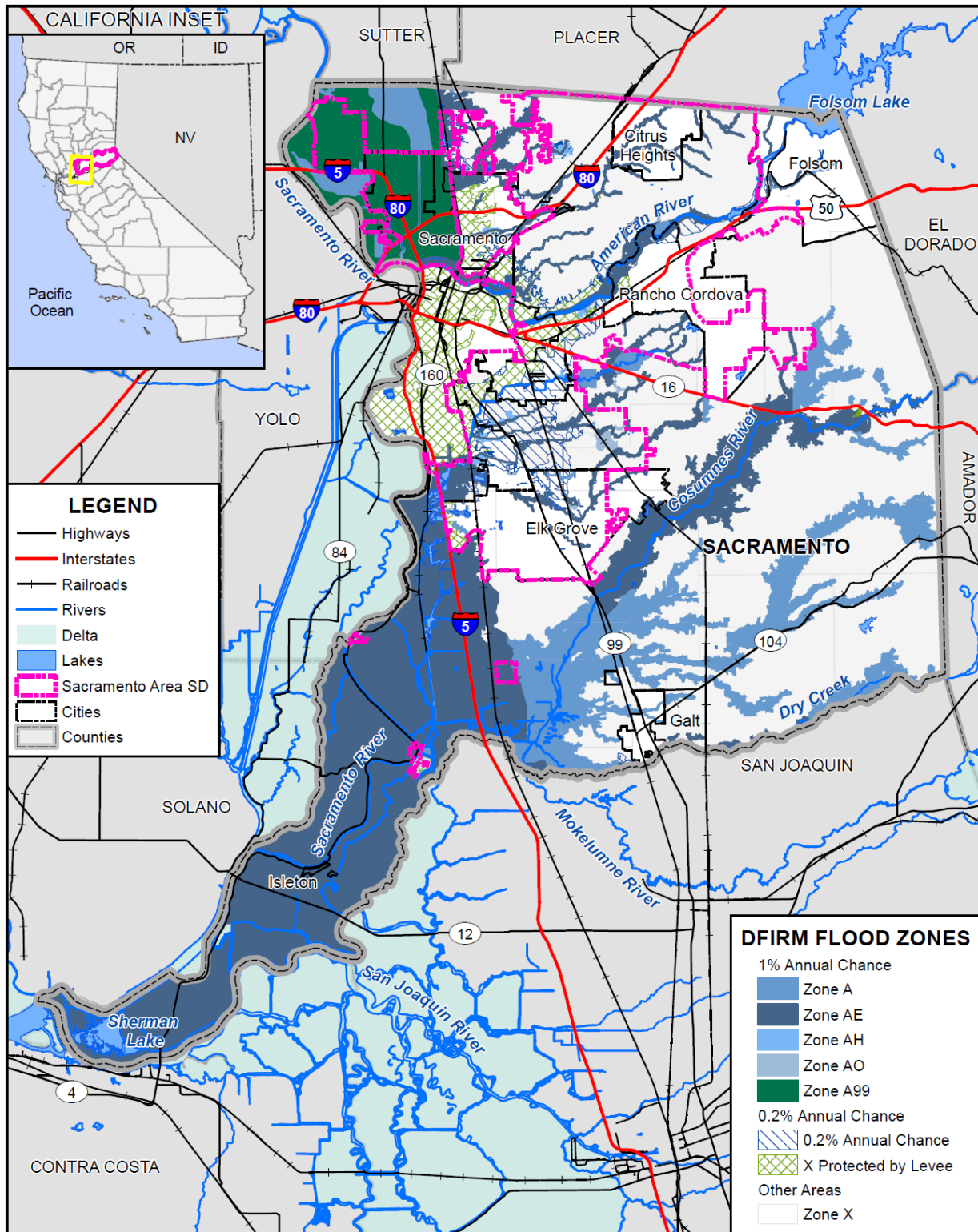
This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the District, and have caused damages in the past. Flooding is a significant problem in Sacramento County and the District. Historically, the District has been at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

Location and Extent

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

Figure P-5 SASD – FEMA DFIRM Flood Zones



Data Source: FEMA NFHL 07/19/2018, Sacramento Area Sewer District, Sacramento County GIS, Cal-Atlas; Map Date: 03/2021.

Table P-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 P-5 SASD– 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
X (unshaded)	Outside of Flood Zone	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 P-6. These events also likely affected the District to some degree.

Table P-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

Flood events since 2016 have not negatively impacted SASD facilities.

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.

Assets at Risk

SASD assets at risk from this hazard are pump stations and manholes.

Levee Failure

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

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

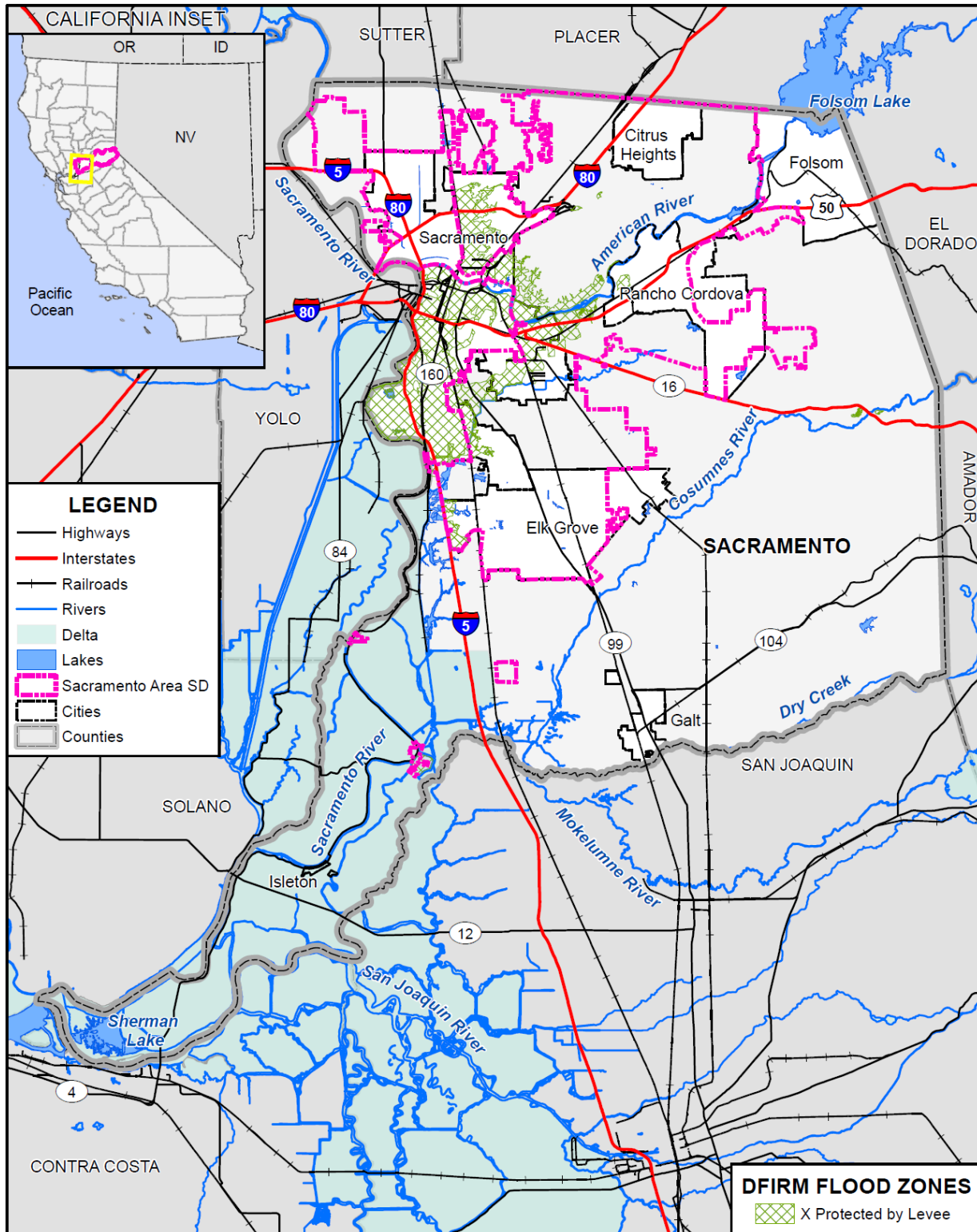
Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce, 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. Levees in the District are shown on Figure P-6.

Figure P-6 SASD – Levee Protected Areas



Data Source: FEMA NFHL 07/19/2018, Sacramento Area Sewer District, Sacramento County GIS, Cal-Atlas; Map Date: 03/2021.

Past Occurrences

There have been no federal or state disaster declarations from levee failure. SASD does not have a documented history of impacts, damages or costs associated with previous levee failure in the Sacramento region.

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.

SASD pump stations may be offline and unable to function when flooded. Once flood waters recede, pump stations will be evaluated and returned to service.

Assets at Risk

Pump stations and manholes along the American levee system.

Pandemic

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

According to the World Health Organization (WHO), a disease epidemic occurs when there are more cases of that disease than normal. A pandemic is a worldwide epidemic of a disease. A pandemic may occur when a new virus appears against which the human population has no immunity. A pandemic occurs when a new virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in a very short time. The U.S. Centers for Disease Control and Prevention has been working closely with other countries and the WHO to strengthen systems to detect outbreaks of that might cause a pandemic and to assist with pandemic planning and preparation. An especially severe a pandemic could lead to high levels of illness, death, social disruption, and economic loss.

Location and Extent

During a pandemic, the whole of the District, County, and surrounding region is at risk, as pandemic is a regional, national, and international event. The speed of onset of pandemic is usually short, while the duration is variable, but can last for more than a year as shown in the 1918/1919 Spanish Flu. There is no scientific scale to measure the magnitude of pandemic. Pandemics are usually measured in numbers affected by the pandemic, and by number who die from complications from the pandemic.

Past Occurrences

There has been one state and federal disaster declaration due to pandemic, as shown in Table P-7.

Table P-7 Sacramento County – State and Federal Pandemic Disaster Declarations 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Pandemic	1	2020	1	2020

Source: Cal OES, FEMA

The 20th century saw three outbreaks of pandemic.

- The 1918-1919 Influenza Pandemic (H1N1)
- The February 1957-1958 Influenza Pandemic (H2N2)
- The 1968 Influenza Pandemic (H3N2)

To date, the 21st century has seen two acknowledged pandemics.

- 2009 Swine Flu (H1N1)
- 2019/2020 COVID 19

SASD is an essential service provider so no operations were suspended during the 2019/2020 global pandemic. Operations were shifted to allow telework when possible and Cal-OSHA guidelines were followed for staff that still reported to work.

Vulnerability to and Impacts from Pandemic

Pandemics have and will continue to have impacts on human health in the region. A pandemic occurs when a new virus emerges for which there is little or no immunity in the human population; the virus causes serious illness and spreads easily from person-to-person worldwide. There are several strategies that public health officials can use to combat a pandemic. Constant surveillance regarding the current pandemic, use of infection control techniques, and administration of vaccines once they become available. Citizens can help prevent the spread of a pandemic by staying home, or “self-quarantining,” if they suspect they are infected. Pandemic does not affect the buildings, critical facilities, and infrastructure in the District. Pandemic can have varying levels of impact to the citizens of the District and greater County, depending on the nature of the pandemic.

Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. Hospitalizations and deaths can occur, especially to the elderly or those with pre-existing underlying conditions. As seen with Covid-19, multiple businesses were forced to close temporarily (some permanently), and unemployment rose significantly. Supply chains for food and essentials can be interrupted. Prisons may need to release prisoners to comply with social distance standards.

Assets at Risk

Pandemics do not affect District facilities, but can affect District personnel who operate District facilities. Cal-OSHA guidelines were followed so that staff could maintain district facilities.

Severe Weather: High Winds and Tornadoes

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. High winds can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds can also cause PSPS events.

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes form when cool, dry air sits on top of warm, moist air. Tornadoes are the most powerful storms that exist. Tornadoes, though rare, are another severe weather hazard that can affect areas of the Sacramento County Planning Area, primarily during the rainy season in the late fall, winter, and early spring.

Location and Extent

The entire District is subject to significant, non-tornadic (straight-line), winds. Each area of the County is at risk to high winds. Magnitude of winds is measured often in speed and damages. These events are often part of a heavy rain and storm event, but can occur outside of storms. The speed of onset of winds can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of winds in California is often short, ranging from minutes to hours. The Beaufort scale is an empirical 12 category scale that relates wind speed to observed conditions at sea or on land. Its full name is the Beaufort Wind Force Scale. The Beaufort Scale was shown in Section 4.3.5 of the Base Plan.

Tornadoes, while rare, can occur at any location in the County and District. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale (EF) provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers

the materials affected and the construction of structures damaged by a tornado. The F Scale and EF Scale are shown in Section 4.3.5 of the Base Plan.

Past Occurrences

There has been no federal or state disaster declarations in the County for winds and tornadoes. The District noted that since high winds is a regional phenomenon, events that affected the lower elevations of the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.5.

There have been no specific high wind or tornado events that have impacted the district.

Vulnerability to and Impacts from Severe Weather: Wind and Tornado

High winds are common occurrences in the District throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered. High winds can impact critical facilities and infrastructure and can lead to power outages. Wind can also drive wildfire flames, spreading wildfires quickly. During periods of high winds and dry vegetation, wildfire risk increases. High winds that occur during periods of extreme heat can cause PSPS events to be declared in the County. More information on power outage and failure can be found at the beginning of Section P.5.3 above, as well as in Section 4.3.3 of the Base Plan.

Impacts from high winds in the District will vary. Future losses from straight line winds include:

- Downed trees
- Power line impacts and economic losses from power outages
- Increased PSPS events
- Occasional building damage, primarily to roofs

Loss of power to sewage pumping stations may cause a sanitary sewer overflow that could impact the surrounding community and environment.

Assets at Risk

SASD assets at risk from this hazard are pump stations.

P.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.

P.6.1. Regulatory Mitigation Capabilities

Table P-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 SASD.

Table P-8 SASD 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	Y May 2020	Plan addresses hazards and provides a likelihood of occurrence.
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)		
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?	
SASD continues to update and train on the Continuity of Operations plan. Updates and table-top exercises are performed on an annual basis.	

Source: SASD

SASD Five Year Strategic Plan (2017)

This Strategic Plan provides SASD with clear direction on what it needs to do to continue to build on its success over the next five years. This Strategic Plan outlines goals and objectives, and SASD will develop an implementation plan that identifies and prioritizes activities and tasks needed to accomplish the goals and objectives outlined in the Strategic Plan. The development of an implementation plan will precede SASD’s annual business planning process so SASD can develop business initiatives to support this Strategic Plan.

As various other plans—such as the business plan, asset management plan, and financial plan—are updated, SASD will ensure alignment between them and this Strategic Plan. During annual business planning, SASD will track progress toward achieving the goals and objectives of the Strategic Plan. SASD will review the Strategic Plan goals and objectives on a one-to two-year cycle to ensure that the plan still reflects the current factors and issues that influence SASD and its work.

Sacramento Area Sewer District Continuity of Operations Plan (May 2020)

SASD prepared a Continuity of Operations Plan (COOP) to ensure continuity of essential SASD functions in the event of a major emergency or disaster affecting the community that the SASD serves. This plan was prepared using an all-hazards approach. The plan provides the decision-making framework and key information to be used by SASD personnel to implement business continuity operations, to restore essential functions within defined Recovery Time Objectives (RTO), and to sustain operations for up to 30 days following an event. This COOP incorporates best practices from the federal, state, and local levels and shall remain a living document with regular updates to ensure currency and relevance.

This plan supports SASD’s vision, mission, and values and applies to SASD and its personnel. The COOP applies to potential hazards identified by SASD staff and uses an all-hazards continuity of operations strategy. This plan discusses the COOP’s relationship to other SASD emergency response plans and the SASD Incident Command System, the different personnel types that are involved in a COOP implementation and the four phases that comprise continuity of operations:

- Phase 0: Normal Operations (Tan)
- Phase I: Alert (Yellow)
- Phase II: Activation (Orange)
- Phase III: Response (Red)
- Phase IV: Recovery (Green)

The COOP is used to restore essential SASD functions and support critical services as quickly as possible and to sustain these services for up to 30 days following an event.

P.6.2. Administrative/Technical Mitigation Capabilities

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

Table P-9 SASD's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N	
Mitigation Planning Committee	N	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	Pump Station Maintenance
Mutual aid agreements	Y	CalWARN
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	FT	Yes
Floodplain Administrator	PT	Part time duty of various positions Facilities/GIS/Safety. Staffing is adequate and trained.
Emergency Manager	PT	Part time duty of Safety. Staffing is adequate and trained.
Community Planner	N	
Civil Engineer	FT	Part Time duties of current Engineering Dept staff. Staffing is adequate and trained.
GIS Coordinator	FT	Full time GIS staff on site trained on Hazards
Other	FT	PIO and Communication specialists. Staffing is adequate and trained.
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	Reverse 911 and employee hotline
Hazard data and information	Y	Identified in COOP
Grant writing	Y	Policy & Planning Department
Hazus analysis	Y	COOP identified hazard analysis
Other		
How can these capabilities be expanded and improved to reduce risk?		
SASD reviews and updates the COOP on an annual basis. Additional table-top exercises will help to expand our capabilities to reduce risk.		

Source: SASD

P.6.3. Fiscal Mitigation Capabilities

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

Table P-10 SASD'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	
Authority to levy taxes for specific purposes	N	
Fees for water, sewer, gas, or electric services	Y	Y. SASD is a rate payer funded utility.
Impact fees for new development	Y	Y. Impact fees are generated for new construction and follow SASDs current program.
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	Y.
Incur debt through private activities	N	
Community Development Block Grant	N	
Other federal funding programs	Y	
State funding programs	Y	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
Capabilities are expanded through proper collection of rate fees and impact fees for new development. Further, SASD complies with the collection systems permit granted by the State of California.		

Source: SASD

P.6.4. Mitigation Education, Outreach, and Partnerships

Table P-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 P-11 SASD'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.	N/A	

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	N/A	
Natural disaster or safety related school programs	N/A	
StormReady certification	N/A	
Firewise Communities certification	N/A	
Public-private partnership initiatives addressing disaster-related issues	N/A	
Other	N/A	
How can these capabilities be expanded and improved to reduce risk?		
SASD does not communicate to rate payers on disaster related information. This is an area that could be expanded.		

Source: SASD

P.6.5. Other Mitigation Efforts

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

- Purchased redundant backup generators at our critical facilities.

P.7 Mitigation Strategy

P.7.1. Mitigation Goals and Objectives

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

P.7.2. Mitigation Actions

The planning team for the SASD 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:

- Dam Failure
- Floods: 1%/0.2% annual chance
- Levee Failure
- Pandemic

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. Flood Control

Hazards Addressed: Dam Failure; Flood: 1%/ 0.2%; Levee Failure

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

Issue/Background: SASD operates pump stations and collection lines along the American River that may be impacted by dam or levee failure and severe flood events along the river parkway.

Project Description: Identify affected pump stations that may be retrofitted with elevated electrical control panels and motor control centers that would remain out of flood waters. Also, ensure affected pump stations are able to operate with submersible pumps.

Other Alternatives: Participate in local planning efforts to identify and mitigate hazards associated with above events

Existing Planning Mechanism(s) through which Action Will Be Implemented: Design and construction planning for new pump stations that are in affected areas. Coordination with the County of Sacramento on Flood Control efforts in areas that SASD may be impacted.

Responsible Agency/ Department/Partners: SASD

Cost Estimate: To be determined.

Benefits (Losses Avoided): Prevent damage to parts of the wastewater collection system infrastructure.

Potential Funding: Cal OES, FEMA, and CA DWR grants

Timeline: As needed

Project Priority (H, M, L): Low

Action 2. Pandemic Planning

Hazards Addressed: Pandemic

Goals Addressed: 4, 5

Issue/Background: SASD is a utility district that provides sewer collection services for the greater Sacramento Area. This critical service must be provided at all times and can cause health and environmental problems if not operated and maintained at all times. A global pandemic may not allow SASD to operate and maintain the collection system.

Project Description: Develop and maintain a pandemic plan that allows the collection system to continue operations in the event of a global pandemic. Pandemic plan must comply with all local, state, and federal rules governing the operation of a business during a pandemic.

Other Alternatives: Participate in the County of Sacramento pandemic planning efforts as SASD contracts with the County for employment.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Pandemic plan will be developed with input from all SASD business sections.

Responsible Agency/ Department/Partners: SASD

Cost Estimate: \$250,000

Benefits (Losses Avoided): Continued operation of the wastewater collection system. Prevention of sanitary sewer overflows.

Potential Funding: Cal OES and FEMA grants. Other public health grant sources.

Timeline: As needed

Project Priority (H, M, L): Medium