Annex K Reclamation District 800

K.1 Introduction

This Annex details the hazard mitigation planning elements specific to Reclamation District 800 (RD 800), 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 IRD 800, with a focus on providing additional details on the risk assessment and mitigation strategy for this District.

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

Table K-1 RD 800 – Planning Team

Name	Position/Title	How Participated
Robert C. Wagner, P.E.	District Engineer	Reviewed draft documents
Patrick W. Ervin, P.E.	Engineer	Collected data, drafted text

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 K-2.

Table K-2 2016 LHMP Incorporation

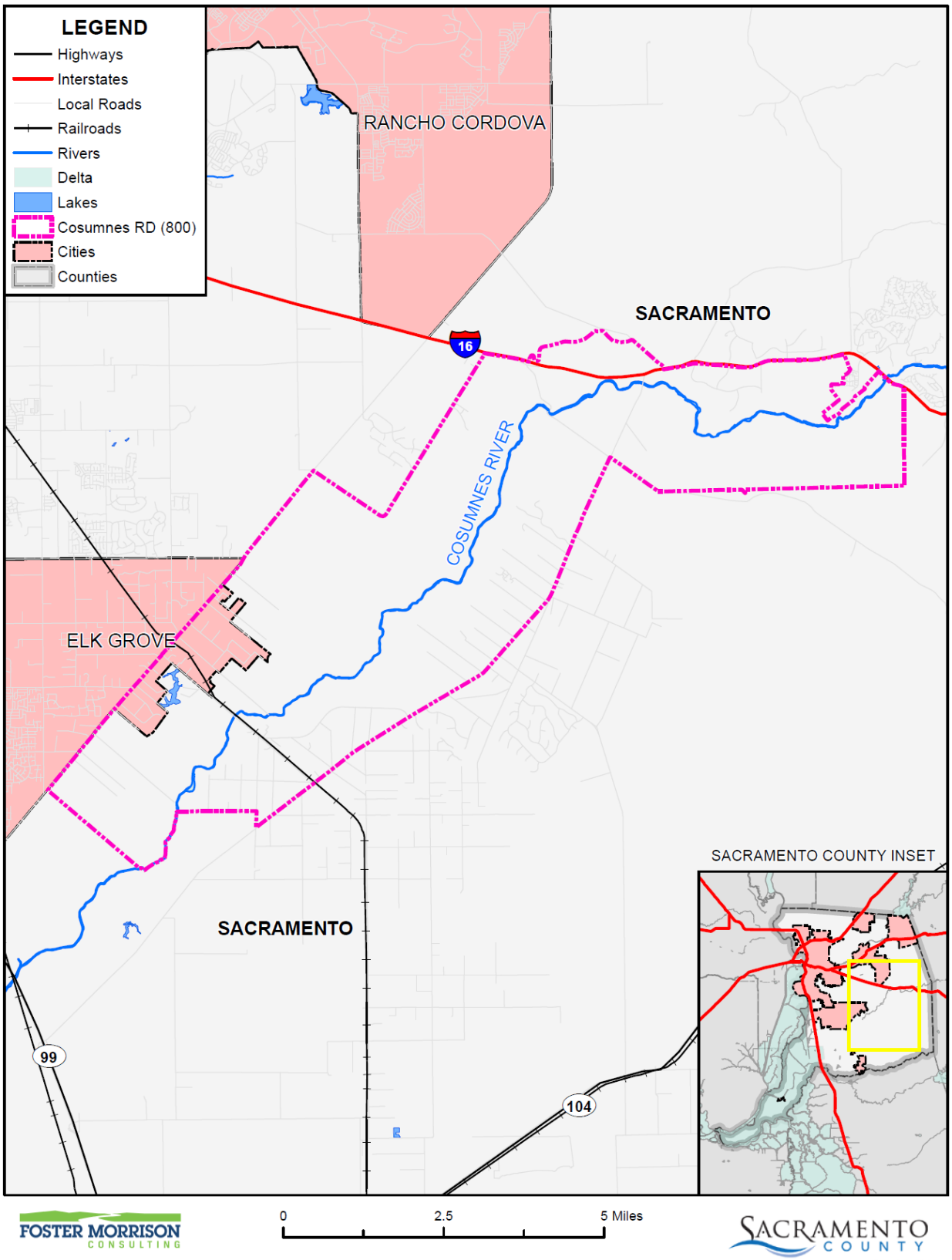
Planning Mechanism 2016 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
Erosion Repair Implemented	The District has repaired 4 places along the Cosumnes River that had significant erosion issues between levee stations 100+00 and 404+50.
National Resources Conservation Service (NRCS) Grant through the Emergency Watershed Protection Program.	The District plans to repair three erosion sites along the Cosumnes River during the summer of 2021. The sites were damaged during the 2017 floods. 75/25 Cost share with the NRCS.

Planning Mechanism 2016 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
Levee Access Improvements	The District improved 3.3 miles of levee access, placing aggregate base on access roads, ramps and the levee crest for all weather access during storm events.

K.3 District Profile

The District profile for the RD 800 is detailed in the following sections. Figure K-1 displays a map and the location of the District within Sacramento County.

Figure K-1 RD 800



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

K.3.1. Overview and Background

Reclamation District No. 800 is an area within Sacramento County lying along the Cosumnes River and was originally created by action of the California State Legislature in 1907 (Statutes 1907, Ch 213). This original District, comprised of 2,136 acres, is located between Deer Creek and the Cosumnes River east of Elk Grove in Sacramento County. In January 1997, a flood of extraordinary size occurred on the Cosumnes River between Sloughhouse and Wilton requiring considerable construction work to levees along the river. However, no levee breaks occurred on those maintained by Reclamation District 800.

As a result of the 1997 flood on the Cosumnes River, it became apparent that a public agency was needed to maintain the levees and facilities along the river between Sloughhouse and Wilton areas, outside the boundaries of Reclamation District 800. At the request of landowners along the Cosumnes River whose lands were not included within Reclamation District 800, the Trustees of the District sought an amendment to the act under which the District was formed, in order to modify the boundaries and incorporate additional lands on the right bank of the Cosumnes River and to include, for the first time, lands on the left bank of the river down to the vicinity of Wilton.

To accommodate the above additions of land, SB 437 (Senator Patrick Johnston) was introduced and adopted by the Legislature and signed by the Governor as Chapter 191, Statutes of 1997. This action provided for the increase in District acreage from 2,136 to 25,435 acres. The total potential levee length is 34.05 miles with 17.65 miles along the right (or north) bank and 16.40 miles along the left (or south) bank.

Since the 1997 flood, with assistance from the County of Sacramento and funding by the U.S. Department of Agriculture, repairs were completed to levees along the Cosumnes River.

K.4 Hazard Identification

RD 800 identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table K-3).

Table K-3 RD 800—Hazard Identification Assessment

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

K.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.

K.5.1. Hazard Profiles

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

K.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 RD 800'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 K-4 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. RD 800's physical assets, valued at over $100 million, consist of the buildings and infrastructure to support the District's operations.

Table K-4 RD 800 Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
RD 800 levees	Levee	In excess of $100,000,000	Flood

Source: RD 800

Natural Resources

RD 800 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

RD 800 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.

Growth and development within RD 800 has remained relatively unchanged since 2011. The District is composed of rural farmland with few economic drivers.

Development since 2016

The RD has not seen an increase in the population protected by their levees since the 2016 plan. There is currently a project in the planning/permitting phase that will fix a large erosion area adjacent to Rooney Dam the Cosumnes River.

Since 2016 the District has improved approximately 3.3 miles of levee access by placing aggregate base rock. The placement of rock allows for all-weather access for patrolling and inspection during and after storm events.

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.

During the 2017 presidentially declared disasters (4301 and 4308) the District sustained significant erosion damage in several locations along the Cosumnes River. The District has identified nine locations for slope stabilization projects to repair the erosion. Biological and cultural assessments have been completed and a Mitigated Negative Declaration has been adopted for all nine sites. The District received grant funding for

three of these sites from the Natural Resources Conservation Service (NRCS) under the Emergency Watershed Protection Program (EWPP). The NRCS sponsored sites are anticipated to be completed during summer 2021. The District will continue to repair the remaining six sites as funding becomes available. In 2017 the District raised assessments to aid in the repair of the levees.

In 2019, the District identified an additional erosion site at the end of Pecos Road near Rancho Murieta. A biological and cultural assessment is in progress and the site will be repaired when permits are received and funds are available.

K.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table K-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.

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.

There may have been PSPS in the area, but since the District doesn't own anything (buildings, pumps, etc) there is really no effect.

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

Assets at Risk

Short duration storms with high precipitation intensities are particularly impactful to RD 800 because there are no dams upstream of the District. These storms cause a rapid rise in river stage within the District. Increased storm intensities related to climate change will likely cause the river to rise more quickly and reach flood stage more often.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional
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

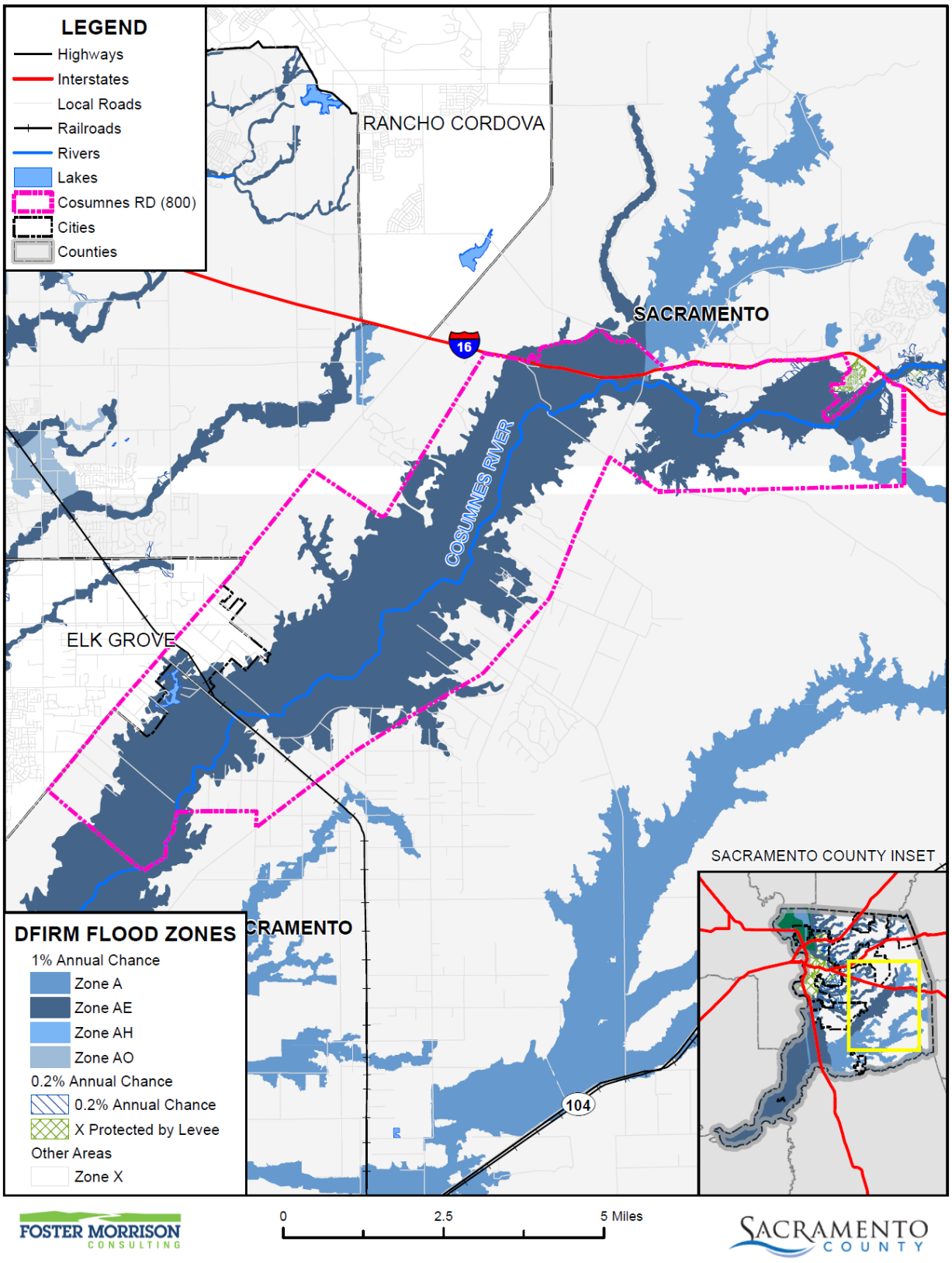
significant problem in Sacramento County and the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by 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 RD 800 have been subject to historical flooding.

Location and Extent

The RD 800 has areas located in the 1% and 0.2% annual chance floodplain. This is seen in Figure K-2.

Figure K-2 RD 800 – FEMA DFIRM Flood Zones



Data Source: FEMA NFHL 07/19/2018, Cosumnes Reclamation District, Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

Table K-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 K-5 RD 800– 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	
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 K-6. These events also likely affected the District to some degree.

Table K-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

The District Planning Team noted that multiple levee failures occurred on the Cosumnes in 1997 which led to flooding.

In February 2017, the District was busy fighting multiple problem areas most notably on the Cosumnes River levee north of the Wilton Road Bridge and along Jackson Road where the river overtopped its bank and inundated vineyards and a walnut orchard. In Sloughhouse, RD 800 sandbagged a developing boil that occurred on a private levee which RD 800 maintains that protects the Rancho Murieta Community below the top of the levee. The event produced flows of up to 50,000 cfs. The river level fluctuated significantly with the rain event. This fluctuation of water levels and the erosive nature of the in-situ sands, silts and gravels caused damaging erosion to the levee embankment. The total length of erosion is 365 feet and the depth of erosion is 20 feet. The erosion occurred the full length of the levee face up to 5 feet. Damage was estimated at $195,268. In another location there are numerous trees (about 15) and car parts used within the fill. The car parts were utilized as slope revetment to mitigate erosion. The total length of erosion is 330 feet and the depth of erosion is 22 feet. In the past, in lieu of conventional stone protection, car parts/ car chassis were used for slope protection. Damage to this area was $202,170. Two other areas needed to be repaired at costs of $178,564.80 and $985,977.

Figure K-3 RD 800 – Levee Boil

Source: River Valley Times

Figure K-4 RD 800 – High Water from 2017 Storms

Source: River Valley Times

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.

Flooding would occur as a result of levee failure or overtopping. Levee failure from either breaching or overtopping would result in the total loss of levee embankment material, as was the case in the 1997 flood event. Levee embankment failure within the current District boundary from the 1997 event resulted in multiple levee failure sites along the Cosumnes River. The resulting damage to agricultural lands was extensive, with the most damage occurring immediately adjacent to the levee breach causing severe erosion to agricultural lands, deposition of sands and debris and the complete destruction of adjacent vineyards and irrigation systems.

Assets at Risk

District levees are at risk from this hazard.

Levee Failure

Likelihood of Future Occurrence–Occasional
Vulnerability–Extremely High

Hazard Profile and Problem Description

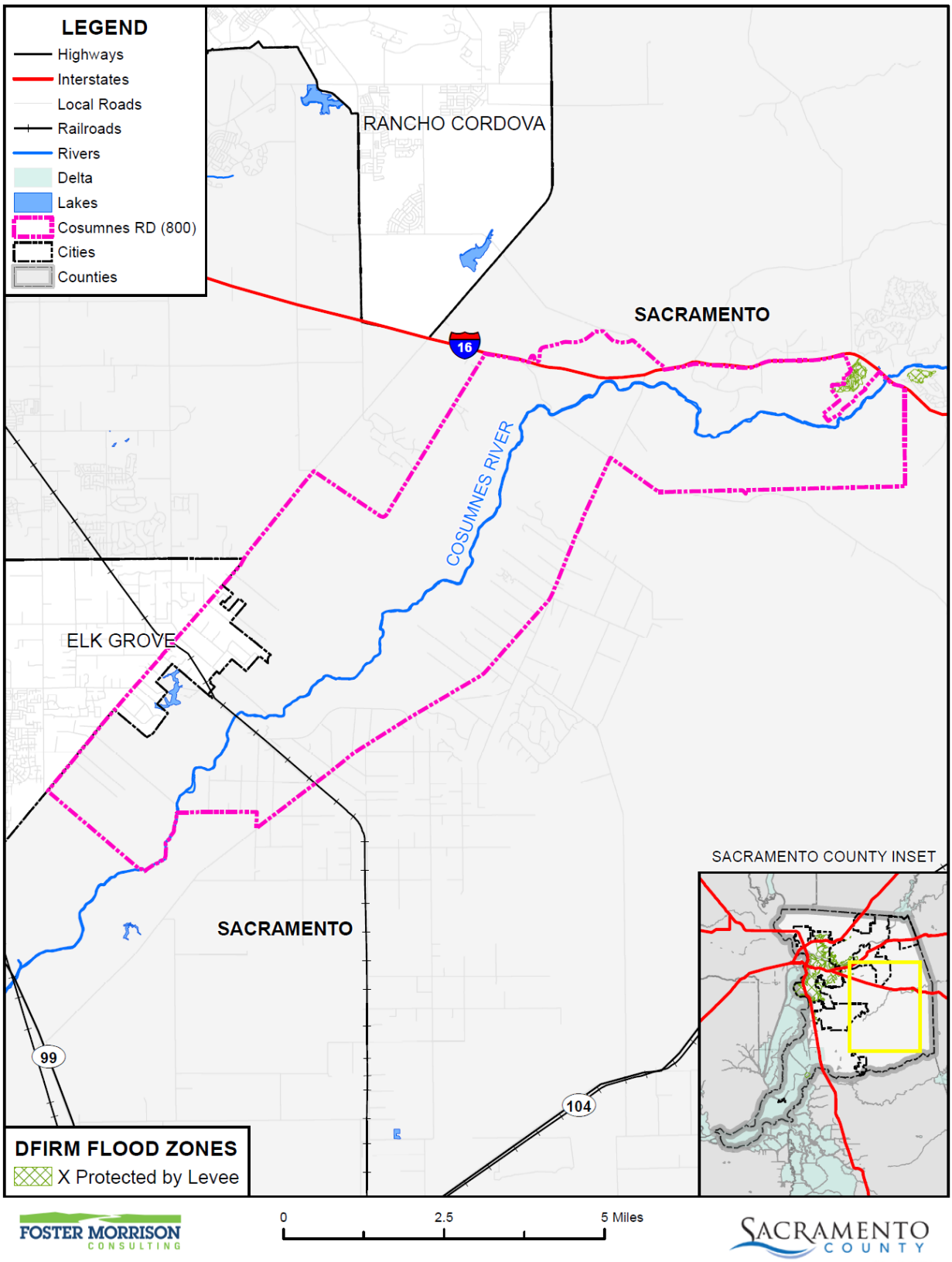
A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower steam channel, levees can also increase the speed of the water. Levees can be 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. Levees in the District are shown on Figure K-5.

Figure K-5 RD 800 – Levee Protected Areas



Data Source: FEMA NFHL 07/19/2018, Cosumnes Reclamation District, Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

Past Occurrences

There have been no federal or state disaster declarations from levee failure. The District noted the following past levee issues:

Levee embankment failure within the current District boundary from the 1997 event resulted in multiple levee failure sites along the Cosumnes River. The resulting damage to agricultural lands was extensive, with the most damage occurring immediately adjacent to the levee breach causing severe erosion to agricultural lands, deposition of sands and debris and the complete destruction of adjacent vineyards and irrigation systems.

In January 2017, RD 800 fought a boil on the Cosumnes River levee near the Wilton Road Bridge. Additionally, the water levels were dangerously high in the Sloughhouse area on the Cosumnes River levee that RD 800 also maintains.

In February 2017, the District was busy fighting multiple problem areas most notably on the Cosumnes River levee north of the Wilton Road Bridge and along Jackson Road where the river overtopped its bank and inundated vineyards and a walnut orchard. In Sloughhouse, RD 800 sandbagged a developing boil that occurred on a private levee which RD 800 maintains that protects the Rancho Murieta Community.

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 significant. 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.

Potential for severe damage to the Wilton Road crossing over the Cosumnes River would require detouring of extensive daily high volume traffic of Wilton Road. Closure of the road would severely delay public safety agency emergency response. Truck and vehicular traffic impacts would have severe economic impacts to the local economy.

Assets at Risk

District levees are at risk from this hazard.

Severe Weather: Heavy Rains and Storms

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile and Problem Description

Storms in the District occur annually and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the District falls mainly in the fall, winter, and spring months.

Location and Extent

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the District. All portions of the District are at risk to heavy rains. Most of the severe rains occur during the fall, winter, and spring months. There is no scale by which heavy rains and severe storms are measured. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of severe storms in California, Sacramento County, and the District can range from minutes to hours to days. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

Past Occurrences

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

The District Planning team noted that 1997 storms caused high flows in the Cosumnes which cause levee failures and flooding.

In 2017, there were a series of three storms that occurred in the District. The storms caused high water and flooding as well as downed trees, localized flooding and the Cosumnes River rose to levels not seen since 1997. More information can be found in the Levee Failure section above.

Vulnerability to and Impacts from Heavy Rain and Storms

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

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

During periods of heavy rains and storms, power outages can occur. These power outages can affect pumping stations and lift stations that help alleviate flooding. More information on power outage and failure can be found in the discussion at the beginning of Section K.5.3, as well as in Section 4.3.3 of the Base Plan.

The secondary effects of heavy rain and storms that are of concern to RD 800. Heavy rains can cause flooding, levee failure, and stream bank erosion. Flooding, levee failure, and stream bank erosion can cost RD 800 millions in damages.

Assets at Risk

District levees are at risk from this hazard.

Severe Weather: High Winds and Tornadoes

Likelihood of Future Occurrence–Occasional
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 or District 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.

In 2017, there were a series of three storms that occurred in the District. The storms caused high water and flooding as well as downed trees, localized flooding and the Cosumnes River rose to levels not seen since 1997.

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 K.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

Assets at Risk

District levees are at risk from this hazard.

K.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.

K.6.1. Regulatory Mitigation Capabilities

Table K-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 RD 800.

Table K-7 RD 800 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	
Capital Improvements Plan	N	
Economic Development Plan	N	
Local Emergency Operations Plan	N	
Continuity of Operations Plan	N	
Transportation Plan	N	
Stormwater Management Plan/Program	N	
Engineering Studies for Streams	N	
Community Wildfire Protection Plan	N	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)		
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	N	Version/Year:
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score:
Fire department ISO rating:	N	Rating:
Site plan review requirements	N	
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	
Subdivision ordinance	N	
Floodplain ordinance	N	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Y	Encroachment permit regulations
Flood insurance rate maps	N	

Elevation Certificates	N	
Acquisition of land for open space and public recreation uses	N	
Erosion or sediment control program	Y	Erosion control measures on levee and canal slopes as necessary
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional funding. The District recently raised assessments so that more funds are available for levee maintenance.		

Source: RD 800

K.6.2. Administrative/Technical Mitigation Capabilities

Table K-8 identifies the District department(s) responsible for activities related to mitigation and loss prevention in RD 800.

Table K-8 RD 800'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)	N	
Mutual aid agreements	N	
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	N	
Floodplain Administrator	N	
Emergency Manager	N	
Community Planner	N	
Civil Engineer	Y	
GIS Coordinator	N	
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	N	
Hazard data and information	N	
Grant writing	N	
Hazus analysis	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		

Additional funding. The District recently raised assessments so that more funds are available for levee maintenance.

Source: RD 800

K.6.3. Fiscal Mitigation Capabilities

Table K-9 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table K-9 RD 800'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	N	
Authority to levy taxes for specific purposes	Y	
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
Storm water utility fee		
Incur debt through general obligation bonds and/or special tax bonds	N	
Incur debt through private activities	N	
Community Development Block Grant	Y	
Other federal funding programs		
State funding programs		
Other		
How can these capabilities be expanded and improved to reduce risk?		
The District may work with other entities in the future to provide education on how hazards affect RD 800 and the people protected by the District.		

Source: RD 800

K.6.4. Mitigation Education, Outreach, and Partnerships

Table K-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.

Table K-10 RD 800'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	

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	
Natural disaster or safety related school programs	N	
StormReady certification	N	
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional funding is needed to expand. The District will look for Cal OES, FEMA, and CA DWR funding opportunities.		

Source: RD 800

K.6.5. Other Mitigation Efforts

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

Levee maintenance practices designed to protect District levee system includes annual vegetation management and rodent control. Due to environmental protection limitations, District disaster reduction practices are limited.

Since 2016 the District has done the following:

- Raised assessments to provide more funding for levee maintenance and repairs.
- Improved 3.3 miles of levee access by placing aggregate base rock on the levee crest, access roads and ramps. The base rock allows for patrolling the levee in all weather conditions.
- Obtained NRCS grant funding to repair three of nine erosion sites on the Cosumnes River resulting from the 2017 floods. Construction is scheduled for summer 2021.
- Completed biological and cultural assessment reports and completed the CEQA process for the remaining six erosion sites. The District plans to repair these sites as funding becomes available.
- In 2019 the District identified an additional erosion site at the end of Pecos Road near Rancho Murieta. The District is in the process of performing biological and cultural assessments of the site.

K.7 Mitigation Strategy

K.7.1. Mitigation Goals and Objectives

The RD 800 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

K.7.2. Mitigation Actions

The planning team for the RD 800 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
- Floods: 1%/0.2% annual chance
- Levee Failure
- Severe Weather: Heavy Rains and Storms
- Severe Weather: Wind and Tornado

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. Reclamation District 800 Emergency Levee Repair Project

Hazards Addressed: Climate Change, Levee Failure, Flood, Heavy Rain and Storms, Winds and Tornadoes

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

Issue/Background: Critical erosion on the waterside of the Cosumnes River levee that suffered severe erosion during the 2017 storms. The erosion at these sites is so severe, levee integrity has been compromised and further erosion could lead to a breach during a major storm event.

Project Description: Reclamation District No. 800 Cosumnes (RD 800), proposes to repair three critical erosion repairs on the waterside of the Cosumnes River levee that suffered severe erosion during the 2017 storms. The erosion at these sites is so severe, levee integrity has been compromised and further erosion could lead to a breach during a major storm event. These sites are named “Fig Road Downstream” “Cosumnes Road Downstream”, and “Freeman Road” after the roads that provide access to each site.

Freeman Road consists of approximately 450 linear feet of construction on the waterside levee slope south bank of the river. The waterside slope will be grubbed, stripped and prepared for material placement. Imported embankment fill material will be placed and compacted at a 1.5 to 1 slope to restore the levee to its previous condition. Rock slope protection will be placed on the entirety of the waterside slope to protect the repair from future erosion. A two-foot deep by two-foot wide toe trench will be utilized to stabilize the rock. A layer of geosynthetic fabric will be placed between the embankment and the rock slope protection to provide additional rock stabilization.

Cosumnes Road Downstream consists of approximately 270 linear feet of construction on the waterside levee slope south bank of the river. The waterside slope will be grubbed, stripped and prepared for material placement. Imported embankment fill material will be placed and compacted at a 1.5 to 1 slope to restore the levee to its previous condition. Rock slope protection will be placed on the entirety of the waterside slope to protect the repair from future erosion. A two-foot deep by two-foot wide toe trench will be utilized to stabilize the rock. A layer of geosynthetic fabric will be placed between the embankment and the rock slope protection to provide additional rock stabilization.

At the Fig Road Downstream site, approximately 200 feet of levee crest will be excavated to a depth of approximately five feet. The crest will be replaced and recompacted using the excavated material. Additionally, approximately 450 of waterside levee slope will be grubbed, stripped and prepared for material placement. Imported embankment fill material will be placed and compacted at a 2 to 1 slope to restore the levee to its previous condition. Rock slope protection will be placed on the entirety of the waterside slope to protect the repair from future erosion. A two-foot deep by two-foot wide toe trench will be utilized to stabilize the rock. A layer of geosynthetic fabric will be placed between the embankment and the rock slope protection to provide additional rock stabilization.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: N/A

Responsible Agency/ Department/Partners: Reclamation District 800

Cost Estimate: Approximately $1,000,000

Benefits (Losses Avoided): Reduces the likelihood of levee failure.

Potential Funding: Reclamation District 800 / Natural Resources Conservation Service

Timeline: 1 Year

Project Priority (H, M, L): H