

Annex L RD 1000

L.1 Introduction

This Annex details the hazard mitigation planning elements specific to the RD 1000 (ACRONYM or District), a previously participating jurisdiction to the 2021 Sacramento County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the District. This Annex provides additional information specific to the District, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this jurisdiction.

L.2 Planning Process

As described above, the RD 1000 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 L-1. Additional details on Plan participation and District representatives are included in Appendix A.

Table L-1 RD 1000 – Internal Planning Team

Name	Position/Title	How Participated
Scott Brown General	Manager	Participated in LHMP update process; reviewed and edited District's information included in LHMP; reviewed and edited District Emergency Action Plan; will participate in regional flood emergency exercise
Gabe Holleman	Operations Manager	Reviewed and edited District's information included in LHMP; reviewed and edited District Emergency Action Plan; will participate in regional flood control emergency exercise

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 FEMA-approved 2021 LHMP into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2021 LHMP through other plans and programs shown in Table L-2.

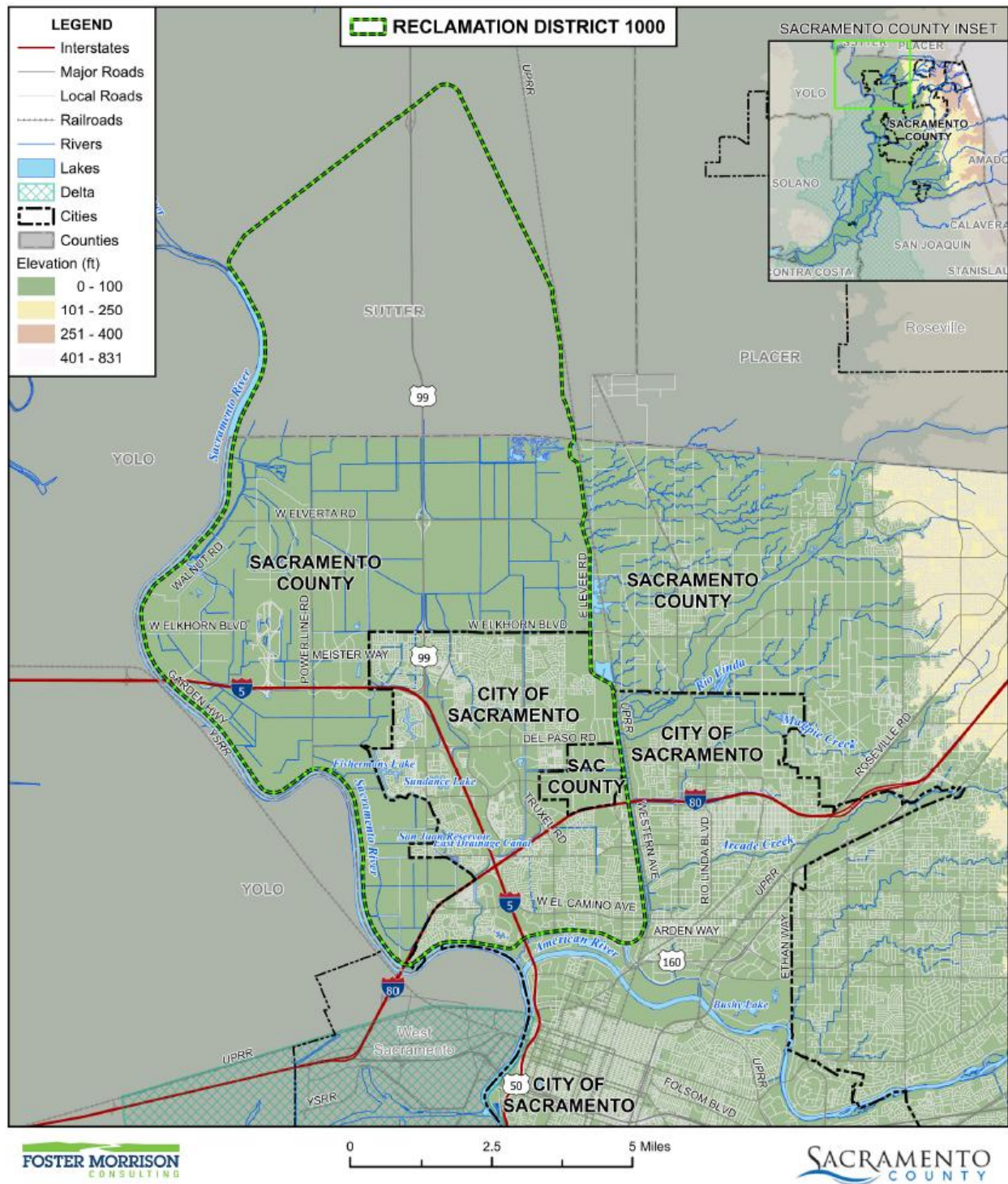
Table L-2 2021 LHMP Incorporation

Planning Mechanism 2021 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
Emergency Action Plan	Identifies potential flood risks and District’s plan to monitor and respond in an emergency including communications, pre-disaster deployment; flood fight materials storage; emergency response contracts all in compliance with NIMS and SEMS protocols. The District’s LHMP Annex was utilized in addressing flood risks.
Capital Improvement Plan	Identifies improvements to District facilities to improve flood safety; assist with monitoring and responding in a flood emergency; and improve system reliability thereby reducing the overall flood risk. Mitigation actions from the 2021 LHMP Annex were included in the CIP.
Security Risk Assessment	Identified critical District infrastructure and recommended measures to improve security and ensure District can perform essential functions during an emergency. Key information from the 2021 LHMP Annex were incorporated into this assessment.
Strategic Plan	Identifies District mission to reduce flood risk; preparations for floods and emergency response; outreach to community including information during flood emergency; coordination with other regional agencies including City and County of Sacramento. Key information from the 2021 LHMP Annex were incorporated into this updated Strategic Plan.

L.3 Community Profile

The community profile for the RD 1000 is detailed in the following sections. Figure L-1 displays a District map and the location of RD 1000 within Sacramento County.

Figure L-1 RD 1000



L.3.1. Overview and Background

Reclamation District No. 1000 (RD 1000) has been providing flood protection, drainage and public safety to residents, businesses, schools, and agriculture since it was formed in 1911 as a California special district by the California State legislature (Act). As shown on Figure L-1, the District sits below 100 ft of elevation. The District's mission is to protect the lives and property in the Natomas basin from flooding and provide drainage for urban and agricultural runoff. RD 1000 maintain 42 miles of levees surrounding Natomas, over 30 miles of large drainage canals and seven pump stations that collect and pump the storm water and agricultural runoff back into the adjacent river system. The District is governed by a seven-member Board of Trustees elected by the property owners within the Natomas basin. The District operates under the direction of the District's General Manager who reports directly to the Board of Trustees. The District's Operations Manager supervises the daily activities of the field crew and reports to the General Manager.

Reclamation District No. 1000 was created by an act of the State Legislature on April 8, 1911 (Act). The purpose was to allow for the reclamation of what was then known as the American Basin for agricultural purposes. Prior to RD 1000, the American Basin historically flooded from the Sacramento and American Rivers overflowing their banks due to winter rains and runoff from the foothills. Much of the land was owned by the Natomas Company of California and with the formation of RD 1000 was reclaimed for agriculture, due to the rich fertile floodplain soil, which dominated the early years in Natomas. The Act gave the District authority and responsibility for flood control and drainage in what has become the Natomas Basin.

Reclamation of Natomas began in 1913 with construction of the perimeter levee system which was completed in 1915 at a cost of approximately \$2 million financed by the sale of bonds. Following completion of the levees, an interior drainage system consisting of canals, ditches and drains was constructed to collect both stormwater runoff from precipitation that falls within the leveed area as well as agricultural runoff from irrigated farmland. The original system conveyed all the runoff to a large pumping plant constructed in 1915 at the terminus of Second Bannon Slough (Plant 1A) at the south end of the District. This plant still exists and is used today and it is located directly across the Garden Highway from the District Office. A second pumping plant (Plant 2) was added at Pritchard Lake in 1920 along the Sacramento River north of Elverta Road, and a third plant (Plant 3) was added in 1939 also located on the Sacramento River just north of San Juan Road. Eventually four more pump plants were added at various locations in the District to accommodate more development and relieve pressure on the original plants.

The drainage system stayed in this configuration for a number of years. In the 1950's and 1960's urbanization of the Natomas Basin began, predominantly because of its close proximity to downtown Sacramento and the construction of the interstate highway system. The first area to develop was the Gardenland area in the southern extremity of the basin tucked up against the American River and Natomas East Main Drain Canal. In the 1960's Sacramento Metropolitan Airport (now Sacramento International Airport) was developed. A new pumping plant paid for by the County was constructed to handle the increased runoff from the newly constructed airport. Through the decades more development occurred starting with the South Natomas Community, Metro Air Park (industrial area adjacent to the airport) and North Natomas Community. More development has been approved and/or is in planning for areas within the City of Sacramento, Sacramento County and Sutter County in the north half of Natomas.

The levees around Natomas were designed to handle the historical “flood of record” which was the 1907 and 1909 floods on the Sacramento River. Another large flood event occurred in 1937 which the system safely passed with only minor problems. Again, in 1955 an even larger flood occurred in the California Central Valley around Christmas and the Natomas levees held with some minor sloughing along the Sacramento River near the Sacramento/Sutter County line. Levees upstream on the Sacramento River failed leading to additional improvements to the flood control system by the Army Corps of Engineers including raising the Natomas Cross Canal and Pleasant Grove Creek Canal levees as much as two to three feet within RD 1000 in anticipation of future, even larger flood events. In addition, by 1955 Folsom Dam was operational which provided additional flood storage capacity along the American River improving flood safety on the District’s southern flank.

The system remained generally in the same condition as originally constructed until February 1986 when the flood of record occurred along the Sacramento and American Rivers caused by a series of large Pacific storms carrying significant amounts of sub-tropical moisture. These storms coined as the “Pineapple Express” because of its origins near the Hawaiian Islands are now referred to as “atmospheric rivers”. The flood levels on the Sacramento River, though not overtopping, caused significant seepage along the Garden Highway levee which nearly resulted in a catastrophic levee failure. Early flood emergency response by the District followed by a major flood fight by the Army Corps of Engineers prevented a levee failure. As a result of the near failure, the levees system surrounding Natomas was de-certified and any further development halted.

A system of repairs was initiated in the early 1990’s on both the Sacramento River and Natomas East Main Drain Canal (NEMDC) Work along the Sacramento River was done by the Corps of Engineers (Sacramento Urban Project) to address the levee seepage. Subsequently, the Sacramento Area Flood Control Agency or SAFCA implemented levee raising and other strengthening measures along the NEMDC as part of the North Area Local Project.

As a result of these projects, the levees were “certified” to provide 100-year FEMA level of protection in 1997 and urban development began again with North Natomas in the City of Sacramento, bringing thousands of new residents, businesses and supporting infrastructure. Industrial and commercial development also expanded in the vicinity of the airport to support its growing needs. And the airport itself has undergone and continues to undergo significant expansion to support the growing passenger demands. In each case, the District worked with the appropriate land use agency to ensure the impacts of the development and increased runoff are mitigated and do not overburden the existing drainage system. In most cases, large detention storage basins have been incorporated into new development to temporarily store the increased urban runoff and allow it to be pumped back into the RD 1000 drainage system at a rate similar to the pre-development condition. These detention basins are augmented by improvements to the existing pumping plants increasing their capacity to assist in handling the increased urban runoff.

In January 1997, a flood similar to the 1986 flood in precipitation amount and resultant river levels occurred throughout Northern California including the RD 1000 system. Unlike 1986, the improved RD 1000 levee system passed the flood event with minimal issues justifying the levee infrastructure investment. However, a number of other levees in Northern California failed during the flood event, which was later attributed to levee underseepage which had not previously been understood or considered to be a significant risk. Following the 1997 flood event, the RD 1000 levees were analyzed and found to have similar foundation

conditions to those levees that had failed indicating its levees were at risk of failure due to underseepage. Following the analysis which demonstrated the levees did not meet the underseepage factor of safety criteria, the Natomas levee system was again de-certified in 2003 shutting down further urbanization

Efforts to address this newly defined levee risk and the potential for further urbanization of the Natomas basin are described later in this annex.

L.4 Risk Assessment

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. “It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.”

The RD 1000 risk assessment identifies and profiles relevant hazards and assesses the exposure of lives, property, infrastructure, and the environment to these hazards. The process allows for a better understanding of the District’s potential risk and vulnerability to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the District Profile above, a risk assessment was performed for the District utilizing the existing District boundaries. This includes the following sections:

- L.4.1 Assets Inventory and Growth and Development Trends
- L.4.2 Hazard Identification
- L.4.3 Hazard Profiles and Vulnerability to Specific Hazards

L.4.1. Assets Inventory and Growth and Development Trends

This section provides an inventory of the RD 1000’s total assets potentially at risk to hazards and an overview of growth and development trends. This section is broken into two parts:

- **Asset Inventory** – The assets inventory identifies the RD 1000’s total assets, including the people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. This data is not hazard specific, but is representative of total assets within the District, potentially at risk to identified hazards as discussed in Section L.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the District, both current and future, is presented.

Assets Inventory

The District’s asset inventory is detailed in the following sections:

- People and Populations
- District Assets and Critical Facilities and Infrastructure
- Community Lifelines
- Natural, Historic, and Cultural Resources

➤ Economic Assets and Community Activities of Value

A discussion of each of these assets follows and serves as the template for the asset discussion for each hazard in Section L.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the community. People and populations in the District include both District staff and workers as well as those populations located within District boundaries and are served by the District. This section includes an inventory of past and current populations of the District and also discusses vulnerable populations and underserved communities as a subsection of people and populations located within the District and potentially at risk to hazards. Information from the District and other sources as detailed below form the basis of this discussion.

Historic Population Trends and Current Population

The most important asset within any community are the people and populations that both work and reside in the District. For special districts, this generally includes District staff and contractors as well as those populations located within its boundaries. The District has X staff that work for the District. NUMBER OF DISTRICT STAFF? CONTRACTORS? The District provides services to PLACE NUMBER OF PEOPLE SERVED.

Reclamation District No. 1000 (RD 1000) has experienced recurring homeless encampments along levees, drainage corridors, pumping plant sites, and other District-owned or maintained properties. These encampments present a combination of public safety, environmental, operational, and flood risk concerns. Encampments are frequently located in high-risk floodplain areas, including levee toes, canal banks, and near critical flood control infrastructure. During storm events, rising water levels, high flows, and emergency operations create life-safety risks for individuals residing in these areas. Encampments can also obstruct maintenance access, delay emergency response, and interfere with inspection and flood fighting activities.

Additional hazards associated with encampments include:

- Accumulation of combustible materials, increasing fire risk near critical infrastructure
- Improper disposal of refuse, debris, and hazardous materials within drainage channels
- Vegetation removal or disturbance along levees and canals
- Damage to fencing, gates, SCADA infrastructure, and security systems
- Potential impairment of pump station operations and access routes

District Assets and Critical Facilities and Infrastructure

This section considers the RD 1000's assets at risk, with a focus on key District assets such as structures, critical facilities and 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 Facilities.

Most of the District assets are considered Category 1 critical facilities, specifically essential services facilities. Table L-3 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. RD 1000's physical assets, valued at nearly \$2.2 billion, consist of structures, critical facilities and infrastructure, and other District assets to support the District's operations.

Table L-3 RD 1000 Assets: Structures, Critical Facilities and Infrastructure, and Other Facilities.

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
RD 1000 Plant 1A and 1B	Essential	\$30,000,000	Flood
RD 1000 Plant 2	Essential	\$8,000,000	Flood
RD 1000 Plant 3	Essential	\$12,000,000	Flood
RD 1000 Plant 4	Essential	\$10,000,000	Flood
RD 1000 Plant 5	Essential	\$5,000,000	Flood
RD 1000 Plant 6	Essential	\$8,000,000	Flood
RD 1000 Plant 8	Essential	\$20,000,000	Flood
District Drains/Canals	Essential	\$55,000,000	Flood
RD 1000 Federal Levee system	Essential	\$2,000,000,000	Flood
RD 1000 Corporation Yard	Essential	\$10,000,000	Flood/Levee Failure
RD 1000 Office	Essential	\$500,000	Flood/Levee Failure
Pleasant Grove Area Levees	Essential	\$2,000,000	Flood/Levee Failure
Total		\$2,160,500,000	

Source: RD 1000

In addition to assets owned by RD 1000, the District noted the following assets that are protected by RD 1000 levees, but are owned by others:

- Sacramento International Airport
- City of Sacramento River Pump Stations (3) and Interior Drainage Pump Stations
- Schools (2 high schools, middle and elementary schools)
- Significant Commercial and Industrial Developments
- Data and Information Storage Centers
- Fire Stations
- Police Stations
- Senior Housing

- Interstate 5 and 80/ Highway 99
- Day Care Centers
- Hazardous Material Sites

Community Lifelines

Assessing the vulnerability of the RD 1000 to natural hazards and disasters also involves reviewing and inventorying the community lifelines in place that could be affected. It is important to include these items in hazard discussions as the continuous operation of critical government and business functions is essential to human health and safety, property protection, and economic security. The importance of community lifelines is discussed below:

- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.
- FEMA has developed a method for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.
- The integrated network of assets, services, and capabilities that provide lifeline services are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function.
- When disrupted, decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to stabilize the incident.

Community lifelines, as defined by FEMA, include the following:

- **Safety and Security** – Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety
- **Food, Hydration, Shelter** – Food, Water, Shelter, Agriculture
- **Health and Medical** – Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management
- **Energy** – Power Grid, Fuel
- **Communications** – Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch
- **Transportation** – Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime
- **Hazardous Material** – Facilities, HAZMAT, Pollutants, Contaminants
- **Water Systems** – Potable Water Infrastructure, Wastewater Management

It should be noted that these community lifelines are all in place and functional as part of regular government operations in the Sacramento County Planning Area serving as a partnership between the cities, local special districts and agencies, and Sacramento County. Most all of the District's community lifelines overlap with the Planning Area's and include many of the critical facilities and infrastructure assets inventoried for this LHMP. As such, specific information on these community lifelines in the District and how they may be affected by a hazard event or disaster are discussed collectively for all jurisdictions in the Base Plan and in the Delta annex.

Natural, Historic, and Cultural Resources

RD 1000 contains historic and cultural resources that are generally consistent with those found throughout Sacramento County. There are also undisclosed Native American culturally sensitive sites within the District. These sites are typically buried below ground surface and would not be expected to be directly impacted by floodwaters. However, these resources could be affected during emergency response, infrastructure repair, or recovery activities following a major flood event, particularly one involving levee damage or failure.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the RD 1000 to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the District.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. Reclamation District No. 1000 (RD 1000) protects a highly urbanized basin containing regionally significant economic, residential, and infrastructure assets. Key economic drivers include commercial and retail development, industrial and logistics facilities, major transportation corridors, and utility/lifeline systems that support business continuity and public safety. Critical transportation routes serving the District include Interstate 5, Interstate 80, and State Route 99, which are essential for commuter mobility, freight transport, regional evacuation routes, and emergency response operations. These assets are highly dependent on reliable levee performance, drainage infrastructure, and uninterrupted utility services.

Community assets within RD 1000 include densely populated residential neighborhoods, public facilities, essential services, recreational resources along the Sacramento River, and critical regional infrastructure such as Sacramento International Airport. Hazard events including flooding, levee failure, severe storms, seismic activity, extreme heat, and utility disruptions could result in business interruption, structural damage, transportation network degradation, service disruptions, and resident displacement. Flood risk and levee system integrity represent the most significant potential threats, with secondary vulnerabilities linked to extreme weather and infrastructure failures. Continued risk reduction, infrastructure maintenance, and resilience planning remain critical to minimizing potential losses and safeguarding these economic and community assets.

Community Activities of Value

Inventorying economic assets in the District and their vulnerability to natural hazards and disasters also involves inventorying activities that have value to the community. This includes activities that are important to a community, like long-standing traditions such as a festival or fair or other activities that bring money into the communities such as sports tournaments and other recreational activities. Community Activities of Value for the County were discussed in Section 4.2.1 of the Base Plan as well as in Section F.4.1 of the City of Sacramento Annex and are assumed to be the same or similar for the District.

Growth and Development Trends

As part of the planning process, the District looked at changes in growth and development, both current and future, and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability over time. This inventory section details future development/redevelopment projects that are likely to occur over the next five years covered by this 2026 LHMP. For Districts, this generally includes the following:

- Construction/development projects related to adding new District facilities, infrastructure, land acquisition, etc.
- Plans for expansion or build out of the District's service area, including new service hookups, and other District functions related to where the District will be expanding services.

Population Trends and Projections

RD 1000 has no land use authority. However, a number of major development projects have initiated the entitlement process and new development is expected within the RD 1000 jurisdiction in the City of Sacramento, County of Sacramento and Sutter County over the next 30 years. Population growth has occurred, and is expected to continue in the future.

Development since 2021 Plan

Although Reclamation District No. 1000's jurisdictional boundaries have remained unchanged, the District has experienced an increase in the population served as a result of continued urban development within the Natomas Basin. This has resulted in higher demands on the District's flood control, drainage, and pumping infrastructure. As agricultural lands transition to residential, commercial, and mixed-use development, the hydrologic characteristics of the watershed change significantly.

Urban development increases impervious surfaces such as roadways, rooftops, parking lots, and sidewalks. These surfaces reduce natural infiltration and increase the volume of stormwater runoff. Although Development projects are required to mitigate for increases to peak stormwater flows into the Districts drainage system, the additional stormwater volume increases the Districts pump operations.

Future Development Areas

It is important to review future development plans for the District. Future development should be sited in areas that are away from known hazard risks. If this is not possible, mitigation should be done to ensure that future development is protected against future hazards. RD 1000 has no land use authority. However, a number of major development projects have initiated the entitlement process and new development is expected within the RD 1000 jurisdiction in the City of Sacramento, County of Sacramento and Sutter County over the next 30 years. This will increase the value of the area protected by RD 1000 levees.

L.4.2. Hazard Identification

The RD 1000 identified the hazards that affect the District and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance (or priority of a hazard) specific to the District

(see Table L-4). Those hazards identified as a high or medium significance in Table L-4 are considered District priority hazards for mitigation planning. Those hazards that occur infrequently or have little or no impact in the District were determined to be of low significance and not considered a priority hazard. Significance was determined based on the hazard profile, focusing on key criteria such as frequency, extent, and resulting damage, including deaths/injuries and property, natural and cultural resources, and economic damage. The ability of a jurisdiction to reduce losses through implementation of existing and new mitigation measures was also considered as to the significance of a hazard. This assessment was used to prioritize those hazards of greatest significance, enabling the District to focus resources where they are most needed.

Table L-4 RD 1000—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/Severity	Significance	Climate Change Influence
Aquatic Nuisance Species (plant/animal)	Significant	High	Limited	Low	Low
Climate Change	Extensive	High	Limited	Medium	–
Dam Failure	Limited	Unlikely	Limited	Low	Medium
Drought & Water Shortage (w/tree mortality)	Extensive	Likely	Limited	Low	High
Earthquake (w/subhazards)	Extensive	Unlikely	Critical	Low	Low
Flood: 1%/0.5%/0.2% annual chance	Extensive	Unlikely	Catastrophic	Medium	Medium
Flood: Localized Stormwater	Limited	Likely	Limited	Low	Medium
Landslides, Mudslides, and Debris Flow	Limited	Unlikely	Limited	Low	Medium
Levee Failure	Extensive	Unlikely	Catastrophic	High	Medium
Sea Level Rise	Limited	Likely	Limited	Low	High
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 (Hail, Lightning, Wind)	Extensive	Likely	Limited	Medium	Medium
Severe Weather: High Winds and Tornadoes	Extensive	Likely	Limited	Medium	Low
Subsidence	Limited	Likely	Limited	Low	Medium
Wildfire (with smoke and air quality)	Limited	Likely	Limited	Low	High
Geographic Extent Limited: Less than 10% of planning area Significant: 10-50% of planning area Extensive: 50-100% of planning area Likelihood of Future Occurrences Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years. Magnitude/Severity Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid Significance Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact Climate Change Influence Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact					

L.4.3. Hazard Profiles and Vulnerability to Specific Hazards

This section includes the hazard profiles and vulnerability assessment for the RD 1000's priority hazards (i.e., those ranked of medium or high significance specific to the District as identified in the Significance column of Table L-4). This section focuses on where and how the District is affected by their priority hazards. Chapter 4 of the Base Plan provides 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 4.2 of the Base Plan.

Hazard Profiles and Vulnerability Assessment

Each hazard is profiled in the following format:

- **Hazard Profile** – A hazard profile is included for each hazard. This includes information on:
 - ✓ **Hazard Overview** – A general discussion of the hazard and related issues is detailed here.
 - ✓ **Location and Extent** – Location is the geographic area within the District that is affected by the hazard. Extent is the expected range of intensity for each hazard. These are discussed in specific detail for mapped hazards, and in more general detail for those hazards that do not have discrete mapped hazard areas.
 - ✓ **Past Occurrences** – Past occurrences are discussed for each hazard. A discussion of disaster declarations is included in each hazard section. NCEM events are also discussed. Other past occurrences data specific to the District follow the disaster declarations and NCEM events for each hazard.
 - ✓ **Climate Change** – This section contains the effects of climate change (as applicable). The possible influence of climate change on the hazard is discussed.

After the hazard profile, a vulnerability assessment is presented. As part of the vulnerability assessment, an estimate of the vulnerability of the District to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections. 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.

After this classification, a general discussion of hazard vulnerabilities occurs. This is done in the following format:

- **Vulnerability Overview** – A general discussion of the hazard vulnerability and related issues is detailed here.
- **Local Concerns** – This includes District provided information on how the District is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same order as in Section L.4.1 above, with a few exceptions. This includes sections on: People and Populations; District Assets and Critical Facilities and Infrastructure; and Natural, Historic, and Cultural Resources. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped. Sections on Community Lifelines and Economic Assets and Community Activities of Value are not included in the Sections below, as they are common to all jurisdictions and are fully covered in Section L.4.1 above and in Chapter 4 of the Base Plan.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the District and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset.
- **Future Conditions/Future Development** – A discussion of how future conditions and future development may affect the hazard is also included. This considers both new District assets and improvements as well as any changes with the District’s boundaries.

Power Interruption/Power Failure: A Common Vulnerability of all Hazards

An impact of almost all hazards evaluated as part of this LHMP Update relates to power shortage 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 U.S. 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. Much of the Sacramento County Planning Area is served by Pacific Gas & Electric (PG&E) and Sacramento Municipal Utility District (SMUD). More information on types of power disruptions can be found in Section 4.3 of the Base Plan.

Public Safety Power Shutoff (PSPS)

An intentional disruption type of power shortage/failure event has been implemented in California as a result of wildfires starting 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 preparing all Californians for the threat of wildfires and power outages during times of extreme (fire) weather. To help protect customers and communities during extreme fire weather events, electric power may be shut off for public safety in an effort to proactively prevent wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3 of the Base Plan. PG&E noted no PSPS events in the Sacramento County Planning Area since the 2021 LHMP. SMUD noted that it has had no PSPS events for its service territories since 2021.

Local Concerns

There have been no intentional (including PSPS events) or unintentional power outage issues associated with hazard events affecting the District since 2021. However, with an increase in climate change related issues (e.g., extreme heat conditions, atmospheric river storms) occurring in the Sacramento County Planning Area, the potential for future hazard related power outages remain a concern.

Generally, the risk due to power outages are low because of the interconnectivity of the drainage system allowing water to be pumped out from multiple plants; also, the plants are served by two electrical suppliers, SMUD in Sacramento County and PG&E in Sutter County. In addition to the risk being low, the vulnerability is also low as the damages are typically limited to flooded fallow agricultural fields or streets and other low points in the urban areas and not damaging homes or other structures provided the outage is of short duration. However, should the duration of the outage be for an extended period and occur during a major storm, the risk will increase and could affect potential evacuation routes if Natomas must be evacuated due to levee safety concerns.

Hazard Profiles and Vulnerability Assessment by Hazards

The following sections provide the hazard profile and vulnerability assessments for each of the hazards identified in Section L.4.2 Hazard Identification.

Climate Change

Likelihood of Future Occurrence—Highly Likely

Vulnerability—Medium

Hazard Profile

Climate change adaptation is a key priority of the State of California. The 2023 State of California Multi-Hazard Mitigation Plan noted that climate change is 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.

California's Adaptation Planning Guide: Understanding Regional Characteristics (from 2017) has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. The District falls in the North Central Valley Region. A map and climate projections for this region are shown in Section 4.3.7 of the Base Plan and include an increase in temperatures, moderate changes in rainfall, and increased risk to wildfire.

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the District, the Sacramento County Planning Area, surrounding counties, 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

Disaster Declaration History

Climate change has never been directly linked to any declared disasters.

NCDC Events

NCDC does not track climate change events.

RD 1000 Events

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. While no singular event has been formally attributed solely to climate change, the District has observed increasingly variable and extreme weather patterns consistent with regional climate projections.

Vulnerability to Climate Change

The whole of the District is at some measure of vulnerability to climate change. The District Planning Team has concerns that the vulnerability of the District to climate change will continue to increase in the future. An assessment of a community's vulnerability to climate change begins with an understanding of local exposure to climate change. This is included in the Local Concerns section below followed by a discussion of the District's assets at risk and impacts to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

The District has observed conditions consistent with regional climate trends. These include periods of more intense storm events, prolonged extreme heat, variable precipitation patterns, and increased operational demands on drainage and pumping infrastructure. Such conditions have required heightened monitoring, routine adjustments to operations, and continued emphasis on maintenance and system readiness.

OTHER VULNERABILITIES/CONCERNS/ISSUES/PROBLEM AREAS SPECIFIC TO THE DISTRICT? CAN THE DISTRICT PROVIDE DETAILS ON THE CLIMATE CHANGE ISSUES THAT WILL SUPPORT MITIGATION ACTION DEVELOPMENT?

Assets at Risk

Assets at risk from climate change include people and populations; District assets and critical facilities and infrastructure); and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

Climate change affects District staff, and those served by the District, especially those climate change issues related to increases in temperature over time. While all populations can be affected by temperature extremes, populations particularly vulnerable include the very old and very young, medically fragile people, people without means of shelter (and air conditioning or heat) or transportation, people who are socially isolated and other vulnerable or underserved populations (as shown in the discussion in Section L.4.1). This includes District staff and contractors, especially those who work outdoors as well as those more vulnerable populations within District boundaries, including those who work or recreate outdoors. Acclimatization to extreme temperatures and other weather extremes may help reduce impacts from these extreme events, such as from heat waves, in the healthy general population but may not be sufficient to protect those with underlying medical conditions.

District Assets and Critical Facilities and Infrastructure

Climate change, on its own, does not generally impact structures (like District assets and critical facilities). However, structures in areas of increased flood, drought, extreme heat, or wildfire areas exacerbated by the effects of climate change would be at increased risk, as described throughout this LHMP. Due to the slow onset of climate change, many structures in the District are expected to undergo improvements and adapt over time to a new climate normal.

Natural, Historic, and Cultural Resources

The rivers, streams, agricultural areas, and open space areas of the District support rich biodiversity, including many special-status species and habitat areas. These are all at risk from the effects of climate change. In addition, if heat continues to contribute to changes in wildfire patterns, some areas (on land) of the District are at increased risk from fire – including natural, historic, and cultural resources. Furthermore, as climate change exacerbates the extreme heat and drought hazard, areas of wetlands in the District may be reduced or dry up temporarily, which could damage habitat areas for waterfowl and other species that depend on these areas.

Impacts from Climate Change

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Central Valley Region in which the District is part of:

- Increased temperatures
- Reduced precipitation
- Public health – heat and air pollution
- Reduced agricultural productivity
- Inland flooding

➤ Reduced tourism

In addition to these sources, the 2023 State of California Hazard Mitigation Plan noted that according to California's Fourth Climate Change Assessment, the state will experience the following climate impacts:

- Annual average daily high temperatures are expected to rise by 2.7° F by 2040, 5.8°F by 2070, and 8.8°F by 2100 compared to observed and modeled historical conditions. These changes are statewide averages.
- Heat waves are projected to become longer, more intense, and more frequent.
- Warming temperatures are expected to increase soil moisture loss and lead to drier conditions. Summer dryness may become prolonged, with soil drying beginning earlier in the spring and lasting longer into the fall and winter.
- Droughts are likely to become more frequent and persistent through 2100.
- The strength of the most intense precipitation and storm events affecting California is expected to increase.
- Snowpack levels are projected to decline significantly by 2100 due to reduced snowfall and faster snowmelt.
- Marine layer clouds are projected to decrease.
- Extreme wildfires (i.e., fires larger than 24,710 acres) would occur 50 percent more frequently. The maximum area burned statewide may increase 178 percent by the end of the century.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the District include the following:

- As climate change continues to accelerate over time, climate related impacts to the District will continue to increase.
- Population projections within the jurisdictional boundaries of the District show the population to be increasing. It is unknown how population patterns and demographics will change in the near future. The District may add staff, but this number would be small. The District noted that it has no control over population changes within its jurisdictional boundaries. With no additional populations numbers and makeup, the vulnerability of the District to this hazard may increase.
- Changes in land use and development in the District are expected to occur in the near future and thus may affect climate change impacts to the District. In addition, adherence to protective building codes

for new development will also assist in limiting future impacts and associated vulnerabilities of the District to this hazard.

Future Development

Future development considerations should be ongoing and proactive. Climate change can influence future development in the District over time. The District could see population fluctuations as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to impact demand for housing and other development. While there are currently no formal studies of specific migration patterns expected to impact the District, climate-induced migration was recognized within the 2026 California Fifth Climate Assessment and is expected to be the focus of future studies.

Flood: 1%/0.5%/0.2% Annual Chance

Likelihood of Future Occurrence—Occasional (1%)/Unlikely (0.5/0.2%)

Vulnerability—Extremely High

Hazard Profile

This hazard discusses the FEMA DFIRM 1%, 0.5%, and 0.2% annual chance floods. These tend to be the larger floods that can occur in the District and have caused damage in the past. Flooding can be a significant problem in the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the District swell with heavy rainfall and snowmelt runoff. The District has also been at risk during atmospheric river flood events. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures located throughout the Sacramento County Planning Area and the RD 1000. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage. Flooding has occurred within the 1% annual chance floodplains and in other localized areas in the District.

Location and Extent

The RD 1000 has areas located in the 1% annual chance flood zones. This is seen in Figure L-2.

Figure L-2 RD 1000 – FEMA DFIRM Flood Zones

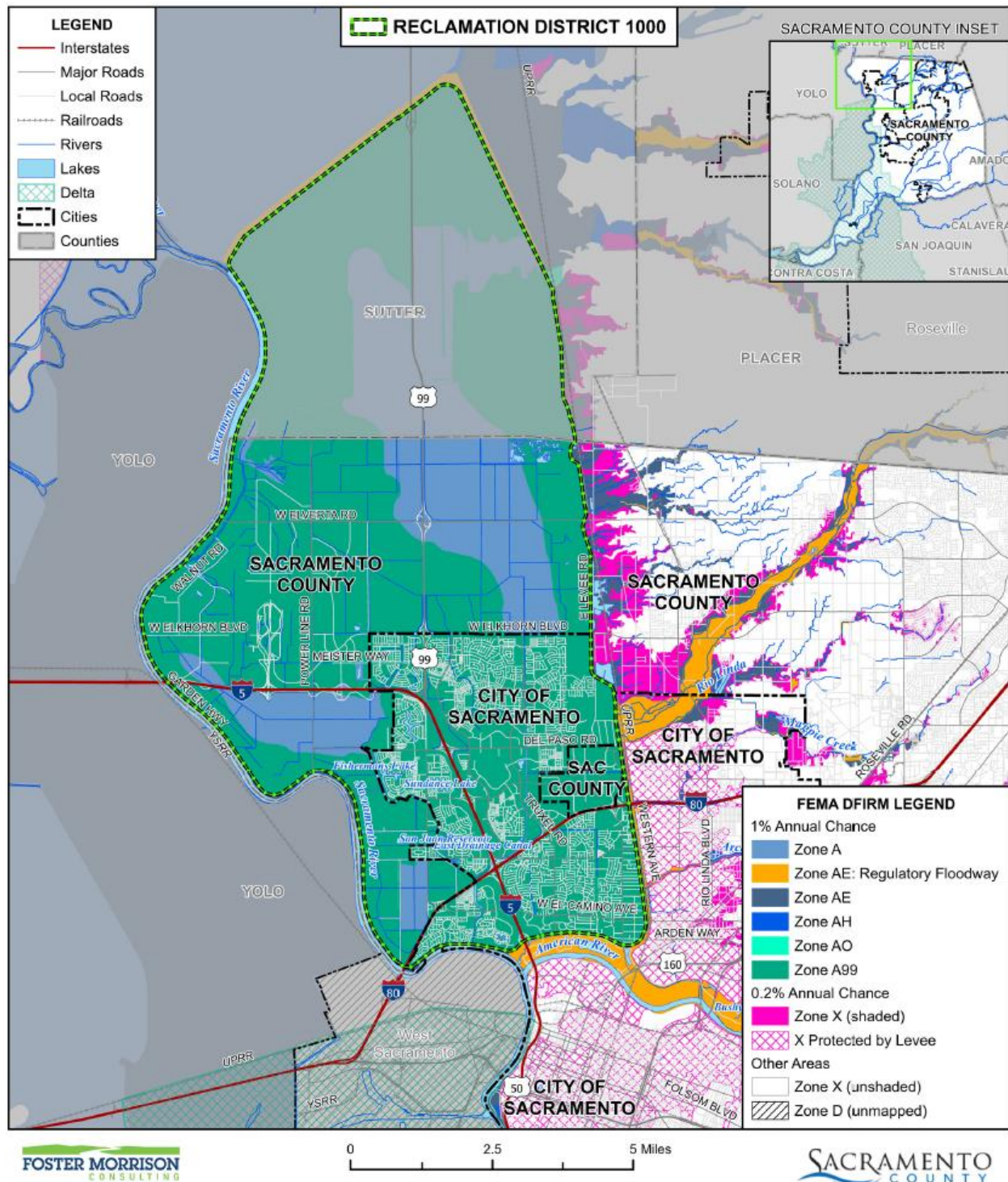


Table L-5 details the DFIRM mapped flood zones located within the District.

Table L-5 RD 1000– DFIRM Flood Hazard Zones

Flood Zone	Description	Present in District
A	1% annual chance flooding; No base flood elevations provided	X
AE Regulatory Floodway	1% annual chance flood: Regulatory floodway; Base flood elevations provided	X
AE	1% annual chance flooding; Base flood elevations provided	X
AH	1% annual chance flood areas of shallow flooding between one to three feet deep. Regulatory floodway; Base flood elevations provided	
AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone.	
A99	Areas subject to inundation by the 1-percent-annual-chance flood event, but which will ultimately be protected upon completion of an under-construction Federal flood protection system.. No Base Flood Elevations (BFEs) or depths are shown.	X
Shaded X	0.2% annual chance flooding: The areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	
X Protected by Levee	Areas protected by levees from 1% annual chance flood event. Levee protection places these areas in the 0.2% annual chance flood zone. Flood insurance is not mandatory but is available.	
X (unshaded)	No flood hazard	

Source: FEMA DFIRM 02/22/2024

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.

Geographical flood extents for the District from the FEMA DFIRMs are shown in Table L-6.

Table L-6 RD 1000 – Geographical DFIRM Flood Zone Extents

Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
1% Annual Chance Flood Hazard	34,716	100%	10,939	100%	23,777	100%
0.2% Annual Chance Flood Hazard	0	0%	0	0%	0	0%
Other Areas	0	0%	0	0%	0	0%
RD 1000 Total	34,716	100%	10,939	100%	23,777	100%

Source: FEMA DFIRM 02/22/2024

Past Occurrences

Disaster Declaration History

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

Table L-7 Sacramento County – State and Federal Disaster Declarations from Flood 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	26	1950, 1955, 1958 (twice), 1963, 1969, 1982 (twice), 1983, 1986, 1995 (twice), 1996, 1997, 1998, 2008, 2017 (three times), 2022*, 2023 (three), 2024 (twice)	18	1955, 1958, 1964, 1969, 1983, 1986, 1995 (twice), 1997, 1998, 2006, 2017 (three times), 2023 (three times)*, 2024*

Source: Cal OES, FEMA

*included a landslide component.

NCDC Events

The NCDC tracks flood events for the County. Events have been tracked for flooding since 1993. Sacramento County has seen 174 events. These events most likely had some impact on the District.

RD 1000 Events

While the District did not incur any physical damages as a result of the 2023 Severe Winter Storms and Atmospheric River events (DR-4683 and DR-4699), operational impacts were experienced, including increased power consumption at District pumping plants and additional staffing time required to maintain system operations and ensure continued flood protection.

Climate Change and Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with flood. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 2024 CAS, climate change may affect flooding in California, the Sacramento County Planning Area, and the District. While average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is possible that average soil moisture and runoff could decline, however, due to increasing temperature, evapotranspiration rates, and spacing between rainfall events. Reduced snowpack and increased number of intense rainfall events are likely to put additional pressure on water infrastructure which could increase the chance of flooding associated with breaches or failures of flood control structures such as levees and dams.

Cal Adapt future precipitation projections were shown in Section 4.3.4.

The 2024 Sacramento County CAP noted that climate change is likely to lead to changes in the frequency, intensity, and duration of extreme weather events, such as sustained periods of heavy precipitation, increased rainfall intensity during precipitation events, and increased risk of rain-on-snow events. Further, more winter-time precipitation that falls as rain instead of snow, and higher temperatures that will cause earlier snowmelt, which could produce substantial surface water flows over a short period of time and may potentially affect dams and spillways and overwhelm levee systems designed for historical precipitation patterns. Historically, the County experienced an average of four extreme precipitation events per year (as shown in Section 4.3.4 of the Base Plan). Under the medium and high emissions scenarios, the County is expected to experience five to six extreme precipitation events per year by mid-century and six to seven extreme precipitation events per year by the late century.

The 2026 American, Bear, and Cosumnes Watersheds Resilience Plan noted that a key driver of climate vulnerability, adaptive capacity, and implementation readiness in the watershed group is flooding. An equity analysis was performed as part of this Plan. An Equity Analysis Technical Appendix demonstrates how social vulnerability aligns with the physical hazard environment across the watershed. It noted that flooding impacts are most severe downstream, where rising flows increasingly stress Sacramento's levee system; a modeled levee-breach scenario affects 12.5% of the watershed population, and 59% of those affected fall into the highest flood-sensitivity category.

Future flooding exacerbated by climate change will result in a range of potential impacts across the County. For populations, there is an array of social vulnerability factors that exacerbate flood-related risks, and those residing in floodplains are especially vulnerable to the direct impacts of flooding. Floodwaters can interact with sources of pollution and distribute hazardous pollutants locally and regionally, which may result in water contamination and a range of human health impacts. Additionally, flooding can disrupt transportation networks, cause economic losses through business and government facility closures, disrupt communications, disrupt the provision of utilities, and cause significant damage to buildings and critical infrastructure. Further, flooding may also threaten ecosystems and agricultural resources; unlike natural flooding regimes that deposit useful sediment resulting in increased soil fertility as well as groundwater recharge, catastrophic flooding from levee overtopping could lead to soil erosion and loss of viable cropland. It could also release sewage and hazardous materials into the environment if wastewater treatment plants are inundated, storage tanks are damaged, and pipelines are severed.

Vulnerability to Flood: 1%, 0.5%, and 0.2% Annual Chance

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 damage and potential loss of life and injury. Predominantly, the effects of 1% annual chance flooding are generally confined to areas near the waterways of the District. As waterways grow in size from local drainages, so grows the threat of flood and dimensions of the threat.

The whole of the District is at some measure of vulnerability to floods. An assessment of a community's vulnerability to flood begins with an understanding of local exposure to flood. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

The District's flood concerns include interior drainage, high water conditions along the perimeter levee system, and the protection of life safety, property, and critical infrastructure from both external and localized flooding within the District. Periods of sustained high water along the Sacramento River and Feather River place increased stress on the levee system and require continuous monitoring to ensure structural integrity and stability. Along the perimeter federal levee system and the Pleasant Grove area levees, these large flood events can result in the following potential impacts:

- erosion of both the landside and waterside levee slopes and waterside berms.
- Seepage both through levee and under levee causing landside boils requiring emergency actions including building sandbag rings, filling landside canals, installing sheet piles, removing pumping plants
- Downed trees blocking access and causing large root ball voids in the levee
- Damages to levee maintenance roads due to excessive patrols to monitor the levees during high water events
- Damages to pump plant outfall structures

Within the interior drainage system these large flood events can result in the following impacts:

- Erosion of the canal, drain and ditch banks
- Sedimentation of the canals, drains and ditches blocking flows
- Damages to drainage culverts, headwalls, gate structures, access structures, or other drainage facilities
- Damages to pumping plants including trash rakes, pumps, and electrical equipment

Maintaining levee integrity, ensuring the continuous operation of pumping and drainage systems, and mitigating the impacts of interior water accumulation on transportation, utilities, and residents are key priorities during these events.

OTHER VULNERABILITIES/CONCERNS/ISSUES/PROBLEM AREAS SPECIFIC TO THE DISTRICT? CAN THE DISTRICT PROVIDE DETAILS ON THE ROOT CAUSE/PROBLEM DESCRIPTION OF FLOOD ISSUES THAT WILL SUPPORT MITIGATION ACTION DEVELOPMENT?

Assets at Risk

Assets at risk from flood include people and populations; District assets and critical facilities and infrastructure); and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All people and populations located in the 1% annual chance floodplains within the District (including both District staff and the population within District boundaries) are at some risk to flooding. Certain vulnerable populations located within areas prone to flooding may be at increased risk to this hazard, especially during

a large event with minimal advance notice. These vulnerable populations include: the unsheltered, those with limited mobility, and those that lack the resources to leave the area.

Populations within District boundaries can be the most vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events.

District Assets and Critical Facilities and Infrastructure

Certain District structures are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. Flooding presents a threat to both critical facilities and infrastructure, as well as community lifelines. Critical infrastructure plays an immensely important role in the District and surrounding communities. District assets listed in Table L-8 would be at risk to flooding.

Table L-8 RD 1000 Assets: Structures, Critical Facilities and Infrastructure, and Other Facilities at Risk to Flood

Name of Asset	Facility Type	Replacement Value
RD 1000 Plant 1A and 1B	Essential	\$30,000,000
RD 1000 Plant 2	Essential	\$8,000,000
RD 1000 Plant 3	Essential	\$12,000,000
RD 1000 Plant 4	Essential	\$10,000,000
RD 1000 Plant 5	Essential	\$5,000,000
RD 1000 Plant 6	Essential	\$8,000,000
RD 1000 Plant 8	Essential	\$20,000,000
District Drains/Canals	Essential	\$55,000,000
RD 1000 Federal Levee system	Essential	\$2,000,000,000
RD 1000 Corporation Yard	Essential	\$10,000,000
RD 1000 Office	Essential	\$500,000
Pleasant Grove Area Levees	Essential	\$2,000,000
Total		\$2,160,500,000

Source: RD 1000

Not all these facilities will likely be damaged during the 1% flood events. More significant damages to all the District facilities would only occur if the flood resulted in a levee failure which is described in more detail below under the Levee Failure Hazard.

Generally, all the RD 1000 facilities are at risk from this flood hazard depending on the specific nature of the flood event but the damages would likely be limited to specific features at specific locations.

Natural, Historic, and Cultural Resources

Large flood events can affect natural, historic, and cultural resources. There are a number of ways floodwaters can impact natural resources and the environment. Wildlife habitats can be destroyed by floodwaters. Contaminated floodwater can pollute rivers and habitats. Silt and sediment can destroy natural

areas. Riverbanks and natural levees can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survived the initial flood may die due to being inundated with water. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures within the flooded areas, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme flood events. Any of these that fall in the flood zones shown on Figure L-2 would be vulnerable.

Impacts from Flood: 1%, 0.5%, and 0.2% Annual Chance

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Large flood events, including those associated with 1% annual chance floods, can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. People may be swept away in floodwaters, causing injuries or deaths. 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. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Structures can be damaged directly from floodwaters and can also be damaged from trees falling as a result of water-saturated soils. 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 causing power outages. The interruption of power causes major problems and can result in the closure of governmental offices and community businesses. Public schools may also be required to close or be placed on a delayed start schedule. Roads can be damaged and closed, causing safety and evacuation issues.

Standing water can cause damage to crops, roads, foundations, and electrical circuits. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change (which was discussed in the hazard profile discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. These are discussed below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the RD 1000 include the following:

- Climate change is likely to exacerbate future flood conditions and associated impacts and vulnerability of the District to 1% and 0.2% annual chance flooding. This was discussed in greater detail in the Climate Change and Flood section of the Hazard Profile above.
- Population projections within the jurisdictional boundaries of the District show the population to be increasing. It is unknown how population patterns and demographics will change in the near future. The District may add staff, but this number would be small. The District noted that it has no control over population changes within its jurisdictional boundaries. With no additional populations numbers and makeup, the vulnerability of the District to this hazard may increase.
- Changes in land use and development in the District are expected to occur in the near future and thus may affect flood impacts to the District. Additional development traditionally leads to additional flooding. In addition, adherence to protective building codes for new development will assist in limiting future impacts and associated vulnerabilities of the District to this hazard.

Future Development

Future development in the District may be built in the floodplain, as long as it conforms to the standards of the floodplain ordinance. The County and each City enforce their floodplain management ordinance on areas inside the District. More detail on the specifics of the floodplain ordinance can be found in Section 4.4.1 of the Base Plan and in Section F.F.3 of the City of Sacramento annex. New District facilities and assets will be sited in such a way as to reduce the risk from flooding to District structures and assets.

Levee Failure

Likelihood of Future Occurrence—Unlikely

Vulnerability—Extremely High

Hazard Profile

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. A natural levee is formed when sediment settles on the streambank, raising the level of the land around the stream.

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 a release from or failure of a dam. 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. It is important to remember that 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.

Over 518 miles of levees are located throughout the Sacramento County Planning Area. These include both accredited and unaccredited levees, as discussed in Section 4.3.14 of the Base Plan, all which pose a risk to adjacent communities should a levee fail or overtop. While the levee analysis included in this section focuses on the accredited levees and those with improvements in process based on the DFIRM A99 and X-Protected by Levee Flood Zones, there are many older, unaccredited levees located throughout the County

Planning Area, including the District, that may have a greater potential for overtopping or breaching and pose a significant risk to communities should they fail.

Location and Extent

Most areas of the District are at risk to levee failure flooding. There is not a scientific scale or measurement system in place for levee failure. It is usually measured in area covered and depth of flooding. Expected flood depths from a levee failure within the Natomas Basin vary based on existing ground elevation and location of the levee failure and will vary from less than 5 feet to over 20 feet. Should a levee failure occur it is anticipated 90% of the District will be flooded as closing a levee is nearly impossible during flood stages. 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 City of Sacramento have designated rescue zones and evacuation zones based on the distance from the levee failure. The speed of onset is slow as the river rises, but if a levee fails the warning times are 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. Those levees accredited as providing protection against the 1% or greater annual chance flood and those in levees in the certification process are identified in the FEMA DFIRMs which also include those areas protected by the levees. Geographical DFIRM A99 (there are no X Protected by Levee flood zones) extents from the FEMA DFIRMs is shown on Figure L-3 and included in Table L-9.

[illegible]

Sacramento County
Local Hazard Mitigation Plan Update
October 2026

Table L-9 RD 1000 – Geographical Flood Hazard Extents in FEMA X Protected by Levee DFIRM Flood Zones

Flood Zone	Total Acres	% of Total Acres	Improved Acres	% of Total Improved Acres	Unimproved Acres	% of Total Unimproved Acres
Zone A99	28,369	82%	10,213	93%	18,156	76%

Source: 02/2024 DFIRM

Past Occurrences

Disaster Declaration History

There have been two state and two federal disasters declarations directly related to levee failure in Sacramento County, as shown on Table L-10. Also, it is important to note that many of the flood disaster declarations included in Section 4.3.11 of the Base Plan (like the December 31, 2022 event near Wilton) also may include flooding associated with levee breach or failure events.

Table L-10 Sacramento County – State and Federal Disaster Declarations Summary 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Levee Break	2	1972, 1980	2	1972, 1980

Source: Cal OES, FEMA

NCDC Events

There have been no NCDC levee failure events in Sacramento County, as the NCDC does not track levee failure flooding as a stand-alone hazard.

RD 1000 Events

There have been no federal or state disaster declarations from levee failure in RD 1000. The District Planning Team noted the following past occurrences of near levee failures as detailed above the Flood 1%/0.2% Annual Chance section above: 1955, 1986, 1997, and 2006. It should be noted the levees west of the Sacramento Airport along the Sacramento River would have failed in 1986 had not the District and eventually the Corps of Engineers conducted an emergency flood fight to stabilize the levee. Likewise, the Sacramento River north of Elverta Road was in jeopardy of failing and RD 1000 deployed emergency measures to again stabilize the levee. While catastrophic levee failures were avoided during these record flood events, additional levee improvements continued to accommodate future flood conditions in the Natomas basin. The 2017 emergency declarations included the Pleasant Grove Area levees that were in danger of overtopping and failing. The District conducted a flood fight and has subsequently repaired the damages with FEMA disaster assistance. The area protected is primarily agricultural property with a few ag-residences.

The District has not had levee breaches or other significant issues, impacting the District since the 2021 LHMP.

Climate Change and Levee Failure

The 2024 Sacramento County CAP noted that climate change is likely to lead to changes in the frequency, intensity, and duration of extreme weather events. The County is projected to experience a steady increase in average annual precipitation through the end of the century, with much of that precipitation likely to occur during extreme precipitation events, which can lead to flood impacts. According to Cal-Adapt, the historic average annual precipitation in Sacramento County is 18.3 inches, and the historic average annual number of extreme precipitation events is four. The average annual precipitation across the County may rise upwards of 22 inches, with the number of extreme precipitation events potentially exceeding 7 per year by the end of the century, depending on the level of current and future GHG emissions.

In general, California exhibits “booms and busts,” which refers to the existence of both very wet years and very dry years. The amount of precipitation that falls in any particular year is largely influenced by occurrences of large, discrete winter storms, also known as atmospheric rivers, which often provide a substantial fraction of the region’s annual precipitation, inclusive of the county. In California, atmospheric rivers vary in intensity; some are beneficial for water supply and replenish snowpack that naturally melts during the summer, serving as the water supply for people and agriculture, while others are responsible for widespread and adverse impacts (NOAA 2023). Extreme precipitation from these atmospheric rivers in the future may prove to be more variable, volatile, and potentially more severe. These extremes are most likely to occur during storm events, leading to more severe damage from waves and floods, thus possibly leading to more levee failure events.

Vulnerability to Levee Failure

According to historical hazard data and levee mapping, levee failures can occur in or near the District. Portions of the District are at some measure of vulnerability to levee failure floods, including failure or breach of accredited levees, those in the certification process, and unaccredited levees. An assessment of a community’s vulnerability to levee failure flooding begins with an understanding of local exposure to levees. This is included in the Local Concerns section below followed by a discussion of the District’s Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

General Concerns

Should a perimeter levee fail in RD 1000 along the Sacramento River, American River, Pleasant Grove Creek Canal, or Natomas Cross Canal, the entire Natomas Basin would likely be inundated due to volume of water within those rivers and canals. Only a small segment of the Natomas East Main Drain Canal levee south of Sankey Road might limit the basin flooding due to the smaller volume of water available to breach the levee.

Portions of the Pleasant Grove Creek Canal, American & Sacramento River levee systems, as well as specific reaches of the Natomas Basin levee system (Reaches A through I) defined under the American River Common Features (ARCF)-Natomas Basin project. These reaches encompass targeted segments where levee seepage, slope stability, and structural enhancements are being implemented to address identified flood risk deficiencies.

The U.S. Army Corps of Engineers, in coordination with local and state partners, is advancing the ARCF Natomas Basin levee improvement project. This work includes construction of seepage cutoff walls, landside seepage berms, levee grading and slope stabilization, utility relocations, and other risk reduction measures across Reaches A–I.

Vandalism

If a potential levee failure can be identified in advance, an evacuation could be done to limit potential loss of life, though it would not diminish the resulting property damage. A catastrophic levee failure with no warning would likely result in loss of life in Natomas. This is why a robust levee patrol and monitoring system is essential to identify levee problems early and allow for emergency response and evacuations.

District facilities, in particular the pump stations are targets for security breaches and vandalism. The electrical equipment and copper wiring are a target for thieves and vandals. If damaged or stolen, the pumping plant could be inoperable until repairs can be made. If this occurs during flood season and prior to a major storm event, the plant could be down for an extended period resulting in increased flood risks such as localized flooding as previously described.

Recently, a new security and vandalism hazard has emerged in the form of homeless encampments on the levees and within the floodway. In some instances, the levee has been damaged or degraded to accommodate tents and other living quarters. In addition, displaced persons move up the levees as flood waters rise blocking access for levee patrols and potentially delaying critical flood emergency responses to insure no people are at risk while the large equipment deploys flood fight materials such as large rocks.

The security issues related to the pumping plants can occur at any of the seven RD 1000 plants. The security issues related to homeless and displaced persons is primarily within the urban areas of the District and are concentrated on the American River on the southern perimeter and Natomas East Main Drain Canal along the southeastern perimeter.

Prior to installation of the high security fencing at Plant 8, the District had several security breaches resulting in vandalism and wire theft. Because of the location of the most recent wire theft, several pumps were inoperable for an extended period before the new wires could be placed. Since the fencing was replaced, there have been security breaches but no major vandalism or wire theft.

Pumping Plant No. 1 was impacted by vandalism at the adjacent SMUD substation serving the plant resulting in the loss of a transformer. The transformer was not a standard one used by SMUD and had to be special ordered resulting in the plant being inoperable for an extended period.

There have been a number of other acts of security breaches and vandalism at District facilities in the past including the Corp Yard and District office resulting in tool and equipment theft and other operational impacts.

Since 2016, the homeless encampments have escalated along with the damages to the levees. In 2019, a large excavation was made in the American River levee segment requiring the District to request assistance from City law enforcement to remove the encampment so levee repairs could be made prior to flood season. These excavations in the levee are concealed from levee patrollers by tents, furniture and other temporary living facilities

As noted, security breaches and vandalism at any of the RD 1000 pump stations could result in loss of use of the facility for an extended period of time until repairs can be made. If the breach occurs prior to a large storm event, there could be localized flooding. While not causing extensive damage, the localized flooding could impact potential evacuation routes if it coincides with a levee failure or other emergency requiring evacuations.

Within the levee system, damages caused by homeless/displaced persons could impact levee stability depending on the extent of the damage and the fact it is not visible to the maintenance personnel to mitigate prior to a flood event. Of equal concern is the impact of the floodway inhabitants on the levee patrol and emergency operations. During high water, floodway inhabitants move to the high ground along the adjacent levees, oftentimes blocking the patrol roads, obscuring levee conditions, slowing the patrol efforts or delaying flood fight activities. Levee patrols are critical during high water to monitor the levee system for seepage, erosion, or other signs of levee distress. It is critical that emergency measures be implemented quickly to ensure minor problems do not escalate and lead to critical levee problems and/or levee failure.

OTHER VULNERABILITIES/CONCERNS/ISSUES/PROBLEM AREAS SPECIFIC TO THE DISTRICT? CAN THE DISTRICT PROVIDE DETAILS ON THE CAUSE/PROBLEM STATEMENT OF LEVEE FAILURE ISSUES THAT WILL SUPPORT MITIGATION ACTION DEVELOPMENT?

Assets at Risk

Assets at risk from levee failure include people and populations; District assets and critical facilities and infrastructure); and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All people and populations (including both District staff and the population within District boundaries) located in leveed areas are at some risk to levee failure flooding. Certain vulnerable populations located within areas prone to levee failure flooding may be at increased risk to this hazard, especially during a large event with minimal advance notice. These vulnerable populations include: the unsheltered, those with limited mobility, and those that lack the resources to leave the area.

District Assets and Critical Facilities and Infrastructure

The District has seven pump stations in the interior basin used to pump the stormwater and agricultural runoff from the basin into the adjacent riverine system. A catastrophic levee failure could eventually

damage all eight of the pump stations and require their reconstruction. Table L-8 shows the estimated replacement cost for each of the pump stations. In addition, the District has a corporation yard and a main office in Natomas. The main office is located on top of the existing Sacramento River levee and would likely not be physically damaged by a catastrophic flood event though it would not be functional due to loss of utilities including power as a result of the flood. The corporation yard would be damaged due to a flood event and could result in a loss of the District's equipment fleet unless it can be relocated to high ground before flood waters affect the corporation yard. This would be dependent on the location of a levee breach in relation to the yard. In addition to RD 1000 assets, the Natomas Basin includes significant public and private development and infrastructure including schools, churches, government buildings, major interstate highways, commercial, industrial and single family residences. In addition, Sacramento International Airport is also located within Natomas and their estimates are that it could be shut down for several months to a year or more to repair damages and make the airport functional again. Closure of the airport along with the infrastructure noted above would have a significant impact on the economy of the Sacramento region.

Table L-11 RD 1000 Assets: Structures, Critical Facilities and Infrastructure, and Other Facilities at Risk to Levee Failure

Name of Asset	Facility Type	Replacement Value
RD 1000 Plant 1A and 1B	Essential	\$30,000,000
RD 1000 Plant 2	Essential	\$8,000,000
RD 1000 Plant 3	Essential	\$12,000,000
RD 1000 Plant 4	Essential	\$10,000,000
RD 1000 Plant 5	Essential	\$5,000,000
RD 1000 Plant 6	Essential	\$8,000,000
RD 1000 Plant 8	Essential	\$20,000,000
District Drains/Canals	Essential	\$55,000,000
RD 1000 Federal Levee system	Essential	\$2,000,000,000
RD 1000 Corporation Yard	Essential	\$10,000,000
RD 1000 Office	Essential	\$500,000
Pleasant Grove Area Levees	Essential	\$2,000,000
Total		\$2,160,500,000

Source: RD 1000

With the levee improvements that have been completed to date and the remainder of the projects about to be completed by the Corps of Engineers over the next few years; the risk of a levee failure will be significantly reduced and not likely to occur. However, as noted previously, there always will be a levee failure risk due to unknowns and future potentially large flood events due to climate change or other climatological conditions.

Natural, Historic, and Cultural Resources

Large flood events, such as those occurring as a result of a levee failure, can affect natural, historic, and cultural resources. There are a number of ways floodwaters can impact natural resources and the environment. Wildlife habitats can be destroyed by floodwaters. Contaminated floodwater can pollute

ivers and habitats. Silt and sediment can destroy natural areas. Riverbanks and natural levees can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survived the initial flood may die due to being inundated with water. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures within the flooded areas, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme flood events. Any of these that fall in the A99 flood zones shown on Figure L-3 as well as those resources located in areas adjacent to or downstream of unaccredited levees would be vulnerable.

Impacts from Levee Failure

Floods and their impacts vary by location, including impacts associated with a levee failure flood event, and will only affect certain areas of the District that are in areas protected by levees. Based on the areas of the District surrounded by levees, it is evident that levee failure floods could potentially have significant impacts to the District, depending on the location, timing, and severity of the event. Impacts that are not quantified, but could be anticipated in large levee failure event, include:

- Injury and loss of life
- Structural and property damage
- Crop damage
- Disruption of and damage to public critical infrastructure and services
- Health hazards associated with mold and mildew, contamination of drinking water, etc.
- Impacts to natural resource areas, including stream bank erosion
- Damage to roads/bridges resulting in loss of mobility

In addition to flood related levee failures, the levees in the District are potentially at risk to failure during an earthquake event. Levee failure flooding could accompany an earthquake and could be compounded further if a dam or storage reservoir fails. Channels and water courses with earthen banks and levees are particularly vulnerable and could collapse in a major earthquake resulting in partial or complete blockage of channels causing flooding upstream of the impoundment. Levees are especially susceptible to rapid settlement due to liquefaction or horizontal spreading of underlying soils.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the RD 1000 include the following:

- Climate change is likely to exacerbate future flood and levee failure conditions and associated impacts and vulnerability of the District to levee failure flooding. This was discussed in greater detail in the Climate Change and Levee Failure section of the Hazard Profile above.
- Population projections within the jurisdictional boundaries of the District show the population to be to be increasing. It is unknown how population patterns and demographics will change in the near future. The District may add staff, but this number would be small. The District noted that it has no control over population changes within its jurisdictional boundaries. With no additional populations numbers and makeup, the vulnerability of the District to this hazard may increase.
- Changes in land use and development in the District are expected to occur in the near future and thus may affect levee failure flood impacts to the District. Additional development traditionally leads to additional flooding, especially in levee protected areas. However, adherence to protective building codes for new development will assist in limiting future impacts and associated vulnerabilities of the District to this hazard.

Future Development

Future development considerations should be ongoing and proactive. Ensuring that comprehensive land use planning is conducted, regulatory requirements, such as building codes and the floodplain ordinance, are followed, and levee improvements, inspections, and maintenance is ongoing will help reduce impacts to future development.

Severe Weather: Heavy Rains and Storms

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile

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. Wind often accompanies these storms; hail and lightning are rare in the District. In recent years, heavy rain and storms have been compounded by more frequent and higher intensity atmospheric river events.

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 and storms. Most of the severe rains occur during the fall, winter, and spring months in the District as discussed below. 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. Hail and lightning are rarer in the District and Sacramento County. Duration of severe storms in the District can range from minutes to hours to days. According to the WRCC, average annual precipitation in the County is 18.15 inches per year. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

Past Occurrences

Disaster Declaration History

According to historical hazard data, severe weather, including heavy rains and storms, is an annual occurrence in the District. This contributes to many of the federal disaster declarations related to flooding. Disaster declarations from flooding are shown on Table L-12.

Table L-12 Sacramento County – State and Federal Disaster Declarations from Flood (Heavy Rain and Storms) 1950-2025

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	26	1950, 1955, 1958 (twice), 1963, 1969, 1982 (twice), 1983, 1986, 1995 (twice), 1996, 1997, 1998, 2008, 2017 (three times), 2022*, 2023 (three), 2024 (twice)	18	1955, 1958, 1964, 1969, 1983, 1986, 1995 (twice), 1997, 1998, 2006, 2017 (three times), 2023 (three times)*, 2024*

Source: Cal OES, FEMA

NCDC Events

The NCDC data recorded 9 hail, 29 heavy rain, 1 lightning, and 2 winter storm weather incidents for Sacramento County since 1950. Winter weather events tend to be rain in the County.

RD 1000 Events

The District noted that heavy rains and storms are an annual occurrence often resulting in flooding. Other events causing issues are listed in the Past Occurrences section of the Flood: 1%/0.2% Annual Chance and discussions above.

In addition to those, the severe weather events occurring between **12/27/23–1/31/23** and **2/21/23–7/10/23** resulted in minimal impacts to the District and did not cause property damage. Observed effects were limited to intermittent power outages at District pumping plants, which were promptly resolved by the utility provider.

Climate Change and Heavy Rains and Storms

It is likely that climate change will increase the chance of future occurrence as well as future impacts from heavy rains and storms. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the 2024 CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is unlikely that hail will become more common in Sacramento County and the RD 1000. The amount of lightning is not projected to change.

Cal-Adapt noted that, on average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century. Cal-Adapt modeled scenarios are shown in Section 4.3.4 of the Base Plan.

According to the 2024 CAP, the County is projected to experience a steady increase in average annual precipitation through the end of the century, with much of that precipitation likely to occur during extreme precipitation events, which can lead to flood impacts. According to Cal-Adapt, the historic average annual precipitation in Sacramento County is 18.3 inches, and the historic average annual number of extreme precipitation events is four. As shown in Section 4.3.4 of the Base Plan, the average annual precipitation across the County may rise upwards of 22 inches, with the number of extreme precipitation events potentially exceeding 7 per year by the end of the century, depending on the level of current and future GHG emissions.

Vulnerability to Heavy Rain and Storms

Heavy rain and severe storms are among the most frequent type of severe weather occurrences in the District. These events can cause both significant and localized flooding. Flooding can be worse during times where the ground is already saturated. Wind often accompanies these storms and has caused damage in the past. Hail and lightning are rare in the District, but also can cause damage, with lightning occasionally igniting wildfires.

The whole of the District is at some measure of vulnerability to heavy rain and storms. An assessment of a community's vulnerability to heavy rains and storms begins with an understanding of local exposure to heavy rain and storms. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

Heavy rain and storm events pose a risk of interior flooding within Reclamation District No. 1000 due to the basin's reliance on active drainage and pumping. Primary concerns include limited drainage capacity during intense rainfall, pump station reliability, and storm related power outages that may temporarily disrupt pumping operations. Additional considerations include debris-restricted channels, localized urban

drainage issues, and increased stress on levees from elevated water levels and prolonged saturation. The District mitigates these risks through routine maintenance, continuous monitoring, pump station redundancy, and coordination with utility providers and partner agencies.

OTHER VULNERABILITIES/CONCERNS/ISSUES SPECIFIC TO THE DISTRICT? CAN THE DISTRICT PROVIDE DETAILS ON THE KEY PROBLEMS ASSOCIATED WITH HEAVY RAINS AND STORMS THAT WILL SUPPORT MITIGATION ACTION DEVELOPMENT?

Assets at Risk

Assets at risk from heavy rain and storms include people and populations; District assets and critical facilities and infrastructure); and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations (including vulnerable populations) in the District (including District staff and those within its boundaries) have some measure of risk to heavy rains and storms. Those populations that work or recreate outside and unhoused individuals are more vulnerable to impacts from heavy storm events. Heavy rains and storms occur every year and do not generally cause significant adverse impacts to individuals; it is the secondary hazard, flooding, which poses the biggest impact to people. Populations at risk to flooding resulting from heavy rains and storm events include those who live in floodplains (discussed in further detail in the Flood: 1%/0.2% Annual Chance and Levee Failure section above) and those who live in and near localized flooding areas.

District Assets and Critical Facilities and Infrastructure

District assets have some risk to heavy rains and storms. Heavy rain and storms can affect critical facilities and infrastructure during large events. District structures built to modern building codes are built to withstand heavy rains and storms (including thunderstorm winds and lightning); older structures may be more vulnerable. During a heavy storm, localized flooding may cause water intrusion into buildings from the outside. Trees can be downed causing impacts to structures. Older homes and buildings may be at increased risk to heavy rains and storms. Power outages during severe storm events can occur, impacting the use of structures until the power is back online. Local roads, streets, and bridges can be impacted resulting in closures restricting traffic flow in the District. In certain areas, large storms can cause erosion and localized landslides which can impact affected facilities. No District assets were at risk Table L-3 were thought to be at risk from heavy rains and storms.

Natural, Historic, and Cultural Resources

Large rain and storm events and associated flooding can affect natural, historic, and cultural resources. Silt and sediment can damage natural areas. Trees can be uprooted and downed by high winds. Extended periods of rainfall can erode natural banks along waterways and degrade soil stability for terrestrial species. While some natural systems can be adversely impacted during these large storms, heavy rain events can also provide benefits. Groundwater and wetland areas can be recharged and water supplies replenished. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to

structures affected by large storm events, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged, and lost during extreme rain and storm and events.

Impacts from Heavy Rain and Storms

Impacts from heavy rains and storms include damage to property, critical facilities and infrastructure, and the natural landscape. This includes: erosion; downed trees; damaged utility structures and infrastructure; power outages; road damage and blockages; and even lightning strikes to critical infrastructure and people. Lightning can also cause wildfires and urban fires to occur. Landsliding and erosion occur when the soil on slopes becomes oversaturated and fails. Climate change may cause these impacts to worsen.

Actual damage associated with the primary effects of severe storms and heavy rains has been somewhat limited. It is the secondary hazards caused by these severe weather events, such as floods, landslides, and erosion that would likely have the greatest impact.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the District include the following:

- Climate change is likely to exacerbate future heavy rain and storm conditions and associated impacts and vulnerability of the District to flooding. This was discussed in greater detail in the Climate Change and Heavy Rains and Storms section of the Hazard Profile above.
- Population projections within the jurisdictional boundaries of the District show the population to be increasing. It is unknown how population patterns and demographics will change in the near future. The District may add staff, but this number would be small. The District noted that it has no control over population changes within its jurisdictional boundaries. With no additional populations numbers and makeup, the vulnerability of the District to this hazard may increase.
- Changes in land use and development in the District are expected to be occur in the near future may affect heavy rains and storm and associated impacts to the District. Adherence to protective building codes for new development will assist in limiting future impacts and associated vulnerabilities of the District to this hazard.

Future Development

Building codes in the District ensure that new development is built to current building standards, which should reduce the risk to future development in the District from heavy rains and storms. New critical facilities such should be built to withstand hail damage, lightning, and thunderstorm winds. New and existing critical facilities and infrastructure should also consider adding backup power systems to limit impacts associated with power outages. With adherence to development standards, future losses to new development should be minimal. Changes in land use may also amplify the impacts of heavy rains and storms, as additional impervious surfaces can cause additional runoff and localized flooding throughout the District.

Severe Weather: High Winds and Tornado

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile

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 damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds can also lead to power outages and in rare instances when combined with high temperatures and low humidity can also lead to PSPS events. Winds can cause wave actions near levees, causing erosion to occur. Winds can also drive fires in and near the District.

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, can affect areas of the District, 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 District 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 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

Disaster Declarations

There have been no federal or state disaster declarations in the County for winds and tornadoes.

NCDC Events

The NCDC data recorded 109 high wind, 7 funnel cloud, and 15 tornado incidents for Sacramento County since 1950. Many of these wind events likely affected the District.

RD 1000 Past Occurrences

The severe weather events occurring between 12/27/23–1/31/23 and 2/21/23–7/10/23 resulted in minimal impacts to the District and did not cause property damage. Observed effects from winds were limited to intermittent power outages at District pumping plants, which were promptly resolved by the utility provider.

Climate Change and High Winds and Tornado

According to the 2024 CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual thunderstorm events is likely to increase during the 21st century. This may bring stronger thunderstorm winds. The CAS does not discuss non-thunderstorm winds or tornadoes.

Vulnerability to Severe Weather: High Wind and Tornadoes

The District is subject to potentially destructive high winds and tornadoes. High winds are common throughout the area and can happen during most times of the entire year and outside of a severe storm event. Tornadoes are rare. High winds and tornadoes can be a significant public safety and economic concern. The whole of the District is at some measure of vulnerability to wind and tornadoes.

An assessment of a community's vulnerability to high winds begins with an understanding of local exposure to wind and tornadoes. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce risk and vulnerability to this hazard.

As mentioned above, utility power outages from high winds resulted in intermittent power outages. Wind can also drive wildfire flames, spreading wildfires quickly. During periods of high winds and dry vegetation, wildfire risk increases.

OTHER VULNERABILITIES/CONCERNS/ISSUES SPECIFIC TO THE DISTRICT? CAN THE DISTRICT PROVIDE DETAILS ON THE KEY PROBLEMS ASSOCIATED WITH HIGH WINDS AND TORNADOES THAT WILL SUPPORT MITIGATION ACTION DEVELOPMENT?

Assets at Risk

Assets at risk from winds and tornadoes include people and populations; District assets and critical facilities and infrastructure); and natural, historic, and cultural resources. These are discussed in the following sections.

People and Populations

All populations are at some vulnerability to high winds and tornadoes. Certain vulnerable populations are at the greatest risk to the effects of high winds and tornadoes. These include: the unsheltered, those with access and functional needs, the medically fragile experiencing power outages as a result of wind events, and those working or caught outdoors during a wind or tornado event.

District Assets and Critical Facilities and Infrastructure

All structures and critical facilities and infrastructure in the District have some measure of risk from high wind and tornadoes. Though rare, a tornado could cause damage to virtually all facilities in the tornado touchdown path. This would affect District structures and critical facilities. During a wind or tornado event, power lines in the District can be damaged by falling trees caused by wind. High winds are a cause for PSPS events to be declared, causing power outages to occur. High winds and tornadoes could cause sparks from electric wires and other sources, which could lead to wildfire ignition. Once ignited, high winds can also cause wildfires to rapidly spread and become out of control. High wind conditions can cause wildfires to move into more urban areas destroying structures and whole communities, as seen in recent wildfire events in the West.

No District assets were at risk Table L-3 were thought to be at direct risk from winds.

Natural, Historic, and Cultural Resources

Natural resources, such as trees, are vulnerable to winds. Increased levee and streambank erosion can occur during periods of high water and high winds. High wave action during significant wind events can impact marsh lands and habitat areas. Soil erosion can also occur during high winds. Most all natural, historic, or cultural resources are at risk to tornadoes. Tornadoes can tear apart habitats, causing fragmentation across ecosystems and can damage and destroy historic structures and cultural resources.

Impacts from Severe Weather: High Wind and Tornado

Wind and tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, the majority of injuries and deaths generally result from flying debris. Property damage can include damage to buildings, fallen trees, and power lines. Local industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response. Winds can push automobiles off roads, damage roofs and structures, cause power outages, and cause

secondary damage due to flying debris and hazardous trees. High winds can also contribute to the spread and intensity of wildfires. High winds during periods of high water can cause impacts to levees and streambanks from accelerated erosion. Climate change may affect this hazard and cause winds to increase in velocity and more tornadoes to affect the District.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change (which was discussed in the hazard profile section above), changes in population patterns, and changes in land use and development. The influencing effects of these factors on this hazard are discussed further in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

This section provides a discussion of how future conditions will influence or affect the hazard over time and also discusses future development relative to each hazard.

Future Conditions

Future conditions may be affected by climate change, changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Findings on this for the District include the following:

- Climate change is likely to exacerbate future wind conditions and associated impacts and vulnerability of the District. Climate change is not likely to affect future tornado conditions. This was discussed in greater detail in the Climate Change and Winds and Tornadoes section of the Hazard Profile above.
- Population projections within the jurisdictional boundaries of the District show the population to be increasing. It is unknown how population patterns and demographics will change in the near future. The District may add staff, but this number would be small. The District noted that it has no control over population changes within its jurisdictional boundaries. With no additional populations numbers and makeup, the vulnerability of the District to this hazard may increase.
- Land use planning should be proactive to address future hazard conditions. Building codes in the County ensure that new development is built to current building standards to withstand high winds, which should reduce the risk to future development in the County from high winds and tornadoes. With adherence to development standards, future losses to new development should be minimal. Changes in land use and increased development may amplify the impacts of high winds and tornadoes, as additional structures in the County increase the number of buildings at risk to high winds and tornadoes.

Future Development

Future development considerations should be ongoing and proactive. The District relies on the County to enforce the local building codes which includes standards for new development to minimize damage from windstorms. New District facilities are built to state and local codes. New critical facilities and infrastructure should also consider adding backup power systems to limit impacts associated with power outages.

L.5 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.

L.5.1. Regulatory Mitigation Capabilities

Table L-13 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 1000.

Note: The District does not have the authority to regulate land use and development within its jurisdiction. Authority for promulgating and enforcing zoning, land use, and development requirements falls to counties and incorporated communities. As such development within the District’s jurisdictional boundaries will conform to the zoning and land use development ordinances and building codes of the county or incorporated community in which the District is located.

Table L-13 RD 1000’s Regulatory Mitigation Capabilities

Plans	In Place Y/N	Does the plan address hazards? Can the plan be used to carry out mitigation actions? When was it last updated??
Capital Improvements Plan	Y	Yes Plan was updated in 2020 and includes hazard mitigation projects
Climate Change Adaptation Plan		
Community Wildfire Protection Plan	N	
Comprehensive/Master Plan	Y	District adopted a 2015-2020 Strategic Plan which identifies hazard mitigation needs and opportunities.
Continuity of Operations Plan	N	
Economic Development Plan	Y	District adopted Comprehensive Financial Plan identifying future funding needs and funding sources for O&M and Capital Improvement. Plan includes mitigation actions. 2021
Land Use Plan		
Local Emergency Operations Plan	Y	Yes, Identifies Flood Hazards and operational response. 2017
Stormwater Management Plan	N	
Transportation Plan	N	
Other		

Land Use Planning and Ordinances		Y/N	Is the ordinance an effective way to reduce hazard impacts? Is the ordinance adequately administered and enforced?
Acquisition of land for open space and public recreation use		Y	Land use planning ordinances are an effective tool for reducing hazard impacts, as they guide development, limit exposure in high-risk areas, and require compliance with applicable floodplain management standards. These ordinances are generally adequately administered and enforced by the responsible local jurisdictions through established permitting, review, and inspection processes, with ongoing coordination supporting hazard mitigation objectives. District works with City and County for open space and public recreation opportunities within drainage and flood control corridors; requests land use plans provide appropriate setbacks from development for emergency flood operations and allow for future levee improvements due to climate change or other considerations.
Building code		NA	
Flood insurance rate maps		NA	Refer to City or County
Floodplain ordinance		NA	Refer to City or County
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)		Y	Title 23 California Water Code for encroachment permits on levees and floodways
Subdivision ordinance		NA	Refer to City or County
Zoning ordinance		NA	Refer to City or County
Other		Y	District has adopted a Development Impact Fee Erosion control measures on levee and canal slopes as necessary; District incorporates SWPP measures on its maintenance and capital projects.
How can these capabilities be expanded and improved to reduce risk?			
Pursuant to Sacramento County General Plan Safety Element Policies, SA-18a&b, written approval must be obtained from the applicable Reclamation District to build any structure or grade any soil within 300 feet of the land side toe of levee. This applies to anyone who wants to fill, excavate, or construct a structure within 50 feet of the toe of a Sacramento County river levee and anyone who wants to develop land within 300 feet of the toe. To ensure this requirement is met, every parcel located near a levee is tagged in the building department database. District can partner with local land use agencies during development reviews to ensure adequate areas are available for operations and maintenance and future improvements to reduce flood risk hazard; could be combined with open space/recreation needs and would address potential climate change impacts. District could work with local land use agencies to incorporate levee safety zones as part of their zoning or general plans to provide buffers for O&M and future flood risk reduction improvements.			

Source: RD 1000

L.5.2. Administrative/Technical Mitigation Capabilities

Table L-14 identifies the District department(s) responsible for activities related to mitigation and loss prevention in the RD 1000.

Table L-14 RD 1000's Administrative and Technical Mitigation Capabilities

Administration	In Place Y/N	Describe capability Is coordination effective?
Staff		Is staffing adequate to enforce regulations?
		Is staff trained on hazards and mitigation?
		Is coordination between agencies and staff effective?
Chief Building Official	NA	
Civil Engineer, including dam and levee safety	Y	RD 1000 Project Manager/Consultant
Community Planner	N	
Emergency Manager	Y	RD 1000 District Manager and Operations Manager—Trained in FEMA/OES SEMS/NIMS. Manager coordinates with City, County, and State staff as necessary
Floodplain Administrator	NA	
GIS Coordinator	Y	RD 1000 General Manager and Operations Manager District has initiated a GIS database of facilities; looking to develop and implement a more robust GIS system in next 5 years to include right of way, O&M activities, encroachment permits, utility crossings, and identified hazards or past performance issues.
Planning Commission	N	
Other		
Technical	Y/N	Has capability been used to assess/mitigate risk in the past?
Grant writing	Y	RD 1000 consultants have grant writing and management capabilities; District may look to retain services of a grant writer if funding for flood risk reduction become available
Hazard data and information	Y	RD 1000 anticipates implementing a more robust GIS system to include specific hazard data and information including past performance issues and locations of levee penetrations or other utility locations to monitor during a flood. Also, the SCADA system allows for real time information on pump operations and canal levels for emergency managers.
GIS analysis	N	
Mutual aid agreements	Y	District has mutual aid agreements with City and County of Sacramento. In addition, it operates under the SEMS/NIMS emergency operations system to request assistance from the Operational Area coordinator at Sacramento County and the State and, if necessary, from the federal government through the Army Corps of Engineers during a flood emergency.
Other	Y	District Board of Trustees develops policies for the District and approves plans, including hazard mitigation activities. General Manager implements policies and plans adopted by the Board.

How can these capabilities be expanded and improved to reduce risk?

Continued training in emergency management will benefit staff and improvement emergency response and coordination with other agencies. Developing a GIS database will improve real time information and emergency response by identifying hazard areas or locations with past performance problems. A more robust SCADA system will allow for more detailed information on real time canal levels and pump operations to facilitate emergency response and alerts to other local agencies such as the City and County.

Source: RD 1000

L.5.3. Fiscal Mitigation Capabilities

Table L-15 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table L-15 RD 1000's Fiscal Mitigation Capabilities

Funding Resource	In Place 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	District currently using Capital Reserves to fund projects; recently adopted Financial Manage Plan looking at alternative funding options for CIP which includes hazard mitigation projects and improved emergency operations.
Community Development Block Grant	NA	
Federal funding programs (non-FEMA)	Y	Emergency funding through Corps of Engineer's PL 84-99 authority; FEMA disaster assistance funding and grants for declared emergency events; federal appropriations for flood mitigation projects through the Army Corps of Engineers Currently being used for Natomas Levee Project; could be used for future identified federal flood risk reduction projects in Natomas. Bureau of Reclamation water efficiency grant funding was used to implement phase 1 SCADA improvements to monitor water levels and pump operations to improve flood operations and notify of power outages.
Fees for water, sewer, gas, or electric services	NA	
Impact fees for new development	Y	District requires impact fee and mitigation for new development.

Funding Resource	In Place 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?
State funding programs	Y	The District received funding from the Department of Water Resources through multiple programs, including the Flood Maintenance Assistance Program (FMAP). Over the past six years, FMAP funds have supported equipment purchases and implementation of flood risk reduction projects. The District also received funding through the Flood System Repair Program (FSRP), which assisted with upper and lower patrol road rehabilitation. Funds may be available in future if State legislature appropriates funding.
Stormwater utility fee	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
The District will need to seek an increase in its annual assessment to cover both O&M and capital improvement costs in the next five years. With a voter approved increase, capital improvements including hazard mitigation projects can be implemented as well as maintaining a robust O&M plan for the levees and flood patrols and emergency response capabilities. RD 1000 will need to coordinate with SAFCA and the State on federal Bank Protection projects to address erosion on the Sacramento River levee.		

Source: RD 1000

L.5.4. Mitigation Education, Outreach, and Partnerships

Table L-16 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 L-16 RD 1000's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	N	
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	Y	District has a community outreach program which includes annual meetings with community and neighborhood groups providing educational material on our public safety role and mission. District has reached out to school district to partner on a flood safety program—hope to achieve in near future.
Local news	N	
Organizations that interact with underserved and vulnerable communities	N	

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Social media	Y	District has a proactive website, Facebook page and Twitter account that we use to provide information to the public both generally and during an emergency.
How can these capabilities be expanded and improved to reduce risk?		
Educating the public on our District's public safety role and mission will increase the awareness of flood risks in Natomas, the importance of our work, and the need to stay informed during an emergency. District could improve its outreach with a public relations consultant to assist with messaging and reaching vulnerable populations. Public education will assist in securing funding for future work and improved public safety.		

Source: RD 1000

L.5.5. Other Mitigation Efforts

Climate Change

While the District actively monitors and manages flood protection, drainage, and infrastructure operations to address evolving environmental conditions, no standalone climate-specific planning document has been developed at this time. Climate-related considerations are instead incorporated into ongoing maintenance, operational procedures, and hazard mitigation planning efforts to ensure system resilience and reliability.

Flood/Levee Failure

The District maintains an approved Emergency Action Plan that defines critical procedures and response protocols for managing flood-related emergencies. The U.S Army Corps of Engineers has an adopted Supplemental O&M Manual for the Sacramento East Levee.

Heavy Rains and Storms/High Winds and Tornadoes

The District does not currently have severe weather-related plans; however, it does have a Heat & Illness Prevention Program.

L.6 Mitigation Strategy

L.6.1. Mitigation Goals and Objectives

The RD 1000 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

L.6.2. NFIP Mitigation Strategy

The District does not participate in the NFIP, as it is not an eligible participant. Many of the District's projects work to reduce impacts from flooding thus furthering the objectives of the NFIP.

L.6.3. Mitigation Actions

The Planning Team for the RD 1000 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, and timeline are also included. The following hazards were considered a priority for purposes of mitigation action planning:

- Climate Change
- Flood: 1%/0.5%/0.2% annual chance
- Levee Failure
- Severe Weather: Heavy Rains and Storms (Hail, Lightning, Wind)
- Severe Weather: High Winds and Tornadoes

Low priority hazards for mitigation planning include:

- Aquatic Nuisance Species (plant/animal)
- Dam Failure
- Drought & Water Shortage (w/tree mortality)
- Earthquake (w/subhazards)
- Flood: Localized Stormwater
- Landslide, Mudslide, Debris Flow
- Sea Level Rise
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Subsidence
- Wildfire (with smoke and air quality)

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 and jurisdictions regardless of hazard priority. Collectively, this LHMP's 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 each jurisdiction has focused on identifying those mitigation actions and projects to address their priority hazards, which are both realistic and reasonable for them to implement for this 5-year planning process, and would like to preserve their right to modify hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement. The participating jurisdictions are not obligated by this document to implement any or all of these projects. Rather this mitigation strategy represents the desires of the jurisdictions to mitigate the risks and vulnerabilities from identified hazards. The actual selection, prioritization, and implementation of these actions will also be further evaluated in accordance with the mitigation categories and criteria contained in Appendix C.

Mitigation Actions

The District has put forward the actions as shown in Table L-17. Details of the actions can be found below the table.

Table L-17 RD 1000 Mitigation Actions

Action Title	New Action/ Previous Action	Address Current Development	Address Future Development	Continued NFIP Compliance	Mitigation Type
Action 1. Asset Management Plan Update	Previous Action	X	X	X	Prevention Property Protection Structural Projects Emergency Services
Action 2. Corporation Yard Improvements	Previous Action	X	X	X	Prevention Property Protection
Action 3. Waterside Levee Inspection Capability	Previous Action	X	X	X	Prevention Property Protection Natural Resource Protection
Action 4. Emergency Generators for Plants 2, 3, 4, 5, 6 and 8	Previous Action	X	X	X	Prevention Emergency Services
Action 5. Plant 8 Improvements	Previous Action	X	X	X	Prevention Structural Projects
Action 6. Expanded SCADA System	Previous Action	X	X	X	Prevention Property Protection
Action 7. Update Emergency Operations Plan and Staffing	Previous Action	X	X	X	Prevention Emergency Services
Action 8. Expanded Pumping Plant Security Systems	New Action	X	X	X	Prevention Property Protection Emergency Services
Action 9. Enhanced Protection of District Infrastructure from Unauthorized Encampments	New Action	X	X	X	Prevention Property Protection
Action 10. Culvert Replacement Program	New Action	X	X	X	Prevention Property Protection Structural Projects Natural Resource Protection

Action 1. Asset Management Plan Update

Hazards Addressed: 1%/0.5% Flood Event; Levee Failure; Localized Flooding, High Winds and Tornadoes

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

Issue/Background (Problem Statement): RD 1000 has a significant number of flood control and drainage assets including pumping stations, canals, levees, drainage ditches and culverts which have not all be categorized or their current conditions assessed. There are several GIS and other historical documents which describe them but have not been fully inventoried nor their current conditions assessed. RD 1000 needs to identify all its assets, assess their conditions and develop a plan for their operation, maintenance and replacement at the end of their useful life so they continue to provide the flood risk reduction and drainage services they were intended to provide. The assessment would include evaluation for security in addition, RD 1000 needs to develop a funding mechanism to meet its current and future operational needs, capital replacement, and capital improvements to meet its flood safety responsibilities.

Project Description: RD 1000 will update its current Capitol Replacement Plant and implement the beginning stages of an asset management plan in FY 26/27 to identify its current and future funding needs for operations, maintenance, capital improvement, security, and capital replacement of its flood control and drainage facilities. This will require an outside consultant to develop a GIS database, field survey to identify and assess conditions including security, development of costs for O&M and capital replacement. This asset management plan will be used to identify current and future funding needs including mechanisms for funding.

Other Alternatives: The alternative is to continue with current practice which addresses problems as they are identified or when assets fail.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The asset management plan will be funded through current budgeting and funding mechanisms with approval by the Board of Trustees.

Responsible Agency/ Department/Partners: The asset management plan will be done by an outside consultant under the direction of the RD 1000 General Manager and the Operations Manager.

Project Benefits (Losses Avoided): Benefits are the timely replacement of assets before they fail. If assets fail during an emergency or flood event, property damage will occur as previously described for the flood events described above.

Potential Funding (Local Budgets, Grant Funds, etc.): This will be funded by the RD 1000 general fund through the annual budgeting process. We are currently looking at future funding mechanisms to meet the District's current and future funding needs including development of this asset management plan.

Timeline: If a funding mechanism is identified and successfully implemented, an asset management plan could be developed withing 2 to 4 years. If RD 1000 relies on its current funding, the plan would have to be implemented in phases over a longer period.

Project Priority (High, Medium, Low): This is a high priority project since much of the planning and funding are dependent on identifying the assets and their funding needs.

Action 2. Corporation Yard Improvements

Hazards Addressed: 1%/0.5% Flood Event; Levee Failure

Goals Addressed: 1, 2, 3, 5

Issue/Background (Problem Statement): RD 1000's current Corporation Yard (yard) is small and does not provide for an efficient operation, especially during a flood fight when time delays can be critical. The District stores much of its flood fight materials including large rock, sandbags, visquine and aggregate base at its Corporation Yard. Equipment, including dump trucks, must be loaded and prepared for deployment in response to a flood emergency to help prevent levee failure. Under the current layout, trucks need to wait and cannot be loaded in an efficient manner, resulting in delays delivering to the levee site. RD 1000 acquired additional area adjacent to its yard as part of the SAFCA levee project improvements.

Project Description: RD 1000 has developed a masterplan for the layout of its yard, which provides for an efficient method to load trucks with flood fight materials without delays, store additional flood materials, and provide locations where equipment can be protected from the elements extending their life. Implementing the masterplan requires additional access road construction, extending perimeter fencing, extending the security alarm system, and developing equipment storage and maintenance facilities. This masterplan has not been implemented due to funding constraints.

Other Alternatives: Alternatives would be to continue with the current system which is inefficient for flood fighting resulting in delays and increasing the risk of levee failure. Another alternative would be to develop a new Corporation Yard at other locations which would be more costly.

Existing Planning Mechanism(s) through which Action Will Be Implemented: RD 1000 would use a combination of its existing field work force supplemented by specialty contractors (for pavement, fences or building construction) to implement the yard masterplan. The work would be scheduled into the District's current maintenance plan as time allows.

Responsible Office/Partners: As noted above, the work will be done by a combination of RD 1000 field work force and outside contractors hired by the District under the direction of the Operations Manager.

Project Benefits (Losses Avoided): The benefits of implementing the Corporation Yard Masterplan are a more efficient operations and maintenance plan, especially during the initial stages of a flood fight when delays can result in a levee failure with catastrophic property damage and potential for loss of life.

Potential Funding (Local Budgets, Grant Funds, etc.): The most likely funding will be the RD 1000 general fund through the annual budgeting process. We are currently looking at future funding mechanisms to meet the District's current and future funding needs including implementation of the Corporation Yard Masterplan

Timeline: RD 1000 implemented some of the proposed yard masterplan over the past several years. However, limited funding and other flood control and drainage priorities have prevented completion of the proposed improvements. With current constraints, the improvements would be delayed for up to 4 years.

Project Priority (High, Medium, Low): The Corporation Yard Masterplan implementation is a medium priority for RD 1000 unless funding becomes available.

Action 3. Waterside Levee Inspection Capability

Hazards Addressed: Levee Failure, High Winds and Tornadoes

Goals Addressed: 1, 2, 3, 5, 7

Issue/Background (Problem Statement): Active erosion on the waterside of the levees in the Sacramento River creates a potential levee failure mode for the adjacent levees. If the levee fails, it will result in catastrophic flooding within Natomas, including loss of life. RD 1000 would benefit from a pro-active program to inspect and monitor the erosion activity to intervene before the erosion poses a threat to the levee.

Project Description: Develop a baseline for current erosion activity and develop a system to conduct periodic inspections to monitor. Engage a professional engineer to assist the District in developing criteria for when erosion could impact the adjacent levee and develop a mitigation strategy to address the threat.

Other Alternatives: A no action alternative would be to rely on the State and Corps of Engineers for their inspections and assessment of the waterside berm.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Development of a waterside erosion plan would be done by an outside consultant under the direction of the General Manager and Operations Manager with approval by the Board of Trustees.

Responsible Office/Partners: RD 1000 would be the responsible agency working in partnership with the California Central Valley Flood Protection Board and Corps of Engineers.

Project Benefits (Losses Avoided): Implementation of a bank erosion program could prevent a future catastrophic levee failure which would result in significant flood damage and loss of life.

Potential Funding (Local Budgets, Grant Funds, etc.): Potential funding includes RD 1000 General Fund, or a funding mechanism from FEMA/State flood mitigation grant funds. Implementation of bank protection projects would require funding from the State and Corps of Engineers under the Sacramento River Bank Protection Authority.

Timeline: Once funding is identified, a bank erosion prevention program could be established in about 2 years with an ongoing annual commitment.

Project Priority (High, Medium, Low): Given the current program by the State and Corps, this would be a Medium priority for RD 1000.

Action 4. Emergency Generators for Plants 2, 3, 4, 5, 6 and 8

Hazards Addressed: 1%/0.5% Flood Event

Goals Addressed: 1, 2, 3, 5, 7

Issue/Background (Problem Statement): Reclamation District No. 1000 (RD 1000) relies on Pumping Plants 1/A, 1/B, 2, 3, 4, 5, 6 and 8 to manage interior drainage, control stormwater, and reduce flood risk within the District. These pumping facilities are critical infrastructure assets that protect residential areas, agricultural lands, transportation corridors, and public resources from flood-related damage. Reliable electrical power is essential for continuous pump operation. However, these facilities remain vulnerable to power interruptions resulting from severe storms, high-wind events and utility grid failures. Any prolonged loss of power during periods of elevated water levels can reduce pumping capacity, leading to interior flooding, property damage, agricultural losses, and increased risks to public safety.

Project Description: Purchase stationary generators for Pumping Plants 2, 3, 4, 5, 6 and 8 to maintain operations during power outages.

Other Alternatives: The only alternative would be to not have generators and be unable to pump during a power outage at these facilities. We could attempt to lease/rent generators during an emergency, but they may not be available.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The project would be implemented by RD 1000 as part of its Capital Improvement Plan and as approved in the annual budget by the Board of Trustees.

Responsible Office/Partners: RD 1000

Project Benefits (Losses Avoided): The benefits of a generator to power the pumping plant during a power outage were described above and would include flood risk reduction and prevention of property damage and potential road closures during flood events which could impact evacuation if accompanied by levee stability issues.

Potential Funding (Local Budgets, Grant Funds, etc.): Potential funding includes RD 1000 General Fund, or FEMA/State flood mitigation grant funds.

Timeline: Once funding is identified, the project could be implemented within 3-4 years.

Project Priority (High, Medium, Low): The procurement of stationary generators for Plants 2, 3, 4, 5, 6 and 8 are a High priority for RD 1000

Action 5. Plant 8 Improvements

Hazards Addressed: 1%/0.5% Flood Event

Goals Addressed: 1, 2, 3, 5,

Issue/Background (Problem Statement): Pumping Plant No. 8 is the most used plant in the RD 1000 system due to its high capacity and flexibility in operations due to numerous pumps at this facility of varying output capabilities. The plant, however, is located on a parcel that is not easily accessible and small creating logistic issues for operations and maintenance. The outfall pipes are located across a four-lane arterial street

and not accessible from the plant. In addition, the plant is serviced by low voltage from the supplier (SMUD) which has led to electrical issues during flood operations.

Project Description: The proposed project is to reconstruct the plant to improve its operation, replace the discharge pipes, and replace the power with medium voltage which is more reliable and reduces electrical issues during flood events. This project is currently in the 60% design phase.

Other Alternatives: Other alternatives would be to downsize the project to only replace the power supply as a phased approach. However, all facilities have a fixed useful life, and eventually the pumping plant will have to be replaced.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The project would be implemented as part of its overall Capital Improvement Plan as identified in the 2020 update as an RD 1000 project.

Responsible Office/Partners: RD 1000

Project Benefits (Losses Avoided): As described above, the benefits for this project are the flood risk reduction and prevention of property damage during a flood event if the pump plant were to fail. As noted, Plant 8 is the most used pumping plant in the RD 1000 system. Though the costs for replacement are high, the facility will eventually have to be replaced when it exceeds its useful life.

Potential Funding (Local Budgets, Grant Funds, etc.): Given the high cost, the likely funding would be associated with a proposed funding mechanism.

Timeline: Given the high cost, this project could only be funded through a debt issuance or after a number of years where the Capital Reserves are built up. If funding source was identified, the project could be implemented in about 5 years.

Project Priority (High, Medium, Low): Because it is a critical facility for RD 1000 the replacement of Pumping Plant 8 is a High priority.

Action 6. *Expanded SCADA System*

Hazards Addressed: 1%/0.5% Flood Event

Goals Addressed: 1, 2, 3, 5

Issue/Background (Problem Statement): RD 1000 prepared a SCADA Master Plan (Plan) to be able to monitor drain levels and pump operations remotely to allow for effective and efficient flood operations. SCADA allows RD 1000 staff to identify potential problems such as pump and trash rack failures, power outages or high canal levels and respond in a timely manner. The District partially implemented SCADA improvements in 2018-2019 and 2023-2026 including monitoring at Pumping Plant Nos. 1B, 2, 3, and 8. We have also requested SCADA be included in Plant 5 when reconstructed by the Corps of Engineers under their Natomas Levee Project.

Project Description: The project proposes to expand the SCADA to include all RD 1000 pumping plants and be placed at key locations within the drainage system to assist with decisions on which pumps to operate. The Plan also includes adding security measures such as cameras to notify staff if there is a security breach at one of our facilities so law enforcement can be dispatched. Loss of power at pumping plants due to security breaches can lead to property damage from localized flooding. The District has budgeted for Pumping Plant #4 SCADA integration in FY 26/27.

Other Alternatives: There are no other alternatives other than continue the current operations with the limited SCADA improvements.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Implementation of the SCADA Plan would be done through a contractor under the direction of the General Manager and Operations Manager.

Responsible Office/Partners: RD 1000 (under the Operations Manager) would be the responsible agency. Other partners could include the Natomas Mutual Water Company, Natomas Basin Conservancy, City of Sacramento, Sacramento County and Sutter County, all who have an interest in canal levels and pumping operations in Natomas.

Project Benefits (Losses Avoided): Implementation of the SCADA improvements would allow for more effective and efficient operations during flood events. Quick problem identification allows for actions to mitigate the flood risk and prevent potential flood damage due to high water levels or power outages.

Potential Funding (Local Budgets, Grant Funds, etc.): Potential funding includes RD 1000 General Fund, or FEMA flood mitigation grant funds.

Timeline: Once a funding source is identified, the SCADA Masterplan improvements could be implemented in 2 to 4 years.

Project Priority (High, Medium, Low): Completion of the SCADA Masterplan improvements is a High priority for RD 1000.

Action 7. *Update Emergency Operations Plan and Staffing*

Hazards Addressed: 1%/0.5% Flood Event; Levee Failure

Goals Addressed: 1, 2, 3, 5, 6, 7

Issue/Background (Problem Statement): RD 1000 has an adopted Emergency Action Plan (EAP). With the recent and on-going improvements to the levee system as part of the Natomas Levee Improvement Project, it would be appropriate to review and update the plan based on the improvements which have been made to the system. The EAP will include identifying locations where emergency flood fight materials are stored for deployment during a flood emergency. In addition, the current emergency action plan requires additional staffing during a flood emergency to conduct the adopted levee patrol requirements. Also, should there be a need to conduct a flood fight, additional personnel will be required to continue the levee patrols while other staff are assisting with the flood fight.

Project Description: Update the current emergency action plan to incorporate the recent Natomas Project Levee Improvements constructed by the Corps of Engineers and SAFCA. Review current mutual aid agreements and amend as necessary to ensure appropriate staffing levels to meet the Emergency Action Plan requirements. Based on these agreements, RD 1000 may need to pursue contracts with private consultants to provide necessary staffing during a flood emergency. In addition, the EAP will identify strategic locations where flood fighting materials can be stored for deployment during a flood event. This will require purchasing or leasing property for storage.

Other Alternatives: The only alternative would be to not update the emergency action plan and continue with existing agreements for staffing. During an emergency, resources may not be available from our mutual aid partners due to their own emergency response needs.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Updating the Emergency Action Plan would be done by an outside consultant working with the RD 1000 staff under the direction of the General Manager.

Responsible Office/Partners: RD 1000 would be the responsible agency for updating the Emergency Action Plan. It will coordinate with the California Central Valley Flood Protection Board and Sacramento County Office of Emergency Services

Project Benefits (Losses Avoided): Having a functional Emergency Action Plan based on current conditions is essential to responding in a flood emergency and preventing flooding or a potentially catastrophic levee failure. It is essential for RD 1000 to have the necessary resources to respond during a flood emergency to monitor the system and respond if problems are found. Having flood fight materials strategically located will reduce response time and potentially prevent a levee failure.

Potential Funding (Local Budgets, Grant Funds, etc.): Potential funding includes RD 1000 General Fund, or State flood control assistance grants or FEMA flood mitigation grant funds.

Timeline: The current Natomas Levee Project is expected to be completed by 2030. However, the proposed improvements are generally known allowing for the Emergency Action Plan update to be initiated. Once a funding source is identified, the update can be completed in approximately 1 year.

Project Priority (High, Medium, Low): Emergency Action Plan Update and resource evaluation are a High priority for RD 1000

Action 8. Expanded Pumping Plant Security Systems

Hazards Addressed: 1%/0.5% Flood Event; Levee Failure

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

Issue/Background (Problem Statement): RD 1000 District pumping plants are critical facilities that support drainage management and flood risk reduction within the basin. Disruptions to pumping plant operations caused by vandalism, unauthorized access, theft, or intentional damage could result in equipment failure, loss of power, or reduced pumping capacity. Such disruptions may occur during storm events when

pumping operations are essential, thereby increasing the potential for localized flooding, property damage, and emergency response costs.

The District has previously implemented security improvements at Pumping Plant Nos. 1B, 2, 3, Riverside, San Juan and 8, as well as at the Corporation Yard. These measures have enhanced facility protection and improve the District's ability to monitor and respond to unauthorized access or security incidents.

Additional security system enhancements are planned for Pumping Plant Nos. 4, 5, and 6 following completion of ongoing U.S. Army Corps of Engineers (USACE) improvement projects. Deferring installation until construction activities are complete will ensure compatibility with new facility configurations and avoid damage or rework. Until these improvements are implemented, the affected facilities will remain vulnerable to security-related risks that could impact operational reliability.

Project Description: Evaluate, design, and implement security system enhancements at District pumping plant Nos 4, 5 and 6. Improvements may include installation of surveillance cameras, intrusion detection systems, perimeter protection, and exterior lighting upgrades. Where feasible, systems may be integrated with remote monitoring platforms to allow District staff to observe facility conditions in real time and respond promptly to security incidents. The project will reduce the likelihood of operational disruptions associated with security breaches and improve protection of critical flood management infrastructure.

Other Alternatives: The alternative is to maintain existing security measures and continue reliance on periodic inspections. This option would not substantially reduce facility vulnerabilities or the associated risk of operational disruptions.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The action will be implemented through the District's Capital Improvement Program (CIP), facility maintenance planning, and coordination with qualified contractors under the direction of District management.

Responsible Office/Partners: RD 1000 General Manager

Project Benefits (Losses Avoided): Security enhancements will reduce the risk of vandalism, theft, and unauthorized access that could damage equipment or interrupt pumping operations. Maintaining reliable pumping capacity supports effective stormwater management and reduces the potential for flood-related damage, emergency repairs, and service disruptions.

Potential Funding (Local Budgets, Grant Funds, etc.): The most likely funding will be the RD 1000 general fund through the annual budgeting process.

Timeline: The current Natomas Levee Project is expected to be completed by 2030. Once a funding source is identified, the project can be completed in approximately 1-2 years.

Project Priority (High, Medium, Low): This action is assigned a Medium Priority, as it protects critical facilities and reduces risks that could contribute to flood-related consequences.

Action 9. Enhanced Protection of District Infrastructure from Unauthorized Encampments

Hazards Addressed: Flood: 1% Annual Chance and Levee Failure

Goals Addressed: 1, 2, 3, 5, 6, 7

Issue/Background (Problem Statement): RD 1000 maintains an extensive network of critical flood management infrastructure, including levees, drainage channels, pump stations, access roads, pipelines, control structures, and maintenance facilities. Unauthorized occupancy and homeless encampments located on or adjacent to District property have resulted in recurring maintenance, security, and operational challenges.

Encampments can contribute to infrastructure damage through vandalism, theft of materials, unauthorized utility connections, debris accumulation, vegetation removal, fire hazards, and obstruction of maintenance access routes. Debris associated with encampments, including household waste, shopping carts, construction materials, abandoned vehicles, and other refuse, often requires removal by District personnel or contractors to maintain safe access and proper drainage conveyance. These cleanup efforts can result in significant labor, equipment, disposal, and contractor costs.

Theft of copper wire, fuel, batteries, and other equipment components can result in operational disruptions and increased repair costs. The presence of encampments near critical infrastructure also creates safety concerns for District staff, contractors, and emergency responders. As regional homelessness challenges continue, the potential for infrastructure damage, increased maintenance expenditures, and operational impacts remains a concern requiring ongoing management and mitigation efforts.

Project Description: : Develop and implement a comprehensive infrastructure protection program to reduce risks associated with unauthorized occupancy and encampments on District property. Measures may include installation of fencing, gates, anti-trespass barriers, signage, surveillance systems, improved lighting, access control improvements, vegetation management, and routine patrols or inspections of vulnerable facilities.

The District will continue documenting encampment-related response and cleanup activities, including associated labor, equipment, contractor, disposal, and repair costs. Maintaining these records provides valuable data for assessing hazard impacts, supporting grant and reimbursement applications, tracking trends over time, and prioritizing areas for future mitigation efforts.

Coordination efforts with local law enforcement agencies, municipal code enforcement personnel, social service organizations, and property owners to facilitate encampment abatement efforts and improve long-term site management. The project will focus on reducing infrastructure damage, minimizing debris accumulation, maintaining operational access, reducing fire risks, and protecting critical flood management facilities.

Other Alternatives: The alternative is to continue responding to encampments and infrastructure damage on a case-by-case basis as issues arise. This approach would not substantially reduce recurring maintenance costs, security concerns, or risks to critical flood management infrastructure.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The action will be implemented through annual maintenance programs, security improvement initiatives and coordination with local agencies.

Responsible Office/Partners: The District will serve as the lead agency. Potential partners may include local law enforcement agencies, municipal code enforcement departments, social service providers, utility providers, and adjacent property owners.

Project Benefits (Losses Avoided): Implementation of this action will reduce the risk of vandalism, theft, fire damage, debris accumulation, and unauthorized access to critical District infrastructure. Benefits include reduced maintenance and repair costs, lower expenditures for debris removal and disposal, improved operational reliability, enhanced staff safety, preservation of emergency access routes, and reduced potential for flooding associated with damaged or obstructed drainage facilities.

Potential Funding (Local Budgets, Grant Funds, etc.): The most likely funding will be the RD 1000 general fund through the annual budgeting process.

Timeline: Implementation can begin immediately upon identification of funding and may be completed in phases over a 1- to 5-year period based on priority locations and available resources.

Project Priority (High, Medium, Low): This action protects critical flood management infrastructure, reduces recurring maintenance and repair costs, improves public and employee safety, and helps maintain the reliability of facilities essential to flood risk reduction.

Action 10. Culvert Replacement Program

Hazards Addressed: Flood: 1% Annual Chance and Levee Failure

Goals Addressed: 1, 2, 3, 5, 6, 7

Issue/Background (Problem Statement): RD 1000 operates and maintains numerous culverts throughout our drainage system that convey stormwater beneath roadways, levees, access roads, and other infrastructure. These culverts are critical components of the District's flood control and interior drainage network, allowing drainage water to move efficiently through the system and preventing localized flooding. Many of the existing culverts were installed decades ago and are approaching or have exceeded their useful service life. Aging culverts are susceptible to corrosion, structural deterioration, joint separation, sediment accumulation, and hydraulic capacity deficiencies. Failure or blockage of a culvert can restrict drainage flows, increase water surface elevations, damage roadways and levee facilities, and contribute to localized flooding of agricultural lands, residences, businesses, and public infrastructure. Increased storm intensity and changing precipitation patterns may further stress existing culvert infrastructure, increasing the likelihood of failures and flood-related damages.

Project Description: Identify, prioritize, and replace aging or structurally deficient culverts throughout the District. The project would include condition assessments, engineering design, permitting, and construction of replacement culverts sized to meet current hydraulic and operational requirements. Associated

improvements may include headwalls, erosion protection, roadway restoration, and drainage system enhancements necessary to improve system reliability and flood protection.

Other Alternatives: The only alternative would be to continue maintaining existing culverts and perform repairs as failures occur. This approach would increase the likelihood of emergency repairs, higher maintenance costs, drainage restrictions, roadway impacts, and localized flooding resulting from culvert failures or reduced hydraulic capacity.

Existing Planning Mechanism(s) through which Action Will Be Implemented: The project would be implemented as part of the Districts Capital Improvement Plan and as approved in the annual budget by the Board of Trustees.

Responsible Office/Partners: The District will serve as the lead agency. Potential partners may include local jurisdictions, utility providers, regulatory agencies, and grant funding agencies as necessary.

Project Benefits (Losses Avoided): Replacement of aging and deficient culverts will improve drainage system reliability, reduce flood risk, prevent roadway and infrastructure damage, protect agricultural and developed properties, reduce emergency repair costs, and increase the overall resilience of the District's flood conveyance system. Improved culvert capacity and condition will also help maintain access routes and support emergency response during storm events.

Potential Funding (Local Budgets, Grant Funds, etc.): The most likely funding will be the RD 1000 general fund through the annual budgeting process, FEMA Hazard Mitigation Assistance grants, California Department of Water Resources grant programs, federal infrastructure funding, and other state or federal flood mitigation grant opportunities.

Timeline: Implementation can begin immediately upon identification of funding and may be completed in phases over a 5-10 year period based on priority locations and available resources.

Project Priority (High, Medium, Low): The replacement of aging and deficient culverts throughout the District is a high priority.