



Annex L Reclamation District 1000

L.1 Introduction

This Annex details the hazard mitigation planning elements specific to Reclamation District 1000 (RD 1000), a previously participating jurisdiction to the 2016 Sacramento County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the District. This Annex provides additional information specific to RD 1000, with a focus on providing additional details on the risk assessment and mitigation strategy for this District.

L.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Sacramento County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table L-1. Additional details on plan participation and District representatives are included in Appendix A.

Table L-1 RD 1000 – Planning Team

Name	Position/Title	How Participated
Kevin King	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 Manger	Reviewed and edited District's information included in LHMP; reviewed and edited District Emergency Action Plan; will participate in regional flood control emergency exercise
Paul Devereux	Project Manager	Participated in LHMP update process; drafted District's information included in LHMP; edited District Emergency Action Plan

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

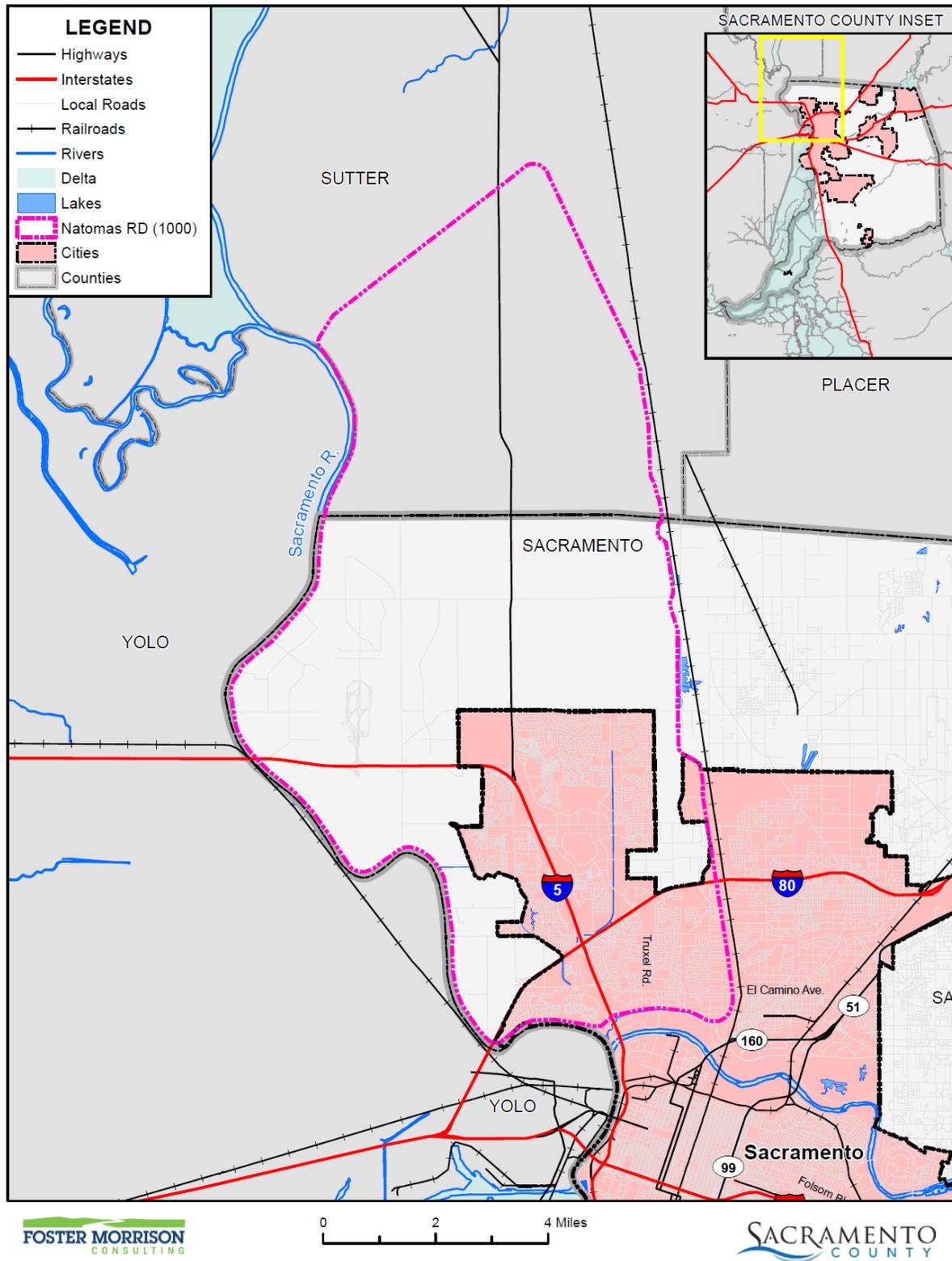
Table L-2 2016 LHMP Incorporation

Planning Mechanism 2016 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 2016 LHMP Annex were included in the CIP which was updated in 2020.
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 2016 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 2016 LHMP Annex were incorporated into this updated Strategic Plan.

L.3 District Profile

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

Figure L-1 RD 1000



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

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). 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 Hazard Identification

RD 1000 identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see

Table L-3).

Table L-3 RD 1000—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	Medium	–
Dam Failure					Medium
Drought & Water Shortage					High
Earthquake					Low
Earthquake Liquefaction					Low
Floods: 1%/0.2% annual chance	Extensive	Unlikely	Catastrophic	Medium	Medium
Floods: Localized Stormwater	Limited	Occasional	Limited	Low	Medium
Landslides, Mudslides, and Debris Flow					Medium
Levee Failure	Extensive	Unlikely	Catastrophic	High	Medium
Pandemic					Medium
Severe Weather: Extreme Cold and Freeze					Medium
Severe Weather: Extreme Heat					High
Severe Weather: Heavy Rains and Storms					Medium
Severe Weather: Wind and Tornado	Extensive	Likely	Limited	Medium	Low
Subsidence					Medium
Volcano					Low
Wildfire					High
Geographic Extent Limited: Less than 10% of planning area Significant: 10-50% of planning area Extensive: 50-100% of planning area		Magnitude/Severity Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid			
Likelihood of Future Occurrences Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.		Significance Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact			
		Climate Change Influence Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact			

L.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile the District’s hazards and assess the District’s vulnerability separate from that of the Sacramento County Planning Area as a whole, which has already been assessed in Section 4.3 Hazard Profiles and Vulnerability Assessment in the Base Plan. The hazard profiles in the Base Plan discuss overall impacts to the Sacramento County Planning Area and describes the hazard problem description, hazard location and extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the District is included in this Annex. This vulnerability assessment analyzes the property and other assets at risk to hazards ranked of medium or high significance specific to the District. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

L.5.1. Hazard Profiles

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

Table L-3) affects the District and includes information on past hazard occurrences and the likelihood of future hazard occurrence. The intent of this section is to provide jurisdictional specific information on hazards and further describes how the hazards and risks differ across the Sacramento County Planning Area.

L.5.2. Vulnerability Assessment and Assets at Risk

This section identifies the District’s total assets at risk, including values at risk, populations at risk, critical facilities and infrastructure, natural resources, and historic and cultural resources. Growth and development trends are also presented for the District. This data is not hazard specific, but is representative of total assets at risk within the District.

Assets at Risk and Critical Facilities

This section considers the RD 1000’s assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan as:

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

Table L-4 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. RD 1000’s physical assets, valued at over \$2.1 billion, consist of the buildings and infrastructure to support the District’s operations.

Table L-4 RD 1000 Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
RD 1000 Plant 1A and 1B	Essential	\$25,000,000	Flood
RD 1000 Plant 2	Essential	\$5,000,000	Flood
RD 1000 Plant 3	Essential	\$10,000,000	Flood
RD 1000 Plant 4	Essential	\$7,000,000	Flood
RD 1000 Plant 5	Essential	\$4,000,000	Flood
RD 1000 Plant 6	Essential	\$7,000,000	Flood
RD 1000 Plant 8	Essential	\$15,000,000	Flood
District Drains/Canals	Essential	\$50,000,000*	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

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Total		\$2,135,500,000	

Source: RD 1000

* Estimated costs to repair damaged canals/drains after major flood and levee failure floods Natomas Basin—not the full replacement value

**Cost includes RD 1000 equipment stored at Corp Yard

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

Natural Resources

RD 1000 has a variety of natural resources of value to the District and to the public. These natural resources parallels that of Sacramento County as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Within the District, the Natomas Basin Conservancy operates and maintains a number of wildlife preserve areas under the Natomas Basin Habitat Conservation Plan. The purpose of the preserves is to provide habitat for endangered and other species to mitigate for the impact of development within the Sutter County and City of Sacramento jurisdiction of the Natomas Basin.

Historic and Cultural Resources

RD 1000 has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallels that of Sacramento County as a whole. Information can be found in Section 4.3.1 of the Base Plan.

There are a number of undisclosed Native American culturally sensitive sites which are generally buried below the ground and therefore would not be directly impacted by a flood event. However, there could be impacts to these sites during the infrastructure repair and recovery following a major flood especially one resulting in a levee failure.

Growth and Development Trends

General growth in the District parallels that of the Sacramento County Planning Area as a whole. Information can be found in Section 4.3.1 of the Base Plan. The following is specific to the Natomas Basin portion of Sacramento County.

As described above, urban development was halted in the District when the levees were decertified in 2003. A comprehensive project for the District's perimeter levee system was studied and developed by SAFCA, State of California and the Army Corps of Engineers. The proposed levee improvements will provide 200-year flood protection to the Natomas Basin, consistent with the newly adopted State flood control standards for urban areas (Urban Level of Protection or ULOP Criteria).

Work was initiated by SAFCA and the State of California in 2006 to mitigate the flood risk. With the construction that was completed (approximately 50% of the levee improvements) and the Federal authorization of the Natomas Levee Project in 2014, the area was remapped into an A99 FEMA flood plain designation recognizing the progress made towards eventually removing Natomas from a FEMA designated Special Flood Hazard Area. Under the A99 floodplain designation, development is again allowed within the Natomas Basin.

Development since 2016

With the lifting of the building moratorium, a number of projects have been approved since 2016 and large scale residential, commercial and industrial projects are under construction in the Natomas Basin even though the levee improvements have not been completed. It should be noted, the previous work on the perimeter levee system by SAFCA from 2007 to 2017 addressed the highest risk areas to the existing levee system. Refer to the City and County for specific projects approved since 2016.

Since 2016, RD 1000 has not added any significant facilities/infrastructure except those being constructed by the Corps of Engineers under their Natomas Levee Project described below in Section C.6.5. A few minor improvements including Supervisory Control and Data Acquisition (SCADA) improvements at several pumping plants to allow remote monitoring of water levels and pump operations; a small building addition at the Corp Yard office and purchase of new equipment have been done since 2016. The cost of these improvements and the equipment are included in the replacement cost estimates in Table C-4. All these improvements are within identifiable hazard areas protected by levees.

Future Development

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.

More general information on growth and development in Sacramento County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Sacramento County Vulnerability and Assets at Risk of the Base Plan.

Future Improvements to RD 1000 Facilities

Future improvements to RD 1000 infrastructure and facilities are primarily tied to the Natomas Levee Project construction by the Corps of Engineers described below in Section C.6.5. The Corps project includes a new Pumping Plant No. 4 on the Natomas Cross Canal; a new Pumping Plant No. 5 on the Sacramento River north of Elkhorn Blvd; major improvements to Pumping Plant Nos 1A near the District office and at Plant No. 3 along the Sacramento River north of Power Line Road; and finally some minor alterations to the outfall conduits at Pumping Plant Nos. 6 and 8.

In addition to the Natomas Levee Project; RD 1000 recently updated its Capital Improvement Program and is currently assessing its long term financing to implement the identified capital improvements. If funding can be secured, it is anticipated capital improvements will be made to the existing RD 1000 infrastructure including major pumping plant improvements, asset management planning, improved SCADA monitoring, and emergency backup generator capability.

These improvements will address the hazard risks identified including mitigating localized flood impacts, security issues, reduced impacts from 1%/0.5% floods and reduce levee failure risks.

L.5.3. Vulnerability to Specific Hazards

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

Table L-3 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Sacramento County Planning Area). Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

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

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

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

Power Outage/Power Failure

An impact of almost all hazards below relates to power outage and/or power failures. The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the Department of Energy, major blackouts are on the upswing. Incredibly, over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. In addition to blackouts, brownouts can occur. A brownout is an intentional or unintentional drop in voltage in an electrical power supply system. Intentional brownouts are used for load reduction in an emergency. Electric power disruptions can be generally grouped into two categories: intentional and unintentional. More information on types of power disruptions can be found in Section 4.3.2 of the Base Plan.

RD 1000 is vulnerable to power outages/power failures which occur during the flood season resulting in a loss of power to our critical facilities including the pump stations. These pump stations remove the water collected in the drainage system from urban, agricultural and airport property within Natomas. The levee system prevents drainage by gravity requiring all stormwater runoff to be discharged out of the basin by

pumps. When the pumps cannot operate due to power outage, the levels in the drains and canals rise and eventually will escape the system at the low points causing localized flooding.

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.

Public Safety Power Shutoff (PSPS)

A new intentional disruption type of power outage/failure event has recently occurred in California. In recent years, several wildfires have started as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), are coordinating to prepare all Californians for the threat of wildfires and power outages during times of extreme weather. To help protect customers and communities during extreme weather events, electric power may be shut off for public safety in an effort to prevent a wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3.2 of the Base Plan.

RD 1000 has lost power at one or more of its pumping plants almost on an annual basis. The likelihood of losing power at all plants is small; however there have been 2 instances in the last 20 years where this event did occur albeit for a short time. In most cases, power is restored to one or more pump plants within a few hours or less. However, there have been some locations within PG&E service area where power was lost for several weeks due to the remote locations of the plants in Sutter County.

PSPS occur during the wildfire season and not the flood season and has been limited to PG&E service areas; therefore RD 1000 is generally unaffected by them. RD 1000 does limited pumping during the summer when rice fields are drained. We are not aware of any PSPS affecting RD 1000 and likely will not impact us in the future.

Climate Change

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

Climate change adaptation is a key priority of the State of California. The 2018 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts

in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing. RD 1000 would be affected by climate change resulting in more precipitation and less snow resulting in increased river levels during large storm events and more precipitation which must be pumped out of the Natomas Basin.

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the District, Sacramento County, and State of California. There is no scale to measure the extent of climate change. Climate change exacerbates other hazards, such as drought, extreme heat, flooding, wildfire, and others. The speed of onset of climate change is very slow. The duration of climate change is not yet known, but is feared to be tens to hundreds of years.

Past Occurrences

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

Vulnerability to and Impacts from Climate Change

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

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

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

Currently the District is monitoring climate change impacts, but has not implemented any modifications to our operations. The District plan based on the long range climate forecast predictions and operate based on individual storm forecasts.

Assets at Risk

The District noted that its facilities could be at risk from climate change.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Unlikely

Vulnerability–High

Hazard Profile and Problem Description

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

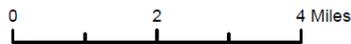
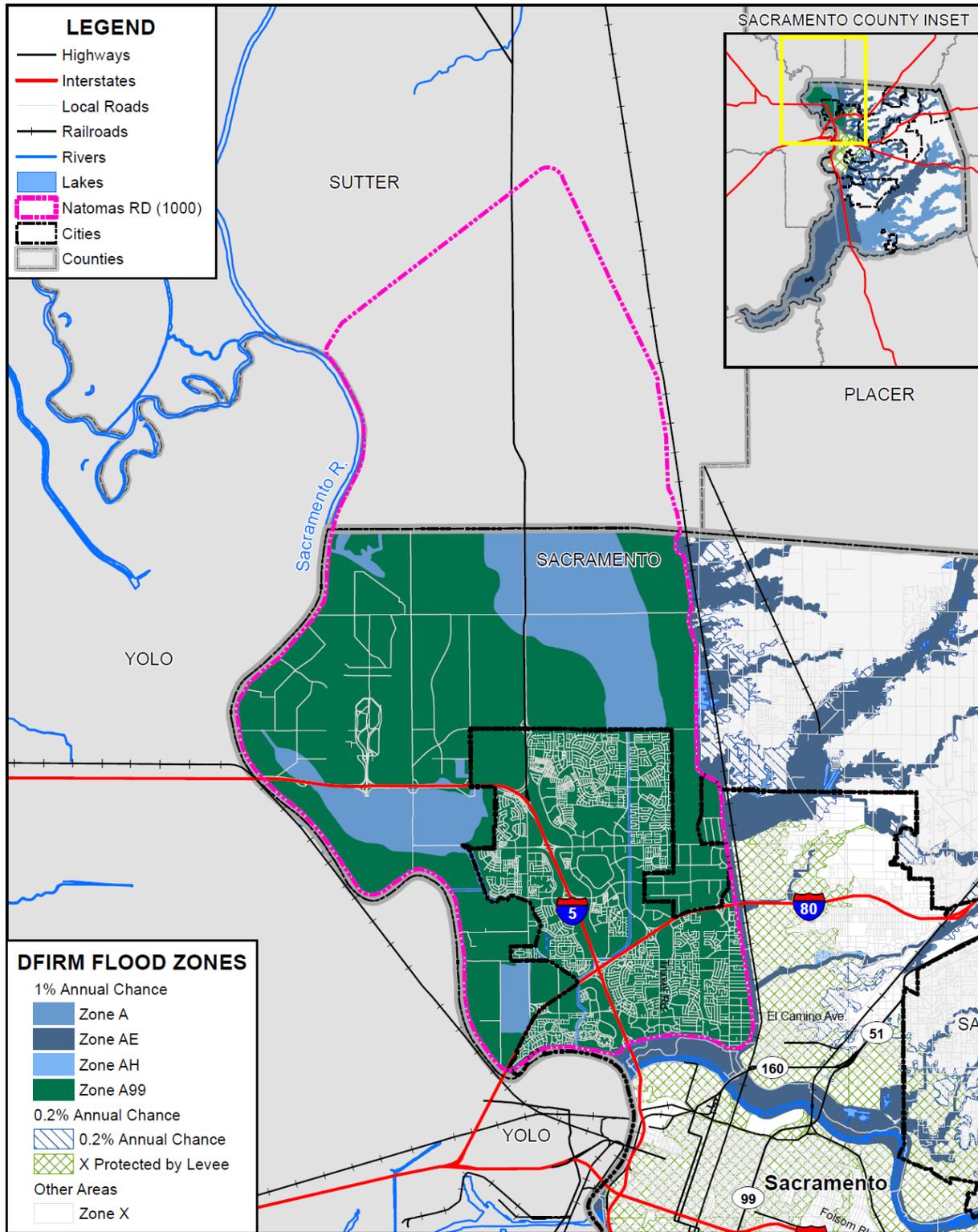
As previously described in Section 4.3.11 of the Base Plan, the Sacramento County Planning Area and the RD 1000 have been subject to historical flooding.

The 1% and 0.5% annual chance of floods can impact the perimeter levee system, Pleasant Grove area levees, as well as the interior drainage system operated by RD 1000 that are not within the special flood hazard areas. These large events will cause the District’s facilities to operate at or above their design capacity and in many instances will result in damages to our system, while not resulting in failure. These impacts may also occur at more frequent flood events including the 10% annual chance event or lower.

Location and Extent

The RD 1000 has areas located in the 1% and 0.2% annual chance floodplain. This is seen in Figure L-2. However, the risk extends to the entire RD 1000 boundary and all our facilities as described above in the impact description.

Figure L-2 RD 1000 – FEMA DFIRM Flood Zones



Data Source: FEMA NFHL 04/16/2016, Natomas Reclamation District, Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

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

Table L-5 RD 1000 – DFIRM Flood Hazard Zones

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

Source: FEMA

Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the District vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Flooding in the District tends to have a shorter speed of onset, due to the amount of water that flows through the District. However, as noted above the District has impacts of these flood events outside the mapped flood hazard areas, and flood events on the perimeter levee system can extend for several weeks.

Past Occurrences

A list of state and federal disaster declarations for Sacramento County from flooding is shown on Table L-6. These events also did affect the District and in many cases RD 1000 filed disaster assistance claims with both FEMA and California OES due to impacts and damages sustained. This includes the three disaster declarations from the 2017 flood events. The District filed claims and has received reimbursements for our damages due to these events. Attached are the PA Worksheets documenting the damages from the 2017 disaster declarations.

Table L-6 Sacramento County – State and Federal Disaster Declarations from Flood 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	19	1950, 1955, 1958 (twice), 1963, 1969, 1982 (twice), 1983, 1986, 1995 (twice), 1996, 1997, 1998, 2008, 2017 (three times)	14	1955, 1958, 1964, 1969, 1983, 1986, 1995 (twice), 1997, 1998, 2006, 2017 (three times)

Source: Cal OES, FEMA

Vulnerability to and Impacts from Flood

Floods have been a part of the District’s historical past and will continue to be so in the future. During winter months, long periods of precipitation and the timing of that precipitation are critical in determining the threat of flood, and these characteristics further dictate the potential for widespread structural and property damages. Predominantly, the effects of flooding are generally confined to areas near the waterways of the County. As waterways grow in size from local drainages, so grows the threat of flood and dimensions of the threat. This threatens structures in the floodplain. Structures can also be damaged from trees falling as a result of water-saturated soils. Electrical power outages happen, and the interruption of power causes major problems. Roads can be damaged and closed, causing safety and evacuation issues. People may be swept away in floodwaters, causing injuries or deaths.

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

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 sheetpiles, 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

Assets at Risk

As noted above, the assets at risk for these large flood events including the perimeter Federal levee system, Pleasant Grove area levees, District's seven pump stations, and the interior drainage system including the canals, drains and ditches. Not all these facilities will likely be damaged during the 1% or 0.5% (or more frequent) 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.

Levee Failure

Likelihood of Future Occurrence–Unlikely

Vulnerability–Medium

Hazard Profile and Problem Description

A levee is a raised area that runs along the banks of a river, 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 which increases the erosion potential. Levees can be natural or man-made. In the case of RD 1000, all the levees are man-made.

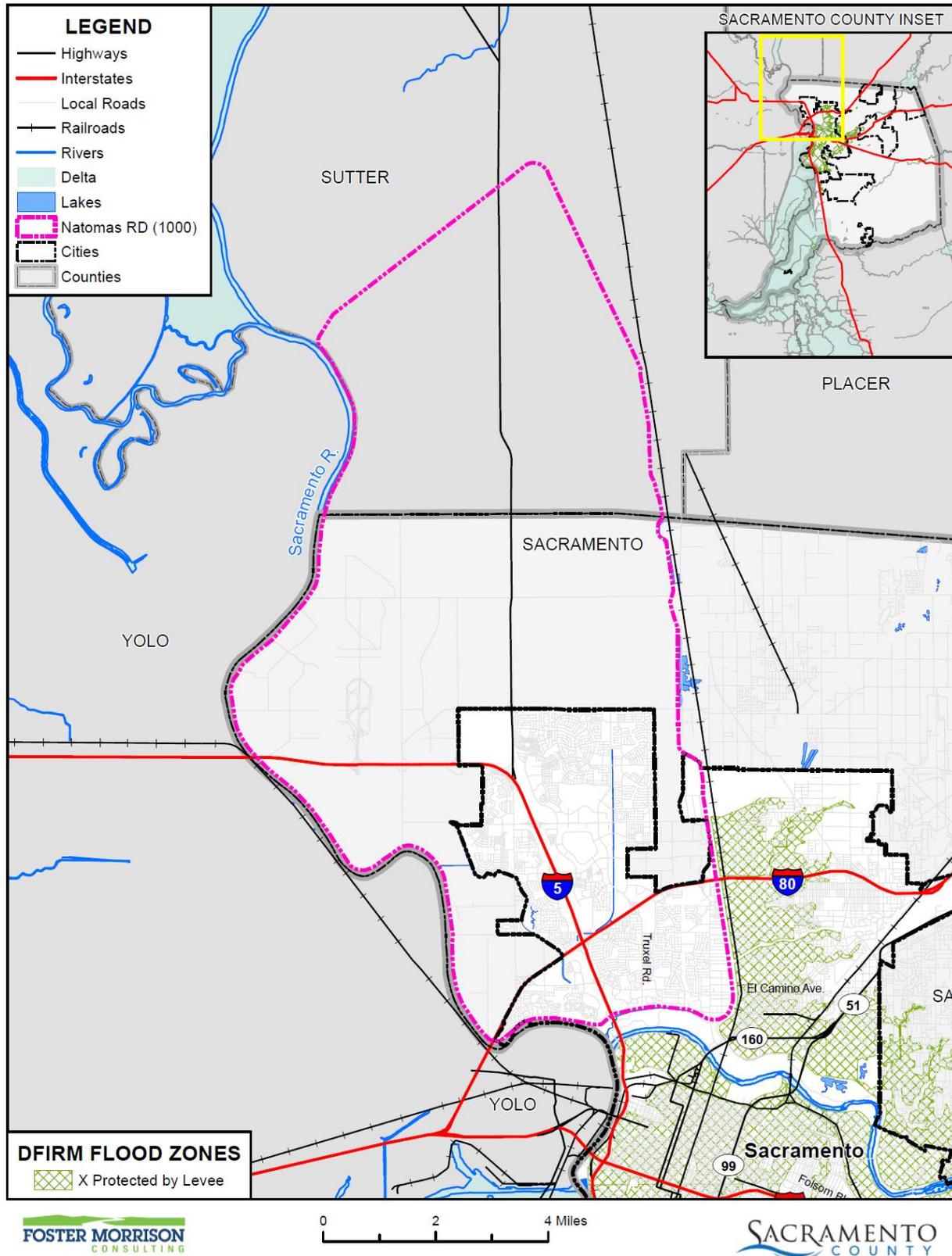
Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events that exceed the design capacity or upstream dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce, not eliminate, the risk to individuals and structures located behind them. A levee system failure or overtopping can create severe flooding and high water velocities. Levee failure can occur through overtopping; levee slope stability issues, seepage through the levee due to highly permeable material or seepage paths caused by burrowing rodents, vegetation roots, pipe penetrations; seepage under the levee foundation moving materials and creating voids in the foundation eventually leading to levee collapse and overtopping; erosion of the waterside slope or berm, and other factors that compromise the integrity of the levee. No levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Location and Extent

There is not a scientific scale or measurement system in place for levee failure. It can occur at any location along the levee system. 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 duration of levee failure risk times can be days to weeks, depending on the river flows that the levee holds back. When northern California dams and reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees including RD 1000. Levees in the District are shown on Figure L-3.

Figure L-3 RD 1000 – Levee Protected Areas



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

Past Occurrences

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

Vulnerability to and Impacts from Levee Failure

A levee failure can range from a small, uncontrolled release to a catastrophic failure. Levee failure flooding can occur as the result of prolonged rainfall which combined with flood releases from upstream reservoirs raise the river levels to flood stage. The primary danger associated with levee failure is the high velocity flooding of those properties outside and downstream of the breach.

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

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.

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 not 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.

Assets at Risk

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-4 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.

With the levee improvements that have been completed to date and the anticipated improvements described below about to be completed by the Corps of Engineers over the next 5s year; 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.

Severe Weather: High Winds and Tornadoes

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

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

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

Location and Extent

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

Tornadoes, while rare, can occur at any location in the County and District. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale (EF) provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. The F Scale and EF Scale are shown in Section 4.3.5 of the Base Plan.

Past Occurrences

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

Vulnerability to and Impacts from Severe Weather: Wind and Tornado

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

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

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

Assets at Risk

In the District, during periods of high water, the levees can be impacted by high winds causing erosion to the water side of the levee.

L.6 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation education, outreach, and partnerships, and other mitigation efforts.

L.6.1. Regulatory Mitigation Capabilities

Table L-7 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the RD 1000.

Table L-7 RD 1000 Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan/General Plan	Y 2015	District adopted a 2015-2020 Strategic Plan which identifies hazard mitigation needs and opportunities
Capital Improvements Plan	Y 2020	Yes Plan was updated in 2020 and includes hazard mitigation projects
Economic Development Plan	Y 2021	District adopted Comprehensive Financial Plan identifying future funding needs and funding sources for O&M and Capital Improvement. Plan includes mitigation actions
Local Emergency Operations Plan	Y 2017	Yes Identifies Flood Hazards and operational response
Continuity of Operations Plan	N	
Transportation Plan	N	
Stormwater Management Plan/Program	N	
Engineering Studies for Streams	N	
Community Wildfire Protection Plan	N	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Y 2018	Asset Management Plan
Building Code, Permitting, and Inspections	Y/N	Are codes adequately enforced?
Building Code	NNA	Version/Year:

Building Code Effectiveness Grading Schedule (BCEGS) Score	NNA	Score:
Fire department ISO rating:	NNA	Rating:
Site plan review requirements	Y	Proposed projects which impact levees or drainage facilities require permits or approvals from RD 1000t and include plan review and sign off. Encroachments on levees or within flood ways require State Encroachment Permit under Title 23 of the CA Water Code. Code is adequate to protect flood control infrastructure
Is the ordinance an effective measure for reducing hazard impacts?		
Land Use Planning and Ordinances	Y/N	Is the ordinance adequately administered and enforced?
Zoning ordinance	NNA	Refer to City or County
Subdivision ordinance	NNA	Refer to City or County
Floodplain ordinance	NNA	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
Flood insurance rate maps	N	Refer to City and County
Elevation Certificates	N	Refer to City and County
Acquisition of land for open space and public recreation uses	Y	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.
Erosion or sediment control program	Y	Erosion control measures on levee and canal slopes as necessary; District incorporates SWPP measures on its maintenance and capital projects.
Other	Y	District has adopted a Development Impact Fee
How can these capabilities be expanded and improved to reduce risk?		
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.6.2. Administrative/Technical Mitigation Capabilities

Table L-8 identifies the District department(s) responsible for activities related to mitigation and loss prevention in RD 1000.

Table L-8 RD 1000's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N	
Mitigation Planning Committee	N	

Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	District's O&M activities directly reduce flood risks as described above including vegetation management; levee maintenance; pump station operations; and 24-hour monitoring during flood events. District created Operations Manager position in 2020 to better manage its operations and maintenance activities including development of a comprehensive annual maintenance, asset management plan all to improve overall operations and reduce the flood risk hazard
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.
Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	NA	
Floodplain Administrator	NA	
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
Community Planner	N	
Civil Engineer	Y	RD 1000 Project Manager/Consultant
GIS Coordinator	Y	RD 1000 General Manager and Operations Manager District has initiated a GIS data base 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.
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	RD 1000 website provides the public with general flood related information including District O&M or Capital Improvement activities as well as what to do in an emergency. It provides links to other websites for more detailed information. During an emergency the District refers the public to the City and County for information including evacuation notices and directions.
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.
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

Hazus analysis	N
Other	
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 data base 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.6.3. Fiscal Mitigation Capabilities

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

Table L-9 RD 1000's Fiscal Mitigation Capabilities

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	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.
Authority to levy taxes for specific purposes	Y	Proposed increases in annual assessments must comply with Proposition 218 which requires a public vote. Some funds for ongoing O&M have been included in Capital Assessment District funding for Natomas Levee project.
Fees for water, sewer, gas, or electric services	NNA	
Impact fees for new development	Y	District requires impact fee and mitigation for new development
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	District has authority but currently has no GO Bonds outstanding
Incur debt through private activities	N	
Community Development Block Grant	NNA	

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Other federal funding programs	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
State funding programs	Y	Fund were received from Department of Water Resource flood maintenance grant program past 3 years used to purchase equipment and implement flood risk reduction projects. Funds may be available in future if State legislature appropriates funding. Other future State sponsored grant programs. Cost sharing on federal flood risk reduction projects currently being used for Natomas Levee Project; could also be used for future flood risk reduction projects in Natomas
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.6.4. Mitigation Education, Outreach, and Partnerships

Table L-10 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table L-10 RD 1000's Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	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 a proactive website, Facebook page and Twitter account that we use to provide information to the public both generally and during an emergency.
Natural disaster or safety related school programs		District has reached out to school district to partner on a flood safety program—hope to achieve in near future.
StormReady certification	NA	
Firewise Communities certification	NA	
Public-private partnership initiatives addressing disaster-related issues		
Other	Y	District has received the Certificate of Transparency from California Special District's Association for the past five years.
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.6.5. Other Mitigation Efforts

Levee Failure and 1%/0.2% chance flood event

As previously described, efforts are currently underway to address both these potential risks with the goal of providing Natomas at least 200 year level of flood protection (a 0.5% risk of flooding in any given year) and looking for opportunities to improve the system even beyond this level; particularly as urbanization of the basin continues. RD 1000 is collaborating with the Corps of Engineers, State Central Valley Flood Protection Board and Sacramento Area Flood Control Agency on these improvements. The work is being done on the 42 mile perimeter federal levee system protecting Natomas and includes new adjacent levees, expanded levees, seepage cutoff walls, seepage berms, pumping plant modifications, retaining walls, landside patrol/maintenance access roads, utility relocations and other improvements.

Work on the project commenced in 2006 by SAFCA which completed approximately 50% of the levee work shown on the attached map in blue. The remaining work, show in red, is being done by the Corps of Engineers based on the 2014 Congressional authorization. Following is the status of the remaining work by Reach.

- Reach A—Contract to be awarded in 2021 with construction commencing in 2022 for three years
- Reach B—Currently under construction expected to be completed by 2023.
- Reach C—All work was completed by SAFCA
- Reach D—Levee work completed by SAFCA; minor levee work remaining was completed by the Corps in 2020; replacement of Pumping Plant 4 under construction to be completed by 2022
- Reach E—Under design with construction scheduled for 2023 and 2024
- Reaches F and G—Under design as a single project with construction scheduled for 2024 and 2025
- Reach H—Levee work under construction to be completed in 2021
- Reach I—Levee work was completed in 2019; remaining work includes levee slope flattening and construction of a patrol/maintenance road at the landside toe to be constructed in 2022 or 2023

The District’s goal is to complete all the work by 2025.

Other previous Flood Hazard Mitigation Projects

- Implementation of the initial phase of a SCADA system to monitor canal levels and pump station operations alerting field staff of any power outages or flow restrictions.
- Bank erosion protection projects implemented with the Corps of Engineers and State CVFPB to address identified high risk areas for erosion potential which could impact levee stability

Operational Flood Mitigation

RD 1000 conducts the following operations to mitigate flood hazards

- Annual pre-flood season levee inspections to identify deficiencies or maintenance needs prior to the flood season
- Annual pre-flood season inspection and testing of pumping plants to identify deficiencies or maintenance needs.
- During high water events, RD 1000 field staff monitors the levees and pump stations on a 24/7 basis looking for seepage, boils, erosion or other signs of levee distress. In addition, crews monitor the pump station operations and remove debris from the trash racks to maintain flows.
- Participate in flood exercises with the City and County when conducted
- Field staff participate in annual flood fight training and exercises conducted by California Department of Water Resources
- Maintain an inventory of flood fight materials including large rock, sandbags, aggregate base material, sand, tools and equipment
- Resurface and/or replenish AB on levee patrol roads prior to flood season.
- Treat vegetation in canals and drains prior to flood season to improve flows.

Power Outage/Power Failure Hazard Mitigation

RD 1000 has one backup generator installed at its Plant 1A and Plant 1B location across from the District office at the southern end of the District. The generator is diesel powered and capable of operating all six pumps at 1B and a portion of Plant 1A pumps but must be re-fueled several times a day. Several other plants are equipped for portable generators to be connected, but the District currently does not possess any.

Security Hazard Mitigation

RD 1000 has replaced existing fencing at Plant 8 and Plant 1 with improved security fencing to reduce the risk of vandalism or theft at the pumping plants. In addition, new plants being replaced or constructed are specified to include the new security fencing.

RD 1000 has a security alarm at both the office and Corp Yard to alert staff and law enforcement of intrusions. In addition, the District partners with Natomas Basin Conservancy and Natomas Water Company on security patrols during non-working hours.

RD 1000 has worked with other partners in the Natomas Basin including the Sacramento Area Flood Control Agency, Natomas Central Mutual Water Company, Natomas Basin Conservancy, Sacramento County Airports and the City of Sacramento on projects of mutual benefit that address public safety and the District's flood control mission.

L.7 Mitigation Strategy

L.7.1. 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.7.2. 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, estimated cost, and timeline are also included. The following hazards were considered a priority for purposes of mitigation action planning:

- Climate Change
- Floods: 1%/0.2% annual chance
- Levee Failure
- Severe Weather: High Winds and Tornadoes

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

NEED THESE ACTIONS FLESHED OUT. EACH AREA HIGHLIGHTED NEEDS TO BE ADDRESSED.

Multi-Hazard Actions

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, 4, 5

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 2. Corporation Yard Improvements

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

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 3. Waterside Levee Inspection Capability

Hazards Addressed: Levee Failure, High Winds and Tornadoes

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 4. Culvert and Drain Replacement Program

Hazards Addressed: 1%/0.5% Flood Event; Localized Flooding

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 5. Floodway Habitation

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

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 6. Update Natomas Flood Model

Hazards Addressed: Localized Flooding; 1%/0.5% Flood Event

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 7. Pleasant Grove Area Levee Improvements

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

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 8. Plant 1 Emergency Generator Natural Gas Conversion

Hazards Addressed: 1%/0.5% Flood Event; Localized Flooding; Security

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 9. Plant 8 Improvements

Hazards Addressed: 1%/0.5% Flood Event; Localized Flooding; Security

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 10. Expanded SCADA System

Hazards Addressed: Localized Flooding; 1%/0.5% flood; Security

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 11. Security Improvements

Hazards Addressed: 1%/0.5% Flood; Levee Failure; Security; Localized Flooding

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):

Action 12. Update Emergency Operations Plan and Staffing

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

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

Issue/Background:

Project Description:

Other Alternatives:

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

Responsible Agency/ Department/Partners:

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Timeline:

Project Priority (H, M, L):