



Annex L Reclamation District 1000

L.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Reclamation District 1000 (RD 1000), a previously participating jurisdiction to the 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 RD 1000. This Annex provides additional information specific to RD 1000, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this District.

L.2 Planning Process

As described above, the District followed the planning process detailed in Section 3 of the Base Plan. In addition to providing representation on the Sacramento County Hazard Mitigation Planning Committee (HMPC), RD 1000 formulated its 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 RD 1000 representatives are included in Appendix A.

Table L-1 RD 1000 Planning Team

Name	Position/Title	How Participated
Board of Trustees		Approved Emergency Action Plan and LHMP
Paul Devereux	General Manager/District Engineer	Participated in LHMP update process; drafted District's information included in LHMP; edited District Emergency Action Plan; participated in regional flood emergency exercise
AECOM	Consultant	Drafted District Emergency Action Plan (EAP)
Don Caldwell	Superintendent	Reviewed District EAP; participated in regional flood emergency exercise
Terrie Figueroa	Admin Services Manager	Reviewed District EAP; participated in regional flood emergency exercise

Source: RD 1000

L.2.1. Coordination with Other District Planning Efforts

Coordination with other District planning efforts is paramount to the successful implementation of this plan. This Section provides information on how the District integrated the previously-approved 2011 Plan into existing planning mechanisms and programs. Specifically, RD 1000 incorporated into or implemented the 2011 LHMP through other plans and programs shown in Table L-2.

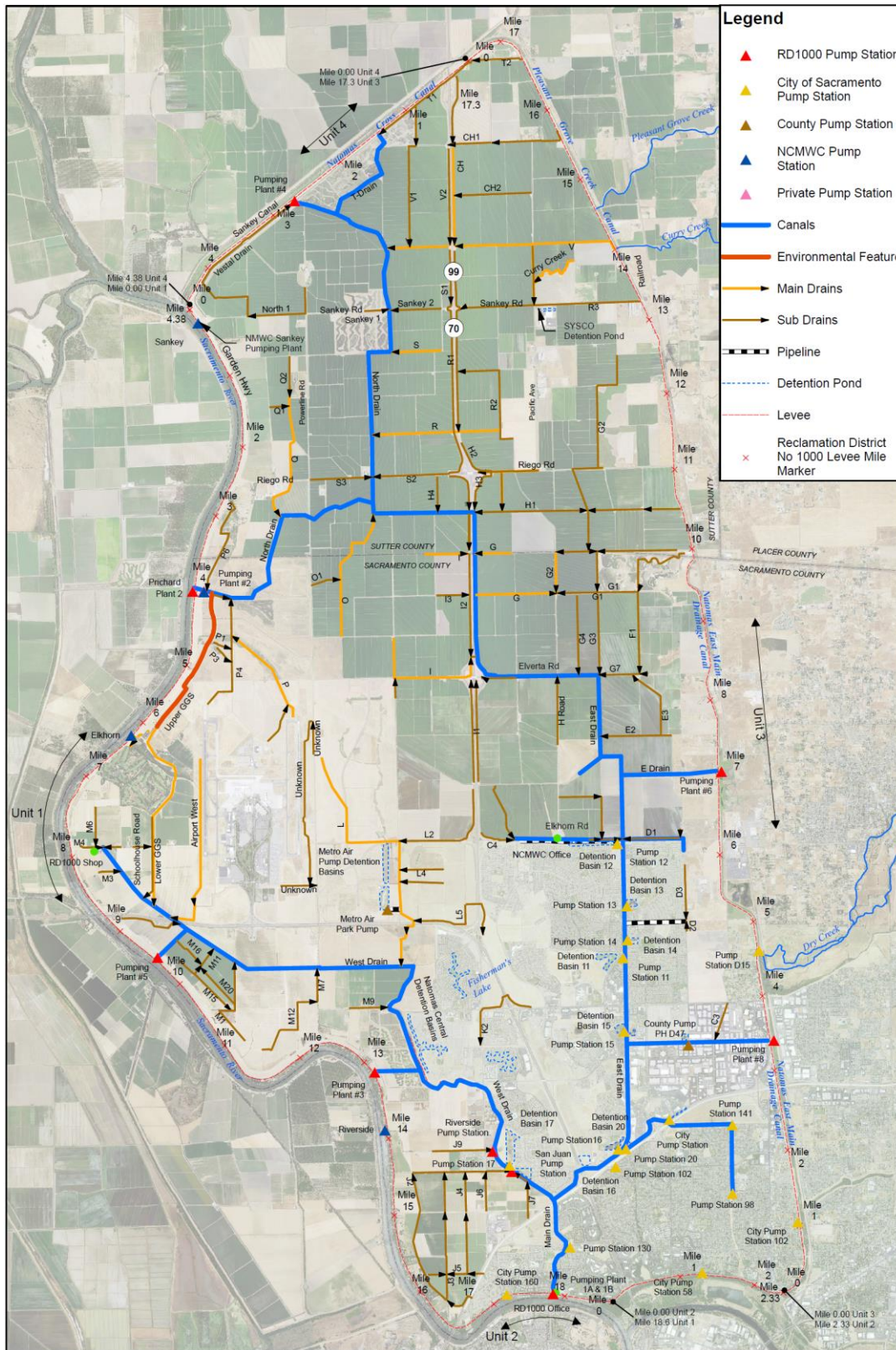
Table L-2 2011 LHMP Incorporation

Planning Mechanism 2011 LHMP Was Incorporated/Implemented In.	Details?
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
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
Security Risk Assessment	Identified critical District infrastructure and recommended measures to improve security and insure District can perform essential functions during an emergency
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

L.3 Community Profile

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

Figure L-1 Reclamation District 1000 Map



Source: RD 1000

L.3.1. RD 1000 Overview

Reclamation District No. 1000 has been providing flood protection and public safety to residents, businesses, schools, and agriculture since 1911. RD 1000 is a special district formed by the California State legislature. The District's job is to protect the lives and property in the Natomas basin from flooding. 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 owner's 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 Superintendent supervises the daily activities of the field crew and reports to the General Manager.

L.3.2. District Overview, History and Background

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. The American Basin historically flooded from the Sacramento and American Rivers overflowing their banks due to winter rains and runoff from the foothills giving it the rich fertile soil to support the agriculture which dominated the early years in Natomas. Much of the land was owned by the Natomas Company of California. 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. The original cost was approximately \$2 million and was financed by the sale of bonds. Some of these original bonds are still in the possession of the District. 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 farm land. 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. 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 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, Arco Arena, and the surrounding areas.

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 roared through the Central Valley around Christmas. The Natomas levees held with some minor sloughing along the Sacramento River near the Sacramento/Sutter County line. However, as a result of this flood, the Army Corps of Engineers raised the Natomas Cross Canal and Pleasant Grove Creek Canal levees as much as two to three feet 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 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 fueled by a series of large Pacific storms carrying significant amounts of sub-tropical water. These storms coined as the “Pineapple Express” because of its origins near the Hawaiian Islands are now referred to as “atmospheric rivers”. The flood on the Sacramento River caused significant seepage along the adjacent 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. Work along the Sacramento was done by the Corps of Engineers (Sacramento Urban Project) while the work on the NEMDC was done by the Sacramento Area Flood Control Agency or SAFCA (North Area Local Project).

As a result of these projects, the levees were “certified” 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 insure 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 bled back into our system at a rate similar to the pre-development condition. These detention basins are augmented by improvements to the existing pumping plants to assist in handling the increased urban runoff.

In January 1997, a flood similar in size and river levels struck the Sacramento area. The improved levee system passed the flood event with minimal issues supporting the levee infrastructure investment. However, a number of other levees in California failed during the flood event, and a deadly catastrophic flood in the New Orleans area raised questions about other potential levee safety issues—namely the potential for underseepage concerns. Following an analysis of the Natomas levees based on this new criteria, they were 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 appendix.

L.4 Hazard Identification

RD 1000's planning team identified the hazards that affect the District and summarized their geographic extent, probability of future occurrences, potential magnitude/severity, and significance specific to RD 1000 (see Table L-3).

Table L-3 RD 1000—Hazard Identification

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agricultural Hazards				
Bird Strike				
Climate Change				
Dam Failure	Extensive	Unlikely	Critical	Low
Drought and Water Shortage				
Earthquake				
Earthquake: Liquefaction	Limited	Unlikely	Limited	Low
Flood: 100/200/500-year	Extensive	Likely	Catastrophic	High
Flood: Localized Stormwater Flooding	Limited	Occasional	Limited	Medium
Landslides				
Levee Failure	Extensive	Occasional	Catastrophic	Medium
River/Stream/Creek Bank Erosion	Significant	Likely	Critical	High
Severe Weather: Extreme Temperatures – Cold/Freeze				
Severe Weather: Extreme Temperatures – Heat				
Severe Weather: Fog				
Severe Weather: Heavy Rains and Storms (Thunderstorms, Hail, and Lightning)	Limited	Likely	Critical	Low
Severe Weather: Wind and Tornadoes				
Subsidence				
Volcano				
Wildfire:(Burn Area/Smoke)				
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		
Probability 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		

L.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile RD 1000’s hazards and assess the District’s vulnerability separate from that of the Planning Area as a whole, which has already been assessed in Sections 4.2 and 4.3 Vulnerability Assessment in the main plan. The hazard profiles in the main plan discuss overall impacts to the Planning Area and describes the hazard problem description, hazard extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to RD 1000 is included in this Annex. This vulnerability assessment analyzes the property, population, critical facilities, 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 main plan.

L.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section L.5.3, includes a description as to how the hazard affects the RD 1000 and information on past occurrences. The intent of these section is to provide jurisdictional specific information on hazards and further describe how the hazards and risks differ across the Planning Area.

L.5.2. Vulnerability Assessment

This section identifies RD 1000’s assets at risk, including values at risk, critical facilities and infrastructure, economic assets, natural resources, historic and cultural resources, and growth and development trends.

Assets at Risk and Critical Facilities

This section considers the District’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:

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, and (3) Hazardous Materials Facilities.

Table L-4 lists particular critical facilities and other District assets identified by the RD 1000’s 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 RD 1000 operations.

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

Name of Asset	Facility Type	Address	Replacement Value	Hazard Info
RD 1000 Plant 1A and 1B	Essential		\$25 million	Flood
RD 1000 Plant 2	Essential		\$5 million	Flood

Name of Asset	Facility Type	Address	Replacement Value	Hazard Info
RD 1000 Plant 3	Essential		\$10 million	Flood
RD 1000 Plant 4	Essential		\$7 million	Flood
RD 1000 Plant 5	Essential		\$4 million	Flood
RD 1000 Plant 6	Essential		\$7 million	Flood
RD 1000 Plant 8	Essential		\$15 million	Flood
District Drains/Canals	Essential		\$50 million*	Flood
RD 1000 Levee system	Essential		\$2 billion**	Flood
Sacramento International Airport	Transportation		County	Flood
City of Sacramento River Pump Stations (3)	Essential		City	Flood
City of Sacramento Drainage Pump Stations	Essential		City	Flood
Schools (2 high schools, middle and elementary)	High Potential		Natomas USD	Flood
Fire Stations	Essential		City	Flood
Senior Housing	High Potential		City	Flood
Interstate 5 and 80 Highway 99	Transportation		Caltrans	Flood
Day Care Centers	High Potential		City	Flood
Hazardous Material Sites	High Potential		City	Flood

Source: RD 1000

* the drains and canals would not have to be replaced but would need repairs after a flood event—estimate is for repairs if a flood occurred

** the levee system would not need to be replaced if a flood occurred but repaired. This is the cost to replace the system; the cost to repair the system following a flood about \$200 million

Natural Resources

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 are 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

There are a number of undisclosed Native American culturally sensitive sites which are generally buried below the ground and therefore would not be impacted by a flood event.

Growth and Development Trends

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. Work is required on the entire 42-miles of perimeter levees protection the District. As planned, the levee improvements would 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 District. However, given the continued flood risk, the local land use agencies are limiting the amount of urban development until the work is complete and the levees are re-certified.

With the lifting of the building moratorium, a number of projects are initiating the entitlement process and new development is expected in the District in the City of Sacramento, County of Sacramento and Sutter County over the next 30 years.

Development since the 2011 Plan

The RD has seen limited growth in their service area population since the 2011 plan due to the building moratorium as a result of the flood risk. The current population within the District is estimated at just over 100,000.

As noted above, a project to strengthen and improve the perimeter levee system to provide 200-year flood protection is underway. About 50% of the improvements were constructed by SAFCA between 2006 and 2013. The remaining improvements will be completed by the Corps of Engineers starting in 2017 and are scheduled to be completed by 2025.

Since 2011, the District completed the replacement of Pumping Plant No. 2. It was taken out during the 2006 flood event due to levee stability concerns at the site. A FEMA disaster assistance grant was used to fund the majority of the replacement project. The pump station is located in the basin and therefore subject to the flood risk identified.

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 RD 1000 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 calculating loss estimates are the similar to those described in Section 4.3 of the Base Plan and are based on data provided by the District as described further below. In general, the most vulnerable structures are those located within the floodplain or within levee and dam inundation areas, such as older facilities that may be constructed with unreinforced masonry and buildings built prior to the introduction of modern building codes. Buildings that contain electronic or electrically operated equipment are also vulnerable to flood inundation.

In general, the most vulnerable District assets include the levees and supporting structures that the District owns.

An estimate of the vulnerability of the RD 1000 to each identified priority hazard, in addition to the estimate of probability 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.

Flood

Likelihood of Future Occurrence—Likely

Vulnerability—High

Hazard Profile and Problem Description

As noted in this document, the current levee system does not meet the FEMA 100-year standard and therefore the District is vulnerable to a catastrophic flood from the potential failure of the perimeter levee system. The District Planning team noted that the likelihood of these floods is 1%, 0.5%, and 0.2% respectively in any given year; however, given current condition of levees, the risk of failure is what is high until they are recertified.

Past Occurrences

See descriptions of past flood events in Section L.3.2.

Vulnerability to Flood

Assets/Critical Facilities at Risk

The current population in Natomas is 100,000 based on the 2010 census and the Corps of Engineer's estimates total property damages (both public and private) would likely exceed \$10 billion.

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.

Natural Resources at Risk

RD 1000's drains, canals and ditches are considered natural resources in that they provide habitat for a number of species in the Natomas Basin. A large flood event would cause modest damage to these facilities requiring repairs and modifications such as sediment removal, access road and gate replacements.

Historic and Cultural Resources at Risk

The District Planning Team noted no cultural or historic resources that would be affected.

Future Development

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. Work is required on the entire 42-miles of perimeter levees protection the District. As planned, the levee improvements would 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 floodplain 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 District. However, given the continued flood risk, the local land use agencies are limiting the amount of urban development until the work is complete and the levees are re-certified.

With the lifting of the building moratorium, a number of projects are initiating the entitlement process and new development is expected in the District in the City of Sacramento, County of Sacramento and Sutter County over the next 30 years.

Flood: Localized Stormwater

Likelihood of Future Occurrence—Occasional

Vulnerability—Medium

Hazard Profile and Problem Description

The Natomas basin which is the jurisdiction of Reclamation District No. 1000, is a low-lying basin surrounded on all four sides by levees. The District operates and maintains miles of canals and drainage ditches which collect local rainfall from within the Natomas basin and transports the water to a system of seven pump stations for discharge into the adjacent river systems.

Past Occurrences

Over the history of the District, there have been a number of localized floods. However, prior to urban development, these floods impacted primarily agricultural properties during the non-growing season. Since urban development, there have been instances of localized flooding, the worst being in February 1986, when spills through the “Sankey Gap” along the eastern perimeter levee system combined with interior runoff due to rainfall affected travel on Highway 99 as well as a number of interior roads. Had an evacuation been necessary, it would have been significantly impacted by the road closures.

The District does not have documents for other localized floods other than anecdotal information from landowners and Natomas residents.

Vulnerability to Localized Stormwater Flooding

Assets/Critical Facilities at Risk

The major interior canals in the urbanized area (City of Sacramento) in the southern quarter of the Natomas basin also have a levee system to contain the 100-year flood within the canals. If the pump stations are not operable due to power failure in the area, the canals are at risk of overflowing creating localized flooding. Flooding would be shallow (less than 3 feet), significantly less than from a failure of the perimeter levee; however, it would impact emergency response and evacuation routes should the perimeter levee system subsequently fail.

Natural Resources at Risk

RD 1000’s drains, canals and ditches are considered natural resources in that they provide habitat for a number of species in the Natomas Basin. Stormwater flooding would cause modest damage to these facilities requiring repairs and modifications such as bank erosion and access road repairs.

Historic and Cultural Resources at Risk

The District Planning Team noted no cultural or historic resources that would be affected.

Future Development

Future development is not likely to be limited by localized flooding.

Levee Failure

Likelihood of Future Occurrence–Likely

Vulnerability–High

Hazard Profile and Problem Description

Floods can threaten the District from several sources. Usually, the possibility of flooding can be anticipated from eight to twenty hours before the “Emergency Period” is reached. However, as demonstrated in Linda, California, in February 1986, it is possible for a levee to collapse with little or no warning when there are still four or more feet of freeboard available.

Generally, levees fail due to overtopping or collapse. A catastrophic levee failure resulting from collapse probably will occur very quickly with relatively little warning. Such a failure would occur where the levee is saturated and the high hydrostatic water pressure on the river side, coupled with erosion of the levee from high water flows or an inherent defect in the levee, causes an almost instant collapse of a portion of the levee. Under such circumstances, structures located relatively near the break will suffer immediate and extensive damage. Several hundred yards away from the break the energy of the flood waters will be dispersed sufficiently to reduce, but not eliminate, flooding damage to structures in its path. The flood water will flow in a relatively shallow path toward any low point in the affected area. Flood water will collect in these low areas and the levels will rise as the flow continues. When the rivers are high, it is not possible to close or repair a levee break until the water surface in the river and the flooded area equalize.

A major overtopping of a levee, if flow persists, will result in severe erosion of the levee crowns on the landward side and cause levee failure over a period of minutes to several hours. A severe levee overtopping can, therefore, be considered as a levee break for the purpose of determining the extent of flooding that any area will suffer. Generally, overtopping can be predicted based on river stages and the warning given depending on the source of the flood waters

Past Occurrences

There have been no failures of District levees.

Vulnerability to Levee Failure

With the levee improvements that have been completed to date and the anticipated improvements described about to be completed by the Corps of Engineers over the next 10 year; the risk of a levee failure is significantly reduced and not likely to occur. However, if a larger storm event or an unforeseen levee stability issue results in a levee failure, there are a number of District facilities at risk as noted in the table above. These include the District pump stations, our Corporation Yard and potentially the District’s main office depending on the location of a levee failure.

Natural Resources at Risk

RD 1000's drains, canals and ditches are considered natural resources in that they provide habitat for a number of species in the Natomas Basin. A large flood event would cause modest damage to these facilities requiring repairs and modifications such as sediment removal, access road and gate replacements.

Historic and Cultural Resources at Risk

The District Planning Team noted no cultural or historic resources that would be affected.

Future Development

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. Work is required on the entire 42-miles of perimeter levees protection the District. As planned, the levee improvements would 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).

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River/Stream/Creek Bank Erosion

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. As farmers settled the valleys in the 1800s, the Gold Rush drew prospectors to the hills. As mining in the Sierra Nevada turned to the more “efficient” methods of hydraulic mining, the use of environmentally destructive high-pressure water jets washed entire mountainsides into local streams and rivers. As a result, the enormous amounts of silt deposited in the riverbeds of the Central Valley increased flood risk. As a remedy to these rising riverbeds, levees were built very close to the river channels to keep water velocity high and thereby scour away the sediment. However, the design of these narrow channels has been too successful. While

the Gold Rush silt is long gone, the erosive force of the constrained river continues to eat away at the levee system and stream banks within the District.

The District Planning team noted that while erosion is likely to occur, it only is a threat if it impacts the stability of the adjacent levee causing a failure

Past Occurrences

RD 1000 conducted bank erosion studies in 1999 and 2004 to identify sites where erosion is of concern and could lead to levee erosion if not addressed. The District has continued to monitor these sites on a limited basis since 2004. In addition, the Army Corps of Engineers and California Department of Water Resources undertakes annual inspections of the Sacramento River to identify erosion sites that could impact the integrity of the adjacent levee system. Four sites both on the Corps list and the in the District's reports have now been repaired through contracts with the Corps of Engineers. These sites are along the Sacramento River adjacent to Natomas at River Miles 78.0, 77.2, 73.5 and 68.9.

During the winter of 2011, RD 1000 staff undertook emergency repairs at approximate RM 68.4 as high water during this past season eroded a significant portion of the bank and was threatening the adjacent levee. This site is just downstream of the work done by the Corps of Engineers at RM 68.9 and is part of an approximately 5800 foot reach of eroding bank site identified in the District's report that is being monitored.

In addition to this site, the District's studies in 1999 and 2004 have identified 6 additional small erosion sites which are being monitored and are being requested to be repaired through the Sacramento River Bank Protection Project though it currently has not been identified by the Corps for remedial work.

Vulnerability to Erosion

Assets/Critical Facilities at Risk

The entirety of the levee system in RD 1000 is at risk to erosion.

Natural Resources at Risk

The natural resources at risk would be the same as those identified above for a levee failure or flood. In addition, the eroding banks themselves are natural resources as they provide critical habitat for fisheries by providing Shaded Riverine Habitat and in-stream woody vegetation.

Historic and Cultural Resources at Risk

The District Planning Team noted no cultural or historic resources that would be affected.

Future Development

This hazard is not applicable to future development issues.

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-5 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-5 RD 1000's 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	Y	District adopted a 2015-2020 Strategic Plan
Capital Improvements Plan	Y	Yes
Economic Development Plan	N	
Local Emergency Operations Plan	Y	Yes
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)	N	
Building Code, Permitting, and Inspections	Y/N	Are codes adequately enforced?
Building Code	N	Version/Year:
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score:
Fire department ISO rating:	N	Rating:
Site plan review requirements	Y	Proposed projects which impact levees or drainage facilities require permits from District and include plan review and sign of

Land Use Planning and Ordinances	Y/N	Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?
Zoning ordinance	N	
Subdivision ordinance	N	
Floodplain ordinance	N	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Y	Title 23 California Water Code
Flood insurance rate maps	N	
Elevation Certificates	N	
Acquisition of land for open space and public recreation uses	N	
Erosion or sediment control program	Y	Erosion control measures on levee and canal slopes as necessary
Other	Y	District has adopted a Development Impact Fee
How can these capabilities be expanded and improved to reduce risk?		

Source: RD 1000

L.6.2. Administrative/Technical Mitigation Capabilities

Table L-6 identifies the department(s) responsible for activities related to mitigation and loss prevention for RD 1000.

Table L-6 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 and monitoring during flood events
Mutual aid agreements	Y	District has mutual aid agreements with City and County of Sacramento
Other		
Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	N	
Floodplain Administrator	N	
Emergency Manager	Y	RD 1000 District Manager
Community Planner	N	
Civil Engineer	Y	RD 1000 District Manager/Consultant

GIS Coordinator	Y	RD 1000 District Manager/Consultant
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	N	
Hazard data and information	N	
Grant writing	N	
Hazus analysis	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		

Source: RD 1000

L.6.3. Fiscal Mitigation Capabilities

Table L-7 identifies financial tools or resources that the RD 1000 could potentially use to help fund mitigation activities.

Table L-7 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 using Capital Reserves to fund projects
Authority to levy taxes for specific purposes	Y	For increase in assessments must comply with Proposition 218 which requires vote
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	Y	District requires impact fee and mitigation for new development
Storm water utility fee		
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	N	
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
State funding programs		
Other		
How can these capabilities be expanded and improved to reduce risk?		

Source: RD 1000

L.6.4. Mitigation Education, Outreach, and Partnerships

Table L-8 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-8 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.		
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Y	District has community outreach program started five years ago. Reach out to a variety of community and neighborhood groups annually. Also, District has a 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		
StormReady certification		
Firewise Communities certification		
Public-private partnership initiatives addressing disaster-related issues		
Other		
How can these capabilities be expanded and improved to reduce risk?		

L.6.5. Other Mitigation Efforts

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.

As described previously, perimeter levee improvements (Natomas Levee Improvement Project) have been completed by the Sacramento Area Flood Control Agency (SAFCA) with local assessment funds and State Bond funds for approximately half of the system. The remaining levee improvements are to be completed by the Corps of Engineers as federal funds are appropriated

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

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 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.

Action 1. River Berm and Levee Erosion

Hazards Addressed: Levee failure and Levee overtopping and loss of riverine habitat

Goals Addressed: 1, 2, 3, 4

Issue/Background: The District's perimeter levee system is susceptible to active erosion due to high velocity flows and fluctuating water levels in the river system. The erosion on the river banks, if not mitigated, will eventually reach the levee section undermining the foundation leading to levee slope failure and levee overtopping. The Corps of Engineers and State DWR conduct annual inspection to identify critical erosion locations.

Project Description: When erosion reaches a critical stage jeopardizing the adjacent levee, a bank erosion project is constructed. Work includes place a rock toe and bottom of the eroding slope with an earthen planting berm placed on top which includes environmental mitigation features.

Other Alternatives: Armor levee slopes. More expensive and results in loss of critical habitat.

Existing Planning Mechanism(s) through which Action Will Be Implemented: RD 1000 Capital Improvement Plan and Sacramento River Bank Protection federally authorized project and California state funds as appropriated

Responsible Office/Partners: RD 1000, California Dept of Water Resources and Corps of Engineers for river bank erosion

Project Priority: Medium

Cost Estimate: \$10 to \$50 Million for river erosion over time

Benefits (Losses Avoided): Loss of property and life due to catastrophic levee failure due to river bank erosion

Potential Funding: RD 1000, California DWR and Corps of Engineers for river bank erosion

Timeline: Projects are implemented when erosion reaches critical stage

Action 2. Erosion Protection Canal Banks

Hazards Addressed: Erosion, Levee failure, Localized flooding

Goals Addressed: 1, 2, 3, 4

Issue/Background: Both the District's perimeter levee system and interior drainage canals are susceptible to active erosion due to water flows in the rivers and fluctuating water levels in the interior canals. The erosion on the river banks, if not mitigated, will eventually reach the levee section undermining the foundation leading to slope failure and levee overtopping. Along the drain canals, fluctuating water levels cause the side slopes to slough which eventually reaches the tops of the canal banks and causes loss of the access roads and adjacent ground.

Project Description: The canal slopes are stabilized by placing a layer of rock slope protection at the waterline and re-grading the canal slope. above

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: District's Capital Improvement Plan and on-going maintenance

Responsible Office/Partners: RD 1000 for canals;

Project Priority: High

Cost Estimate: \$10 Million for interior canals;

Benefits (Losses Avoided): Loss of property and canal repair/replacement costs for canal bank erosion

Potential Funding: RD 1000 for canal bank erosion;

Timeline: Canal bank erosion protection is done annually

Action 3. Implement Security Measures at Key Facilities

Hazards Addressed: Localized flooding, levee failure, levee overtopping

Goals Addressed: 1, 2, 3, 4

Issue/Background: The District had a security risk assessment conducted by an outside contractor who recommended specific measures be implemented to reduce the risk at key District facilities

Project Description: Security measures include improved perimeter fencing to reduce vandalism and theft; security monitoring using cameras, physical patrols and other security measures. The key facilities identified include the District office and Corporation Yard as well as the pump stations

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: District's Capital Improvement Program

Responsible Office/Partners: RD 1000

Project Priority: High

Cost Estimate: \$1.5 Million

Benefits (Losses Avoided): Reduce risk of power loss due to vandalism and theft which would avoid localized flooding; insure District materials and equipment are available for flood emergency response to reduce risk of levee failure/overtopping

Potential Funding: RD 1000 and state-wide grants

Timeline: Current. Projects on-going on an annual basis

Action 4. 2014 Capital Improvement Plan

Hazards Addressed: Localized flooding, levee failure, levee overtopping, erosion

Goals Addressed: 1, 2, 3, 4

Issue/Background: District identified a number of capital project needs—some of which are included in this plan under separate Mitigation Action Worksheets

Project Description: See attached

Other Alternatives:

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

Responsible Office/Partners: RD 1000

Project Priority: Varies by project

Cost Estimate: Estimate \$1.0 to \$3.0 million annually to implement over next 20 years

Benefits (Losses Avoided): Avoid potential loss of life, property damage

Potential Funding: RD 1000, SAFCA, USACE, State of California

Timeline: Portions of CIP currently being implemented

Action 5. Implement Supervisory Control and Acquisition Data system (SCADA) on District canals and pump stations

Hazards Addressed: Localized flooding

Goals Addressed: 1, 2, 3

Issue/Background: District cannot remotely monitor levels in canals and pump stations—only physical monitoring available

Project Description: SCADA system allows for remote monitoring of canals and pump stations and operations.

Other Alternatives: Physical monitoring and operations

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

Responsible Office/Partners: Natomas Central Mutual Water Company

Project Priority: High

Cost Estimate: \$1.5 million

Benefits (Losses Avoided): Flood losses due to localized flooding

Potential Funding: District funds and Bureau of Reclamation District grant

Timeline: Initiate in 2016

Action 6. Public Outreach and Education

Hazards Addressed: Flood risk including localized flooding, levee failure and levee overtopping

Goals Addressed: 1, 2, 3, 4

Issue/Background: Providing education and information to the public allows for them to prepare for and respond during a flood emergency including evacuation procedures, personal and family preparation.

Project Description: District will outreach to community based organizations providing information about the District and our critical role in provide flood protection. Also improve our website and social media presence to provide information to the public during flood on status of canal, river levels and levee conditions.

Other Alternatives: Respond to phone calls during emergency

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

Responsible Office/Partners: RD 1000; City of Sacramento; County of Sacramento; Sutter County

Project Priority: High

Cost Estimate: \$50,000 to \$100,000 annually

Benefits (Losses Avoided): Assist with potential emergency evacuation and personnel property protection during flood emergency—prevent potential loss of life and loss of property

Potential Funding: RD 1000

Timeline: Currently implemented

Action 7. Stockpile and pre-stage flood emergency response materials

Hazards Addressed: Levee failure, levee overtopping

Goals Addressed: 1, 2, 3

Issue/Background: District needs to have readily available flood fight materials such as sand bags, rock, AB and fill material in close proximity to potential levee failure areas to stabilize levee and avoid failure.

Project Description: Purchase properties at strategic locations in District to stockpile flood fight materials. Purchase and store materials at the sites for deployment during flood emergency

Other Alternatives: Stockpile at remote locations or purchase as necessary—delay in response which could result in levee failure

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

Responsible Office/Partners: RD 1000

Project Priority: High

Cost Estimate: \$2.5 million

Benefits (Losses Avoided): Catastrophic levee failure, loss of life and significant property loss

Potential Funding: RD 1000

Timeline: Immediate

Action 8. *Emergency response improvements including radios for communications*

Hazards Addressed: Levee failure, levee overtopping, localized flooding

Goals Addressed: 1, 2, 3

Issue/Background: Current operations rely on cell phone communications. During flood emergency, cell phone communication not reliable. Also District needs additional flood fight equipment such as portable lights, trailers, flatbed trucks, ect.

Project Description: Purchase radios to allow communication between District personnel during emergency and with outside emergency operational area coordinators including law enforcement, fire and Sacramento County OES. Also purchase additional flood fight equipment such as portable lights, trailers and flatbed trucks for emergency response

Other Alternatives: Cell phone

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

Responsible Office/Partners: RD 1000; Sacramento County OES

Project Priority: Very High

Cost Estimate: \$100,000 for radios; \$300,000 for equipment

Benefits (Losses Avoided): Coordinated emergency response can prevent levee failure or overtopping avoiding catastrophic flooding, loss of life and significant property damage

Potential Funding: RD 1000, Sac County OES

Timeline: Prior to 2016 flood season

Action 9. *Emergency Back-up Generator for pump stations*

Hazards Addressed: Localized flooding

Goals Addressed: 1, 2, 3, 4

Issue/Background: Only one District pump station has an emergency backup generator for power failure situations. Need to have additional generators at existing pump stations or portable generators that could be deployed to stations if power is lost. Without pumping capacity, canals will overtop and flood adjacent property and flood potential evacuation routes in case of imminent levee overtopping or failure

Project Description: Construct permanent back up diesel or gas powered generators at current pump plants or provide for two or more portable generators for deployment during power outage

Other Alternatives: None

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

Responsible Office/Partners: RD 1000

Project Priority: High

Cost Estimate: \$3.0 million

Benefits (Losses Avoided): Localized flood damages to properties due to water overtopping canals.
Disruption to evacuation and/or emergency response due to flooded access routes

Potential Funding: RD 1000

Timeline: Purchase as funds available--2018