

Delta Annex Chapter 7 Reclamation District 551

7.1 Introduction

This Annex details the hazard mitigation planning elements specific to Reclamation District 551 (RD 551), 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 551, with a focus on providing additional details on the risk assessment and mitigation strategy for this District.

7.2 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 7-1. Additional details on plan participation and District representatives are included in Appendix A.

Table 7-1 RD 551 – Planning Team

Name	Position/Title	How Participated
Topper Van Loben Sels	President	Evaluated District issues and developed solutions
Doug Chan	Trustee	Evaluated District issues and developed solutions
Kurt Jonson	Trustee	Evaluated District issues and developed solutions
Gilbert Cosio/MBK	District Engineer	Evaluated District issues and developed solutions

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 7-2.

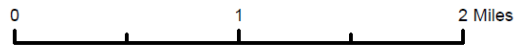
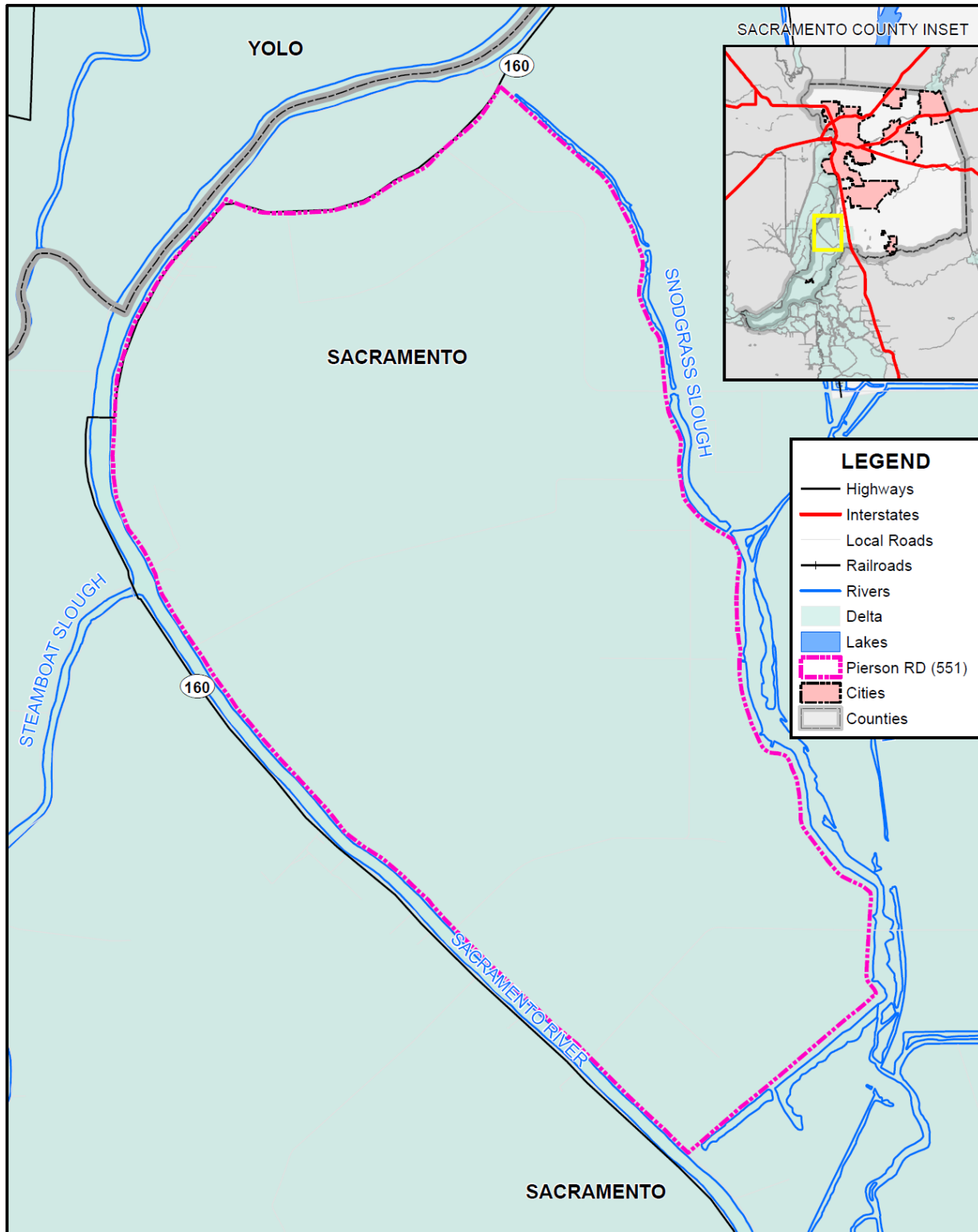
Table 7-2 2016 LHMP Incorporation

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

7.3 District Profile

The District profile for the RD 551 is detailed in the following sections. Figure 7-1 displays a map and the location of the District within Sacramento County.

Figure 7-1 RD 551



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

7.3.1. Overview and Background

Reclamation District No. 551, Pearson District (District), is the local public entity that provides flood protection in the form of levee maintenance and drainage to the landowners of Pearson District. The District operates and maintains all the levees that protect the landowners. As described in Division of Water Resources, (currently known as Department of Water Resources) Bulletin No. 37, published in 1930, the District is described as protecting 8,800 gross acres, with a net protected area of 8,537 acres, within Sacramento County.

The District originally built the project levee along the Sacramento River (6.85 miles); USACE, under authority of the SRFCP, rebuilt portions of the levee. This is the levee recognized by both the state and federal governments as the primary flood protection levee, as part of the SRFCP. The District built the non-project levee along Snodgrass Slough (5.91 miles) to its present design in the 1920s. There are also 1.37 miles of non-project cross levee, adjacent to the Delta Meadows State Park.

The District does not supply water, which is the responsibility of the individual landowners; however, the District maintains 37.97 miles of canals and ditches that provide drainage to the property owners. These ditches and canals are fed by farmer ditches, which are designed by the landowner to drain their property adequately. Once the drain water enters the District's ditches and canals, water is removed at pumping plants located at one location on Pearson District.

Land use is predominantly agricultural, aside from the small town of Courtland. Orchards (including pears, apples, and cherries), vineyards, alfalfa, grain, and miscellaneous row crops are the primary crops. The historic town of Courtland is the largest residential area on the District. There are an estimated 636 residents within the District. Courtland has a sewage treatment plant operated by Sacramento County. Two large fruit packing operations are located within the protected area of the District. There are public roads running along the entire length of the Sacramento River levee.

The District has no major land use changes, although there are statewide planning efforts that if carried out could require major land use changes, affecting all aspects of the District operation and maintenance of the levee and drainage system. The District is currently in the process of annexing adjacent Reclamation District 755.

Interior ground elevations slope toward the center of the District. Interior ground elevations range from 12 feet (toe of Sacramento River levee) to -12 NGVD within the District interior. Top of levee elevations range from 19.0 to 27.5 feet national geodetic vertical datum (NGVD) along the non-project back levee, and 24.9 to 26.2 feet NGVD along the project levee (left bank of Sacramento River). The low elevation of 19.0 on the non-project levee is located at Lambert Road, still over 2.0 feet above the 100-year flood elevation. Except for this and two other road crossings, the non-project levee generally has over 6 feet of freeboard above the 100-year flood elevation.

Reclamation is one of the first forms of public improvement in California, with the early focus on reclaiming "swamp and overflowed" lands granted to the state under the Federal 1850 Arkansas Act. The term

reclamation primarily encompasses flood control and drainage, but has also long included irrigation.¹ To help local landowners reclaim the swamp and overflowed lands, the state adopted a series of statutes authorizing them to form local reclamation and levee districts. The area of a proposed district was outlined in a formation petition presented to a state or county board, which would order a district to be formed after a majority vote of the affected landowners. Beginning in 1861, the Board of Swamp Land Commissioners issued the orders organizing reclamation and levee districts. Beginning in 1867, districts were organized under the Green Act by county boards of supervisors. (Stats. 1867-8, c. 415.) A few reclamation districts were also created by special act of the legislature. (See, e.g., Stats. 1911, c. 100 (RD 900).) Regardless of how they were formed, reclamation districts now operate under Water Code Division 15, § 50000 et seq., and levee districts under Division 19, § 70000 et seq. (See also Stats. 1911, c. 100, § 2.)

As reclamation districts were formed under the above noted laws, they were given numbers sequentially. Pearson District formed in 1893, and was given the number “551.” The area protected by the District has remained the same for essentially the entire time of its existence.

Starting in the 1940s, USACE improved the Sacramento River levee is a flood control structure to meet the federal design standard. To satisfy the conditions of federal involvement in such projects, the Central Valley Flood Protection Board (CVFPB) agreed to operate and maintain the Sacramento River levee. USACE transferred the District levee, as part of Unit No. 111, completely over to CVFPB, formerly the State Reclamation Board, in September 1955. Under Section 8618 of the Water Code, reclamation districts are authorized to establish agreements with the CVFPB to perform these actions for the state. The District is required to maintain and operate the levees to meet the standards as listed in the Supplemental Operation and Maintenance Manual.

7.4 Hazard Identification

RD 551 identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table 7-3).

¹ Hershey v. Reclamation Dist. No. 108, 200 Cal. 550, 567-68 (1927).

Table 7-3 RD 551—Hazard Identification Assessment

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

7.5 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.

7.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section 7.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table 7-3) 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.

7.5.2. 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.

The District protects the town of Courtland. The total population within the District is approximately 700 with approximately 173 residential structures with a depreciated value of \$54 million.

The District has approximately 8,436 acres dedicated to agriculture. The District supports a mixture of permanent crops such as orchards and vineyards, row crops, grain, and pasture. The total value of this is estimated to be \$50 million.

Additionally, the District supports critical infrastructure that includes State Highway 160 as well as County roads, a ferry, local bridges, schools, fire station, water wells, gas wells, and communication tower

Assets at Risk and Critical Facilities

This section considers the RD 551'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 LHMP. Critical facilities are defined for this Plan as:

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

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

Table 7-4 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. RD 551’s physical assets, valued at over \$290 million, consist of the buildings and infrastructure to support the District’s operations.

Table 7-4 RD 551 Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Pumps – Snodgrass Slough	Drain Pumps	\$3,000,000	Floods, Levee Failure, Severe Weather: Heavy Rain and Storms
Pumps – Lake	Drain Pumps	\$2,000,000	Floods, Levee Failure, Severe Weather: Heavy Rain and Storms
District Owned Facilities	Home, Buildings & Equipment	\$3,000,000	Floods, Levee Failure, Severe Weather: Heavy Rain and Storms
Levees	Flood Control System	282,600,000	Floods, Levee Failure, Severe Weather: Heavy Rain and Storms
Total		\$290,600,000	

Source: RD 551

Natural Resources

RD 551 has a variety of natural resources of value to the District. These natural resources parallels that of Sacramento County as a whole. Information can be found in Section 4.3.1 of the Base Plan. In the past, RD 551 has protected a number of natural gas wells. Currently, there are no wells in operation on Pearson District. RD551’s levees support vegetation that provide fish and wildlife habitat. Agricultural ground and ditches also support wildlife.

Historic and Cultural Resources

RD 551 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. Since the land has been settled for over 150 years, there are many historic structures on Pearson District.

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.

Pearson District is within the Primary Zone of the Delta. Therefore, in addition to Sacramento County, development is controlled by a State agency, the Delta Protection Commission. Therefore, there is little, if any, potential for growth beyond that allowed by agricultural zoning.

Development since 2016

No District facilities have been constructed since 2016. As such, vulnerability to the District is unchanged.

Future Development

Future development in these areas generally parallels that of the Sacramento County Planning Area. More general information on growth and development in Sacramento County as a whole can be found in “Growth and Development Trends” in Section 4.3.1 Sacramento County Vulnerability and Assets at Risk of the Base Plan. Pearson District is within the Primary Zone of the Delta. Therefore, in addition to Sacramento County, development is controlled by a State agency, the Delta Protection Commission. Therefore, there is little, if any, potential for growth beyond that allowed by agricultural zoning. None of these planned repairs listed in Table 7-5 are intended to induce growth due to land use regulations.

Table 7-5 RD 551 Proposed Maintenance and Improvement Projects

Proposed Projects	Levee Segment
2017 Storm Damage, Waterside Erosion Repairs	Sacramento River
Remediate unacceptable items listed in the USACE PIR (2013)	Sacramento River
Interior Drainage Improvements	Sacramento River and Snodgrass Slough

7.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table 7-3 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Sacramento County Planning Area). Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

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

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

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

Power Outage/Power Failure

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

Public Safety Power Shutoff (PSPS)

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

The District is not located within an area that is subject to a PSPS and has not been affected by any activity.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence—Occasional

Vulnerability—High

Hazard Profile and Problem Description

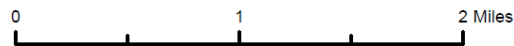
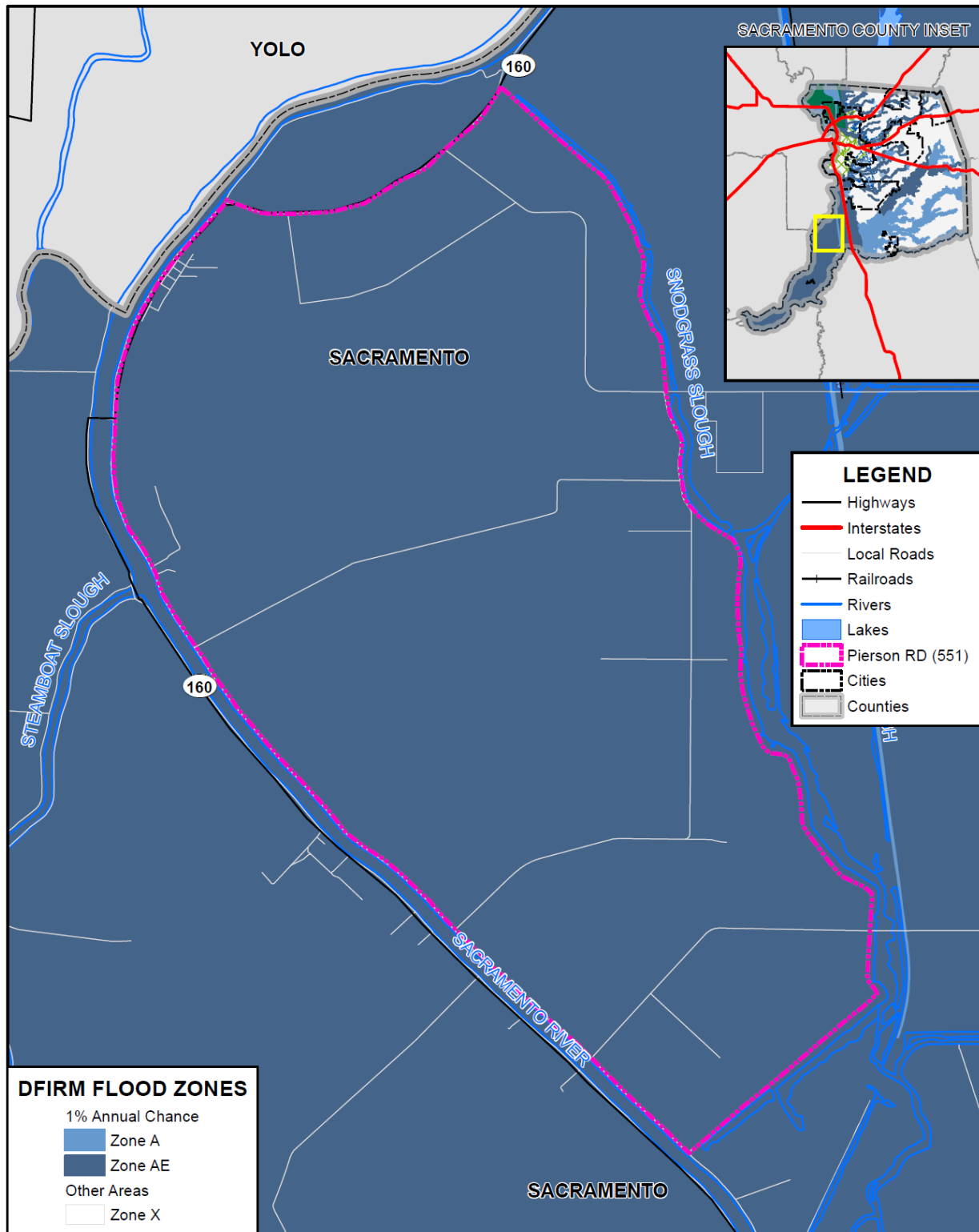
This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the District, and have caused damages in the past. Flooding is a significant problem in Sacramento County and the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage. Flooding on the Sacramento River has threatened the levees of RD 551 in the past. Flooding inside the leveed area would occur as a result of levee failure or overtopping. The flood elevations around Pearson District exceed the elevation of almost every acre of ground protected by RD 551 levees. Therefore, a levee breach under flood conditions would be catastrophic to the landowners. In addition, the Pearson District levees are not certified to protect against the 100-year flood.

As previously described in Section 4.3.11 of the Base Plan, the Sacramento County Planning Area and the RD 551 have been subject to historical flooding.

Location and Extent

The RD 551 has areas located in the 1% annual chance floodplain. This is seen in Figure 7-2.

Figure 7-2 RD 551 – FEMA DFIRM Flood Zones



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

Table 7-6 details the DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the District.

Table 7-6 RD 551– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone Present in the District
A	100-year Flood: No base flood elevations provided	
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	
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	
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	
X (unshaded)	Areas outside of the flood zone	

Source: FEMA

Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the District vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Flooding in the District tends to have a shorter speed of onset, due to the amount of water that flows through the District.

Past Occurrences

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

Table 7-7 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

Past river floods, most recently in 1986, 1997/1998, 2006 and 2017, have damaged the RD 551 levees in the form of erosion. Some of this erosion was repaired by RD 551 under flood fight conditions. Restoration erosion repair has typically been performed by the Corps of Engineers as authorized under PL 84-99. Repair work under PL 84-99 was performed by the Corps of Engineers on Pearson District levees following the recent floods of 1986, 1997, 1998, and 2006. Erosion experienced in other years was repaired by RD 551. The District temporarily lost eligibility in the PL84-99 program but is in the process to regain eligibility through the preparation and execution of a Systemwide Improvement Framework (SWIF). The District is now eligible to receive repair and recovery assistance from the Corps of Engineers in the event of a levee failure.

Past floods, as previously listed, have also required flood fighting by RD 551. This flooding fighting has consisted of seepage control and emergency erosion repair. Seepage control is critical in levee breach prevention. The levees and levee foundations of Pearson District are very porous and subject to flood water seeping through, and under, the levee. If left uncontrolled, this seepage could accelerate to the point that it has the force to move levee material. This phenomenon is called piping, or internal erosion of the levee. Once enough material is moved out of the levee section, a levee breach occurs.

Most recently, high water events in 2017 and 2019 have resulted in considerable waterside erosion and exacerbated sites that have experienced erosion over time throughout the District levees.

The flood event of 2017 also resulted in increased vegetation removal, levee patrols, and pumping costs.

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.

Assets at Risk

Should a flood breach the levees, the entirety of the assets of RD 551 would be at risk. These assets include the small community of Courtland. All of the RD 551 drain pumps would be flooded and therefore, RD 551 could not drain the flooded areas with their existing pumps; auxiliary pumps would have to be brought in. A flood event could also deteriorate the District levees on waterside slopes causing significant erosion as seen in the aftermath of the 2017 event. If a breach were to occur, the levees could experience erosion on the landside slopes from wave wash.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Likely

Vulnerability–High

Hazard Profile and Problem Description

Flooding occurs in areas other than the FEMA mapped 1% and 0.2% annual chance floodplains. Flooding may be from drainages not studied by FEMA, lack of or inadequate drainage infrastructure, or inadequate maintenance. Localized, stormwater flooding occurs throughout the County during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration.

During high rainfall events, the drainage system is not capable to evacuate water from the interior of Pearson District without flooding some low lying properties. On properties that farm annual row crops, this is not a problem since crops are not normally planted until after the rainy season. However, winter wheat, perennial, or multi-year crops are susceptible to damage when water overflows the banks of the drain canals.

Location and Extent

The RD 551 is subject to localized flooding throughout the District. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. 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. Localized flooding in the District tends to have a shorter speed of onset, especially when antecedent rainfall has soaked the ground and reduced its capacity to absorb additional moisture.

Past Occurrences

There have been no federal or state disaster declarations in the County due to localized flooding. The District noted the following past occurrences of localized flooding: The storm event of 2017 resulted in localized flooding in the center of the District in low areas adjacent to State Highway 220 and Poverty Road. These areas are mostly row crops, but recently permanent orchards have been established in historically wet areas on the District and may be lost in a localized flooding event depending on the floodwater residency time.

Stormwater flooding occurs every few years. In most years, it is not significant enough to be a problem. For the most part, past flooding has damaged alfalfa and winter wheat. However, past floods have damaged county roads. In addition, many acres of vineyards and orchards have been planted in the past few years, so it is anticipated that these recently planted permanent crops may be damaged by future canal bank flooding.

Vulnerability to and Impacts from Localized Flooding

Historically, much of the growth in the District and County has occurred adjacent to streams, resulting in significant damages to property, and losses from disruption of community activities when the streams overflow. Additional development in the watersheds of these streams affects both the frequency and duration of damaging floods through an increase in stormwater runoff.

As stated above, stormwater flooding has the potential to result in significant damage due to the increased acreage of permanent crops. In addition, residences in the lower elevations of Courtland are at risk.

Primary concerns associated with stormwater flooding include impacts to infrastructure that provides a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Objects can also be buried or destroyed through sediment deposition. Floodwaters can break utility lines and interrupt services. Standing water can cause damage to crops, roads, and foundations. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

During high rainfall events, the drainage system is not capable of evacuating water from the interior of Pearson District without flooding some low lying properties. On properties that farm annual row crops, this is not a problem since crops are not normally planted until after the rainy season. However, winter wheat, perennial, or multi-year crops are susceptible to damage when water overflows the banks of the drain canals.

Assets at Risk

As stated above, stormwater flooding has the potential to result in significant damage due to the increased acreage of permanent crops. Stormwater flooding can result in losses of less flood resistant crops planted at low elevations. Depending on timing and severity of flooding, some permanent crops will be lost and require reestablishment. Reestablishing a vineyard or orchard can take 5 years or more before there is a harvestable crop.

Levee Failure

Likelihood of Future Occurrence—Occasional
Vulnerability—High

Hazard Profile and Problem Description

A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a

narrower steam channel, levees can also increase the speed of the water. Levees can be natural or man-made.

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce, not eliminate, the risk to individuals and structures located behind them. A levee system failure or overtopping can create severe flooding and high water velocities. Levee failure can occur through overtopping or from seepage issues resulting from burrowing rodents, general erosion, excessive vegetation and root systems and other factors that compromise the integrity of the levee. No levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Location and Extent

There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District vary by event and location. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of levee failure risk times can be hours to weeks, depending on the river flows that the levee holds back. When northern California dams and reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees.

To reduce the risk of flooding the District is planning to perform the repairs listed in Table 7-5 to reduce the likelihood of levee failure.

Past Occurrences

There have been no federal or state disaster declarations from levee failure. The District Planning Team noted no past occurrences of levee failures. The RD 551 levees have not failed in over 100 years. Two floods over the past few decades (1986 & 1997) required extensive flood fighting by RD 551 forces in order to prevent a levee breach.

Vulnerability to and Impacts from Levee Failure

A levee failure can range from a small, uncontrolled release to a catastrophic failure. Levee failure flooding can occur as the result of prolonged rainfall and flooding. The primary danger associated with levee failure is the high velocity flooding of those properties outside and downstream of the breach.

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

A levee failure would impact almost all the assets and critical facilities on Pearson District; including the small community of Courtland. State Highways 160, as well as a number of county roads are at risk. Approximately 8,000 of agricultural land would be damaged and possibly rendered unfarmable for at least a year. There are many permanent crops on Pearson District, such as wine grapes, pears, apples and cherries that would be destroyed. If a breach were to occur within the levees fronting the towns or areas north, there could be a potential loss of life due to limited evacuation time and disruptions in evacuation routes.

A levee failure and subsequent flooding on Reclamation District 551 could result in large wave fetch that could damage the interior slopes of the District's levee system as well as those of adjacent Districts.

Scour at the breach area is another concern. Once the breach is repaired this location may prove to be too low to support any agriculture due to drainage difficulties.

StormReady Flood Scenarios and Evacuation Routes

The County of Sacramento and the City of Sacramento have prepared various detailed maps showing hypothetical levee breaks, inundation levels and the time it would take for waters to rise in affected neighborhoods, and rescue and evacuation zones. It is important to note that these maps deal with potential scenarios. These are to help Sacramento County citizens think of how to escape before an emergency occurs. It should be noted that it would be incorrect to assume that the evacuation routes shown on the maps will necessarily be citizens only way out in a flood. Escape routes could be affected by localized flooding, traffic accidents, and different flooding situations occurring at the time. Emergency officials will monitor roads and let the public know through radio stations and other media if alternate routes should be taken.

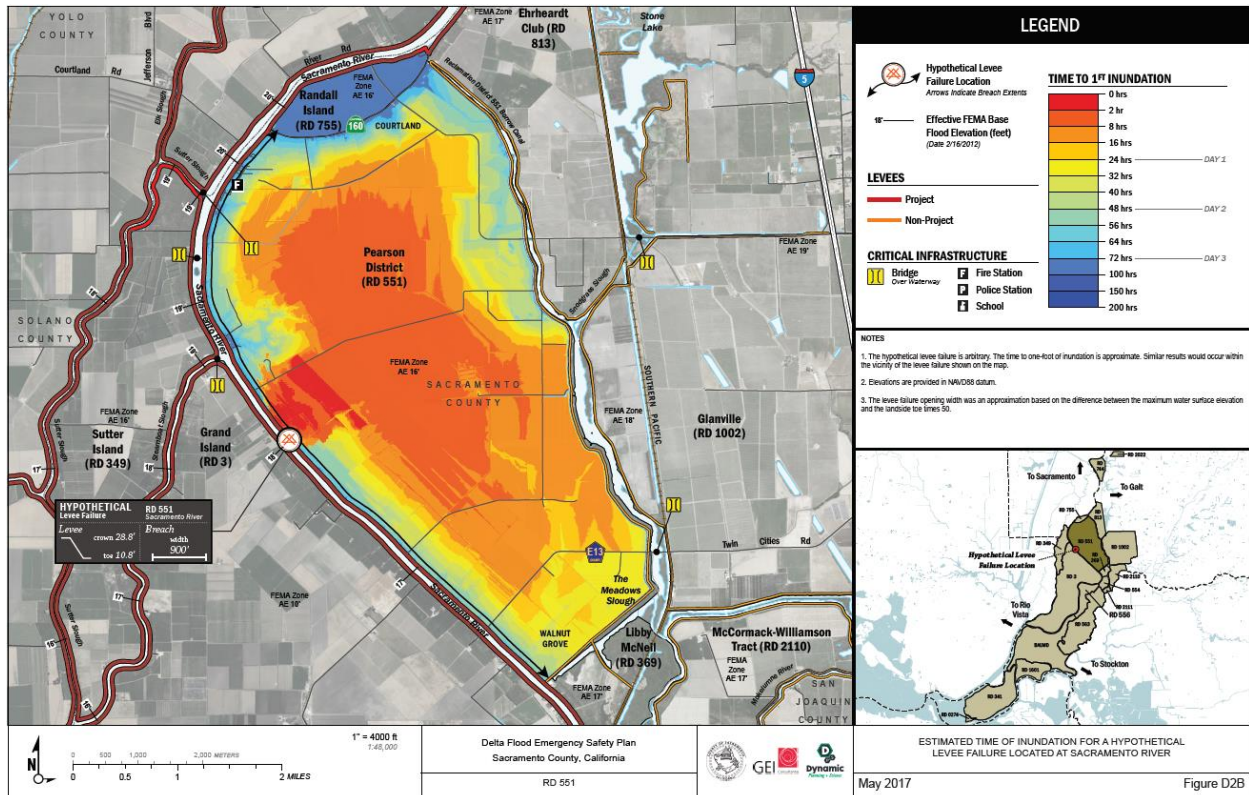
For RD 551, Figure 7-3 details the locations in the Delta within RD 551 where flooding could occur. The red triangles denote potential levee breach locations. RD 551 has two potential levee break scenarios. Maps for Scenario 1 regarding time to one foot inundation (Figure 7-4), estimated flood depths (Figure 7-5), and suggested evacuation routes (Figure 7-6) are displayed below. Maps for Scenario 2 can be found on the Sacramento County stormready.org website.

Figure 7-3 RD 551 – Potential Levee Breach Location



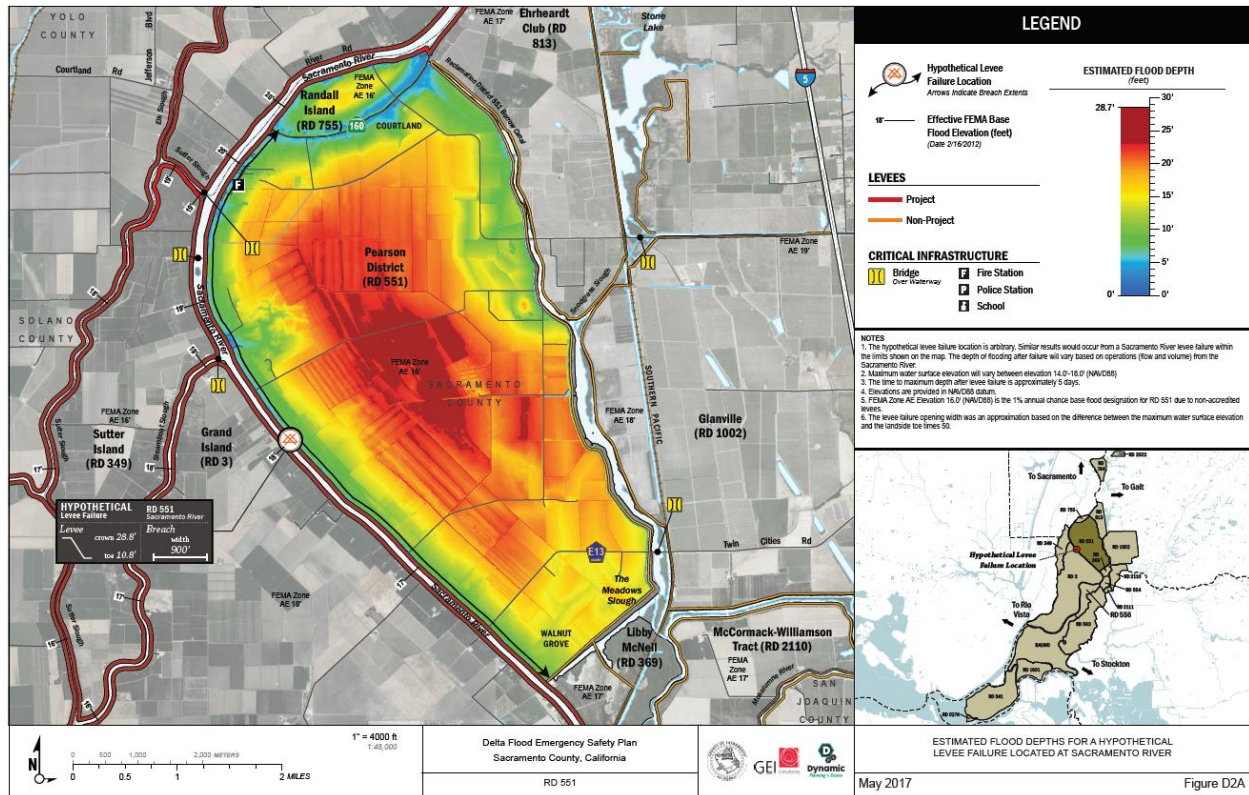
Source: Sacramento County Storm Ready – retrieved March 30, 2021

Figure 7-4 RD 551 – Time to One Foot Inundation after Levee Breach



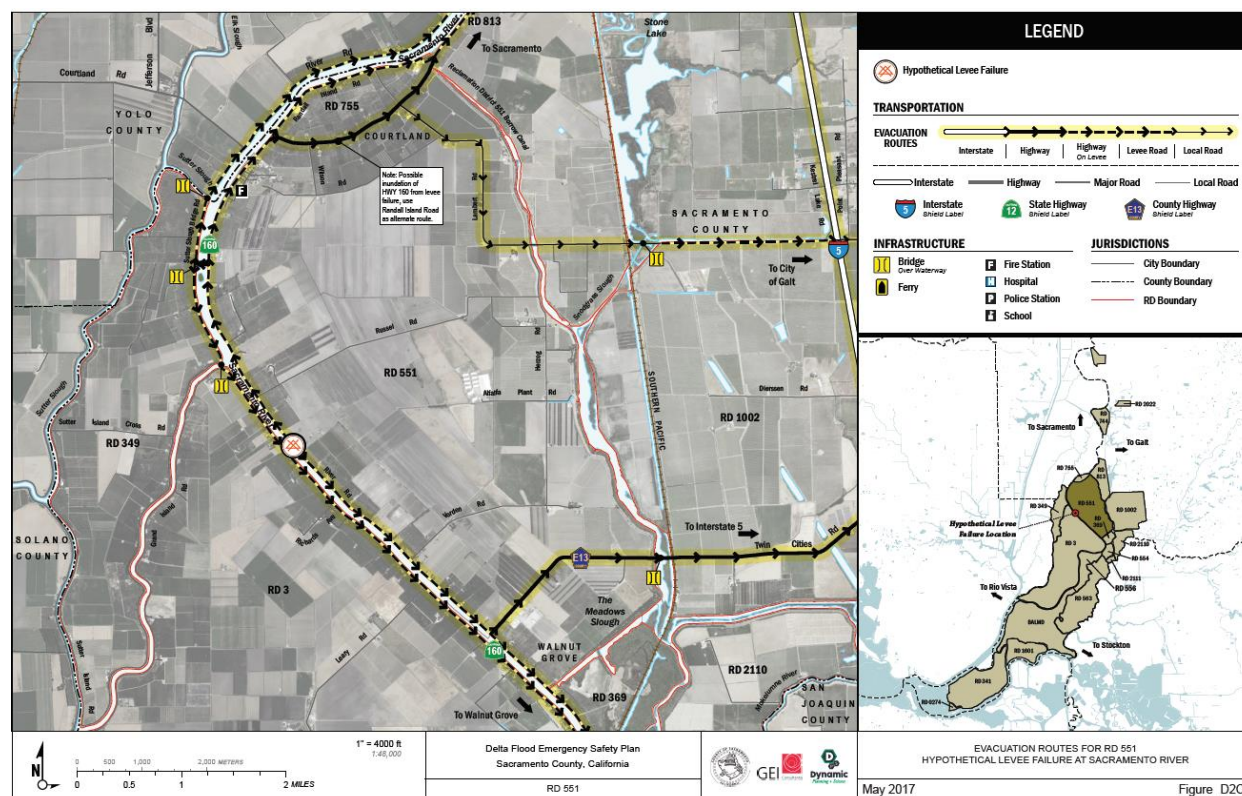
Source: Sacramento County Storm Ready – retrieved March 30, 2021

Figure 7-5 RD 551 – Estimated Flood Depth from Levee Breach Scenario



Source: Sacramento County Storm Ready – retrieved March 30, 2021

Figure 7-6 RD 551 – Levee Breach Scenario Evacuation Routes



Source: Sacramento County Storm Ready – retrieved March 30, 2021

Assets at Risk

A levee failure would impact almost all the assets and critical facilities on Pearson District; including the small community of Courtland. State Highway 160, as well as a number of county roads are at risk. Approximately 8,000 acres of agricultural land would be damaged and possibly rendered unfarmable for at least a year. There are many permanent crops on Pearson District, such as alfalfa, grain, orchards, tomatoes, potato processing, vineyards, and a variety of other field crops that would be destroyed. Production of permanent crops can take approximately 5 years to produce a viable harvest.

A levee failure could cause flooding that could damage the District’s pumps and drainage system. A levee failure can also result in subsequent levee failures around the District and on adjacent islands due to increased fetch of the flooded area and subsequent erosion on exposed levee slopes.

Severe Weather: Heavy Rains and Storms (Hail, Lightning)

Likelihood of Future Occurrence–Likely

Vulnerability–High

Hazard Profile and Problem Description

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

Location and Extent

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

Past Occurrences

There have been past disaster declarations from heavy rains and storms, which were discussed in Past Occurrences of the flood section above. According to historical hazard data, severe weather, including heavy rains and storms, is an annual occurrence in the District. This is the cause of many of the federal disaster declarations related to flooding. In 1996, the District experienced a heavy rainfall event that overwhelmed the District's drainage system and left a substantial amount of acreage in the lower elevations inundated for at least a month. Recent above average years for rainfall, such as 2017 and 2019 have resulted in similar localized flooding and increased costs to power and run the Districts pumping facilities.

Vulnerability to and Impacts from Heavy Rain and Storms

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

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

trees can break utilities and interrupt services. During periods of heavy rains and storms, power outages can occur. These power outages can affect pumping stations and lift stations that help alleviate flooding.

It is the secondary effects of heavy rain and storms that are of concern to RD 551. Heavy rains can cause flooding, levee failure, and erosion. Flooding, levee failure, and erosion can cost RD 551 millions in damages.

Severe storm events can lead to erosion, significant flooding and impacts to the levee system. Although water surface elevation is a major factor to levee seepage and overtopping, severe weather can cause significant damage, such as erosion, that puts the integrity of the Pearson District levee system at risk.

A levee failure would impact almost all the assets and critical facilities on Pearson District; including the small community of Courtland. State Highways 160, as well as a number of county roads are at risk. Approximately 8,000 of agricultural land would be damaged and possibly rendered unfarmable for at least a year. There are many permanent crops on Pearson District, such as wine grapes, pears, apples and cherries that would be destroyed.

Assets at Risk

Heavy rain and thunderstorms are the most frequent type of severe weather occurrence in the area. Wind and lightning often accompany these storms and have caused damage in the past. Problems associated with the primary effects of severe weather include erosion, flooding, pavement deterioration, washouts, landslide/mudslides, and downed trees. However, it is the secondary effects of heavy rain and storms that are of concern to RD 551. Heavy rains can cause flooding, levee failure, and stream bank erosion. Flooding, levee failure, and stream bank erosion can cost RD 551 millions in damages as stated previously under a levee failure scenario.

High winds during storm events can knock down power lines and result in a loss of power to the District pumps. This will require the District to bring in diesel powered auxiliary pumps and will likely result in increased flooding within the District.

7.6 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.

7.6.1. Regulatory Mitigation Capabilities

Table 7-8 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the RD 551.

Table 7-8 RD 551 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/2021	Five-year plan consisting of levee stability, seepage control and maintenance projects.
Capital Improvements Plan	Y/2021	Five-year plan consisting of levee stability, seepage control and maintenance projects can outlay a long term improvement plan.
Economic Development Plan	N	Not within the responsibilities of the Reclamation District
Local Emergency Operations Plan	Y/2017	Through a state grant, Sacramento County is funding revisions to the District’s existing Emergency Action Plan for RD 551. The plan update will be complete in early 2022. This plan will also evaluate and create an action plan for a relief cut in the event of a levee failure.
Continuity of Operations Plan	N	No plan in place.
Transportation Plan	N	Not within the responsibilities of the Reclamation District
Stormwater Management Plan/Program	Y/Ongoing	RD 551 consistently evaluates flooding of low areas and the need for improvements in its drainage system
Engineering Studies for Streams	N	No plan in place.
Community Wildfire Protection Plan	N	No plan in place.
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Y	Annual routine maintenance plans and participation in the state Delta Levees Subventions Program which assists in funding levee maintenance. RD 3 is also active in the Corps of Engineers PL84-99 program and is beginning to implement its System-Wide Improvement Framework (SWIF) to respond to maintenance and rehabilitation issues brought up by the Corps of Engineers Periodic Inspection Report
Building Code, Permitting, and Inspections	Y/N	Are codes adequately enforced?
Building Code	N	Version/Year: Not within this jurisdiction’s authority
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score: Not within this jurisdiction’s authority
Fire department ISO rating:	N	Rating: Not within this jurisdiction’s authority
Site plan review requirements	N	Not within this jurisdiction’s authority
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	Not within this jurisdiction’s authority
Subdivision ordinance	N	Not within this jurisdiction’s authority
Floodplain ordinance	N	Not within this jurisdiction’s authority
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N	Not within this jurisdiction’s authority
Flood insurance rate maps	N	Not within this jurisdiction’s authority
Elevation Certificates	N	Not within this jurisdiction’s authority

Acquisition of land for open space and public recreation uses	N	Not within this jurisdiction's authority
Erosion or sediment control program	Y	Erosion control measures on levee and canal slopes as necessary. Sediment removal from drainage system canals as necessary.
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
<p>Pursuant to Sacramento County General Plan Safety Element Policies, SA-18a&b, written approval must be obtained from the applicable Reclamation District to build any structure or grade any soil within 300 feet of the land side toe of levee. This applies to anyone who wants to fill, excavate, or construct a structure within 50 feet of the toe of a Sacramento County river levee and anyone who wants to develop land within 300 feet of the toe. To ensure this requirement is met, every parcel located near a levee is tagged in the building department database.</p> <p>In implementation of the District's SWIF, the District will require increased coordination from permitting agencies as well as landowners. Many issues identified are going to require significant permitting and come at a high cost to landowners. Programmatic permitting capabilities as well as a grant program to address such issues identified in the SWIF would help both the District and landowners remediate issues in a timely manner so that the District can remain eligible for PL84-99 funding in the event of a levee failure.</p> <p>The Delta Levees Special Projects and Subventions Programs are state-local cost share programs that the District relies on to perform required operations and maintenance activities. This program is currently only funded through bonds. With uncertainty on long term program funding, the District is unable to confidently outlay long term repair and improvement projects. The Districts capabilities could be expanded and improved if funding would be more consistent and secure such as coming from the General Fund.</p>		

Source: RD 551

7.6.2. Administrative/Technical Mitigation Capabilities

Table 7-9 identifies the District department(s) responsible for activities related to mitigation and loss prevention in RD 551.

Table 7-9 RD 551's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N	Not within this jurisdiction's authority
Mitigation Planning Committee	N	Not within this jurisdiction's authority
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	RD 551 annually performs over \$100,000 in maintenance. In addition, it periodically constructs projects to repair deficiencies in the levee.
Mutual aid agreements	N	None formally established with adjacent Reclamation Districts. Informally resources will be shared in the event of an emergency.
Other	N	
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	Not a position within this jurisdiction
Floodplain Administrator	N	Not a position within this jurisdiction
Emergency Manager	Y	Topper van Loben Sels, President
Community Planner	N	Not a position within this jurisdiction

Civil Engineer	Y	Gilbert Cosio and the staff at MBK Engineers has served as District Engineer for over 30 years and has participated in many flood fight actions.
GIS Coordinator	N	Not a position within this jurisdiction
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	There are sirens at fire houses in adjacent towns. The process of using these as flood warnings should be revisited by local volunteer fire departments. District has a phone list, but does not have staffing beyond the trustees, civil engineer, and secretary.
Hazard data and information	Y	Civil Engineer has hazard data and information to aide district
Grant writing	N	Not a position within this jurisdiction
Hazus analysis	N	Not a position within this jurisdiction
Other		
How can these capabilities be expanded and improved to reduce risk?		
Consistent and available funding opportunities can aide in planning and outlaying substantial improvement projects.		

Source: RD 551

7.6.3. Fiscal Mitigation Capabilities

Table 7-10 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table 7-10 RD 551'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	RD 551's annual assessment includes funding for future anticipated capital projects
Authority to levy taxes for specific purposes	Y	As dictated by law, RD 551 has the authority to levy taxes for specific purposes
Fees for water, sewer, gas, or electric services	N	Not within this jurisdiction's authority
Impact fees for new development	N	Not within this jurisdiction's authority
Storm water utility fee	N	Not within this jurisdiction's authority
Incur debt through general obligation bonds and/or special tax bonds	Y	RD 551 has the ability to levy special assessments
Incur debt through private activities	N	Not within this jurisdiction's authority
Community Development Block Grant	N	Not within this jurisdiction's authority
Other federal funding programs	Y	The District is preparing a Letter of Intent to become eligible for the Corps of Engineers PL84-99 program

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?
State funding programs	Y	The District participates in the Delta Levees Subventions program that provides a 75/25 state to local cost share.
Other		
How can these capabilities be expanded and improved to reduce risk?		
<p>Substantial funding will be required both publicly and privately in implementation of the District’s SWIF. A grant program to address such issues identified in the SWIF would help both the District and landowners remediate issues in a timely manner so that the District can remain eligible for PL84-99 funding in the event of a levee failure. The Delta Levees Special Projects and Subventions Programs are state-local cost share programs that the District relies on to perform required operations and maintenance activities. This program is currently only funded through bonds. With uncertainty on long term program funding, the District is unable to confidently outlay long term repair and improvement projects. The Districts capabilities could be expanded and improved if funding would be more consistent and secure such as coming from the General Fund. Furthermore the District has utilized other funding opportunities such as the Flood System Repair Program to address critical issues. Continued funding of such programs would greatly benefit the District’s ability to perform necessary repairs and improvements.</p>		

Source: RD 551

7.6.4. Mitigation Education, Outreach, and Partnerships

Table 7-11 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table 7-11 RD 551’s Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	N	No formal program currently exists within this jurisdiction
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Y	RD 511 maintains a web page with appropriate information to educate the public. With SWIF implementation, the District will perform outreach to landowners for education and assistance in addressing encroachment issues
Natural disaster or safety related school programs	N	No formal program currently exists within this jurisdiction
StormReady certification	Y	The RD 551 manager, trustees, and District Engineer have been, or soon will be, trained in SEMS and NIMS
Firewise Communities certification	N	No formal program currently exists within this jurisdiction
Public-private partnership initiatives addressing disaster-related issues	N	No formal program currently exists within this jurisdiction

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Other		
How can these capabilities be expanded and improved to reduce risk?		
<p>Many risks to the integrity of the levee system can come from noncompliant and aging encroachments such as pipes through the levee. Repair and replacement of encroachments, particularly pipes can place a large financial burden on landowners leading to deferred maintenance and ultimately a dangerous situation within the flood control system. It would be beneficial if a program were established that would create a local agency/private landowner partnership that provides funding and permitting assistance to address these issues before they result in levee failures</p>		

Source: RD 551

7.6.5. Other Mitigation Efforts

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

RD 551 has been a very active participant in the state’s Delta Levee Subventions Program for about 20 years. This program has proven useful and has enabled RD 551 to react financially if a non-routine cost arises.

7.7 Mitigation Strategy

7.7.1. Mitigation Goals and Objectives

The RD 551 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

7.7.2. Mitigation Actions

The planning team for the RD 551 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:

- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Levee Failure
- Severe Weather: Heavy Rains and Storms

It should be noted that many of the projects submitted by each jurisdiction in Table 5-4 in the Base Plan benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the countywide public outreach action, as well as many of the emergency services actions, apply to all hazards regardless of hazard priority. Collectively, this multi-jurisdictional mitigation strategy includes only those actions and

projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Multi-Hazard Actions

Action 1. 2017 and 2019 Storm Event Waterside Erosion Repairs

Hazards Addressed: Earthquake, Earthquake: Liquefaction, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Levee Failure, Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: The high water events of 2017 and 2019 resulted in 30 areas that had experienced erosion on the waterside slope of the Sacramento River levee. Some areas had experienced erosion in previous high water events (1986 and 1997) that became worse following these events.

Project Description: Repairing waterside erosion at various locations along Sacramento River that resulted from the 2017 and 2019 high water events. Utilizing rip rap material to re-establish the existing levee slope.

Other Alternatives: None.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Reclamation District 551 Five Year Plan, Storm Damage DWR Emergency Rehabilitation (SDDER) Program

Responsible Agency/ Department/Partners: Reclamation District 551, Department of Water Resources

Cost Estimate: \$800,000

Benefits (Losses Avoided): Protects levee breach which could result in losses of \$120 million in property, crops and other assets as well as disruptions and damages to critical infrastructure such as roads and power transmission.

Potential Funding: Delta Levees Subventions Program and Flood System Repair Project

Timeline: Scheduled to be completed by 2026

Project Priority (H, M, L): High

Action 2. FSRP Critical Seepage Repair

Hazards Addressed: Earthquake, Earthquake: Liquefaction, Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Levee Failure, Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: As part of the California Department of Water Resources' (DWR) Flood System Repair Project (FSRP) critical and serious seepage sites were identified on RD 755. The District will be annexed by RD 551 given a failure on the RD 755 levee would also flood RD 551. Pending additional program funding and a local ability to cost share, the sites can be repaired under the FSRP program.

Project Description: The District plans to install a cut off wall to address seepage along approximately 4,000 feet of the left bank of the Sacramento River between Levee Mile (LM) 0.2 and LM 0.9. The Project will address historic seepage that has been observed during high water events.

Other Alternatives: None.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Reclamation District 551 Five Year Plan, Flood System Repair Project (FSRP)

Responsible Agency/ Department/Partners: Reclamation District 551, Department of Water Resources

Cost Estimate: \$10 million

Benefits (Losses Avoided): Protects levee breach which could result in losses of \$120 million in property, crops and other assets as well as disruptions and damages to critical infrastructure such as roads and power transmission.

Potential Funding: Flood System Repair Project

Timeline: No current plan to complete

Project Priority (H, M, L): High

Action 3. Addressing Unacceptable Items in the District's USACE Periodic Inspection Report

Hazards Addressed: Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Levee Failure, Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: The USACE Periodic Inspection Report dated August 2013, identified one unacceptable deficiency category, encroachments, that affects the District's PL 84-99 eligibility. Six other categories, erosion, vegetation, sod cover, depressions/rutting, animal control, and rip rap/bank protection had items that were minimally acceptable but they do not impact eligibility. The District's assigned rating is currently unacceptable. The listed unacceptable encroachments included 37 pipe crossings and 138 items/structures within the levee section, particularly those in the town of Courtland

Project Description: Addressing these unacceptable items to maintain eligibility in the PL84-99 program with a worst first approach. If an item in one of the lower priority categories poses a greater risk it will be

addressed sooner. Once the unacceptable items are addressed the District will continue to correct items listed in the USACE Periodic Inspection Report in its effort to achieve an acceptable rating.

Other Alternatives: None.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Reclamation District 551 Five Year Plan, System Wide Improvement Framework

Responsible Agency/ Department/Partners: Reclamation District 551, Department of Water Resources

Cost Estimate: \$6.5 million

Benefits (Losses Avoided): Protects levee breach which could result in losses of \$120 million in property, crops and other assets as well as disruptions and damages to critical infrastructure such as roads and power transmission.

Potential Funding: Delta Levees Subventions Program, Deferred Maintenance Program

Timeline: Schedule for completion 2050

Project Priority (H, M, L): High

Action 4. Interior Drainage Improvements

Hazards Addressed: Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Levee Failure, Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: The District has issues draining the interior of the District and will need to adjust and repair some of their drainage features to facilitate drainage.

Project Description: Repair and enhance pumping facilities within the existing District drainage system to improve efficiency and reduce residency time of flood waters. This could also include the acquisition of an ancillary diesel pump to use in the event of pump damage or power outages.

Other Alternatives: None.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Reclamation District 551 Five Year Plan, Storm Damage DWR Emergency Rehabilitation (SDDER) Program

Responsible Agency/ Department/Partners: Reclamation District 551, Department of Water Resources

Cost Estimate: \$2 million

Benefits (Losses Avoided): Assists with dewatering the island which could result in losses of up to \$120 million in property, crops and other assets as well as disruptions and damages to critical infrastructure such as roads and power transmission.

Potential Funding: Delta Levees Subventions Program and Flood System Operations and Maintenance Program

Timeline: No current schedule for completion

Project Priority (H, M, L): High

Action 5. *Implement recommendations in Courtland Flood Risk Reduction Plan*

Hazards Addressed: Earthquake, Earthquake: Liquefaction Floods: 1%/0.2% annual chance, Floods: Localized Stormwater, Levee Failure, Severe Weather: Heavy Rains and Storms

Goals Addressed: 1, 2, 3, 4, 5, 6

Issue/Background: Sacramento County conducted studies to evaluate risk in each small legacy community located within Sacramento County in the Delta. The study proposed and recommended several remediation actions to reduce to risks from flooding.

Project Description: The study recommended a suite of potential management actions that included: 1) Repair of DWR FSRP Critical and Serious Seepage Sites and Repair Levee adjacent to Courtland 2) Address Erosion Sites in SPFC Levees 3) Address Erosion Concerns on whole District 4) All-Weather Access Road/Flood Fight Berm around Courtland 5) Ring Levee and FEMA Certification for the community of Courtland 5) Repair and Strengthen-In Place Sacramento River Levee north of Highway 220 6) Repair and Strengthen-In Place Sacramento River Levee 7) Repair and Strengthen-In Place Snodgrass Slough and Delta Meadows 8) Secure 100-Year FEMA Certification for Sacramento River and Snodgrass Slough Levee

Other Alternatives: None.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Small Community Flood Risk Reduction Feasibility Study, Sacramento County Flood Safety Plan Update

Responsible Agency/ Department/Partners: Sacramento County, Reclamation District 551, Sacramento County Office of Emergency Services

Cost Estimate: \$1 million to \$600 million

Benefits (Losses Avoided): Proposed actions will reduce the risk of flooding to the town of Courtland that is located on the east side of the Sacramento River. As well as any damages to surrounding property and agricultural crops depending on the management action.

Potential Funding: Delta Levees Subventions Program, Flood System Operations and Maintenance Program, Small Community Flood Risk Reduction Program

Timeline: Dependent on qualification for outside funding

Project Priority (H, M, L): Medium