Delta Annex Chapter 8 Reclamation District 554

8.1 Introduction

This Annex details the hazard mitigation planning elements specific to Reclamation District 554 (RD 554 or District), 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 554, with a focus on providing additional details on the risk assessment and mitigation strategy for the District.

8.2 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 8-1. Additional details on plan participation and District representatives are included in Appendix A.

Table 8-1 RD 554 – Planning Team

Name	Position/Title	How Participated
Jeff Tranum	Chairman, Board of Trustees	Provided information regarding the annex.
Gilbert Labrie	Contract District Engineer	Attended planning meetings. Provided information regarding the annex.
Barb McGowan	Assistant to District Engineer	Provided information regarding the annex.

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 8-2.

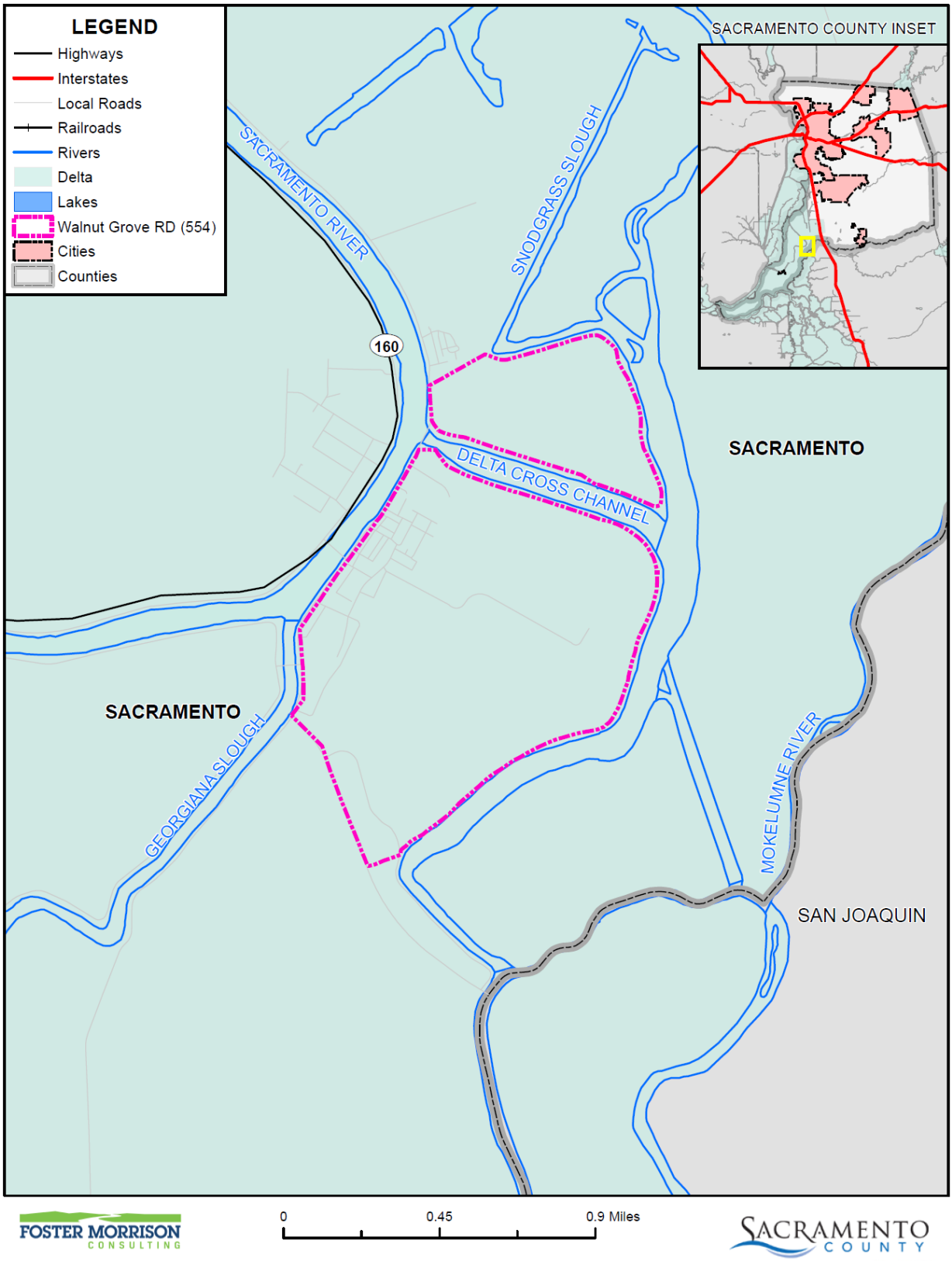
Table 8-2 2016 LHMP Incorporation

Planning Mechanism 2016 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
2016 Sacramento County Flood Safety Plan (by GEI). Currently being updated in 2021	The plans include information that sets up SEMS/NIMS processes, identifies critical infrastructure and evacuation routes, and sets up monitoring and levee patrol protocols. The 2021 updates will include Flood Annex Maps that summarize information contained in the plans as well as including any missing protocols to bring them into full compliance with existing codes and any additional information/updates the Districts may have since the plans were originally completed. The updates should be complete by this winter.
2021 Emergency Operations Plan (EOP)	Coordination between RD 554 team members to clarify and ensure conformance and focus to prevent duplication efforts when a solution is available and planned.

8.3 District Profile

The District profile for the RD 554 is detailed in the following sections. Figure 8-1 displays a map and the location of the District within Sacramento County.

Figure 8-1 RD 554



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

8.3.1. Overview and Background

Reclamation District 554 protects the urban, eastern side of Walnut Grove, 374 acres of cropland, and the Walnut Grove Marina service area. Walnut Grove was established in 1850 by John Sharp and became a thriving agricultural center and shipping port by 1865.

Reclamation District 554 is the upper 452-acre portion of Tyler Island that is separately protected by 3.58 miles of levee. The District includes the east Walnut Grove urban area. It is the only town in the Delta that is interdependent and occupies both sides of the Sacramento River. The main commercial corridor is on this side of Walnut Grove along with the main sewer collection system and key government services. But the majority of the land use in this small district is rural/agricultural since the urban area is only 77 acres.

RD 554 is bordered by Sacramento River, Georgiana Slough, Snodgrass Slough, the Delta Cross Channel, and the cross levee between RD 554 and RD 563 (lower Tyler Island). Levees along the Sacramento River, Georgiana Slough, and the Delta Cross Channel are federal project levees (1.6 miles). The Cross Channel, Snodgrass Slough, and the cross-levee are non-project levees (1.98 miles), but are still held to the project levee standard. Reclamation District 554 manages levee inspections, levee maintenance, and two pumping stations on the island. The pumping stations are both located along Snodgrass Slough.

8.4 Hazard Identification

RD 554 identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table 8-3).

Table 8-3 RD 554—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Limited	Occasional	Negligible	Low	–
Dam Failure	Extensive	Unlikely	Catastrophic	Low	Medium
Drought & Water Shortage	Significant	Likely	Critical	Low	High
Earthquake	Limited	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	Occasional	Limited	High	Medium
Landslides, Mudslides, and Debris Flow	Limited	Unlikely	Limited	Low	Medium
Levee Failure	Significant	Occasional	Critical	High	Medium
Pandemic	Extensive	Likely	Limited	Low	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Likely	Limited	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Low	High
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: Wind and Tornado	Extensive	Highly Likely	Limited	Low	Low
Subsidence	Limited	Occasional	Negligible	Low	Medium
Volcano	Limited	Unlikely	Negligible	Low	Low
Wildfire	Limited	Likely	Limited	Low	High

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Climate Change Influence
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

8.5 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.

8.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section 8.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table 8-3) 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.

8.5.2. Vulnerability Assessment and Assets at Risk

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

Assets at Risk and Critical Facilities

This section considers the RD 554'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 8-4 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. RD 554's physical assets, valued at over $36 million, consist of the buildings and infrastructure to support the District's operations.

Table 8-4 RD 554 Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Levee	Infrastructure	$30,000,000	Floods: 1%/0.2%, Localized Flooding, Levee Failure, Heavy Rain and Storms
Cross-levee	Infrastructure	$5,000,000	Localized Flooding, Heavy Rain and Storms
Pump Station	Infrastructure	$500,000	Localized Flooding, Levee Failure, Heavy Rain and Storms
Pump Station	Infrastructure	$500,000	Localized Flooding, Levee Failure, Heavy Rain and Storms
Total		**$36,000,000**	

Source: RD 554

In general, the most vulnerable District assets include the levees and pumping stations that the District owns and maintains. There are approximately 3.58 miles of levee surrounding the District. The levees along Georgiana Slough and the Delta Cross Channel are federal project levees. Snodgrass Slough and the cross-levee are non-project levees. The levee system is subject to riverine flooding. However, it is highly unlikely the levee system will fail due to overtopping. A high water situation could increase the hydraulic gradient within the levee that could result in under or through seepage. Seepage, if left unchecked, can result in levee failure and subsequent flooding. The District owns two pumping stations that are critical for island drainage. If the drainage system becomes compromised the District could experience localized flooding. If the system becomes compromised in a flood situation, damages could be worse than anticipated.

Natural Resources

RD 554 has a variety of natural resources of value to the District. Due to the urban nature of RD 554 there are only a few areas of freshwater wetland, upland, and riparian habitats. The size of the island and development that has taken place over time, has resulted in mostly ruderal vegetation. See Figure 8-2 for a map of vegetation types. According to the Department of Fish and Game Levee Log in the 5-Year Plan, riparian, scrub shrub, and freshwater marsh habitat types exist on and adjacent to the levees. The estimated amount of each type of habitat per lineal feet is shown on Table 8-5.

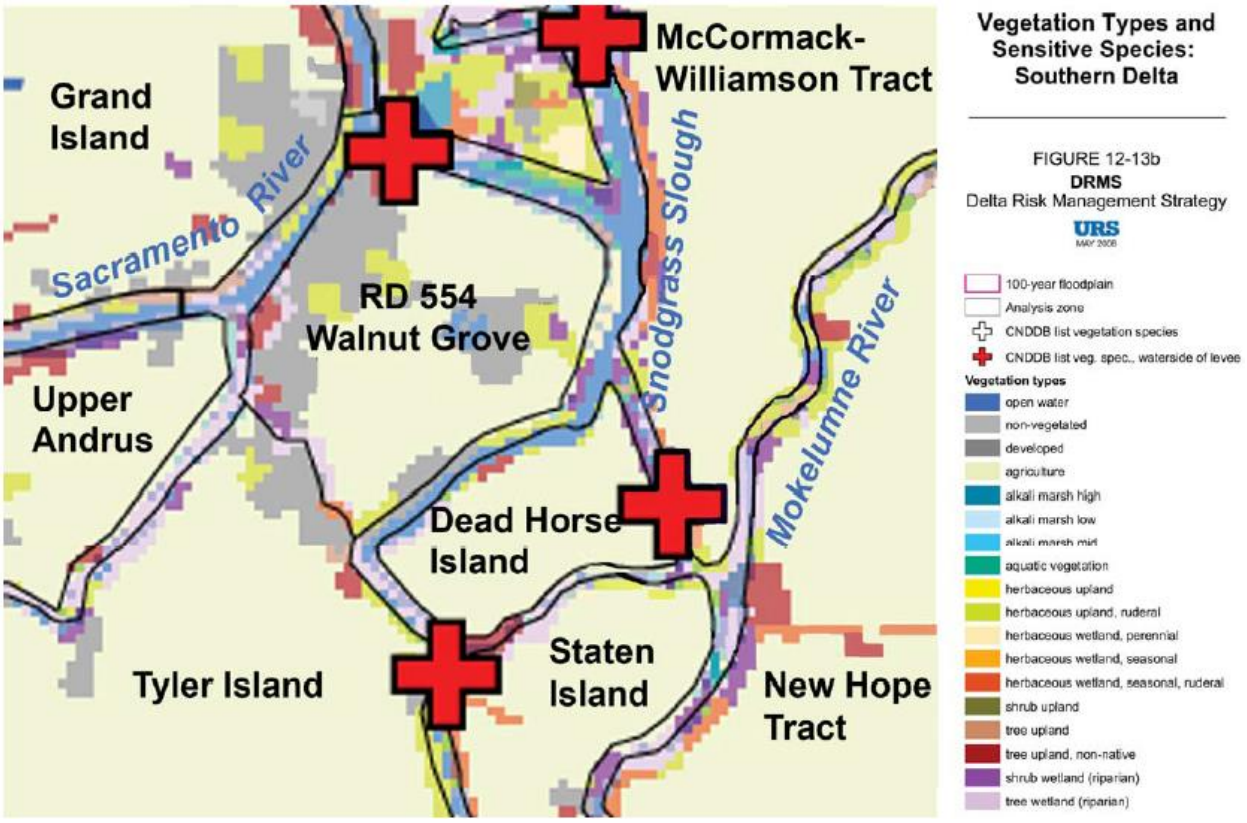
Table 8-5 RD 554 Vegetation Types

Type	Waterside	Landside
Riparian	2223 lf (3.66 ac.), 29 single trees	1710 lf (1.35 ac.), 15 single trees
Scrub Shrub	880 lf (0.62 ac.), 23 single trees	1700 lf (1 ac), 40 single trees
Freshwater Marsh	1229 lf (0.37 ac.)	0 lf

Source: RD 554 2012 5-Year Plan

Note: These estimates are for non-project levees comprising the location of proposed projects in this plan.

Figure 8-2 RD 554 Vegetation Types

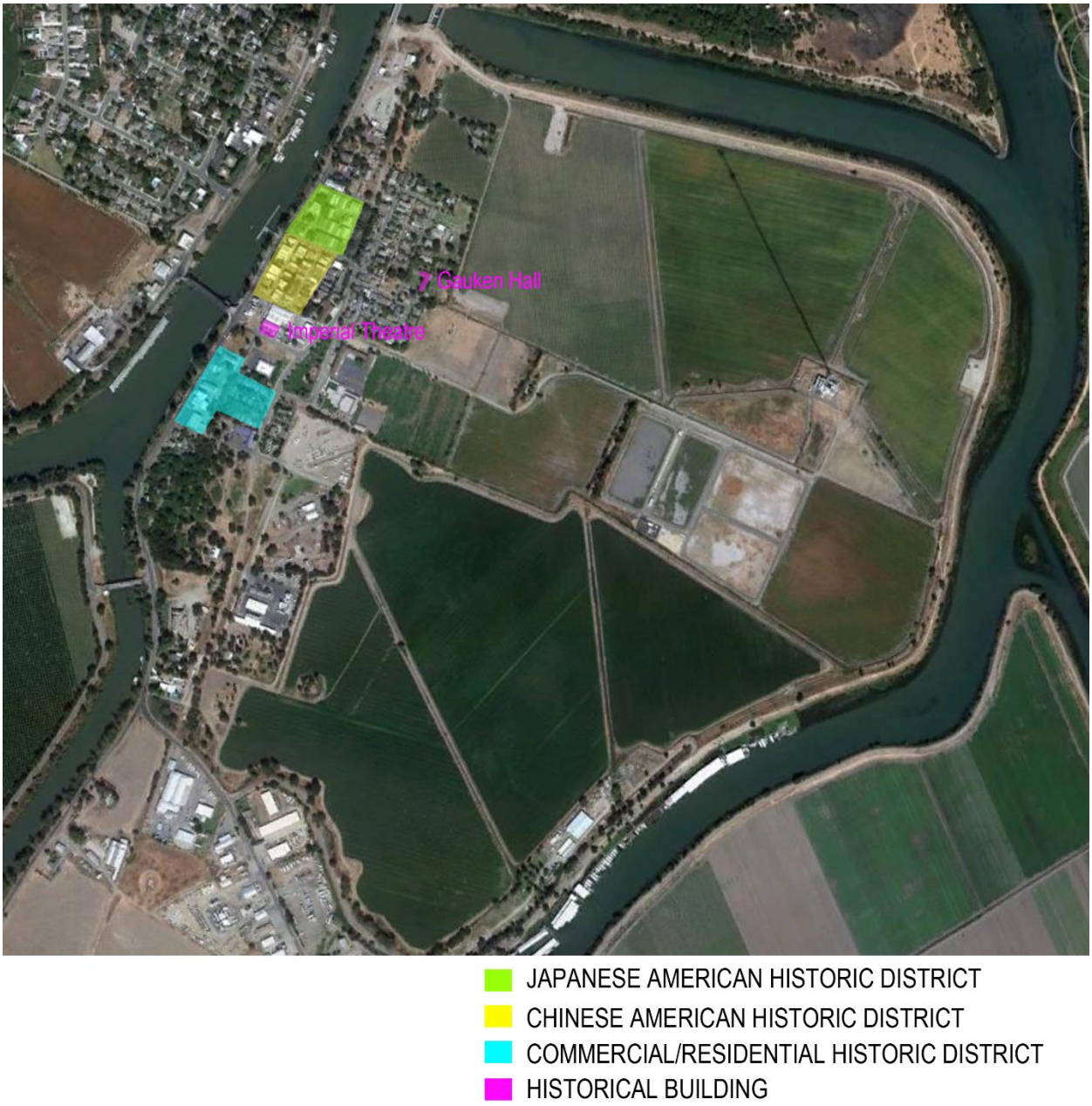


Source: RD 554 2012 5-Year Plan

Historic and Cultural Resources

RD 554 has a variety of historic and cultural resources of value to the District. In the Walnut Grove area, there are three nationally registered historic districts, the Walnut Grove Chinese and Japanese American Historical Districts, and the Walnut Grove Commercial/Residential Historic District. There are three two nationally registered historical buildings, Gakuen Hall and the Imperial Theatre. These are shown on Figure 8-3.

Figure 8-3 Historic Sites in Walnut Grove



Source: RD 554 2012 5-Year Plan

Growth and Development Trends

Limited growth is expected to occur in the District due to limits of Walnut Grove's SPA.

Development since 2016

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

Future Development

There are approximately 10 acres of land available for development. One new home has been built in the last decade; any anticipated growth is expected to be slow and small in nature. There are no current development plans.

8.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table 8-3 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.

Currently, there is no effect and no backup power is required. This could change if the length of outage is significant.

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.

Currently, there is no effect and no backup power is required. This could change if the length of outage is significant.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

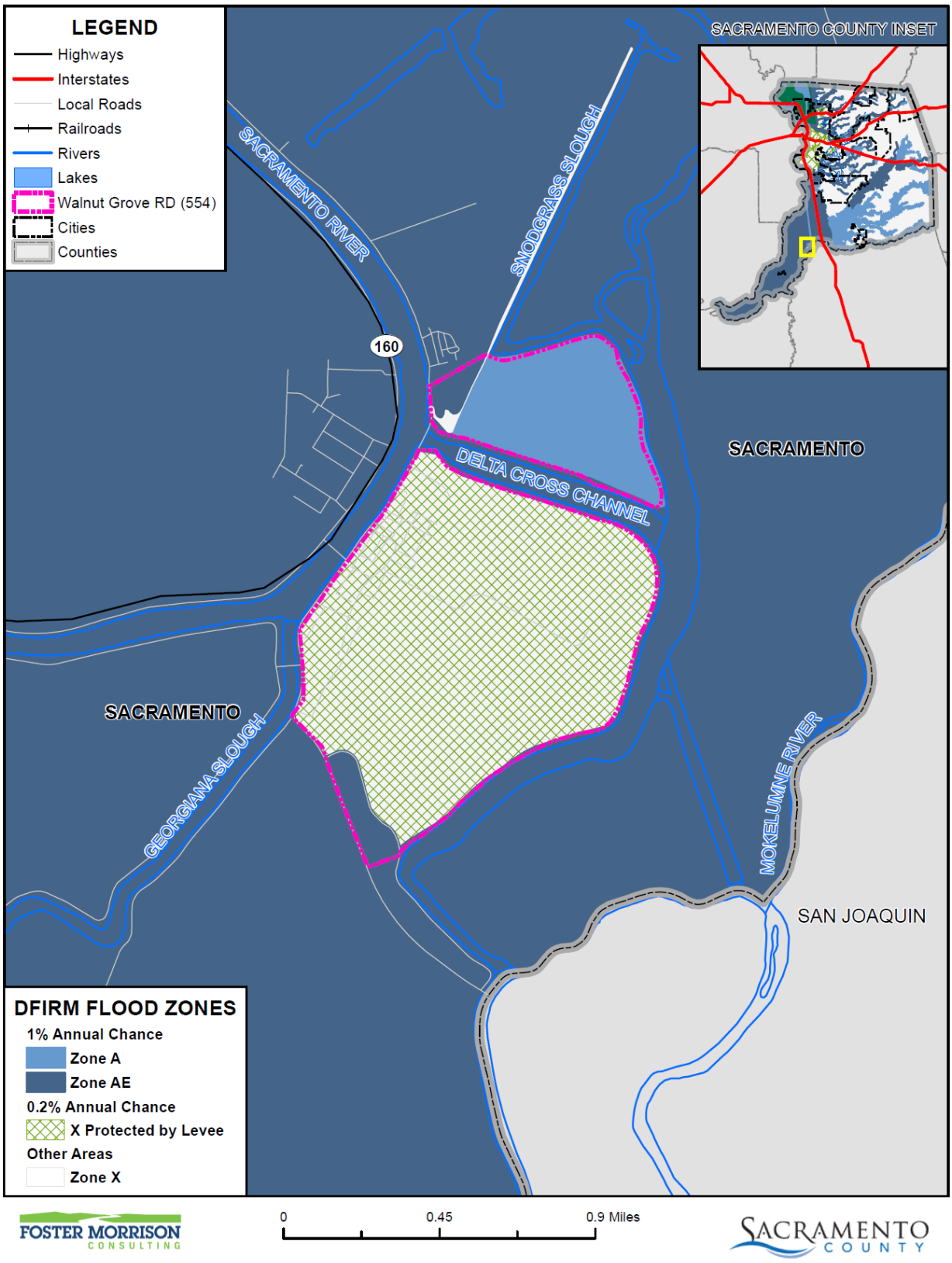
This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the District, and have caused damages in the past. Flooding is a significant problem in Sacramento County and the District. Historically, the District has been at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

As previously described in Section 4.3.11 of the Base Plan, the Sacramento County Planning Area and the RD 554 have been subject to historical flooding.

Location and Extent

The RD 554 has areas located in the 1% and 0.2% annual chance floodplain. This is seen in Figure 8-4.

Figure 8-4 RD 554 – FEMA DFIRM Flood Zones



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

Table 8-6 details the DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the District.

Table 8-6 RD 554– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone Present in the District
A	100-year Flood: No base flood elevations provided	X
AE	100-year Flood: Base flood elevations provided	X
AH	An area inundated by 1% annual chance flooding (usually an area of ponding), for which BFEs have been determined; flood depths range from 1 to 3 feet	
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

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 8-7. These events also likely affected the District to some degree.

Table 8-7 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

1986 was the closest the District came to experiencing a 100-year flood event when adjacent lower Tyler flooded. The District has not experienced a 200 or 500-yr flood. Recent floods and high water events (HWE) in the District include:

- 2017 HWE: Event initiated extra monitoring. No notable damage.

Vulnerability to and Impacts from Flood

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

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

A 1%, /0.5%/0.2% annual chance flood event could cause flooding within the District. A high water event, depending on the water elevation, is unlikely to cause failure due to overtopping as many other surrounding Districts are lower and more likely to fail before failure of RD 554 levees. Higher levels of water could increase hydraulic gradients within the levee section resulting in landside seepage or boils. Continued seepage, if left unaddressed, could erode the levee and result in failure. Heavy flows could also cause erosion and scour on the waterside bank that could undermine the levee and cause failure.

There are three nationally registered historic districts protected by the levee system, the Walnut Grove Chinese and Japanese American Historic Districts and the Walnut Grove Commercial/Residential Historic District. There are also two nationally registered historical buildings, Gauken Hall and Imperial Theater. There are also historic homes that are over 100 years old. A 100/200/500 year flood event could inundate these districts and historic places if the event results in levee failure. Such an event may also exceed the District's pumping facility and improper drainage could also flood the districts. Flooding could cause irreparable damage to some structures and they could be lost.

Assets at Risk

The levee system and pumping stations are vulnerable to a 1%/0.5%/0.2% annual chance flood. As the flows could exceed the capacity of both the levee system and the pumping station that is needed to drain the island.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Highly 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.

Location and Extent

The RD 554 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. Localized flooding can occur anywhere inside the District.

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:

Some form of localized stormwater flooding occurs during most heavy rains. The most likely time this could have occurred in the past was during the wet year in 2006. Since 2016, the following events occurred:

- 2017 HWE: Initiated extra monitoring, no notable damage. Produced excess electrical cost for pumping the excess run off required to prevent localized flooding and the threat of overtopping on Snodgrass Slough.

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.

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. Localized stormwater flooding can occur during heavy rains or seepage events that exceed the District's drainage capabilities. Lower areas around the island may be subject to minor flooding.

Assets at Risk

Localized flooding can overtax the Districts pumping system and create for a more hazardous situation involving the levee system by limiting the ability for inspection.

Levee Failure

Likelihood of Future Occurrence–Occasional
Vulnerability–Extremely High

Hazard Profile and Problem Description

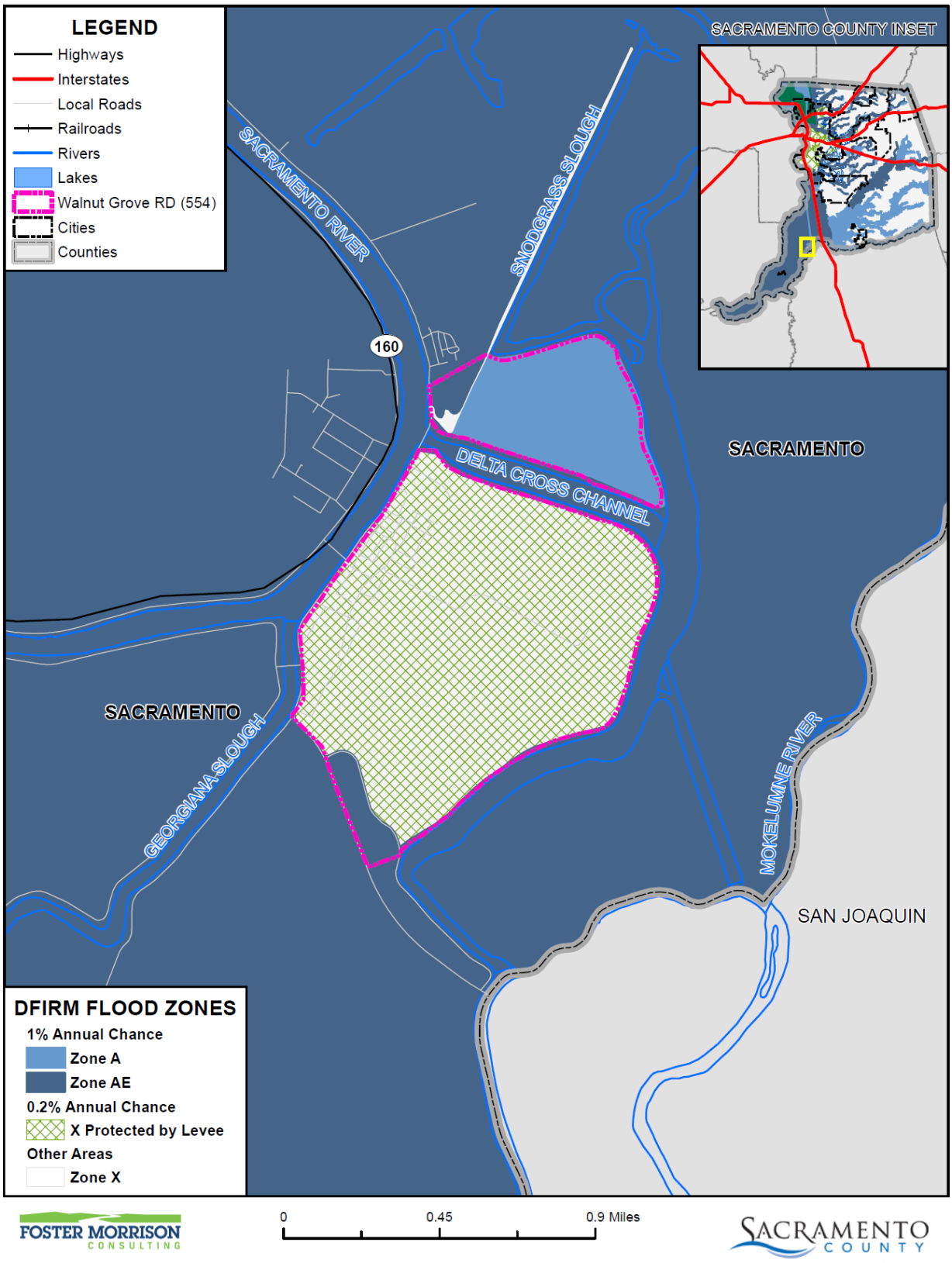
A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower steam channel, levees can also increase the speed of the water. Levees can be natural or man-made.

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

Location and Extent

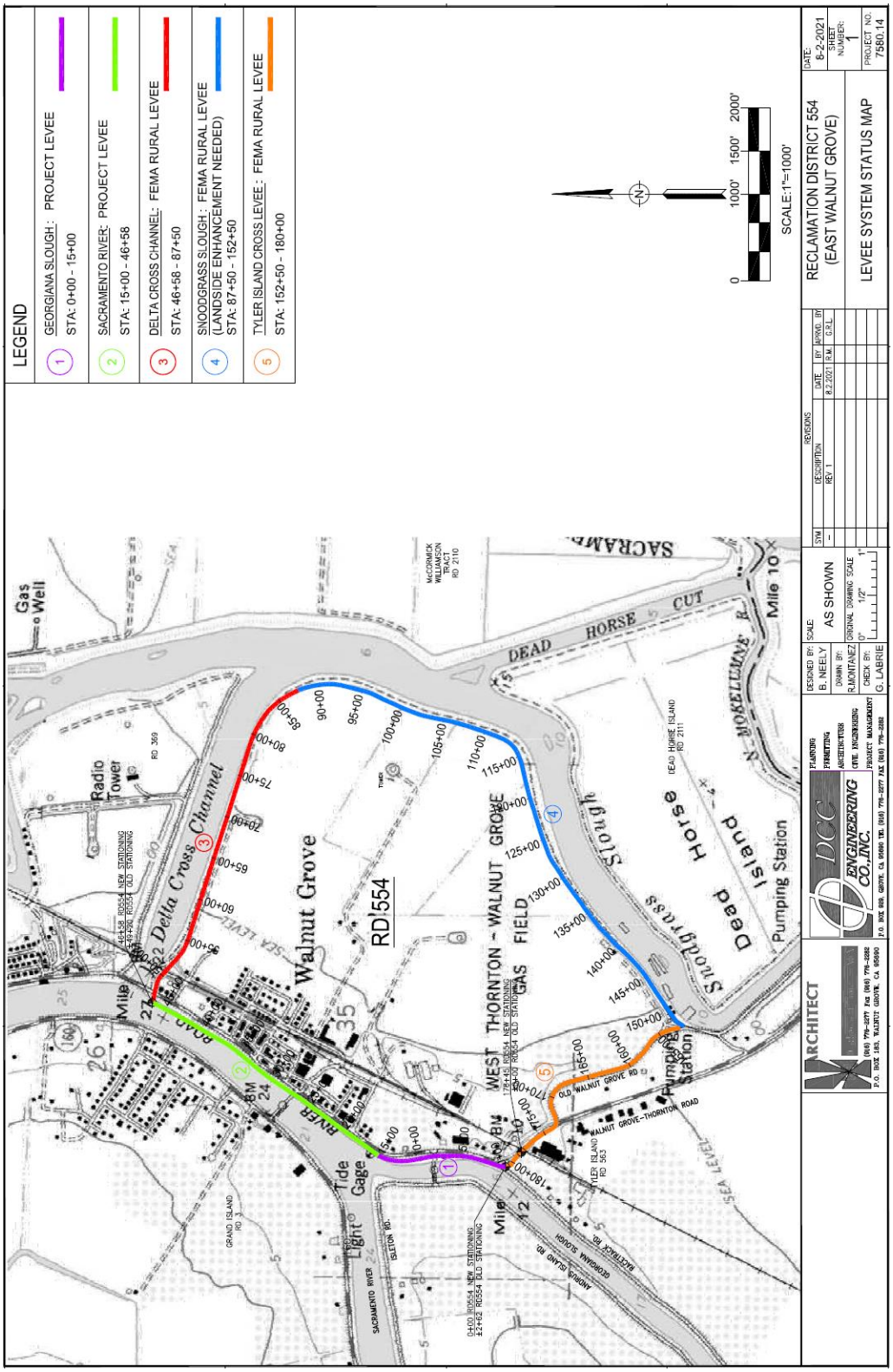
There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District vary by event and location. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of levee failure risk times can be hours to weeks, depending on the river flows that the levee holds back. When northern California dams and reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees. Levees in the District are shown on Figure 8-5. Levee statuses (from DCC Engineering) of the District are shown on Figure 8-6.

Figure 8-5 RD 554 – Levee Protected Areas



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

Figure 8-6 RD 554 – Levee Status Map



Source: DCC Engineering, 8/2/2021, RD 554

Past Occurrences

There have been no federal or state disaster declarations from levee failure. The 5-Year Plan noted that in 1986, lower Tyler Island flooded and threatened to flood RD 554. At that time, an effort was undertaken to enhance the cross levee height by adding a berm on the lower Tyler side of the levee to ensure that the urban area did not get flooded. The added height was not necessary when the water crested but the emergency construction paved the way for the more permanent configuration that exists today. That levee upgrade then led to a successful LOMR for eastern Walnut Grove and its Zone X determination in 1987. No events have occurred since 2012.

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 propert ies 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. The District noted that RD 554 is high ground. This urban area is on higher ground and would be less effected if there was a 100 year flood, making this too general/generic a paragraph.

Not only would a breach inundate RD 554, but it would also overtop (or by an intentional breach) the dry cross levee and flood the rest of Tyler Island. Flood waters would flow down to the lower part of the island since it is at a lower elevation than RD 554. The lowest elevation on the southern part of Tyler Island is -15.0 feet (NAVD 88) according to the LIDAR survey supplied by DWR. By the same survey, the lowest elevation on RD 554 is -1.0 feet. The average elevation for Tyler Island is +9.0 feet.

The 2012 5-Year Plan addressed levee repair costs due to failure. The 5-Year Plan broke down costs by land use type:

- **Residential** – For RD 554, it is estimated that there could be a one-time displacement cost of $57,500 for all occupied households along with an additional $4,780 per day to house these residents elsewhere. On lower Tyler Island, the estimated one-time displacement could be $9000 and an additional $756 per day. The Walnut Grove Marina adds a transient population that is difficult to quantify since there are no statistics covering that element to determine associated costs. Furthermore, this number would fluctuate with the seasons. To house this population in emergency shelters it is estimated to cost $85 a day. As there would be sufficient time to evacuate, the costs to accommodate this unique group of part-time residents may not be significant. But the marina would be shut down until the island was pumped out.
- **Commercial** – Commercial structures will be adversely impacted from the time they are inundated through the time it takes to repair such damage and damage to surrounding infrastructure. There are about 48 businesses on all of Tyler Island. Overall, a flood could cost Walnut Grove and Tyler Island

businesses an estimated $113,000 per day. Some businesses may be unable to recover from a flood and could possibly be lost as the result of a flood event.

- **Agricultural** – Crops grown on Tyler Island are generally alfalfa, wheat, corn, pears, truck crops, tomatoes, rice, and wine grapes. Tyler Island has a total of 8,687 acres of crops. Average cost for rehabilitation and field cleanup is $235 per acre. This involves the removal of debris and sediment deposits after floodwaters have receded. Silt and debris can also clog drainage and irrigation ditches adding a variable cost to rehabilitation. The estimated total one-time cost for clean-up and rehabilitation is estimated to be $2.7 million. If inundation lasts longer than 14 days, it is assumed that the crops will be permanently lost. Any flood event that occurs between planting and harvest, could completely destroy the crops. Reestablishment of a lost crop dramatically increases economic losses. The inundation period is assumed to be five weeks on lower Tyler Island, meaning all crops on the lower end could potentially be lost in a flood event. However, due to the smaller size of RD 554 and an assumed inundation period of five days, not all crops may be lost. Not including clean-up costs, reestablishment of all crops on the island could total an estimated $29 million.

Using the 2021 adjusted figure for breach repair, Walnut Grove RD 554 estimates $1,875,000 for repair, recovery, and associated damages. Additionally, land values have increased because of the changes in crops. A breach at RD 554 would impact RD 563 and therefore would result in expenses for damage on both islands and increase the estimate to approx. $33,000,000. So, a major event would impact both upper and lower Tyler Island.

The 5-Year Plan also addressed infrastructure issues related to levee failure. Levee failure on Reclamation District 554 could cause direct physical damage to the island's infrastructure. If a break were to occur in the north inundating Walnut Grove/Thornton Road/J11, it would disrupt the island's connection to Highway 160 or 1-5, delaying up to 1,500 trips. The cost due to lost trips is small but the estimated time delay could cost $48,000 per day, $53,000 if 10% are assumed to be truck trips. Some of Walnut Grove's surface streets could be inundated affecting the area on a local level by removing access to the town's residential areas. The District also houses a FM radio and television transmission tower with support facilities serving KOVR, KXTV, and KQCA. This 2049' tower currently serves the Stockton-Sacramento-Modesto broadcasting area stations and radio stations (Fybush). The transmitter building is on stilts so the equipment will not be affected in a flood. But a flood could still restrict maintenance access to the building, and potentially interfere with broadcasting if there is a lengthy power disruption.

Overall, residential, commercial, agriculture, and infrastructure losses due to a flood event on all of Tyler Island could cost approximately $185,000 per day. The one-time/direct cost of the event to relocate the residents and businesses and reestablish cropland would be around $2.2 million. Assuming an inundation residence period 5 days on RD 554 (upper Tyler) a flood event there could cost approximately $1.6 million. Lower Tyler with an assumed inundation residence period of 5 weeks (35 days), a flood event could cost approximately $27.2 million of direct and indirect costs. These figures include daily losses to residents and business, one-time costs of displacement, rehabilitation costs of cropland, and reestablishment and annual production loss costs for vineyards and orchards. A flood event occurring between February and October, that would delay planting until the next season and is assumed to kill all crops, could add up to approximately $78.3 million of direct and indirect costs for both districts. This figure includes the estimated costs associated with repairing the breach and pumping out the islands, about $30 million.

Water quality issues were also addressed in the 5-Year Plan. Due to the urban nature of a portion of RD 554, a flood could release household and commercial chemicals potentially contaminating the surrounding

waterways. A flood could also suspend sediment, metals, fertilizers, and pesticides that are attached to soil particles. Increased sedimentation of the waterway can reduce the amount of sunlight to reach submerged aquatic plants and also smother fish larvae and harm fish by clogging their gills. The extent of the effects on fish and aquatic species from suspended sediment and chemicals depend on the quantities of pollutants, amount of dilution, and frequency of freshwater releases.

Besides those listed above, other potential in-island pollutant sources could degrade water quality on the island and in the waterways. A long inundation period could create anoxic conditions in the soil can release toxic substances, such as manganese that is naturally occurring but can be dangerous to health in high concentrations. Other toxic substances such as, organochlorine "legacy" pesticides that, although have been banned for over 20 years, slowly degrade in the environment and can still be present in soils where it was applied. This can have harmful effects on fish species in terms of reducing food production, namely a primary producer, phytoplankton if released into the waterway. Although not harmful in small traces, "legacy" pesticides can become more concentrated through bioamplification and not only harm fish species but terrestrial and avian species as well.

Waterside habitat that is adjacent to the break could be lost due to the erosive forces of the water flowing through the break.

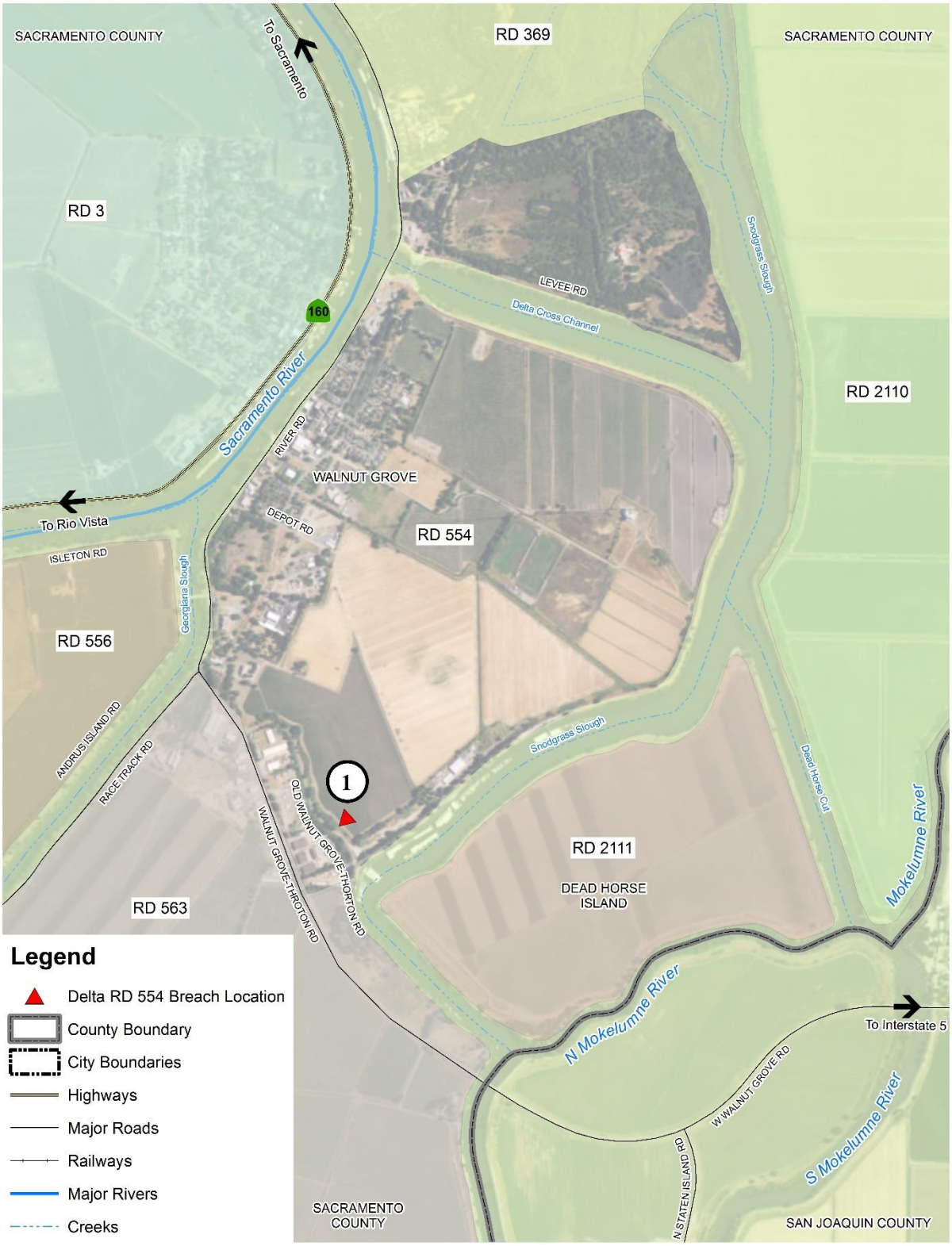
StormReady Flood Scenarios and Evacuation Routes

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 554, Figure 8-7 details the locations in the Delta within RD 554 where flooding could occur. The red triangles denote potential levee breach locations. RD 554 has a potential levee break scenario. Maps regarding time to one foot inundation (Figure 8-8), estimated flood depths (Figure 8-9), and suggested evacuation routes (Figure 8-10) are displayed below.

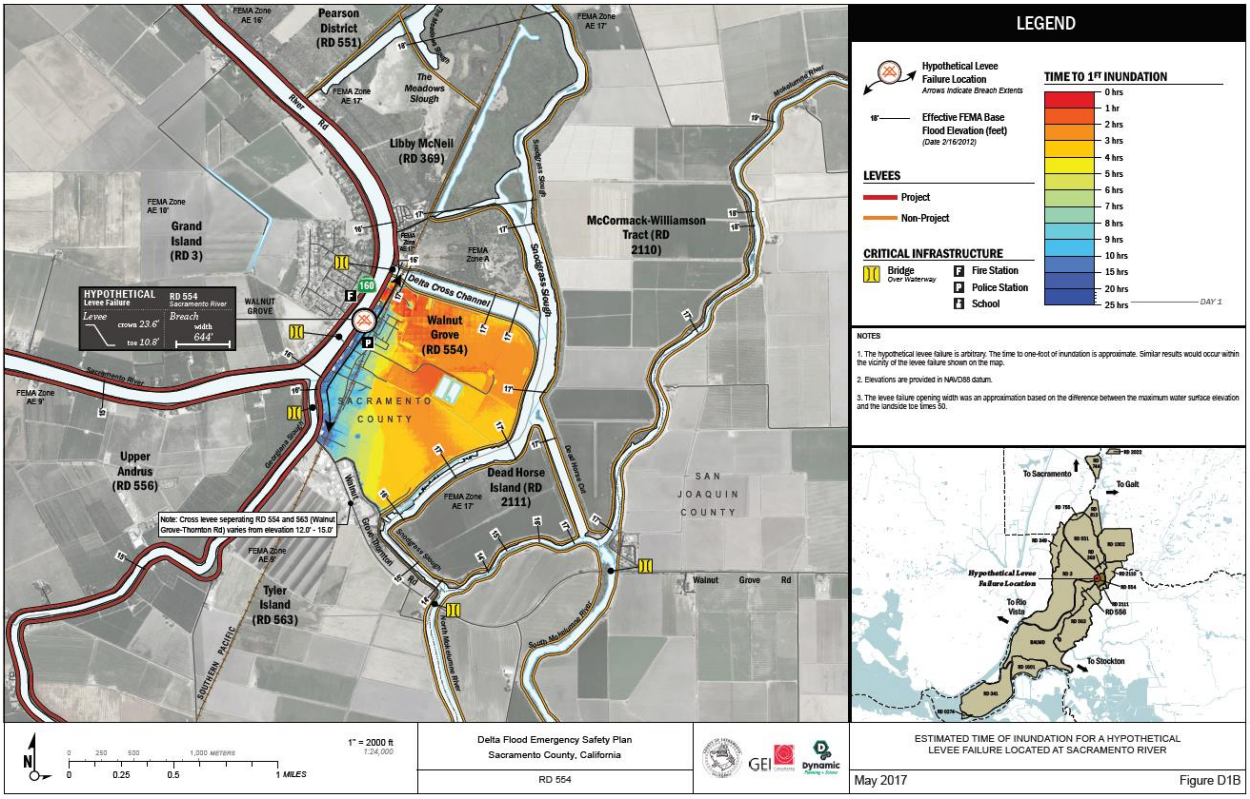
Note: This information is based on assumptions and scenarios developed as part of the flood safety planning done for Delta RDs in 2017; areas of possible flooding depicted in these maps may or may not reflect current conditions and would change depending on the location of breach areas and conditions during any given event. Current conditions should be verified with an LMA representative.

Figure 8-7 RD 554 – Potential Levee Breach Location



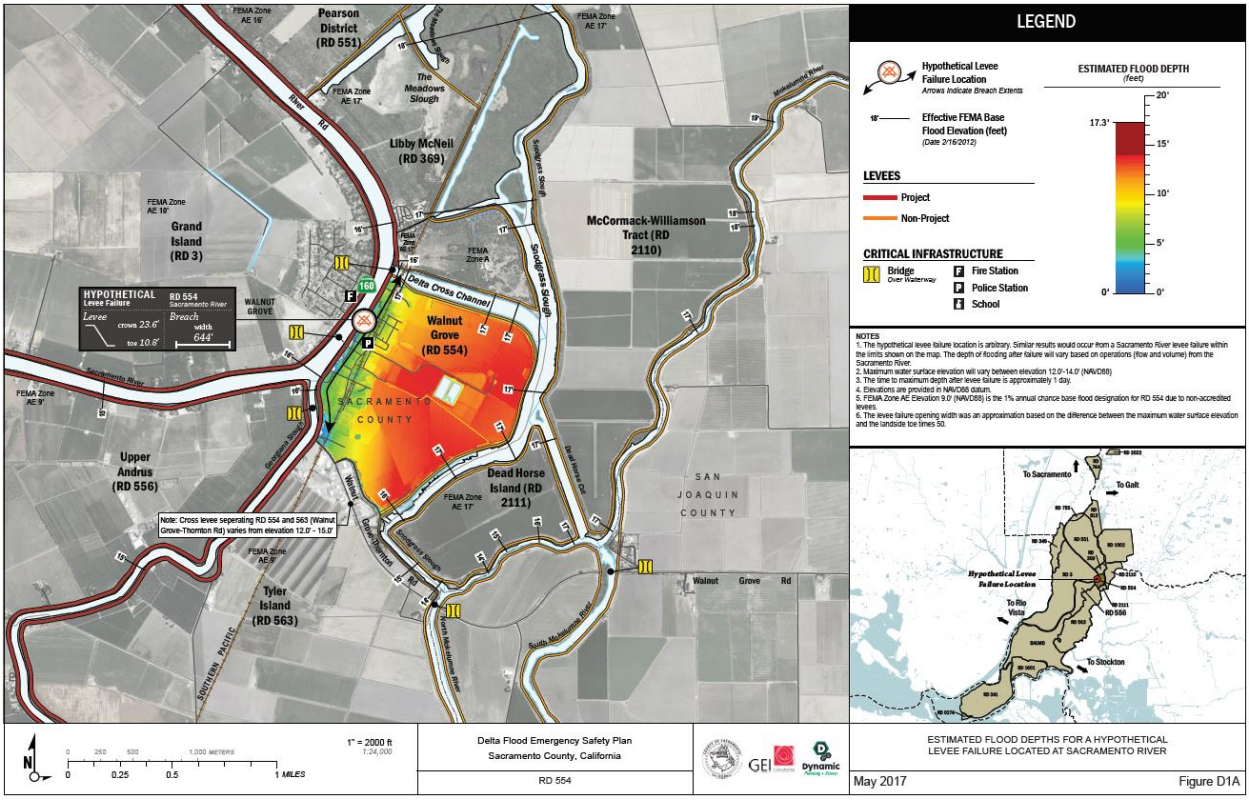
Source: Sacramento County Storm Ready – retrieved March 26, 2021

Figure 8-8 RD 554 – Time to One Foot Inundation after Levee Breach



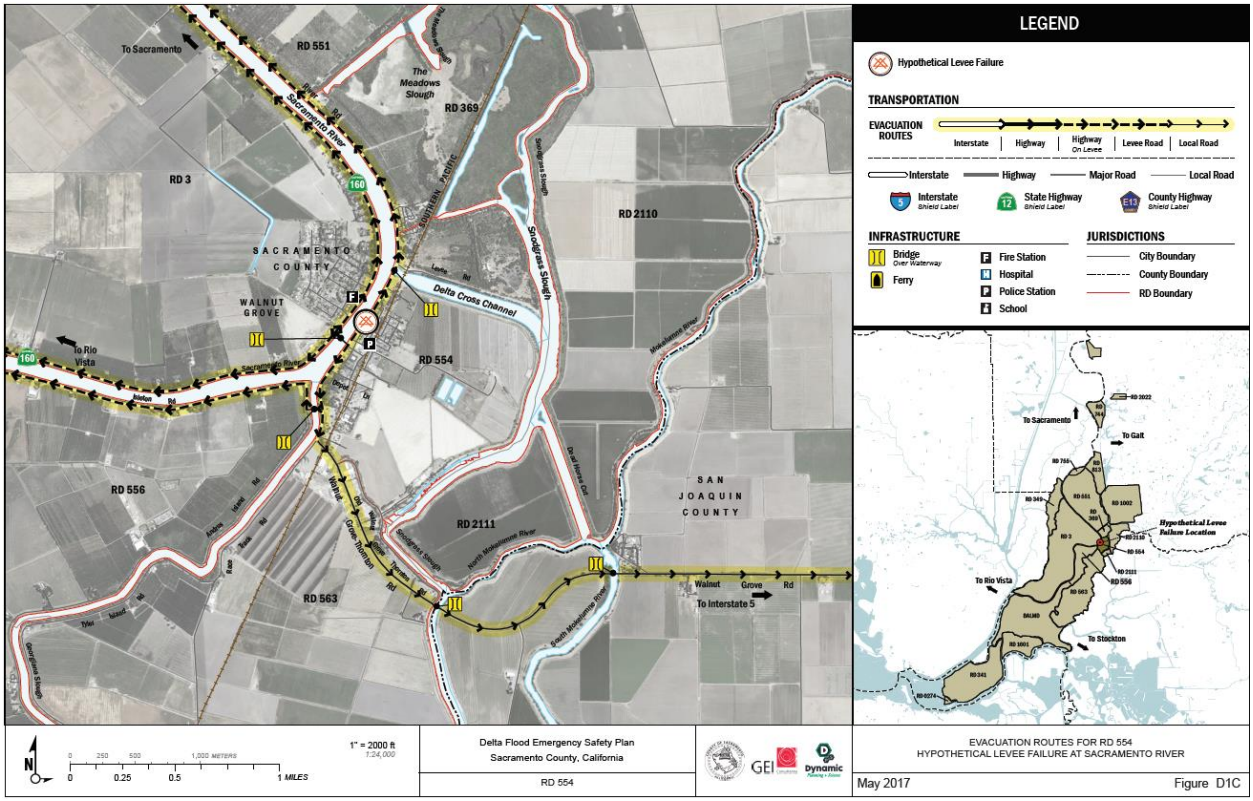
Source: Sacramento County Storm Ready – retrieved March 26, 2021

Figure 8-9 RD 554 – Estimated Flood Depth from Levee Breach Scenario



Source: Sacramento County Storm Ready – retrieved March 26, 2021

Figure 8-10 RD 554 – Levee Breach Scenario Evacuation Routes



Source: Sacramento County Storm Ready – retrieved March 26, 2021

Assets at Risk

Levees and district pumping plants. On island inundation can create an open water situation where a large fetch could develop and erode the interior of other levees within the District. Inundation of the drainage pump can make it inoperable and require replacement. Other critical facilities at risk include a fire department, police station and elementary school. The fire department and police station are non-critical facilities because they are above the potential HW/flood elevation. Assets at risk to levee failure were shown on Table 8-4.

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

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

Storms in the District 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, has occurred in the District. This is the cause of many of the federal disaster declarations related to flooding.

The last heavy rain and storm event the District experienced was in 2006, 1997 and 1986. No significant damages occurred due to these high water events. Events since 2016 include:

- 2017 HWE: Additional monitoring was initiated, but no significant damage

Vulnerability to and Impacts from Heavy Rain and Storms

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

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

During periods of heavy rains and storms, power outages can occur. These power outages can affect pumping stations and lift stations that help alleviate flooding. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.3 of the Base Plan.

Heavy rains and storms can result in higher flood flows that could increase the hydraulic gradients within the levee section and result in seepage or if great enough, possibly overtopping. They can also increase flows and result in erosion of the waterside bank. Riparian vegetation could be lost from high flows as a

result of heavy rains and large storms. The historic buildings and districts discussed above could be damaged from heavy storms due to falling trees or flooding.

Assets at Risk

The District levees and pumping plant are at risk of damage from heavy rains and storms.

8.6 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.

8.6.1. Regulatory Mitigation Capabilities

Table 8-8 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 554.

Table 8-8 RD 554 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	1. Current 5-year plan is under review and being updated. It describes past, present, and future hazards. These hazards are managed and implemented using the standard operating plan strategies. 2. At this time, an Emergency Operations Plan Update is still in development. Expected process to the finalized during the next 2 years. 3. 2016 Sacramento County Flood Safety Plan is in place. As well, as a Hazard Plan concerted with Sacramento County with GEI as the interface. The plans include information that sets up SEMS/NIMS processes, identifies critical infrastructure and evacuation routes, and sets up monitoring and levee patrol protocols. The 2021 updates will include Flood Annex Maps that summarize information contained in the plans as well as including any missing protocols to bring them into full compliance with existing codes and any additional information/updates the Districts may have since the plans were originally completed. The updates should be complete by this winter. 4. Small Communities Program for flood protection and structural and nonstructural mitigation. This Legacy grant is interfaced through GEI/MBK in conjunction with agencies and RD 554 to improve levee integrity, operations, and management to reduce flood related losses. The benefit as a participant in SCP is to reduce risk to people, property, and environmental resources. Flood risk reduction can be implemented through this program. 5. Update of the 2016 LHMP continues to include valuable information about the priority of hazards RD 554 faces. Once accepted this data and information can be used to the highest and best interest of the District and the protected community.
Capital Improvements Plan	N	
Economic Development Plan	N	
Local Emergency Operations Plan	In development	The plan addresses flooding hazards and can be used to implement mitigation actions. While EOP is in development, there is unofficial protocol of those that live and work on the island. They have used this protocol over a long time to respond to flood and other related hazards.
Continuity of Operations Plan	Y	While EOP is in development, there is unofficial protocol of those that live and work on the island. They have used this protocol over long period of time to respond to flood and other related hazards. The EOP provides continuity for the District and the expected process is to finalize during the next 2 years.
Transportation Plan	N	

Stormwater Management Plan/Program	Y	This category is included in the District standard operations and maintenance procedures. Patrols are dispatched at critical times. Before and after storms, patrols know where to look, inspect and take action to proactively provide flood risk reduction. Procedures are in place to keep water flow moving.
Engineering Studies for Streams	Y	District is contracted with local engineering company who provides counseling and advice of Operations and Management for risk reduction, levee integrity, and mitigation relating to water/flood flows. Engineer provides and satisfies agency interface as well as Fiscal advice.
Community Wildfire Protection Plan	Y	In the event of such hazard, the community Reverse 911 and phone tree would be initiated. Detailed communication from WGFD command center would be put into action.
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	Y	Version/Year: CBC 2019
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score:
Fire department ISO rating:	N	Rating:
Site plan review requirements	Y	Walnut Grove SPA County Building Department Walnut Grove HOA
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	Y	Walnut Grove Special Planning Area controls land use and development so could aide in reducing hazard impacts through land use and development criteria. Sacramento County Zoning Code reduces both hazard and growth and development. The District is a mixture of zoned agriculture, commercial and residential property covered by an SPA in itself limits development. The District is mostly zoned agriculture which limits growth and development.
Subdivision ordinance	N	
Floodplain ordinance	Y	Yes, Sacramento County Floodplain Ordinance restricts development in the floodplain
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N	
Flood insurance rate maps	Y	PAL - District is working on being mapped back into Zone X

Elevation Certificates	Y	Sacramento County requires Elevation Certificates for new construction. Other outside resources such as insurance companies and mortgage companies may choose to require EC also. There is emphasis and funding from FEMA to raise existing homes to provide safer residential properties against hazards. Thereby reducing risk.
Acquisition of land for open space and public recreation uses	N	
Erosion or sediment control program	Y	5-Year Plan continues to include monitoring for such hazards. Through the Districts standard operating plan, patrols are dispatched at critical times. Special attention is given to inspection of critical erosion sites. The District is responsible for its own main levee repair and maintenance in which procedures are outlined in the general patrol guidelines. Patrols take action to proactively provide erosion or sediment reports. The results are reduced risk for the District and Community.
Other	Y	Pre permit submissions requires an owner to receive RD approval before proceeding forward with permits. This procedure prepares new developers or owners for the risk reduction measure to include in their projects.
How can these capabilities be expanded and improved to reduce risk?		
Pursuant to Sacramento County General Plan Safety Element Policies, SA-18a&b, written approval must be obtained from the applicable Reclamation District to build any structure or grade any soil within 300 feet of the land side toe of levee. This applies to anyone who wants to fill, excavate, or construct a structure within 50 feet of the toe of a Sacramento County river levee and anyone who wants to develop land within 300 feet of the toe. To ensure this requirement is met, every parcel located near a levee is tagged in the building department database. The District noted the following expansion abilities: Continue to support the Small Communities Program for flood protection and structural and nonstructural mitigation. This Legacy grant is interfaced through GEI/MBK in conjunction with agencies and RD 554 to improve levee integrity. Continue working with the geotechnical engineer to complete a report on the integrity of the District levee to identify deficiencies and develop engineering solutions to reduce risk.		

Source: RD 554

8.6.2. Administrative/Technical Mitigation Capabilities

Table 8-9 identifies the District department(s) responsible for activities related to mitigation and loss prevention in RD 554.

Table 8-9 RD 554'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	Drainage system is effective. Developing a tree trimming and vegetation clearing plan RD 554 has planned maintenance programs that include annual vegetation management. Levees are mowed, vegetation is trimmed, and roadways are clear for patrol and emergency vehicles to have access.
Mutual aid agreements	Y	RD 554 is contracted with a local engineering company who provides counseling, review, and implementation on risk reduction, levee integrity, and mitigation related to mitigation capabilities. Unofficial coordination between many community members and local residents responding to their respective duties during a hazard. This is very effective risk reduction coordination.
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	
Floodplain Administrator	N	
Emergency Manager	Y	Determined by the Fire Department Chief.
Community Planner	Y	County Board of Supervisors through town meetings, board or trustees, and interface with District Engineer.
Civil Engineer	Y, FT	Staff is trained to coordinate with agencies and perform tasks in an emergency situation. The Engineer provides interface with agencies and their staff.
GIS Coordinator	N	
Other	N	
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	Reverse 911, phone tree, detailed and organized communication from WGFD command center would be put into action.

Hazard data and information	Y	1. Current 5-year plan is under review and being updated. It describes past, present, and future hazards. These hazards are managed and implemented using the standard operating plan strategies. 2. At this time, an Emergency Operations Plan is still in development. Expected process to the finalized during the next 2 years. 3. 2016 Sacramento County Flood Safety Plan is in place. As well, as a Hazard Plan concerted with Sacramento County with GEI as the interface. The plans include information that sets up SEMS/NIMS processes, identifies critical infrastructure and evacuation routes, and sets up monitoring and levee patrol protocols. The 2021 updates will include Flood Annex Maps that summarize information contained in the plans as well as including any missing protocols to bring them into full compliance with existing codes and any additional information/updates the Districts may have since the plans were originally completed. The updates should be complete by this winter. 4. Update of the 2016 LHMP continues to include valuable information about the priority of hazards RD 554 faces. Once accepted this data and information can be used to the highest and best interest of the District.
Grant writing	N	
Hazus analysis	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
RD 554 must organize a more appropriate warning system among trustees, public and staff. Additionally, the organization through the Fire Department Chief provides a continuity the community and agencies allowing information to flow more efficiently. Implementing mitigation strategies to improve District LOP for its community. Thus, reducing risk to life and property. This capability is a District priority, but expenditures and allowances of financial resources often slows or stalls efforts to implement preventive operational and maintenance plans.		

Source: RD 554

8.6.3. Fiscal Mitigation Capabilities

Table 8-10 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table 8-10 RD 554'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	Delta Levees Subventions program to maintain levee system.
Authority to levy taxes for specific purposes	Y	Proposition 218 provides the District with the limited ability to raise benefit assessments through a vote of property owners.

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?
Fees for water, sewer, gas, or electric services	Y	Fees are assessed by the County for sewer and water. SMUD provides electrical service.
Impact fees for new development	N	Unknown
Storm water utility fee	Y	Benefit Assessments are applied for drainage
Incur debt through general obligation bonds and/or special tax bonds	N	
Incur debt through private activities	Y	Districts may borrow from a financial institution can be an option
Community Development Block Grant	N	
Other federal funding programs	N	
State funding programs	Y	Delta Levee Subventions Program Delta Levee Special Projects Proposition 84 and 1E Small Community Plan
Other	N	Additional funding would allow more projects to be completed per year adding staff to better reduce the risk in the District
How can these capabilities be expanded and improved to reduce risk?		
The involvement of Federal agencies funds would help in reducing risk as well as the removal of the sunset clause on the Delta Levees Subventions Program. The involvement of Federal agencies funds would help in reducing risk. RD 554 is in the Subventions Program.		

Source: RD 554

8.6.4. Mitigation Education, Outreach, and Partnerships

Table 8-11 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 8-11 RD 554'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.	Y	Walnut Grove Volunteer Fire Department, Delta Citizens Municipal Advisory Council, Walnut Grove HO and Merchants Association, Rotary Club of Walnut Grove, River Delta Historical Society, River Delta Unified School District.
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Y	Department of Water Resources Delta Flood Emergency Preparedness, Cal OES, Sacramento County OES River Delta Unified School District

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Natural disaster or safety related school programs	N	
StormReady certification	N	
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	Y	Through neighboring RD's, unofficial partnerships are in place for assistance in the event of a hazard.
Other	Y	RD 554 is contracted with a local engineering company who provides counseling, review, and implementation on risk reduction, levee integrity, and mitigation related to mitigation capabilities. Unofficial coordination between many community members and local residents responding to their respective duties during a hazard is in place. This is a very effective risk reduction coordination.
How can these capabilities be expanded and improved to reduce risk?		
As a small number of people district, current planned coordination for RD 554 is consistently reviewed, implemented, and quite effective. Continuation of improving outreach programs in coordination with State agencies and neighboring RD's may be helpful in community education about disaster related issued.		

Source: RD 554

8.6.5. Other Mitigation Efforts

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

- The US Army Corps of Engineers performed an erosion repair project along the Sacramento River levee summer 2007 to create a riparian bench and resolve erosion issues. The District is currently developing a geotechnical study to locate deficiencies within the system. The District is still completing the geotechnical studies to identify deficiencies within the system. Once the problematic areas are identified. the District will perform repair projects to improve the levee system and reduce risk to the District and its communities.
- Cross levee interface at Snodgrass Slough
- Erosion Repair on the Sacramento River downstream of the cross channel
- Stability berm and levee profile rehabilitation along Snodgrass Slough and small section across the Cross Channel levee (minor)

8.7 Mitigation Strategy

8.7.1. Mitigation Goals and Objectives

The RD 554 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

8.7.2. Mitigation Actions

The planning team for the RD 554 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. Small Communities Plans – Flood Protection – Structural and Nonstructural Mitigation

Hazards Addressed: Floods, Levee Failure, Heavy Rain and Storms, and Disadvantaged Community

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

Issue/Background: BALMD and RD#554 Walnut Grove East, Sacramento County, are included in the Small Communities Plans. These and other communities obtained grants under the CA DWR flood protection programs. Phase 1 provided the resourced to access and evaluate levee and flood risks. The upcoming Phase 2 of the program will involve implementation and construction of mitigation projects identified in Phase 1.

Project Description: Multiple agencies will work in conjunction with the County to implement the mitigation projects brought to light in the Small Communities Plans. The agencies will work to increase levee protection, additional levee improvements in all plans and improve levee integrity to manage flood risk and provide safer systems for the community. Specifically, cross levee interface at Snodgrass Slough, Erosion repair on the Sacramento River downstream of the cross channel, and stability berm and levee profile rehabilitation along Snodgrass Slough and small section across the Cross Channel levee (minor). In general, these projects will contain many levee and flood management improvements including but not

limited to environmental projects such as burrowing animal mitigations, levee repairs, erosion control, riparian bench restorations, crown raising to address subsidence, vegetation management and removal, proactive levee improvements, operations and maintenance improvements, structure rising, seepage repair and protection, encroachment modifications and fixes and repairs to the levee perimeters, bank and slope protections, encroachment modifications, and others.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Small Communities Projects; Disadvantaged Community Projects; 2016 Sacramento County Flood Safety Plan (by GEI) and subsequent updating in 2021. Regional Flood Management Plan; and 2021 Emergency Operations Plan (EOP) – Currently in development; and HMA 2021 BRIC and FMA Programs and subsequent mitigations.

Responsible Agency/ Department/Partners:

1. Isleton – BALMD (RD 317, RD 407)

2. Walnut Grove East – RED 554 Walnut Grove

3. Walnut Grove West – RD 3 Grand Island

4. Locke – RD 369 Libby McNeil

5. Courtland – RD 551 Courtland

Cost Estimate: Phase 1 of the Small Communities projects were $500,000 per community. Phase 2 Construction Costs will be determined upon the completion of Phase 1

Benefits (Losses Avoided): Proactive levee integrity management is to reduce risk to people in the communities, property, and environmental resources from a possible levee failure or other flood events.

Potential Funding: CA DWR, FEMA hazard mitigation, the Army Corps of Engineers, 2021 HMA Grants (BRIC and FMA), and others.

Timeline: Upon completion of Phase 1 and moving into Phase 2 Construction a timeline would be included.

Project Priority (H, M, L): High

Action 2. Disadvantaged Community Projects and subsequent updating in 2021.

Hazards Addressed: Floods, Levee Failure, Heavy Rain and Storms, and Disadvantaged Community

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

Issue/Background: Levee and flood management, operations, and improvements are all integral necessities for continued levee and flood protection. Projects need to be undertaken at various locations in the District, including RD554. The plans include information that sets up SEMS/NIMS processes, identifies

critical infrastructure and evacuation routes, and sets up monitoring and levee patrol protocols. The 2021 updates will include Flood Annex Maps that summarize information contained in the plans as well as including any missing protocols to bring them into full compliance with existing codes and any additional information/updates the Districts may have since the plans were originally completed. The updates should be complete by this winter.

Project Description: Multiple agencies will work in conjunction with the County to implement the mitigation projects contained in the Regional Flood Management Plan. The agencies will work to increase levee protection, additional levee improvements in all plans and improve levee integrity to manage flood risk and provide safer systems for the community. Specifically, cross levee interface at Snodgrass Slough, Erosion repair on the Sacramento River downstream of the cross channel, and stability berm and levee profile rehabilitation along Snodgrass Slough and small section across the Cross Channel levee (minor). In general, these projects will contain many levee and flood management improvements including but not limited to, levee repairs, erosion control and repair, riparian bench restorations, crown raising to address subsidence, vegetation management and removal, proactive levee improvements, operations and maintenance improvements, structure rising, seepage repair and protection, encroachment modifications and fixes and repairs to the levee perimeters, bank and slope protections, encroachment modifications, and others.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: 2016 Sacramento County Flood Safety Plan (by GEI) and subsequent updating in 2021. Regional Flood Management Plan; Disadvantage Community Projects; Small Communities Program Projects; 2021 Emergency Operations Plan (EOP) – Currently in development; and HMA 2021 BRIC and FMA Programs and subsequent mitigations.

Responsible Agency/ Department/Partners: County DWR and Reclamation Districts; FEMA hazard mitigations, the Army Corps of Engineers; State DWR, SAFECA, USACE, and others.

Cost Estimate: Estimated cost varies by nature and extent of each project.

Benefits (Losses Avoided): Proactive levee integrity management is to reduce risk to people in the communities, property, and environmental resources from a possible levee failure or other flood events.

Potential Funding: CA DWR grants, County, Reclamation Districts, FEMA, 2021 HMA Grants (BRIC and FMA), and others

Timeline: 2021 and ongoing, subject to funding, planning, permitting, and construction windows.

Project Priority (H, M, L): High

Action 3. 2016 Sacramento County Flood Safety Plan (by GEI) and subsequent updating in 2021.

Hazards Addressed: Floods, Levee Failure, Heavy Rain and Storms, and Disadvantaged Community

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

Issue/Background: Levee and flood management, operations, and improvements are all integral necessities for continued levee and flood protection. Projects need to be undertaken at various locations in the District, including RD554. The plans include information that sets up SEMS/NIMS processes, identifies critical infrastructure and evacuation routes, and sets up monitoring and levee patrol protocols. The 2021 updates will include Flood Annex Maps that summarize information contained in the plans as well as including any missing protocols to bring them into full compliance with existing codes and any additional information/updates the Districts may have since the plans were originally completed. The updates should be complete by this winter.

Project Description: Multiple agencies will work in conjunction with the County to implement the mitigation projects contained in the Regional Flood Management Plan. The agencies will work to increase levee protection, additional levee improvements in all plans and improve levee integrity to manage flood risk and provide safer systems for the community. Specifically, cross levee interface at Snodgrass Slough, Erosion repair on the Sacramento River downstream of the cross channel, and stability berm and levee profile rehabilitation along Snodgrass Slough and small section across the Cross Channel levee (minor). In general, these projects will contain many levee and flood management improvements including but not limited to, levee repairs, erosion control and repair, riparian bench restorations, crown raising to address subsidence, vegetation management and removal, proactive levee improvements, operations and maintenance improvements, structure rising, seepage repair and protection, encroachment modifications and fixes and repairs to the levee perimeters, bank and slope protections, encroachment modifications, and others.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: 2016 Sacramento County Flood Safety Plan (by GEI) and subsequent updating in 2021. Regional Flood Management Plan; 2021 Emergency Operations Plan (EOP) – Currently in development; Disadvantage Community Projects; Small Communities Program Projects; and HMA 2021 BRIC and FMA Programs and subsequent mitigations.

Responsible Agency/ Department/Partners: County DWR and Reclamation Districts; FEMA hazard mitigations, the Army Corps of Engineers; State DWR, SAFECA, USACE, and others.

Cost Estimate: Estimated cost varies by nature and extent of each project.

Benefits (Losses Avoided): Proactive levee integrity management is to reduce risk to people in the communities, property, and environmental resources from a possible levee failure or other flood events.

Potential Funding: CA DWR grants, County, Reclamation Districts, FEMA, 2021 HMA Grants (BRIC and FMA), and others

Timeline: 2021 and ongoing, subject to funding, planning, permitting, and construction windows.

Project Priority (H, M, L): High

Action 4. 2021 Emergency Operations Plan (EOP) – Currently in development

Hazards Addressed: Floods, Levee Failure, Heavy Rain and Storms, and Disadvantaged Community

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

Issue/Background: Levee and flood management, operations, and improvements are all integral necessities for continued levee and flood protection. Projects need to be undertaken at various locations in the District, including RD554. The EOP is coordination between RD554 team members to clarify and ensure conformance and focus to prevent duplication efforts when a solution is available and planned.

Project Description: Multiple agencies will work in conjunction with the County to implement the mitigation projects contained in the Regional Flood Management Plan. The agencies will work to increase levee protection, additional levee improvements in all plans and improve levee integrity to manage flood risk and provide safer systems for the community. Specifically, cross levee interface at Snodgrass Slough, Erosion repair on the Sacramento River downstream of the cross channel, and stability berm and levee profile rehabilitation along Snodgrass Slough and small section across the Cross Channel levee (minor). In general, these projects will contain many levee and flood management improvements including but not limited to, levee repairs, erosion control and repair, riparian bench restorations, crown raising to address subsidence, vegetation management and removal, proactive levee improvements, operations and maintenance improvements, structure rising, seepage repair and protection, encroachment modifications and fixes and repairs to the levee perimeters, bank and slope protections, encroachment modifications, and others.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: 2021 Emergency Operations Plan (EOP) – Currently in development; 2016 Sacramento County Flood Safety Plan (by GEI) and subsequent updating in 2021; Regional Flood Management Plan; Disadvantaged Community Projects and the Small Communities Program Projects; and HMA 2021 BRIC and FMA Programs and subsequent mitigations.

Responsible Agency/ Department/Partners: County DWR and Reclamation Districts; FEMA hazard mitigations, the Army Corps of Engineers; State DWR, SAFECA, USACE, and others.

Cost Estimate: Estimated cost varies by nature and extent of each project.

Benefits (Losses Avoided): Proactive levee integrity management is to reduce risk to people in the communities, property, and environmental resources from a possible levee failure or other flood events.

Potential Funding: CA DWR grants, County, Reclamation Districts, FEMA, 2021 HMA Grants (BRIC and FMA), and others

Timeline: 2021 and ongoing, subject to funding, planning, permitting, and construction windows.

Project Priority (H, M, L): High

Action 5. Regional Flood Management Plan Projects

Hazards Addressed: Floods, Levee Failure, Heavy Rain and Storms, and Disadvantaged Community

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

Issue/Background: Levee and flood management, operations, and improvements are all integral necessities for continued levee and flood protection. Projects need to be undertaken at various locations in the District, including RD554.

Project Description: Multiple agencies will work in conjunction with the County to implement the mitigation projects brought to light in the Small Communities Plans. The agencies will work to increase levee protection, additional levee improvements in all plans and improve levee integrity to manage flood risk and provide safer systems for the community. Specifically, cross levee interface at Snodgrass Slough, Erosion repair on the Sacramento River downstream of the cross channel, and stability berm and levee profile rehabilitation along Snodgrass Slough and small section across the Cross Channel levee (minor). In general, these projects will contain many levee and flood management improvements including but not limited to environmental projects such as burrowing animal mitigations, levee repairs, erosion control, riparian bench restorations, crown raising to address subsidence, vegetation management and removal, proactive levee improvements, operations and maintenance improvements, structure rising, seepage repair and protection, encroachment modifications and fixes and repairs to the levee perimeters, bank and slope protections, encroachment modifications, and others.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: 2016 Sacramento County Flood Safety Plan (by GEI) and subsequent updating in 2021. Regional Flood Management Plan; Small Communities Program Projects; Disadvantaged Community Projects, and 2021 Emergency Operations Plan (EOP) – Currently in development; and HMA 2021 BRIC and FMA Programs and subsequent mitigations.

Responsible Agency/ Department/Partners: County DWR and Reclamation Districts; State DWR, SAFECA, USACE, and others.

Cost Estimate: Estimated cost varies by nature and extent of each project.

Benefits (Losses Avoided): Proactive levee integrity management is to reduce risk to people in the communities, property, and environmental resources from a possible levee failure or other flood events.

Potential Funding: CA DWR grants, County, Reclamation Districts, FEMA, 2021 HMA Grants (BRIC and FMA), and others

Timeline: 2021 and ongoing, subject to funding, planning, permitting, and construction windows.

Project Priority (H, M, L): High