

Delta Annex Chapter 7 Reclamation District 554

7.1 Introduction

This chapter to the Delta Annex details the hazard mitigation planning elements specific to Reclamation District 554 (RD 554), a new participating jurisdiction to the Sacramento County Local Hazard Mitigation Plan (LHMP) Update. This chapter of the Delta Annex is not intended to be a standalone document, but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the RD 554. This chapter of the Delta Annex provides additional information specific to RD 554, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this District.

7.2 Planning Process

As described above, the District followed the planning process detailed in Section 554 of the Base Plan. In addition to providing representation on the Sacramento County Hazard Mitigation Planning Committee (HMPC), RD 554 formulated its own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table 7-1. Additional details on plan participation and RD 554 representatives are included in Appendix A.

Table 7-1 RD 554 Planning Team

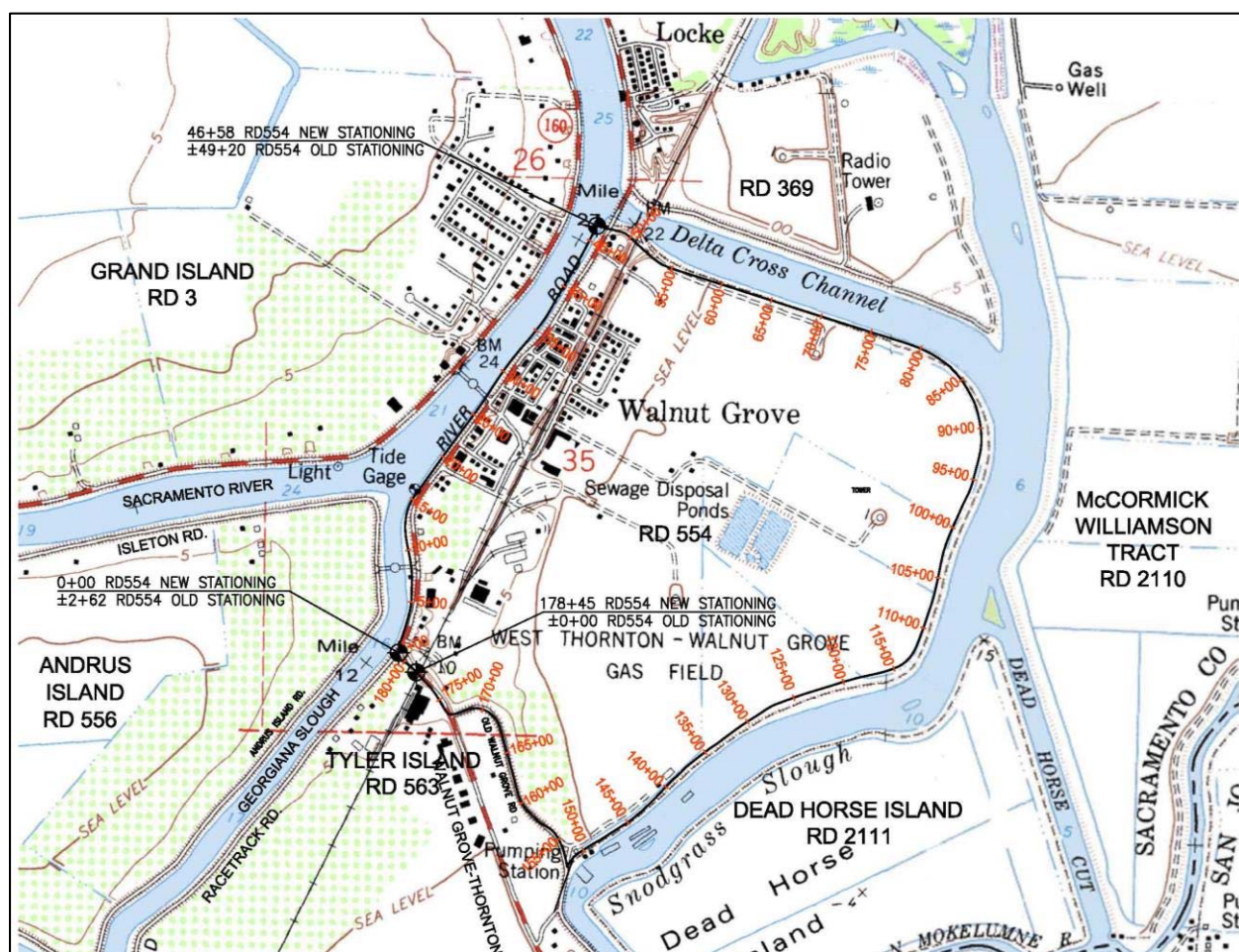
Name	Position/Title	How Participated
Emily Pappalardo	Project Manager	Attended meetings, collected data, drafted text, reviewed draft docs
Gilbert Labrie	District Engineer	Collected data, reviewed draft docs

Source: RD 554

7.3 Community Profile

The community profile for RD 554 is detailed in the following sections. Figure 7-1 displays a map and the location of RD 554 boundaries within Sacramento County.

Figure 7-1 Reclamation District 554 Map



Source: RD 554

7.3.1. RD 554 Overview, Background, and History

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.

7.4 Hazard Identification

RD 554’s planning team identified the hazards that affect the District and summarized their geographic extent, probability of future occurrences, potential magnitude/severity, and significance specific to RD 554 (see Table 7-2).

Table 7-2 RD 554—Hazard Identification

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/Severity	Significance
Agricultural Hazards	Significant	Occasional	Critical	Low
Bird Strike	Limited	Unlikely	Negligible	Low
Climate Change	Limited	Occasional	Negligible	Low
Dam Failure	Extensive	Unlikely	Catastrophic	Medium
Drought and Water Shortage	Significant	Likely	Critical	Medium
Earthquake	Limited	Occasional	Limited	Low
Earthquake: Liquefaction	Significant	Occasional	Limited	Medium
Flood: 100/200/500-year	Extensive	Occasional	Catastrophic	High
Flood: Localized Stormwater Flooding	Significant	Highly Likely	Limited	High
Landslides	Limited	Unlikely	Limited	Low
Levee Failure	Significant	Occasional	Critical	High
River/Stream/Creek Bank Erosion	Significant	Highly Likely	Limited	Medium
Severe Weather: Extreme Temperatures – Cold/Freeze	Extensive	Likely	Limited	Low
Severe Weather: Extreme Temperatures – Heat	Extensive	Highly Likely	Limited	Low
Severe Weather: Fog	Extensive	Highly Likely	Limited	Medium
Severe Weather: Heavy Rains and Storms (Thunderstorms, Hail, and Lightning)	Extensive	Highly Likely	Critical	Medium
Severe Weather: Wind and Tornadoes	Extensive	Highly Likely	Limited	Medium
Subsidence	Limited	Occasional	Negligible	Low
Volcano	Limited	Unlikely	Negligible	Low
Wildfire:(Burn Area/Smoke)	Limited	Likely	Limited	Medium
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 5540 days; and/or multiple deaths Critical —25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability Limited —10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability Negligible —Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid		
Probability of Future Occurrences Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.		Significance Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact		

7.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile RD 554’s hazards and assess the District’s vulnerability separate from that of the Planning Area as a whole, which has already been assessed in Sections 4.2 and 4.554 Vulnerability Assessment in the main plan. The hazard profiles in the main plan discuss overall impacts to the Planning Area and describes the hazard problem description, hazard extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to RD 554 is included in this Annex. This vulnerability assessment analyzes the property, population, critical facilities, and other assets at risk to hazards ranked of medium or high significance specific to the District. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the main plan.

7.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section 7.5.3, includes a description as to how the hazard affects the RD 554 and information on past occurrences. The intent of this section is to provide jurisdictional specific information on hazards and further describe how the hazards and risks differ across the Planning Area.

7.5.2. Vulnerability Assessment

This section identifies RD 554’s assets at risk, including values at risk, critical facilities and infrastructure, economic assets, natural resources, historic and cultural resources, and growth and development trends.

Assets at Risk and Critical Facilities

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

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

Table 7-3 lists critical facilities and other District assets identified by the RD 554’s planning team as important to protect in the event of a disaster. RD 554’s physical assets, valued at over \$35 million, consist of the buildings and infrastructure to support the RD 554 operations.

Table 7-3 RD 554’s Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Address/ Coordinates	Replacement Value	Hazard Info
Levee	Infrastructure	n/a	\$30,000,000	
Cross-levee	Infrastructure	n/a	\$5,000,000	

Name of Asset	Facility Type	Address/ Coordinates	Replacement Value	Hazard Info
Pump Station	Infrastructure	38° 14' 12.86" 121° 29' 58.37"	\$500,000	
Pump Station	Infrastructure	38° 14' 05.14" 121° 30' 05.79"	\$500,000	

Source: RD 554

Natural Resources

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 7-2 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 7-4.

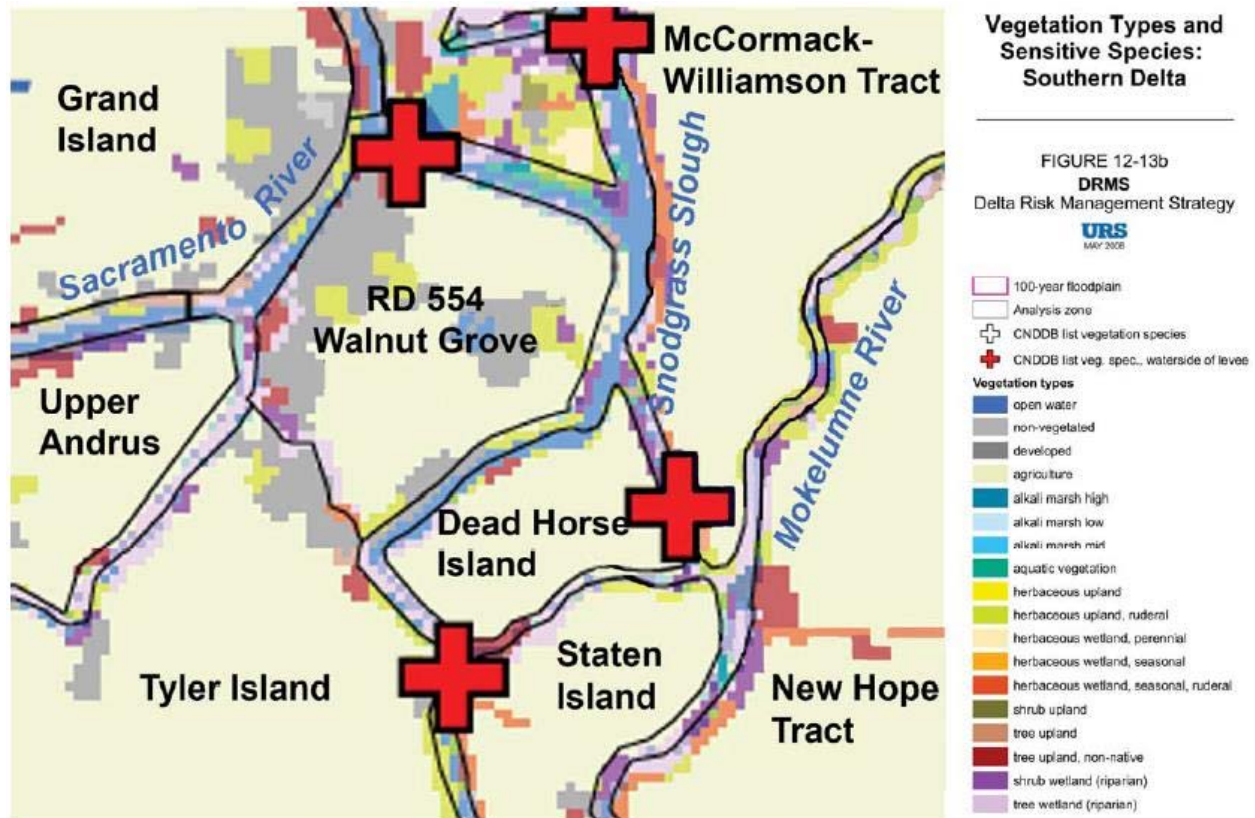
Table 7-4 RD 554 Vegetation Types

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 7-2 RD 554 Vegetation Types

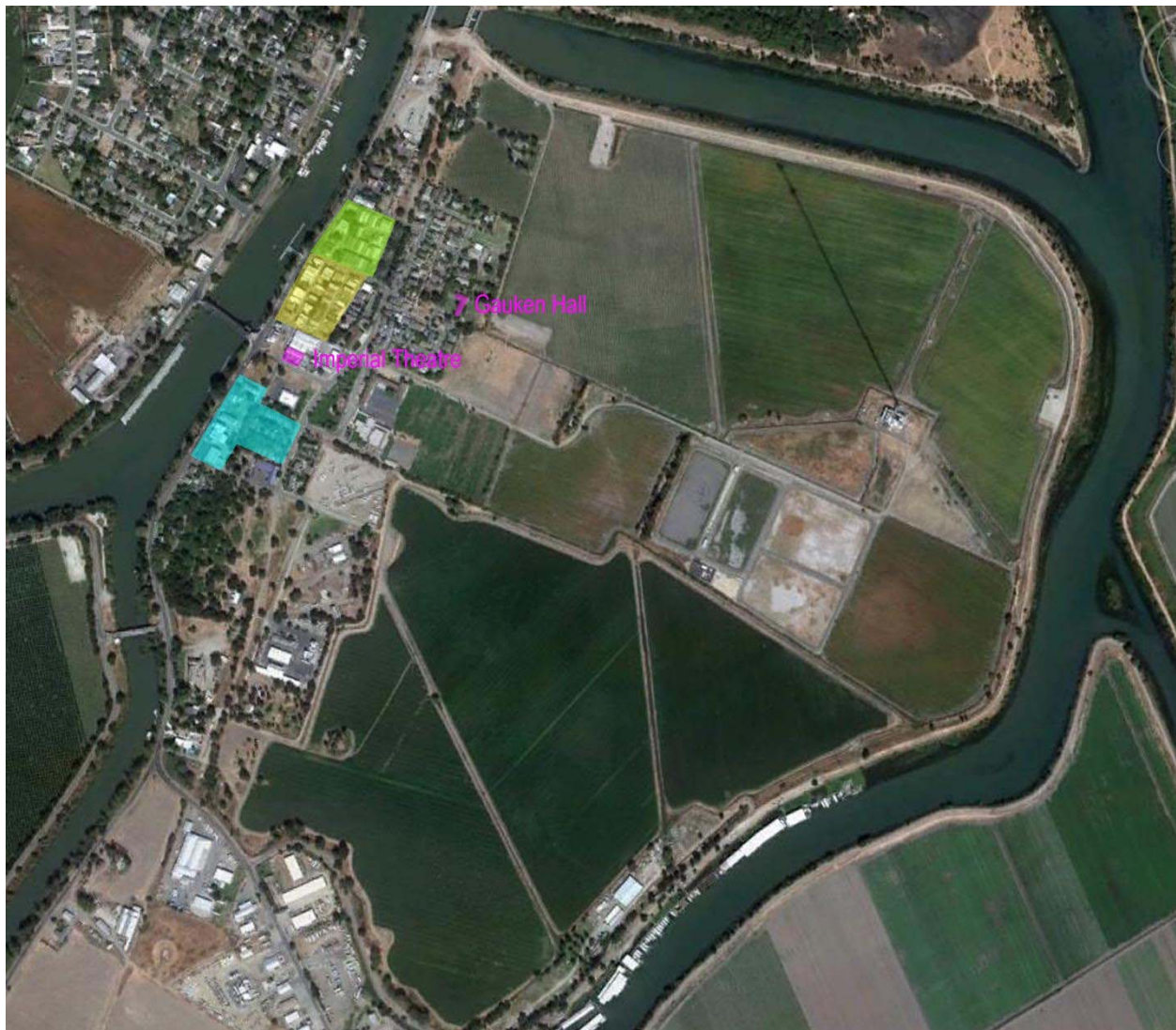


Source: RD 554 2012 5-Year Plan

Historic and Cultural Resources

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 nationally registered historical buildings, Guaken Hall, The Imperial Theatre, and the Jean Harvie Community Center. These are shown on Figure 7-3.

Figure 7-3 Historic Sites in Walnut Grove



- JAPANESE AMERICAN HISTORIC DISTRICT
- CHINESE AMERICAN HISTORIC DISTRICT
- COMMERCIAL/RESIDENTIAL HISTORIC DISTRICT
- HISTORICAL BUILDING

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. There are approximately 10 acres of land available for development. Provided 1 new home has been built in the last decade, any anticipated growth is expected to be slow and small in nature.

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 7-2 as high or medium significance hazards. Impacts of past events and vulnerability of the RD 554 to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Sacramento County Planning Area). Methodologies for calculating loss estimates are the similar to those described in Section 4.554 of the Base Plan and are based on data provided by the District as described further below. 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.

An estimate of the vulnerability of RD 554 to each identified priority hazard, in addition to the estimate of probability of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

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

Dam Failure

Likelihood of Future Occurrence—Unlikely

Vulnerability—Medium

Hazard Profile and Problem Description

While unlikely, it is possible that dam failure can create a high water situation in the adjacent channels that could put the levee system at risk of failure from overtopping, under seepage, through seepage or debris

impact. Given the distance from the dam system, a dam surge could dissipate prior to reaching this point in the Delta and result in a minor change in water elevation.

Past Occurrences

There are no past occurrences of dam failure.

Vulnerability to Dam Failure

Assets/Critical Facilities at Risk

The levees are at the highest risk to this hazard.

Natural Resources at Risk

Riparian habitats that border the channel can be lost due to erosive forces of high flows from dam failure.

Historic and Cultural Resources at Risk

Historic homes could be lost as a result of flooding due to dam failure.

Future Development

While future development may occur in the areas protected by levee that can be damaged during a dam failure, the District does not control this development. The District only can control whether the levees meet certification standards and the ongoing maintenance of these levees.

Drought and Water Shortage

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

This hazard could disrupt crop irrigation. Prolonged disruption could result in the loss of a crop that year. In the event that orchards or vineyards experience disruption in irrigation, they could be lost for multiple years until they are replanted and begin producing a crop between 3 to 5 years. Agriculture is the primary industry on the island. Agricultural users pay assessments for levee maintenance and improvements. While there is some population on the island their assessment fees are low, but if agriculture is lost the District will not be able to cover levee maintenance or make any necessary improvements.

The residents and businesses could be impacted by drought but it is unlikely due to senior water rights and a prioritization system that puts municipal water at a higher priority than agriculture.

Past Occurrences

Although California did recently experience an extended drought, agriculture in this District remained largely unaffected due to senior water rights and riparian water rights. Some farmers voluntarily cut water use by 25% in the Delta in response to the drought in the Summer of 2015.

Vulnerability to Drought and Water Shortage

Assets/Critical Facilities at Risk

None.

Natural Resources at Risk

None.

Historic and Cultural Resources at Risk

None.

Future Development

Future development in the District should not be affected by drought conditions.

Earthquake: Liquefaction

Likelihood of Future Occurrence—Occasional

Vulnerability—Medium

Hazard Profile and Problem Description

In the event an earthquake is intense enough to result in shaking that could cause the sandy soils to liquefy, the levees could resettle, move off their foundations and possibly fail. Failure could compromise the levee system and result in flooding.

Liquefaction at the base of historic buildings and residences can compromise the structures and possibly result in significant damage.

Past Occurrences

None.

Vulnerability to Liquefaction

Assets/Critical Facilities at Risk

The District levees and unreinforced historic buildings are the most at risk from this hazard.

Natural Resources at Risk

Riparian habitats that border the channel can be lost due to a destabilization of the bank from liquefaction. Liquefaction could also introduce substantial sediment into the waterway through the destabilization of soils. Sedimentation could impact sensitive aquatic species.

Historic and Cultural Resources at Risk

Historic homes could be lost as a result of compromised foundations from soil liquefaction.

Future Development

While future development may occur in the areas protected by levees, which can be comprised by earthquakes and liquefaction, the District does not control this development. The District only can control whether the levees meet certification standards and the ongoing maintenance of these levees.

Flood: 100/200/500-year

Likelihood of Future Occurrence—Occasional

Vulnerability—High

Hazard Profile and Problem Description

A 100/200/500-year 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.

Past Occurrences

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.

Vulnerability to Flood: 100/200/500-year

Assets/Critical Facilities at Risk

The levee system and pumping stations are vulnerable to a 100/200/500-year flood. As the flows could exceed the capacity of both the levee system and the pumping station that is needed to drain the island.

Natural Resources at Risk

Riparian habitats that border the channel can be lost due to erosive forces of high flows from 100/200/500-year flows.

Historic and Cultural Resources at Risk

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 three nationally registered historical buildings, Gauken Hall, Imperial Theater and Jean Harvie Community Center. 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 the structures and they could be lost.

Future Development

While future development may occur in the areas protected by levees, which if compromised could cause severe flooding, the District does not control this development. The District only can control whether the levees meet certification standards and the ongoing maintenance of these levees.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence—Highly Likely

Vulnerability—High

Hazard Profile and Problem Description

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.

Past Occurrences

Localized stormwater flooding rarely occurs due to the higher elevation of the island. The most likely time this could have occurred in the past was during the wet year in 2006.

Vulnerability to Flood: Localized Stormwater Flooding

Assets/Critical Facilities 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.

Natural Resources at Risk

None

Historic and Cultural Resources at Risk

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 three nationally registered historical buildings, Gauken Hall, Imperial Theater and

Jean Harvie Community Center. There are also historic homes that are over 100 years old. Localized flooding could occur if the capacity of the District's pumping facility is exceeded. Flooding could cause irreparable damage to the structures and they could be lost.

Future Development

While future development may occur in the areas protected by levees, which if compromised could cause localized flooding, the District does not control this development. The District only can control whether the levees meet certification standards and the ongoing maintenance of these levees.

Levee Failure

Likelihood of Future Occurrence—Occasional

Vulnerability—High

Hazard Profile and Problem Description

Levee failure could result in inundation of the District and could also result in the flooding of lower Tyler Island.

Past Occurrences

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 insure 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.

Vulnerability to Levee Failure

The 2012 5-Year Plan addressed levee repair costs due to failure. To repair a levee breach and pump out the island the average cost has been estimated to be approximately \$25 million. But the total truly depends on access, the size and severity of the breach, volume of water to be pumped out, weather conditions, etc. The \$25 million figure assumes costs for \$5/yd³ of on-island replacement fill, 15/yd³ of off-island fill, 6% per linear foot of engineering costs, and \$5/foot for rip rap. The Jones Tract failure in 2004 is the most recent levee failure to provide insight into determining what a levee breach could cost today. It has been publicized that the 500-foot levee breach cost approximately \$90 million for the repair, recovery, and associated damage. Many knowledgeable locals consider that figure inflated by as much as a factor of two.

Not only would a breach inundate RD 554, it would 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 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 the 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. Even west side residents and business would be affected because the sewer service may have to be curtailed.
- **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 clean up 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.

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 was 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. Walnut Grove's surface streets could be inundated affecting the area on a local level by removing access to the town's businesses and services. 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 figure includes 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.

Assets/Critical Facilities 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.

Natural Resources at Risk

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.

Historic and Cultural Resources at Risk

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 three nationally registered historical buildings, Gauken Hall, Imperial Theater and Jean Harvie Community Center. There are also historic homes that are over 100 years old. A levee failure could inundate these districts and historic places. 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 the structures and they could be lost.

Future Development

While future development may occur in the areas protected by levee, the District does not control this development. The District only can control whether the levees meet certification standards and the ongoing maintenance of these levees.

River/Stream/Creek Bank Erosion

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile and Problem Description

River/Stream/Creek bank erosion could destabilize the levee slope and, if left unaddressed, cause levee failure through undercutting.

Past Occurrences

Bank erosion is currently occurring on the District levee but is minor and is a low priority for District repairs.

Vulnerability to Erosion

Assets/Critical Facilities at Risk

The District's levees are at risk of erosion.

Natural Resources at Risk

Riparian benches exist along the District's levee and are at risk of being lost due to bank erosion.

Historic and Cultural Resources at Risk

None.

Future Development

While future development may occur in the areas protected by levees, which can be compromised by severe erosion issues the District does not control this development. The District only can control whether the levees meet certification standards and the ongoing maintenance of these levees.

Severe Weather: Fog

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile and Problem Description

Fog can make it difficult to perform levee inspections during high water due to lack of visibility. It can also impact commuters that use the county road within this district. Many businesses front this road which creates slow car traffic and high pedestrian traffic. Low visibility can prove to be dangerous in high traffic areas.

Past Occurrences

Fog occurs annually.

Vulnerability to Fog

Assets/Critical Facilities at Risk

The levees are at risk due to the inability to perform inspections.

Natural Resources at Risk

None.

Historic and Cultural Resources at Risk

None.

Future Development

While future development may occur in the areas protected by levees, which could be a concern if compromised during extreme erosion events, the District does not control this development. The District only can control whether the levees meet certification standards and the ongoing maintenance of these levees.

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

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Medium

Hazard Profile and Problem Description

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.

Past Occurrences

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.

Vulnerability to Heavy Rain and Storms

Assets/Critical Facilities at Risk

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

Natural Resources at Risk

Riparian vegetation could be lost from high flows as a result of heavy rains and large storms.

Historic and Cultural Resources at Risk

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

Future Development

While future development may occur in the areas protected by levee, which can be compromised during severe weather events, the District does not control this development. The District only can control whether the levees meet certification standards and the ongoing maintenance of these levees.

Severe Weather: Wind and Tornadoes

Likelihood of Future Occurrence—Highly Likely

Vulnerability—Medium

Hazard Profile and Problem Description

In the event of high water, wind can create wave action that could cause erosion at the waterside bank of the District's levees.

Past Occurrences

Wind occurs on a regular basis. The hazard comes when high winds are coupled with high water, which happened in the winter of 2006. There was negligible impact from this event.

Vulnerability to Wind and Tornadoes

Assets/Critical Facilities at Risk

The District's levees are at risk.

Natural Resources at Risk

None.

Historic and Cultural Resources at Risk

Wind could cause trees to fall and create flying debris that could damage historic structures.

Future Development

While future development may occur in the areas protected by levee, the District does not control this development. The District only can control whether the levees meet certification standards and the ongoing maintenance of these levees.

Wildfire

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

A wildfire could destroy private property and other such structures on the island.

Past Occurrences

None. A fire did cause part of a marina and 14 boats to burn down January 2015.

Vulnerability to Wildfire

Assets/Critical Facilities at Risk

The District's pumping station could be damaged in a fire. Furthermore the vegetation on the District levees could be burned leaving bare soil that could be subject to erosion.

Natural Resources at Risk

Riparian and shrub scrub vegetation could be lost in a wildfire.

Historic and Cultural Resources at Risk

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 three nationally registered historical buildings, Gauken Hall, Imperial Theater and Jean Harvie Community Center. There are also historic homes that are over 100 years old. A wildfire on this island would devastate these districts and historic buildings if they become substantially burned.

Future Development

Future development should not be affected by the wildfire hazard.

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 7-5 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the RD 554.

Table 7-5 RD 554's Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan	N	
Capital Improvements Plan	N	
Economic Development Plan	N	
Local Emergency Operations Plan	Y	The plan addresses flooding hazards and can be used to implement mitigation actions
Continuity of Operations Plan	Y	
Transportation Plan	N	
Stormwater Management Plan/Program	N	
Engineering Studies for Streams	N	
Community Wildfire Protection Plan	N	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)		N

Building Code, Permitting, and Inspections	Y/N	Are codes adequately enforced?
Building Code	Y	Version/Year: CBC 2013
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score:
Fire department ISO rating:	N	Rating:
Site plan review requirements	N	
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
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 in Zone X
Elevation Certificates	Y	
Acquisition of land for open space and public recreation uses	N	
Erosion or sediment control program	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		

Source: RD 554

7.6.2. Administrative/Technical Mitigation Capabilities

Table 7-6 identifies the department(s) responsible for activities related to mitigation and loss prevention for RD 554.

Table 7-6 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	Annual vegetation management.
Mutual aid agreements	N	
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	Y	Determined via the Emergency Operations Plan
Emergency Manager	Y	Determined via the Emergency Operations Plan
Community Planner	N	
Civil Engineer	Y, FT	Staff is trained to coordinate with agencies and perform tasks in an emergency situation
GIS Coordinator	N	
Other	N	
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	Fire Station siren in Walnut Grove, phone tree, Reverse 911
Hazard data and information	Y	
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. Also needs to have a plan in place to determine an Emergency Manager to coordinate Emergency Response activities.		

Source: RD 554

7.6.3. Fiscal Mitigation Capabilities

Table 7-7 identifies financial tools or resources that the RD 554 could potentially use to help fund mitigation activities.

Table 7-7 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 ability to raise assessments through a vote
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		unknown
Storm water utility fee	Y	Assessments are developed for drainage
Incur debt through general obligation bonds and/or special tax bonds	N	

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?
Incur debt through private activities	Y	Bonds are obtained from the Bank of Rio Vista
Community Development Block Grant	N	
Other federal funding programs	N	
State funding programs	Y	Delta Levee Subventions Program and Delta Levee Special Projects, Proposition 84 and 1E
Other	N	
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.		

Source: RD 554

7.6.4. Mitigation Education, Outreach, and Partnerships

Table 7-8 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table 7-8 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
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
Natural disaster or safety related school programs	N	
StormReady certification	N	
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		

7.6.5. Other Mitigation Efforts

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. Once problematic areas are identified the District will perform repair projects to improve the levee system and reduce risk.

7.7 Mitigation Strategy

7.7.1. Mitigation Goals and Objectives

RD 554 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 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.

Action 1. Apply for a Letter of Map Revision (LOMR) to bring the District back into Zone X.

Hazards Addressed: Levee Failure, Earthquake: Liquefaction, River Bank Erosion, Flood 100/200/500-year, Severe Weather: Heavy Rains, Severe Weather: Wind

Goals Addressed: 1, 2, 3, 4

Issue/Background: The District is aiming to prove their levee system meets FEMA 100-year certification standards so that the District may be put back into a Zone X designation. The District applied for a Provisional Accredited Levee (PAL), but it took longer than anticipated for the District to provide the necessary information due to budgetary restrictions.

Project Description: District will apply for a Letter of Map Revision (LOMR) to re-certify that the levee system will protect against a 100-year flood event, Zone X.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office/Partners: Reclamation District Board of Trustees and District Engineer Gilbert Labrie

Project Priority: High

Cost Estimate: \$50,000

Benefits (Losses Avoided): Reduce in flood risk from levee failure, bank erosion, 100/200/500 year flood and heavy rains.

Potential Funding: District assessments and Delta Levees Subventions Program

Timeline: Fall 2018

Action 2. Fill Abandoned Slough

Hazards Addressed: Levee Failure, Earthquake: Liquefaction, River Bank Erosion, Flood 100/200/500-year, Severe Weather: Heavy Rains, Severe Weather: Wind

Goals Addressed: 1, 2, 3, 4

Issue/Background: An old slough that long ago was cut off from its source is creating a deficient area adjacent to the island cross levee due to its depth and steep slopes.

Project Description: Vegetation in the slough will be removed and the slough will be filled with imported fill to match the existing land level within the district.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office/Partners: Reclamation District Board of Trustees and District Engineer Gilbert Labrie

Project Priority: High

Cost Estimate: \$200,000

Benefits (Losses Avoided): Reduce in flood risk from levee failure, bank erosion, 100/200/500 year flood and heavy rains.

Potential Funding: District assessments and Delta Levees Subventions Program

Timeline: Fall 2018

Action 3. Geotechnical Investigation

Hazards Addressed: Levee Failure, Earthquake: Liquefaction, River Bank Erosion, Flood 100/200/500-year, Severe Weather: Heavy Rains, Severe Weather: Wind

Goals Addressed: 1, 2, 3, 4

Issue/Background: The District is aiming to prove their levee system meets FEMA 100-year certification standards so that the District may be put back into a Zone X designation. A geotechnical investigation is necessary information needed for levee evaluation.

Project Description: CPT tests will be done along certain areas where there are data gaps. From there a geotechnical study will be performed to determine if there are any repairs that need to be made to increase levee stability to meet FEMA requirements.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office/Partners: Reclamation District Board of Trustees and District Engineer Gilbert Labrie

Project Priority: High

Cost Estimate: \$30,000

Benefits (Losses Avoided): Aides in providing information for projects that will reduce in flood risk from levee failure, bank erosion, 100/200/500 year flood and heavy rains.

Potential Funding: District assessments and Delta Levees Subventions Program

Timeline: Fall 2016

Action 4. Snodgrass Slough Levee Improvements

Hazards Addressed: Levee Failure, Earthquake: Liquefaction, River Bank Erosion, Flood 100/200/500-year, Severe Weather: Heavy Rains, Severe Weather: Wind

Goals Addressed: 1, 2, 3, 4

Issue/Background: The District is aiming to prove their levee system meets FEMA 100-year certification standards so that the District may be put back into a Zone X designation. Improvements on the landside slopes of Snodgrass Slough are needed to meet FEMA criteria based on geotechnical studies.

Project Description: Based on findings in the geotechnical studies, landside slope improvements will be performed to accommodate FEMA criteria for 100-year level flood protection.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: None

Responsible Office/Partners: Reclamation District Board of Trustees and District Engineer Gilbert Labrie

Project Priority: High

Cost Estimate: Dependent on geotechnical studies, estimated \$500,000

Benefits (Losses Avoided): Aides in providing information for projects that will reduce in flood risk from levee failure, bank erosion, 100/200/500 year flood and heavy rains.

Potential Funding: District assessments and Delta Levees Subventions Program

Timeline: Summer 2017