



Annex F RD 108

F.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Reclamation District 108 (RD 108 or District), a previously participating jurisdiction to the 2018 Colusa 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 108, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this District.

F.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 Colusa 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 F-1. Additional details on Plan participation and District representatives are included in Appendix A.

Table F-1 RD 108 – Planning Team

Name	Position/Title	How Participated
Meegan Nagy	Deputy Manager	Coordination of planning project internal to District, Plan development, review and implementation, Internal Planning Team
Elizabeth Ramos	Assistant District Engineer	Plan development, review and implementation, Internal Planning Team
Jordon Navarro	Superintendent	Plan development, review and implementation, Internal Planning Team

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 2018 LHMP into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2018 LHMP through other plans and programs shown in Table F-2.

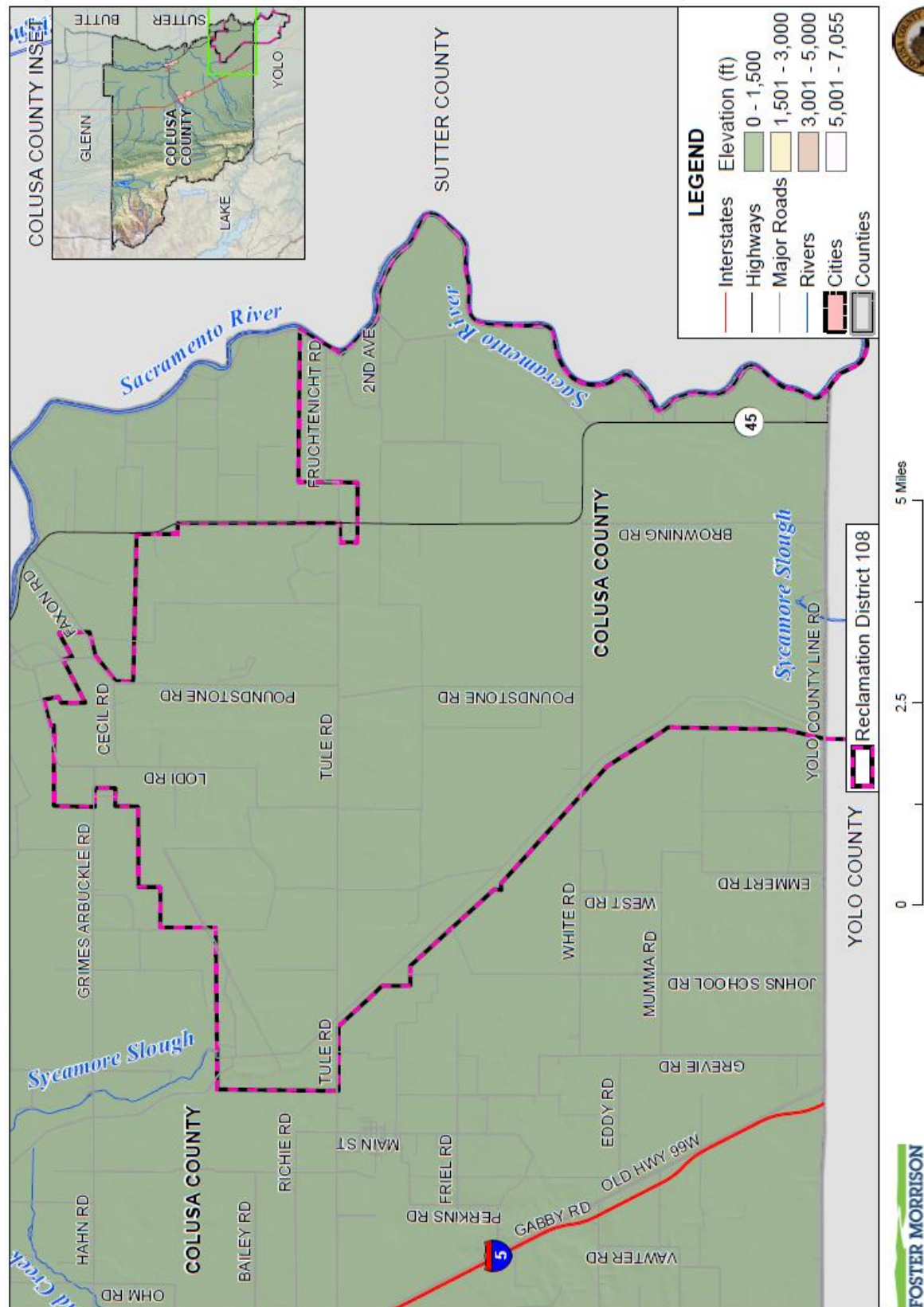
Table F-2 2018 LHMP Incorporation

Planning Mechanism 2018 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
2023 Emergency Operations Plan	Multiple hazard sections inform the EOP.

F.3 District Profile

The District profile for the RD 108 is detailed in the following sections. Figure F-1 displays a map and the location of the District within Colusa County.

Figure F-1 RD 108



Data Source: Colusa County GIS, Cal-Atlas, Map Date: 3/20/2024.

F.3.1. Overview and Background

Reclamation District (RD) 108 is located along the western edge of the Sacramento River and delivers water to nearly 48,000 acres of farmland within southern Colusa County and northern Yolo County. RD 108 receives water from the Sacramento River under riparian water rights, licenses for appropriation of surface water, and a Settlement Contract with the US Bureau of Reclamation. The first irrigated crops were grains, mostly barley but today include rice, wheat, corn, safflower, tomatoes, beans, vine seeds, cotton, walnuts, and fruit.

The District was formed in 1870 under the Reclamation District Law of 1868 for the purpose of forming a district to build levees and “reclaim” land subject to periodic overflow from neighboring rivers and water bodies. At this time the Government was promoting reclamation to develop swamp lands for the improvement and cultivation of the thousands of acres in California. On October 4, 1870, the landowners submitted a petition to the Colusa and Yolo County Boards of Supervisors authorizing the formation of a new Reclamation District and assigned it the number 108.

RD 108 is surrounded on three sides by levees, that include the west-side levees from Colusa to Knights Landing along the Sacramento River, a Back Levee along the District’s western boundary to prevent flooding from the Colusa Basin, and then along the slough in the South that at one time took drainage water from the Colusa Basin back to the Sacramento River. The District works in coordination with the Sacramento River West Side Levee District and the Knights Landing Ridge Drainage District to provide maintenance to over 90 miles of levees. All of the levees were originally built by the local landowners using whatever materials available and whatever criteria they chose but have since become part of the federally sponsored Sacramento River Flood Control Project. The levees protect the rural communities in Yolo and Colusa Counties. These levees are integral to the system-wide performance of the Sacramento River Flood Control Project and provide indirect protection to the cities of Sacramento and West Sacramento. Since formation of the levee districts, Sacramento River West Side Levee District and Knights Landing Ridge Drainage District have shared management, personnel, and equipment with RD 108. The flood control districts reimburse RD 108 for management and work performed.

In addition to maintaining flood control infrastructure, the District manages drainage and the delivery of water to nearly 48,000 acres of farmland within southern Colusa County and northern Yolo County.

F.4 Risk Assessment

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. “It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.”

The RD 108 risk assessment identifies and profiles relevant hazards and assesses the exposure of lives, property, infrastructure, and the environment to these hazards. The process allows for a better understanding of the District’s potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

Building on the Overview and Background above, a risk assessment was performed for the District. This includes the following sections:

- F.4.1 District Assets Inventory and Growth and Development Trends
- F.4.2 Hazard Identification
- F.4.3 Hazard Profiles and Vulnerability to Specific Hazards

F.4.1. District Assets Inventory and Growth and Development Trends

This section provides an inventory of the District’s total assets potentially at risk to hazards and an overview of growth and development trends. This section is broken into two parts:

- **Asset Inventory** – The assets inventory identifies the District’s total assets, including the people and populations; structures; critical facilities and infrastructure; community lifelines; natural, historic, and cultural resources; and economic assets and community activities of value. This data is not hazard specific, but is representative of total assets within the District, potentially at risk to identified hazards as discussed in Section F.4.3 Hazard Profiles and Vulnerability to Specific Hazards.
- **Growth and Development Trends** – A discussion of growth and development trends in the District, both current and future, is presented.

Assets Inventory

The District’s asset inventory is detailed in the following sections:

- People and Populations (Populations Served)
- Structures
- Critical Facilities and Infrastructure
- Community Lifelines
- Natural, Historic, and Cultural Resources
- Economic Assets and Community Activities of Value

A discussion of each of these assets follows and serves as the template for the asset discussion for each hazard in Section F.4.3.

People and Populations

The most important asset within any community are the people and populations that reside in the District. The District provides services to 480 to 500 people. The District currently employs approximately 30 staff members.

Special Populations and Disadvantaged Communities

The District noted that there are no special populations or disadvantaged communities that could be adversely affected by hazard events impacting district facilities or operations.

Structures and Critical Facilities

This section considers RD 108's assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan as:

Any facility, 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.

Table F-3 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. RD 108's physical assets, valued at over \$220 million, consist of the buildings and infrastructure to support the District's operations.

Table F-3 RD 108 Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
RD 108 Headquarters	Office/Shops	N/A	Flooding, Localized Flood, Levee Failure
Colusa Basin Drain Levee	Levee	\$220,000,000	Flooding, Localized Flood, Levee Failure
Pump Stations	Pump Stations	N/A	Flooding, Localized Flood, Levee Failure
Tract 6	Cropland	N/A	Flooding, Localized Flood, Levee Failure
Total		\$220,000,000	

Source: RD 108

Community Lifelines

Assessing the vulnerability of the District to natural hazards and disasters also involves reviewing and inventorying the community lifelines in place that could be affected. It is important to include these items in hazard discussions as the continuous operation of critical government and business functions is essential to human health and safety, property protection, and economic security. The importance of community lifelines is discussed below:

- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.
- FEMA has developed a construct for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.
- The integrated network of assets, services, and capabilities that provide lifeline services are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function.

- When disrupted, decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to stabilize the incident.

Community lifelines, as defined by FEMA, include the following:

- **Safety and Security** – Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety
- **Food, Hydration, Shelter** – Food, Water, Shelter, Agriculture
- **Health and Medical** – Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management
- **Energy** – Power Grid, Fuel
- **Communications** – Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch
- **Transportation** – Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime
- **Hazardous Material** – Facilities, HAZMAT, Pollutants, Contaminants
- **Water Systems** – Potable Water Infrastructure, Wastewater Management

It should be noted that these community lifelines are all in place and functional as part of regular government operations in the District as a partnership between the District, local cities, and Colusa County. Due to its rural nature, there is an interplay in community lifelines between all jurisdictions in the County. In fact, most of the District’s community lifelines overlap the County’s. It should also be noted that these lifelines collectively include many of the critical facilities and infrastructure assets inventoried for this LHMP. Due to this fact, specific information on these community lifelines in the District and how they may be affected by a hazard event or disaster are discussed in each hazard section; however, many of these sections refer back to the detailed lists that are captured in the Section 4.2.1 of the Base Plan.

Natural, Historic, and Cultural Resources

Assessing the vulnerability of the District to natural hazards and disasters also involves inventorying the natural, historic, and cultural assets of the area. This step is important for the following reasons:

- Environmental and natural resources add to a community’s identity and quality of life. They also help the local economy through agriculture, tourism and recreation. They support ecosystem services, such as clean air and water.
- Conserving the environment may help people mitigate risk. It can also protect sensitive habitats, develop parks and trails, and build the economy.
- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

RD 108 has a variety of natural resources of value to the District. These natural resources parallel that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Historic and Cultural Resources

RD 108 has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallel that of Colusa County as a whole. Information can be found in Section 4.2.1 of the Base Plan.

Economic Assets and Community Activities of Value

Assessing the vulnerability of the RD 108 to natural hazards and disasters also involves inventorying the economic assets and community activities of value in the District.

Economic Assets

After a disaster, economic resiliency is one of the major drivers of a speedy recovery. Each community has specific economic drivers. Economic assets for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Community Activities of Value

Inventorying economic assets in the District and their vulnerability to natural hazards and disasters also involves inventorying activities that have value to the community. This includes activities that are important to a community, like long-standing traditions such as a festival or fair. Community Activities of Value for the County were discussed in Section 4.2.1 of the Base Plan and are assumed to be the same or similar for the District.

Growth and Development Trends

As part of the planning process, the District looked at changes in growth and development, both current and future, and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability over time.

Population Trends and Projections

The District follows and parallels the County projections for population; however, new growth is not expected during the planning period.

Development since 2018 Plan

The District noted that there has been no development since the 2018 LHMP.

Future Development Areas

It is important to review future development plans for the District. Future development should be sited in areas that are away from known hazard risks. If this is not possible, mitigation should be done to ensure that future development is protected against future hazards. The District has no control over future development in areas protected by District levees. Future development in these areas parallels that of the County as a whole, the District does not expect any future development in the upcoming planning period.

F.4.2. Hazard Identification

RD 108 identified the hazards that affect the District and summarized their location, extent, likelihood of future occurrence, potential magnitude, and significance specific to the District (see Table F-4).

Table F-4 RD 108—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude / Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Invasive Species (Pests and Weeds)	–	–	–	–	–
Climate Change	Extensive	Highly Likely	Critical	Low	–
Dam Failure	Extensive	Occasional	Catastrophic	Low	Medium
Drought & Water shortage	Extensive	Likely	Critical	Low	High
Earthquake	Limited	Occasional/Unlikely	Limited	Low	Low
Floods: 1%/0.5%/0.2% annual chance	Extensive	Occasional/Unlikely	Catastrophic	High	High
Floods: Localized Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, and Debris Flow	–	–	–	–	–
Levee Failure	Extensive	Likely	Catastrophic	High	Medium
Severe Weather: Extreme Cold and Freeze	Limited	Unlikely	Negligible	Low	Low
Severe Weather: Extreme Heat	–	–	–	–	–
Severe Weather: Heavy Rain and Storms (Wind, Hail, Lightning)	–	–	–	–	–
Severe Weather: High Winds and Tornadoes	–	–	–	–	–
Stream Bank Erosion	Extensive	Highly Likely	Limited	Low	Medium
Subsidence	Limited	Occasional	Limited	Low	Medium
Wildfire	Limited	Occasional	Limited	Low	Low
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					

F.4.3. Hazard Profiles and Vulnerability to Specific Hazards

This section includes the hazard profiles and vulnerability assessment for hazards ranked of medium or high significance specific to the District (as identified in the Significance column of Table F-4) and also includes a hazard profile and vulnerability assessment to the four primary hazards to the State of California: dam failure, earthquake, flood, and wildfire, regardless of the significance ranking by the District. Chapter 4 of the Base Plan provides more detailed information about these hazards and their impacts on the Colusa County Planning Area. Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.2 of the Base Plan.

Hazard Profiles and Vulnerability Assessment Format

Each hazard is profiled in the following format:

- **Hazard Profile**— A hazard profile is included for each hazard. This includes information on:
 - ✓ A general discussion of the hazard and related issues.
 - ✓ **Location and Extent** - Location is the geographic area within the District that is affected by the hazard. Extent is the expected range of intensity for each hazard. These are discussed in specific detail for mapped hazards, and in more general detail for those hazards that do not have discrete mapped hazard areas.
 - ✓ **Past Occurrences** – Past occurrences are discussed for each hazard. NCEM events are also discussed. A discussion of disaster declarations is included in each hazard section. Other past occurrence data specific to the District follows the disaster declarations for each hazard.
 - ✓ **Climate Change**—This section contains the effects of climate change (as applicable). The possible influence of climate change on the hazard is discussed.

After the hazard profile, a vulnerability assessment is presented. As part of the vulnerability assessment, an estimate of the vulnerability of the District to each identified hazard, in addition to the estimate of risk 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.

After this classification, a general discussion of hazard vulnerabilities occurs. This is done in the following format:

- **Local Concerns** – This includes District provided information on how the District is uniquely affected by or vulnerable to each hazard.
- **Assets at Risk** – A discussion of the assets at risk follows, presented in the same format as in Section F.4.1 above. This includes sections on: People and Populations Served; Structures and Critical Facilities, Community Lifelines; Natural, Historic, and Cultural Resources; and Economic Assets and Community Activities of Value. These are discussed in specific terms for mapped hazards, and in more general terms for those hazards that are unmapped.
- **Impacts** – A discussion on hazard impacts follows. Impacts describe how each hazard can affect the District and its assets. The type and severity of impacts reflect both the potential magnitude of the hazard and the vulnerability of the asset. Impacts are also affected by the community’s ability to mitigate, prepare for, respond to, and recover from an event.
- **Future Conditions/Development** – A discussion of how future development will be affected by the hazard is also included.

Power Interruption/Power Failure: A Common Vulnerability of all Hazards

An impact of almost all hazards evaluated as part of this LHMP Update relates to power shortage 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 U.S. 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 of the Base Plan.

Public Safety Power Shutoff (PSPS)

A new intentional disruption type of power shortage/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 (fire) weather. To help protect customers and communities during extreme fire weather events, electric power may be shut off for public safety in an effort to prevent wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3 of the Base Plan.

In addition to PSPSs, to help prevent wildfires, electric utilities have begun to evolve safety efforts. This includes installing safety settings on powerlines in and around high fire-risk areas. These are known as Enhanced Powerline Safety Settings (EPSS), and they help prevent falling tree branches, animals and other hazards from starting a wildfire. By stopping ignitions, it helps prevent wildfires from starting and spreading. According to PG&E, if ignitions occur, the size of fires are much smaller due to EPSS. In 2022, there was a 99% decrease in acres impacted by ignitions (as measured by fire size from electric distribution equipment (compared to the 2018-2020 average). This decrease occurred despite dry conditions.

Local Concerns

The District noted that there is concern about a PSPS event. Pump stations that require electricity to function would be impacted during an extended period without power. There is potential for flooding due to internal drainage issues that these stations may experience.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence—Occasional/Unlikely

Vulnerability—High

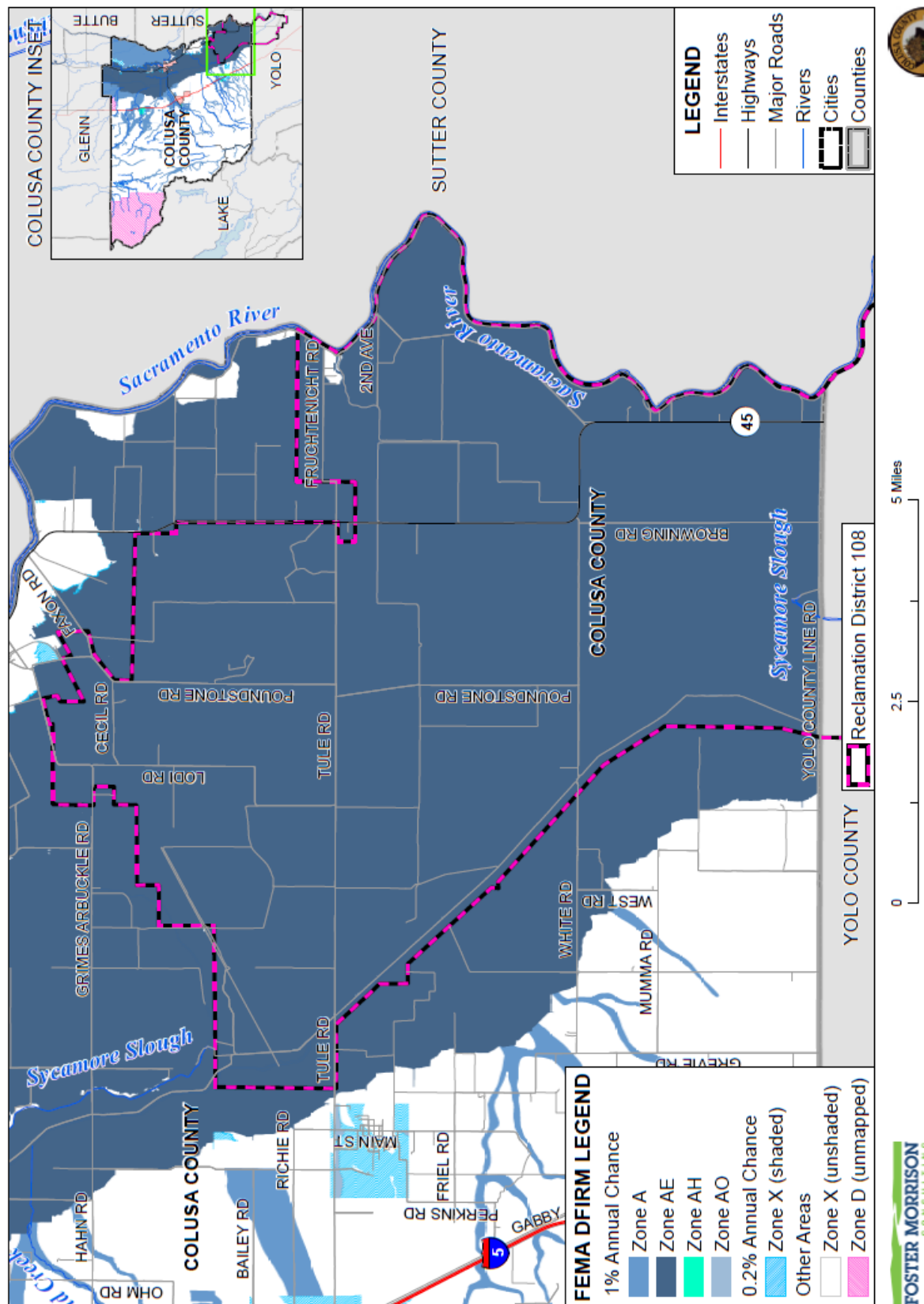
Hazard Profile

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

Location and Extent

RD 108 has areas located in the 1% and 0.2% annual chance flood zones. This is seen in Figure F-2.

Figure F-2 RD 108 – FEMA DFIRM Flood Zones



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

Disaster Declaration History

A list of state and federal disaster declarations for Colusa County from flooding is shown on Table F-5. These events also likely affected the District to some degree.

Table F-5 Colusa County – State and Federal Disaster Declarations from Flood 1950-2024

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	17	1955, 1958, 1963 (twice), 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2017, 2019 (twice), 2023 (twice)	19	1950, 1955, 1958 (twice), 1963 (twice), 1973, 1978, 1983, 1986, 1995 (twice), 1997, 1998, 2005/2006, 2008, 2017, 2019 (twice)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Colusa County has seen 14 events. These events most likely had some impact on the District.

RD 108 Events

The District Planning Team noted that flood damages have occurred in 2023, 2019, 2017, 2011, 2006, 1998, 1997, 1986, and 1955. Typical damage includes wave wash and erosion, slope stability, and downed trees for each of these events. Information on recent events follows:

- **February 25-27, 2019** - a severe storm caused a long duration, high water event. The resulting event caused an estimated \$20,000,000 in damages and impacted back erosion, seepage, and slips caused by high winds. Various locations on the RD-108 levee and District wide were in the affected area. The District noted that an event like this is highly likely to occur again.
- **December 28, 2023, to February 9th, 2024** - a series of heavy rains and storms caused record breaking snowpack to form District wide and along various locations on RD-108 levees. This event caused high water to form along with power outages. Major property damage occurred due to bank erosion, seepage, two major slips, and emergency pumping that needed to transpire. The District noted that an event like this is highly likely to occur again.

Climate Change and Flood

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with flood. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

According to the CAS, climate change may affect flooding in California, and the Colusa County Planning Area, including the District. While average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is possible that average soil moisture and runoff could decline, however, due to increasing temperature, evapotranspiration rates, and spacing between rainfall events. Reduced snowpack and increased number of intense rainfall events are likely to put additional pressure on water infrastructure which could increase the chance of flooding associated with breaches or failures of flood control structures such as levees and dams. Cal Adapt future precipitation projections were shown in Section 4.3.4.

Vulnerability to Flood: 1% and 0.2% Annual Chance

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 damage. Predominantly, the effects of 1% and 0.2% chance flooding are generally confined to areas near the waterways of the District.

The whole of the District is at some measure of vulnerability to floods. An assessment of a community's vulnerability to flood begins with an understanding of local exposure to flood. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

The 2007 Colusa County General Plan also noted that flooding within the District's boundaries occur and can do so even during mild storms. Flooding and other issues caused by severe weather events, primarily heavy rains and thunderstorms, can often pose a risk to the District. Should the District levees fail as a result of large flood events, all of the area protected by RD 108 would be at risk causing impacts to property and posing life safety concerns. Additional impacts include dewatering of the levee protected areas, as well as erosion of leveed areas, and the rebuilding of the levees.

The 2023 RD 108 Emergency Operations Plan noted that flood waters at the southern end of the Colusa Basin Drain south of County Line Road can pool and back up toward the west and north in flood events and form a fetch of up to 5 miles in extent. Knights Landing Ridge Cut mouth is the only area of significance that potentially could be impacted. Maintenance Area 12 levee along levee miles 4, 5, and 6 is exposed to wave wash erosion due to lack of vegetation within Colusa Drain in that area. Heavier vegetation to the north of that stretch dampens waves. Flood waters pond and build toward east and north at north end of

Maintenance Area 12 levee reaching Wescott Road, an abandoned railroad embankment and Highway 20. Flood fighting these structures is necessary to prevent property loss and loss of use of Highway 20.

Assets at Risk

Assets at risk from flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

All people and populations located in the 1% and 0.2% annual chance floodplains are at some risk to flooding. Certain vulnerable populations located within areas prone to flooding may be at increased risk to this hazard, especially during a large event with minimal advance notice. These vulnerable populations include: the unsheltered, those with limited mobility, and those that lack the resources to leave the area.

District residents that live in the 1% and 0.2% annual chance floodplains are often the most vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events.

Structures and Critical Facilities

Certain structures in the District are at risk of DFIRM flooding and primarily include those structures located within the 1% and 0.2% annual chance floodplains. As shown in Table F-3, all District assets are at risk to this hazard.

Flooding presents a threat to both critical facilities and infrastructure, as well as community lifelines. Critical infrastructure plays an immensely important role in our communities. Communities rely on roads, rail corridors, and related biking and pedestrian routes for transportation, and on water infrastructure for drinking water, wastewater service, and draining streets of rainwater. Damage to any one of these systems can threaten public safety, wreak havoc on daily life, impact properties far from flood zones, and result in economic impacts that cascade throughout California.

Community Lifelines

1% and 0.2% annual chance flooding presents a threat to life and property, including community lifelines in the District. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.11 of the Base Plan. Generally, even major flood events are temporary events with flood waters receding back to pre-storm levels at the conclusion of the storm. However, depending on the location, duration, and magnitude and severity of any given flood event, some of these community lifelines may be overwhelmed in the short term.

Natural, Historic, and Cultural Resources

Large flood events can affect natural, historic, and cultural resources. There are a number of ways floodwaters can impact natural resources and the environment: Wildlife habitats can be destroyed by

floodwaters. Contaminated floodwater can pollute rivers and habitats. Silt and sediment can destroy natural areas. Riverbanks and natural levées can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survive the initial flood may die due to being inundated with water. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures within the flooded areas, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme flood events. Any of these that fall in the flood zones shown on Figure F-2 would be vulnerable. This is especially true if a 0.2% annual chance flood event occurs.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.11 of the Base Plan.

Impacts from Flood: 1% and 0.2% Annual Chance

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Large flood events, including those associated with 1% and 0.2% annual chance floods, can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Structures can be damaged directly from floodwaters and can also be damaged from trees falling as a result of water-saturated soils. 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 causing power outages. The interruption of power causes major problems and can result in the closure of governmental offices and community businesses. Public schools may also be required to close or be placed on a delayed start schedule. Roads can be damaged and closed, causing safety and evacuation issues.

Standing water can cause damage to crops, roads, foundations, and electrical circuits. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and

the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 108 are relatively small, which limits additional future impacts to RD 108. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect levee failure in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

One of the most effective ways to reduce vulnerability to potential flood damage is through careful land use planning that fully considers applicable flood management information and practices. Master planning will also be necessary to assure that open channel flood flow conveyances serving the smaller internal streams and drainage areas are adequately prepared to accommodate the flows. Preservation and maintenance of natural and riparian areas should also be an ongoing priority to realize the flood control benefits of the natural and beneficial functions of these areas.

Future development in the District may be built in the floodplain, in conformance to the standards of the floodplain ordinance. The County enforces the floodplain ordinance on new development in RD 108. RD 108 does not control future development in areas protected by levees, that is the purview of the County or cities of Colusa and Williams. RD 108 will continue to work with these entities in the future to ensure that future development is sited in proper areas.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence—Highly Likely

Vulnerability—Medium

Hazard Profile

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 District 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

RD 108 is subject to localized flooding throughout the District. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Localized flooding in the District tends to have a shorter speed of onset, especially when antecedent rainfall has soaked the ground and reduced its capacity to absorb additional moisture.

Past Occurrences

Disaster Declaration History

There have been no state or federal disaster declarations from localized floods.

NCDC Events

The past occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile above.

RD 108 Events

The District noted past occurrences of localized flooding have occurred that parallel the flood events listed in the Past Occurrences of Flood: 1%/0.2% Annual Chance above.

Climate Change and Localized Flood

It is likely that climate change will increase the chance of future occurrence as well future impacts associated with flood. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

Even if average annual rainfall may decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century, increasing the likelihood of overwhelming stormwater systems built to historical rainfall averages. This makes localized flooding more likely.

Vulnerability to Localized Flood

Flood vulnerability and their impacts vary by location and severity of any given flood event and will likely only affect certain areas of the District during specific times. Based on the risk assessment, it is evident that floods will continue to have potentially significant impacts to certain areas of the District. However, while flooding can cause significant impacts depending on the duration and volume of precipitation and the drainage in any given area, many of the floods in the District are minor, localized flood events that are more of a nuisance than a disaster.

Many areas of the District are at some measure of vulnerability to localized flooding. An assessment of a community's vulnerability to localized flooding begins with an understanding of local exposure to localized flooding. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

Historically, the District has been affected by flooding of streams and creeks occurring during heavy rain and storm events. Additional development in the District and in the watersheds of these streams affects both the frequency and duration of damaging floods through an increase in stormwater runoff and contributes to localized flooding occurring in areas throughout the District.

Localized flooding events occurring during periods of heavy rains pose an ongoing concern to the District. Primary concerns include flooding of RD levees and facilities and impacts to infrastructure that provides a means of ingress and egress throughout the District. Ground saturation can result in instability, collapse, or other damage to District facilities. Loss of power or pump failure can also occur during a strong storm or flood event which could make the pump stations inoperable.

RD 108 provides drainage to approximately 48,000 acres of farmland. Pump stations are used during rain events to drain water out of the District. Pump stations used for drainage operations are located at El Dorado Pumping Plant, Rough and Ready Pumping Plant, Riggs Pumping Plant, and Sycamore Slough.

The District noted that pumps and drainage canal system do a very good job of draining the District. The District received no complaints of localized flooding in 2017. The District's biggest concern would be one of the pumps malfunctioning or losing power. If that were to occur, localized flooding is likely to occur.

In 2023, the District noted that two pump stations lost power for a period of time. There was localized flooding that occurred, but power was restored before it could impact the District. If the outage had extended for a longer period of time, flooding would have begun to impact Highway 45 and other local roads; some of which are used for emergency evacuations.

The District tracks localized flooding areas. Affected localized flood areas identified by the RD 108 are roads such as Fruchteniecht, Tule, County Line, as well as smaller county roads. The loss of these routes is of high concern to the District as it would impede evacuation procedures, emergency response, and potential search and rescue.

Assets at Risk

Assets at risk from localized flood include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

People and populations are traditionally not highly vulnerable to localized flooding, but their structures and contents can be at risk. Localized flooding may also cause transportation issues as roads and lanes are impacted or closed and affect the ability for people to travel throughout the District.

Structures and Critical Facilities

Structures and critical facilities in areas with localized flooding can be affected if floodwaters intrude into the structure. Structures in low lying areas, or those with basements can be at greater risk. Buildings with older foundations that are prone to water intrusion are also at greater risk. Once water finds its way into a

structure, it tends to continue to do so until the path that brings water into a structure is mitigated. Structures can also be damaged by trees that have become uprooted and fall during rain and storm events. Large trees falling onto structures can cause significant damages. As shown in Table F-3, all District assets are at risk to this hazard.

Localized flooding, while often more of a nuisance, can cause damage to critical facilities and infrastructure during a heavy rain and storm event. Any facility that experiences localized flooding can be impacted. Utilities and other critical infrastructure can all be affected, causing interruptions in service until repairs can be made. For example, water and wastewater systems can be vulnerable to heavy rains and flood events. Rainfall creates a high water table, surging streams and creeks, and saturates soil. Infiltration of stormwater into water and wastewater systems may occur and presents a threat to public health and safety, when the infrastructure is no longer able to meet operational needs and local demands. Other critical facilities such as roads, bridges and other transportation facilities can also experience localized flooding causing road closures and other impacts until storm waters recede. This can result in extended road closures requiring alternate routes.

Community Lifelines

Due to the relatively minor nature of localized flooding, community lifelines are unlikely to be overwhelmed. Many of the District's community lifelines are the same as or similar to Colusa County's. This was discussed in greater detail in Section 4.3.12 of the Base Plan.

Natural, Historic, and Cultural Resources

Natural resource assets may have some vulnerabilities to localized flood during major storm events, but can benefit from floodwaters, often by design. Many parks and green spaces are designed to take overflow water and release it into the underlying soils and natural areas. Wetlands areas in the District actually help reduce the risk of flooding, as they can absorb excess rainfall that would have to be drained away from impervious surfaces. Flooding can provide many benefits to the natural environment, including recharging wetlands and groundwater, increasing fish production, creating wildlife habitat, and rejuvenating soil fertility. These smaller localized flooding events often provide more benefits to the environment in comparison to negative impacts associated with large flood events. Historic and cultural resources may be at some measure of vulnerability if they are located in areas subject to repeated localized flooding.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.12 of the Base Plan.

Impacts from Localized Flood

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.

Life safety issues from localized flooding would be more limited. The amount and type of damage or flooding that occurs varies from year to year and from storm to storm, depending on the quantity of precipitation and runoff.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 108 are relatively small, which limits additional future impacts to RD 108. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect levee failure in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Future development in the District will add more impervious surfaces causing an increase in stormwater runoff and the continued need to drain these waters. The District will need to be proactive to ensure that increased development has proper siting and drainage for stormwaters. The risk of localized flooding to future development can also be minimized by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the localized stormwater flooding will reduce future risks of losses.

RD 108 does not control future development in areas protected by levees, which is the purview of the County or cities of Colusa and Williams. RD 108 will continue to work with these entities in the future to ensure that future development is sited in proper areas.

Levee Failure

Likelihood of Future Occurrence—Likely
Vulnerability—High

Hazard Profile

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

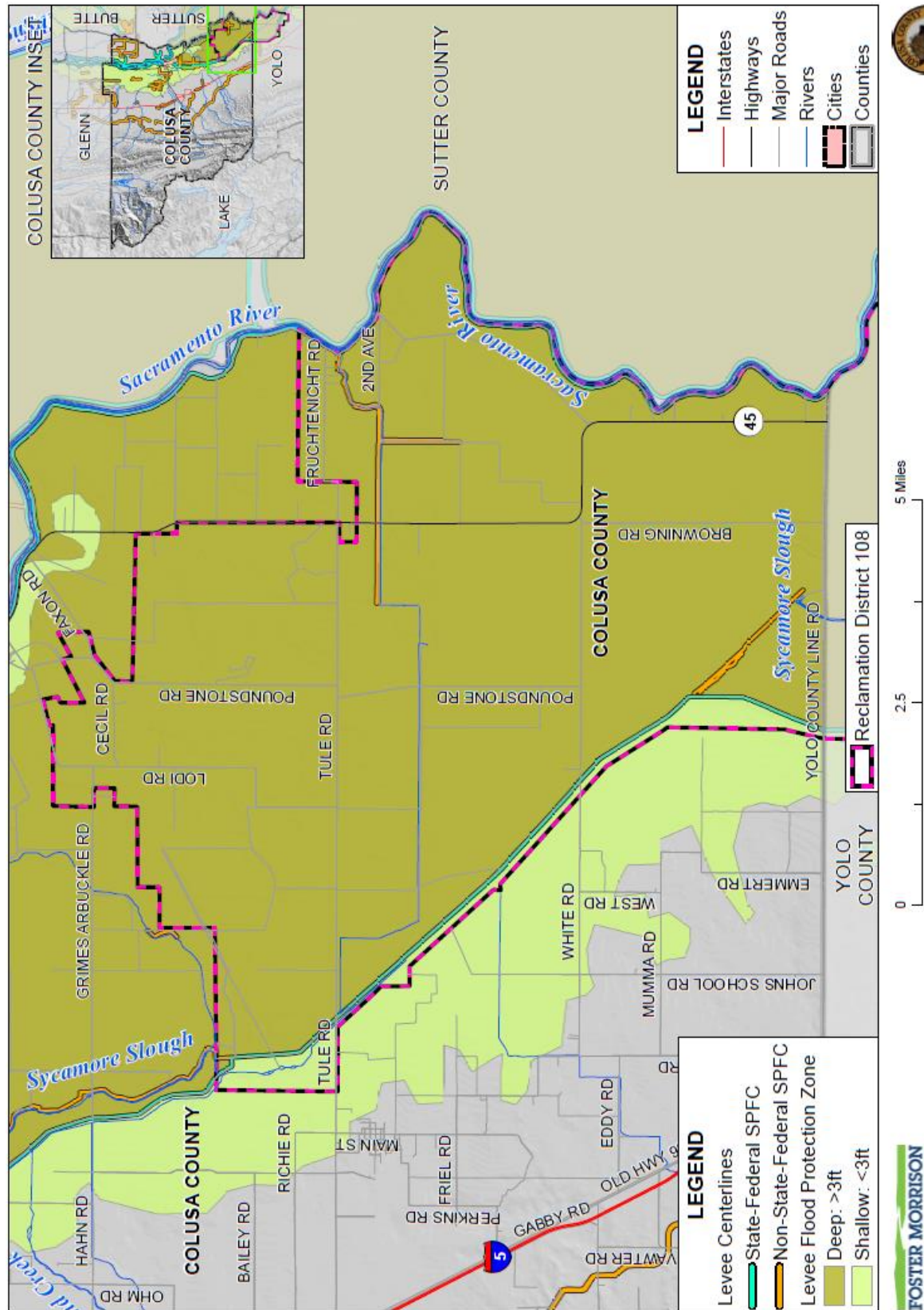
Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce, 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

Numerous levees are located throughout the District (as shown in Section 4.3.14 of the Base Plan. Figure F-3 shows the Levee Flood Protection Zones (LFPZs) in the District. Since the decertification of the levees, there is no FEMA DFIRM X Protected by Levee Flood Zone. However, analysis is performed using the LFPZ data for expected flood depths.

There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District are not fully known, but the LFPZ maps provide a rough estimation. 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 a levee failure can be hours to weeks, depending on the water flows that the levee holds back. The District noted that when northern California reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on District levees.

Figure F-3 RD 108 – LFPZs



Data Source: LFPZ BAM 2023 (updated 3/10/2016), Colusa County GIS, Cal-Atlas, Map Date: 3/21/2024.

Past Occurrences

Disaster Declarations

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

NCDC Events

There have been no NCDC levee failure events in Colusa County.

RD 108 Events

There are no recorded catastrophic levee failures of RD 108 levees within the Colusa County Planning Area. However, the Colusa Basin Drain levees are prone to ongoing erosion and stability issues. As recent as 2017, 2019, and 2023, the levees suffered wind wave damage as well as multiple slips which resulted in levee instability. The District actively performed flood fighting to stop the failure from progressing.

Two events causing high water have occurred in the District, one in 2019 and another in 2023. While the levees held and didn't break, there was bank erosion and seepage that happened. More information can be found in the Past Occurrences of the Flood: 1%/0.2% Annual Chance section.

Climate Change and Levee Failure

It is likely that climate change will increase the chance of future occurrence as well as future impacts associated with flood. More information on future impacts to the District can be found in the Future Conditions/Future Development section of the Vulnerability Assessment below.

In general, increased flood frequency in California is a predicted consequence of climate change. Mechanisms whereby climate change leads to an elevated flood risk include more extreme precipitation events and shifts in the seasonal timing of river flows. This threat may be particularly significant because recent estimates indicate the additional force exerted upon the levees is equivalent to the square of the water level rise. These extremes are most likely to occur during storm events, leading to more severe damage from waves and floods.

Vulnerability to Levee Failure

The probability of levee failure is increasing over time due to increased storms and flooding potential from global climate change. Levee failure flooding can occur as the result of partial or complete collapse of an impoundment, and often results from prolonged rainfall and flooding. A levee failure can range from a small uncontrolled release to a catastrophic failure. The primary danger associated with levee failure is the high velocity flooding of those properties downstream of the breach. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the levee. In addition, levee failure can cause stream bank erosion, which can in some instances have effects worse than those of flooding itself.

Portions of the District are at some measure of vulnerability to levee failure as shown by the LFPZs. An assessment of a community's vulnerability to levee failure begins with an understanding of local exposure

to levee failure. This is included in the Local Concerns section below followed by a discussion of the District's Assets at Risk to this hazard. It should be noted that in the following sections, only the certified levees are analyzed.

Local Concerns

The District has specific concerns and unique vulnerabilities regarding this hazard. These concerns form a portion of the basis for the mitigation strategy and mitigation actions that seek to reduce vulnerabilities to this hazard.

Levees provide strong flood protection, but they are not failsafe. A levee system failure or overtopping can create severe flooding and high-water velocities. Should the District levees fail, all of the areas protected by RD 108 would be at risk, causing property damage and life safety concerns. All of RD 108 facilities would be at risk. Approximately 8,000 people are at risk as well as over \$1.3 billion in property damage. Flood depths can be as deep as 15' within the County and greater than 15' to the south, in Yolo County, where the floodwaters would ultimately pool against the Colusa Basin Drain levee. Relief cuts would be necessary to minimize damage and dewater the basin. Additional issues include dewatering of the levee protected areas, as well as the rebuilding of the levees.

Assets at Risk

Assets at risk from levee failure include people and populations served; structures and critical facilities; community lifelines; natural, historic, and cultural resources; economic assets; and community activities of value. These are discussed in the following sections.

People and Populations Served

Populations in the floodplains are at risk to flooding, including the LFPZ. Certain vulnerable populations may be at a greater risk of a sudden levee failure, including the unsheltered, those with limited mobility and those that lack the resources to leave the area. District residents that live in the LFPZ are often the most vulnerable. Not only are the residents at risk, but their homes and contents are all at risk, compounding the impacts associated with significant hazard events.

Structures and Critical Facilities

A levee failure can affect the District, with some structures and critical facilities in the District at risk to a levee failure event. Structures protected by levees that fail are often total losses. The extent and depth of actual flooding and associated damage will vary depending on the location, nature, depth, and extent of any levee break. Critical infrastructure failures such as loss of power, impacts to potable and wastewater treatment systems, and road and bridge failures can all be caused by levee failure events, depending on the magnitude of the resulting flood. As shown in Table F-3, all District assets are at risk to this hazard.

Community Lifelines

Community lifelines may be affected by levee failure. Many of the District's community lifelines are the same as or similar to Colusa County's. A large wildfire may overwhelm these community lifelines. These were discussed in greater detail in Section 4.3.14 of the Base Plan.

Natural, Historic, and Cultural Resources

Large levee failure events can affect natural, historic, and cultural resources. There are a number of ways levee failures and associated floodwaters can impact natural resources and the environment in the District. Wildlife habitats can be destroyed. Contaminated floodwater can pollute rivers and habitats. Silt and sediment can destroy natural areas. Riverbanks and natural levées can be eliminated as rivers reach bankfull capacity. Rivers can be widened, and deposition can increase downstream. Trees can be uprooted by high-velocity water flow. Plants that survive the initial flood may die due to being inundated with water. Historic and cultural resources may also be affected. Generally, the impacts are associated with damage to structures within the areas protected by levees, but other cultural resources such as those associated with Native Americans and old tribal areas can also be disturbed, damaged and lost during extreme levee failure events. Any of these that fall in the LFPZ flood zones would be vulnerable.

Economic Assets and Community Activities of Value

Economic assets and community activities of value for the District are similar or the same as those for the County as a whole. Those assets and activities were discussed in greater detail in Section 4.3.14 of the Base Plan.

Impacts from Levee Failure

Floods and their impacts vary by location, including the added impacts associated with a levee failure flood event, and will only affect certain areas of the District that are in areas protected by levees. Based on the LFPZ analysis, it is evident that levee failure floods could potentially have significant impacts to areas of the District protected by levees, depending on the severity of the event. Impacts that are not quantified, but could be anticipated in large future levee failure events, include:

- Injury and loss of life.
- Commercial and residential structural and property damage.
- Disruption of and damage to public critical infrastructure and services.
- Health hazards associated with mold and mildew, contamination of drinking water, etc.
- Impacts to natural resource areas, including stream bank erosion.
- Damage to roads/bridges resulting in loss of mobility.

In addition to flood related levee failures, the levees in the District are at risk to failure during earthquake. Levee failure flooding could accompany an earthquake if a dam or storage reservoir or tank fails. Severe ground shaking from an earthquake event can cause a dam to fail or overflow to the surrounding area. Channels and water courses with earthen banks and levees are particularly vulnerable and could collapse in a major earthquake resulting in partial or complete blockage of channels causing flooding upstream of the

impoundment. Levees are especially susceptible to rapid settlement due to liquefaction or horizontal spreading of underlying soils.

Impacts to identified assets at risk to this hazard and the overall vulnerability of the District may be affected in the future by climate change (which was discussed in the Likelihood of Future Occurrence discussion above), changes in population patterns (migration, density, or the makeup of socially vulnerable populations), and changes in land use and development. Changes in population patterns and land use, and the extent to which they affect this hazard, are discussed in the Future Conditions/Future Development discussion below.

Future Conditions/Future Development

As discussed in the hazard profile section, climate change is anticipated to exacerbate this hazard over time. The anticipated future changes in population in the areas served by RD 108 are relatively small, which limits additional future impacts to RD 108. The District noted it has no control over population changes, it merely reacts to them by providing additional (or reduced) services. It is unknown how changes in land use and development will affect levee failure in the District's service territory. Building codes are in effect to reduce this risk and should be updated as necessary to continue to address future conditions.

Future development in levee protected areas may be affected by this hazard. RD 108 does not control future development in areas protected by levees, that is the purview of the County or cities of Colusa and Williams. RD 108 will continue to work with these entities in the future to ensure that future development is sited in proper areas.

F.5 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.

It should be noted (for all of the tables in the sections below) that these tables were designed to display capability information for a county or city. The District has very few of these capabilities, due to their lack of size, lack of complexity, as well as their lack of statutory ability to regulate. The District depends on other jurisdictions for many of these capabilities, and partners with them on case-by-case issues that affect the District.

F.5.1. Regulatory Mitigation Capabilities

Table F-6 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 108.

Table F-6 RD 108's Regulatory Mitigation Capabilities

Plans	In Place Y/N	Does the plan address hazards? Can the plan be used to carry out mitigation actions? When was it last updated??
Capital Improvements Plan	N	
Climate Change Adaptation Plan		
Community Wildfire Protection Plan	N	
Comprehensive/Master Plan	N	
Continuity of Operations Plan	N	
Economic Development Plan	N	
Land Use Plan		
Local Emergency Operations Plan	Y	
Stormwater Management Plan	N	
Transportation Plan	N	
Other		
		Is the ordinance an effective way to reduce hazard impacts?
Land Use Planning and Ordinances	Y/N	Is the ordinance adequately administered and enforced?
Acquisition of land for open space and public recreation use	N	
Building code	N	
Flood insurance rate maps	N	
Floodplain ordinance	N	
Natural hazard-specific ordinance (stormwater, steep slope, wildfire)	N	
Subdivision ordinance	N	
Zoning ordinance	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Increase capacity through staffing and training; plan development, monitoring and updating; increased enforcement and updates to ordinances, policies, and procedures; increased funding opportunities and capacity; and implementation of mitigation actions and projects		

Source: RD 108

Grimes Basin EOP (2023)

The purpose of this Reclamation District 108 (RD108), Reclamation District 787 (RD787), Sacramento River Westside Levee District (SRWSLD), and Maintenance Area 12 (MA 12) joint flood safety plan, collectively named the Grimes Basin Flood Safety Plan, is to ensure that the staffs of these levee maintaining agencies (LMAs) can meet response objectives in a flood emergency and interact efficiently with each other and with jurisdictions performing public safety emergency functions within the Grimes Basin. This plan is intended to be used in conjunction with the emergency operations plans of the State of

California and the Colusa and Yolo Operational Areas to facilitate multi-jurisdictional coordination within LMA boundaries.

Levee maintaining agencies (e.g. reclamation district, levee district, State levee maintenance area) have responsibility for the maintenance of the levee, and sometimes for associated drainage systems, within their jurisdictional boundaries. While the LMAs will work with, and assist if possible, the local jurisdiction(s) responsible for other public safety functions within the LMA, this LMA emergency operations plan only contains detailed procedures for those direct levee flood fight emergency responsibilities. The manner of interacting with other jurisdictions is described, but the operational plans or procedures of other jurisdictions with public safety responsibilities within the area protected by the Grimes Basin levees are only referenced in this document.

F.5.2. Administrative/Technical Mitigation Capabilities

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

Table F-7 RD 108's Administrative and Technical Mitigation Capabilities

Administration	In Place Y/N	Describe capability Is coordination effective?
Staff Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?		
Chief Building Official	N	
Civil Engineer, including dam and levee safety	Y	Under contract
Community Planner	N	
Emergency Manager	Y	General Manager, Deputy Manager and Superintendent can all serve as Emergency Manager.
Floodplain Administrator	N	
GIS Coordinator	N	
Planning Commission	N	
Other		
Technical Y/N Has capability been used to assess/mitigate risk in the past?		
Grant writing	Y	General Manager and Deputy Manager write all grant applications with support from contractors.
Hazard data and information	Y	Engineering firms of record provide this support.
GIS analysis	Y	Engineering firms of record provide this support.
Mutual aid agreements	Y	
Other		

How can these capabilities be expanded and improved to reduce risk?
Increase capacity through staffing and training; plan development, monitoring and updating; increased enforcement and updates to ordinances, policies, and procedures; increased funding opportunities and capacity; and implementation of mitigation actions and projects.

Source: RD 108

F.5.3. Fiscal Mitigation Capabilities

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

Table F-8 RD 108's Fiscal Mitigation Capabilities

Funding Resource	In Place 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	Typically cost shared with State grants.
Community Development Block Grant	N	
Federal funding programs (non-FEMA)	Y	Bureau of Reclamation Grants
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	N	
State funding programs	Y	Multiple grants through the State
Stormwater utility fee	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Increase capacity through staffing and training; plan development, monitoring and updating; increased enforcement and updates to ordinances, policies, and procedures; increased funding opportunities and capacity; and implementation of mitigation actions and projects.		

Source: RD 108

F.5.4. Mitigation Education, Outreach, and Partnerships

Table F-9 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 F-9 RD 108's Mitigation Education, Outreach, and Partnerships

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Community newsletters	Y	Quarterly newsletters in conjunction with RD 108
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	N	They are included as appropriate in County outreach efforts

Program/Organization	In Place Y/N	How widespread are each of these in your community?
Local news	N	They are included as appropriate in County outreach efforts
Organizations that interact with underserved and vulnerable communities	N	
Social media		
How can these capabilities be expanded and improved to reduce risk?		
Increase capacity through staffing and training; plan development, monitoring and updating; increased enforcement and updates to ordinances, policies, and procedures; increased funding opportunities and capacity; and implementation of mitigation actions and projects.		

Source: RD 108

F.5.5. Other Mitigation Efforts

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

The District has levee patrol plans, dewatering plans, and evacuations plans for the District's levees. This applies to flooding, levee failure, and localized flooding. The dewatering plan also has a strategy for Grimes Basin relief cuts to reduce the amount of water that would affect critical facilities and populations.

F.6 Mitigation Strategy

F.6.1. Mitigation Goals and Objectives

The RD 108 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

F.6.2. Mitigation Actions

The planning team for RD 108 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:

- Flood: 1%/0.02% Annual Chance Flood
- Flood: Localized Flood
- Levee Failure

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.

Mitigation Actions

Action 1. *Emergency Generator Maintenance and Upkeep – District Office*

Hazards Addressed: Flood: 1%/0.02% Annual Chance Flood, Flood: Localized Flood, Levee Failure

Goals Addressed: 1, 3, 4, 5

Issue/Background: The RD 108 office serves as the hub of emergency response activities for RD 108, SRWSLD and KLRDD. The office does not currently have a backup generator.

Project Description: The District now has an emergency generator. It will need to be maintained to ensure its reliability during power outages.

Other Alternatives: No Action

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

Responsible Office/Partners: RD 108

Benefits (Losses Avoided): Power for staff to work during power outages from severe weather and PSPS events.

Potential Funding: PDM, HMGP

Timeline: Generator installed in 2020. Upkeep and maintenance are an ongoing annual occurrence.

Project Priority (H, M, L): Medium

Action 2. *Emergency Generator – Pump Stations*

Hazards Addressed: Flood: 1%/0.02% Annual Chance Flood, Flood: Localized Flood, Levee Failure

Goals Addressed: 1, 3, 4, 5

Issue/Background: The pump stations are critical for preventing interior flooding of the District. If the pump stations were to lose power, interior flooding may occur.

Project Description: Emergency generators will be added to reduce risk to the District.

Other Alternatives: No Action

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

Responsible Office/Partners: RD 108

Benefits (Losses Avoided): Power for pumps to continue working during power outages from severe weather and PSPS events.

Potential Funding: PDM, HMGP, USBR grants

Timeline: In progress. Design initiated 2020.

Project Priority (H, M, L): High

Action 3. *Stabilization of Colusa Basin Drain Levee*

Hazards Addressed: Flood: 1%/0.02% Annual Chance Flood, Flood: Localized Flood, Levee Failure

Goals Addressed: 1, 3, 4, 5

Issue/Background: The Colusa Basin Drain levees are prone to instability issues during highwater events.

Project Description: Stability repairs would be designed and constructed. Typical fixes include stability berms, slope flattening or levee realignment.

Other Alternatives: No Action

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

Responsible Office/Partners: RD 108

Benefits (Losses Avoided): Reduced risk to people and property.

Potential Funding: DWR Grant, PDM, HMGP

Timeline: In progress. Design initiated 2024.

Project Priority (H, M, L): High