Annex G Reclamation District 817

G.1 Introduction

This Annex details the hazard mitigation planning elements specific to Reclamation District 817 (RD 817 or District), a new participating jurisdiction to the 2021 Yuba County Local Hazard Mitigation Plan (LHMP) Update. ***Note***: RD 817 participated in the original 2007 Yuba County LHMP. Staff turnover in the past 14 years has reduced institutional memory of that 2007 Plan. Actions from the 2007 Plan:

- Levee system improvement
  - ✓ In order to address flooding concerns for the City of Wheatland and surrounding agricultural lands, RD 817 partnered with RD 2103 to initiate a joint program (Program) to evaluate and repair the Bear River and Dry Creek levees to provide 200-year protection for the urbanizing area and repair the agricultural levees to meet the 1957 design. The Program includes three phases as described below.
    - Phase 1 of the project included evaluation and repair of the entire 5 mile RD 2103 portion of the Bear River north levee. Phase 1 was initiated in 2006 and, with Proposition 1E Early Implementation Project funding, was completed in 2010 at a cost of $20 million. The Bear River North Levee Rehabilitation Project was designed to remediate deficiencies to restore the levee's ability to protect against the 1957 design profile. However, the rehabilitation measures, by their nature, actually allow the levee to accommodate higher flood flows up to and including a 200-year flood event without violating criteria for underseepage and stability. For the higher flood events, no additional slurry cutoff wall construction would be necessary in other reaches of the levee and no modification would be necessary to the length or depth of cutoff wall already constructed. Finally, the Bear River levee has adequate freeboard to meet the 200-year plus three feet water surface elevation for the entire reach of levee. Therefore, the Bear River North Levee Rehabilitation Project increased the level of protection from a 1-in-9 year event to in excess of a 1-in-200 year event. A certification package was completed and FEMA accredited the RD 2103 portion of the Bear River effective February 2011.
    - Phase 2 of the Program will include evaluation and repair of the RD 2103 portion of the Dry Creek levee. RD 2103 completed a Feasibility Study in 2016 using Yuba Feather Flood Protection Program which recommended a combination of seepage and stability berms to meet the State Urban Levee Design Criteria for a 200-year level of protection. That study was further evaluated and identified as the top priority for the Wheatland Basin in the State of California Department of Water Resources Small Communities Flood Risk Reduction (SCFRR) Program Feasibility Study completed in 2020. Estimated project costs are $13.6 million to complete the recommended repairs in RD 2103.
    - Phase 3 of the Program includes the RD 817 Bear River and Dry Creek levees from RD 2103 downstream to their confluence. This phase was preliminarily evaluated in the SCFRR Feasibility Study (2020) which identified $38.5 million for improvements to the Dry Creek levee and $22.6 million of improvements to the Bear River after the Bear River Setback Levee construction, currently being implemented by RD 817, is complete (expected in 2022).

It can be assumed that the 2007 Plan was not incorporated into any RD 784 planning mechanisms. Development in the District since 2007 was described by RD 784 as minimal. As such, it can be assumed that the vulnerability has not changed.

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 817, with a focus on providing additional details on the risk assessment and mitigation strategy for this District.

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

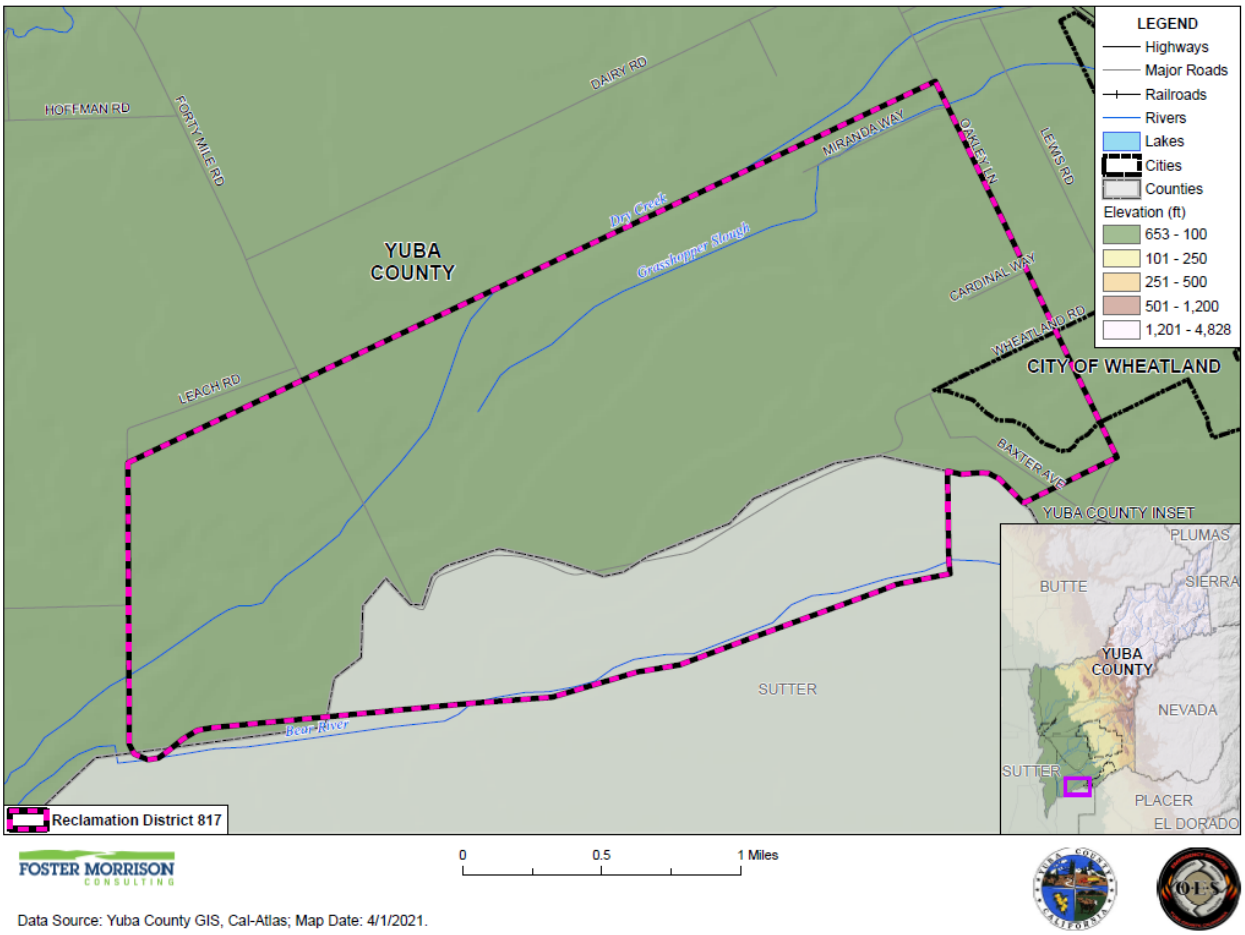
Table G-1 RD 817 – Planning Team

Name	Position/Title	How Participated
Joe Conant	Board President	Advised planning team on local issues/needs
Jack Gilbert, Jr.	Board Secretary	Advised planning team on local issues/needs
Bob Stineman	Board Treasurer	Advised planning team on local issues/needs
Tom Engler	District Engineer	Program Manager and Plan lead. Attended meetings.

G.3 District Profile

The District profile for the RD 817 is detailed in the following sections. Figure G-1 displays a map and the location of the District within Yuba County.

Figure G-1 RD 817



G.3.1. Overview and Background

RD 817 encompasses approximately 2,600 acres of primarily agricultural land directly west of the City of Wheatland, which consists of two levee reaches totaling 7.7 miles. RD 817 was formed in 1910 and is responsible for the maintenance and operation of these two levees reaches, which are part of the Dry Creek and Bear River levee systems. RD 817 depends on volunteer labor to maintain and operate its levee system. RD 817 is adjacent to and west of RD 2103, which provides protection to the City of Wheatland.

The District has no permanent staff. RD 817 relies on volunteers, and maintenance is accomplished by using the farm crews of the farms protected. The farmers are reimbursed for the labor costs for the farm crews. They donate their management time and equipment time. The district has an annual budget of approximately $30,000 which is equivalent to $3,900/mile.

G.4 Hazard Identification

RD 817 identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table G-2).

Table G-2 RD 817—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	Medium	-
Dam Failure	Significant	Unlikely	Catastrophic	High	Medium
Drought & Water Shortage	Significant	Occasional	Limited	Low	High
Earthquake	Extensive	Unlikely	Catastrophic	Low	Low
Floods: 1%/0.5%/0.2% annual chance	Extensive	Occasional	Catastrophic	High	Medium
Floods: Localized Stormwater	Extensive	Occasional	Critical	Medium	Medium
Levee Failure	Extensive	Likely	Catastrophic	High	Medium
Pandemic	Extensive	Occasional	Limited	Low	Low
Severe Weather: Extreme Cold and Freeze	Significant	Likely	Negligible	Low	Medium
Severe Weather: Extreme Heat	Significant	Occasional	Negligible	Low	High
Severe Weather: Heavy Rains and Storms	Extensive	Likely	Negligible	Medium	High
Severe Weather: High Winds and Tornadoes	Limited	Occasional	Limited	Low	Low
Wildfire	Limited	Occasional	Limited	Low	High

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

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

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

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

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

G.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile the District's hazards and assess the District's vulnerability separate from that of the Yuba County Planning Area as a whole, which has already been assessed in Section 4.3 Hazard Profiles and Vulnerability Assessment in the Base Plan. The hazard profiles in the Base Plan discuss overall impacts to the Yuba County Planning Area and describes the hazard problem description, hazard location and extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the District is included in this Annex. This vulnerability assessment analyzes the property and other assets at risk to hazards ranked of medium or high significance specific to the District. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

G.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section G.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table G-2) affects the District and includes information on past hazard occurrences and the likelihood of future hazard occurrence. The intent of this section is to provide jurisdictional specific information on hazards and further describes how the hazards and risks differ across the Yuba County Planning Area.

G.5.2. Vulnerability Assessment and Assets at Risk

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

Assets at Risk and Critical Facilities

This section considers the RD 817'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:

> ***Critical Infrastructure describes the physical and cyber systems and assets that are so vital to the County of Yuba that their incapacity or destruction would have a debilitating impact on our physical or economic security or public health or safety. Critical infrastructure includes any location, facility, or infrastructure that are necessary to maintain normalcy in daily life, and that are essential for the delivery of vital services and for the protection of the community. Critical Facilities are further broken out into three Categories: 1) Essential Services Facilities, 2) Large Group and Vulnerable Populations Facilities, and 3) Infrastructure Facilities.***

Table G-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 817 currently has no assets but is responsible for

operations and maintenance of flood control levees that protect all private and publicly held assets in the District.

Table G-3 RD 817 Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Levees	Flood Control Structures	$150,000,000	Dam Failure, Earthquake, Floods, Levee Failure, and Severe Weather
Total		**$150,000,000**	

Source: RD 817

Natural Resources

RD 817 has a variety of natural resources of value to the District. These natural resources parallels that of Yuba County as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Historic and Cultural Resources

RD 817 has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallels that of Yuba County as a whole. Information can be found in Section 4.3.1 of the Base Plan. As identified in the SCFRR Study, With the possible exceptions of a small portion of the National Register of Historic Places (NRHP) listed Johnson Ranch and Burtis Hotel sites, the section of the Southern Pacific Railroad that crosses Dry Creek, and the suspected location of the prehistoric site P-58-001275, there are no known cultural resources within or within ¼ mile of the proposed project. However, large portions of the project site have not been subjected to intensive archaeological investigations, and those that have been conducted are limited to surface investigations. The intensity of prehistoric and historic-era human occupation suggests that there is a high potential for the presence of as yet unidentified resources within the project area.

Populations Served

Also potentially at risk should the District be affected by natural hazard events are the populations served by the District. According to the SCFRR Study, The Wheatland Basin (Basin) contains approximately 6,186 acres including the City, as well as approximately 5,200 acres of agricultural land uses surrounding the City's limits. The City has a population of 3,842 (U.S. Census Bureau 2017 Population Estimate). It is projected, however, that the community will have a population more than 10,000 residents by the year 2025. Land use designations within the City's limits include residential, commercial, and agricultural.

The Basin contains infrastructure that is vital to the surrounding communities and should be preserved. Major roads within the Basin include Pleasant Grove Road/Forty Mile Road, Wheatland Road, Oakley Lane, Jasper Lane, and Spenceville Road (Camp Beale Highway). State Route 65 passes through the basin with an Annual Average Daily Traffic (AADT) volume of 21,000 vehicles in Wheatland. The Union Pacific Railroad (UPRR) runs through the Basin, crossing the Bear River and Dry Creek levees just upstream of and parallel to State Route 65. There are over 1,000 residential structures, 50 commercial/government

structures, and 7 industrial structures including 3 special needs facilities with 260 elderly, low income, or other residents with special needs. There are 8 potable water facilities, a wastewater treatment plant and 5 sewer pump stations, a police station, a fire station, 3 schools, and 10 acres of landscaped park land.

Growth and Development Trends

General growth in the District parallels that of the Yuba County Planning Area and the City of Wheatland as a whole. Information can be found in Section 4.3.1 of the Base Plan, as well as in the City of Wheatland's Annex to this Plan Update.

Future Development

RD 2103 is currently working to annex the portion of RD 817 in the Wheatland Basin to consolidate flood control operations and maintenance within the basin. The annexation will allow more efficient operations and coordinated local funding for operations, maintenance, repair, rehabilitation, or replacement projects in the future

The District has no control over future development in areas the District services. Future development in these areas parallels that of the Yuba County Planning Area. More general information on growth and development in Yuba County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Yuba County Vulnerability and Assets at Risk of the Base Plan.

G.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table G-2 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Yuba County Planning Area). Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

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

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

- **Extremely High**—Very widespread with catastrophic impact.

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

Power Outage/Power Failure

An impact of almost all hazards below relates to power outage and/or power failures. The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the Department of Energy, major blackouts are on the upswing. Incredibly, over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. In addition to blackouts, brownouts can occur. A brownout is an intentional or unintentional drop in voltage in an electrical power supply system. Intentional brownouts are used for load reduction in an emergency. Electric power disruptions can be generally grouped into two categories: intentional and unintentional. More information on types of power disruptions can be found in Section 4.3.3 of the Base Plan. RD 817 is not affected by power outages or failures.

Public Safety Power Shutoff (PSPS)

A new intentional disruption type of power outage/failure event has recently occurred in California. In recent years, several wildfires have started as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), are coordinating to prepare all Californians for the threat of wildfires and power outages during times of extreme weather. To help protect customers and communities during extreme weather events, electric power may be shut off for public safety in an effort to prevent a wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3.3 of the Base Plan. RD 817 is not affected by power outages or failures.

Climate Change

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile and Problem Description

Climate change adaptation is a key priority of the State of California. The 2018 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the District, Yuba County, and State of California. There is no scale to measure the extent of climate change. Climate change exacerbates other hazards, such as drought, extreme heat, flooding, wildfire, and others. The speed of onset of climate change is very slow. The duration of climate change is not yet known, but is feared to be tens to hundreds of years.

Past Occurrences

Climate change has never been directly linked to any declared disasters. While the District noted that climate change is of concern, no specific impacts of climate change could be recalled. The District and HMPC members did, however, note that in Yuba County, the strength of storms does seem to be increasing and the temperatures seem to be getting hotter. It is also understood that climate change may increase variability in the strength and duration of storm events which creates uncertainty for the flood control system in the District's jurisdiction.

Vulnerability to and Impacts from Climate Change

The 2014 California Adaptation Planning Guide (APG) prepared by California OES and CNRA was developed to provide guidance and support for local governments and regional collaboratives to address the unavoidable consequences of climate change. California's APG: Understanding Regional Characteristics has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. Yuba County falls within the North Sierra Region characterized as a sparsely settled mountainous region where the region's economy is primarily tourism-based. The region is rich in natural resources, biodiversity, and is the source for the majority of water used by the state. This information can be used to guide climate adaptation planning in the District and Yuba County Planning Area.

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Sierra region in which the Yuba County Planning Area is part of:

- Temperature increases
- Decreased precipitation
- Reduced snowpack
- Reduced tourism
- Ecosystem change
- Sensitive species stress
- Increased wildfire

Risks to the District include the precipitation variability and potential for more extreme precipitation events that could lead to flooding or flood events that exceed the levee system design

Assets at Risk

The District noted that its facilities will most likely not be at risk from climate change.

Dam Failure

Likelihood of Future Occurrence–Unlikely
Vulnerability–Medium

Hazard Profile and Problem Description

Dams are manmade structures built for a variety of uses including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they are usually engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped or fail. Overtopping is the primary cause of earthen dam failure in the United States.

Location and Extent

Dam failure is a natural disaster from two perspectives. First, the inundation from released waters resulting from dam failure is related to naturally occurring floodwaters. Second, a total dam failure would most probably happen as a consequence of the natural disaster triggering the event, such as an earthquake. There is no scale with which to measure dam failure. However, Cal DWR Division of Safety of Dams (DOSD) assigns hazard ratings to dams within the State that provides information on the potential impact should a dam fail. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in four categories that identify the potential hazard to life and property: Low, Significant, High, and Extremely High. These were discussed in more detail in Section 4.3.7 of the Base Plan.

While a dam may fill slowly with runoff from winter storms, a dam break has a very quick speed of onset. The duration of dam failure is generally not long – only as long as it takes to empty the reservoir of water the dam held back. The District would be affected for as long as the flood waters from the dam failure took to drain downstream.

Extremely High Hazard Dams inside the County that can affect the District can be seen on Figure G-2. High Hazard Dams inside the County that can affect the District can be seen on Figure G-3. Extremely High Hazard Dams outside the County that can affect the District can be seen on Figure G-4. No high hazard dams outside the County have mapped inundation areas that intersect RD 817.

Figure G-2 RD 817 – Dam Inundation Areas from Extremely High Hazard Dams Inside the County

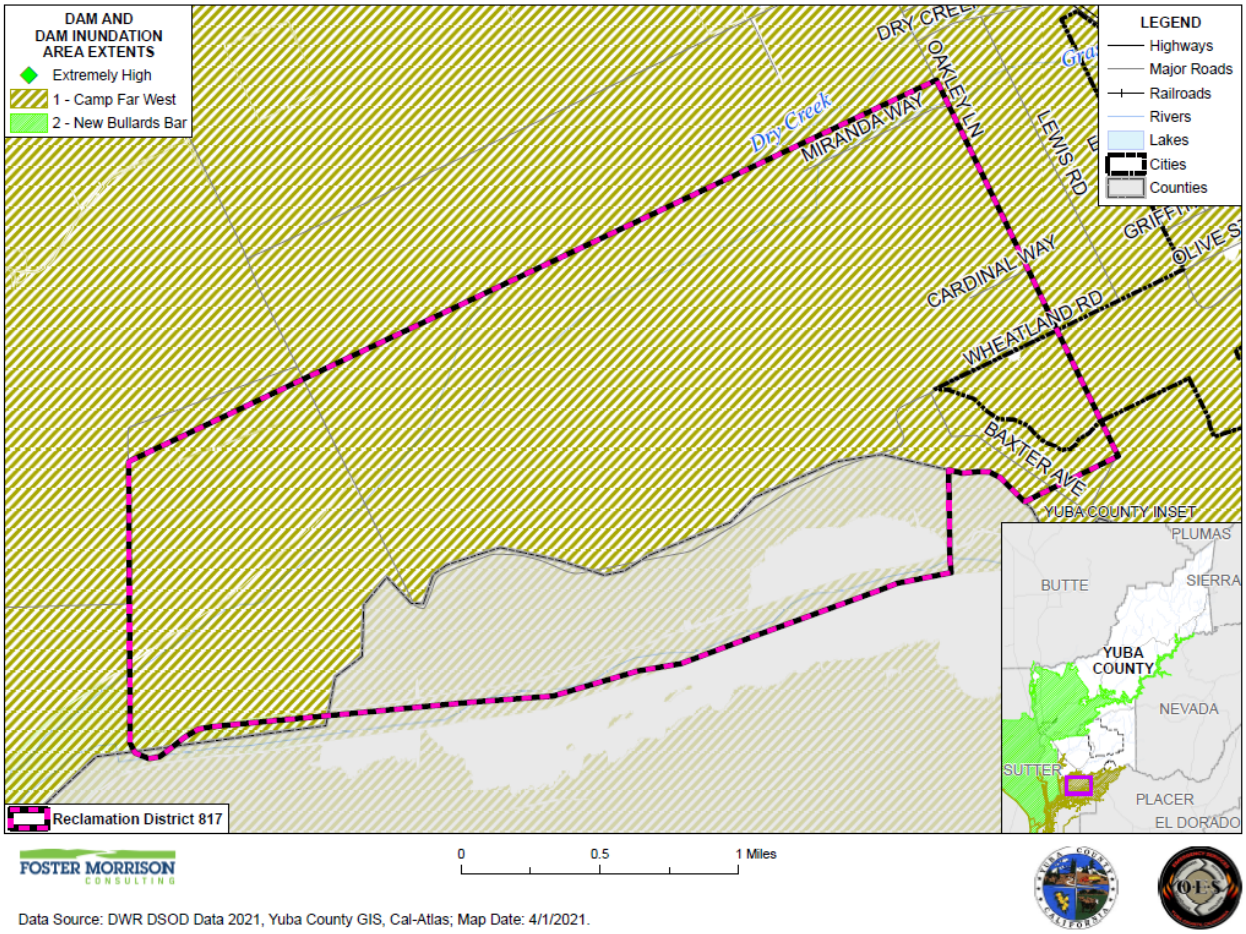


Figure G-3 RD 817 – Dam Inundation Areas from High Hazard Dams Inside the County

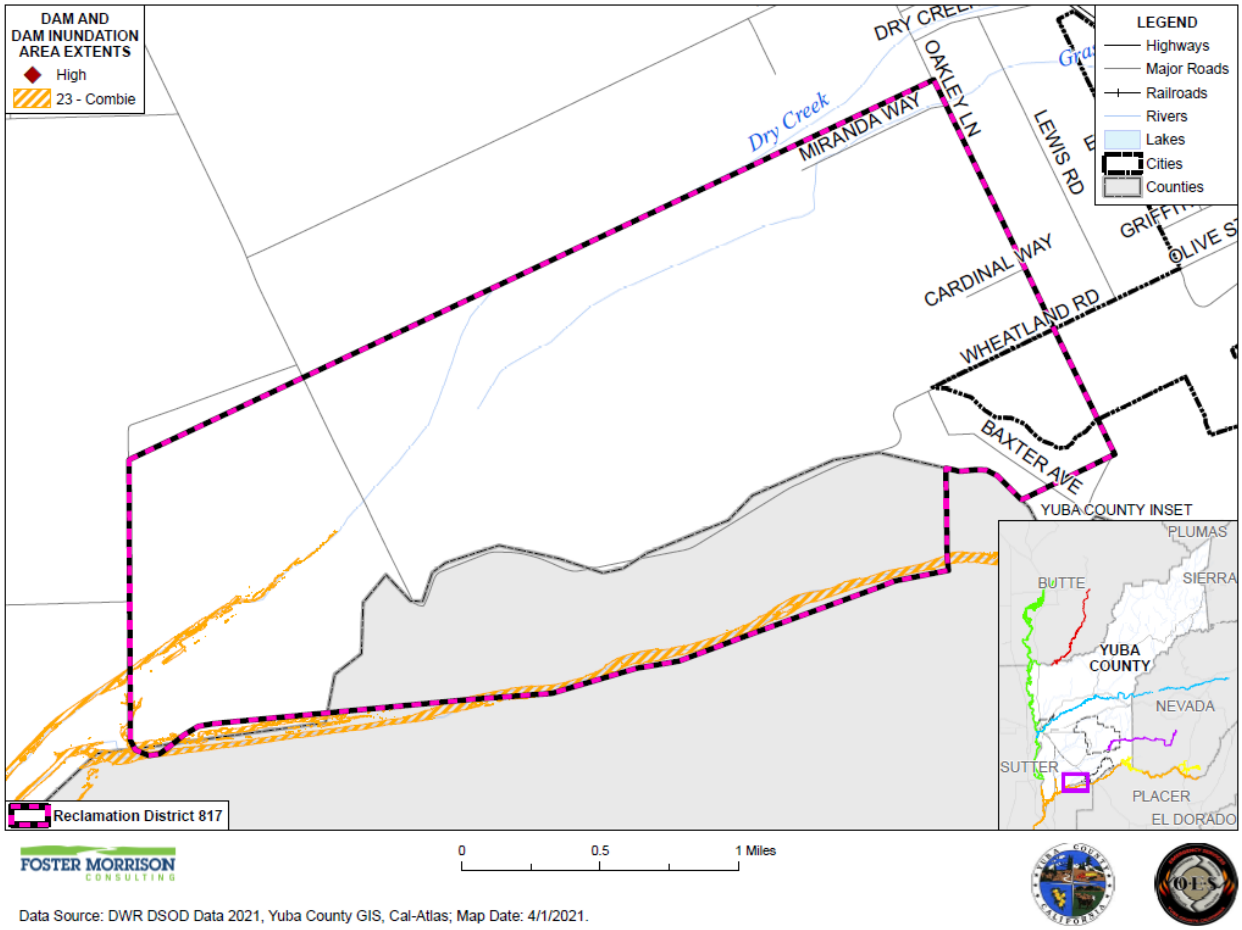
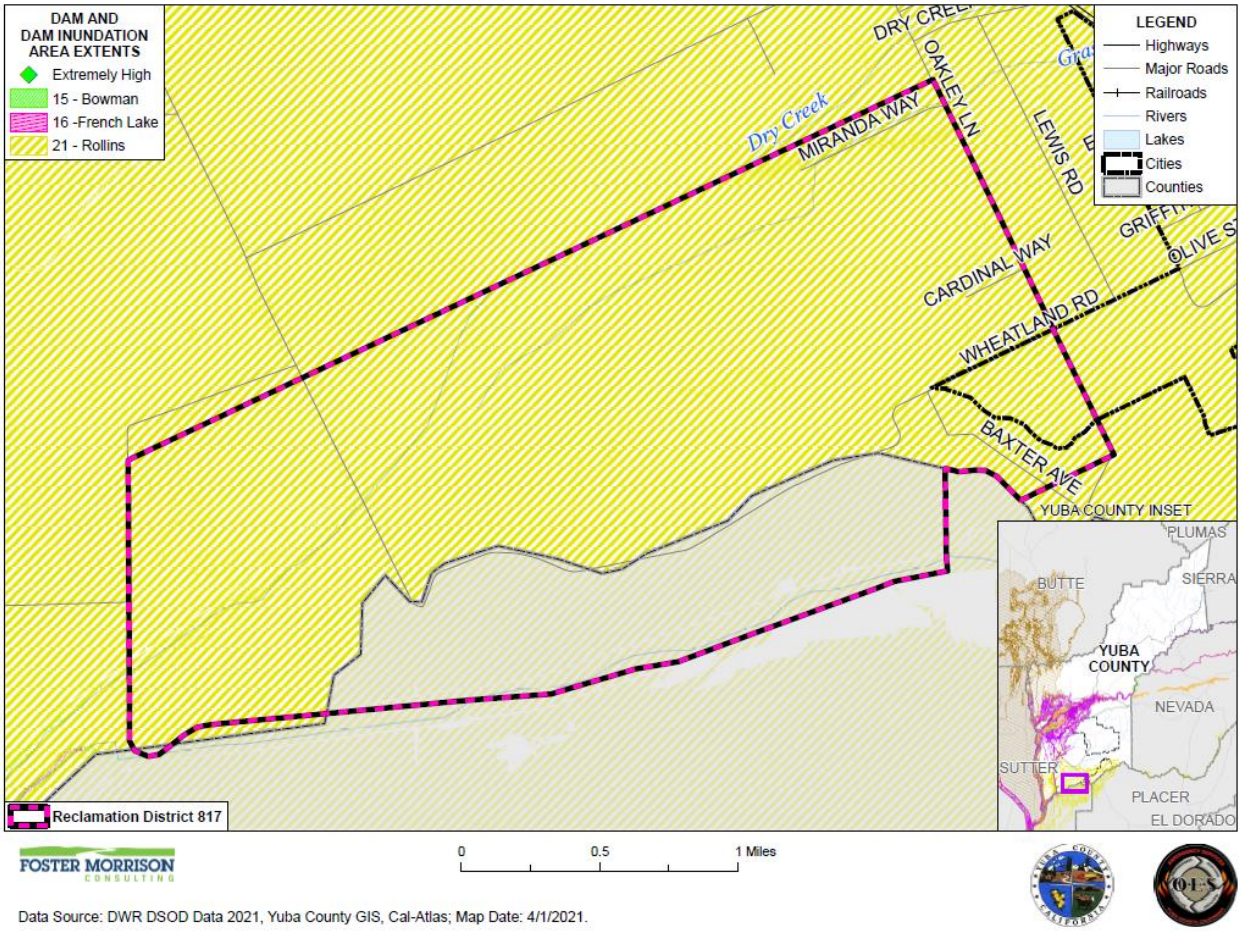


Figure G-4 RD 817 – Dam Inundation Areas from Extremely High Hazard Dams Outside the County



Past Occurrences

There has been on federal or state disaster declarations for dam failure (from the Oroville Dam spillway incident) in the County, as shown on Table G-4.

Table G-4 Yuba County – State and Federal Disaster Declarations from Dam Failure 1950-2021

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Dam Failure	0	–	1	2017

Source: Cal OES, FEMA

Although the Oroville Spillway incident caused evacuations in RD 817, no facilities were damaged and the District did not have any damages resulting from the incident. The District noted no other dam failure occurrences that have affected the District.

Vulnerability to and Impacts from Dam Failure

Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding. Impacts to the District from a dam failure flood could include loss of life and injury, flooding and damage to property and structures, damage to critical facilities and infrastructure, loss of natural resources, and all other flood related impacts. Additionally, mass evacuations and associated economic losses can also be significant.

The Camp Far West Dam is in very close proximity to RD 817. Failure of the dam would quickly overwhelm the District levees and cause significant flooding within the District with full inundation in less than 15 minutes. Rollins Dam, upstream of Camp Far West, would also likely overwhelm Camp Far West and the RD 817 levees. It would not be as quick as a Camp Far West failure, but would also have catastrophic impacts to the District.

Assets at Risk

The levees and the residents and facilities protected by the levees are at risk from this hazard.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–High

Hazard Profile and Problem Description

This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the District, and have caused damages in the past. Flooding is a significant problem in Yuba County and the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage. As previously described in Section 4.3.10 of the Base Plan, the Yuba County Planning Area and the RD 817 have been subject to historical flooding.

Location and Extent

RD 817 lies southwest of the City of Wheatland. A large area of the District falls within the 100- year flood zone due to its proximately to Dry Creek and Grasshopper Slough. RD 817 is at a lower elevation than the City of Wheatland and RD 2103. If a levee failed in RD 2103 it would flow into RD 817, causing internal flooding. The City of Wheatland has limited development until the levees protecting the City, primarily in RD 2103, are improved and certified. Therefore, development within RD 817 is subject to levee improvements in RD 2103.

The RD 817 has areas located in the 1% and 0.2% annual chance floodplain. This is seen in Figure G-5.

Figure G-5 RD 817 – FEMA DFIRM Flood Zones

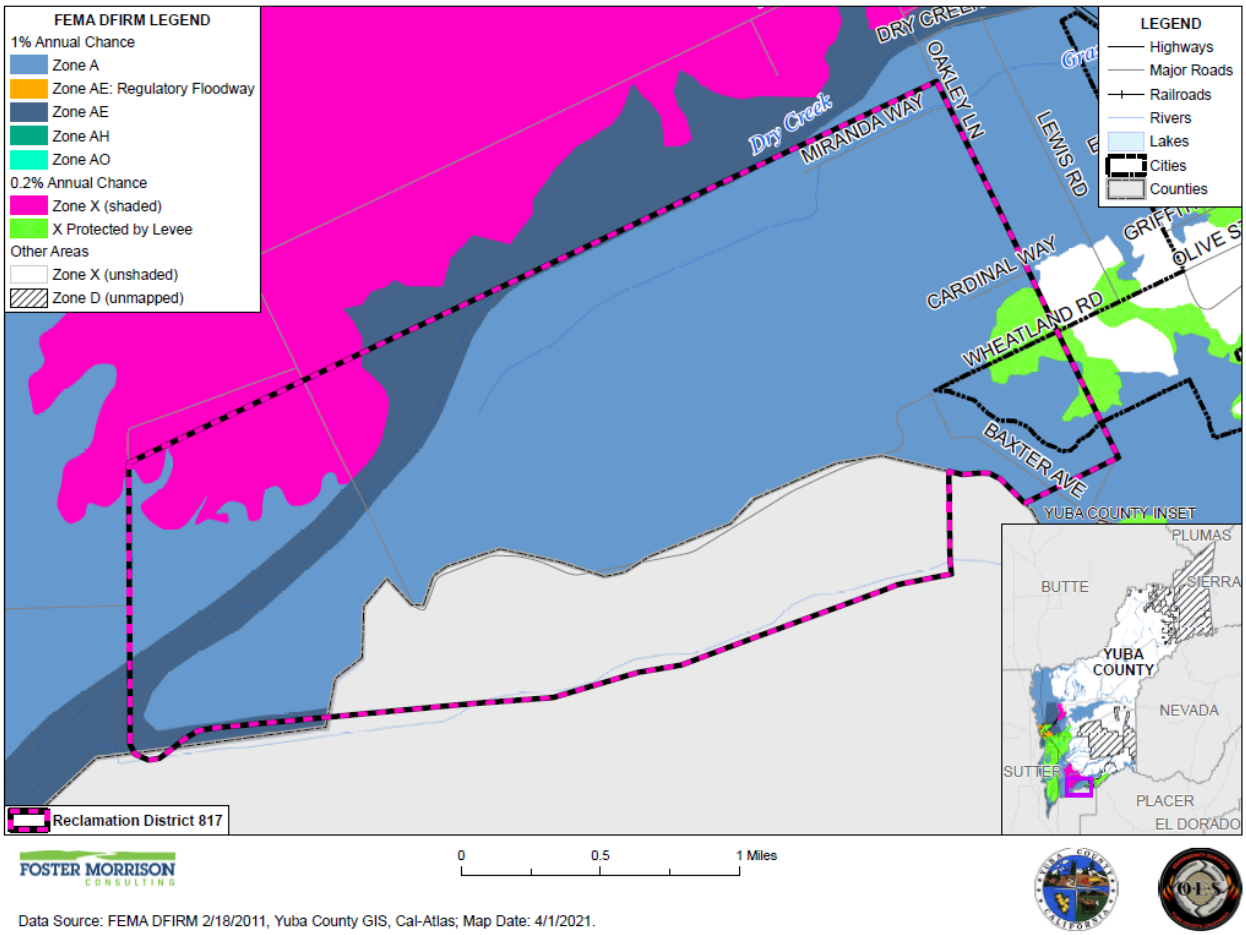


Table G-5 details the DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the District.

Table G-5 RD 817– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone Present in the District
A	1% annual chance flooding: No base flood elevations provided	X
AE	1% annual chance flooding: Base flood elevations provided	X
AE Floodway	1% annual chance flood: Regulatory floodway; Base flood elevations provided	
AH	1% annual chance flood areas of shallow flooding between one to three feet deep. Regulatory floodway; Base flood elevations provided	
AO	1% annual chance flooding: sheet flow areas. BFEs derived from detailed hydraulic analyses are shown in this zone.	
Shaded X	0.2% annual chance flooding: The areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	X

Flood Zone	Description	Flood Zone Present in the District
X Protected by Levee	Areas protected by levees from 1% annual chance flood event. Levee protection places these areas in the 0.2% annual chance flood zone.	X
X (unshaded)	No flood hazard	X

Source: FEMA

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

Past Occurrences

A list of state and federal disaster declarations for Yuba County from flooding is shown on Table G-6. These events also likely affected the District to some degree.

Table G-6 Yuba County – State and Federal Disaster Declarations from Flood 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	16	1950, 1955, 1958, 1962, 1963 (twice), 1969, 1973, 1982, 1983, 1986, 1995 (twice), 1997, 2008, 2017	15	1955, 1962, 1963, 1964, 1969, 1970, 1983, 1986, 1995 (twice), 1997, 1998, 2006, 2017 (twice)

Source: Cal OES, FEMA

Vulnerability to and Impacts from Flood

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

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream which can damage or remove

stationary structures. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

Flood events are the primary reason that RD 817 exists and events result in significant financial burden for temporary labor, contractors, engineering and legal fees associated with monitoring and flood fighting on district facilities.

Assets at Risk

The levees and the residents and facilities protected by the levees are at risk from this hazard.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

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

Location and Extent

The RD 817 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.

Local flooding occurs because of inadequately sized facilities or deteriorated facilities such as drainage inlets, pipes, drainage ditches and related facilities that transport water to the Bear River, and Dry Creek. The Public Works Department operates and maintains the local drainage system within the City, as well as the two facilities outside the City limits consisting of the northwest detention pond and discharge pumps located west of SR 65 and south of Dry Creek, and partial maintenance of the east side ditch that connects the Wheatland Ranch Subdivision detention basin to Dry Creek. Outside the city limits the Yuba County Public Works Department operates the county local drainage systems which consist primarily of county roadway drain lines and side ditches. All other drainage facilities are maintained by the local property owners.

RD 817 is responsible for one drainage pipe through the levee that drains Grasshopper Slough into Dry Creek near the confluence with the Bear River. Although the pipe is sufficiently sized, it is a gravity drain with a flap gate at the Dry Creek outlet. During high flows on Dry Creek the flap gate is unable to open and release drainage water to the Creek. This creates ponding water against the levees at the lower end of the District and causes flooding to adjacent agricultural lands and a residential structure

The District tracks localized flooding areas. localized flood areas identified by the RD 817 are summarized in Table G-7.

Table G-7 RD 817 – List of Localized Flooding Problem Areas

Area Name	Flooding	Pavement Deterioration	Washout	High Water	Landslide/ Mudslide	Debris	Downed Trees
Grasshopper Slough Outfall	X			X			

Source: RD 817

Past Occurrences

There have been no federal or state disaster declarations in the County due to localized flooding. The District noted no past occurrences of localized flooding that caused damages.

Vulnerability to and Impacts from Localized Flooding

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

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

The major concern for localized stormwater is ponding of water against levees river stages on Dry Creek which could result in levee instability.

Assets at Risk

The levees and the residents and facilities protected by the levees are at risk from this hazard.

Levee Failure

Likelihood of Future Occurrence–Likely
Vulnerability–Extremely High

Hazard Profile and Problem Description

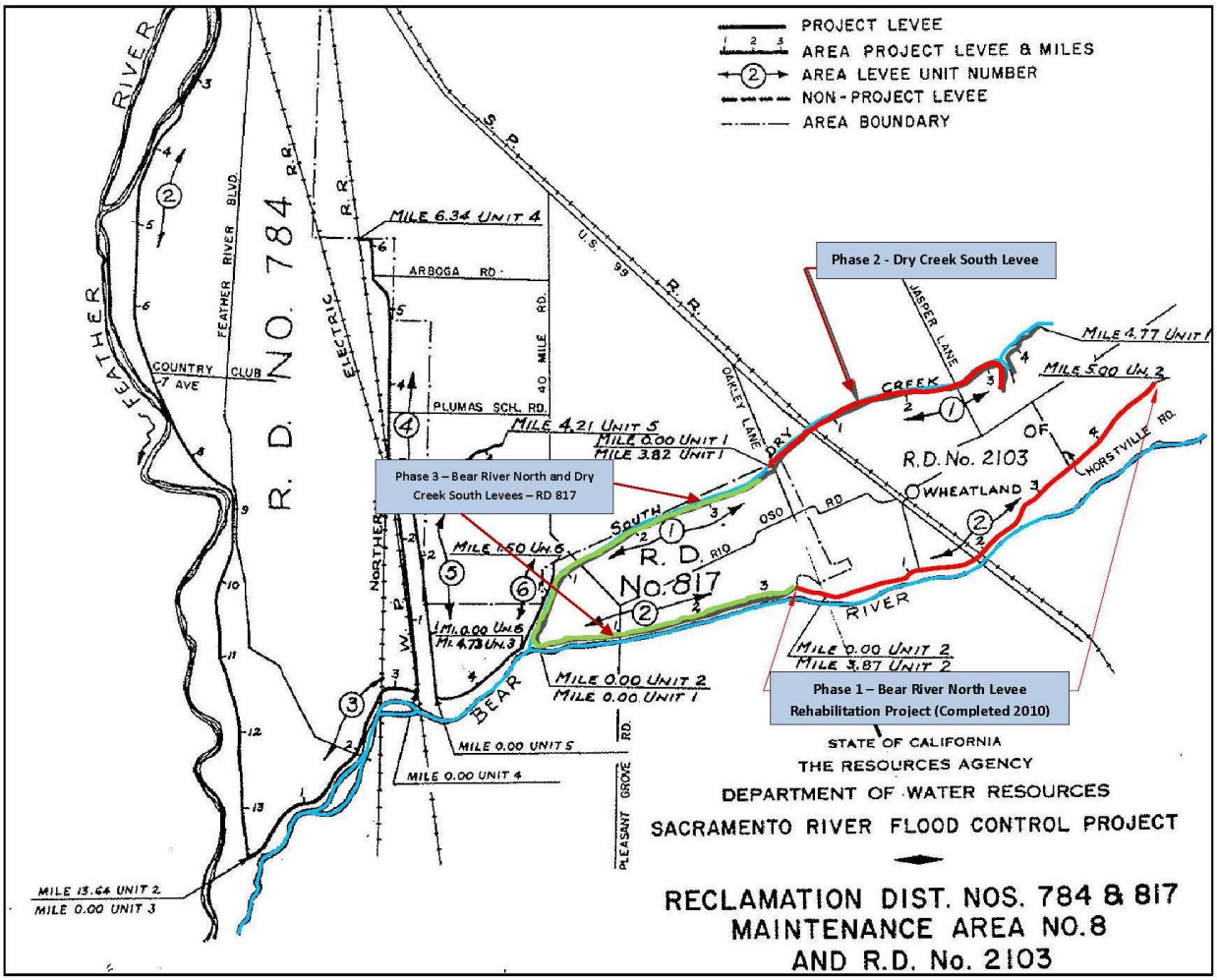
A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower steam channel, levees can also increase the speed of the water. Levees can be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

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

Location and Extent

RD 817 encompasses approximately 2,600 acres of primarily agricultural land directly west of the City of Wheatland, which consists of two levee reaches totaling 7.7 miles. RD 817 is responsible for the maintenance and operation of the western portions of the Dry Creek and Bear River levees, west of the City of Wheatland. The portions of the levees that are the responsibility of RD 817 do not directly protect the City of Wheatland. There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District vary by event and location. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of levee failure risk times can be hours to weeks, depending on the river flows that the levee holds back. When northern California dams and reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees. Levees in the District are shown on Figure G-6.

Figure G-6 RD 817 – Levees



Past Occurrences

The District Planning Team noted no past occurrences of recent levee failures. However, verbal histories indicate that a levee failure occurred in the 1920's along the Bear River.

Though failures did not occur, in a severe winter storm event the amount of rainfall and the short period of time it could fall, could cause a greater impact on the existing facilities to be able to handle the increased flows. This was apparent during the 2005-2006 winter storm event in which three boils developed on the Dry Creek Levee, at the site of the 1997 Dry Creek levee failure within the RD 2103 area of responsibility.

Vulnerability to and Impacts from Levee Failure

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

Should a levee fail, some or all of the area protected by the levees would be at risk to flooding. Impacts from a levee failure include property damage, critical facility damage, and life safety issues. Business and

economic losses could be large as facilities could be flooded and services interrupted. School and road closures could occur. Road closures would impede both evacuation routes and ability of first responders to quickly respond to calls for aid. Other problems connected with levee failure flooding include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

A levee failure in RD 2103 would allow water to proceed west and eventually pond on, and flood the lands in RD 817. Thus RD 817 is subject to flooding from levees that are not in their district. Failure of RD 817 levees would not pond flood waters high enough to flood the City of Wheatland. RD 817 would suffer significant economic hardship from a levee failure associated with flood fighting, repairs, and economic impacts to the tax paying constituents that would likely decrease the ability to collect assessments necessary for operations and maintenance of the facilities. Additionally, levee breaches further stress downstream levees by saturating the normally dry side of the levees causing instability and potential failure of other levee facilities.

Assets at Risk

The levees and the residents and facilities protected by the levees are at risk from this hazard.

Severe Weather: Heavy Rains and Storms

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile and Problem Description

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

Location and Extent

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

Past Occurrences

There have been past disaster declarations from heavy rains and storms, which were discussed in Past Occurrences of the Levee Failure section above. According to historical hazard data, severe weather,

including heavy rains and storms, is an annual occurrence in the District. This is the cause of many of the federal disaster declarations related to flooding.

In conjunction with the 2005-2006 Winter Storm event, 72,000 gallons of treated wastewater was accidentally discharged into the Bear River as a result of excessive rainfall.

Vulnerability to and Impacts from Heavy Rain and Storms

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

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

During periods of heavy rains and storms, power outages can occur. These power outages can affect pumping stations and lift stations that help alleviate flooding. Heavy rains and storms can exacerbate high water conditions during flood events and can also cause surface erosion, debris, fallen trees, and rutting of the District levees. These impacts cause above normal economic burden in clean up and repairs after storm events.

Assets at Risk

The levees and the residents and facilities protected by the levees are at risk from this hazard.

G.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.

G.6.1. Regulatory Mitigation Capabilities

Table G-8 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the RD 817.

Table G-8 RD 817 Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan/General Plan	N	
Capital Improvements Plan	Y	State of California, Department of Water Resources Small Communities Flood Risk Reduction Program
Economic Development Plan	N	
Local Emergency Operations Plan	Y	Working with Yuba County on updating flood emergency response plan
Continuity of Operations Plan	N	
Transportation Plan	N	
Stormwater Management Plan/Program	N	
Engineering Studies for Streams	N	
Community Wildfire Protection Plan	N	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	N	
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	N/A	Version/Year:
Building Code Effectiveness Grading Schedule (BCEGS) Score	N/A	Score:
Fire department ISO rating:	N/A	Rating:
Site plan review requirements	N/A	
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance	N/A	
Subdivision ordinance	N/A	
Floodplain ordinance	N/A	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N/A	
Flood insurance rate maps	N/A	
Elevation Certificates	N/A	
Acquisition of land for open space and public recreation uses	N/A	
Erosion or sediment control program	N/A	
Other		

How can these capabilities be expanded and improved to reduce risk?
The District has no regulatory authority. The District relies on the County for regulatory ability. The District will seek additional ways to partner. Examples include: local flood operations plans should be coordinated with neighboring agencies including Yuba and Sutter Counties to allow for coordinated evacuations and flood operations to avoid evacuation chaos as was experienced in the Oroville Spillway Incident

Source: RD 817

G.6.2. Administrative/Technical Mitigation Capabilities

Table G-9 identifies the District department(s) responsible for activities related to mitigation and loss prevention in RD 817.

Table G-9 RD 817's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N	
Mitigation Planning Committee	Y	Yes, through their participation on the Yuba County LHMP.
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	Annual contracts to perform levee O&M according to State and Federal Standards based on need. Some funding from DWR Flood Maintenance Assistance Program is utilized.
Mutual aid agreements	N	
Other	Y	Systemwide Improvement Framework Plan through CVFPB and US Army Corps of Engineers to address deferred maintenance, minor repairs, and correct other maintenance deficiencies to remain eligible for Federal Rehabilitation Assistance after a flood
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/A	
Floodplain Administrator	N/A	
Emergency Manager	N/A	
Community Planner	N/A	
Civil Engineer	Y	MBK Engineers provides District Engineering services that are adequate. MBK staff is trained on hazards and mitigation.
GIS Coordinator	N/A	
Other	Y	RD 817 Board of Trustees and local volunteers. There are no District staff.
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	Through Yuba County
Hazard data and information	Y	Through DWR and NOAA websites and County LHMP
Grant writing	Y	MBK Engineers
Hazus analysis	N	
Other	Y	DWR and Army Corps technical assistance programs

How can these capabilities be expanded and improved to reduce risk?
It should be noted that the District has no staff. The District noted there could be better coordination between neighboring counties. The District will seek to assist where necessary. The District could also benefit from mutual aid agreements with neighboring District, Cities or Counties for assistance during emergencies. The District will seek these where and when available.

Source: RD 817

G.6.3. Fiscal Mitigation Capabilities

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

Table G-10 RD 817'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	State and Federal grant programs with local funding assistance through Yuba Water
Authority to levy taxes for specific purposes	Y	Authority exists, but is not currently used
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	Y	Authority exists, but is not currently used
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	
Incur debt through private activities	N	
Community Development Block Grant	N	
Other federal funding programs	Y	USACE Civil Works Program, FEMA PDM, HMGP, and or BRIC programs
State funding programs	Y	DWR and CDFW grants for flood control and restoration work. Grants previously used include FSRP, YFFPP, and SCFRR
Other		
How can these capabilities be expanded and improved to reduce risk?		
The District will seek FEMA, Cal OES, and CA DWR grants. The District will seek to find additional revenue opportunities. Capabilities could be expanded with additional revenue that allows the District to hire employees.		

Source: RD 817

G.6.4. Mitigation Education, Outreach, and Partnerships

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

Table G-11 RD 817's Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	N	
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Y	Yuba Water has education programs that benefit RD 817
Natural disaster or safety related school programs	Y	Yuba Water has education programs that benefit RD 817
StormReady certification	N	
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional public education programs would help to reduce risk. Programs similar to DWR Flood Risk Awareness, FEMA flood risk communication toolkit, analysis and mapping, and other flood risk outreach programs would be beneficial to the Community. These could be expanded with additional revenue.		

Source: RD 817

G.6.5. Other Mitigation Efforts

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

- Bear River Setback Levee Project is currently being designed and permitted to rehabilitate a critical reach of the Bear River levee utilizing $11 million of DWR Flood System Repair Program funding with local funding being provided by Yuba Water.
- Implement structural actions recommended in the SCFRR Feasibility Study
- District lined the Grasshopper Slough CMP culvert crossing through the Dry Creek levee to improve interior drainage outfall and protect the integrity of the levee at the failing culvert.
- District is working with RD 817 to develop a USACE System-Wide Improvement Framework Plan to maintain Federal Rehabilitation assistance Eligibility after flood events while addressing deficiencies noted in Federal Inspections.
- Removal, repair or replacement of drainage culverts through levees.

G.7 Mitigation Strategy

G.7.1. Mitigation Goals and Objectives

The RD 817 adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

G.7.2. Mitigation Actions

The planning team for the RD 817 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:

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

It should be noted that many of the projects submitted by each jurisdiction in Table 5-4 in the Base Plan benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the countywide public outreach action, as well as many of the emergency services actions, apply to all hazards regardless of hazard priority. Collectively, this multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Multi-Hazard Actions

Action 1. Implement Problem Identification and Feasibility Study on Bear River and Dry Creek

Hazards Addressed: Floods (both 1%, 0.2% and Localized Flood), Dam Failure, Levee Failure, and Heavy Rains and Storms, and Climate Change

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

Issue/Background: It is unknown as to the extent of geotechnical, freeboard, or stability issues on the Bear River and Dry Creek levees and the District needs a study to determine needed actions and feasibility of implementation. Climate change is expected to make heavy rain events more severe, causing additional flooding on the Bear River and Dry Creek. These floods will stress District levees.

Project Description: The project will seek to perform a feasibility study on how to protect levees on the Bear River and Dry Creek. This will help the District to know what needs to be done to protect the levees from dam failure, heavy rains and storms, flooding, and localized flooding. These are all expected to be exacerbated by climate change. This study will help the District know what specific mitigation is needed on District levees.

Other Alternatives: Repair areas with past performance issues and continue with unknown risk

Existing Planning Mechanisms through which Action will be Implemented: SCFRR, Feather Regional Flood Management Plan, Central Valley Flood Protection Plan, FEMA HMGP or BRIC

Responsible Office: RD 817, City of Wheatland

Cost Estimate: $750,000

Potential Funding: Grants from Cal OES, FEMA, CA DWR, and US Army Corps

Benefits (avoided Losses): Reduced flood insurance costs for those protected by the levee.

Schedule: 6-12 months after initiation

Priority (H, M, L): H

Action 2. Implement Alternatives Identified in Action 1

Hazards Addressed: Floods (both 1%, 0.2% and Localized Flood), Dam Failure, Levee Failure, and Heavy Rains and Storms, and Climate Change

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

Issue/Background: Implement repairs or improvements identified as feasible in Action 1.

Project Description: The project will seek to implement the actions noted in the feasibility study on how to protect levees on the Bear River and Dry Creek. This will help the District to know what needs to be done to protect the levees from dam failure, heavy rains and storms, flooding, and localized flooding. These are all expected to be exacerbated by climate change.

Other Alternatives: Repair areas with past performance issues and continue with unknown risk

Existing Planning Mechanisms through which Action will be Implemented: SCFRR, Feather Regional Flood Management Plan, Central Valley Flood Protection Plan, FEMA HMGP or BRIC

Responsible Office: RD 817, City of Wheatland

Cost Estimate: $20M - $50M depending on the extent of repairs or improvements required

Potential Funding: Grants from Cal OES, FEMA, CA DWR, or others

Benefits (avoided Losses): Reduced flood insurance costs for those protected by the levee.

Schedule: 2-3 years after funding is secured

Priority (H, M, L): H