Annex R Twin Rivers School District

R.1 Introduction

This Annex details the hazard mitigation planning elements specific to Twin Rivers Unified School District (TRUSD or District), a previously participating jurisdiction to the 2016 Sacramento County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the District. This Annex provides additional information specific to TRUSD, with a focus on providing additional details on the risk assessment and mitigation strategy for this community.

R.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Sacramento County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table R-1. Additional details on plan participation and District representatives are included in Appendix A.

Table R-1 TRUSD – Planning Team

Name	Position/Title	How Participated
Greg Rash	Business Director	Coordination/Reports
Perry Hererra	Facilities Director	Project Planning/Implementation
Victoria Garcia	Facilities Sr. Budget	Provided Facility Records

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the District integrated the previously approved 2016 Plan into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2016 LHMP through other plans and programs shown in

le R-2.

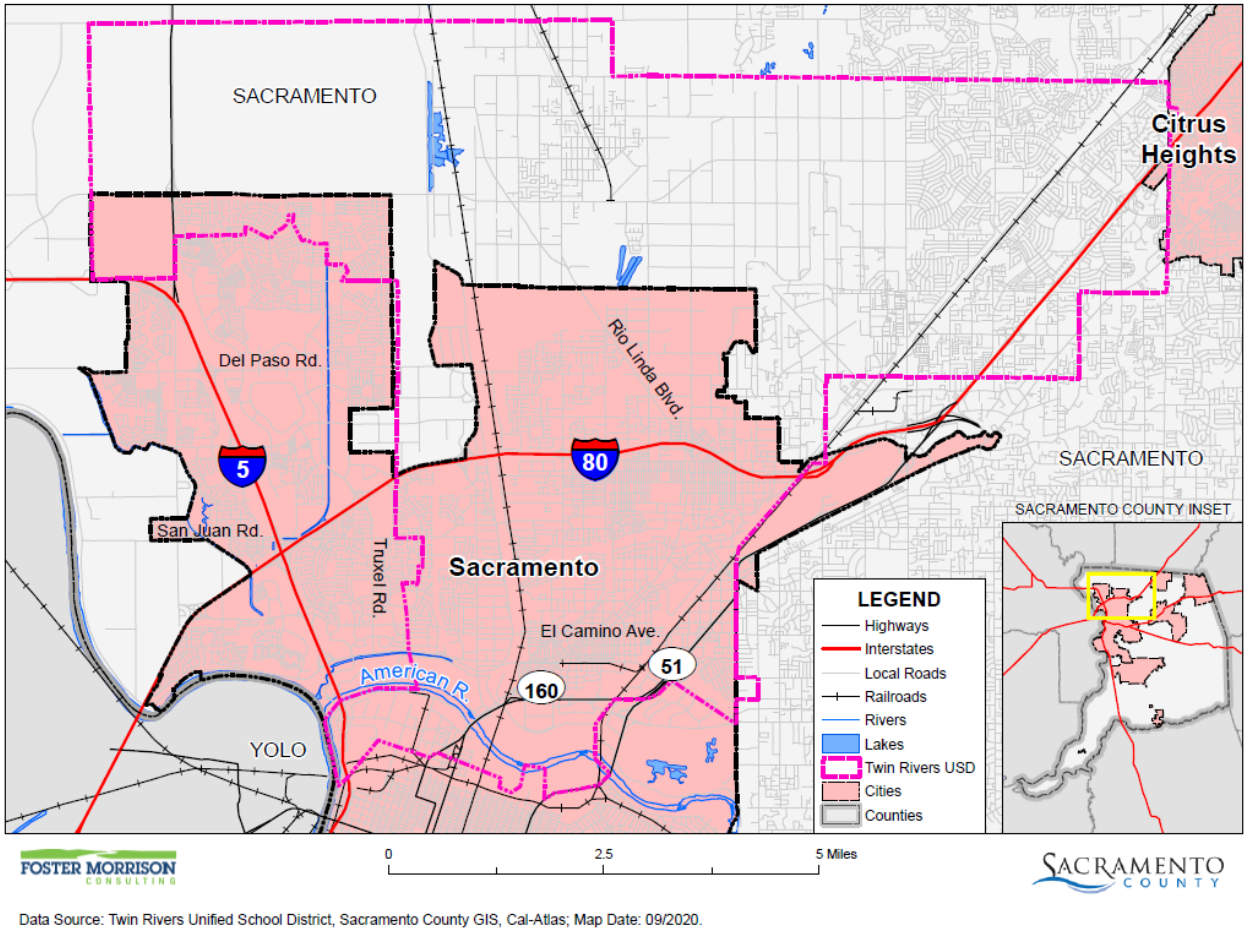
le R-2 2016 LHMP Incorporation

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

R.3 District Profile

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

Figure R-1 TRUSD



Data Source: Twin Rivers Unified School District, Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

R.3.1. Overview and Background

The small community school districts that evolved in the North Sacramento communities were long a topic of discussion and debate. While most of the country's students receive a fully articulated and unified educational experience in preschool through 12th grade systems, students in the North Sacramento area attended a variety of schools and districts depending on their neighborhood and grade level. Many educational leaders saw the need for more consistency, financial stability, and realignment of resources, but others worried that a larger system would take away a family-friendly culture the smaller districts enjoyed. In the late 1990s, a small group of community members and educators embarked upon a vision to unify the north area districts. After more than 60 years and seven attempts, voters finally approved this new vision for unification involving four of the six area school districts: Grant Joint Union High School District, North

Sacramento School District, Rio Linda Union School District, and Del Paso Heights School District. On November 7, 2007, the voters overwhelmingly adopted the unification proposal.

The voters chose a new board of trustees to lead this new unified district. They selected one trustee from each of seven geographic regions in the boundary area. The board requested that the community name our new district. After a month-long promotional contest and more than 500 suggestions, Twin Rivers Unified School District became the official name. On July 1, 2008, with much excitement and positive enthusiasm, the Twin Rivers Unified School District officially became the newest unified district in California.

The District is comprised of 760 acres utilizing over 3.4 million square feet of space, located in Sacramento County, in the northern region of the greater Sacramento area. Bordering Natomas district to the south and west, Sacramento City district to the south and San Juan district to the east, the District holds a total of 24,000 students in over 60 different schools. The District also owns a variety of other properties and buildings to house a variety of support facilities that include administrative offices, maintenance buildings, and park lands.

R.4 Hazard Identification

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

Table R-3 TRUSD—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	Low	–
Dam Failure	Significant	Unlikely	Catastrophic	Medium	Medium
Drought & Water Shortage	Extensive	Occasional	Limited	Low	High
Earthquake	Limited	Occasional	Critical	Medium	Low
Earthquake Liquefaction	Limited	Unlikely	Limited	Low	Low
Floods: 1%/0.2% annual chance	Limited	Occasional	Limited	High	Medium
Floods: Localized Stormwater	Significant	Occasional	Critical	Medium	Medium
Landslides, Mudslides, and Debris Flow	Limited	Likely	Limited	Low	Medium
Levee Failure	Limited	Unlikely	Negligible	Medium	Medium
Pandemic	Extensive	Likely	Catastrophic	High	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Occasional	Limited	Low	Medium
Severe Weather: Extreme Heat	Limited	Highly Likely	Negligible	Medium	High
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: Wind and Tornado	Extensive	Likely	Critical	Medium	Low
Subsidence	Limited	Likely	Limited	Low	Medium
Volcano	Limited	Unlikely	Limited	Low	Low
Wildfire	Extensive	Highly Likely	Catastrophic	High	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

R.5 Hazard Profile and Vulnerability Assessment

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

R.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section R.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table R-3) affects the District and includes information on past hazard occurrences and the likelihood of future hazard occurrence. The intent of this section is to provide jurisdictional specific information on hazards and further describes how the hazards and risks differ across the Sacramento County Planning Area.

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

Table R-4 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. TRUSD's physical assets, valued at over $471 million, consist of the buildings and infrastructure to support the District's operations.

Table R-4 TRUSD Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Occupancy	Replacement Value	Which Hazards Pose Risk
Allison, Warren A. Elementary	275	$8,656,606	
Babcock Park	0	N/A	
Babcock, D W Elementary	400	$10,091,408	
Castori, Michael J. Elementary	750	$11,657,008	
Creative Conn. Arts Academy Charter (K-5)	540	$7,718,359	
Creative Conn. Arts Academy Charter(6-12)	105	$15,956,958	
Del Paso Heights Elementary	290	$9,858,937	Maintenance shop demolished
District Office	330	$67,947,365	
DPH Park	0	$0	
Dry Creek Elementary	115	$9,979,484	Added3840 sq ft portables
East Natomas Educational Complex	0	$20,590,225	
Fairbanks Elementary	435	$9,339,298	
Foothill High	1,270	$45,703,319	
Foothill Oaks Elementary	580	$10,789,688	
Foothill Ranch Jr. High	765	$19,910,462	
Frontier Elementary	545	$7,637,419	
Future Charter School (7-12)	565	$0	
Garden Valley Elementary	410	$4,443,049	
Grant High	1,035	$56,079,174	
Grant West	1,035	$19,791,090	
Hagginwood Elementary	455	$7,948,263	
Hayer Park (RLPA) Park	0	$0	
Higher Learning Academy formerly	115	$2,684,822	
Higher Learning Academy formerly	115	N/A	
Highlands Academy of Art & Design	925	$36,927,807	
Hillsdale Elementary	460	$8,517,966	
LasPalmas was Johnson 2.0/Noralto	1385	$23,586,990	
Johnson, Harmon Elementary, Old (demolished lot)	0	$0	
Joyce, Frederick C. Elementary	605	$7,794,432	
Keema High School	0	$7,538,637	
King, Jr,. Martin Luther Technology Academy	365	$26,848,314	
Kohler Elementary	510	$8,791,281	
Madison Elementary	680	$9,601,208	

Name of Asset	Occupancy	Replacement Value	Which Hazards Pose Risk
Maint./Food/Transp. - Taft Street	15	$3,421,071,	
Maint./Oper./Transp. - Rio Linda	75	$1,453,205	
Morey Avenue Pre K - K	30	$4,930,529	
Murchison Center	0	$4,812,052	
Northwood Elementary	535	$11,684,220	
Norwood Jr. High	405	$17,883,487	
Nutrition - I Street Rio Linda	0	$1,453,205	
Oakdale Elementary	555	$7,255,223	
Orchard Elementary	255	$11,799,457	
Orchard Elementary	255	$0	
Pacific Career & Technology High	150	$8,131,581	
Pioneer Elementary	695	$8,715,550	
Regency Park Elementary	915	$14,367,957	
Richmond, Miles P. School	60	$3,527,456	
Ridgepoint Elementary	745	$8,671,283	
Rio Linda Elementary	0	$9,072,988	
Rio Linda High	1,930	$48,726,398	
Rio Linda High Stadium	0	N/A	
Rio Linda Prep Academy	500	$14,430,530	
Rio Tierra Jr. High	625	$19,693,026	
Sierra View Elementary	505	$8,046,391	
Smythe, Alethea B. Charter (7-8)	455	$8,707,534	
Smythe, Alethea B. Charter (K-6)	665	$9,026,714	
Strauch, Hazel Elementary	600	$9,017,816	
TR Police Admin Offices	55	$12,516,727	
Transportation - Grand Ave.	60	$2,542,809	
United Cerebral Palsey (leased out)	190	$6,684,217	
Village Elementary	645	$9,080,015	
Vineland (Pre) / Pathways (Alt.)	55	$7,362,893	
Vista Nueva Career & Tech High/NOVA	185	$6,962,473	
Westside Elementary	585	$8,355,629	
Winona Admin Center	105	$34,714,679	
Woodlake Elementary	480	$7,487,253	
Woodridge Elementary	515	$11,095,553	
Total		**$471,236,556**	

Source: TRUSD

Natural Resources

TRUSD is located in an area with a variety of natural resources of value to the District. These natural resources parallels that of Sacramento County as a whole. Information can be found in Section 4.3.1 of the Base Plan. While these species are not necessarily on the existing school grounds, they do exist in undeveloped areas nearby and within District boundaries.

Historic and Cultural Resources

TRUSD is located in an area a variety of historic and cultural resources of value to the District. The Planning Team for the District noted that there are sites that originated in the 1930's and 1940's, but they are not currently on the historical registry.

Growth and Development Trends

General growth in the District parallels that of the Sacramento County Planning Area as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Development since 2016

No District facilities have been constructed since 2016.

Future Development

The District noted the Greenbriar project is expected to begin construction 2021-2022. The District has no control over future development in areas the District services. Future development in these areas parallels that of the Sacramento County Planning Area. More general information on growth and development in Sacramento County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Sacramento County Vulnerability and Assets at Risk of the Base Plan.

R.5.3. Vulnerability to Specific Hazards

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

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

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

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

Power Outage/Power Failure

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

Public Safety Power Shutoff (PSPS)

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

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.

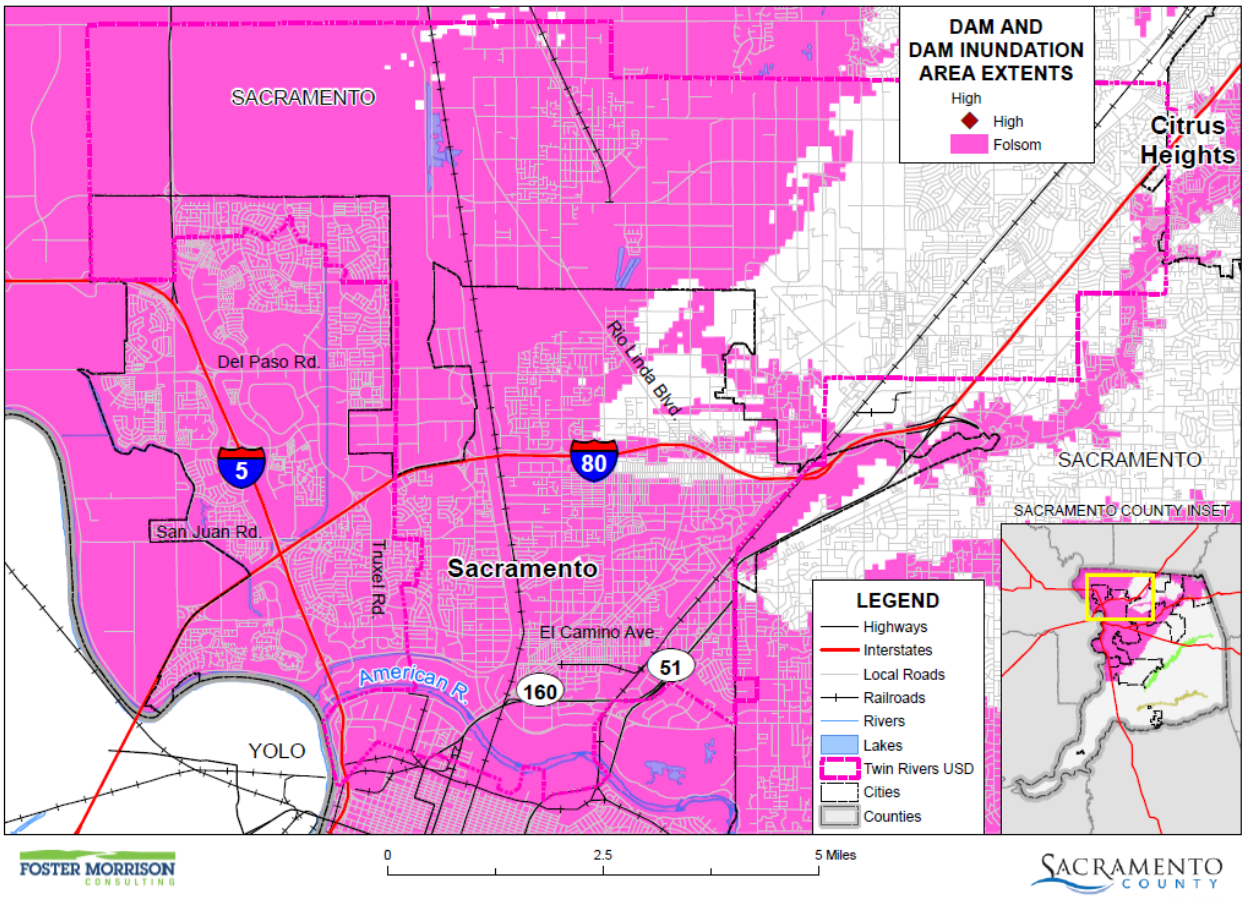
Location and Extent

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.

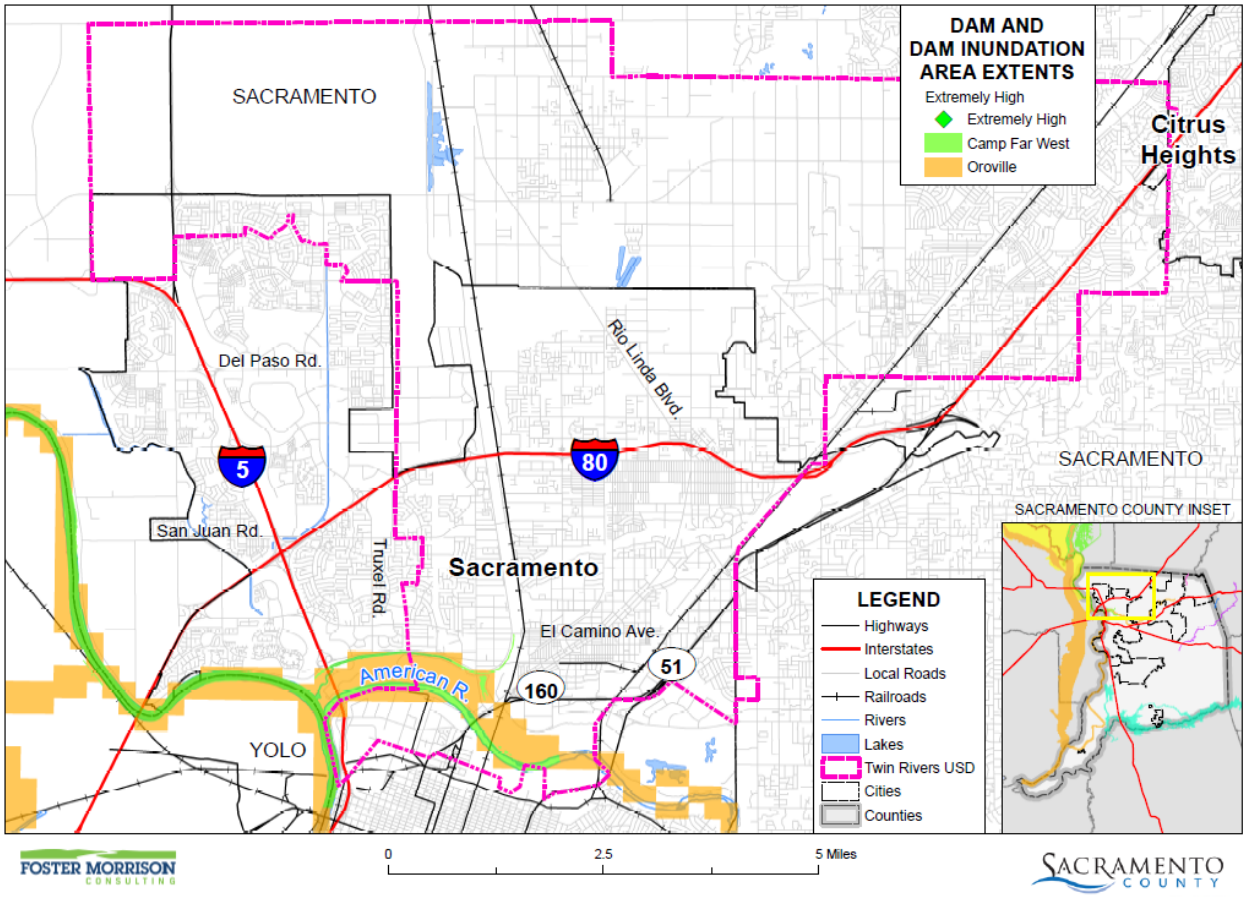
Based on dam inundation data obtained from CA DWR and Cal OES the was discussed in Section 4.3.7 of the Base Plan, dams inside the County that can affect the District can be seen on Figure R-2. Dams outside the County that can affect the District can be seen on Figure R-3. Portions of the District lie in the dam inundation areas from the Folsom 235,000 cfs scenario. These are shown on Figure R-4. While Figure R-2 and Figure R-3 illustrate dam inundation areas from an actual dam failure, Figure R-4, the Folsom 235,000 cfs scenario reflects the likely inundation area associated with a possible "super" release of water from Folsom. This updated Folsom scenario reflects the Folsom dam improvements which make a dam failure unlikely, with any resulting downstream inundation from Folsom associated with an intentional release of water from the dam. It is anticipated that the worst case scenario would be a 235,000 cfs release, which is comparable to a 200-year flood.

Figure R-2 TRUSD – Dam Inundation Areas from Dams Inside the County



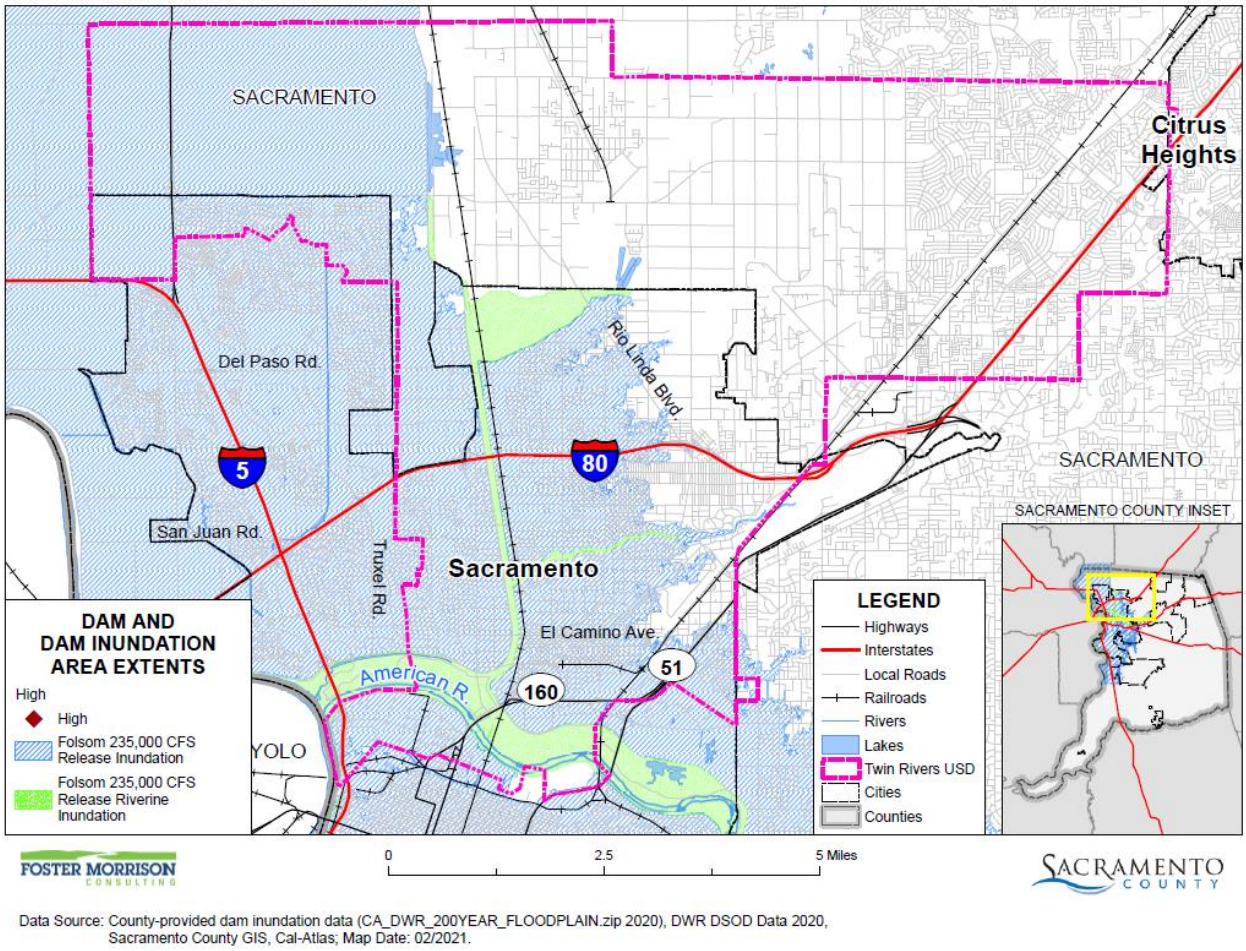
Data Source: County-provided dam inundation data (FOLSOM_DAM_INUNDATION_AREA.shp 2016), DWR DSOD Data 2020 and Cal OES Dam Status 10/2017, Sacramento County GIS, Cal-Atlas; Map Date: 2/2021.

Figure R-3 TRUSD – Dam Inundation Areas from Dams Outside the County



Data Source: DWR DSOD Data 2020 and Cal OES Dam Status 10/2017, Sacramento County GIS, Cal-Atlas; Map Date: 9/2020.

Figure R-4 TRUSD – Dam Inundation from Folsom 235,000 cfs Scenario



Data Source: County-provided dam inundation data (CA_DWR_200YEAR_FLOODPLAIN.zip 2020), DWR DSOD Data 2020, Sacramento County GIS, Cal-Atlas; Map Date: 02/2021.

Folsom Dam is the major dam which affects the District and the student populations in the inundation areas. Of prime concern is the Folsom Dam, which is owned by the US Bureau of Reclamation. The flood waters from the dam would affect the District.

Other dams could affect the District, but inundation zones for the following dams were not mapped for this Plan. The District noted that a Sacramento Municipal Utility District (SMUD) inundation map indicates that a failure of the Rancho Seco Dam would flow to the Laguna Creek Basin and stop approximately at Stockton Boulevard. Failure of Shasta Dam would affect populations south along the Sacramento River basin to about Knights Landing where the water would lose momentum. An Oroville Dam failure would impact populations southwest along the Feather River basin to about the Yolo Bypass.

Past Occurrences

There has been no federal or state disaster declarations for dam failure in the County. 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 include loss of life and injury, flooding and damage to property and structures, damage to critical facilities and infrastructure, school closures, loss of natural resources, and all other flood related impacts. Additionally, mass evacuations of students and staff during these times can also be difficult.

Warning ability is generally determined by the frequency of inspections for structural integrity, the flood wave arrival time (the time it takes for the flood wave to reach its maximum distance of inundation), or the ability to notify persons downstream and their ability to evacuate. The existence and frequency of updating and exercising an evacuation plan that is site-specific assists in warning and evacuation functions.

The Districts greatest concern is property damage due to flooding, as well as the evacuations that may be necessary for students, faculty, and staff.

Assets at Risk

Smythe 7-8, Woodlake, and Babcock would be at risk to dam failure.

Earthquake

Likelihood of Future Occurrence–Occasional
Vulnerability–Medium

Hazard Profile and Problem Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. The degree of damage depends on many interrelated factors. Among these are: the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction.

Location and Extent

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales, as discussed in Section 4.3.9 of the Base Plan. Geological literature indicates that no major active faults transect the County; however, there are several subsurface faults in the Delta. The Midland fault, buried under alluvium, extends north of Bethel Island in the Delta to the east of Lake Berryessa and is considered

inactive but possibly capable of generating a near 7.0 (Richter Scale) earthquake. This magnitude figure is speculative based on a 1895 earthquake measuring 6.9 on the Richter Scale with an epicenter possibly in the Midland Fault vicinity. However, oil and gas companies exploring the area's energy potential have identified several subsurface faults, none of which show any recent surface rupture. A second, presumably inactive, fault is in the vicinity of Citrus Heights near Antelope Road. This fault's only exposure is along a railroad cut where offsetting geologic beds can be seen. Neither the lateral extent of the trace, the magnitude of the offset, nor the age of faulting has been determined. To the east, the Bear Mountain fault zone trends northwest-southeast through Amador and El Dorado Counties. Geologists believe this series of faults has not been active in historic time.

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. The District is located in an area where few earthquakes of significant magnitude occur, so both magnitude and intensity of earthquakes are expected to remain low. Seismic shaking maps for the area show Sacramento County and the District fall within a low to moderate shake risk, with most of the moderate risk in the Delta area of the County.

Past Occurrences

There have be no past federal or state disaster declarations from this hazard. The District noted no past occurrences of earthquakes or that affected the District in any meaningful way.

Vulnerability to and Impacts from Earthquake

The combination of plate tectonics and associated California coastal mountain range building geology generates earthquake as a result of the periodic release of tectonic stresses. Sacramento County lies in the center of the North American and Pacific tectonic plate activity. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future of the California north coastal mountain region.

Fault ruptures itself contributes very little to damage unless the structure or system element crosses the active fault; however, liquefaction can occur further from the source of the earthquake. In general, newer construction is more earthquake resistant than older construction due to enforcement of improved building codes. Manufactured buildings can be very susceptible to damage because their foundation systems are rarely braced for earthquake motions. Locally generated earthquake motions and associated liquefaction, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry (URM) and soft story buildings. There are no URM or soft story buildings in the District.

The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. The TRUSD is within the less hazardous Zone 3.

Impacts from earthquake in the District will vary depending on the fault that the earthquake occurs on, the depth of the earthquake strike, and the intensity of shaking. Large events could cause damages to infrastructure, critical facilities, residential and commercial properties, and possible injuries or loss of life.

All facilities in the District are designed, approved, and built in accordance with building codes current at time of construction, Department of State Architects

Assets at Risk

No District assets from Table R-4 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

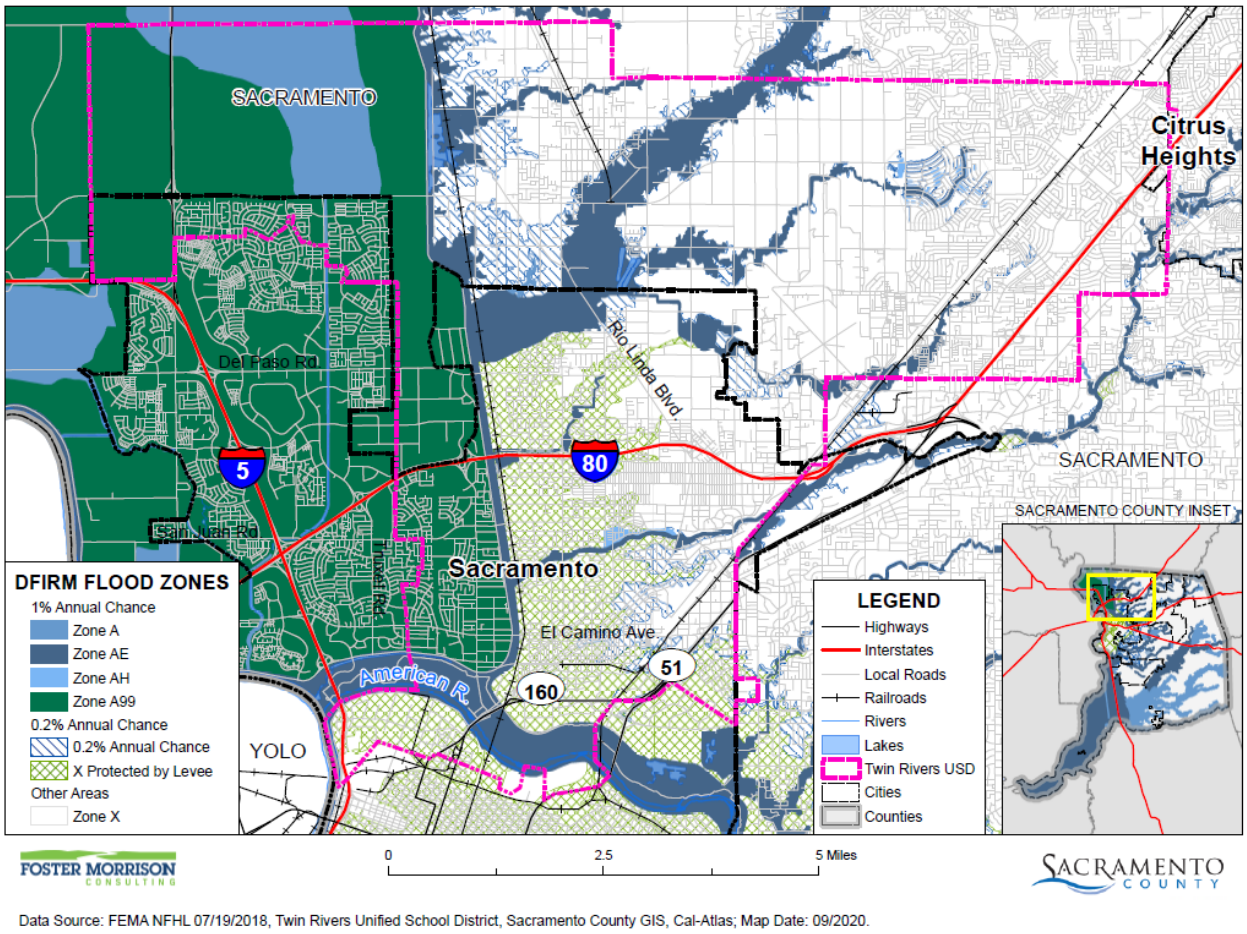
This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the District, and have caused damages in the past. Flooding is a significant problem in Sacramento County and the District. Historically, the District has been at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

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

Location and Extent

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

Figure R-5 TRUSD – FEMA DFIRM Flood Zones



Data Source: FEMA NFHL 07/19/2018, Twin Rivers Unified School District, Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

Table R-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 R-5 TRUSD– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone Present in the District
A	100-year Flood: No base flood elevations provided	X
AE	100-year Flood: Base flood elevations provided	X
AH	An area inundated by 1% annual chance flooding (usually an area of ponding), for which BFEs have been determined; flood depths range from 1 to 3 feet	X
AO	Areas subject to inundation by 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet	
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones	X
Shaded X	500-year flood the areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	X

Flood Zone	Description	Flood Zone Present in the District
X Protected by Levee	An area determined to be outside the 500-year flood and protected by levee from 100-year flood	X
X (unshaded)	Areas outside flood zones	X

Source: FEMA

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

Past Occurrences

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

Table R-6 Sacramento County – State and Federal Disaster Declarations from Flood 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	19	1950, 1955, 1958 (twice), 1963, 1969, 1982 (twice), 1983, 1986, 1995 (twice), 1996, 1997, 1998, 2008, 2017 (three times)	14	1955, 1958, 1964, 1969, 1983, 1986, 1995 (twice), 1997, 1998, 2006, 2017 (three times)

Source: Cal OES, FEMA

Flood waters in 1986 and 1998 caused damage to roads, structures and district properties. The many creeks and tributaries are still a risk for downstream flooding, in spite of corrections to local levees and upriver dams. While some damage occurred at this time, the records indicating repairs and corrections are not available. Twin Rivers USD is the culmination of four school districts, which unified in 2008. Records prior to this time are not available.

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.

Assets at Risk

The District noted that Regency Park, Garden Valley, Rio Tierra, Strauch, Smythe P-6, and Smythe 7-8 are at risk from flooding.

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

Localized flooding also occurs throughout the Sacramento County Planning Area at various times throughout the year with several areas of primary concern unique to the District.

Past Occurrences

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

- Flood waters in 1986 and 1998 caused considerable damage to roads, structures and district properties. The many creeks and tributaries are still a risk for downstream flooding, in spite of corrections to local levees and upriver dams.

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.

The District floods easily and each year during storm season, sand bags are pulled out. These instances are only recorded by work orders carried out by the maintenance department. The District could not provide any specific data on areas of localized flooding that directly affect District properties.

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.

Assets at Risk

No District assets from Table R-4 are at risk from this hazard.

Levee Failure

Likelihood of Future Occurrence–Unlikely
Vulnerability–Medium

Hazard Profile and Problem Description

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

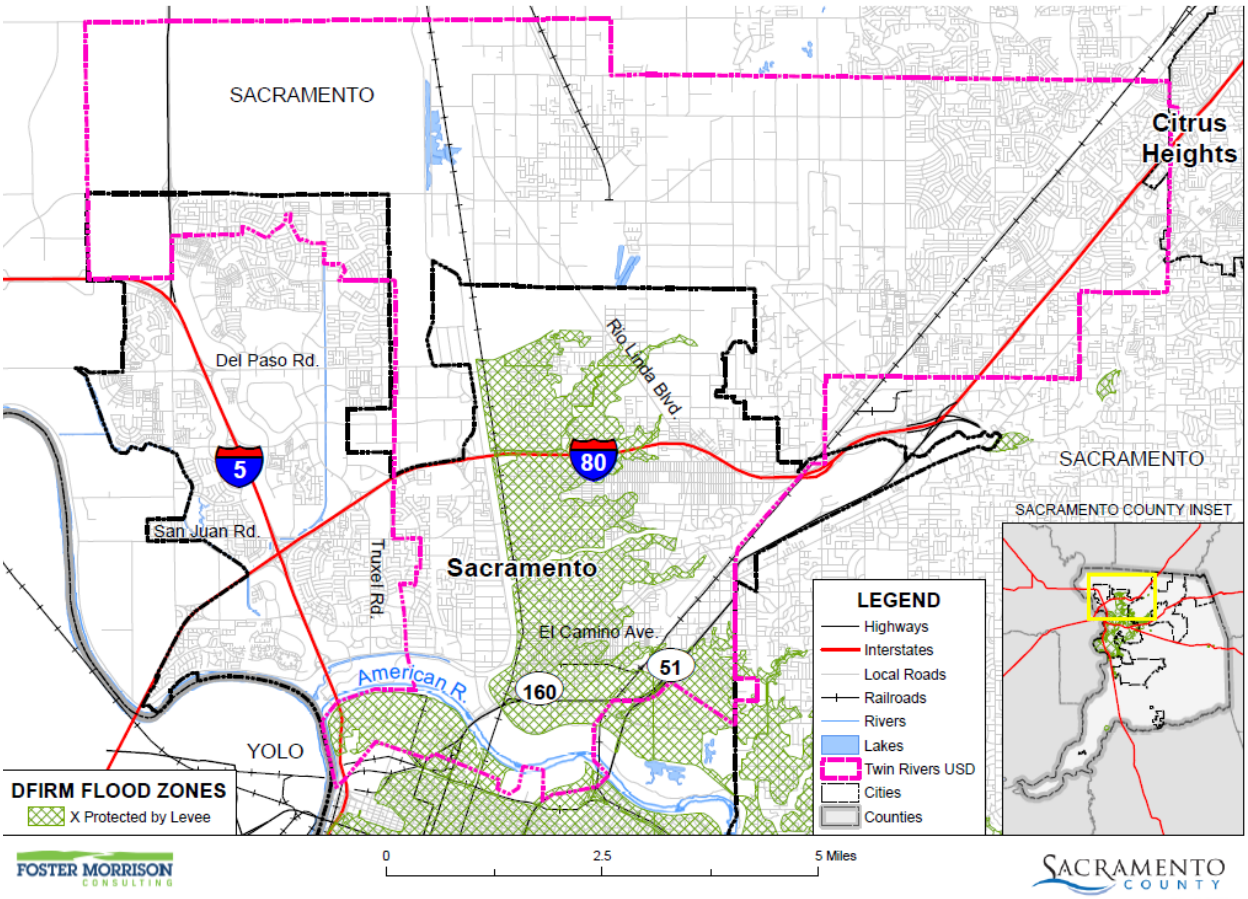
Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. For example, levees can be certified to provide protection against the 1% annual chance flood. Levees reduce,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

eliminate, the risk to individuals and structures located behind them. A levee system failure or overtopping can create severe flooding and high water velocities. Levee failure can occur through overtopping or from seepage issues resulting from burrowing rodents, general erosion, excessive vegetation and root systems and other factors that compromise the integrity of the levee. No levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Location and Extent

There is not a scientific scale or measurement system in place for levee failure. Expected flood depths from a levee failure in the District vary by event and location. The speed of onset is slow as the river rises, but if a levee fails the warning times are generally short for those in the inundation area. The duration of levee failure risk times can be hours to weeks, depending on the river flows that the levee holds back. When northern California dams and reservoirs are nearing maximum capacity, they release water through the river systems, causing additional burdens on County levees. The FEMA DFIRMs show areas that were protected by levees as of the 2018 DFIRM map date. The X-protected by levee flood zone reflects areas protected by levees certified as providing 100-year level of protection. These X-protected by levee zones in the District are shown on Figure R-6.

Figure R-6 TRUSD – Levee Protected Areas



Data Source: FEMA NFHL 07/19/2018, Twin Rivers Unified School District, Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

Past Occurrences

There have been no federal or state disaster declarations from levee failure. The District Planning Team noted no past occurrences of levee failures.

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.

Property damage is the greatest concern for the District from levee failure.

Assets at Risk

The District noted that Smythe 7-8, Woodlake, Babcock, Del Paso, Morey, Fairbanks, Las Palmas, MLK Jr.Norwood are at risk from this hazard.

Pandemic

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile and Problem Description

According to the World Health Organization (WHO), a disease epidemic occurs when there are more cases of that disease than normal. A pandemic is a worldwide epidemic of a disease. A pandemic may occur when a new virus appears against which the human population has no immunity. A pandemic occurs when a new virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in a very short time. The U.S. Centers for Disease Control and Prevention has been working closely with other countries and the WHO to strengthen systems to detect outbreaks of that might cause a pandemic and to assist with pandemic planning and preparation. An especially severe a pandemic could lead to high levels of illness, death, social disruption, and economic loss.

Location and Extent

During a pandemic, the whole of the District, County, and surrounding region is at risk, as pandemic is a regional, national, and international event. The speed of onset of pandemic is usually short, while the

duration is variable, but can last for more than a year as shown in the 1918/1919 Spanish Flu. There is no scientific scale to measure the magnitude of pandemic. Pandemics are usually measured in numbers affected by the pandemic, and by number who die from complications from the pandemic.

Past Occurrences

There has been one state and federal disaster declaration due to pandemic, as shown in Table R-7.

Table R-7 Sacramento County – State and Federal Pandemic Disaster Declarations 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Pandemic	1	2020	1	2020

Source: Cal OES, FEMA

The 20th century saw three outbreaks of pandemic.

- The 1918-1919 Influenza Pandemic (H1N1)
- The February 1957-1958 Influenza Pandemic (H2N2)
- The 1968 Influenza Pandemic (H3N2)

To date, the 21st century has seen two acknowledged pandemics.

- 2009 Swine Flu (H1N1)
- 2019/2020 COVID 19

All schools were closed on March 13, 2020. All staff worked remotely from home. Students engaged in on-line learning using issued computers and online communication programs. Schools were set up for social distancing of 6', desks and other furniture were removed from classrooms and placed in storage. COVID-19 Prevention Plan was implemented, protocol posters and floor distancing decals placed strategically throughout campuses. Custodial Operations implemented cleaning and disinfecting policies and schedules. Mandatory mask wearing is practiced. Staff returned to work March 2021. Students returned under a cohort model.

Vulnerability to and Impacts from Pandemic

Pandemics have and will continue to have impacts on human health in the region. A pandemic occurs when a new virus emerges for which there is little or no immunity in the human population; the virus causes serious illness and spreads easily from person-to-person worldwide. There are several strategies that public health officials can use to combat a pandemic. Constant surveillance regarding the current pandemic, use of infection control techniques, and administration of vaccines once they become available. Citizens can help prevent the spread of a pandemic by staying home, or "self-quarantining," if they suspect they are infected. Pandemic does not affect the buildings, critical facilities, and infrastructure in the District. Pandemic can have varying levels of impact to the citizens of the District and greater County, depending on the nature of the pandemic.

Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. Hospitalizations and deaths can occur, especially to the elderly or those with pre-existing underlying conditions. As seen with Covid-19, multiple businesses were forced to close temporarily (some permanently) and unemployment rose significantly. Supply chains for food and essentials can be interrupted. Prisons may need to release prisoners to comply with social distance standards.

All schools were closed on March 13, 2020. All staff worked remotely from home. Students engaged in on-line learning using issued computers and online communication programs. Schools were set up for social distancing of 6', desks and other furniture were removed from classrooms and placed in storage. COVID-19 Prevention Plan was implemented, protocol posters and floor distancing decals placed strategically throughout campuses. Custodial Operations implemented cleaning and disinfecting policies and schedules. Mandatory mask wearing is practiced. Staff returned to work March 2021. Students returned under a cohort model.

Assets at Risk

Pandemics do not affect District facilities, but can affect District personnel who operate District facilities.

Severe Weather: Extreme Heat

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile and Problem Description

According to FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In extreme heat and high humidity, evaporation is slowed, and the body must work extra hard to maintain a normal temperature." Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat.

In addition to the risks faced by citizens of the District, there are risk to the built environment from extreme heat. While extreme heat on its own does not usually affect structure, extreme heat during times of drought can cause wildfire risk to heighten. Extreme heat and high winds can cause power outages and PSPS events, causing issues to buildings in the District.

Location and Extent

Heat is a regional phenomenon and affects the whole of the District. Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. Heat waves do not strike victims immediately, but rather their cumulative effects slowly affect vulnerable populations and communities. Heat waves do not generally cause damage or elicit the immediate response of floods, fires, earthquakes, or other more "typical" disaster scenarios.

The NWS has in place a system to initiate alert procedures (advisories or warnings) when extreme heat is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. The NWS HeatRisk forecast provides a quick view of heat risk potential over the upcoming seven days. The heat risk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale which is similar in approach to the Air Quality Index (AQI) or the UV Index. This can be seen in Section 4.3.3 of the Base Plan.

Past Occurrences

There has been no federal or state disaster declarations in the County for heat. The District Planning Team noted that since extreme heat is a regional phenomenon, events that affected the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.3.

The District has had to provide fans, temporary AC units and other devices to cool classrooms during extreme heat.

Vulnerability to and Impacts from Extreme Heat

The District experiences temperatures in excess of 100°F during the summer and fall months. The temperature moves to 105-110°F in rather extreme situations. During these times, drought conditions may worsen. Also, power outages and PSPS events may occur during these times as well. Health impacts are the primary concern with this hazard, though economic impacts are also an issue.

Days of extreme heat have been known to result in medical emergencies, and unpredictable human behavior. Periods of extended heat and dryness (droughts) can have major economic, agricultural, and water resources impacts. Extreme heat can also dry out vegetations, making it more vulnerable to wildfire ignitions.

Extreme heat conditions are likewise most pervasive during the summer months when school populations and programming are at their lowest levels. The impact on schools from extreme heat, as a consequence, are minimal when contrasted to those stemming from other natural hazards. That said, high temperatures have, with increasing frequency, served as a catalyst in hazardous air quality emergencies, which hold substantive operational impacts for schools. Extreme heat events do not typically necessitate school closures, but do require limits to outdoor activities and sometimes confining students to indoor spaces.

The District is situated on a thermal belt in a relatively flat area, as is much of the central California area, resulting in excessive heat during late spring and early fall seasons. Due the age of most schools, the HVAC equipment has long since passed its intended usage. The District continues to install new equipment, when able. This has been a very real problem in the District for years, due to the extreme temperatures, over 100 degrees in the beginning and end of the school year. In the event of extreme heat, populations with special needs such as elementary school students are of particular concern; as they are most vulnerable to extreme temperatures. Approximately 13,500 students in elementary or pre-kindergarten these would be at risk to extreme heat. The District intends, as a matter of policy, to address these issues in the hazard mitigation plan and as a matter of course for district procedure. The extreme heat has also killed many trees and planted areas.

Assets at Risk

All District assets from Table R-4 are at risk from this hazard.

Severe Weather: Heavy Rains and Storms

Likelihood of Future Occurrence–Highly 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, Sacramento County, and the District can range from minutes to hours to days. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

Past Occurrences

There have been past disaster declarations from heavy rains and storms, which were discussed in Past Occurrences of the flood section above. According to historical hazard data, severe weather, including heavy rains and storms, is an annual occurrence in the District. This is the cause of many of the federal disaster declarations related to flooding.

The District noted that multiple campuses and classrooms suffered rain damage caused by leaking roofs.

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 in the District. More information on power outage and failure can be found in the discussion at the beginning of Section R.5.3, as well as in Section 4.3.3 of the Base Plan.

Assets at Risk

All District assets from Table R-4 are at some risk from this hazard.

Severe Weather: High Winds and Tornadoes

Likelihood of Future Occurrence–Likely
Vulnerability–Medium

Hazard Profile and Problem Description

High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. High winds can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds can exacerbate a wildfire event and can also cause a PSPS.

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes form when cool, dry air sits on top of warm, moist air. Tornadoes are the most powerful storms that exist. Tornadoes, though rare, are another severe weather hazard that can affect areas of the Sacramento County Planning Area, primarily during the rainy season in the late fall, winter, and early spring.

Location and Extent

The entire District is subject to significant, non-tornadic (straight-line), winds. Each area of the County is at risk to high winds. Magnitude of winds is measured often in speed and damages. These events are often part of a heavy rain and storm event, but can occur outside of storms. The speed of onset of winds can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of winds in California is often short, ranging from minutes to hours. The Beaufort scale is an empirical 12 category scale that relates wind speed to observed conditions at sea or on land. Its full name is the Beaufort Wind Force Scale. The Beaufort Scale was shown in Section 4.3.5 of the Base Plan.

Tornadoes, while rare, can occur at any location in the County and District. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale (EF) provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers

the materials affected and the construction of structures damaged by a tornado. The F Scale and EF Scale are shown in Section 4.3.5 of the Base Plan.

Past Occurrences

There has been no federal or state disaster declarations in the County for winds and tornadoes. The District noted that since high winds is a regional phenomenon, events that affected the lower elevations of the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.5.

Vulnerability to and Impacts from Severe Weather: Wind and Tornado

High winds are common occurrences in the District throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered. High winds can impact critical facilities and infrastructure and can lead to power outages. Wind can also drive wildfire flames, spreading wildfires quickly During periods of high winds and dry vegetation, wildfire risk increases. High winds that occur during periods of extreme heat can cause PSPS events to be declared in the County.

Impacts from high winds in the District will vary. Future losses from straight line winds include:

- Downed trees
- Power line impacts and economic losses from power outages, including PSPS events
- Occasional building damage, primarily to roofs

Tornadoes need to be given serious consideration in this assessment, because if and when they do strike a school, the impact can be devastating. Tornadoes can impact the District by destroying buildings and infrastructure within seconds. Tornadoes can cause numerous human injuries or fatalities. They can create tremendous debris removal problems, overwhelm building departments, and psychologically scar students, faculty, and staff.

Assets at Risk

No District assets from Table R-4 are at possible risk from this hazard, though the risk is not high.

Wildfire

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

Hazard Profile and Problem Description

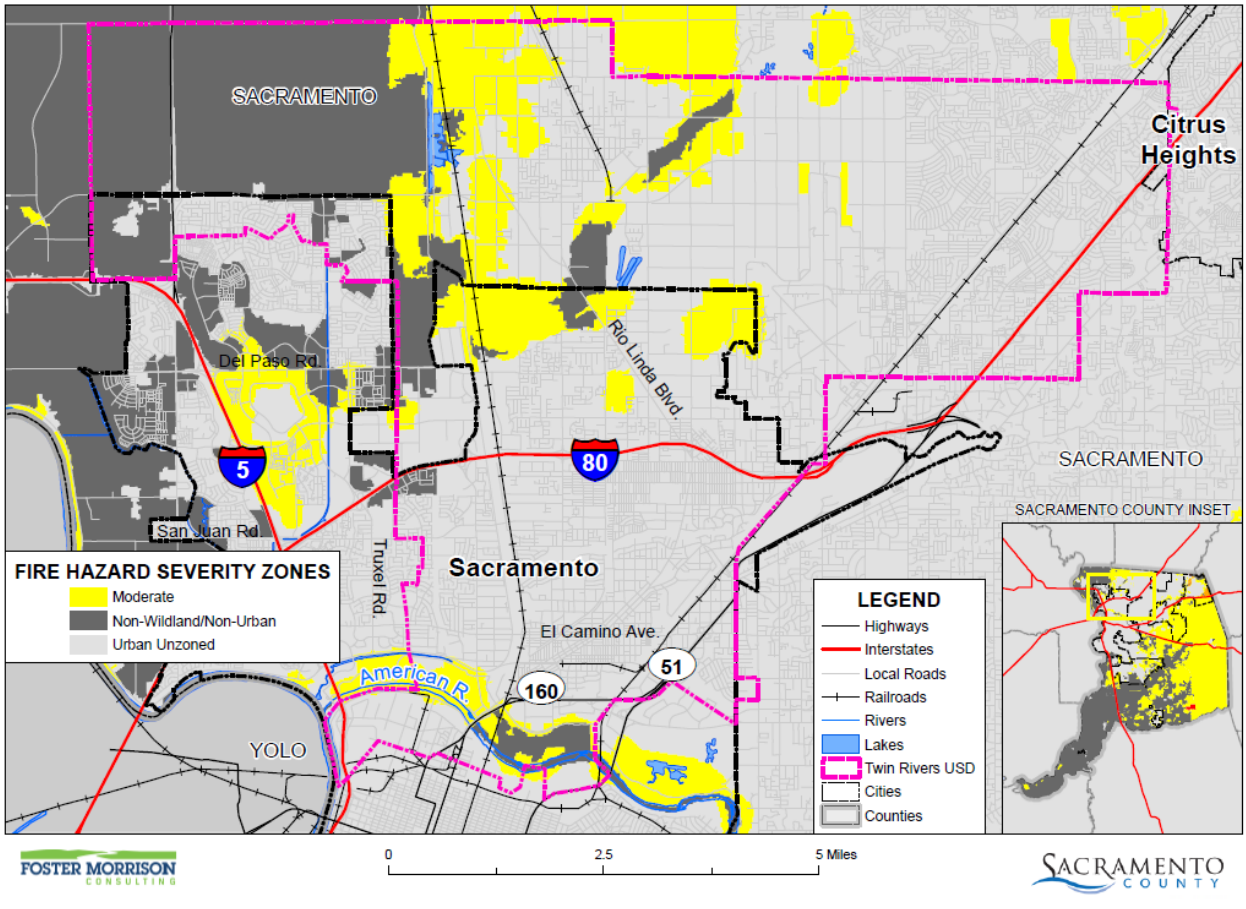
Wildland fire and the risk of a conflagration is an ongoing concern for the TRUSD. Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of the ecosystem. Wildland fires affect grass, forest, and brushlands, as well as any structures located within them. Where

there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Historically, the fire season extends from early spring through late fall of each year during the hotter, dryer months; however, in recent years, the risk of wildfire has become a year around concern. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds. While wildfire risk has predominantly been associated with more remote forested areas and wildland urban interface (WUI) areas, significant wildfires can also occur in more populated, urban areas.

Location and Extent

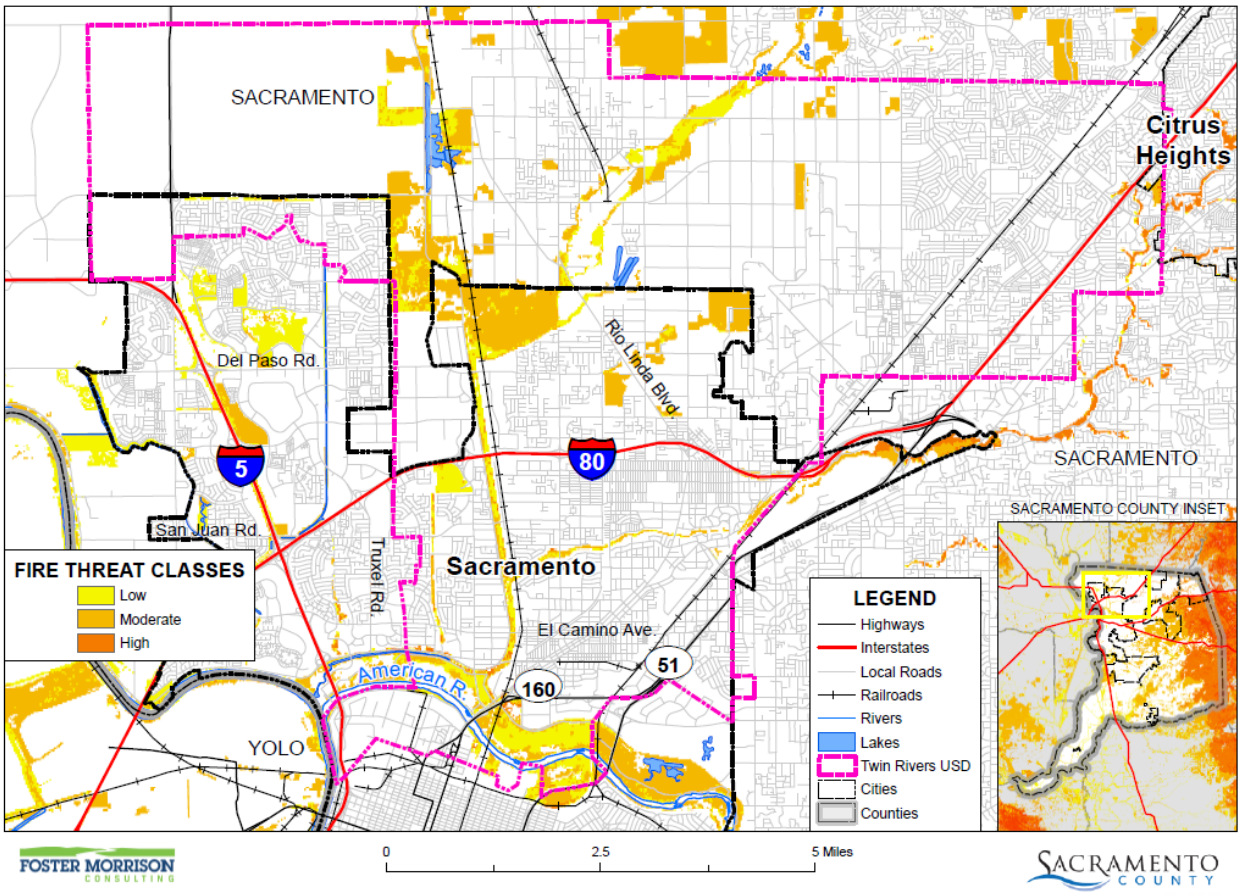
Wildfire can affect all areas of the District. CAL FIRE has estimated that the risk varies across the District and has created maps showing risk variance. Following the methodology described in Section 4.3.16 of the Base Plan, wildfire maps for the TRUSD were created. Figure R-7 shows the CAL FIRE FHSZ in the District. As shown on the maps, fire hazard severity zones within the District range from Urban Uzoned to Moderate. Figure R-8 shows the CAL FIRE Fire Threat Areas in the City. As shown on the maps, fire threat within the District ranges from No Threat to High.

Figure R-7 TRUSD – Fire Hazard Severity Zones



Data Source: Cal-Fire 2017 (Draft 9/2007 - c34fhszl06_1, Adopted 11/2007 - fhsz06_3_34, Recommended 10/2008 - c34fhszl06_3), Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

Figure R-8 TRUSD – Fire Threat Areas



Data Source: Cal-Fire 2017 Fire Threat Data (fthrt14_2), Twin Rivers Unified School District, Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on acres burned. Fires can have a quick speed of onset, especially during periods of drought or during hot dry summer months. Fires can burn for a short period of time, or may have durations lasting for a week or more.

Past Occurrences

There has been one state and no federal disaster declarations for Sacramento County from fire. It should be noted that this was from Southern Pacific Railroad Fires and Explosions (Roseville), so it was not truly a wildfire.

Table R-8 Sacramento County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Fire	1	1973	0	–

Source: Cal OES, FEMA

The District noted that the Paradise Fire had District-wide impact on air quality. Students had to remain indoors, Grounds and Maintenance staff were unable to complete work.

Vulnerability to and Impacts from Wildfire

Risk and vulnerability to the Sacramento County Planning Area and the District from wildfire is of significant concern, with some areas of the District being at greater risk than others as described further in this section. High fuel loads, combined with a large built environment and population, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and potentially catastrophic fires. During the May to October fire season, the dry vegetation and hot and sometimes windy weather results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire. As development continues throughout the County and the District, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

Potential impacts from wildfire include loss of life and injuries; damage to structures and other improvements, natural and cultural resources, croplands,; and loss of recreational opportunities. Wildfires can cause short-term and long-term disruption to the District. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the District by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires can also affect air quality in the District; smoke and air pollution from wildfires can be a severe health hazard.

Although the physical damages and casualties arising from large fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Schools and businesses can be forced to close for extended periods of time. The threat of wildfire, combined with the potential for high winds, heat, and low humidity, can cause PG&E to initiate PSPSs which can also significantly impact a community through loss of services, business closures, and other impacts associated with loss of power for an extended period. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

Assets at Risk

No District assets from Table R-4 are at direct risk from this hazard.

R.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.

R.6.1. Regulatory Mitigation Capabilities

Table R-9 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 TRUSD.

Table R-9 TRUSD Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan/General Plan	Y 2009	District Organization and Implementation Planning Process
Capital Improvements Plan	Y	Facilities master plan
Economic Development Plan	N	
Local Emergency Operations Plan	Y	Emergency Management Plan
Continuity of Operations Plan	N	
Transportation Plan	N	
Stormwater Management Plan/Program	Y	TRUSD SWWP-continuously updated
Engineering Studies for Streams	N	
Community Wildfire Protection Plan	Y	Natomas Habitat Conservation Plan
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Y	Safety Plan
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	N	Dept. of State Architect / Title 24
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score: unknown
Fire department ISO rating:	N	Rating: unknown
Site plan review requirements	Y	By CDE as required and to verify preventative measures established. By DSA for final plan check.
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	
Subdivision ordinance	N	
Floodplain ordinance	N	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N	
Flood insurance rate maps	N	
Elevation Certificates	N	

Acquisition of land for open space and public recreation uses	N	
Erosion or sediment control program	N	
Other	Y	District Policy Manual
How can these capabilities be expanded and improved to reduce risk?		
District wide training on prctices to include emergency response drills		

Source: TRUSD

R.6.2. Administrative/Technical Mitigation Capabilities

Table R-10 identifies the District department(s) responsible for activities related to mitigation and loss prevention in TRUSD.

Table R-10 TRUSD's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N	
Mitigation Planning Committee	N	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	
Mutual aid agreements	N	
Other		
Staff	**Y/N FT/PT**	**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Chief Building Official	N	
Floodplain Administrator	N	
Emergency Manager	Y FT	Risk Manager
Community Planner	N	
Civil Engineer	Y FT	Facilities/Planning – Director of Facilities & Construction
GIS Coordinator	Y	Facilities/Planning
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	IT Department
Hazard data and information	N	
Grant writing	N	
Hazus analysis	N	
Other		

How can these capabilities be expanded and improved to reduce risk?
Implement Planning Committee.

Source: TRUSD

R.6.3. Fiscal Mitigation Capabilities

Table R-11 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table R-11 TRUSD'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	Used for all types of improvement projects
Authority to levy taxes for specific purposes	Y	School Impact Fees
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	Y	Developer Fees used on various projects
Storm water utility fee		
Incur debt through general obligation bonds and/or special tax bonds	Y	Bonds-for specific site improvements
Incur debt through private activities	Y	Private Loans
Community Development Block Grant	N	
Other federal funding programs	Y	Grants
State funding programs	Y	Modernization Funding
Other		
How can these capabilities be expanded and improved to reduce risk?		
District is self-insured and a member of a JPA. Working closely with JPA on risk reduction		

Source: TRUSD

In addition, there are a number of Federal sources of funding for hazard mitigation projects, including:

- Federal Emergency Management Agency (FEMA)
- Housing and Urban Development (HUD)
- US Army Corps of Engineers (USACE)
- Small Business Administration (SBA)
- US Department of Agriculture (USDA)
- Natural Resource Conservation Service (NRCS)
- National Oceanic and Atmospheric Administration (NOAA)
- Federal Homeland Security Grants
- Bureau of Land Management (BLM)
- CA Dept. of Water Resources Flood Safe Program

R.6.4. Mitigation Education, Outreach, and Partnerships

Table R-12 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 R-12 TRUSD'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	Safe Schools, Energy Management; solar and water retention programs.
Natural disaster or safety related school programs	Y	In Emergency Plan
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?		
Those listed above in table. The District will work with students and faculty to reduce risk to natural hazards.		

Source: TRUSD

R.6.5. Other Mitigation Efforts

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

The district is in the process of partnering with appropriate agencies, such as the California Department of Natural Resources, County of Sacramento, Rio Linda/Elverta Water Department, Sacramento Regional Flood Control Agency, Arcade Creek Parks and Recreation and neighborhood efforts to minimize loss of property and casualties of potential catastrophic event.

The district works closely with the local efforts to monitor ongoing efforts to provide safe levee systems. The district also works closely with neighboring water districts to minimize flooding and provide adequate drainage at sites within flood zones. The district plans to prepare and activate a community protection/assistance initiative for the area most critical.

The County of Sacramento, Rio Linda/Elverta Water Department, SAFCO, Arcade Creek Parks and Recreation and Sacramento County Libraries will become partners in mitigation efforts.

The District is in the process of implementing an assessment and protection plan based on National Clearinghouse of Educational Facilities (NCEF) guidelines. In addition to this, the District has made efforts

to compile emergency supplies such as emergency communications, power, fuel and water as a part of the Emergency Preparedness Plan.

The District is creating District Standard Construction Specifications, outlining in detail the mandatory building procedures and techniques that will be implemented in all future building. These "standards" will include raised foundations, drainage systems and detention ponds, earthen berms and other natural resource protection, structural systems designed for high winds or tornados and "safe areas" in a particular building where staff and students will collect during catastrophic events, natural or by man.

In 2007, during the construction of a new school compound known as ENEC, various mitigation efforts were implemented in the design. Detention ponds were constructed on a larger than needed scale to be included as infrastructure for surrounding areas and adjacent development.

Drainage from the building and site flowed directly into the detention ponds with overflow going directly into the County flood channels. This project was designed and constructed in partnership with SAFCA (Sacramento Area Flood Control Agency), the County of Sacramento and local developers.

R.7 Mitigation Strategy

R.7.1. Mitigation Goals and Objectives

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

R.7.2. Mitigation Actions

The planning team for the TRUSD 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:

- Dam Failure
- Earthquake
- Earthquake Liquefaction
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Levee Failure
- Pandemic
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms
- Severe Weather: Wind and Tornado
- Wildfire

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.

NEED MITIGATION ACTIONS FOR EACH OF THE HAZARDS IN THE BULLETED LIST. REMEMBER THAT MORE THAN ONCE HAZARD CAN BE COVERED BY EACH ACTION. YOU HAVE ACTIONS FROM THE OLD PLAN THAT YOU MAY WISH TO CARRY FORWARD. WE NEED NEW MITIGATION ACTION WORKSHEETS FILLED OUT FOR THOSE.

Multi-Hazard Actions

Action 1.

Hazards Addressed:

Goals Addressed:

Issue/Background:

Other Alternatives:

Existing Planning Mechanisms through which Action will be Implemented:

Responsible Office:

Priority (H, M, L):

Cost Estimate:

Potential Funding:

Benefits (avoided Losses):

Schedule: