Annex H Citrus Heights Water District

H.1 Introduction

This Annex details the hazard mitigation planning elements specific to CHWD (CHWD or District), a new participating jurisdiction to the 2021 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 CHWD, with a focus on providing additional details on the risk assessment and mitigation strategy for this District.

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

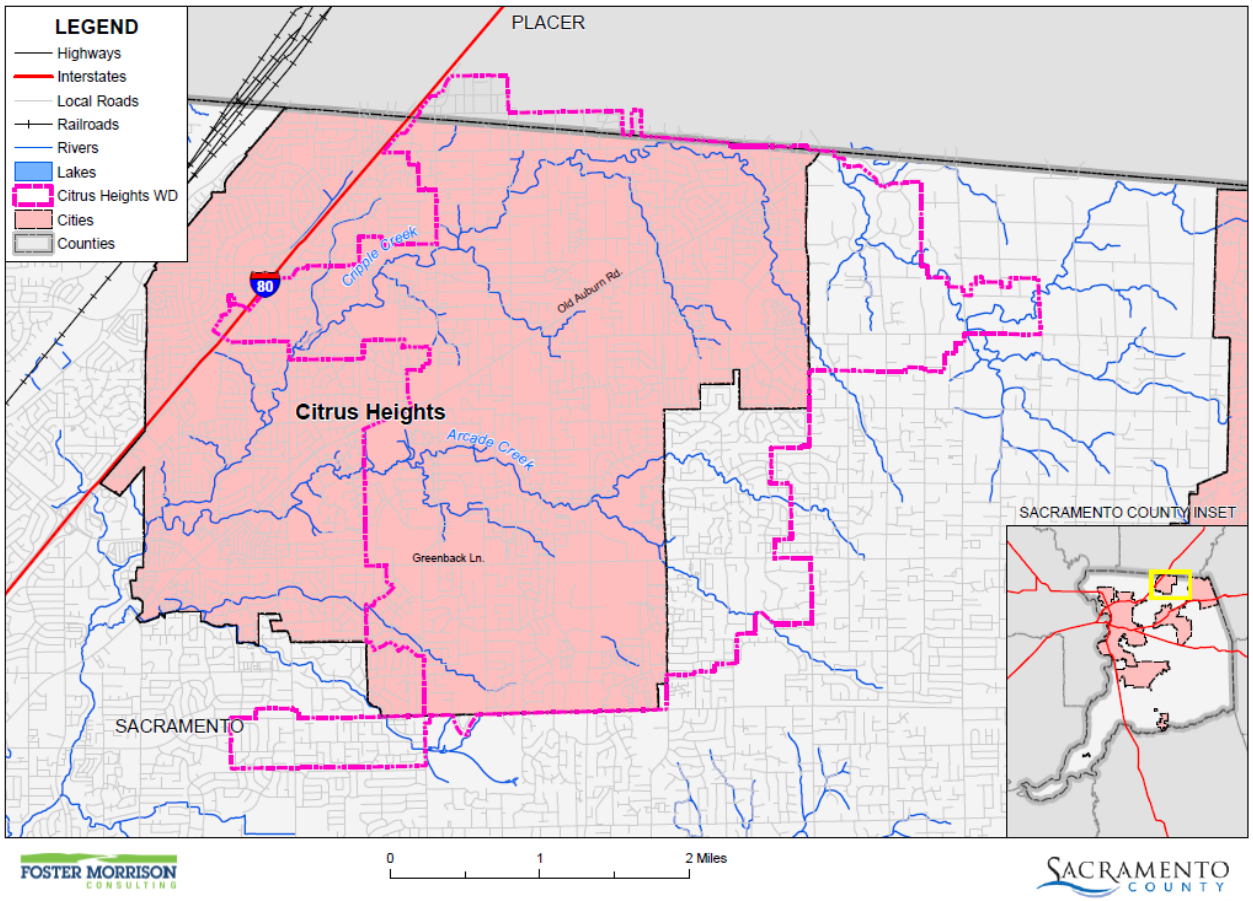
Table H-1 CHWD – Planning Team

Name	Position/Title	How Participated
Rebecca Scott	Director of Operations	Attended meetings. Assisted with Plan development
Brian Hensley	Water Resources Supervisor	Assisted with Plan development
Kelly Drake	Senior Water Efficiency Specialist	Assisted with Plan development

H.3 District Profile

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

Figure H-1 CHWD



Data Source: Citrus Heights Water District, Sacramento County GIS, Cal-Atlas; Map Date: 09/2020.

H.3.1. Overview and Background

The Citrus Heights Water District is an Irrigation District, founded in 1920, operating under the State of California Water Code. CHWD provides drinking water to an estimated service area population of 67,000 customers via approximately 19,600 water service connections in Sacramento and Placer Counties, including about 60% of the area within the boundaries of the City of Citrus Heights. The District constructs and maintains water facilities and supplies domestic water in an area of approximately 12.8 square miles, including a system of approximately 250 miles of underground pipes, approximately 2,200 fire hydrants and valves, and nearly 20,000 water service connections. The District has 22 interconnections with neighboring water agencies to provide water in the event water from Folsom Lake or its wells are unable to provide adequate water supply.

H.4 Hazard Identification

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

Table H-2 CHWD—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	Medium	Medium
Drought & Water Shortage	Extensive	Likely	Limited	High	High
Earthquake	Extensive	Occasional	Limited	Medium	Low
Earthquake Liquefaction	Limited	Occasional	Limited	Low	Low
Floods: 1%/0.2% annual chance	Significant	Likely	Negligible	Low	Medium
Floods: Localized Stormwater	Extensive	Highly Likely	Negligible	Low	Medium
Landslides, Mudslides, and Debris Flow	Limited	Occasional	Negligible	Low	Medium
Levee Failure	Extensive	Occasional	Negligible	Low	Medium
Pandemic	Extensive	Likely	Limited	Low	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Occasional	Limited	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Negligible	Low	High
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Negligible	Low	Medium
Severe Weather: Wind and Tornado	Extensive	Highly Likely	Negligible	Low	Low
Subsidence	Significant	Unlikely	Negligible	Low	Medium
Volcano	Extensive	Unlikely	Negligible	Low	Low
Wildfire	Significant	Unlikely	Negligible	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

H.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.

H.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section H.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table H-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 Sacramento County Planning Area.

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

> ***Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.***

A critical facility is classified by the following categories: (1) Essential Services Facilities, (2) At-risk Populations Facilities, (3) Hazardous Materials and Solid Waste Facilities.

Table H-3 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. CHWD's physical assets, valued at over $6.3 million, consist of the buildings and infrastructure to support the District's operations.

Table H-3 CHWD Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Corporation Yard	Land & Buildings	$4,300,000	Earthquake
Well Sites	Wells & Buildings	$2,000,000	Earthquake
Total		**$6,300,000**	

Source: CHWD

Natural Resources

CHWD has a variety of natural resources of value to the District. These natural resources parallels that of Citrus Heights as a whole. Information can be found in the City of Citrus Heights Annex to this Plan Update.

Historic and Cultural Resources

CHWD has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallels that of Sacramento County as a whole Information can be found in the City of Citrus Heights Annex to this Plan Update.

Growth and Development Trends

General growth in the District parallels that of the City of Citrus Heights as a whole. Information can be found in Section 4.3.1 of the Base Plan. Information can be found in the City of Citrus Heights Annex to this Plan Update.

Future Development

The District has no control over future development in areas the District services. Future development in these areas parallels that of the Citrus Heights. Though development is not controlled by CHWD, the District does plan for future water uses. New connections are added by the District as new development occurs. The 2015 CHWD Urban Water Management Plan noted CHWD plans to construct an additional three wells over the next seven years to provide additional dry-year supplies. The District plans to maintain groundwater supply equivalent of 5,000 AFY from its well system. However, groundwater production could increase up to the full well capacities in successive dry year scenarios. Well site availability could impact the number of wells constructed or the construction implementation schedule. The District continues to monitor its service area for potential well sites and obtains the land as available. The District is currently evaluating its needs for new wells in the future as it completes a new UWMP (in draft state as of April 2021) which will update the number or timing of new wells as appropriate. Future supply projects are summarized in Table H-4.

Table H-4 CHWD – Expected Future Water Supply Projects and Programs

Name of Future Projects or Programs	Joint Project with other suppliers?	Description	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply
Well #7	No		2023	All Year Types	
Well #8	No			All Year Types	
Well #9	No			All Year Types	
Well #12	No			All Year Types	

Source: 2021 Draft CHWD Urban Water Management Plan

Projected supply needs are summarized in Table H-5. As the San Juan Water District (SJWD) provides CHWD sufficient supply to meet its needs, SJWD supply is set equal to projected demands minus groundwater usage. Groundwater usage from "maintenance" pumping during normal years is assumed to be an average 900 acre-feet per year.

Table H-5 CHWD – Projected Water Supplies

Water Supply	Additional Description	2025	2030	2035	2040	2045
Purchased or Imported Water	SJWD	10,949	11,273	11,537	12,006	12,455
Groundwater (not desalinated)	CHWD	900	900	900	900	900
Total	**–**	**11,849**	**12,173**	**12,437**	**12,906**	**13,355**

Source: 2021 Draft CHWD Urban Water Management Plan

H.5.3. Vulnerability to Specific Hazards

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

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. The District has not seen any of these events. The District noted it has sufficient backup power to mitigate against any power outages in the future.

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, Sacramento 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 Sacramento County, the strength of storms does seem to be increasing and the temperatures seem to be getting hotter.

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. Sacramento 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 Sacramento County Planning Area.

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

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

CHWD participated in the American River Basin Study as a member of the RWA The American River Basin (Basin) region conducted a climate change study in partnership with local water purveyors and the United States Bureau of Reclamation (USBR). The purpose of the American River Basin Study (ARBS or Study) was to develop data tools and analyses, identify supply-demand imbalances, and climate change adaptation strategies specific to the Basin. Under the "new normal" of a changing climate, the ARBS aims to improve the resolution of regional climate change data and to develop regionally-specific mitigation and adaptation strategies. These are not yet published as of June 2021.

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.

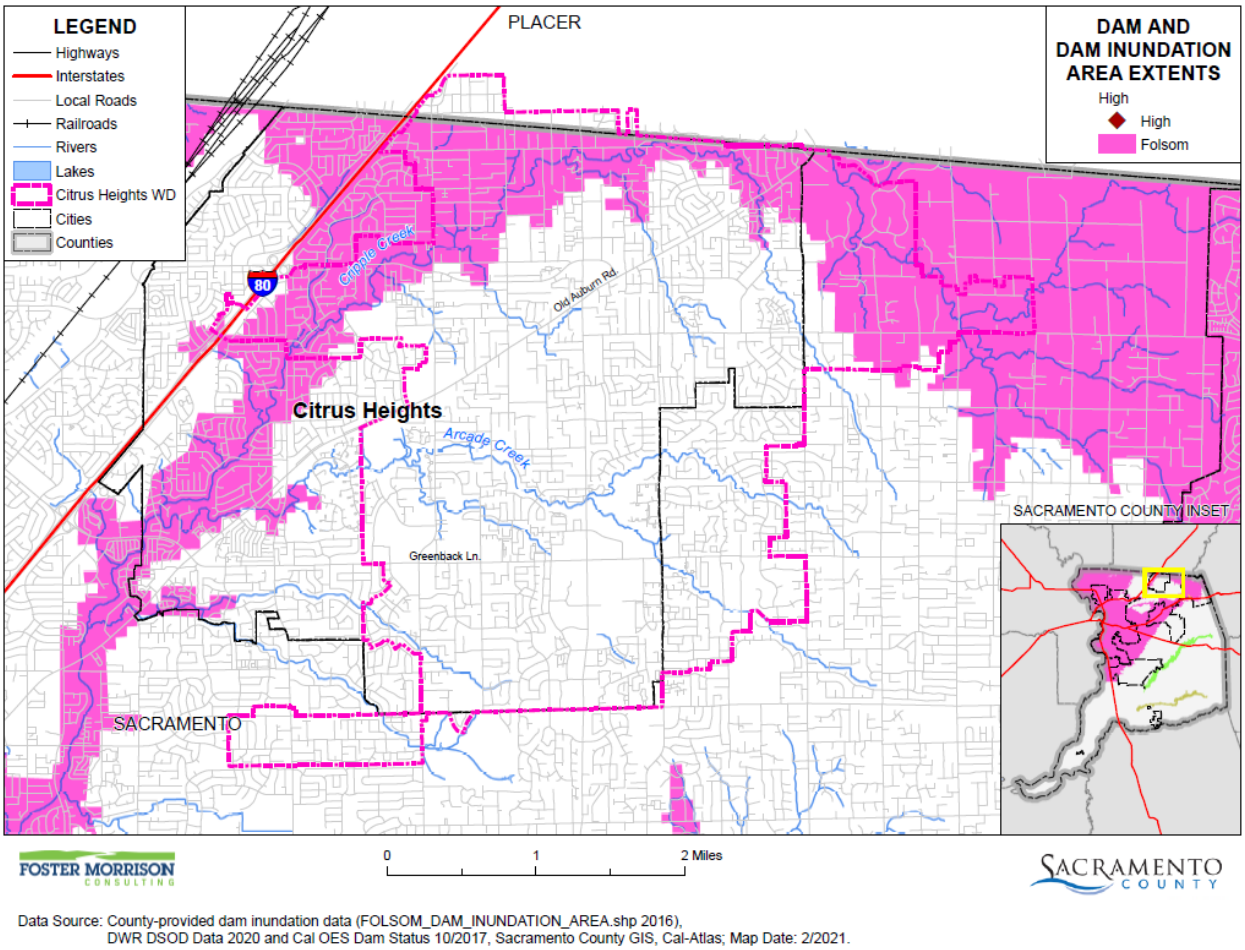
Location and Extent

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.

Dams inside the County that can affect the District can be seen on Figure H-2. This includes inundation from a Folsom Dam failure event, which with the most recent improvements of the Folsom Dam, is more unlikely to occur. The District is not affected by dams from outside the County. The District is also not affected by the Folsom Dam 235,000 cfs scenario discussed in Section 4.3.7 of the Base Plan, which is considered the likely Folsom Dam scenario since improvements on the Dam have been completed.

Figure H-2 CHWD – 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.

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 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 District noted that flooding has a small chance of affecting the City of Citrus Heights, but not CHWD.

Assets at Risk

No District assets from Table H-3 are at direct risk from this hazard.

Drought & Water Shortage

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile and Problem Description

Drought is a complex issue involving many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects. Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water is the most critical issue and is critical for agriculture, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Location and Extent

Drought and water shortage are regional phenomenon. The whole of the County, as well as the whole of the District, is at risk. The US Drought Monitor categorizes drought conditions with the following scale:

- None
- D0 – Abnormally dry
- D1 – Moderate Drought
- D2 – Severe Drought
- D3 – Extreme drought
- D4 – Exceptional drought

Drought has a slow speed of onset and a variable duration. Drought can last for a short period of time, which does not usually affect water shortages and for longer periods. Should a drought last for a long period of time, water shortage becomes a larger issue. Current drought conditions in the District and the County are shown in Section 4.3.8 of the Base Plan.

Past Occurrences

There has been two state and one federal disaster declaration due to drought since 1950. This can be seen in Table H-6.

Table H-6 Sacramento County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	2	2008, 2014	1	1977

Source: Cal OES, FEMA

Since drought is a regional phenomenon, past occurrences of drought for the District are the same as those for the County and includes 5 multi-year droughts over an 85-year period. Details on past drought occurrences can be found in Section 4.3.8 of the Base Plan.

Vulnerability to and Impacts from Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including the District, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts can be extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult.

According to the CHWD website, CHWD's main source of surface water is Folsom Lake. The US Bureau of Reclamation controls the Folsom Lake water supply. The water is treated by the San Juan Water District (SJWD) and provided to CHWD and other water agencies. Groundwater from CHWD's six wells is used to supplement the Folsom Lake surface water supply for customers. Even with these water sources, it is important to conserve water as the ever-increasing need for water in CHWD.s region and throughout California will continue to place demands on both surface and groundwater supplies. Water use efficiency and conservation are keys to meeting future demands. Total annual water consumption by CHWD customers peaked in 1999 at 23,000 acre-feet. Since then, it has ranged from a high of about 21,100 acre-feet to a low of about 9,970 acre-feet.

The 2021 Draft Urban Water Management Plan for CHWD noted that CHWD maintains two connections with SJWD to receive its water supply, one on the CHWD 42-inch transmission main and three on the SJWD 72-inch Cooperative Transmission Pipeline (CTP). Barring failure of these connections, there are no physical constraints to obtaining the required SJWD supply. The SJWD UWMP addresses any restraints within SJWD's facilities to diverting, treating, and delivering the necessary supplies to CHWD.

The 2021 Draft Urban Water Management Plan for CHWD noted SJWD's water supplies are subject to legal constraints through the Central Valley Project (CVP) and State Board cutbacks and use restrictions as described in the 2020 SJWD Urban Water Management Plan. Total supply availability is also influenced by the Water Forum Agreement (WFA). Both CHWD and SJWD are signatories of the WFA. The WFA stipulates that SJWD supply can be cut back to a minimum of 54,200 AFY, however, it is not a legal

mandate such as the CVP and State Board restrictions. The quality of water from Folsom Reservoir is considered good as the drainage basin is mostly alpine-based snowpack at the higher elevations and forest at the lower elevations with little to no urbanization. There are no water quality impacts expected that would reduce the supply.

CHWD's groundwater supplies are subject to factors that could impact reliability. Groundwater basin issues could impact CHWD's groundwater supply. If the wells begin to produce contaminated groundwater, the supply could either be eliminated, reduced or treated. The basin elevation levels have historical decreased, and only recently stabilized or even increased in some locations. If the groundwater levels decrease further, CHWD well capacities could be impacted or even eliminated. However, the SGA has a groundwater accounting framework implemented by the region's water agencies to mitigate and improve the groundwater basin conditions. It is assumed the only issue that could impact supply availability is groundwater contamination. Should this occur, CHWD will evaluate pump-and-treat alternatives versus drilling new wells.

Climate change may create additional impacts to drought and water shortage in the County and the District. During periods of drought, vegetation can dry out which increases fire risk. Drought that occurs during periods of extreme heat and high winds can cause Public Safety Power Shutoff (PSPS) events to be declared in the County. More information on power outage and failure can be found in the discussion at the beginning of Section H.5.3, as well as in Section 4.3.3 of the Base Plan.

Assets at Risk

No District assets from Table H-3 are at direct risk from this hazard.

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 an 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 been 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. The District noted no URM or soft story buildings owned by 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 CHWD 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.

Assets at Risk

The District noted that the Corporation Yard & Well Buildings could be impacted, and well casings could collapse in an earthquake event.

Severe Weather: Extreme Cold and Freeze

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile and Problem Description

According to the National Weather Service (NWS), extreme cold often accompanies a winter storm or is left in its wake. Freezing temperatures can also occur without the accompanying winter storm.

Location and Extent

Extreme cold and freeze are regional issues, meaning the entire City is at risk to cold weather and freeze events. While there is no scale (i.e. Richter, Enhanced Fujita) to measure the effects of extreme cold and freeze, temperature data from the County from the WRCC indicates that there are 21.8 days that fall below 32°F in western Sacramento County. Freeze has a slow onset and can generally be predicted in advance for the County. Freeze events can last for hours (in a cold overnight), or for days to weeks at a time.

Past Occurrences

There has been no federal or state disaster declarations in the County for cold or freeze. The District noted that cold and freeze is a regional phenomenon; events that affected the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.2. During some of these past events, clay valves at well sites cracked, all additional damage was on private property.

Vulnerability to and Impacts from Severe Weather: Freeze and Winter Storms

The District experiences temperatures below 32 degrees during the winter months. Freeze can cause injury or loss of life to residents of the District. While it is rare for buildings to be affected directly by freeze,

damages to pipes that feed building can be damaged during periods of extreme cold. The District noted that this concern was already mitigated by installing protective bags over these valves.

Assets at Risk

No District assets from Table H-3 are at direct risk from this hazard.

H.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, and mitigation education, outreach, and partnerships.

H.6.1. Regulatory Mitigation Capabilities

Table H-7 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 CHWD.

Table H-7 CHWD 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: 2020	N/A
Economic Development Plan	N	
Local Emergency Operations Plan	Y: 2019	Yes, addresses hazards
Continuity of Operations Plan	Y: 2021	
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	Version/Year:
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score:
Fire department ISO rating:	N	Rating:

Site plan review requirements	N	
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance	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	N	
How can these capabilities be expanded and improved to reduce risk?		
CHWD staff will periodically review all plans for accuracy and make any necessary revisions. In addition, annual emergency trainings will be held to ensure that all staff are aware of the steps and procedures related to an emergency.		

Source: CHWD

Citrus Heights 2021 Draft Urban Water Management Plan

The Urban Water Management Act (Act) became part of the California Water Code with the passage of Assembly Bill 797 during the 1983-1984 regular session of the California Legislature. The California Water Code requires every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually (AFY) to adopt and submit an Urban Water Management Plan (UWMP) every five years to the California Department of Water Resources (DWR). The specific planning requirements are in the California Water Code Division 6, Part 2.6 Urban Water Management Planning.

Subsequent legislation has been passed that updates and provides for additional requirements for UWMPs and water management. In particular, SB X7- 7 Water Conservation, requires the State to achieve a 20 percent reduction in urban per capita water use by December 31, 2020, known as 20x2020. 20x2020 requirements are incorporated into the 2015 UWMP requirements. In summary, the UWMP must include the baseline demand analysis, water use target analysis use for 2015 and 2020, and present a compliance plan to achieve the target demand reductions in the UWMP.

The core requirements for the UWMP include:

- A description of the water service area.
- A description of the existing and planned supply sources.
- Estimates of past, present, and projected water use.
- 20x2020 analysis and target compliance.
- A description of water conservation Demand Management Measures (DMMs) already in place and planned, and other conservation measures.
- A description of the Water Shortage Contingency Plan/Conservation Program.

Ordinance No 01-2021

This ordinance establishes a water conservation program within CHWD. It lays the groundwork on why the District needs such an ordinance, sets water conservation stage definitions, declarations, and regulations, and enforcement measures.

H.6.2. Administrative/Technical Mitigation Capabilities

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

Table H-8 CHWD'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	Y	
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	N	
Community Planner	N	
Civil Engineer	Y	
GIS Coordinator	Y	
Other	N	
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	(We can use the County's Reverse 911 system if needed)
Hazard data and information	Y	
Grant writing	Y	
Hazus analysis	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
CHWD will hire an additional engineer in the next several years to assist with assessing water mains. In addition, staff will look for opportunities to attend grant writing trainings.		

Source: CHWD

H.6.3. Fiscal Mitigation Capabilities

Table H-9 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table H-9 CHWD'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	Y: new wells (water sources), yes, can be used for future mitigation actions
Authority to levy taxes for specific purposes	N	
Fees for water, sewer, gas, or electric services	Y	
Impact fees for new development	N	
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	Grant funding: new well
State funding programs	Y	Grant funding: new well
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
CHWD will continue to look for grant opportunities for new wells. In addition, CHWD will allocate funding for capital improvement projects in its annual budget.		

Source: CHWD

H.6.4. Mitigation Education, Outreach, and Partnerships

Table H-10 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 H-10 CHWD'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	Water Efficiency messaging, drought messaging

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Natural disaster or safety related school programs	N	
StormReady certification	N	
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	N	
Other	N	
How can these capabilities be expanded and improved to reduce risk?		
CHWD is hiring a Communications Manager to assist with increased public information efforts. In addition, the District will continue to expand its Water Efficiency classes and programs for the local community.		

Source: CHWD

H.7 Mitigation Strategy

H.7.1. Mitigation Goals and Objectives

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

H.7.2. Mitigation Actions

The planning team for the CHWD 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
- Drought & Water Shortage
- Earthquake
- Severe Weather: Extreme Cold and Freeze

After a review of mitigation actions and efforts, because District infrastructure is primarily underground, it's not at risk from flooding/storms, etc. The one thing that used to be an issue (freeze) was mitigated years ago with a wrap around the above-ground appurtenances that were prone to freezing/breaking. As a result, the following hazards were dropped from concern:

- Dam Failure
- Severe Weather: Extreme Cold and Freeze

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 ASR Technology

Hazards Addressed: Climate Change, Drought & Water Shortage

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

Issue/Background: Historical droughts

Project Description: Increase water supply during dry periods

Other Alternatives: Storage tank

Existing Planning Mechanisms through which Action will be Implemented: Regional and CHWD-specific ASR Studies

Responsible Office: Operations Department

Priority (H, M, L): H

Cost Estimate: $250K per well site

Potential Funding: CHWD CIP Budget

Benefits (avoided Losses): Additional water storage capabilities

Schedule: TBD, requires 2 months for retrofitting, adding to a new well would be built into the cost.

Action 2. Construction of a New Storage Tank

Hazards Addressed: Drought & Water Shortage, Climate Change

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

Issue/Background: Historical droughts have occurred which have affected the District. There is concern that future climate change will increase droughts and water shortages.

Project Description: Increase water supply during dry periods

Other Alternatives: Groundwater banking

Existing Planning Mechanisms through which Action will be Implemented: Regional and CHWD-specific ASR Studies

Responsible Office: Operations Department

Priority (H, M, L): L

Cost Estimate: $9 Million

Potential Funding: CHWD CIP Budget, State or Federal Grant

Benefits (avoided Losses): Additional water storage capabilities

Schedule: TBD, One year for construction

Action 3. Construction of a New Operations Building

Hazards Addressed: Earthquake

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

Issue/Background: Potential for earthquake damage

Project Description: Increase building resiliency to earthquakes. The new Operations building will be built to withstand earthquake.

Other Alternatives: Retrofitting the building.

Existing Planning Mechanisms through which Action will be Implemented: Staffing Study, Pre-Architectural Planning Study

Responsible Office: Operations & Engineering Departments

Priority (H, M, L): H

Cost Estimate: $4 Million

Potential Funding: CHWD CIP Budget, State or Federal Grant

Benefits (avoided Losses): Additional water storage capabilities

Schedule: TBD, 2 years for construction