



# Calaveras County Water District

## America's Water Infrastructure Act of 2018 (AWIA) Risk and Resiliency Assessment



Public Version  
Released June 2021

### *Disclaimer*

This Risk and Resiliency Assessment (RRA) was developed to comply with America's Water Infrastructure Act of 2018 (AWIA). As such, this RRA contains sensitive information related to CCWD operations, infrastructure, asset management, and technological vulnerabilities, which could place public water supply systems and Calaveras County communities at risk. As such, several sections, tables, figures, and other sensitive materials have not been included in this Public Version of the RRA, as noted.

## List of Contents

The following sections are included in this document:

- 1.0 Basis for Preparing an RRA
- 2.0 Risk and Resilience Defined
- 3.0 Related Planning Efforts
  - 3.1 Local Hazard Mitigation Plan
  - 3.2 Water System Emergency Response Plans
- 4.0 District Overview
  - 4.1 Water System Infrastructure
  - 4.2 Monitoring Practices
  - 4.3 Financial Infrastructure
  - 4.4 Operations & Maintenance
  - 4.5 Use, Storage, and Handling of Chemicals
  - 4.6 Advanced Metering Infrastructure
- 5.0 District Service Goals
  - 5.1 Systems Resiliency
- 6.0 Planning Integration (Countermeasures)
  - 6.1 County Planning Efforts
  - 6.2 Other Countermeasures
- 7.0 Risk Focus Areas
  - 7.1 Malevolent Acts Review
  - 7.2 National Risk Index
  - 7.3 Cybersecurity Guidance
- 8.0 Assessment Checklists
  - 8.1 Matrix Assessment
- 9.0 Recommendations
- 10.0 RRA Procedures
  - 10.1 District Contacts

### *Appendices*

- A AWIA Water System Assets List
- B AWIA Guidance Checklist
- C Service Area Infrastructure Lists
- D RRA Service Area Checklists
- E Outreach & Notification Documents

## 1.0 Basis for Preparing an RRA

*America's Water Infrastructure Act of 2018 (AWIA)* is a United States federal law that requires community (drinking) water systems serving more than 3,300 people to conduct a Risk and Resilience Assessment (RRA). AWIA specifies the water system assets (infrastructure) that the RRA must address, as listed in **Appendix A**. The primary objectives of an RRA are to:

1. Become more aware of the risks to water service continuity, and
2. Identify options that can mitigate undesirable consequences.

In this context, a “community water system” (CWS) is defined by the U.S. Environmental Protection Agency (EPA) as a water supplier which provides its water and/or wastewater services to the same population on a consistent basis. The Calaveras County Water District (CCWD/District), by combination of its service area populations – estimated around 17,500 people served in 2020 - fits this definition and is therefore required to prepare and certify<sup>1</sup> an RRA by the small CWS<sup>2</sup> deadline of June 30, 2021. Additional information on the preparation and certification processes is provided in **Section 10**. Following certification of this initial RRA, AWIA mandates that the RRA be updated and re-certified, to address changes in federal legislation and/or updates to District system infrastructure (next update due June 30, 2026). In addition, CCWD must prepare a follow-up Emergency Response Plan (ERP) due no later than six months after each RRA certification, which incorporates the findings of an RRA into strategies and resources to improve water systems resiliency.

CCWD has prepared this RRA to comply with the requirements associated with AWIA, the EPA guidelines for small CWSs, and to meet the following planning objectives:

- Improve understanding of risks to the District from malevolent acts and natural hazards.
- Define improvements to the resiliency of pipes and constructed conveyances, physical barriers, source water, water collection and intake, pretreatment, treatment, storage and distribution facilities, electronic, computer, or other automated systems (including the security of such systems) which are utilized by the District.
- Review District infrastructure monitoring practices.
- Review District financial infrastructure risk and vulnerabilities.
- Review the District's use, storage, or handling of various chemicals, and
- Define District systems operations and maintenance.

---

<sup>1</sup> Each community water system must self-certify the completion of its RRA for each individual Public Water System ID (PWSID) service area using the EPA online portal.

<sup>2</sup> Small Community Water Systems are defined by EPA as systems serving more than 3,300 people, but less than 50,000.

CCWD has utilized the EPA “Guidance for Small Community Water Systems on Risk and Resilience Assessments under America’s Water Infrastructure Act” document (Guidance) in preparation of this RRA. In an effort to verify the District has met all the requirements put forth in AWIA, a Guidance-based contents ‘checklist’ is provided in **Appendix B**.

## 2.0 Risk and Resilience Defined

EPA Guidance provides the following definitions to assist in preparation of the RRA:

- **Risk** to critical infrastructure, including water systems, is a function of **threat likelihood, vulnerability, and consequence**.
- **Threat** can be a malevolent act, like a cyberattack or process sabotage, or a natural hazard, such as a flood or hurricane.
  - **Threat likelihood** is the probability that a malevolent act will be carried out against the water system or that a natural hazard will occur.
- **Vulnerability** is a weakness that can be exploited by an adversary or impacted by a natural hazard. It is the probability that if a malevolent act or natural hazard occurred, then the water system would suffer significant adverse impacts.
- **Consequences** are the magnitude of loss that would ensue if a threat had an adverse impact against a water system. Consequences may include:
  - Economic loss to the water system from damage to utility assets;
  - Economic loss to the utility service area from a service disruption, and
  - Severe illness or deaths that could result from water system contamination, a hazardous gas release, or other hazard involving the water system.
- **Resilience** is the capability of a water system to maintain operations or recover when a malevolent act or a natural hazard occurs.
- **Countermeasures** are steps that a water system implements to reduce risk and increase resilience. They may include plans, equipment, procedures, and other measures.

CCWD has utilized these terms as defined to develop this RRA, given they are compatible with CCWD’s jurisdictional provisions for public water service, wastewater treatment and disposal, and water supply development and planning within the County. To the extent these terms appear in other CCWD planning efforts, such as CCWD’s Urban Water Management Plan (UWMP), they may use alternate definitions to better match the applicable mandates or guidance.

## 3.0 Related Planning Efforts

The following sub-sections outlines some of CCWD’s planning efforts related to the requirements or concepts defined under AWIA.

### **3.1 Local Hazard Mitigation Plan**

CCWD's 2018 Local Hazard Mitigation Plan (LHMP) identifies several hazard and disaster events which may impact Calaveras County (County) resources and infrastructure. That plan also defines CCWD's mitigation measures meant to reduce vulnerabilities associated with these events, and provides information related to County response actions. The LHMP was developed per Federal Emergency Management Agency (FEMA) guidelines, in coordination with a Hazard Mitigation Planning Committee (HMPC) comprised of key District, County, and regional representatives.

Several of the concepts and analyses in this RRA borrow from broader LHMP materials. More information on the District's LHMP and a copy of the latest plan is available online at: <https://ccwd.org/water-resources/>

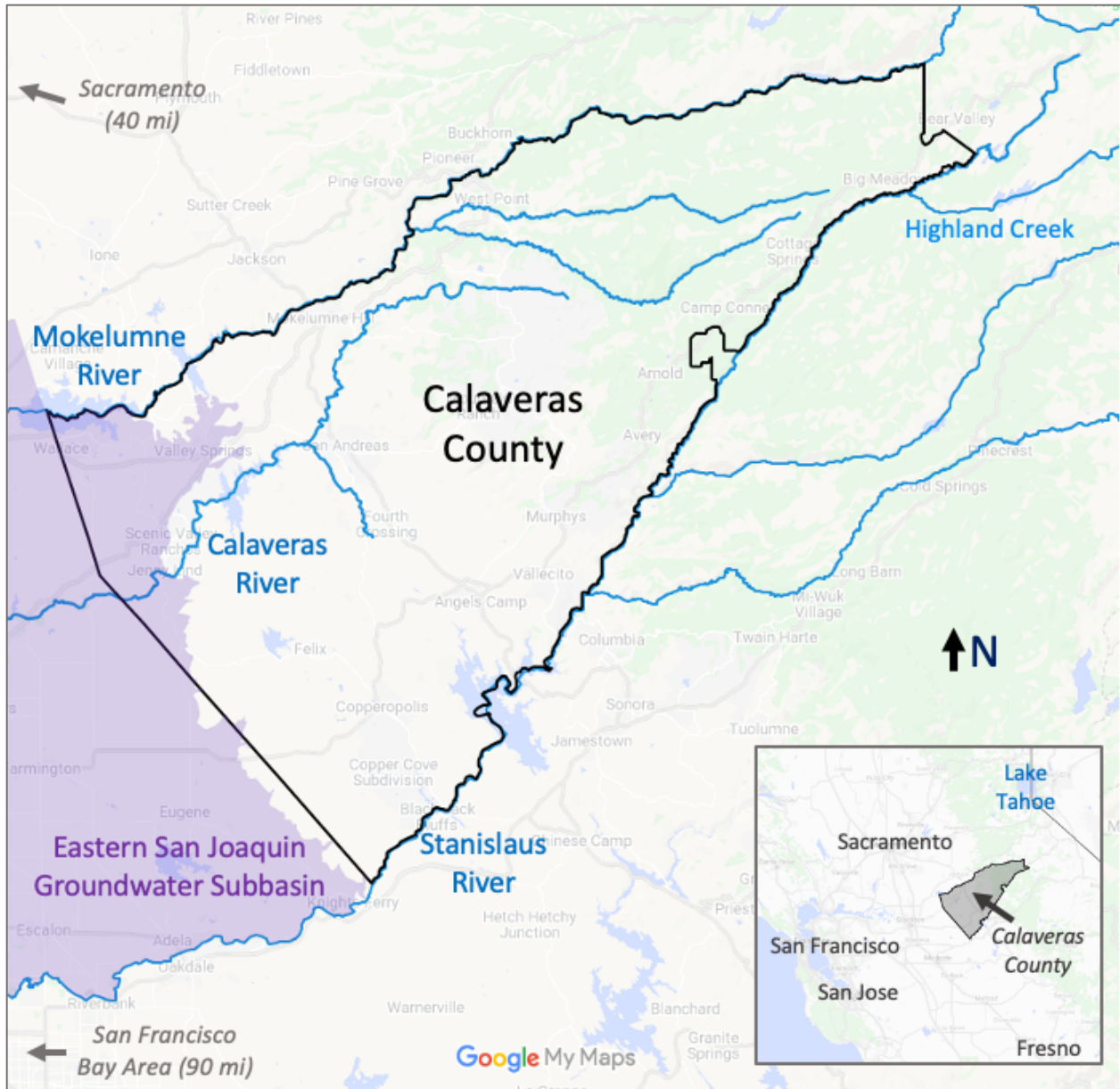
### **3.2 Water System Emergency Response Plans**

The Federal Safe Drinking Water Act (SDWA) §1433(b), as amended by the Public Health Security and Bioterrorism Preparedness Response Act of 2002 (Public Law 107-188, Title IV – Drinking Water Security and Safety), required CCWD to develop water supply system Emergency Response Plans (ERPs). The ERPs incorporated the results of a then-current Vulnerability Assessment (VA) to identify plans, procedures, and equipment needed in the event of a terrorist attack on a water supply system. CCWD developed its ERPs in early-2004, certified completion with EPA, and submitted a copy to the local California Department of Health Services (CDHS) Drinking Water Field Operations Branch District Office (DWFO Office).

Several of the malevolent act hazards and water system response actions identified in the ERPs remain applicable to CCWD's current water systems. As such, many of the concepts and analyses in this RRA borrow from the ERPs. Because of the sensitive nature of the information contained in the ERPs, distribution of the ERPs is limited to those individuals directly involved in CCWD emergency planning and response activities.

## **4.0 District Overview**

CCWD is a California Special District (local government) located with its jurisdiction covering the entire County, as shown in **Figure 1**, governed by a publicly elected five-member Board of Directors (Board). CCWD acts as the largest County water supplier and maintains water resources management authority for several key watersheds of the Sierra Nevada Mountains – which drain to the Sacramento-San Joaquin River Delta (Bay Delta), diverted for use in the San Francisco Bay and Los Angeles Metropolitan Areas. CCWD provides water service to approximately 17,500 people, mostly in the residential and commercial sectors, from six water treatment facilities each forming CCWD's independent water service areas located throughout the County. CCWD also operates 12 wastewater treatment facilities, provides recycled water supplies, and actively manages a portion of the 'critically over-drafted' Eastern San Joaquin Groundwater Subbasin (Subbasin). Owing to CCWD's complex water and wastewater services, vulnerable groundwater resources, and reliance on surface water diversion and storage rights, CCWD understands that water is a limited, vulnerable, and often contentious resource. Proper resource planning and coordination is therefore essential to protect local and



**Figure 1. CCWD Map (Jurisdictional Area/County)**

downstream communities, economies, and environmental health from both natural hazards and malevolent acts.

#### **4.1 Water System Infrastructure**

Descriptions of CCWD’s key water systems, and infrastructure facilities, are provided below. A list of CCWD infrastructure within the scope of this RRA is also provided in **Appendix C**.

- CCWD’s six water supply systems (service areas) are defined in **Table 1**, with a map of these areas within the County shown in **Figure 2**. CCWD procures water supplies for these areas from one of four watershed sources, and/or their tributaries: 1) the

Calaveras River, 2) the Stanislaus River, 3) the Mokelumne River, or 4) groundwater from the portions of the Subbasin underlying the County. Each service area has a sole raw water intake to the area's water treatment plant (WTP), used to supply that area's customer demands and wholesale customers, if applicable. These sources and associated water systems are largely independent of one another with no interties, and each relies on separate diversion, storage, and use water rights<sup>3</sup> providing the legal basis for CCWD's water supplies.

- CCWD also has 12 wastewater service systems which are also disconnected and located throughout the County, but do not necessarily coincide with the water service areas referenced above. No water service area has return flows to its original raw water sources (i.e., waterways), owing to a combination of private septic tank systems and CCWD's wastewater treatment plants (WWTPs), with effluent impounded in regulated ponds and later applied to spray and/or leach fields per applicable Federal and California Waste Discharge Requirements (WDRs). Some of CCWD's WWTPs contain facilities which treat wastewater to sufficient standards for recycled water use, primarily for nearby golf course and landscape irrigation purposes. However, no recycled water is used in CCWD's service areas to supply drinking water to customers. As such and given wastewater systems are not covered in AWIA, CCWD's wastewater infrastructure is not addressed in this RRA.
- Beyond CCWD's WTPs, WWTPs, and service area pipeline conveyance infrastructure, CCWD owns and operates several reservoir storage (dams) and open water facilities which are upstream of water supply systems, as listed in **Table 2A** and shown in **Figure 3**. Where required by the California Governor's Office of Emergency Services (Cal OES), California Department of Water Resources' (DWR) Division of Safety of Dams (DSOD), and/or the Calaveras County Office of Emergency Services (Calaveras OES), CCWD has prepared and maintains dam/reservoir Emergency Action Plans (EAPs), which document dam owner responsibilities, provide up-to-date emergency contact information, define monitoring and preparedness efforts, and analyze failure conditions. The EAPs are based around legislative requirements of California Water Code (CWC) §6160 and §6161, and California Government Code §8589.5, which includes FEMA's Federal Guidelines for Dam Safety.
  - As noted in **Table 2A**, CCWD owns two reservoirs currently operated by the Northern California Power Agency (NCPA) for hydropower production under a Power Purchase Agreement (PPA) executed in March 1985. These facilities are part of the North Fork Stanislaus Hydroelectric Development Project (North Fork Project, FERC<sup>4</sup> Project No. 2409), which also includes the roughly 13-kilometer Collierville Diversion Tunnel and Powerhouse, capable of generating 253 megawatts (MW) of power along the Stanislaus River. Related North Fork Project EAPs, federal and state operating requirements, and other conditions and vulnerabilities assessments for these facilities are handled by NCPA and are therefore not included in this RRA. Note the PPA and current FERC license are set to expire in 2032.

---

<sup>3</sup> Details regarding the extents, limitations to, and permitted uses of the District's water rights are provided in CCWD's 2020 UWMP Update, available at: <https://ccwd.org/water-resources/>

<sup>4</sup> U.S. Federal Energy Regulatory Commission (FERC).



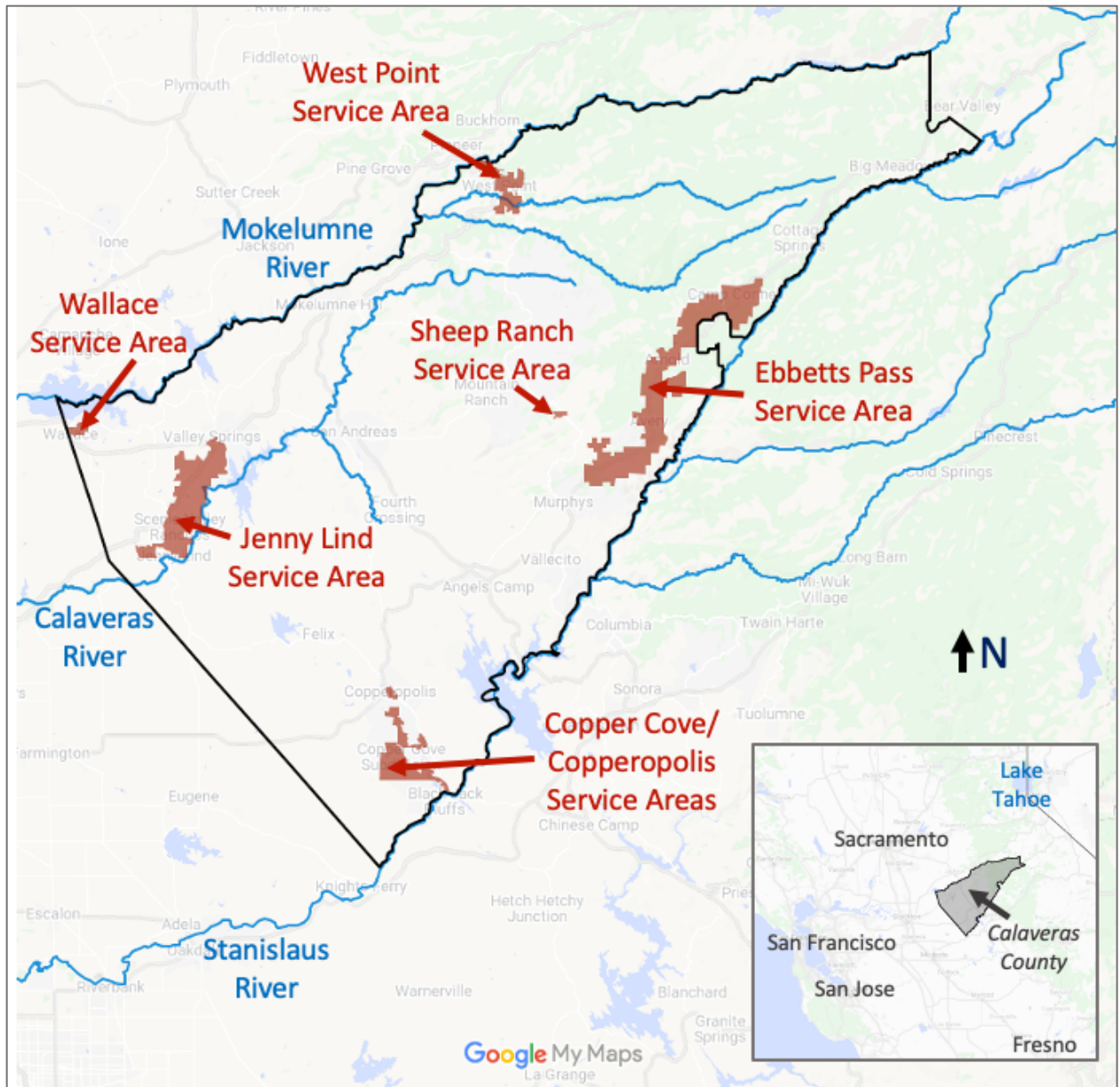
**Table 1. CCWD Water Service Areas Information**

CCWD Service Area Name	Water Treatment Plant(s)		PWSID <sup>1</sup>	Watershed/ Source	Number of Connections <sup>2</sup>	Est. Population Served <sup>2</sup>
	Name	Capacity				
Copper Cove/ Copperopolis Service Areas (Copper Cove)	Copper Cove WTP	4 MGD	CA0510017	Stanislaus River (Lake Tulloch)	2,664	5,187
Ebbetts Pass Service Area (Ebbetts Pass)	Hunters WTP	4 MGD	CA0510016	North Fork Stanislaus River, Highland Creek	5,991	7,280
Jenny Lind Service Area (Jenny Lind)	Jenny Lind WTP	6 MGD	CA0510006	Calaveras River (New Hogan)	3,858	9,861
Sheep Ranch Service Area (Sheep Ranch)	Sheep Ranch WTP	20,000 GPD	CA0510004	Big Trees Creek, San Antonio Creek (Calaveras River Tributaries)	48	89
Wallace Service Area (Wallace)	Wallace WTP	273,000 GPD	CA0510019	Subbasin (Groundwater)	110	255
West Point Service Area (West Point)	West Point WTP	1 MGD	CA0510005	Bear Creek, Middle Fork Mokelumne River	584	1,043
<b>Total CCWD</b>					<b>13,255</b>	<b>23,715</b>

*MGD = Million Gallons per Day; GPD = Gallons per Day.*

<sup>1</sup> Public Water Systems Identification Number (PWSID), as defined by EPA for CWSs.

<sup>2</sup> As of calendar year 2020. Population estimates include part-time and full-time service area residents.



**Figure 2. CCWD Map (Water Service Areas)**

**Table 2A. CCWD Owned Reservoir and Open Water Facilities**

<b>Reservoir Name</b>	<b>Dam Height (ft) and Type</b>	<b>Reservoir Capacity (acre-feet)</b>	<b>Approx. Water Surface Area (acres)</b>	<b>Watershed/Source</b>	<b>Uses</b>	<b>Public Access</b>	<b>EAP<sup>4</sup></b>	<b>DSOD Downstream Hazard Rating</b>
Beaver Creek Diversion	50 ft Gravel	20	2	Beaver Creek (Stanislaus River Tributary)	Water Supply (Ebbetts Pass, Copper Cove); Hydropower	No	Managed by NCPA (CA01259)	Low
Blaggen Mill Pond (Mill Pond)	None	25 <sup>1</sup>	6	San Antonio Creek (Calaveras River Tributary)	Recreation <sup>1</sup>	Yes <sup>1</sup>	None	Not Applicable
Bummerville Regulating Reservoir (Bummerville)	60 ft Earthen Embank.	60	6	Bear Creek, Middle Fork Mokelumne River	Water Supply (West Point) <sup>2</sup>	No	Managed by CCWD (CA00846)	Significant
Copper Cove Regulating Reservoir (CCRR)	42 ft Earthen Embank.	205	11	Copper Cove WWTP Effluent	Recycled Water Supply (Copper Cove) <sup>5</sup>	No	Managed by CCWD (CA01356)	Low
La Contenta Lower Effluent Storage Pond (La Contenta)	43 ft Earthen Embank.	172	19	La Contenta WWTP Effluent	Recycled Water Supply (Jenny Lind) <sup>5</sup>	No	Managed by CCWD (CA01464)	High
North Fork Diversion	53 ft Gravel	120	8	North Fork Stanislaus River	Water Supply (Ebbetts Pass, Copper Cove); Hydropower	No	Managed by NCPA (CA01234)	Low

Owned, but not operated by CCWD. Not analyzed in RRA.  
See footnotes in continued table below.

**Table 2A. CCWD Owned Reservoir and Open Water Facilities (Continued)**

<b>Reservoir Name</b>	<b>Dam Height (ft) and Type</b>	<b>Reservoir Capacity (acre-feet)</b>	<b>Approx. Water Surface Area (acres)</b>	<b>Watershed/Source</b>	<b>Uses</b>	<b>Public Access</b>	<b>EAP<sup>4</sup></b>	<b>DSOD Downstream Hazard Rating</b>
New Spicer Meadow Reservoir (New Spicer)	262 ft Rock-Fill	190,000	2,000	Highland Creek, North Fork Stanislaus River	Water Supply (Ebbetts Pass, Copper Cove); Hydropower; Recreation	Yes	Managed by NCPA (CA01224)	High
McKays Point Reservoir (McKays)	233 ft Concrete Arch	1,928	35	North Fork Stanislaus River, Beaver Creek, Highland Creek	Water Supply (Ebbetts Pass); Hydropower <sup>2</sup>	No	Managed by NCPA (CA01257)	High
White Pines Lake (White Pines)	35 ft Earthen Embank.	250	26	San Antonio Creek, Big Trees Creek (Calaveras River Tributaries)	Recreation	Yes	Managed by CCWD (CA01005)	Low
Wilson Lake	32 ft Earthen Embank. <sup>3</sup>	25	2.5	Bear Creek (Mokelumne River Tributary)	Incidental Environmental and Recreation	Yes <sup>3</sup>	None	Not Applicable

Owned, but not operated by CCWD. Not analyzed in RRA.

<sup>1</sup> Not currently cleared for access, water storage, or used to impound water. Theoretical capacity and (potential) use based on permitted storage.

<sup>2</sup> Recreational uses and public access not permitted at reservoir.

<sup>3</sup> Generally understood to be in need of significant restoration (e.g., edge cleaning, dredging, and dam repair), public access not encouraged.

<sup>4</sup> Emergency Action Plan (EAP) developer listed. U.S. Army Corps of Engineers National Dam ID number (NID ID) also provided.

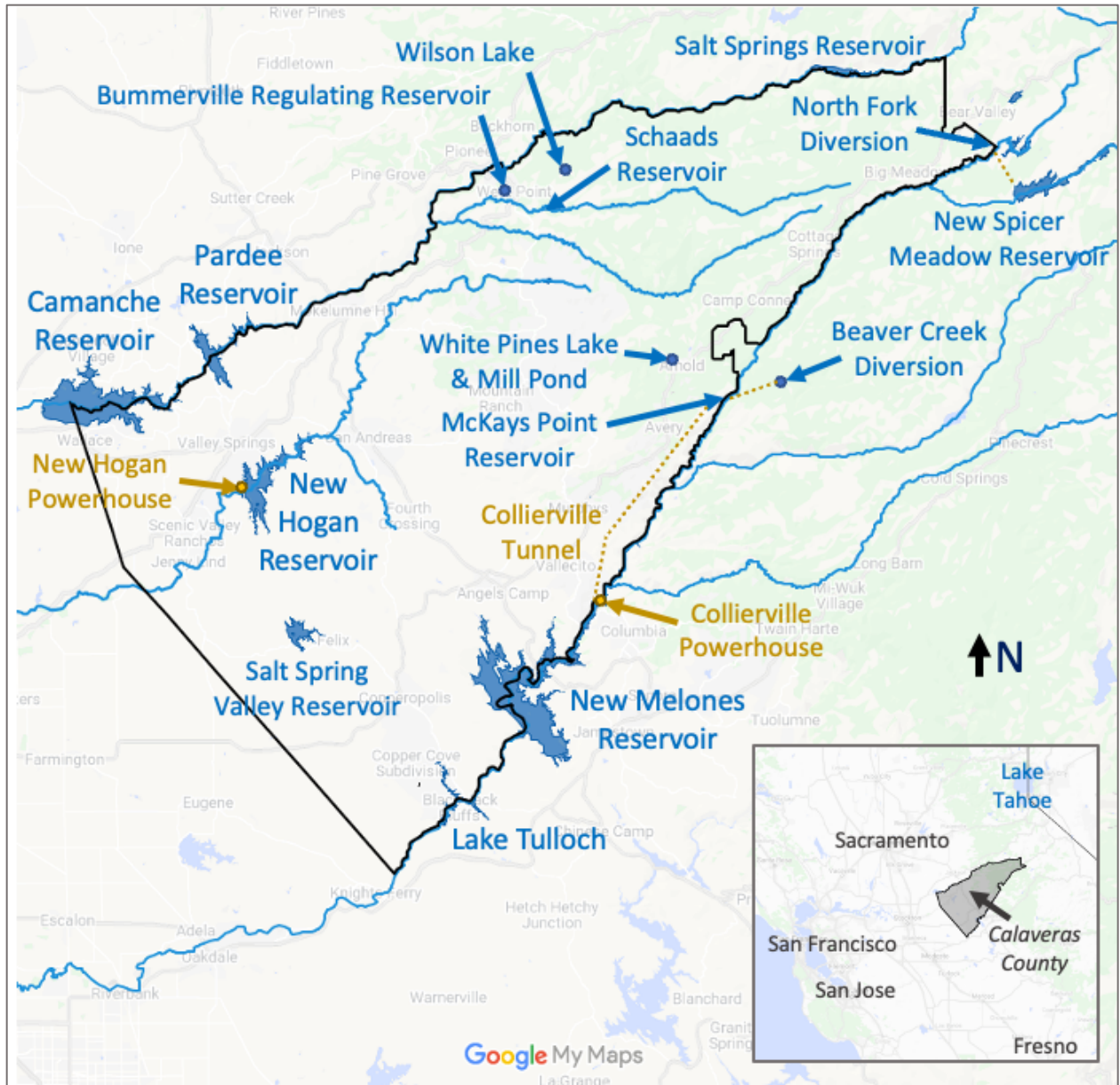
<sup>5</sup> Recycled water used for local golf course irrigation only.

**Table 2B. Non-CCWD Owned Reservoir and Open Water Facilities (Continued)**

<b>Reservoir Name</b>	<b>Dam Height (ft) and Type</b>	<b>Reservoir Capacity (acre-feet)</b>	<b>Approx. Water Surface Area (acres)</b>	<b>Watershed/Source</b>	<b>Uses</b>	<b>Public Access</b>	<b>Owner(s)/Operator(s)</b>
Lake Tulloch	205 ft Gravel	68,400	1,152	Stanislaus River	Water Supply (Copper Cove) <sup>1</sup> ; Hydropower; Recreation	Yes	Tri-Dam Project (CA00265) <sup>2</sup>
New Hogan Reservoir (New Hogan)	210 ft Earthen Embank.	317,100	3,206	Calaveras River	Water Supply (Jenny Lind) <sup>1</sup> ; Hydropower; Recreation	Yes	U.S. Army Corps of Engineers (USACE), U.S. Bureau of Reclamation (Reclamation), Stockton East Water District (SEWD) (CA10109) <sup>2</sup>
New Melones Reservoir (New Melones)	625 ft Earthen Embank.	2,400,000	12,500	Stanislaus River	Water Supply (Copper Cove) <sup>1</sup> ; Hydropower; Recreation	Yes	Reclamation (CA10246) <sup>2</sup>
Schaads Reservoir	112 ft Earthen Embank.	2,500	41	Middle Fork Mokelumne River	Water Supply (West Point) <sup>1</sup> ; Hydropower; Recreation	Yes	Calaveras Public Utilities District (CPUD) (CA00307) <sup>2</sup>

<sup>1</sup> Water supply for several downstream users and uses. CCWD service area(s) receiving water supplies from facility listed for reference.

<sup>2</sup> U.S. Army Corps of Engineers National Dam ID number (NID ID).



**Figure 3. CCWD Map (Reservoir and Open Water Facilities)**

- CCWD also owns the New Hogan Power Project (New Hogan Project, FERC Project No. 2903) on the Calaveras River, a powerhouse capable of generating 3.0 MW at New Hogan Reservoir (New Hogan). New Hogan is owned by the U.S. Army Corps of Engineers (USACE) and operated by the Bureau of Reclamation (Reclamation) for flood control and water supply purposes, respectively. Additionally, the New Hogan Project facility is currently operated by the Modesto Irrigation District (MID) for hydropower production under an agreement with CCWD executed in August 1985. As such, related New Hogan Project analysis is handled by MID and is not included in this RRA. This FERC license is also set to expire in 2032.

- Other reservoirs and open water systems not owned by CCWD, but which are upstream of or impact CCWD’s water supplies, are listed in **Table 2B**.

For the purposes of this RRA, the water supply, wastewater, and reservoir facilities are consolidated by service area, based on geographic proximity, as shown in **Table 3** below.

**Table 3. CCWD Facility Consolidation by Service Area**

<b>Service Area Name</b>	<b>Water Supply Facilities (Table 1)</b>	<b>CCWD Reservoir &amp; Open Water Facilities (Table 2A)</b>	<b>Non-CCWD Reservoir &amp; Open Water Facilities (Table 2B)<sup>2</sup></b>
Copper Cove	Copper Cove WTP	Beaver Creek Diversion <sup>1</sup> , CCRR, North Fork Diversion <sup>1</sup> , New Spicer <sup>1</sup>	Lake Tulloch, New Melones
Ebbetts Pass	Hunters WTP	Beaver Creek Diversion <sup>1</sup> , North Fork Diversion <sup>1</sup> , New Spicer <sup>1</sup> , McKays <sup>1</sup>	
Jenny Lind	Jenny Lind WTP	La Contenta	New Hogan
Sheep Ranch	Sheep Ranch WTP	Mill Pond, White Pines	
Wallace	Wallace WTP		
West Point	West Point WTP	Bummerville, Wilson Lake	Schaads Reservoir

*Other Service Area infrastructure within the scope of this RRA is defined in **Appendix C**.*

<sup>1</sup> Facilities owned, but not operated by CCWD. Not analyzed in RRA beyond risks to CCWD supplies.

<sup>2</sup> Non-CCWD facilities not analyzed in RRA beyond potential risks to CCWD water supplies.

***Due to the sensitivity of information contained in Sections 4.2 through 4.5, they are not included in this RRA Public Version.***

**4.2 Monitoring Practices**

*Not included in RRA Public Version.*

**4.3 Financial Infrastructure**

*Not included in RRA Public Version.*

**4.4 Operations & Maintenance**

*Not included in RRA Public Version.*

**4.5 Use, Storage, and Handling of Chemicals**

*Not included in RRA Public Version.*

#### 4.6 Advanced Metering Infrastructure

CCWD is implementing an advanced, fixed network, Advanced Metering Infrastructure (AMI) system to replace all existing analog customer volumetric meters throughout CCWD's service areas. The implementation phase started in February 2021 and is anticipated to be completed by Spring of 2022. The new AMI digital metering system will transmit end usage data to CCWD through a new wireless network, allowing CCWD to monitor real-time data usage. In addition, CCWD will have the capability to facilitate the detection of potential leaks, broken infrastructure, system flow issues, or other water systems failures. CCWD is in the process of reviewing wireless network security and information technology (IT) infrastructure options, to ensure data monitoring and collection procedures with the new AMI system are protected. Review of potential AMI risks and vulnerabilities is beyond the scope of this RRA, given the system is not yet implemented by CCWD. For more information and updates regarding CCWD's transition to the AMI system, visit: <https://ccwd.org/projects/ami-implementation/>.

#### 5.0 District Service Goals

CCWD was founded in 1946 to develop and secure adequate water supply sources to meet the County's anticipated needs. To this end, CCWD maintains, protects, and enhances its water resources and legal diversion and storage rights, and uses water supply reliability metrics to ensure it is consistently able to fulfill its water supply obligations. As such, CCWD's water supply resilience metrics are based on a measure of its ability to meet its service area demands with available supplies (as defined in UWMP). CCWD strives to make sure it can consistently supply 100 percent of its service areas' annual demands regardless of hydrologic (wet or dry) conditions. To date, CCWD has been able to utilize its surface water, groundwater, and recycled water resources to consistently satisfy demands with minimal water supply interruptions<sup>5</sup>.

CCWD's surface water supplies are largely dictated by the volume, nature, and timing of precipitation in its watersheds; primarily the Calaveras River, Stanislaus River, and Mokelumne River. CCWD has been able to withstand much of this variability owing to its established water rights and reservoir storage facilities. However, there are several factors which could result in constraints on CCWD's water supplies going forward, as explored in **Table 6**. CCWD has devoted much of its Capital Improvement Program (CIP), engineering and planning analyses, and has undertaken several countermeasures towards bolstering its water supply systems in response to these potential constraints. Additionally, CCWD developed a Water Shortage Contingency Plan (WSCP) which defines the analysis, public outreach protocols, and 'shortage response actions' used to address local water supply shortage conditions. CCWD relies on the WSCP and these other efforts to better prepare for droughts or water shortage which may limit CCWD's water supply availability. In any event, CCWD's water service goals remain fulfilling 100 percent of customer demands<sup>6</sup> and avoiding the consequences of not fulfilling that goal.

---

<sup>5</sup> Water supply outages interruptions have historically been from instances of infrastructure issues (treatment or distribution, or from required maintenance, not generally due to unavailable water supply.

<sup>6</sup> For context, CCWD's water supplies are generally on order of 65,400 AF to 76,600 AF per year made available, while service areas' treated water demands total only around 8,400 AF per year.



## **5.1 Systems Resiliency**

In the context of this RRA, resilience (as defined in **Section 2.0**) relates to CCWD's ability to maintain its service goals given the potential impacts to CCWD's water supplies explored in **Table 6**. CCWD benefits from the fact that its service areas are spread across the County and rely on different water sources and infrastructure systems, meaning lower potential for consequences to impact CCWD's entire system at once. However, several of these areas have low population densities and relatively small rate-payer bases, which can lead to management and financial challenges for CCWD as a whole. It also makes planning and O&M of the system more challenging (i.e., assessing six different WTPs, sets of infrastructure, and water sources).

CCWD's ability to be resilient due to natural hazards and/or malevolent acts depends on the extent, location, and severity of such events. As described in **Section 4.1**, CCWD has adequate water storage and availability under its water rights to withstand much of the annual hydrologic variability and 'low-level' natural hazards (e.g., severe weather).

However, more dramatic events such as large-scale wildfires affecting customers and water quality and/or malevolent acts aimed at reservoir infrastructure would cause more severe water supply shortages (impacting repair costs and/or timeline). More information regarding County local hazards and CCWD's potential water shortage actions are covered in the LHMP and WSCP, respectively. The WSCP also includes a description of actions given a catastrophic supply interruption, including the local and regional agency coordination needed to withstand such an event.

Subsequent sections address some of the countermeasures led by CCWD to plan and prepare for water supply interruptions. CCWD maintains some reserve funding for emergency repair purposes but has continued to explore grant options and other funds to support its CIP and other water supply needs.

**Table 6. Factors Resulting Reductions to Water Supply**

Factors	Surface Water	Groundwater	Recycled Water
<i>Naturally Occurring Factors</i>			
<p>Limited Quantity (e.g., minimal snowpack, more liquid precipitation runoff)</p>	<p>Hydrologic variation could result in limited storage carryover, either by lack of inflow supply or increased required outflows to account for flood control. Additionally, this variation could lead to minimal flows in key water sources being inadequate for diversions.</p>	<p>Limited surface water supplies have historically caused users to depend more on groundwater. This dependency has caused over-draft (unsustainable) conditions and subsequent permanent lowering of groundwater levels, which has caused wells to go dry for periods of time.</p>	<p>Conservation during water shortage and reduced inflow and infiltration from stormwater could theoretically lead to less wastewater intake, thereby decreasing recycled water availability.</p>
<p>Water Quality (e.g., changing in-stream quality conditions)</p>	<p>Variable flow of surface water sources can dramatically change the water quality composition from year to year. This can include higher naturally occurring levels of algae or manganese, increased nitrates from local runoff, nutrients, or other constituents, all which create long-term nuisance issues for water supply treatment. Additionally, wildfires and resulting forest biomass issues has caused several issues with water quality in the past.</p>	<p>Groundwater in CCWD's portion of the underlying subbasin has historically not had major water quality issues. However, continued over-draft conditions would eventually lead to high levels of iron and manganese, nitrates, nutrients, and other constituents associated with agricultural production, common to many other subbasin.</p>	<p>None beyond temporary wastewater treatment plant outages or issues leading to recycled water not meeting water quality requirements for use. This would be resolved by the District as any issues occur.</p>
<p>Natural Disasters (e.g., Wildfires, Earthquakes, Erosion, etc.)</p>	<p>Several natural disaster events could threaten natural streamflow or the water quality in waterways which CCWD relies on for its supplies (e.g., wildfire sediment runoff, massive erosion/slides from earthquake, which prevents river flow). These disasters could also adversely impact CCWD reservoirs and other surface water systems. See <i>LHMP for more information.</i></p>	<p>Several natural disasters could significantly damage groundwater pumping facilities or cause hydrogeologic changes to groundwater levels, meaning no temporary access to groundwater (or permanent depending on damage extent).</p>	<p>Several natural disasters could significantly damage WWTP or related infrastructure, meaning no production of recycled wastewater available for CCWD demands.</p>

**Table 6. Factors Resulting Reductions to Water Supply (Continued)**

Factors	Surface Water	Groundwater	Recycled Water
<i>Non-Naturally Occurring Factors</i>			
<p>Legal/ Regulatory (e.g., new legislation or SWRCB orders)</p>	<p>In certain dry conditions mandatory curtailments of water rights usage can create inconsistency and impact the reliability of these supplies. Additional legal issues include inconsistent supply availability due to delays in construction, approval of water rights applications /extensions, or required environmental analysis.</p>	<p>There are likely to be several constraints on groundwater use resulting from implementation of the California Sustainable Groundwater Mgmt. Act (SGMA). CCWD is not a large groundwater user but does overlie a 'critically over-drafted' subbasin, meaning more stringent management to achieve sustainability.</p>	<p>Once permitting for use is acquired there are several monitoring and management requirements to ensure continued use (e.g., Waste Discharge Requirements, Title 22). Additionally, there are often several constraints to obtaining permits.</p>
<p>Environmental (e.g., new legislation, outside legal challenges)</p>	<p>Future changes to instream flow requirements in key rivers and/or changing downstream flow requirements could decrease District surface water supplies by impacting CCWD's ability to divert water (e.g., California Bay Delta Water Quality Control Plan Update).</p>	<p>Several questions remain regarding environmental criteria of SGMA (e.g., requirements for hydro-connectivity of streams and groundwater tables). This could require additional surface water releases and/or mgmt. steps to achieve, all which decreases supply.</p>	<p>WDRs often set criteria for applications of treated wastewater (e.g., timing, weather conditions, and constraints on use). WDR changes for environmental factors could further impact recycled water use opportunities.</p>
<p>Malevolent Acts (Terrorism, Significant Vandalism)</p>	<i>Not included in RRA Public Version.</i>		
<p>Anthropogenic Climate Change</p>	<p>Climate change threatens the volume, nature, and timing of precipitation in key watersheds, which dictates the amount of surface water made available to CCWD. It is anticipated a warming climate would decrease average snowpack and induce more frequent and intense drought conditions, impacting the reliability and availability of supplies.</p>	<p>Limited surface water supplies have historically caused users to depend more on groundwater. Climate change impacts threatens to increase landscape and irrigation demands, increasing this dependency. If possible, more runoff from liquid precipitation can be used for conjunctive management efforts.</p>	<p>Few climate change impacts are anticipated for recycled water supplies. Changing urban water use under a warmer climate could theoretically alter wastewater treatment operations and impact recycled water availability, but the potential impacts remain unclear.</p>

### 6.0 Planning Integration (Countermeasures)

CCWD has committed to developing short- and long-term comprehensive management strategies for maintaining and protecting its water system assets. CCWD’s staff develop these strategies through carefully planned, proactive, flexible countermeasures which review holistic watershed management, water supply reliability, and infrastructure needs. CCWD also frequently works with a variety of federal and state agencies, local and regional water suppliers, community partners, tribal entities, and other interested parties in its planning and project implementation efforts<sup>7</sup>. **Table 7** lists a number of the countermeasures led by or in coordination with CCWD to incorporate risk and resiliency concepts into its long-term planning.

**Table 7. Key CCWD Planning Efforts**

<b>Planning Effort Name [Latest, Update Cycle]</b>	<b>Lead</b>	<b>Description</b>
DSOD EAPs [2020, Updated per DSOD Requirements]	CCWD	Documents dam owner responsibilities, provides up-to-date emergency contact information, defines monitoring and preparedness efforts, and analyzes failures and threats. See <b>Table 2A</b> .
Integrated Regional Water Management Plans (IRWMPs) [2018, Updated per IRWM Program Requirements]	Applicable IRWM Group(s), <i>see Footnote 7</i>	Details IRWM vision, analyzes local conditions, project and program needs, and establishes collaborative framework for participants to engage in planning at regional level.
LHMP [2018, Updated per FEMA Requirements]	CCWD	See Section 3.1 description.
Groundwater Sustainability Plan (GSP) [2020, Updated per SGMA Requirements]	Eastern San Joaquin Groundwater Authority	Details groundwater and hydrogeologic conditions in Subbasin, and defines plan and monitoring needs to achieve long-term sustainability (i.e., reduce historic over-draft conditions and repair other undesirable impacts).
UWMP [2021, 5-yr Updates for Legislative Changes]	CCWD	Contains details on water supply and use trends, water conservation programs, and water supply reliability risks under varied planning scenarios.
EPA Watershed Sanitary Surveys (WSS) [2021, 5-yr Updates for Conditional Changes]	CCWD, CPUD (Upper Mokelumne) SEWD (Stanislaus/Calaveras)	Provides overview of source watershed water supply quality and reviews WTP operational vulnerabilities and risks. CCWD participates in Stanislaus and Calaveras Rivers combined WSS and leads Upper Mokelumne River WSS.

<sup>7</sup> Examples include the California Integrated Regional Water Management (IRWM) Program - which CCWD participates in the Mokelumne-Amador-Calaveras (MAC) and Tuolumne-Stanislaus (T-Stan) IRWM groups - the Mountain Counties Water Resources Association, Upper Mokelumne River Watershed Authority (UMRWA), and Subbasin groundwater management under SGMA.

**Table 7. Key CCWD Planning Efforts (Continued)**

<b>Planning Effort Name [Update Cycle]</b>	<b>Lead</b>	<b>Description</b>
WSCP [2021, 5-yr Updates for Legislative Changes]	CCWD	Contains details on CCWD water shortage condition planning, sets procedures for annual assessment(s) of water supply and demand conditions, and defines shortage response stages and actions.
Water Systems Master Plans [Varied 2005 to 2018 for Areas, Updated as Needed]	CCWD	Developed for a particular service area, documents infrastructure conditions and risks, and sets a guide for operating, maintaining, and constructing the water system. Often used to set CIP projects and priorities.
Infrastructure Operations Plans, Operations & Maintenance Manuals [Varies, Updated as Needed]	CCWD	Developed for a particular set of infrastructure or purpose (e.g., WTP operations), documents infrastructure conditions and risks, and sets the procedural guidance for operations and/or maintenance.
Organization Strategic Plan [2021, Updated as Needed]	CCWD	Defines the organizational strategy, direction, and analysis of CCWD service goals and objectives.
<i>Technical Analysis</i> [As Needed]	CCWD (and Partners)	As needed technical analysis for specific investigations or analyses (e.g., Highway 4 Corridor Demands Study, Amador and Calaveras Counties Hydrologic Assessment).

### **6.1 County Planning Efforts**

The County of Calaveras government and other in-County water suppliers also frequently work together on several key planning and coordination efforts in order to better prepare for extreme conditions and potential utility service impacts. The follow lists some of the County-wide efforts<sup>8</sup>, and describes the applicability to CCWD’s water services:

- *Calaveras County General Plan*: Provides a long-term outlook of County policies, programs, and development objectives aimed at sustainable population growth. Plan includes assessment of resource demands and public safety concerns, which guides County governance and coordination with CCWD on water-related issues.
- *Calaveras County Mass Fatality Plan*: Establishes the policies, responsibilities, and procedures required to serve the County populace during incidents that result in significant loss of life, both from malevolent acts and natural hazards (e.g.,

<sup>8</sup> List originates from 2021 Calaveras County Multi-Jurisdictional Hazard Mitigation Plan (pgs. 312-314). Plans can be found online at: <https://oes.calaverasgov.us/Pre-Planning>

emergency response organization, operational and response procedures). Plan addresses fatality events from catastrophic failure of CCWD facilities.

- *Calaveras County Terrorism Plan*: Establishes a concept of operations for County consequence management of a domestic terrorist incident which impacts life, property, or utility systems. This plan provides the basic field Incident Command System (ICS) and emergency operations guidance for actions to take for terrorist and malevolent actor situations (e.g., analysis, initial response, recovery, and mitigation). Plan applies broadly to terrorist incident response at CCWD facilities.
- *Calaveras County Emergency Operations Plan (EOP)*: Outlines the functions, responsibilities, and regional risk assessment of large-scale emergencies (e.g., wildfire, hazardous materials incidents, flooding, dam failure, airplane crashes, etc.) Plan sets forth an operating strategy for managing and responding to these incidents, including CCWD's role in maintaining and responding to emergencies involving water supply and wastewater systems infrastructure.
- *Calaveras County Area Plan*: Also known as the Calaveras County Hazardous Materials Emergency Response Plan. It establishes the policies, roles and responsibilities, and procedures required of County agencies to protect the health and safety of people, the environment, public and private property from the effects of hazardous materials incidents.
- *Calaveras County Wildfire Protection Plan*: Identifies the risks and hazards associated with wildfires in the Wildland-Urban Interface (WUI)<sup>9</sup> areas of the County. Proposes projects and programs aimed at reducing infrastructure and ecosystems damage from possible wildfire events (e.g., fuel reduction projects).
- *Multi-Agency Coordinating Group (MAC)*: An emergency-response management team composed of major jurisdictional representatives in the County, who are responsible for responding to and managing broad-based emergency events. CCWD acts as liaison for all wastewater and water suppliers in the MAC. More info can be found online at: <https://oes.calaverasgov.us/Multi-Agency>

## 6.2 Other Countermeasures

CCWD also maintains other countermeasures efforts to plan for and analyze specific water systems risks and vulnerabilities, and to provide appropriate response protocols. A couple examples are provided below. CCWD Operations staff will often monitor and assess local, regional, or statewide events which may prompt the need for these efforts and will update planning documents accordingly.

- *Public Safety Power Shutoffs (PSPS) Strategic Plan*: CCWD developed a water systems operational procedures guide for PSPS conditions enacted by the Pacific Gas & Electric Company (PG&E) where they shut off portions of the electric grid in the County to minimize wildfire risks during certain weather conditions. CCWD maintains some electric generation facilities at its WTPs, as listed in **Appendix C**, which allows for continued treatment operations during these conditions. However, localized wildfire risks from weather, along with distribution systems and end user

---

<sup>9</sup> Defined as areas of County populations most at risk from large-scale wildfires originating in rangelands.

power shut offs, may cause issues and constraints to CCWD operations, which are addressed in the PSPS Strategic Plan for all water systems.

- *Chemical Delivery SOPs*: As discussed in **Section 4.5**, CCWD maintains chemical storage, handling, and delivery SOPs at its facilities. These documents also provide information on chemical spills, notification and cleanup procedures.
- *IT Health Assessment Report*: In response to cybersecurity concerns for utility and infrastructure IT systems, CCWD is working with Coneth Solutions (Coneth), a local IT services and support company, to assess its IT-specific risks and opportunities for improved security (both hardware and software). Coneth developed an IT Health Assessment Report (IT Assessment Report) which details existing systems and highlights the standardization of CCWD staff policies regarding equipment use. CCWD Administrative Services anticipates working through the IT Assessment Report and analyses throughout 2021 with implementation of recommended actions enacted shortly thereafter. Note CCWDs service area operations (e.g., SCADA) and other network infrastructure are on separate systems and network infrastructure.

## 7.0 Risk Focus Areas

AWIA requires CWSs to analyze assets for the following risk focus areas in the RRA:

- *Malevolent Acts*, such as: assault on utility (physical), contamination of source or finished water (intentional or accidental), theft or illegal diversion, cyberattack(s) on enterprise or process control systems, or sabotage (collectively referred to as “Threat Categories”).
- *Natural Hazards*, such as: hurricanes, floods, earthquakes, tornados, ice storms, or fires/wildfires.

The ERPs provide some information on malevolent acts and CCWD emergency response actions for its primary water supply facilities (mainly for WTPs). A few of the primary catastrophic vulnerabilities identified by CCWD in the LHMP, which could lead to significant water supply interruptions and other consequences, are listed below:

- *Severe Weather: Heavy Rains and Storms* (Section 4.2.3 of LHMP): large precipitation accumulation, generally as snow in the higher elevation service areas, typically several issues with infrastructure operations related to inaccessibility or delayed operations for post-storm event clean up (e.g., manual customer meter readings delayed due to large winter storms). CCWD’s water supply infrastructure is generally capable of handling large storm events without complete failure given preparation for these types of conditions. However, changes to weather intensity or patterns could threaten subsequent actions which impact CCWD systems (e.g., Pacific Gas & Electric Public Power Safety Shutoff events).
- *Dam or Reservoir Failure* (Section 4.2.8 of LHMP): CCWD develops and maintains the EAPs for each of its dams per DSOD requirements for dam owners and operators (see Table 2A). EAPs typically contain emergency situation details, notification lists, and other coordination materials to prepare for failures or other

problematic conditions. Owing to several CCWD owned open surface reservoirs, and many non-CCWD owned reservoirs scattered across County watersheds, there are several vulnerabilities associated with reservoir infrastructure failure and/or water quality degradation.

- *Wildfires* (Section 4.2.18 of LHMP): as with much of the forest-heavy Sierra Nevada Mountains, CCWD is susceptible to large wildfires which dramatically impact natural alpine environments and threaten County urban areas. CCWD spends much of its planning resources and staff time coordinating with agencies aimed at preparing its water supplies to withstand wildfire conditions and to aid in regional fire suppression needs.
  - The US Forest Service (USFS) maintain a collection of wildfire risk assessment tools, which includes nationwide zonal statistics in Geographic Information Systems (GIS) to illustrate the intersections of high population density and wildfire risks. The USFS “Wildfire Risk to Communities” database (WRC)<sup>10</sup> for the County is shown in **Figure 4A**, with the corresponding risk graphic shown in **Figure 4B**. The USFS WRC is intended to help inform risk-based decision making while increasing wildfire risk awareness. As shown in the figures, the County is generally at very high wildfire risk as compared with other areas of California.

Given these risk focus area priorities, CCWD often incorporates risk and resiliency concepts in its operational and planning processes (listed in **Table 7**). CCWD programs, such as staff and facility safety and security, operational procedures, and regional coordination, are examples of the ways that CCWD attempts to manage its vulnerabilities. **Figure 5** provides a diagram for how CCWD generally identifies risks, analyzes and priorities the vulnerabilities from those risks, and incorporates them into various efforts.

---

<sup>10</sup> USFS GIS tool which ranks wildfire likelihood (i.e., annual probability of wildfire event) with wildfire consequences (i.e., general susceptibility of buildings to wildfire damage). Maps can be found online at: <https://wildfirerisk.org/explore/0/06/06009/>



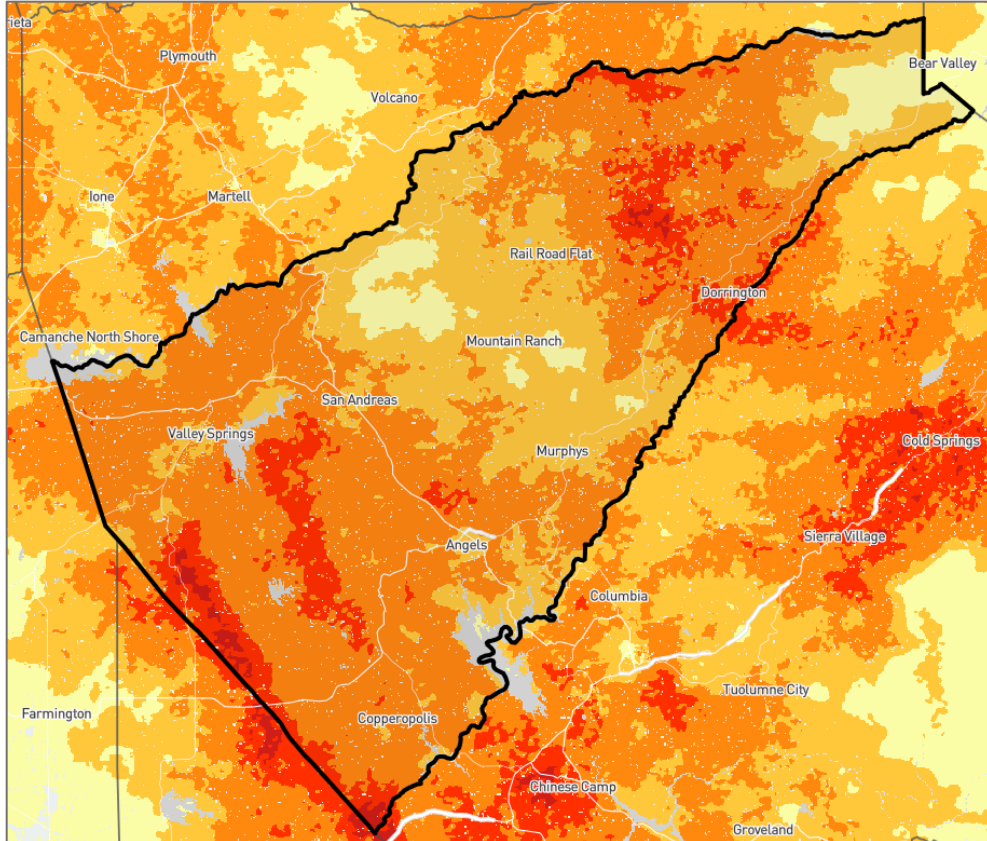


Figure 4A. USFS WRC Wildfire Risk Assessment Map for Calaveras County

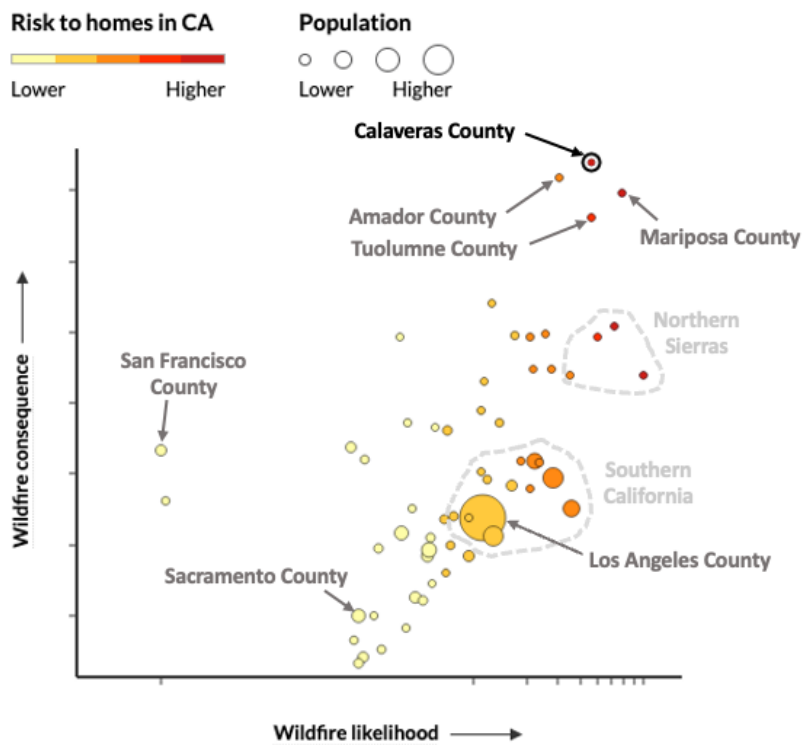
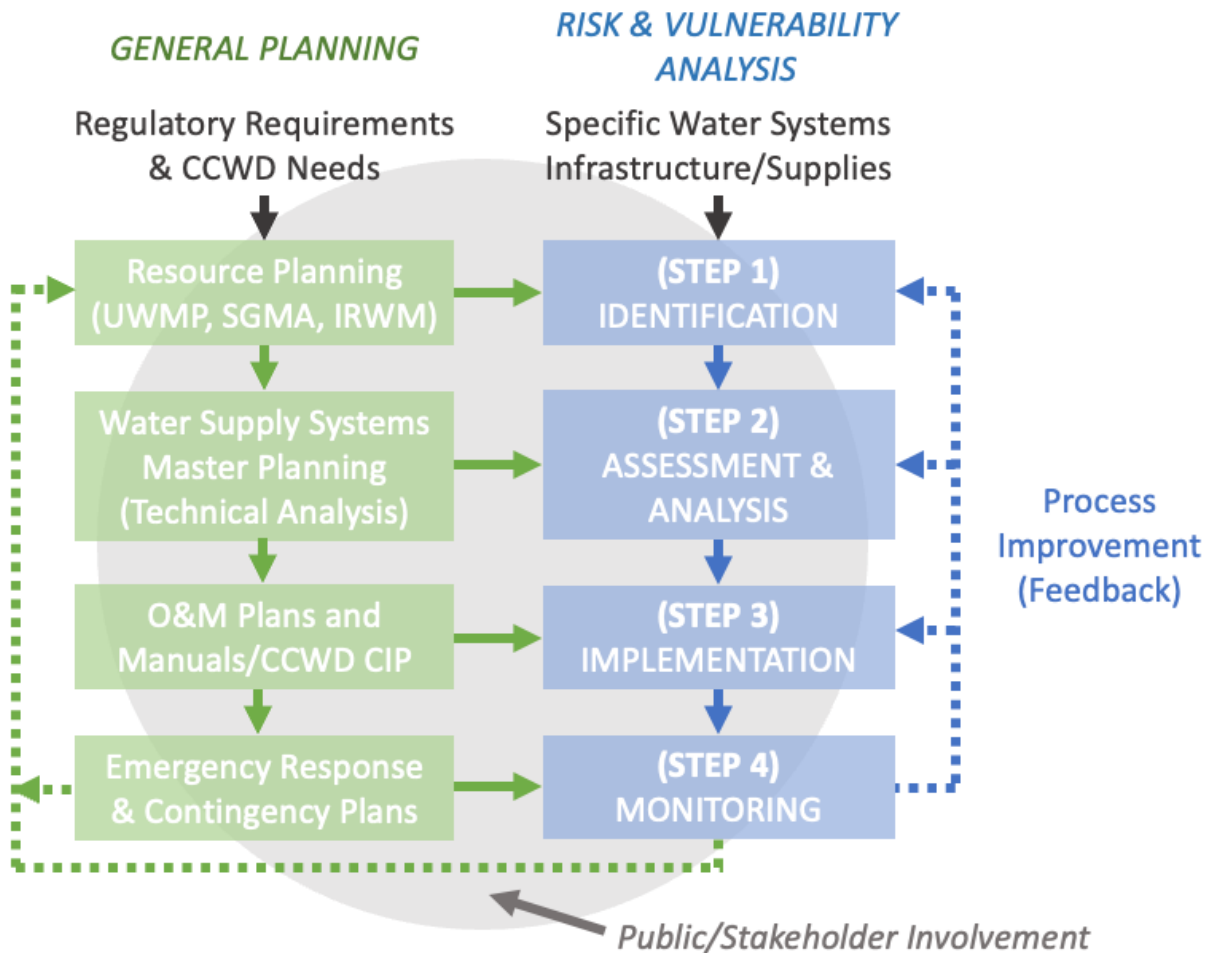


Figure 4B. USFS WRC California Wildfire Severity Rankings



**Figure 5. CCWD General Risk and Vulnerability Framework**

### 7.1 Malevolent Acts Review

EPA released the “Baseline Information on Malevolent Acts for Community Water Systems” document (Baseline Document) to assist CWSs with analyzing Threat Categories when preparing the RRA. Per the Baseline Document, these Threat Categories encompass actions that could be taken by a malevolent actor to either (1) substantially disrupt the ability of a system to provide a safe and reliable supply of drinking water, or (2) cause significant public health or economic impacts in the community served by the CWS. Malevolent acts may be perpetrated by individuals or groups operating outside or inside the CWS.

Threat likelihood can be impacted by many factors, such as adversary intent and capability, target visibility and potential impact, awareness, ease of discovery, ease of exploitation of water system vulnerabilities, and the probability of detection and intervention. The Baseline Document presents several factors to consider for malevolent act likelihood. Although CCWD’s service areas vary in location, water resources and supplies, and infrastructure, the malevolent act risks are generally similar and are investigated in **Table 8**.

## **Table 8. Factors for Malevolent Acts Likelihood**

*Not included in RRA Public Version.*

### **7.2 National Risk Index**

FEMA's National Risk Index (NRI)<sup>11</sup> was developed to help inform risk-based decision making while increasing the awareness of economic impacts from specific natural hazards. NRI data are provided at the Census Tract level, as listed in **Table 9** for the County. Combined with the overview of hazards described above, CCWD is able to confirm several of the known and previously assessed vulnerabilities using the NRI scoring system. Moreover, these data can often be used to justify certain mitigation measures based on potential losses from inaction. As described in the LHMP and confirmed by the NRI data, wildfire risk and resulting damages continue to be the most potentially catastrophic threat to the County and CCWD facilities – accounts for most of NRI estimated in-County monetary losses.

### **7.3 Cybersecurity Guidance**

Within the last several decades, cybersecurity threats, including such things as cyber-terrorism and ransomware attacks, have grown into a problem of concern and a potential vulnerability for IT-dependent utility systems. In response to these threats, a wide array of standards and guidelines are available to assist organizations with implementing security controls to mitigate the risks from cyber-attacks. One such guideline is the AWWA 2019 Cybersecurity Guidance document (AWWA Guidance)<sup>12</sup>, which provides key information on IT prioritization, recommended controls, and tools to help implement response actions. An overview of CCWD's network architecture, existing control systems, and IT procedures is beyond the scope of this RRA. However, some of the key cybersecurity risks areas identified in the AWWA Guidance were analyzed for CCWD, as shown in **Table 10**. This provides a high-level overview used to guide the ongoing IT cybersecurity efforts and IT Assessment Report noted in **Section 6.2**.

## **Table 10. IT Cybersecurity Risks per AWWA Guidance**

*Not included in RRA Public Version.*

---

<sup>11</sup> NRI conveys the average expected annual monetary loss for buildings due to wildfire in a neighborhood or region. GIS data can be found at: <https://hazards.geoplatform.gov/portal/apps/MapSeries/index.html?appid=ddf915a24fb24dc8863eed96bc3345f8>

<sup>12</sup> AWWA Guidance online at: <https://www.awwa.org/Portals/0/AWWA/ETS/Resources/AWWACybersecurityGuidance2019.pdf?ver=2019-09-09-111949-960>

**Table 9. NRI Risk Factors for Calaveras County Census Tracts**

Census Tract	Tract Name	Popul.	Est. Building Value (\$) <sup>1</sup>	Est. Agricultural Value (\$) <sup>2</sup>	Hazard Risk Ratings (NRI Score) <sup>3</sup>																	NRI Est. Loss <sup>4</sup> (\$/yr) (Rating)	Risk National/ State Percentile <sup>5</sup>	
					Avalanche	Coastal Flooding	Cold Wave	Drought	Earthquake	Hail	Heat Wave	Hurricane	Ice Storm	Landslide	Lightning	Riverine Flood	Strong Wind	Tornado	Tsunami	Volcanic Activity	Wildfire			Winter Weather
06009000210	Valley Springs	9,515	\$1.085B	\$6.67M	18.2		0.0	21.2	22.1	7.9	11.5			17.4	26.6	15.3	14.3	3.9		0.0	43.3	2.5	\$1.25M (Very Low)	27/26
06009000300	Mountain Ranch	6,969	\$921M	\$2.44M	18.3		0.0	14.3	20.8	7.7	32.5			54.8	24.2	11.8	11.8	2.9		0.0	38.3	7.2	\$3.82M (Relatively Low)	51/52
06009000400	Rail Road Flat	4,032	\$474M	\$377k	21.5		0.0	8.4	17.3	8.5	30.8			26.7	23.1	9.3	11.6	2.7		0.0	34.6	9.3	\$614k (Very Low)	21/18
06009000504	Cottage Springs	942	\$468M	\$1.4k	22.8		0.0	1.4	15.1	6.3	12.6			11.1	20.3	5.6	6.9	2.8		3.9	44.6	9.8	\$579k (Very Low)	23/20
06009000503	Arnold	2,330	\$841M	\$5.8k	17.3		0.0	1.9	20.1	6.3	13.5			9.8	16.8	5.6	7.1	5.4		0.0	33.6	10.4	\$681k (Very Low)	13/9
06009000501	Avery	3,332	\$778M	\$23.4k	19.7		0.0	3.52	18.4	7.5	23.8			13.9	21.3	7.4	8.9	5.4		0.0	31.2	11.3	\$474k (Very Low)	10/12
06009000122	Murphys	4,046	\$436M	\$897k	21.2		0.0	12.6	18.8	7.9	30.7			14.5	22.2	9.9	11.5	3.8		0.0	36.5	6.6	\$519k (Very Low)	17/13

See footnotes on following page.

**Table 9. NRI Risk Factors for Calaveras County Census Tracts (Continued)**

Census Tract	Tract Name	Popul.	Est. Building Value (\$) <sup>1</sup>	Est. Agricultural Value (\$) <sup>2</sup>	Hazard Risk Ratings (NRI Score) <sup>3</sup>																NRI Est. Loss <sup>4</sup> (\$/yr) (Rating)	Risk National/ State Percentile <sup>5</sup>		
					Avalanche	Coastal Flooding	Cold Wave	Drought	Earthquake	Hail	Heat Wave	Hurricane	Ice Storm	Landslide	Lightning	Riverine Flood	Strong Wind	Tornado	Tsunami	Volcanic Activity			Wildfire	Winter Weather
06009000121	Angels Camp	4,463	\$494M	\$2.08M	21.5		0.0	16.9	20.9	8.2	32.1			13.6	21.8	11.1	12.8	4.1		0.0	33.3	6.9	\$488k (Very Low)	16/12
06009000220	Salt Spring Valley	5,515	\$633M	\$4.59M	17.1		0.0	18.2	15.8	6.2	11.5			12.9	21.1	7.4	11.8	3.1		0.0	38.4	2.5	\$903k (Very Low)	17/13
06009000120	Copperopolis	4,434	\$630M	\$10.34M	17.6		0.0	24.6	17.2	6.2	18.4			13.4	19.9	9.4	14.6	2.6		0.0	40.8	3.9	\$1.13M (Very Low)	23/21
<i>County Total</i>		45,578	\$6.76B	\$27.4M	19.5		0.0	12.3	18.7	7.3	21.8			18.8	21.7	9.3	11.1	3.7		0.4	37.5	7.1	\$10.5M (Very Low)	22/20
<i>County Risk Ranking (1 = Worst)</i>					4		14	7	6	10	2			5	3	9	8	12		13	1	11		

*Note: Higher risk scores (>30) highlighted orange for reference purposes.*

<sup>1</sup> FEMA-estimated monetary value of buildings within census tract based on type and property value (e.g., low-density residential, high-density residential, commercial).

<sup>2</sup> FEMA-estimated cropped and potentially cropped acreage property value and livestock production value.

<sup>3</sup> Scores range from 0 (lowest possible) to 100 (highest possible); describes relative position among all other communities (nationwide) for given hazard.

<sup>4</sup> Represents dollar loss from building value, population, and/or agricultural exposure each year due to natural hazards.

<sup>5</sup> Percentage of communities (Census Tracts) with lower NRI estimated losses on nation and state-wide basis (i.e., lower number means fewer communities with lower risk).

## 8.0 Assessment Checklists

For small CWSs the Guidance document provides a “Risk and Resilience Assessment Checklist” (Assessment Checklist) to assist in analyzing the water system assets, provided in **Appendix A**, that a CWS must assess in it an RRA per AWIA. CCWD utilized the Assessment Checklist to analyze its assets of each service area, for the assets listed in **Appendix C**, following the instructions provided by the Guidance. Particular focus was placed on the Risk Focus Areas described in **Section 7.0**. Copies of the service area Assessment Checklists are provided in **Appendix D**. For malevolent act portions of the Assessment Checklist, supplemental checklist questions from the Baseline Document are also provided. *Due to the sensitivity of information contained in the Assessment Checklists, they are not included in the RRA Public Version and distribution is limited to those individuals directly involved in CCWD emergency planning and response activities.*

### 8.1 Matrix Assessment

The Assessment Checklists qualitatively highlight several of CCWD’s most-pressing risks and vulnerabilities in its service areas. Each service area is unique in its water supply systems, water treatment facilities, and infrastructure, as described in **Section 4.1**. However, many of the specific risks and vulnerabilities are similar between these systems owing to the mostly rural and low-density nature of the County. To better understand these issues, the most frequently noted risks from the Assessment Checklists were collected and consolidated into high-level events/issues<sup>13</sup>. The consolidated list of risks was re-forwarded to the Assessment Checklist evaluators to rank-order the risks and to provide insights to potential (generalized) cost-impacts and operational impact details CCWD from such an event occurring. More work is needed to assess the degree of risk impacts to CCWD, but this “matrix assessment” helps to focus the list of major risks and vulnerabilities and provides some insight into CCWD staff perception of potential impacts. The results of this assessment are shown in **Table 11**.

It is worth noting that several Risk Factors identified in the matrix are likely interconnected and could cause successive damages to CCWD operations, water services, and employee communications in response to such events. For example, pervasive dry conditions and drought may lead to forest tree death and other conditions which may increase wildfire likelihood and the potential for large-scale damages. Regarding individual Risk Factors, as noted in Section 7.0, large and devastating wildfire events remain the greatest risk to CCWD facilities, operations, and administration in the more rural County areas of the Sierra Nevada Mountains. A few recent wildfire events are provided in Section 4.2.18 of the LHMP, these past wildfires have devastated CCWD and in-County community resources (e.g., 2015 Butte Fire in Amador and Calaveras Counties). Resulting or independent utility outages, water quality contaminations, and other Risk Factors continue to threaten CCWD, as provided in the Matrix Assessment. These factors will be further investigated in CCWD’s upcoming ERP document.

---

<sup>13</sup> For instance, wildfire threats to specific service area facilities identifies in the Assessment Checklists were broadened to a wildfire risk threatening all CCWD facilities.

## Table 11. CCWD Risks & Vulnerabilities Matrix Assessment

*Not included in RRA Public Version.*

### 9.0 Recommendations

This RRA has detailed CCWD service area infrastructure in the context of risks and resiliency vulnerabilities, via the Assessment Checklists and matrix assessment. Per the requirements of AWIA, CCWD must prepare a follow-up ERP within six months after certification of this RRA, to incorporate its findings into strategies and resources aimed at improving water systems resiliency. As discussed in **Sections 3.0 and 6.0**, CCWD has several related planning efforts which will be utilized to develop the ERPs comprehensive strategies for responding to water systems threats and vulnerabilities. It is likely that CCWD will build from the prior service area ERPs to incorporate new RRA elements (e.g., malevolent acts). Beyond the AWIA requirements, the following recommendations are provided to improve CCWD risk management and to continue developing an analysis framework:

- Develop a complete inventory (database) of existing infrastructure, georeferenced and with operational details provided. *Made available only the CCWD personnel.*
- Develop a risk and vulnerability matrix to quantify and prioritize service area infrastructure and opportunities for countermeasures, expanding upon or embedded within CCWD's CIP. Build from qualitative matrix assessment shown in this RRA to incorporate more details on disaster cost-impacts, constraints, etc.
- Identify critical interdependencies with other County and regional water suppliers and reservoir/systems operators (examples in Table 2B) and establish regular communication and/or coordinated emergency response procedures.
- Establish a standardized cost-benefit analysis for projects and programs that support risk reduction.
- Develop tools and analysis methodology to prepare for real-time customer AMI data used to quickly identify infrastructure issues or problems, once implemented.
- Continue with IT cybersecurity review efforts and develop strategies to mitigate risk levels identified in **Table 10**.
- Hold community workshops aimed at discussing water supply risks, emergency response actions, and other related topics.
- Continue to incorporate water supply risk and resiliency concepts in other CCWD planning efforts, following the generalized framework shown in **Figure 4**.

### 10.0 RRA Procedures

This RRA was developed and reviewed by CCWD staff. Prior to certification the RRA was presented to the CCWD Board, for review and in preparation of subsequent AWIA ERP

requirements. The RRA Public Version<sup>14</sup> and Board meeting agenda materials were released consistent with the Brown Act contained in §54950 et seq. of the California Government Code. EPA provides instructions for how to electronically certify the RRA on its website<sup>15</sup>, a statement used to certify this RRA following the aforementioned the Board meeting. The public Board meeting materials and certification statements are contained in **Appendix E**.

The service area Assessment Checklists contained in **Appendix D** may require periodic updates to be responsive to changing conditions, including the analysis following any attempted malevolent acts and/or natural hazards, prior to the next scheduled re-certification update.

### **10.1 District Contacts**

For more information on this RRA, or regarding other CCWD efforts involving risk and resiliency concepts applied to review of its water supply systems, please use the following CCWD contact information:

*Water Supply Planning Contact*  
Brad Arnold, PE  
Water Resources Program Manager  
Phone: (209) 754-3094  
E-mail: [brada@ccwd.org](mailto:brada@ccwd.org)

*External Affairs & Public Outreach*  
Jessica Self  
External Affairs Manager  
Phone: (209) 754-3123  
E-mail: [jessicas@ccwd.org](mailto:jessicas@ccwd.org)

---

<sup>14</sup> RRA “Public Version” does not include some materials, as noted, due to the sensitivity of information contained within. The RRA “Internal Version” contains all such information, but its distribution is limited to those individuals directly involved in CCWD emergency planning and response activities.

<sup>15</sup> EPA Certification Info Website available at: <https://www.epa.gov/waterresilience/certification-statements-risk-and-resilience-assessment-or-emergency-response-plan>



## Appendix A

### AWIA Water Systems Assets List

The following water systems assets are listed in available EPA Guidance:

1. *Physical Barriers*: Encompasses physical security in place at the CWS. Possible examples include fencing, bollards, and perimeter walls; gates and facility entrances; intrusion detection sensors and alarms; access control systems (e.g., locks, card reader systems); and hardened doors, security grilles, and equipment cages.
2. *Source Water*: Encompasses all sources that supply water to a water system. Possible examples include rivers, streams, lakes, source water reservoirs, groundwater, and purchased water.
3. *Pipes and Constructed Conveyances, Water Collection, and Intake*: Encompasses the infrastructure that collects and transports water from a source water to treatment or distribution facilities. Possible examples include holding facilities, intake structures and associated pumps and pipes, aqueducts, and other conveyances.
4. *Pretreatment and Treatment*: Encompasses all unit processes that a water system uses to ensure water meets regulatory public health and aesthetic standards prior to distribution to customers. Possible examples include sedimentation, filtration, disinfection, and chemical treatment. For the risk assessment, individual treatment processes at a facility may be grouped together and analyzed as a single asset if they have a similar risk profile.
5. *Storage and Distribution Facilities*: Encompasses all infrastructure used to store water after treatment, maintain water quality, and distribute water to customers. Possible examples include residual disinfection, pumps, tanks, reservoirs, valves, pipes, and meters.
6. *Electronic, Computer, or Other Automated Systems (including the security of such systems)*: Encompasses all treatment and distribution process control systems, business enterprise information technology (IT) and communications systems (other than financial), and the processes used to secure such systems. Possible examples include the sensors, controls, monitors and other interfaces, plus related IT hardware and software and communications, used to control water collection, treatment, and distribution. Also includes IT hardware, software, and communications used in business enterprise operations. The assessment must account for the security of these systems (e.g., cybersecurity, information security).
7. *Monitoring Practices*: Encompasses the processes and practices used to monitor source water and finished water quality, along with any monitoring systems not captured in other asset categories. Possible examples include sensors, laboratory resources, sampling capabilities, and data management

equipment and systems. Examples are contamination warning systems for the source water or distribution system.

8. *Financial Infrastructure*: Encompasses equipment and systems used to operate and manage utility finances. Possible examples include billing, payment, and accounting systems, along with third parties used for these services. This asset category is not intended to address the financial “health” of the water utility (e.g., credit rating, debt-to-equity ratios).
9. *The Use, Storage, or Handling of Chemicals*: Encompasses the chemicals and associated storage facilities and handling practices used for chemical disinfection and treatment. Assessments under this asset category should focus on the risk of uncontrolled release of a potentially dangerous chemical like chlorine where applicable.
10. *The Operation and Maintenance of the System*: Encompasses critical processes required for operation and maintenance of the water system that are not captured under other asset categories. Possible examples include equipment, supplies, and key personnel. Assessments may focus on the risk to operations associated with dependency threats like loss of utilities (e.g., power outage), loss of suppliers (e.g., interruption in chemical delivery), and loss of key employees (e.g., disease outbreak or employee displacement).

## Appendix B AWIA Guidance Checklist

**Table B1** lists RRA required contents from the available EPA Guidance, and the corresponding section(s) included in CCWD's RRA document.

**Table B1. RRA Requirements per EPA Guidance**

<b>RRA Requirement</b>	<b>Section(s)</b>
Describe malevolent acts that pose a significant risk to the asset category of the CWS.	Section 7.1, Section 8.1, Appendix D
For each malevolent act that you identify as a significant risk, briefly describe how the malevolent act could impact the asset category at the CWS. Include major assets that might be damaged or disabled, water service restrictions or loss, and public health impacts as applicable.	Appendix D
Describe natural hazards that may pose a significant risk to the asset category at the CWS.	Section 7.0, Section 7.2, Section 8.1, Appendix D
For each natural hazard that you identify as a significant risk, briefly describe or provide examples of how the hazard could impact the asset category at the CWS. Include major assets that might be damaged or disabled, water service restrictions or loss, and public health impacts as applicable.	Appendix D
Identify countermeasures that the CWS could potentially implement to reduce risk from the malevolent acts and natural hazards that you selected in this assessment.	Section 3.0, Section 6.0, Section 9.0, Appendix D

**Table B2** lists additional RRA required contents defined in the Baseline Document, and the corresponding section(s) included in CCWD's RRA document.

**Table B2. RRA Requirements per EPA Baseline Document**

<b>RRA Requirement</b>	<b>Section(s)</b>
Identify the most significant malevolent acts and natural hazards to a CWS's critical assets, systems, and networks.	Section 7.0, Section 8.1, Appendix D
Account for threats to source water (ground and surface), treatment and distribution systems, and business enterprise systems.	Section 5.0, Section 7.0, Appendix D
Consider risks posed to the surrounding community related to attacks on the CWS.	Appendix D
Serve as guide to facilitate a prioritized plan for security upgrades, modifications of operational procedures, and policy changes to mitigate the risks to the CWS's critical assets.	Section 5.0, Section 7.0, Section 9.0, Appendix C, Appendix D

**Table B3** lists the basic requirements of AWIA §2013(D), provided by Federal Document 2019-05770, and the corresponding section(s) included in CCWD's RRA document.

**Table B2. RRA Requirements per AWIA §2013(D)**

§2013(D) ¶	RRA Requirement	Section(s)
(1)	The risk to the system from malevolent acts and natural hazards.	Section 3.0, Section 5.0, Section 7.0, Section 8.1, Appendix D
(2)	The resilience of the pipes and constructed conveyances, physical barriers, source water, water collection and intake, pretreatment, treatment, storage and distribution facilities, electronic, computer, or other automated systems (including the security of such systems) which are utilized by the system.	Section 5.1, Appendix C, Appendix D
(3)	The monitoring practices of the system.	Section 3.0, Section 4.2, Appendix D
(4)	The financial infrastructure of the system.	Section 4.3, Appendix D
(5)	The use, storage, or handling of various chemicals by the system.	Section 4.5, Appendix D
(6)	The operation and maintenance of the system.	Section 4.4, Appendix D
	The assessment <i>may</i> also include an evaluation of capital and operational needs for risk and resilience management for the system.	Section 5.1

## **Appendix C**

### **Service Area Infrastructure Lists**

The water systems assets within the scope of this RRA are listed in Appendix A. For the purposes of the CCWD RRA, these assets are analyzed by water supply service area. Applicable service area assets are listed in **Appendix C** of the RRA Internal Version; however, *due to the sensitivity of information contained in that appendix (e.g., infrastructure importance and capabilities) it is not included in this RRA Public Version.*

## Appendix D

### RRA Service Area Checklists

**Appendix D** of the RRA Internal Version contains the following Assessment Checklists for each service area, as follows, per the EPA Guidance for small CWSs. RRA **Table 3** outlines the service area infrastructure considered in each area's Assessment Checklist.

1. Copper Cove/Copperopolis Service Areas (PWSID CA0510017)
2. Ebbetts Pass Service Area (PWSID CA0510016)
3. Jenny Lind Service Area (PWSID CA0510006)
4. Sheep Ranch Service Area (PWSID CA0510004)
5. Wallace Service Area (PWSID CA0510019)
6. West Point Service Area (PWSID CA0510005)

*Due to the sensitivity of information contained in the Assessment Checklists, they are not included in this RRA Public Version. The service area Assessment Checklists may require periodic updates to be responsive to changing conditions, including the analysis following any attempted malevolent acts and/or natural hazards, prior to the next scheduled re-certification update. The original Assessment Checklists were developed and reviewed by CCWD management and operations staff during a May 10, 2021 meeting regarding review of CCWD water systems risks and vulnerabilities.*

## **Appendix E**

### **Outreach & Notification Documents**

Subsequent pages contain the public Board Meeting materials and applicable RRA certification statements.

# Agenda Item

DATE: June 23, 2021  
TO: Board of Directors  
FROM: Brad Arnold, Water Resources Program Manager  
SUBJECT: AWIA Risk and Resiliency Assessment Update

---

## **RECOMMENDED ACTION:**

Receive and discuss information regarding development of Calaveras County Water District's Risk and Resiliency Assessment (RRA) for compliance with America's Water Infrastructure Act of 2018. This is an information-only item, and no action is required.

## **SUMMARY:**

America's Water Infrastructure Act of 2018 (AWIA) is a federal law requiring community (drinking) water systems serving more than 3,300 people to conduct a Risk and Resilience Assessment (RRA). AWIA specifies the water system assets (infrastructure) that the RRA must address. Per AWIA, the primary objectives of an RRA are to:

1. Become more aware of the risks to water service continuity, and
2. Identify options that can mitigate undesirable consequences.

Calaveras County Water District (CCWD), by combination of its service area populations – estimated around 17,500 people served in 2020 – fits the AWIA definition of a “small community water system” (Small CWSs) and is therefore required to prepare and self-certify an RRA with the US Environmental Protection Agency (EPA) by June 30, 2021 (Deadline). CCWD developed an RRA document to address the objectives above, and to analyze the risks to CCWD's water supply operations and infrastructure from malevolent acts and natural hazards. The RRA provides in-depth review of CCWD's water service areas (no wastewater topics covered) and related infrastructure, supply risks, and vulnerabilities in a narrative document and via the EPA RRA Assessment Checklists, provided as an appendix. As such, the RRA contains sensitive information related to CCWD operations, infrastructure, asset management, and technological vulnerabilities, which could place public water supply systems and Calaveras County (County) communities at risk. A Public Version of the RRA is provided as Attachment A, in which several sections, tables, figures, and other sensitive materials have been excluded, as noted. Several of the concepts and analyses in the RRA also borrow from CCWD's 2018 Local Hazard Mitigation Plan (LHMP) which provided in-depth assessment of County hazards and potential CCWD mitigation measures – that LHMP is available to the public. A (Confidential) Internal Version of the RRA with all content will be made available to the CCWD Board of Directors (Board) and individuals directly involved in CCWD emergency planning and response activities.



### *Follow Up Actions*

Following this Board meeting, the RRA will be finalized for certification with EPA by the Deadline. The RRA is neither submitted to nor reviewed by EPA for AWIA compliance. After certification of this initial RRA, AWIA mandates that the RRA be periodically updated and re-certified, to address changes in federal legislation and/or updates to CCWD system infrastructure (every 5-years, next update therefore due June 30, 2026). In addition, CCWD must prepare a follow-up Emergency Response Plan (ERP) due no later than six months after each RRA certification, which incorporates the findings of an RRA into strategies and resources to improve water systems resiliency. Per AWIA, the first ERP for Small CWSs will be due December 31, 2021. CCWD is anticipating releasing a Request for Proposals (RFP) in the start of the upcoming Fiscal Year 2021-2022 (FY 2022) for consultant services to develop an ERP. More information on the RRA certification and ERP development process will be provided as it becomes available.

### **FINANCIAL CONSIDERATIONS:**

None at this time. CCWD's FY 2022 budget includes funds for development of an ERP, as required by AWIA (Water Resources Dept. 60, Fund 61450 'Mandated Plans' line-item). The Board will be considering approval of the FY 2022 budget.

### **STRATEGIC PLANNING:**

The 2021-2026+ CCWD Strategic Plan (Strategic Plan), adopted April 28, 2021 per Board Resolution No. 2021-24, outlines several Goals and Objectives (Objectives) meant to identify organizational opportunities and measure CCWD's results over time. Consistent with the Strategic Plan, this Agenda Item supports the following Objectives:

- FR-05, Strategic Plan pg. 8: Review financial budget systems and tools and update if needed.
- OI-06, Strategic Plan pg. 9: Monitor and adapt to emerging and existing regulatory requirements and mandates.
- OI-07, Strategic Plan pg. 9: Communicate on CCWD's operational efforts to effectively deliver water and wastewater services.
- PP-05, Strategic Plan pg. 12: Closely monitor and engage in any relevant policy developments that affect CCWD.

For more info on the Strategic Plan, visit: [ccwd.org/ccwd-adopts-2021-2026-strategic-plan/](https://ccwd.org/ccwd-adopts-2021-2026-strategic-plan/)

Attachment:           A) CCWD RRA Public Version  
                              (RRA Internal Version provided to Board members)

## America's Water Infrastructure Act (Sec. 2013(a)) / Risk and Resilience Assessment Certification Statement

I **Brad Arnold** hereby certify that **CCWD - COPPER COVE**, serving a population of **5187**, has conducted, reviewed, or reviewed and revised an assessment of the risks to, and resilience of, its system. This assessment included an assessment of:

- The risk to the system from malevolent acts and natural hazards;
- The resilience of the pipes and constructed conveyances, physical barriers, source water, water collection and intake, pretreatment, treatment, storage and distribution facilities, electronic, computer, or other automated systems (including the security of such systems) which are utilized by the system;
- The monitoring practices of the system;
- The financial infrastructure of the system;
- The use, storage, or handling of various chemicals by the system;
- The operation and maintenance of the system; and
- May include an evaluation of capital and operational needs for risk and resilience management for the system.

Date of certification: **06/24/2021**

The U.S. EPA and the authorized official signing this document agree that this certification may be signed electronically. The parties agree that the typed electronic signature that appears on this certification is the same as a handwritten signature for the purposes of validity, enforceability, and admissibility.

**Once you have submitted your risk and resilience assessment certification, EPA will send an email acknowledging receipt of your certification. If you have any problems, please email us at [dwresilience@epa.gov](mailto:dwresilience@epa.gov).**

Certify now

Print this page

## America's Water Infrastructure Act (Sec. 2013(a)) / Risk and Resilience Assessment Certification Statement

I **Brad Arnold** hereby certify that **CCWD - EBBETTS PASS**, serving a population of **7280**,

has

conducted, reviewed, or reviewed and revised an assessment of the risks to, and resilience of, its system. This assessment included an assessment of:

- The risk to the system from malevolent acts and natural hazards;
- The resilience of the pipes and constructed conveyances, physical barriers, source water, water collection and intake, pretreatment, treatment, storage and distribution facilities, electronic, computer, or other automated systems (including the security of such systems) which are utilized by the system;
- The monitoring practices of the system;
- The financial infrastructure of the system;
- The use, storage, or handling of various chemicals by the system;
- The operation and maintenance of the system; and
- May include an evaluation of capital and operational needs for risk and resilience management for the system.

Date of certification: **06/24/2021**

The U.S. EPA and the authorized official signing this document agree that this certification may be signed electronically. The parties agree that the typed electronic signature that appears on this certification is the same as a handwritten signature for the purposes of validity, enforceability, and admissibility.

**Once you have submitted your risk and resilience assessment certification, EPA will send an email acknowledging receipt of your certification. If you have any problems, please email us at [dwresilience@epa.gov](mailto:dwresilience@epa.gov).**

Certify now

Print this page

## America's Water Infrastructure Act (Sec. 2013(a)) / Risk and Resilience Assessment Certification Statement

I **Brad Arnold** hereby certify that **CCWD - JENNY LIND**, serving a population of **9861**,

has

conducted, reviewed, or reviewed and revised an assessment of the risks to, and resilience of, its system. This assessment included an assessment of:

- The risk to the system from malevolent acts and natural hazards;
- The resilience of the pipes and constructed conveyances, physical barriers, source water, water collection and intake, pretreatment, treatment, storage and distribution facilities, electronic, computer, or other automated systems (including the security of such systems) which are utilized by the system;
- The monitoring practices of the system;
- The financial infrastructure of the system;
- The use, storage, or handling of various chemicals by the system;
- The operation and maintenance of the system; and
- May include an evaluation of capital and operational needs for risk and resilience management for the system.

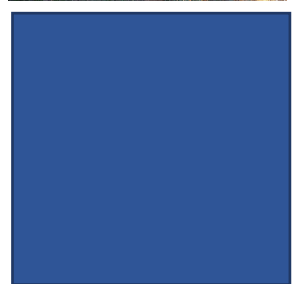
Date of certification: **06/24/2021**

The U.S. EPA and the authorized official signing this document agree that this certification may be signed electronically. The parties agree that the typed electronic signature that appears on this certification is the same as a handwritten signature for the purposes of validity, enforceability, and admissibility.

**Once you have submitted your risk and resilience assessment certification, EPA will send an email acknowledging receipt of your certification. If you have any problems, please email us at [dwresilience@epa.gov](mailto:dwresilience@epa.gov).**

Certify now

Print this page



Calaveras County Water District  
120 Toma Court, San Andreas, CA 95249  
Phone: (209) 754-3543 | Fax: (209) 754-0270