APPENDIX G. ADAPTATION STRATEGIES

Water Management Strategies (Tier 1 and 2)

Tier 1 Water Management Strategies

Clements Pipeline and Reservoir

The Clements Pipeline and Reservoir project consists of a 15-acre regulating reservoir and recharge basin. During the irrigation season (approximately April 15 through October 15), water would be released from the regulating reservoir as needed to meet agricultural irrigation demand. A pipeline would be installed to convey water by gravity from the Old Calaveras River to the regulating reservoir. Water would then be pumped back to the Old Calaveras River when more irrigation is needed. This pipeline would deliver surface water in lieu of groundwater use to approximately 450 acres of land."

When complete, this project would save an average annual volume of approximately 650 AFY of groundwater stored in the subbasin. Additionally, the pipeline would provide approximately 1,600 AFY of average annual direct recharge and a maximum of 2,200 AF of direct recharge through Flood-MAR.

Surface Water Expansion and Flood-MAR

As part of the SEWD Surface Water Implementation Expansion Project, SEWD would incentivize landowners adjacent to surface water conveyance systems (rivers or pipelines) to utilize surface water in lieu of groundwater. SEWD would also implement Flood-MAR to supplement the groundwater basin. The surface water expansion would increase surface water usage by an average annual estimated 7,300 AFY based on a conversion of 4,818 acres along the conveyance system.

West Groundwater Recharge Basin

The West Groundwater Recharge Basin would provide additional opportunities for direct recharge of surface water into the underlying groundwater basin. Between 1,500 and 16,000 AFY would be available for direct recharge, depending on available water.

Beckman ASR Well

East San Joaquin Parties Water Authority (ESJPWA) previously utilized the "Beckman" property to install the Beckman ASR Well, an aquifer storage and recovery (ASR) well and three monitoring wells. This project would upgrade the Beckman ASR Well to use Mokelumne Aqueduct water for recharge and extraction.

West Linden Project

The West Linden Project will utilize pressurized surface water from the Mokelumne Aqueduct through a hydropower facility, sand filtration treatment process, and approximately 67,000 linear feet of pipeline to provide surface water to agricultural land that currently only has access to groundwater and allow distribution for excess water during extreme water events to recharge via ASR wells, Flood-MAR, and dry wells.

Regulating Reservoir 3 and 5

Regulating Reservoir 3 and 5 are two 15-acre regulating reservoirs with recharge basins that would improve SEWD customer service and provide increased groundwater recharge. SEWD would divert water from the Old Calaveras River (OCR) into Regulating Reservoir 3 and 5, respectively. During the irrigation season (approximately April 15 through October 15), water would be released from the regulating reservoir as needed to meet agricultural irrigation demand downstream on the OCR and Mormon Slough. This project could divert water during all months of year, if water is available.

Tier 2 Water Management Strategies

Farmington Reservoir Project

This proposed project seeks to repurpose the Farmington Dam, a flood control reservoir, into a water supply reservoir. The existing Farmington Dam has a flood control capacity of 52,000 AF. The project aims to augment the total reservoir capacity to 112,000 AF, allocating 60,000 AF for water supply and retaining 52,000 AF for flood control purposes. The remainder of the Tier 2 projects depend upon the increased surface water storage and recharge capacity of this project.

Demartini Pipeline

The Demartini Pipeline is a gravity-fed pipeline taking water from the Old Calaveras River upstream of Clements Dam. This pipeline would provide surface water to approximately 300 acres of land, delivering water in lieu of groundwater through 9 turnouts to 13 grower parcels. This project would save an average annual volume of approximately 400 acre-feet (AF) per year of groundwater stored in the subbasin. Additionally, the pipeline would provide approximately 1,000 AF/year of average annual direct recharge and a maximum of 1,380 AF of direct recharge through Flood-MAR.

Houston Pipeline

The Houston Pipeline is a gravity-fed pipeline taking water from the Old Calaveras River upstream of Clements Dam that would provide surface water to approximately 415 acres of land. This pipeline would provide surface water in lieu of groundwater through nine turnouts to 13 grower parcels). This would save an average annual volume of approximately 600 AF/year of groundwater stored in the subbasin. Additionally, this pipeline would provide approximately 1,400 AF/year of average annual direct recharge and a maximum of 1,900 AF of direct recharge through Flood-MAR.

Mosher Pipeline

The Mosher Pipeline project would install a pump and pipeline for surface water access to approximately 180 acres and six grower parcels north of the Old Calaveras River and Mosher Slough west of Clements Road. This would save an average annual volume of approximately 250 AF/year of groundwater stored in the subbasin. Additionally, this pipeline would provide approximately 1,000 AF/year of average annual direct recharge and a maximum of 1,400 AF of direct recharge through Flood-MAR.

Mosher Creek Recharge Basin

The Mosher Creek Recharge Basin is a 104-acre recharge basin and dry wells for the purposes of increased groundwater recharge. SEWD would divert water from Mokelumne Aqueduct to a pressurized sand filtration treatment process before discharging into a pipeline running south along Jack Tone Road. Part of the recharge basin may serve as an unlined regulating reservoir during the irrigation season to improve SEWD customer service and provide additional recharge.

East Mosher Creek Recharge Area

SEWD is proposing to construct an 80-acre recharge basin for the purpose of increased groundwater recharge. This Project would divert water from Mokelumne Aqueduct to a pressurized sand filtration treatment process before discharging into a pipeline running south along Jack Tone Road serving the West Linden Project. This water would be used to recharge the aquifer and would be extracted by private groundwater wells in SEWD that are used for domestic and production agriculture.

TABLE 1: WATER SUPPLY BENEFITS (TIER 1 AND 2)

Project Name	Water Source [1]	Recharge Type	Season	Project Capacity		Tier 1 - Yield		Tier 2 - Yield	
				Direct Recharge	In-Lieu Recharge	T0P100	T2P100	T0P100	T2P100
Tier 1 Water Management Strategies									
Clements Pipeline and Reservoir (Phase 1)	Calaveras WAFR and Linden WR	Direct	Winter	891		500	400	500	400
	Calaveras Contract	In-Lieu	Summer		1,500	800	700	800	700
Clements Pipeline and Reservoir (Phase 2)	Calaveras Contract, WAFR and Linden WR	Direct	Winter	17,100		8,900	7,500	8,900	7,500
Surface Water Expansion	Calaveras and New Melones	In-Lieu	Summer		13,537	7,000	6,000	7,000	6,000
West Groundwater Recharge Basin	Calaveras and New Melones	Direct	Winter	16,000		8,200	6,900	8,300	7,100
Beckman ASR Well	Mokelumne and Linden WR	Direct	Winter	328		200	100	200	100
West Linden Project	Calaveras, Mokelumne and Linden WR	Direct	Winter	11,603		3,500	3,300	6,000	5,100
Reg-03	Spills	Direct	Winter	964		500	400	500	400
Reg-05	Spills	Direct	Winter	321		200	100	200	100

Project Name	Water Source [1]	Recharge Type	Season	Project Capacity		Tier 1 - Yield		Tier 2 - Yield	
				Direct Recharge	In-Lieu Recharge	T0P100	T2P100	T0P100	T2P100
Tier 2 Water Management Strategies									
Demartini Pipeline	Calaveras WAFR and Linden WR	Direct	Winter	3,056		-	-	1,600	1,400
	Calaveras Contract	In-Lieu	Summer		769	-	-	400	300
Houston Pipeline	Calaveras Contract and Linden WR	Direct	Winter	2,213		-	-	1,200	1,000
	Calaveras Contract	In-Lieu	Summer		1,154	-	-	600	500
Mosher Pipeline	Calaveras Contract and Linden WR	Direct	Winter	1,400		-	-	700	600
	Calaveras Contract	In-Lieu	Summer		481	-	-	200	200
Mosher Creek Recharge Basin	Calaveras Contract and WAFR	Direct	Winter	19,338		-	-	8,300	6,900
East Mosher Creek Recharge Area	Calaveras Contract, WAFR, Mokelumne and Linden WR	Direct	Winter	16,606		-	-	7,100	5,900
Note: All units are in acre-feet per year									

1. Although Tier 2 water management strategies rely on the Farmington Reservoir Project, the Farmington Reservoir itself is not a supply source. The water sources for the Tier 2 strategies are derived from SEWD's existing water rights and contractual allocations, but are stored and conveyed through the Farmington system.

Tier 3 Water Management Strategies

TABLE 2: EXISTING WATER MANAGEMENT PROJECTS (TIER 3)

Project	Risk Area	Strategy Type	Project Proponent	Project Description
Bellota Pipeline Flood-MAR Project	Basin Conditions	Direct and In-Lieu Recharge	SEWD	There are approximately 42 parcels along the Bellota Pipeline that could potentially be used for Flood-MAR (Flood-Managed Aquifer Recharge). Utilizing the Soil Agricultural Groundwater Banking Index (SAGBI), staff identified the parcels that are rated "poor" to "good" for groundwater banking. SAGBI bases these ratings on five major factors: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition. The project would include installation of new turnouts along the Bellota Pipeline, and possible earthwork or infrastructure to contain the storm water within the designated properties.
Dewatered Domestic Well Mitigation Program	Basin Conditions	Infrastructure Improvement	ESJ GSAs	This program provides emergency, interim, and financial mitigation for domestic water supply wells that have been determined to have failed due to groundwater overdraft conditions since January 2015.
Mormon Slough System FloodMAR Feasibility Study	Basin Conditions	Direct Recharge	DWR	As part of an ongoing effort to explore conjunctive use opportunities, a feasibility-level study has been initiated through the DWR Watershed Studies to inform potential FloodMAR alternatives associated with the Mormon Slough system, including potential diversions from New Hogan Reservoir.
Vineyard Recharge	Basin Conditions	Direct Recharge	SEWD	Collaborate with three customers to convert 2,400 acres of existing vineyards from groundwater to surface water irrigation and construct additional facilities to perform vineyard flooding during high runoff events.

Project	Risk Area	Strategy Type	Project Proponent	Project Description
Agriculture and Municipal Conservation Programs	Direct Impacts	Demand Management	SEWD	Municipal Conservation Program BMPs are intended to reduce long-term urban demands from what they would have been without implementation of these practices. They will help to conserve water resources in the basin, which will ultimately help maintain adequate habitat conditions for anadromous fisheries in the Calaveras River. Water conservation will reduce demand on water storage in New Hogan Reservoir, which in turn is expected to reduce the period of time when the reservoir is in critical water storage, which is the threshold for when flows at Shelton Road may drop below 20 cfs.
Demand Management Program	Direct Impacts	Demand Management	ESJ GSAs	A framework for a Subbasin-wide Demand Management Program will be developed as part of this management action. This program will serve as a backstop that can be activated if projects fall short of meeting expected supply-side targets. The program will be developed and preliminarily implemented, if needed, by GSAs between 2025 and 2030.
Rotational Fallowing or Permanent Fallowing of Crop Lands	Direct Impacts	Demand Management	ESJ GSAs	Rotational fallowing of crop lands reduces the economic impacts to any one area by rotating the areas of fallowing. This management action could be combined with a recharge project through the application of surplus water supplies to the fallowed lands, resulting in in-lieu groundwater recharge or the repurposing of the permanently fallowed lands to create wildlife habitat or some other land use benefit that is not reliant on groundwater as a supply.

Project	Risk Area	Strategy Type	Project Proponent	Project Description
Mormon Slough Channel Bypass	Flood	Flood Risk Reduction	Restore the Delta (NGO); San Joaquin County	The Mormon Slough Bypass Project is a flood control measure that would take part in the Lower San Joaquin River/South Delta region. Mormon Slough has experienced bank erosion from several past flood events. Bank erosion in the vicinity of Escalon-Bellota Road remains a problem reach. This project aims to repair this reach of Mormon Slough along with preventative measures to mitigate future bank erosion throughout the Mormon Slough. The goal of this project is to reduce flood risk in the Stockton area for vulnerable communities. As a multi-benefit project it would not only reduce flood risk by diverting floodwaters from the Stockton Diverting Canal to the Mormon Channel but could also include ecosystem and recreational benefits. Through the installation of a diversion structure on the left bank of the Stockton diverting canal and its designed capacity to divert 1,200 CFS of water into the Mormon Channel with a 90% assurance of containment within the channel banks. Overall, this project would improve the channel's hydraulic capacity and lower surface water elevations (Project description provided by Restore the Delta).
Sitkin Property Mitigation	Flood	Flood Risk Reduction	SEWD	Construct improvements to the existing levees to prevent summer flows from entering the gravel pit area, replace the existing crossing, and develop a floodplain area to provide recharge during high runoff events.
USACE Lower San Joaquin River Project (LSJRP) - Phase D Calaveras River, San Joaquin River	Flood	Flood Risk Reduction	USACE; SJAFCA; DWR; CVFPB	Levee fix in place with the addition of a cutoff wall, geometry improvements, height improvements and retention walls. Location: Left bank of the Calaveras River, north of Monte Diablo Avenue to N. El Dorado Street, including a small portion South of the Calaveras on the San Joaquin River near Smith Canal. Length: Approx. 27,500 ft. Dates: Scheduled construction start 2035.
Mormon Slough System ULDC Evaluation	Flood	Flood Risk Reduction	SJAFCA	Senate Bill 5 (passed in 2007) requires a 200-year level of flood protection for urban and urbanizing areas within California's Central Valley. The first step in developing a plan for Stockton to comply with SB5 would be to conduct a feasibility level evaluation on the existing levee protection system and to determine what upgrades would be needed to meet ULDC standards.

Project	Risk Area	Strategy Type	Project Proponent	Project Description
McGurk Crossing and Recharge Area	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	Replace the existing crossing to improve fish passage, construct a new low water crossing to eliminate the need for the McGurk Earth Dam, and develop a floodplain area to provide recharge during high runoff events.
Artificial Instream Structures Improvements.	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	SEWD has been working collaboratively with DWR to identify specific fish passage problem areas, including those associated with flashboard dams, low flow crossings, and bridge aprons in the Old Calaveras River channel and Mormon Slough/SDC. Thirty-seven instream structures have been identified as potential passage impediments to salmon and steelhead trout in the lower Calaveras River downstream of Bellota Weir via both the Mormon Slough/SDC and Old Calaveras River channel routes (DWR 2007a). Twenty-two structures are located in the Mormon Slough/SDC route while 15 are located in the Old Calaveras River channel.
Bellota Weir Modifications Project	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	A combined crest gate/fishway/fish screen that will improve salmonid passage opportunities and prevent entrainment at the Bellota Diversion Facility. This project will complement other fish passage improvements on the lower Calaveras River and Mormon Slough that were evaluated by DWR in collaboration with SEWD.
Fall Flashboard Dam Removal Operations	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	Each year after the irrigation season is over in October, SEWD removes flashboard dams within and drains the Mormon Slough/SDC. Flashboard dams in the Old Calaveras, Potter Creek, Mosher Slough/Creek, and Bear Creek are generally removed at the same time as those in Mormon Slough. However, in some years (<15% frequency expected occurrence), flashboards are left in place in these latter waterways through November for percolation benefits.

Project	Risk Area	Strategy Type	Project Proponent	Project Description
Fish Screens for Privately Owned Diversions	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	CH2M Hill, on behalf of SEWD, completed an evaluation of 28 unscreened diversion facilities between New Hogan Dam and Bellota (27 privately owned within the District's service areas and included in this CHCP) in 2005. For each facility, CH2M Hill identified preliminary fish screen design recommendations and anticipated costs. Although this evaluation only considered diversions upstream of Bellota, the same types of fish screen designs and costs are anticipated to apply to various diversions downstream of Bellota. The priority of individual diversions located throughout the river will follow the process established by the CVPIA Anadromous Fish Screen Program (AFSP), which evaluates and prioritizes fish screening projects based on "…biological benefits, the size and location of the diversion, project costs, and the availability of cost-share funding partners." Biological benefits to fish will need to be identified through a targeted evaluation of representative diversion types.
Flashboard Dam Notches	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	At the beginning of the irrigation season, SEWD installs flashboard dams in Mormon Slough. Since 2006, with exception of critical water storage conditions (i.e., 2014), SEWD has installed flow conveyance openings (one square foot notched openings) located about 3-4 ft above the base and 6-10 ft from the south abutment of each dam. These outlets have been created to be as "fish friendly" as possible in that they spill into pool areas and not onto exposed riprap or concrete. They are installed to provide a pass-through area for downstream migrating juvenile salmonids, particularly under those conditions when flashboard dams are not spilling, and juvenile salmonids would not have any other way to travel downstream.
Flood Control Release Coordination	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	During the flood control season not covered by number 2 above, coordination of flood control releases with the USACE will be conducted to optimize salmonid migration opportunities and provide adequate spawning and rearing habitat.

Project	Risk Area	Strategy Type	Project Proponent	Project Description
Minimum Instream Flow Commitment	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	New Hogan releases will be managed to ensure a minimum of 20 cfs at Shelton Road year-round in all years, with the exception of periods during potential critical water storage levels. Minimum flows of 20 cfs or greater at Shelton Road were considered for implementation year-round in all years under all water year types and reservoir conditions. However, 20 cfs was determined to be infeasible under critical water storage periods (typically associated with successive drought years) due to the potential for reducing the reservoir to the minimum pool.
Non-Dedicated Fall Storage Management	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	In years when suitable water storage is available on October 15 (i.e., >152,000 AF), flood control releases must be undertaken by December 1 to ensure the reservoir remains at or below 152,000 AF. SEWD will identify and, in coordination with the USACE, implement a flow release schedule designed to optimize salmonid migration opportunities into/out of the 18-mile spawning and rearing reach between Bellota and New Hogan Dam for the period between October 15 and November 30.
Non-entraining Upstream Passage Barrier	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	A permanent non-entraining, upstream passage barrier (e.g., rock weir or flashboard dam) will be installed at the downstream end of the Old Calaveras River near the confluence with the SDC to prevent adult salmonids from inadvertently entering the channel during the few occasions when there is connectivity with the SDC.
Old Calaveras River/Stockton Diverting Canal Fish Barrier	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	As required by the Calaveras River Habitat Conservation Plan, the project will construct a fish barrier to prevent fish passage upstream in the Old Calaveras River. The barrier will also act as a water impoundment structure to allow for diversion of surface water for irrigation of an adjacent 61 acre golf course and water from high runoff events to adjacent land for recharge.

Project	Risk Area	Strategy Type	Project Proponent	Project Description
Stakeholder Education Program regarding Fishery Issues	Surface Water Quality	Demand Management	SEWD	SEWD will implement a stakeholder educational program via periodic workshops, annual newsletters, and a regularly updated website to ensure that local landowners understand Calaveras River basin fishery issues and how they can assist in implementing conservation measures, which is anticipated to result in fish screens being installed at private diversions more rapidly than in the absence of stakeholder education. The educational program may also result in landowners being able to delay flashboard dam installation and water diversions, if they determine that watering of certain crops can be initiated later in the spring.
Supervisory Control and Flow Data Acquisition System	Surface Water Quality	Infrastructure Improvement	SEWD	In 2005, SEWD received a $150,255 contribution from a Water 2025 Challenge Grant to implement a SCADA project totaling $335,236. Installation of this system was completed in mid-2007 and consists of two new automated flow sensors (sensor programmed with a known cross section and measures velocity and height to automatically determine flow) and 10 automated level sensors (sensor programmed with a known cross section and measures depth to-water to automatically determine flow) at 10 potential flashboard dam locations, including two in Mormon Slough, five in Old Calaveras River channel, four in Mosher Slough/Creek, and one in Potter Creek (Figure 15); note: one flow sensor already in place and operated by USACE at Bellota and one flow sensor already in place and operated by SEWD at the Old Calaveras Headworks21.
Temporary Fish Ladders at the Bellota Diversion Facility	Surface Water Quality	Fish Passage and Ecosystem Improvements	SEWD	Until the permanent combined crest gate/fishway/fish screen at Bellota is implemented, SEWD will increase migration opportunities for salmonids by operating two Denil fish ladders at the Bellota Weir during the non-irrigation season whenever minimum fish ladder passage flows are available (>10 cfs). The ladders are designed to assist passage under low flow conditions and details regarding the operating protocols are provided in the Bellota Fish Ladder Operating Criteria (Attachment C-1 in Appendix C).
Additional ASR Wells	Water Supply	Direct Recharge	SEWD	Identify locations for new ASR wells. Aquifer Storage and Recovery (ASR) Wells utilize groundwater wells to recharge water directly into the aquifers in the subsurface.

Project	Risk Area	Strategy Type	Project Proponent	Project Description
Duck Creek Reservoir	Water Supply	Water Storage	SEWD	Construct a new dam to develop the Duck Creek reservoir to increase water supply.
Groundwater Extraction Fee with Land Use Modifications	Water Supply	Demand Management	ESJ GSAs	A groundwater extraction fee or groundwater production charge could be collected from entities that own or operate an agricultural well. Revenue from these fees could then be used to pay for a variety of activities.
Lake Grupe	Water Supply	Direct and In-Lieu Recharge	SEWD	The Lake Grupe Phase 2 project is to supply surface water to multiple farms/growers currently using groundwater. The project will provide surface water to 2,500 acres of orchard crops currently using groundwater. Phase 1 is complete and constructed a surface water diversion turnout on the Calaveras River and a 24-inch PVC pipeline for about 5,000 feet to deliver water into a ravine that flows into Lake Grupe. The project is estimated to provide an average annual recharge of 2,700 and 5,100 acre-feet per year in in-lieu and direct recharge, respectively. The maximum total (in-lieu and direct combined) recharge is estimated to be 15,600 acre-feet.
Linden Canal	Water Supply	Direct and In-Lieu Recharge	SEWD	Purchase existing ST&E right-of-way, construct a new pump station in either Old Calaveras River or Mormon Slough, and construct a new canal. The new facilities will allow for the conversion of up to 4,400 acres from groundwater to surface water irrigation, allow for recharge during high runoff events, or develop a 43 acre recharge canal.

Project	Risk Area	Strategy Type	Project Proponent	Project Description
New Hogan Reservoir Storage Assessment and Climate Change Mitigation Study	Water Supply	Flood Risk Reduction	SJAFCA	DWR's future climate change hydrology predicts that New Hogan reservoir could be overwhelmed in large storm events and estimates that a future 200yr event could result in spilling from New Hogan on the order of 3x the downstream channel capacity. As "Phase 1" of this proposed effort, a feasibility-level analysis would be needed to explore potential options for mitigating this and for integrating multi-benefit solutions. Per BWFS, this option includes 42 TAF of additional storage for flood risk reduction obviating the need for 16 mi levee improvement and 1.1 mi of raises, primarily along the Calaveras River for a 200-yr with climate change assumption.
Podesta Canal	Water Supply	Direct and In-Lieu Recharge, Storage	SEWD	Enter into an agreement with the Podesta Family to allow for the District's joint use of the existing Podesta Reservoir, construct a pump station to divert water from the Old Calaveras River into the reservoir, construct a canal to divert water from the reservoir to growers for conversion of 1,950 acres of groundwater irrigation to surface water irrigation and to allow for recharge during high runoff events.
South Gulch Reservoir	Water Supply	Storage	SEWD	Construct a new dam to develop the South Gulch Reservoir to increase water supply and a new conveyance facility to allow water to flow from New Hogan Reservoir into South Gulch Reservoir.
White Pines Restoration Project	Water Supply	Storage	CCWD	Restores storage capacity loss due to sedimentation in White Pines.

New Conceptual Projects

1. Implement and Expand Fuel Breaks and Home Hardening

Project Type: Wildfire Resilience

Project Status: Conceptual

Implementing Agencies: Calaveras County Office of Emergency Services, Calaveras County Resource Conservation District, Calaveras County Water District, Bureau of Land Management, Calaveras-Amador Consensus Group

Project Description: CCWD will coordinate with federal, state, and local agencies (i.e., Calaveras County OES, Calaveras RCD, etc.) responsible for wildfire prevention activities including fuel breaks and defensible space maintenance. Allowing these agencies to coordinate and access strategically located CCWD properties to establish fuel breaks is vital to the protection of critical infrastructure and assets.
Calaveras RCD is currently working with BLM to develop a 10-year long term strategy to continue mitigation in the areas affected by the Butte Fire. The analysis conducted by Vibrant Planet and incorporated into the WRP will provide vital information and data in developing the treatment processes associated with the Butte Fire. CCWD and Calaveras County OES have been in discussions about coordinating wildfire resilience, home hardening, and hydrology i.e., limiting sedimentation, improving erosion control, reductions in forest evapotranspiration, evaluating runoff versus percolation in Upper Watershed groundwater, etc.

Benefits: Wildfire mitigation efforts may benefit forest health and in turn have ancillary water supply benefits. These efforts will also serve to protect critical infrastructure and assets in the upper Watershed.

2. Cosgrove Creek Flood Mitigation

Project Type: Flood Mitigation

Project Status: Conceptual
Implementing Agencies: CCWD, Calaveras RCD, DWR

Project Description Cosgrove Creek is a tributary to the Calaveras River that drains directly into the Calaveras downstream of New Hogan Reservoir. Cosgrove Creek runs through the communities of Valley Springs, La Contenta, and Jenny Lind. Near Valley Springs, Spring Valley Creek joins Cosgrove Creek before entering a single channel discharging into the Calaveras River. There is no flood protection infrastructure within the Cosgrove Creek catchment or on Spring Valley Creek. The creek flows through the critically overdrafted Eastern San Joaquin groundwater basin. CCWD's Jenny Lind water treatment plant is located at the confluence of Cosgrove Creek and the Calaveras River.

Cosgrove Creek and the area in which it drains has a history of devastating flooding. Atmospheric River events have significantly increased the risk of the flooding. A number of reasons may influence the flooding: lack of flood protection infrastructure, poorly maintained riparian vegetation conditions, regional geology encourages runoff rather than percolation, etc.

There is a need to divert high flow conditions away from the communities and property in the area. One way to do that is flood and high flow capture in dry wells or reverse tile drains to encourage distribution of flood waters into the aquifer rather than laterally spreading on the surface. CCWD owns a 50-acre property at the confluence of Cosgrove Creek and Spring Valley Creek. This property could act as the site of such dry well/reverse tile drain flood mitigation. CCWD intends to conduct preliminary geophysical assessment to better understand the subsurface and explore groundwater conditions in the area. The flood capture and mitigation effort could benefit local groundwater conditions, as well. CCWD also has wastewater infrastructure along Cosgrove Creek that has historically been threatened by flooding. Risks associated with flooding at the wastewater facilities could degrade water quality in the Calaveras River.

Benefits: This project will mitigate the effects of flooding on communities, property, and CCWD assets in the upper Watershed along Cosgrove Creek. The flood capture project is located within the Eastern San Joaquin Groundwater Basin will provide direct recharge to the aquifer, possibly increasing water supplies.

3. San Antonio Creek – White Pines – Sheep Ranch Resilience

Project Type: Supply Resilience

Project Status: Conceptual

Implementing Agencies: CCWD, Utica Power and Water

Project Description: The White Pines Restoration Project, described under "**Existing Projects**," aims to restore White Pines Lake storage capacity lost due to sedimentation. The proposed San Antonio Creek / White Pines Lake Flood Mitigation Project builds off of the White Pines Restoration Project and will include analysis of an intertie with the Ebbetts Pass distribution system which would effectively provide the Sheep Ranch service area with Stanislaus River water. This would allow natural flows in Big Trees Creek and San Antonio Creek to flow into New Hogan without being diverted to Sheep Ranch. This project concept also includes replacement of the Sheep Ranch water system to mitigate several hazards, such as wildfire, drought, severe weather, and flooding that all impact the intake system. This project also likely benefits a DAC. There are several water rights and infrastructure challenges with this project concept.

Benefits: Adding an interconnection between two service areas would increase supply resilience in the upper Watershed and provide the Sheep Ranch area with water from the Stanislaus River. Replacement of the Sheep Ranch water system would also mitigate climate-related hazards to the water system and its users.

4. Wallace-Burson Conjunctive Use Program

Project Type: Groundwater Resilience

Project Status: Conceptual

Implementing Agencies: CCWD, local landowners

Project Description: The northwest portion of Calaveras County resides in the Eastern San Joaquin groundwater basin. The area generally relies on groundwater for domestic, municipal, and irrigation water supply. Natural recharge in the area is slow resulting in declining groundwater storage. CCWD is exploring options for conjunctive use in the Wallace-Burson area to reduce stress on the groundwater system. Options include getting Mokelumne River water into the area for direct recharge or transitioning the Wallace service area from groundwater to surface water. There could be a project that bring Calaveras River water over to the area to mitigate groundwater storage challenges.

Benefits: The program would increase water supply resilience by reducing demand pressure on the groundwater basin via direct or in-lieu recharge.

5. Groundwater Monitoring Improvements

Project Type: Groundwater Resilience

Project Status: Conceptual

Implementing Agencies: CCWD, Eastern San Joaquin Groundwater Authority

Project Description: The upper Watershed has many data gaps, especially related to quantitative inputs into numerical modeling frameworks. Collection of additional empirical data in the Upper Watershed is necessary to better define the model parameters that result in outputs for the lower watershed. This project involves working with the ESJ GWA to deploy measurement equipment into existing monitoring wells and establish sites to install new wells. This project builds on work that is already occurring. For instance, CCWD is currently conducting an updated assessment to better understand the groundwater conditions and dynamics in the County. CCWD is also coordinating with the Department of Water Resources Basin Characterization Program to conduct field surveys in the groundwater basin to better define the hydrogeology. These efforts will help inform the monitoring improvements, including what types of monitoring would be most beneficial and where the monitoring should be located.

Data Gaps: Some data and measurements that could be included in a data gap filling effort include: stream gauge installation on the Upper Calaveras and associated tributaries, groundwater monitoring in the Upper Watershed including in the fractured rock areas, remote sensing and native evapotranspiration measurement and evaluation.

Benefits: Increasing the breadth and quality of data collected on groundwater dynamics in the Watershed would increase system resilience by providing accurate data to inform effective adaptive management.

6. Wastewater Collection Infrastructure Improvements

Project Type: Supply Resilience

Project Status: Conceptual

Implementing Agencies: CCWD

Project Description: The District's collection system in the Jenny Lind area includes infrastructure in, along, and near Cosgrove Creek which are at risk of flood impacts. CCWD has funding earmarked in the CIP for general wastewater and sewer collection infrastructure improvements.

Benefits: Relocating infrastructure away from the creek limits immediate flood risk and help eliminate water quality degradation risks that could impact the Calaveras River downstream of New Hogan Dam.

7. FIRO Implementation at New Hogan Dam

Project Type: Supply Resilience

Project Status: Conceptual

Implementing Agencies: CCWD, SEWD, and US Army Corps of Engineers

Project Description: Scenario analysis described in Section **Error! Reference source not found.** assumes the implementation of forecast-informed reservoir operation (FIRO) under the integrated forecast-informed resources management (I-FIRM) Flood-MAR strategy. This strategy reflects a watershed-scale, multisector resource management approach to combining MAR with forecast-informed reservoir operation (FIRO) towards sustainability and climate change resilience. The "integrated" element in I-FIRM entails joint management of reservoir flood operations that would be managed by the US Army Corps of Engineers, along with MAR diversions that would be managed by districts that hold water rights in New Hogan. The implementation of something similar to the I-FIRM strategy would represent a comprehensive approach to water management and would require broader involvement and coordination with local water managers, State entities, and the US Army Corps for implementation.

Benefits: This new approach to management would enhance collaboration and cooperation between water supply (both surface and groundwater), flood risk, and ecosystem sectors. I-FIRM specifically targets enhanced ecosystem management through increased ecosystem flows and creation of ponded shorebird habitat and multibenefit flow-through basin (FTB) habitat. In addition, I-FIRM includes various infrastructure and operational improvements that expand the acreage accessible to recharge and that increase the efficiency (i.e., acre-foot [AF] per acre) of applied recharge.

8. Flood Diversions for Groundwater Recharge Under Water Code Section 1242.1

Project Type: Flood Management

Project Status: Conceptual

Implementing Agencies: SEWD and CCWD

Project Description: In 2023, the California Governor's Office signed Executive Orders N-4-23 and N-7-23 in response to extensive statewide flooding. These EO's resulted in Senate Bill 122 adding Section 1242.1 to the State Water Code, allowing water agencies to divert floodwaters for groundwater recharge without holding formal water rights. This temporary legislation is in effect through January 1, 2029 and includes certain requirements related to noticing, where and how the water can be diverted, and where the water can be spread. This conceptual project will explore the application of Section 1242.1 in flood-prone areas of the Watershed as a strategy to enhance water supply resilience and reduce flood risk. Work would include identifying where floodwaters could be diverted – both the diversion point and the land to be used for recharge – and the mechanisms by which the diversion could occur. An implementation plan for adding more distributed recharge projects throughout the watershed would be developed.

Benefits: Redirecting floodwaters into groundwater storage would increase the availability of groundwater supply, particularly during drought, thereby improving overall water supply resilience.

Implementation Strategies for Tier 1, 2, and 3 Water Management Strategies

TABLE 3: IMPLEMENTATION STRATEGIES FOR PROJECT TIERS 1, 2, AND 3

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
Tier 1 Water Management Strategies				
Beckman ASR Well	Project Type: Direct Recharge Project Status: Planning Estimated Completion: TBD Capital Costs: $320,000	SEWD; EBMUD	Municipal water users; farmers	SEWD is partnering with EBMUD to restore the ASR well.
West Groundwater Recharge Basin	Project Type: Direct Recharge Project Status: Construction Estimated Completion: Ongoing, 5-10 years Capital Costs: $9,940,000	SEWD; SJAFCA; USACE	Municipal water users; farmers; groundwater users	SEWD has partnered with SJAFCA and the U.S. Army Corp of Engineers. Material removal is ongoing.
Clements Pipeline and Reservoir	Project Type: Surface Water Infrastructure and Storage Project Status: Design Estimated Completion: 3-5 years Capital Costs: $10,260,000	SEWD	Farmers; groundwater users	Final design is ongoing and is expected to be completed by December 2026.
Reg-03	Project Type: Storage Project Status: Planning Estimated Completion: 5 years Capital Costs: $4,520,000	SEWD	Farmers; groundwater users	The project's next steps are dependent on purchasing or leasing property in the preferred reservoir location.
Reg-05	Project Type: Storage Project Status: Planning Estimated Completion: 5 years Capital Costs: $4,270,000	SEWD	Farmers; groundwater users	The project's next steps are dependent on purchasing or leasing property in the preferred reservoir location.

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
Surface Water Expansion and Flood-MAR	Project Type: Surface Water Infrastructure and Regulatory Project Status: Construction Estimated Completion: Ongoing Capital Costs: $10,990,000	SEWD	Farmers; groundwater users; environmental groups	SEWD has almost met its SGMA goal for surface water expansion. The District also maintains a Flood-MAR program for farmers.
West Linden Project	Project Type: Surface Water Infrastructure Project Status: Planning Estimated Completion: TBD Capital Costs: $86,380,000	SEWD; EBMUD	Farmers; renewable energy partners, municipal water providers	SEWD is partnering with EBMUD to explore bringing water from the Mokelumne Aqueduct and connecting to the Calaveras River.
Tier 2 Water Management Strategies				
Farmington Reservoir Project	Project Type: Storage Project Status: Planning Estimated Completion: 5-10 years Capital Costs: $303,404,000	SEWD	Municipal water providers; farmers; flood control	A planning study is ongoing and is expected to be completed by 2028.
East Mosher Creek Recharge Area	Project Type: Direct Recharge Project Status: Design Estimated Completion: 3-5 years Capital Costs: $9,940,000	SEWD	Farmers; groundwater users	Following completion of the Farmington Reservoir Project, implementation is dependent on purchasing or leasing property in the preferred reservoir location.
Mosher Creek Recharge Basin	Project Type: Direct Recharge Project Status: Planning Estimated Completion: 5-10 years Capital Costs: $11,300,000	SEWD	Farmers; groundwater users	Following completion of the Farmington Reservoir Project, implementation is dependent on purchasing or leasing property in the preferred reservoir location.

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
Demartini Pipeline	Project Type: Surface Water Infrastructure Project Status: Planning Estimated Completion: 5-10 years Capital Costs: $3,380,000	SEWD	Farmers; groundwater users; municipal water users	The implementation of Tier 2 priority projects relies on the Farmington Reservoir Project for increased surface water storage and recharge capacity.
Houston Pipeline	Project Type: Surface Water Infrastructure Project Status: Planning Estimated Completion: 5-10 years Capital Costs: $4,640,000	SEWD	Farmers; groundwater users; municipal water users	The implementation of Tier 2 priority projects relies on the Farmington Reservoir Project for increased surface water storage and recharge capacity.
Mosher Pipeline	Project Type: Surface Water Infrastructure Project Status: Planning Estimated Completion: 5-10 years Capital Costs: $4,000,000	SEWD	Farmers; groundwater users; municipal water users	The implementation of Tier 2 priority projects relies on the Farmington Reservoir Project for increased surface water storage and recharge capacity.
Tier 3 Water Management Strategies				
Old Calaveras River/Stockton Diverting Canal Fish Barriers	Project Type: Fish Passage and Ecosystem Improvements Project Status: Design Estimated Completion: 2028 Capital Costs: $3,000,000	SEWD	Wildlife agencies; environmental groups; business owners	Preliminary design was completed in 2024. Next step is to initiate a construction contract.
Linden Canal	Project Type: Surface Water Infrastructure Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	SEWD	Farmers; groundwater users; environmental groups	SEWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
Podesta Canal	Project Type: Surface Water Infrastructure Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	SEWD	Landowners; farmers; groundwater users	SEWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.
Demand Management Program	Project Type: Demand Management Project Status: In Progress Estimated Completion: 2028 Capital Costs: TBD	ESJ GSAs	Municipal water users; farmers	GSAs will agree on an initial allocation of responsibility for reducing demand within their GSA areas by December 31, 2026.
Groundwater Extraction Fee with Land Use Modifications	Project Type: Demand Management	ESJ GSAs	Municipal water users; environmental groups	Programs in the GSP are implemented as needed.
Rotational Fallowing or Permanent Fallowing of Crop Lands	Project Type: Demand Management	ESJ GSAs	Environmental groups; compensated farmers	Programs in the GSP are implemented as needed.
Bellota Weir Modifications Project	Project Type: Fish Passage and Ecosystem Improvements Project Status: Construction Estimated Completion: 2030 Capital Costs: $83,000,000	SEWD	Wildlife agencies; recreation; environmental groups	SEWD has initiated a contract for the construction of the Bellota Weir modifications.
Agriculture and Municipal Conservation Programs	Project Type: Demand Management	SEWD	Municipal water users; environmental groups	Management actions under the HCP have been implemented and are ongoing.

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
Minimum Instream Flow Commitment	Project Type: Fish Passage and Ecosystem Improvements	SEWD	Wildlife agencies; environmental groups; USACE	Management actions under the HCP have been implemented and are ongoing.
Non-Dedicated Fall Storage Management	Project Type: Fish Passage and Ecosystem Improvements	SEWD	Wildlife agencies; environmental groups; USACE	Management actions under the HCP have been implemented and are ongoing.
Flood Control Release Coordination	Project Type: Fish Passage and Ecosystem Improvements	SEWD	Wildlife agencies; environmental groups; USACE	Management actions under the HCP have been implemented and are ongoing.
Non-entraining Upstream Passage Barrier	Project Type: Fish Passage and Ecosystem Improvements	SEWD	Wildlife agencies; environmental groups	Management actions under the HCP have been implemented and are ongoing.
Temporary Fish Ladders at the Bellota Diversion Facility	Project Type: Fish Passage and Ecosystem Improvements	SEWD	Wildlife agencies; environmental groups	Management actions under the HCP have been implemented and are ongoing.
Artificial Instream Structures Improvements	Project Type: Fish Passage and Ecosystem Improvements	SEWD	Wildlife agencies; environmental groups	Management actions under the HCP have been implemented and are ongoing.
Flashboard Dam Notches	Project Type: Fish Passage and Ecosystem Improvements	SEWD	Wildlife agencies; environmental groups	Management actions under the HCP have been implemented and are ongoing.
Supervisory Control and Flow Data Acquisition System	Project Type: Infrastructure Improvement	SEWD	Farmers; groundwater users; environmental groups	Management actions under the HCP have been implemented and are ongoing.
Fish Screens for Privately Owned Diversions	Project Type: Fish Passage and Ecosystem Improvements	SEWD	Wildlife agencies; environmental groups; landowners	Management actions under the HCP have been implemented and are ongoing.

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
Stakeholder Education Program regarding Fishery Issues	Project Type: Demand Management	SEWD	Wildlife agencies; environmental groups; farmers	Management actions under the HCP have been implemented and are ongoing.
Additional ASR Wells	Project Type: Direct Recharge Project Status: Conceptual Estimated Completion: TBD Capital Costs: $2,000,000	SEWD	Farmers; groundwater users; municipal water providers	SEWD will undergo a feasibility study to determine ideal locations for ASR wells.
Vineyard Recharge	Project Type: Direct Recharge Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	SEWD	Vineyard owners; groundwater users	SEWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.
McGurk Crossing and Recharge Area	Project Type: Fish Passage and Ecosystem Improvements Project Status: Design Estimated Completion: 2027 Capital Costs: $900,000	SEWD	Wildlife agencies; groundwater users; environmental groups	SEWD has initiated a contract for modeling and design of the McGurk low water crossings.
White Pines Restoration Project	Project Type: Storage Project Status: Planning Estimated Completion: TBD Capital Costs: TBD	CCWD	Recreation; environmental groups; municipal water users	CCWD will undergo a feasibility study to determine costs and schedule.
Lake Grupe	Project Type: Surface Water Infrastructure Project Status: Planning Estimated Completion: TBD Capital Costs: $3,720,000	SEWD	Farmers; groundwater users	Phase 2 of the project is to convey stored water from Lake Grupe to local property owners. These landowners are ultimately responsible for planning, permitting, and funding Phase 2.

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
South Gulch Reservoir	Project Type: Storage Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	SEWD	Farmers; municipal water users	SEWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.
Duck Creek Reservoir	Project Type: Storage Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	SEWD	Farmers; municipal water users	SEWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.
Mormon Slough System FloodMAR Feasibility Study	Project Type: Direct Recharge Project Status: Planning Estimated Completion: 2026 Capital Costs: $1,000,000 1	SJAFCA	Farmers; groundwater users; environmental groups	A feasibility study will be finalized in 2026.
Mormon Slough Channel Bypass	Project Type: Flood Risk Reduction Project Status: Planning Estimated Completion: TBD Capital Costs: $34,000,000	SEWD	Restore the Delta; San Joaquin County; public safety (flood prevention)	Planning and outreach is being finalized. Restore the Delta is in search of funding for design and implementation.
Sitkin Property Mitigation	Project Type: Flood Risk Reduction Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	SEWD	Groundwater users; public safety (flood prevention); landowners	SEWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.
New Hogan Reservoir Storage Assessment and Climate Change Mitigation Study	Project Type: Flood Risk Reduction Project Status: Planning Estimated Completion: TBD Capital Costs: TBD	SJAFCA; SEWD	Public safety (flood prevention); municipal water users; USACE	SJAFCA will initiate a planning or feasibility study.

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
Mormon Slough System ULDC Evaluation	Project Type: Regulatory Project Status: Planning Estimated Completion: TBD Capital Costs: $750,000 1	SJAFCA	Public safety (flood prevention); local governments	SJAFCA will initiate a planning or feasibility study.
USACE Lower San Joaquin River Project (LSJRP) - Phase D Calaveras River, San Joaquin River	Project Type: Flood Risk Reduction Project Status: Design Estimated Completion: 2037 Capital Costs: TBD	SJAFCA; USACE	Public safety (flood prevention); local governments	Project proponents will initiate the necessary project design, with support from SJAFCA.
Dewatered Domestic Well Mitigation Program	Project Type: Infrastructure Improvement	ESJ GSAs	Domestic well owners; farmers	Programs in the GSP are implemented as needed.
Bellota Pipeline Flood-MAR Project	Project Type: Surface Water Infrastructure and Recharge Project Status: Planning Estimated Completion: TBD Capital Costs: $20,000 per turnout	SEWD	Farmers; GSAs; environmental groups	The project is part of a larger water rights request from New Hogan. It is currently in the permitting phase. SEWD is in the process of obtaining funding for this project.
Fall Flashboard Dam Removal Operations	Project Type: Fish Passage and Ecosystem Improvements	SEWD	Wildlife agencies; landowners; environmental groups	Management actions under the HCP have been implemented and are ongoing.
Cosgrove Creek Flood Mitigation	Project Type: Flood Risk Reduction Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	CCWD	Local residents; public safety (flood prevention); groundwater users; environmental groups	CCWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
San Antonio Creek – White Pines – Sheep Ranch Resilience	Project Type: Infrastructure Improvement Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	CCWD	Environmental groups; local residents	CCWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.
Wallace-Burson Conjunctive Use Program	Project Type: Surface Water Infrastructure and Recharge Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	CCWD	Landowners; domestic well users; farmers; GSAs	CCWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.
Groundwater Monitoring Improvements	Project Type: Infrastructure Improvement Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	CCWD	GSAs; domestic well users; environmental groups	CCWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.
Wastewater Collection Infrastructure Improvements	Project Type: Infrastructure Improvement Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	CCWD	Local residents; environmental groups; public health agencies	CCWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.
FIRO Implementation at New Hogan Dam	Project Type: Infrastructure Improvement Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	CCWD; SEWD	Environmental groups; farmers; municipal water users; public safety (flood prevention)	CCWD and SEWD will coordinate with USACE to complete feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.

Project Name	Project Status	Responsible Parties	Supportive Partners	Next Steps
Flood Diversions for Groundwater Recharge Under Water Code Section 1242.1	Project Type: Flood Risk Reduction Project Status: Conceptual Estimated Completion: TBD Capital Costs: TBD	CCWD; SEWD	Landowners; groundwater users; GSAs, farmers; public safety (flood prevention); environmental groups	CCWD and SEWD will conduct feasibility and/or planning studies to determine project scope, assess alternatives, and estimate project costs.

Other Projects

TABLE 4: OTHER EXISTING PROJECTS

Project Name	Risk Area	Agency Name	Source Document	Project Description
Groundwater Study	Basin Conditions	City of Stockton Municipal Utilities District	Water Supply Master Plan	A comprehensive groundwater supply study is recommended to investigate existing facility conditions, capacity and water quality/regulatory trends. The outcome of the study would identify recommendations for rehabilitation of wells in North Stockton and South Stockton, including identifying appropriate wellhead treatment (at each location or centralized at a reservoir site).
Groundwater Storage Bank Study	Basin Conditions	City of Stockton Municipal Utilities District	Water Supply Master Plan	A groundwater storage bank/recharge basins study is recommended to address future supply reliability by expanding and augmenting the conjunctive use portfolio, allowing for the flexibility of banking unused supply for use at a later time.
Mokelumne Long-Term Supply Strategies	Climate Resilience	CCWD/CPUD	Calaveras County Mokelumne River Long-Term Water Needs Study	To meet the anticipated demands, the Districts are considering multiple projects listed below: Middle Fork Ditch Pipeline Middle Fork Pump Station Capacity Increase Wilson Dam Restoration to 50 AF Regulating Reservoir Expansion to 150 AF Schaads Reservoir Expansion Forest-Middle Fork Dam and Reservoir In addition to these projects, the Districts will need to negotiate with EBMUD for a diversion and storage agreement at Lake Camanche or Pardee Lake to meet demands in Area B, Valley Springs and the Jenny Lind/ La Contenta area.

Project Name	Risk Area	Agency Name	Source Document	Project Description
Regional Climate Collaborative	Climate Resilience	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Create a Regional Climate Collaborative or committee to coordinate and implement responses to climate change. Cross-sector collaboration including public health, community-based organizations (CBOs), Climate Action Corps, and private sector
Regional Emergency Response Plan	Climate Resilience	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Develop a Regional Emergency Response Plan which integrates the region's transit operators and their role in a mass evacuation event.
Climate Change Education; Outreach	Climate Resilience	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Execute a public education campaign to ensure that the broader public understands climate change projections, impacts, and adaptation strategies, and the terminology surrounding these topics. There have been good efforts through the Office of Emergency Services to list information on their website about potential risks. This could be taken a step further with public campaigns or explicit partnerships with organizations. The public education campaign should include information about evacuation prep, the act of evacuating, and returning home. Identify and provide outreach funding, such as stipends for volunteers, students, or other professionals to participate in meetings. Providing incentives to contribute will ensure a diverse range of perspectives (not just from subject matter experts and professionals working in the field).

Project Name	Risk Area	Agency Name	Source Document	Project Description
Emergency Communication Services	Climate Resilience	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Provide better communication services in emergencies. Communications should be offered in multiple languages and formats (e.g., social media, text alerts, phone calls)
Transit Backup Power	Climate Resilience	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Develop back up power strategies to ensure that electric transit can still provide regular service or assist in evacuation when there are outages.
Port Backup Power	Climate Resilience	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Provide comprehensive backup power at Port of Stockton during outages.
Infrastructure Adaptation	Climate Resilience	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Update design criteria and guidance for infrastructure projects to address climate change. Including Caltrans Highway Design Manual.
Climate Change Funding	Climate Resilience	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Identify dedicated funding sources are needed to support regional climate change work including implementation of adaptation strategies. Existing funding sources need to be more flexible for adaptation projects.

Project Name	Risk Area	Agency Name	Source Document	Project Description
Regional Agricultural Conservation Program	Direct Impacts	San Joaquin County Resource Conservation District	MokeWISE	Increase irrigation efficiency; A program which would work with growers and agencies to test and evaluate agricultural management practices for irrigation water management efficiency.
Advanced Metering Infrastructure (AMI) Study	Direct Impacts	City of Stockton Municipal Utilities District	Water Supply Master Plan	An Advanced Metering Infrastructure (AMI) study, design, and implementation project is recommended to improve metering technology to allow for enhanced demand tracking, management, and water loss identification.
Flood Adaptation Assessment (SR-4)	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Conduct a flood adaptation assessment for SR-4 from Stockton west to Contra Costa County flood, considerate of evacuation planning.
Lower San Joaquin River Feasibility Study	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Continue critical projects in progress by the San Joaquin Area Flood Control Agency (SJAFCA). Advance the Lower San Joaquin River Feasibility Study.
Flood Adaptation Assessment (SR-99)	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Conduct a flood adaptation assessment for SR-99 through Lodi, considerate of evacuation planning.

Project Name	Risk Area	Agency Name	Source Document	Project Description
Flood Adaptation Assessment (South Stockton)	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Conduct a flood adaptation assessment for South Stockton including roads, transit stops, and rail.
Flood Adaptation Assessment (Waterloo Road; CA-88)	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Conduct a flood adaptation assessment for Waterloo Road; CA-88, considerate of evacuation planning.
Mossdale Adaptation Assessment	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Continue SJAFCA Mossdale Tract (Reclamation District 17) area adaptation assessment (SJAFCA and DWR already evaluating options). Flooding here could affect I-5, I-205 and potentially SR-120. Includes portions of Lathrop, Manteca, Stockton, and San Joaquin County
Stockton Public Housing Flood Mitigation	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Assess flood mitigation for City of Stockton public housing in floodplain.
Smith Canal	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Advance SJAFCA Smith Canal Project (currently under construction).

Project Name	Risk Area	Agency Name	Source Document	Project Description
Stokton Wye Adaptation Assessment	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Conduct a Stockton Wye flood adaptation assessment.
Railyard Flood Adaptation Assessment	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Conduct a BNSF Intermodal Railyard (Stockton) flood adaptation assessment
Regional Levee Raising	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Implement regionally coordinated level raising projects to ensure the entire system is high enough for future flows. (Can include coordination with DSC Delta Levee Investment Strategy.)
Corral Hollow Flood Adaptation Assessment	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Conduct a flood adaptation assessment for Corral Hallow (including mudslides, erosion, wildfire; evacuation challenges; bridge capacity issues).
Bridge Piers	Flood	San Joaquin Council of Governments	SJCOG Regional Resiliency Implementation Plan	Reconfigure bridge piers to reduce restriction of flow. Other bridge improvements to increase freeboard and reduce risk of scour

Project Name	Risk Area	Agency Name	Source Document	Project Description
North Frontage Road backflow valve (North 99 Frontage Road)	Flood	San Joaquin County	San Joaquin County Local Hazard Mitigation Plan	Project is to reduce the flooding of the roadway section with the design and construction of an improved backflow prevention valve and theft proof enclosure. In addition, repair of the roadway section that has been flooded.
200 Year Flood Plain Code	Flood	San Joaquin County	San Joaquin County Local Hazard Mitigation Plan	Develop 200 Year Flood Plain code for new construction in
Oak Grove Regional Park Lake Bank Erosion Mitigation	Flood	San Joaquin County	San Joaquin County Local Hazard Mitigation Plan	Re-stabilization of the bank of the levee will be restored
High Country Meadow Restoration Program	Surface Water Quality	Foothill Conservancy	MokeWISE	Develop a three-phased program to restore high-elevation meadows to approximate natural function to provide water supply, storage, and ecosystem enhancement benefits. The initial phase of the program would involve mapping, identifying, and assessing potential meadows for restoration. The second phase would include setting goals and opportunities for both the program and for each of the identified meadows. The third and final phase would involve developing an implementation plan and budget for restoring the identified meadows. This implementation plan and budget could then be used to secure funding for implementation of the restorations.

Project Name	Risk Area	Agency Name	Source Document	Project Description
Lower Bear River Reservoir Expansion Project	Water Supply	Amador Water Agency	MAC IRWM Update	This feasibility study will evaluate enlarging Lower Bear Reservoir by raising the existing dam (embankment) 32 feet to increase surface water storage capacity within the upper Mokelumne River watershed. Previous studies performed on behalf of Amador Water Agency suggest that Lower Bear Reservoir would provide 18,300 feet of additional yield (Willard 2005). In addition to modifications to the dam itself, other facilities that would need to be constructed include an updated intake structure and spillway. Also note that the project would require the relocation of adjacent roads and existing operational facilities. While the primary benefit is additional supply for participating entities through increased storage of winter flows, other benefits include flood control, power generation, improved water quality, and cold water releases to improve fisheries.
Lake Camanche Recycling Water Project	Water Supply	Amador Water Agency	MAC IRWM Update	The Lake Camanche Village Wastewater Treatment Plant serves approximately 400 homes in the Lake Camanche Village Development. The existing storage and spray irrigation system was unable to handle the effluent loading during the spring storms of 2005 and 2006.

Project Name	Risk Area	Agency Name	Source Document	Project Description
Water Storage Reoperation Study	Water Supply	Amador Water Agency	MAC IRWM Update	The Agency Water System is owned and operated by the Amador Water Agency. AWA has agreements in place to utilize the water right for the drinking water of its communities and store that water in PG&E reservoirs. AWA intends to lease additional storage capacity in these reservoirs to meet Amador County's drinking water needs in the future without additional surface water storage. AWA will explore the opportunity to utilize PG&E reservoirs for additional storage and evaluate the added cost of such storage
NSJWCD Infrastructure Improvements	Water Supply	North San Joaquin Water Conservation District	MokeWISE	Improve the infrastructure for reliable surface water delivery to the North San Joaquin Water Conservation District so the District can utilize existing water rights and its agricultural customers can reduce reliance on groundwater sources. The largest of these projects includes rebuilding the southern pump station and southern distribution system, and rebuilding the northern distribution system.
PG&E Storage Recovery	Water Supply	Amador Water Agency	MokeWISE	Evaluate the feasibility of removing silt and sediment from behind PG&E dams.
Re-operation of Existing Storage	Water Supply	Upper Mokelumne River Watershed Authority	MokeWISE	Feasibility study to assess capability to re-operate existing storage to store water for consumptive use in addition to hydropower. The study would include a discussion on legal, environmental, political, and technical feasibility, as well as address the issue of flood control capabilities.

Project Name	Risk Area	Agency Name	Source Document	Project Description
Pump Station and Tank Improvements	Water Supply	Calaveras Public Utilities District	CPUD 2024 Water Master Plan Update	South Fork Pump Station, Glencoe Pump Station, Ponderosa Hydro #1, Main Control Valve Hydro #2, Mokelumne Hill Tank, Paloma Tank, Garamendi Hydro #3, Golden Hills Tank, San Andreas Tank, Jeff Davis WTP, Jeff Davis Clearwell #1
Replacement of Transmission Mains/Lines	Water Supply	Calaveras Public Utilities District	CPUD Distribution System Feasibility Study	Replacement of Transmission Lines, Replace Undersized Distribution Pipes, Replace Mokelumne Hill to Paloma Transmission Main. A majority of the transmission main and distribution mains are 50 years old and nearing the end of their design life. Mains have been replaced on an as needed basis due to leaks or planned system improvements. CPUD currently has a project initiated to replace the transmission main along the Rich Gulch area in the Ponderosa PZ. Four additional main projects have been identified in this study.
Jeff Davis Recycle Backwash Project	Water Supply	Calaveras Public Utilities District	MAC Implementation Programs	The project proposes to construct a backwash recycle pump station and force main pipeline from the existing backwash storage at the Water Treatment Plant (WTP) to discharge and disperse backwash water into Jeff Davis Reservoir. Additionally, the project would include measures to improve the efficiency of the backwash ponds. The pump station would be installed at the location of the backwash ponds and would pump pond contents into the force main pipeline. The pipeline would extend underground approximately 1,130 linear feet from the pump station along an existing access road to a diffuser structure to be constructed within Jeff Davis Reservoir

Project Name	Risk Area	Agency Name	Source Document	Project Description
Well Rehab and Backup Power	Water Supply	City of Stockton Municipal Utilities District	Water Supply Master Plan	Addresses supply reliability in South Stockton. Supplies from SEWD could be curtailed depending on the Water Year. SEWD is assumed to supply up to a maximum of 70 percent of the South Stockton demands. Additional wells bolster local supplies in the event of a supply curtailment from SEWD. This well will also satisfy local storage requirements.
Intake Pump Station and Pipeline Upgrade	Water Supply	City of Stockton Municipal Utilities District	Water Supply Master Plan	Ground settlement at the IPS site has required interim repair and adjustment of station infrastructure and the 54-inch raw water pipeline that supplies the DWTP. It is recommended that COSMUD perform additional studies to develop a long-term strategy, including appropriate design features, and construct improvements to station infrastructure and the raw water pipeline.
DWTP Campus Improvements	Water Supply	City of Stockton Municipal Utilities District	Water Supply Master Plan	COSMUD plans to develop an overall DWTP campus to centralize treatment and distribution staff. These campus improvements would result in both management and operational efficiencies.
Backup Power (Well SSS3, Well SSS9)	Water Supply	City of Stockton Municipal Utilities District	Water Supply Master Plan	Addresses the projected near-term storage capacity deficit in South Stockton by maximizing the emergency groundwater credit. Currently, Wells SSS3 and SSS9 do not have backup power and therefore do not contribute to the emergency groundwater credit in South Stockton. Additional storage is needed due to increased demands; therefore, these improvements should be funded by future development.

Project Name	Risk Area	Agency Name	Source Document	Project Description
Storage and Pumping (Reservoirs; Pump Stations)	Water Supply	City of Stockton Municipal Utilities District	Water Supply Master Plan	To offset storage reservoir size and/or address the projected storage deficit through increased emergency groundwater storage credit and improve water supply reliability, the following well improvements are recommended: In North Stockton, construct and equip the planned Well 33 with backup power. In South Stockton, construct and equip a new well within the Mariposa Road Community development area, with backup power. In South Stockton, rehabilitate existing Well SSS8 and equip it with backup power.
Backup Power (Well 33, Well SSS8)	Water Supply	City of Stockton Municipal Utilities District	Water Supply Master Plan	To offset storage reservoir size and/or address the projected storage deficit through increased emergency groundwater storage credit and improve water supply reliability, the following well improvements are recommended:
Pipeline Improvements (DWTP)	Water Supply	City of Stockton Municipal Utilities District	Water Supply Master Plan	To address high velocities observed in transmission pipelines downstream of the DWTP, it is recommended to construct 5,800 linear feet of 36-inch diameter pipelines.

Project Name	Risk Area	Agency Name	Source Document	Project Description
Improve Fire Flows	Wildfire	Calaveras Public Utilities District	CPUD Distribution System Feasibility Study	Improve fire flows for Glencoe and Golden Hills. The booster pumps and hydropneumatic tank at the Glencoe Pump Station currently meet the domestic demand but do not have the capacity to provide fire flow of 500 gpm for two hours. Construction of a 500 gpm fire pump station next to Glencoe Pump Station would resolve the issue. The pump station would pump water from the 27 inch transmission main in Ridge Road. With this solution a storage tank is not required. The clearwell and treatment plant have the capacity to provide the required fire flow. The fire pump station would only be used during a fire flow emergency, therefore, minimizing the cost of O&M.
Giant Sequoia Forest Resilience Project	Wildfire	California Department of Parks and Recreation	Calaveras County Community Wildfire Protection Plan	Prescribed burning of 222 acres and 199 acres of fuel reduction.
Northwest Corner Omnibus Forest Management (various units)	Wildfire	California Department of Parks and Recreation	Calaveras County Community Wildfire Protection Plan	Fuel reduction and prescribed burning in the Upper San Antonio, West Moran, 5000'/Hwy 4, Moran Creek, Love Creek, and Big Tree Village Units)
Fuelbreak Maintenance	Wildfire	Calaveras County Resource Conservation District	Calaveras County Community Wildfire Protection Plan	Big Flat, Mill Woods, Murphys/Forest Meadows

Project Name	Risk Area	Agency Name	Source Document	Project Description
Roadside Brushing Maintenance	Wildfire	Calaveras County Resource Conservation District	Calaveras County Community Wildfire Protection Plan	Highway 4 Corridor Roads, Middle Fork Moke Roads, Central Calaveras Roads
Fuel Maintenance	Wildfire	Mokelumne Hill Sanitation District	Calaveras County Community Wildfire Protection Plan	Fuel maintenance Mokelumne Hill Sanitation District
Perimeter Maintenance	Wildfire	CAL FIRE	Calaveras County Community Wildfire Protection Plan	Mokelumne Hill perimeter firebreak
Butte Fire Restoration	Wildfire	Cal-Ama Forestry Team	Calaveras County Community Wildfire Protection Plan	Restoration at Buckeye Gulch/Boston Yale, Ponderosa Road, Indian Gulch, Alabama Hill
Fuels Reduction/Forest Restoration	Wildfire	Cal-Ama Forestry Team	Calaveras County Community Wildfire Protection Plan	SF Mokelumne Watershed private property, West Point WWTP, Bummerville BLM Forest Restoration, decommissioned CCWD West Point WWTP, CCWD Winton Regulatory Reservoir, Lily to Tiger Cr. Power House

Project Name	Risk Area	Agency Name	Source Document	Project Description
Fuel Maintenance	Wildfire	Cal-Ama Forestry Team	Calaveras County Community Wildfire Protection Plan	SF Mokelumne Watershed restoration BLM, Pine Ridge FB, Arnold WWTP
Murphys Area Fuels Reduction Project	Wildfire	Calaveras Foothills FSC	Calaveras County Community Wildfire Protection Plan	Fuel break
MFPD and WPFD Pre-Fire Mapping	Wildfire	Calaveras Foothills FSC	Calaveras County Community Wildfire Protection Plan	Map
Calaveras County Seniors and Disabled Defensible Space Project	Wildfire	Calaveras Foothills FSC	Calaveras County Community Wildfire Protection Plan	Defensible space clearing
Calaveras County Door-to-door Chipping Program	Wildfire	Calaveras Foothills FSC	Calaveras County Community Wildfire Protection Plan	Chipping

Project Name	Risk Area	Agency Name	Source Document	Project Description
Rancho Calaveras Fuels Reduction Project Phase 2	Wildfire	Calaveras Foothills FSC	Calaveras County Community Wildfire Protection Plan	Fuel break
Love Creek Fuels Reduction Project	Wildfire	Calaveras Foothills FSC	Calaveras County Community Wildfire Protection Plan	Fuel break
Ridge Road Fuel Break	Wildfire	Calaveras Foothills FSC	Calaveras County Community Wildfire Protection Plan	Fuel break
The Wildfire Next Time Educational Video	Wildfire	Calaveras Foothills FSC	Calaveras County Community Wildfire Protection Plan	Public education
Mountain Ranch Fuel Break	Wildfire	Calaveras Foothills FSC	Calaveras County Community Wildfire Protection Plan	Fuel break

Project Name	Risk Area	Agency Name	Source Document	Project Description
BLM Lily 1 & 2	Wildfire	BLM Mother Lode Field Office	Calaveras County Community Wildfire Protection Plan	Maintenance
Last Chance Fuel Break, Davies Ranch	Wildfire	Davies Ranch	Calaveras County Community Wildfire Protection Plan	Fuel break; forest restoration
Arnold Avery Hazardous Fuel Reduction and Fuel Break	Wildfire	Calaveras Healthy Impact Product Solutions	Calaveras County Community Wildfire Protection Plan	Fuel break maintenance and fuels reduction
Blue Lake Springs Debris Removal	Wildfire	Blue Lake Springs HOA	Calaveras County Community Wildfire Protection Plan	Connect to fuel break, remove debris, thin canopy

Project Name	Risk Area	Agency Name	Source Document	Project Description
Forest Meadows/Wylderidge Fuels Reduction Project	Wildfire	Calaveras County Resource Conservation District	Calaveras County Resource Conservation District Website	The project would reduce fuels on 174 acres and extend the existing fuelbreak network, providing protection for the northern and eastern sides of these developments as well as surrounding homes interspersed along the Utica Grade and in Hathaway Pines, Avery, and Arnold. Clearing this area will also reduce the risk of fire ignition on Hwy 4, slow its spread, create clearance along evacuation routes and provide First Responders with critical extra time to achieve control on the initial attack. The project is designed to protect around 7,000 residences.`
NW Calaveras Fuels Reduction Project	Wildfire	Calaveras County Resource Conservation District	Calaveras County Resource Conservation District Website	This project would actively treat 470 acres (TIZ) within a 3,080 acre footprint.
HWY 108 N/Fricot City Road Fuel Reduction Project	Wildfire	Calaveras County Resource Conservation District	Calaveras County Resource Conservation District Website	This project will consist of two hazardous fuels reduction projects: the Highway 108 North fuel break in Tuolumne County, and the Fricot City Road fuel break in Calaveras County. The Highway 108 North fuel break is approximately 124 acres in size, and parallels Middle Camp Road and Highway 108 along the top of the South Fork Stanislaus River canyon in Tuolumne County. Fuel reduction work will consist of removal of surface fuels, brush, and trees less than 12-inches diameter at breast height to create a shaded fuel break condition.

Project Name	Risk Area	Agency Name	Source Document	Project Description
Mokelumne Hill Fuels Reduction Project	Wildfire	Calaveras County Resource Conservation District	Calaveras County Resource Conservation District Website	The Project will reduce the risk and the spread of fire ignition by rearranging dangerous ladder fuels and dead trees/debris to ground litter by mastication.
Bummerville/Blizzard Mine Fuels Reduction and Forest Restoration Project	Wildfire	Calaveras County Resource Conservation District	Calaveras County Resource Conservation District Website	The Bummerville/Blizzard Mine Fuels Reduction and Forest Restoration Project (Project) is an implementation project in northern Calaveras County near the communities of Bummerville and West Point. The applicant, the Calaveras County Resource Conservation District (CCRCD), will complete 460 acres of ladder fuel reduction and forest thinning on Bureau of Land Management (BLM) parcels within the Mokelumne Watershed.
Firefighting Capacity Upgrades	Wildfire	City of Stockton Municipal Utilities District	Water Supply Master Plan	Increase capacity of pipelines for improved fire flow (renewal and replacement)