Attachment 2: Project Justification

Contents

Project Summary Table

	IRWM Project Element	Lake Camanche Service Lateral Replacement – Phase 3	Sheep Ranch Drinking Water Compliance	MAC Region Water Conservation Program
IR.1	Water supply reliability, water conservation, and water use efficiency	X	X	X
IR.2	Stormwater capture, storage, clean-up, treatment, and management			X
IR.3	Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands			
IR.4	Non-point source pollution reduction, management, monitoring	X		X
IR.5	Groundwater recharge and management projects			
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users			
IR.7	Water banking, exchange, reclamation, and improvement of water quality	X		
IR.8	Planning, implementation of multipurpose flood management programs			
IR.9	Watershed protection and management			
IR.10	Drinking water treatment and distribution	X	X	
IR.11	Ecosystem and fisheries restoration and protection			

25-Word Project Descriptions

The following table briefly describes the three projects included in this proposal.

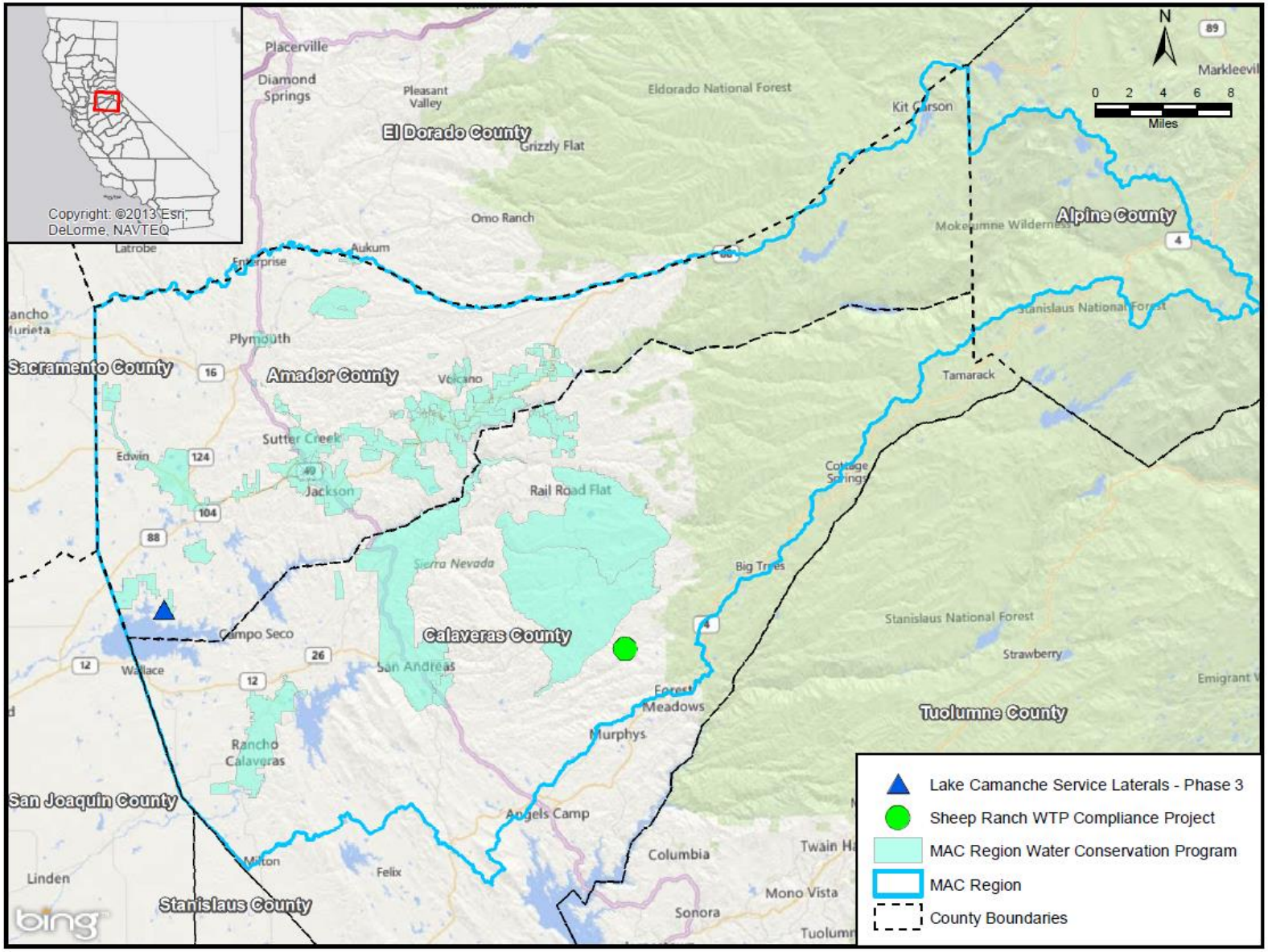
Table 2-1: 25-word Project Descriptions

Project	Description (25 Word Limit Based on PSP)
Lake Camanche Service Lateral Replacement – Phase 3	The Lake Camanche Service Lateral Replacement – Phase 3 Project will replace 200 leaking service laterals in the Lake Camanche area.
Sheep Ranch Drinking Water Compliance	The Sheep Ranch Drinking Water Compliance project will replace the existing Sheep Ranch Drinking WTP to provide clean, reliable drinking water to the community.
MAC Region Water Conservation Program	The MAC Region Water Conservation Program will implement urban water use efficiency measures throughout the MAC Region.

Regional Map

A regional project map is provided in Figure 2-1, which includes the locations of the Lake Camanche Service Lateral Replacement – Phase 3 Project, the Sheep Ranch Drinking Water Compliance Project, and the MAC Region Water Conservation Program.

Figure 2-1: Mokelumne/Amador/Calaveras Proposition 84 IRWM 2015 Implementation Grant Application Regional Project Map



Lake Camanche Service Lateral Replacement – Phase 3

Project Description

Project Proponent: Amador Water Agency (AWA)

Amador Water Agency (AWA) is the main water purveyor in western Amador County with over 6,700 connections. AWA serves the cities of Amador City, Ione, Jackson, Plymouth, Sutter Creek and portions of unincorporated western Amador County, including the community of Lake Camanche Village. Lake Camanche Village is a major subdivision in western Amador County near the shore of Camanche Reservoir (a recreation and flood control reservoir), and is known as Water Improvement District #7 (WID #7). The AWA WID #7 service area has 733 connections and provides an average of 0.27 million gallons per day (MGD) of potable water.

The existing polyethylene ("Poly-Tube") laterals, installed in the late 1970s, are very brittle and subject to severe longitudinal cracking, resulting in significant water losses and infrastructure damage. During fiscal year 2011/2012, AWA produced 91.22 million gallons of water, but only sold 86.93 million gallons, indicating up to 4.29 million gallons per year are lost. By replacing the service laterals, AWA will reduce this loss to ensure that sufficient water is available for emergency and drought situations, and that water will be available to meet increasing water demands in Lake Camanche Village. Coordination with PG&E may need to take place during Phase 3 to ensure AWA accessibility to the leaking service laterals as they are in a common trench with PG&E cable that will be in the process of being de-energized.

The project will replace 200 leaking service laterals with ¾ inch copper pipe, and will involve excavating along each lateral, removing the old lateral to be replaced with copper pipe, backfilling in the trench, and performing disinfection and pressure tests. Phase 1 of this project is complete and Phase 2 is currently under construction. Phases 1 and 2 were made possible through the award of Proposition 84 funds from DWR. Each phase consists of replacing approximately 200 of the existing poly tube service laterals, generating 3.6 acre-feet per year (AFY) in supply savings over the project life. Repair of the leaking laterals will prevent treated, chlorinated water from being discharged to the environmental and local waters via groundwater recharge, drainages, creeks and water bodies. Over the 70 year project life, 6,258 pounds of chlorine would be prevented from being discharged to receiving waters and recharged to groundwater. By replacing laterals before they fail, the project will prevent an estimated 200 emergency repairs over the 70-year project life.

The desired outcomes of the project are to reduce system losses by 3.6 AFY, reduce chlorine discharge to local waters and the environment by 0.91 mg/L for the volume of water supply saved which equates to 8.9 pounds per year, reduce emergency maintenance requests, reduce needs for new supply sources, and improve water supply reliability.

This project will help to address the current needs of the MAC Region by contributing to meeting the following regional goals to: ensure sufficient firm yield water supply, maintain and improve water infrastructure reliability, and reduce sources of contaminants.

Project Map

Figures 2-2 and 2-3 show a project maps for the Lake Camanche Service Lateral Replacement – Phase 3 project. As described above, the project will replace 200 service laterals within AWA's Lake Camanche Service area. Project monitoring will be conducted using existing water meters of customers whose service laterals have been replaced and supply production meters, and therefore cannot be represented on this map.

Figure 2-2: Lake Camanche Service Lateral Replacement – Phase 3 Project Location, water resources and DACs

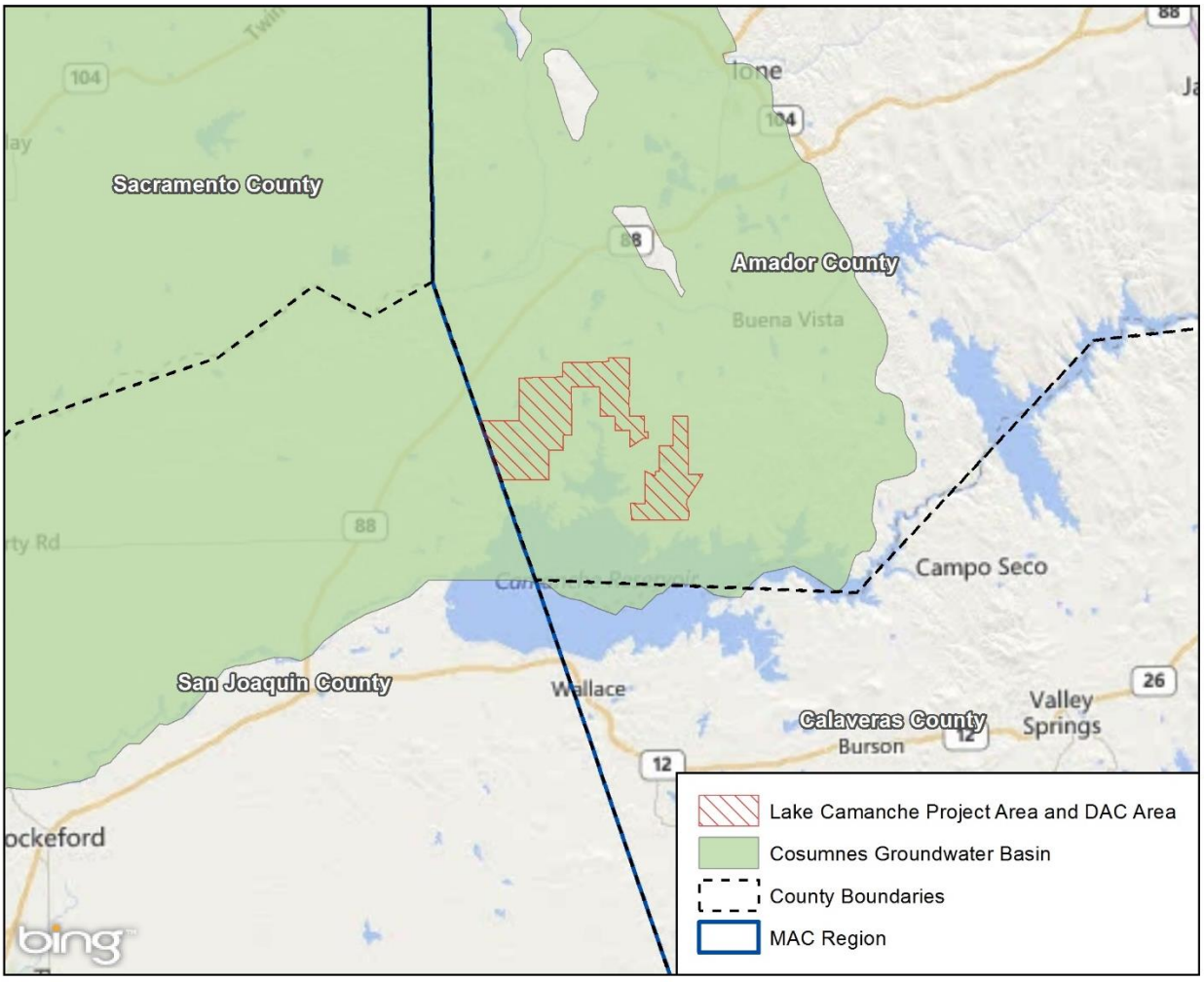
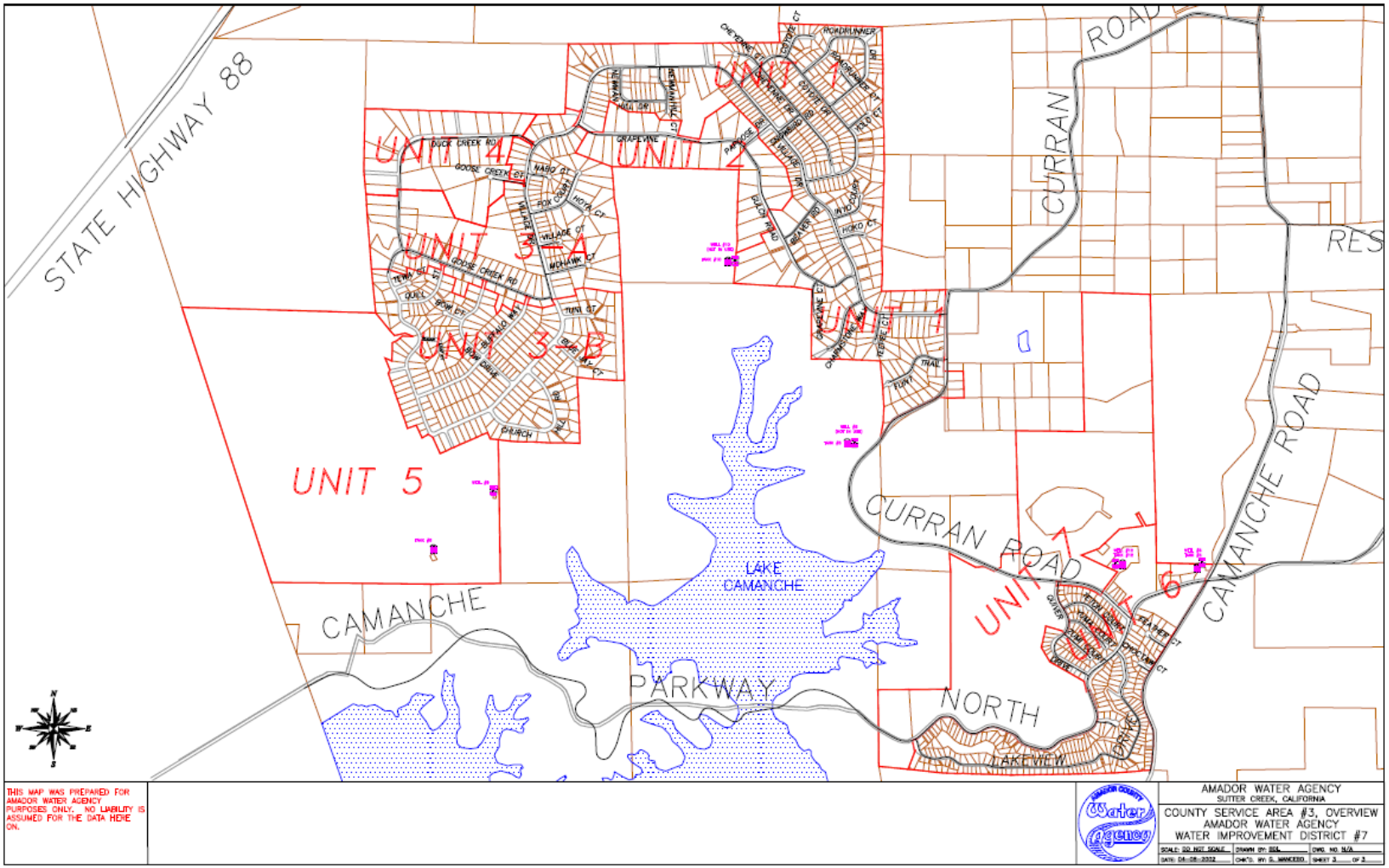


Figure 2-3: Lake Camanche Service Lateral Replacement - Phase 3 Project Map



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Project Physical Benefits

The primary physical benefit of the Lake Camanche Service Lateral Replacement (Phase 3) Project (Lake Camanche Project) will be water supply saved through reduction in leakage of service laterals, while the secondary physical benefit will be improvement of water quality through reduction of chlorinated water not reaching the environment and water supply sources via groundwater recharge, drainages, creeks and water bodies from leaking service laterals.

Table 2-2: Annual Project Physical Benefit – Lake Camanche Service Lateral Replacement – Water Supply Saved

Table 5 (from PSP) – Annual Project Physical Benefits **Project Name: Lake Camanche Service Lateral Replacement - Phase 3** **Type of Benefit Claimed: Water Supply Saved** **Units of the Benefit Claimed : acre-feet per year (AFY)** **Anticipated Useful Life of Project: 70 years**			
(a)	**(b)**	**(c)**	**(d)**
	Physical Benefits		
Year	**Without Project**	**With Project**	**Change Resulting from Project (c) – (b)**
2015-2016	0	0 – Construction	0
2017-2086	0	3.6	3.6
Comments: Assumes 200 laterals will be replaced at a rate of 50 laterals per year, and 0.018 AF of water supply saved per lateral. Total supply lost based on AWA metering data of water produced minus water supplied, and applied to 200 out of the area's 733 laterals. Communication with distribution personnel that work in the system, determined that leakage of the service laterals is the primary source of losses. As shown in the schedule in Attachment 5, construction will begin in 2016 and end in 2017. Project benefits are expected to begin after construction is complete. Project benefits will end as the useful life of each lateral reaches 70 years.			

Table 2-3: Annual Project Physical Benefit – Lake Camanche Service Lateral Replacement – Water Quality Improved

Table 5 (from PSP) – Annual Project Physical Benefits **Project Name: Lake Camanche Service Lateral Replacement - Phase 3** **Type of Benefit Claimed: Water quality improved through chlorine discharge reduction** **Units of the Benefit Claimed: mg/L and pounds (lb) chlorine** **Anticipated Useful Life of Project: 70 years**			
(a)	**(b)**	**(c)**	**(d)**
	Physical Benefits		
Year	**Without Project**	**With Project**	**Change Resulting from Project (c) – (b)**
2015-2016	0.91 mg/L 8.9 lb	0.91 mg/L 8.9 lb	0
2017-2086	0.91 mg/L 8.9 lb	0	-0.91 mg/L -8.9 lb
Comments: Sources – Based on chlorine concentration of 0.91 mg/L present in Lake Camanche Supply (2011 Consumer Confidence Report) that would not be discharged in the 3.6 AFY of water leaked to local surface water and groundwater. As shown in the schedule in Attachment 5, construction will begin in 2016 and end in 2017, and assumes that benefits will begin in 2017. Project benefits will end as the useful life of each lateral reaches 70 years.			

Technical Analysis of Physical Benefits Claimed

Primary Benefit: Water Supply Saved

Explanation of Need for the Project

In 2011/2012, Amador Water Agency produced 91.22 million gallons of water but only sold 86.93 million gallons, meaning 4.29 million gallons per year (13.2 AFY) of water are lost from the distribution system. Leakage of the service laterals is the primary source of losses based on distribution personnel that work in the system. This project is needed in order to eliminate this water supply loss, improve water supply reliability and reduce the need for more costly emergency system repairs, and is a continuation on a project that has already replaced a number of service laterals in the Lake Camanche Service Area.

Estimates of Without-Project Conditions

Under without-project conditions, existing leaking laterals would remain in service, and water would continue to leak water supply from the service laterals at a rate of 3.6 AFY. No other projects are anticipated or planned that will alleviate these conditions.

Description of Methods Used to Estimate Benefits

Based on AWA's metering data, in fiscal year 2011/2012, 91.22 MG of water were produced but only 86.93 MG were sold, indicating 4.3 MG per year, or 13.2 AFY, in water losses. Based on communication with distribution personnel that work in the system, leakage of the service laterals is the primary source of losses. Given that the service area has 733 laterals, this translates to 0.018 AFY per laterals. The project proposes to replace 200 of the service area's 733 laterals, which is estimated to yield 3.6 AFY of water supply saved or 252 AF over the 70-year project life. It was assumed that system losses are proportionate between all laterals (averaging).

Identification of New Facilities, Policies, and Actions Required

In order to achieve the physical benefits claimed, the replacement of 200 service laterals with 3/4–inch copper pipe is required. No additional policies or actions are required.

Description of Potential Adverse Physical Effects

No significant, long-term adverse physical effects are expected to result from the implementation of the Lake Camanche Service Lateral Replacement – Phase 3 Project as it requires only minor work be completed to replace existing laterals. A Categorical Exemption will be required to comply with CEQA.

Description of Whether the Project Effectively Addresses Long-Term Drought Preparedness

This project promotes water conservation by eliminating leaks throughout the distribution system. This project will also achieve a long-term reduction in water use simply by reducing water loss thereby reducing the amount of water needed to meet system demands. It is estimated this project will save 3.6 AFY of water supply over the project lifetime.

Secondary Benefit: Water quality improved through chlorine discharge reduction

Explanation of Need for the Project

According to the 2013 MAC Integrated regional Water Management Plan Update 2013, the MAC Region obtains 100% of its supplies from local surface water and groundwater resources, making the maintenance of the quality of local waters a high priority. In particular, groundwater quality in the Cosumnes Subbasin, the groundwater basin from which the project area receives its water supplies, is already of concern. The MAC Region is also home to a largely natural area, providing habitat to numerous wetland and riparian species, making the maintenance of the quality of local surface water supply a top priority. Currently, it's estimated that the leaking service laterals which will be replaced through this project currently discharge water a concentration of 0.91 mg/L or 8.9 pounds per year of chlorine that has the potential to reach local surface waters and groundwater.

In 2011/2012, Amador Water Agency produced 91.22 million gallons of water but only sold 86.93 million gallons, meaning 4.29 million gallons per year (13.2 AFY) of water was lost from the distribution system. Leakage of the service laterals is the primary source of losses based on distribution personnel that work in the system. This project proposes to replace one-third of the laterals, which - in addition to preventing loss of water supply - will prevent treated, chlorinated water from being discharged to the environment and Consumnes via groundwater recharge, drainages, creeks and water bodies.

Estimates of Without-Project Conditions

Under without-project conditions, existing leaking laterals would remain in service, and water would continue to allow 9 pounds per year of chlorine to be discharged to the environment and Consumnes Subbasin. No other projects are anticipated or planned that will alleviate these conditions.

Description of Methods Used to Estimate Benefits

Based on AWA's 2011 Consumer Confident Report, chlorine residuals average 0.91 mg/L in the Lake Camanche area. Assuming the chlorine concentration in water losses is equal to 0.91 mg/L and applied to the 3.6 AFY of water estimated to leak from the 200 laterals to be replaced through this project, this equates to 8.9 lbs per year of chlorine discharged to the environment from the laterals that would be reduced by this Project.

Identification of New Facilities, Policies, and Actions Required

In order to achieve the physical benefits claimed, the replacement of 200 service laterals with 3/4–inch copper pipe is required. No additional policies or actions are required.

Description of Potential Adverse Physical Effects

No significant, long-term adverse physical effects are expected to result from the implementation of the Lake Camanche Service Lateral Replacement – Phase 3 Project as it requires only minor work be completed to replace existing laterals. A Categorical Exemption will be required to comply with CEQA.

Description of Whether the Project Effectively Addresses Long-Term Drought Preparedness

This project promotes water conservation by eliminating leaks throughout the distribution system. This project will also achieve a long-term reduction in water use simply by reducing water loss thereby reducing the amount of water needed to meet system demands. It is estimated this project will save 3.6 AFY of water supply over the project lifetime.

Direct Water Related Benefit to a DAC

Water Related Need of the DAC

The Lake Camanche Service Lateral Replacement Project – Phase 3 consists of improvements to the Amador Water Agency (AWA) water distribution system serving the Lake Camanche Village, which is classified as a DAC, as described in Attachment 7 of this Proposal. The project consists of replacing 200 leaking service laterals with ¾ inch copper pipe only within this area. The existing laterals are very brittle and subject to severe longitudinal cracking, resulting in significant water losses and infrastructure damage. This water loss makes the DAC vulnerable to drought situations and reduces water available for emergency situations. In addition, the District must charge higher rates to account for the higher cost of water distribution that cannot be captured as the loss occurs prior to customer water meters. Customers with leaking service laterals are also subject to service lateral failure, causing potable water to no longer reach the customer and necessitating emergency repairs.

How the Proposed Project will Address the Need of the DAC

By targeting lateral replacement in the DAC of Lake Camanche Village, the project will directly benefit the DAC, and eliminate the loss of 13.2 AFY of water supply. This reduction in water supply loss will allow for greater system reliability and allow for groundwater supply to be made available to AWA and the communities it serves in the area during drought events. In addition, reductions in in-system water loss have the potential to improve

water rates for the area by reducing the cost of delivering water to Lake Camanche Village. By replacing laterals before they fail, the project will prevent an estimated 200 emergency repairs over the 70-year project life.

Project Performance Monitoring Plan

Project Performance Monitoring Plan Project: Lake Camanche Service Lateral Replacement - Phase 3		
Proposed Physical Benefits	**Targets**	**Measurement Tools and Methods**
Primary benefit: Water Supply Saved	Save 3.6 AFY of water supply by replacing 200 leaking service laterals	Tools and Methods: Water supply saved will be estimated by comparing production meter readings with lateral meter readings to obtain the difference. This difference will be compared to pre- and post-retrofit of data calculations post-Phases 1 and 2 implementation for the project (which replace the remaining service laterals) to determine the water loss reduction achieved through Phase 3. Locations: Data will be collected at the production meter and each lateral meter Data to be Collected: Water meter data Monitoring data will be used to compare the pre- and post-project system water loss that currently occurs between supply production and at the laterals. In addition, the change in water loss will be compared to the post-Phases 1 and 2 lateral replacement to determine the water loss reduction from Phase 3. The monitoring tools and targets are appropriate for the benefits claimed because they will provide a direct measurement of the in-system water loss reduction to determine whether the lateral replacement was successful in saving water supply.
Secondary benefit: Water quality improved through chlorine discharge reduction	Reduce loading of chlorine to local surface water and groundwater by 9 pounds per year	Tools and Methods: Chlorine loading reduction will be estimated first by calculating water supply saved, which will be estimated by comparing production meter readings with lateral meter readings to obtain the difference. The chlorine residual in the water will be obtained from AWA's annual Consumer Confidence Reports and applied to the water supply saved to determine the decrease in chlorine loading to surface water and groundwater. This reduction in chlorine loading will be compared to pre- and post-retrofit of data calculations post-Phases 1 and 2 implementation for the project (which replace the remaining service

		laterals) to determine the chlorine loading reduction achieved through Phase 3. <u>Locations</u>: Data will be collected at the production meter and each lateral meter. Chlorine concentration will be obtained from AWA's annual Consumer Confidence Report. <u>Data to be Collected:</u> Water meter data, and chlorine residual concentrations from consumer confidence reports. Monitoring data will be used to compare the pre- and post-project system chlorine loading that currently occurs due to lateral leaks. In addition, the change in chlorine loading will be compared to the post-Phases 1 and 2 lateral replacement to determine the chlorine loading reduction from Phase 3. The monitoring tools and targets are appropriate for the benefits claimed because they will provide a direct estimate of the chlorine loading reduction to determine whether the lateral replacement was successful in improving water quality through chlorine loading reduction.

Cost Effectiveness Analysis

Cost Effectiveness Analysis (Table 6 from PSP)		
Project Name: Lake Camanche Service Lateral Replacement - Phase 3		
Question 1	Types of benefits provided as shown in previous tables	Water Supply Saved Water Quality Improved
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as proposed project been identified?	No.
	If no, why?	This project plans to replace failing "poly tube" service laterals with industry standard materials to eliminate water loss due to system leakage. No alternative materials or methods exist that will achieve the same results while meeting the same industry standards
	If yes, list the methods (including the proposed project) and estimated costs.	Not applicable.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any	Not applicable.

	accomplishments of the proposed project that are different from the alternative project or methods.
Comments: Not applicable.	

Sheep Ranch Water Treatment Plant Compliance Project

Project Description

Implementing Organization: Calaveras County Water District (CCWD)

Sheep Ranch is a small Disadvantaged Community in central Calaveras County with a full-time residential population of around 100 residents. The Sheep Ranch community receives its water supply solely from San Antonio Creek, which is tributary to the Calaveras River. Sheep Ranch currently has a 35 year old treatment facility that ultimately needs replacement to comply with drinking water regulatory requirements.

The Sheep Ranch Drinking Water Treatment Plant (SRWTP) currently produces 30 gallons per minute (gpm) via an out of date "in-line" pressure filter system that is not recognized as a compliant technology according the Federal Surface Drinking Water Treatment Rule. CCWD was first notified by the California State Water Resources Control Board Division of Drinking Water (SWRCB DDW) in 1993 that the current system is out of compliance because it does not utilize an approved technology. As a result, the SRWTP has been operating under an alternative compliance mechanism that is restrictive with regard to water production and requires additional staff time for routine compliance, and a significant burden on the District to import water during times when the plant has to be shut down. Specifically, the operational constraints on the SRWTP prevent CCWD from treating water to drinking water standards during storm events when turbidity levels increase. During these periodic events, the SRWTP must shut down and utilize water stored in the system. If these events last longer than the capacity of the system storage, then water must be imported by truck to backfeed the Sheep Ranch distribution system. This is of considerable concern with regard to maintaining adequate fire protections for the Sheep Ranch community due to the reasonable probability of loss of pressurization and supply during these episodic shutdowns.

SWRCB DDW has recommended that CCWD upgrade the SWWTP to a membrane filtration system with sodium hypochlorite disinfection. The replacement of the current system with this technology would alleviate this issue as the system would be able to maintain adequate treatment capability even during times when the source water quality is degraded beyond the current filtration unit capacity. This has become a lingering concern as the drought continues and elevated turbidity persists in San Antonio Creek.

This project will replace the existing SRWTP filter system with a new membrane filtration system. Work to be performed will include site improvements such as site grading, drainage, underground piping and valves, tanks, foundations, chemical systems, and a building to house equipment. Site electrical work will also be performed to transfer power to the building that will house the packaged treatment plant. Once these activities are complete, the new treatment system will be put into place and connected to the water system. The existing facilities will be dismantled and removed from the site.

By replacing the existing non-compliant equipment, the project will provide a new water supply benefit of 0.06 AFY of water. The project will enable the SRWTP to use surface water with high turbidity, eliminating the need to import water when the plant is shut down. It will also allow CCWD to recycle backwash water, which cannot be done with the current system. The project will also reduce the use of coagulants for treating low TOC, which will reduce alum dosing by 1.0 mg/L. This equates to reduced loading of aluminum (12,800 pounds [lb] per year), potassium (18,600 lb per year), and sulfur (30,600 lb per year). The desired outcome of the project is to improve water supply reliability and allow for more efficient management of the SRWTP through the replacement of the current treatment system.

The project will help to address the current needs of the MAC Region by contributing to meeting the following regional goals: maintain and improve water infrastructure reliability; promote water conservation, recycling, and reuse for urban and agricultural use; and prioritize projects that have the best likelihood of being completed in the planning horizon.

Project Map

Figure 2-4 shows the general project location, the benefit area represented by the Sheep Ranch service area, and local water resources. All monitoring will take place at the Sheep Ranch WTP. Figure 2-5 and Figure 2-6 provide detailed facility maps for the service area, including the location of the Sheep Ranch WTP, pipelines and other distribution facilities. Note that he entirety of the project area shown in these figures are DAC areas.

Figure 2-4: Sheep Ranch Water Treatment Plant Compliance Project Map – Project Location, Supply Sources and Monitoring Location

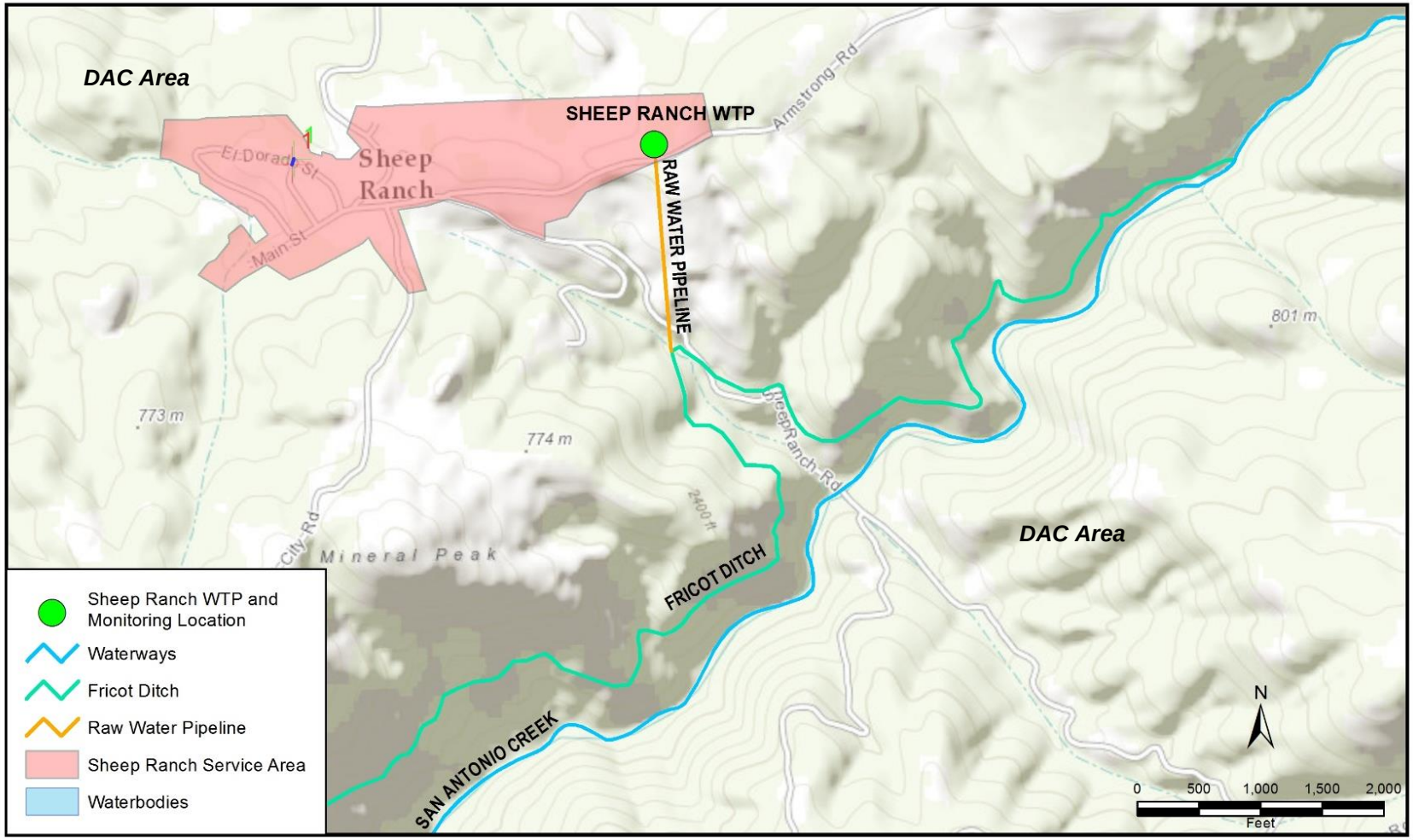


Figure 2-5: Sheep Ranch Water Treatment Plant Compliance Project Map – Detailed Facilities, East

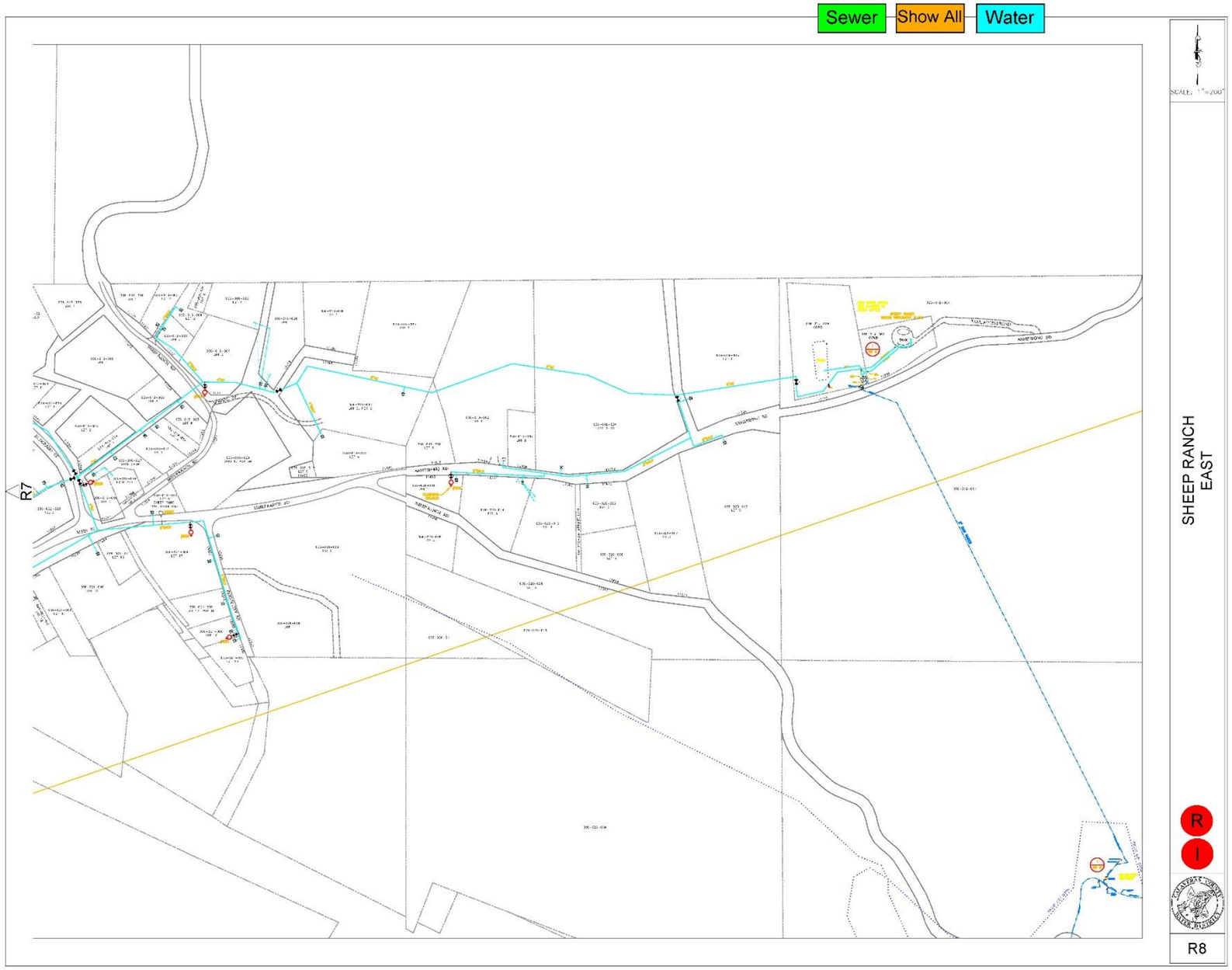
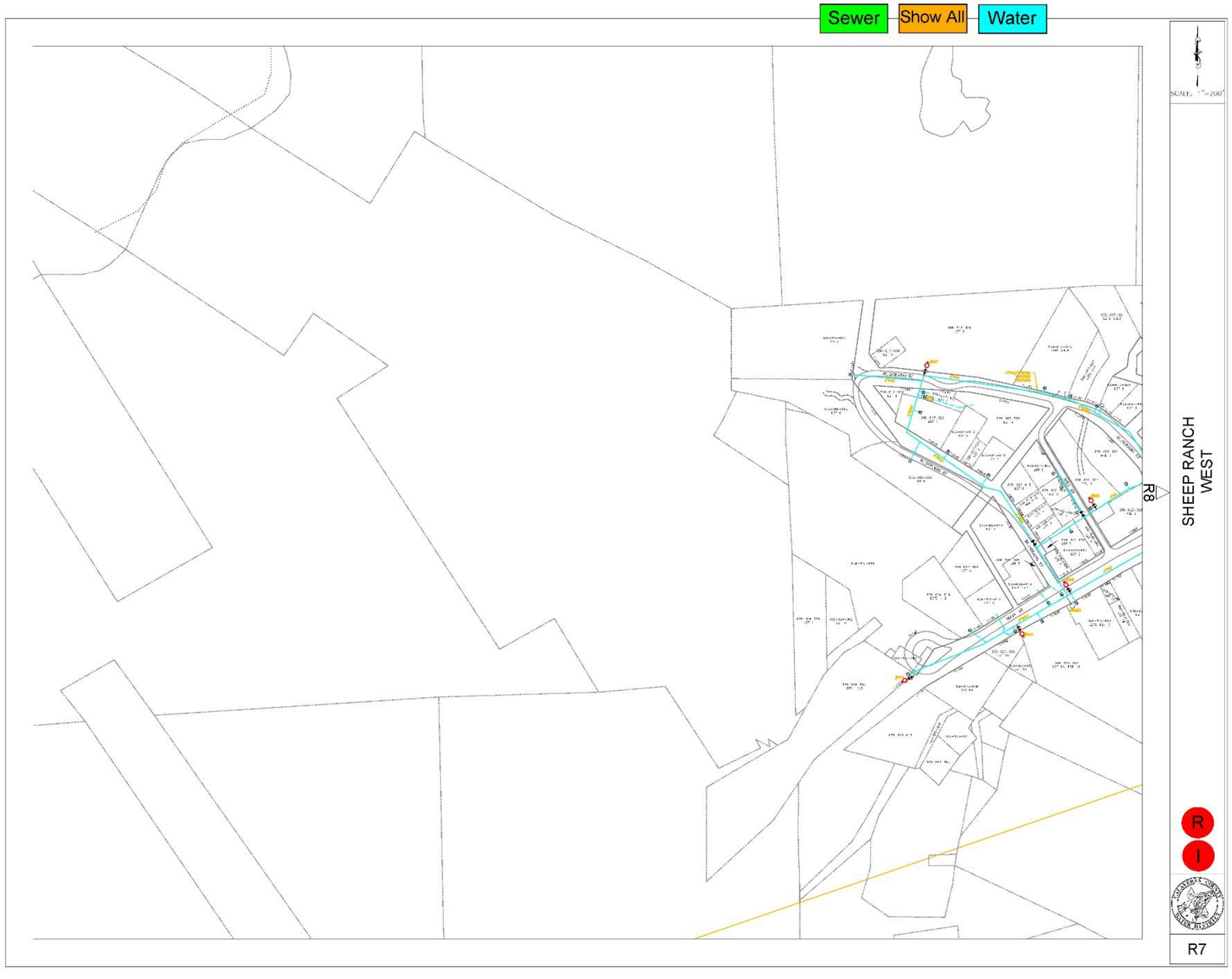


Figure 2-6: Sheep Ranch Water Treatment Plant Compliance Project Map – Detailed Facilities, West



Project Physical Benefits

The primary physical benefit of the SRWTP Compliance Project will be to save water supply by reducing imported water supply required by the community when the SRWTP has historically shut down due to high turbidity and conserve water utilized in plant treatment processes. Upgrades to the plant will address long-standing regulatory compliance concerns for human health. The secondary benefit will be performance improvements in treating source water.

Table 2-4: Annual Project Physical Benefit – Sheep Ranch Water Treatment Plant Compliance Project – Water Supply Saved

Table 5 (from PSP) – Annual Project Physical Benefits **Project Name: Sheep Ranch Water Treatment Plant Compliance Project** **Type of Benefit Claimed: Water Supply Saved** **Units of the Benefit Claimed: AF** **Anticipated Useful Life of Project: 25**			
(a)	**(b)**	**(c)**	**(d)**
	Physical Benefits		
Year	**Without Project**	**With Project**	**Change Resulting from Project (c) – (b)**
2015-2016	0.06	0.06 - Construction	0
2017-2041	0.06	0	-0.06
Comments: The new membrane technology would be able to treat the source water at a much higher turbidity level (order of magnitude). Estimates are based on typical source water quality and the frequency of shut-downs in the past (8 times between 2008-2010) and the quantity of water that must be trucked in as a result. CCWD has record of water being trucking in during particularly lengthy episodes every year between 2006 and 2008, with approximately 50,000 gallons or 0.15 AF trucked/imported to the SRWTP in 2008. It can be extrapolated that over a ten year period, at least 150,000 gallons (0.5 AF) of water were trucked in, or an average of 15,000 gallons (0.05 AF) per year. From 2006-2010 California experienced higher to normal rainfall, and 2011-2015 have been some of the driest on record. Assuming this pattern continues into the future, this would equate to an average of 0.05 AF of water being trucked to the plant every year. Additionally, the new membrane technology would allow CCWD to recycle backwash water through the filter system; a capability that the SRWTP does not have at this time. Currently, the filter is manually backwashed by a CCWD employee on a regularly scheduled timeframe based upon typical plant performance. The plant does not currently have the capability to reclaim the backwash water, and it is instead sent to a settling pond for disposal. Conservatively assuming 78 backwashes per year, with 1,120 gallons disposed per backwash cycle, this equates to a loss of 87,360 gallons annually. In other words, about 2.5 percent of water produced from the plant is lost each year as a result of inability to recycle backwash water (97.5% recovery). Stated performance for a variety of membrane filters is a 98-99% recovery rate with backwash being recirculated through the filters and recovered. If we assume 98.5% recovery, this amounts to a 1 percent savings, or about 4,368 gallons annually (.01 AFY). Project benefits are expected to begin in 2017 following construction completion, and extend for the treatment system life of 25 years.			

Table 2-5: Annual Project Physical Benefit – Sheep Ranch Water Treatment Plant Compliance Project – Water Quality Improved

Table 5 (from PSP) – Annual Project Physical Benefits **Project Name: Sheep Ranch Water Treatment Plant Compliance Project** **Type of Benefit Claimed: Water Quality Improved** **Units of the Benefit Claimed: Alum concentration reduction: mg/L** **Aluminum loading reduction: lb** **Potassium loading reduction: lb** **Sulfur loading reduction: lb** **Anticipated Useful Life of Project: 25**			
(a)	**(b)**	**(c)**	**(d)**
	Physical Benefits		
Year	**Without Project**	**With Project**	**Change Resulting from Project (c) – (b)**
2015-2016	Alum: 1.5 mg/L Aluminum: 19,300 lb Potassium: 27,900 lb Sulfur: 45,800 lb	Alum: 1.5 mg/L Aluminum: 19,300 lb Potassium: 27,900 lb Sulfur: 45,800 lb	Alum: 0 mg/L Aluminum: 0 lb Potassium: 0 lb Sulfur: 0 lb
2017-2041	Alum: 1.5 mg/L Aluminum: 19,300 lb Potassium: 27,900 lb Sulfur: 45,800 lb	Alum: 0.5 mg/L Aluminum: 6,500 lb Potassium: 9,300 lb Sulfur: 15,200 lb	Alum: -1.0 mg/L Aluminum: -12,800 lb Potassium: -18,600 lb Sulfur: -30,600 lb
Comments: Based on coagulant concentration needs for the existing and planned treatment system at the Sheep Ranch WWTP, requirements of which are located in the Sheep Ranch Treatment Plant Operations Manual, Page 5-18. Table 5-3 and Pall Corporation, 2003. Aria Membrane Filtration System, Page 4, http://www.pall.com/pdfs/Fuels-and-Chemicals/Power_Purity_Performance_ ARIA-PIA100.pdf. Project benefits are expected to begin in 2017 following construction completion, and extend for the treatment system life of 25 years.			

Technical Analysis of Physical Benefits Claimed

Primary Benefit: Water Supply Saved

Explanation of Need for the Project

The current Sheep Ranch treatment system was installed in 1980 and consists of a small dual media in-line pressure filter (a cylindrical vessel 4-ft in diameter and 5-ft in depth), permitted for a maximum flow of 30 gpm. While the existing filter has remained in service for the past 35 years, this treatment technology is now obsolete and needs to be replaced to ensure that CCWD can continue to provide safe water for the community.

Due to the use of the outdated SRWTP capabilities, the system must operate within a distinct set of operational constraints in order to produce safe and reliable drinking water. The system habitually exceeds the limits (turbidity) of these constraints related to source water from San Antonio Creek due to the outdated technology. During this time the facility must shut down production capacity and work off of minimal storage within the system, or even worse, import water from outside of the system by truck; leading to the possibility of water supply shortages and risk to human health and welfare.

Below is a snapshot of several times that the facility has had to shut down related to turbidity exceedances. These occur most often during storm events. Every time the plant registers source water turbidity greater than 10.0 NTU, the plant must shut down until suspended materials generated by higher flows settle out. CCWD anticipates that these shutdowns will be completely eliminated with the replacement of the current pressure filter system. Between

2008 and 2010, eight shutdowns occurred with outages varying in duration. CCWD was also required to truck in water during storm events in 2006 and 2007 to meet demands.

SRWTP Shutdowns between 2008 and 2010

2008	Jan. 04, 2008-Jan. 07, 2008
	Jan. 10, 2008-Jan. 11, 2008
	Jan. 23, 2008-Jan. 31, 2008
2009	Jan. 23, 2009-Jan.26, 2009
	Feb. 15, 2009-Feb.19, 2009
	Mar. 02, 2009-Mar. 06, 2009
	Apr. 10, 2009-Apr. 13, 2009
2010	Apr. 10, 2010- Apr.14, 2010

Upgrading the facility would allow for the system to treat water from San Antonio Creek during times when the turbidity currently exceeds the treatment capacity and operational constraints of the SRWTP. This would allow for greater flexibility in the system and increased reliability for fire protection in an area that is seasonally under extreme risk of fire. The ability to treat water during episodes of elevated turbidity will lead to more water being produced by the facility annually. Additionally, improved treatment is likely to lengthen the seasonal timeframe in which water can safely be produced, thus reducing the quantity of water that needs to be trucked in from outside of the area.

Additionally, the new membrane technology would allow CCWD to recycle backwash water through the filter system; a capability that the SRWTP does not have at this time. Currently, water is reversed through the filter (aka "backwashed") manually by a CCWD employee on regular schedule based upon typical plant performance. The plant does not currently have the capability to reclaim backwash water, and it is sent to a settling pond for disposal. The system is backwashed approximately 78 times per year, with 1,120 gallons of water disposed of following each cycle, for a total of 87,360 gallons annually lost in this process. This equates to about 2.5 percent of water produced from the plant each year.

This project, in conjunction with other planned supply/storage reliability enhancement components upstream, will assist in eliminating the need to truck water in to Sheep Ranch in the future.

Estimates of Without-Project Conditions

Without the project, the District will need to continuously monitor the raw water influent to the SRWTP and shut down any time the source water exceeds 10.0 NTU. This leaves the District and the Sheep Ranch community vulnerable to service interruptions and increased costs associated with trucking in water from the Stanislaus River watershed. In addition, after 35 years of use, the current pressure filter system has likely exceeded its manufacturer recommended usable life. If CCWD continues to use this treatment system, the risk of failure and breakdown continues to increase. CCWD will continue to experience shutdowns, leading to trucking in of at least 150,000 gallons (0.05 AFY) of drinking water every 10 years , and will continue to be unable to lose approximately 0.01 AF per year in backwash water disposal.

Description of Methods Used to Estimate Benefits

Utilizing records from the SRWTP, staff were able to capture a "snapshot in time" of multiple periods in which the plant was shut down. During a particularly long lasting event in 2008, CCWD needed to truck water into the Sheep Ranch community to backfeed the treatment plant. This required 4 truck trips for a total of 50,000 gallons (0.15 AF) of water hauled into the plant. It is assumed that in the future, an equivalent volume of water would be required to be imported during plant shut downs. As described under "Explanation of Need for the Project", the SRWTP shut down eight times over the three year period from 2008 to 2010. CCWD also trucked in water in every year from

2006-2008. It is estimated that over a ten year period, approximately 150,000 gallons (0.5 AF) of water, or an average of 15,000 gallons (0.05 AF) per year, must be trucked in to meet demands as a result of the inability to treat the source water turbidity. Assuming this pattern continues into the future, this would equate to an average of 0.05 AF of water being trucked to the plant every year.

Additionally, the new membrane technology would allow CCWD to recycle backwash water through the filter system, a capability that the SRWTP does not have at this time. Currently, the filter is manually backwashed by a CCWD employee on a regular schedule based upon typical plant performance. The plant does not currently have the capability to reclaim the backwash water, which is sent to a settling pond for disposal. The filter is backwashed approximately 78 times per year, with 1,120 gallons disposed of after each backwash event, resulting in disposal of 87,360 gallons of backwash water each year. This equates to about 2.5 percent of water produced by the plant each year being lost (97.5% recovery). Stated performance for a variety of membrane filters is a 98-99% recovery rate with backwash being recirculated through the filters and recovered. If we assume 98.5% recovery, this would amount to a 1 percent savings, or about 4,368 gallons annually (.01 AFY).

In total, the reduction in imported water and the recycling of backwash equates to an average water supply savings of 0.06 AFY.

Identification of New Facilities, Policies, and Actions Required

The existing SRWTP is very small, and will be physically removed and replaced with a "package plant". This "package plant" could be tied in directly to the existing distribution infrastructure. Some electrical upgrades and connectivity components would be required to bring the system online and integrate it into CCWD's Supervisory Control and Data Acquisition (aka SCADA) system.

No policies or actions are required to achieve the above described project benefits.

Description of Potential Adverse Physical Effects

Minimal, if any, adverse physical effects would be expected to result from project implementation, since it would be constructed within the footprint of the existing facility. The project would replace existing facilities and equipment which would create no further land, water, or air quality disturbance. With the exception of a small physical construction window during which there would be some noise impacts to the surrounding community, CCWD anticipates no lasting adverse effects related to the project. CCWD would presumably work with the selected construction and environmental consultant to reduce impacts to the surrounding physical community. CCWD would also plan to conduct outreach to the Sheep Ranch residential community to keep local stakeholders apprised of the project.

Description of Whether the Project Effectively Addresses Long-Term Drought Preparedness

The project would allow CCWD to conserve and reuse a portion of the backwash water that is currently disposed of, a function that is not currently available. This would amount to a 1 percent savings of total water produced at the plant, or about 4,368 gallons annually (0.01 AFY). Therefore, the project effectively addresses long-term drought preparedness by promoting water reuse and recycling.

Secondary Benefit: Performance improved in treating source water

Explanation of Need for the Project

The current SRWTP has been in service for more than 35 years and is outdated. The plant currently requires the use of a high volume of coagulant in the form of alum in order to treat water. The compounds in this coagulant, aluminum, potassium and sulfur, are released to the environment following water treatment. As identified in the

Upper Mokelumne River Watershed Assessment and Planning Project, levels of aluminum are already elevated in the upper watershed, and this project will help to reduce additional loading to the watershed.

Estimates of Without-Project Conditions

Without the project, CCWD will continue to use 0.5-2.0 mg/L of alum as a coagulant to treat water at the Sheep Ranch WTP (Sheep Ranch Treatment Plant Operations Manual, Page 5-18. Table 5-3) and so will continue to release the same loadings of aluminum, potassium and sulfur to the watershed every year.

Description of Methods Used to Estimate Benefits

The new plant is capable of treating low TOC water without coagulation. In contrast, the existing Sheep Ranch WTP uses 0.5 – 2.0 mg/L of alum as a coagulant, with 1.5 mg/L reflecting a typical dosage (Sheep Ranch Treatment Plant Operations Manual, Page 5-18. Table 5-3). While no coagulant is assumed to be needed for the new plant under typical operating conditions, we have conservatively assumed that 0.5 mg/L of alum will continue to be used to reduce loading to the membranes (Pall Corporation, 2003. Aria Membrane Filtration System, Page 4, http://www.pall.com/pdfs/Fuels-and-Chemicals/Power_Purity_Performance_ ARIA-PIA100.pdf). This will result in a 1.0 mg/L reduction in alum usage. The WTP currently produces 30 gpm of treated water, equivalent to approximately 15.8 million gallons, or 59.7 million liters per year.

The chemical formula for alum is KAl(SO4)2·12H2O. For every mg of alum applied, 0.15 mg of aluminum, 0.22 mg of potassium, and 0.23 mg of sulfur are introduced to the water supply. Since the Sheep Ranch WTP treats approximately 59.7 million liters of water per year, this equates to 8,750 kg (19,300 lb) of aluminum, 12,680 kg (27,900 lb) of potassium, and 20,790 kg (45,800 lb) of sulfur per year. Reducing alum dosing from 1.5 mg/L to 0.5 mg/L will cut this application by 1/3, reducing loading to the environment by 12,800 lb of aluminum, 18,600 lb of potassium, and 30,600 lb of sulfur per year. In addition, the amount of aluminum discharged to the environment in the form of backwash water will be reduced.

Identification of New Facilities, Policies, and Actions Required

The existing SRWTP is very small, and will be physically removed and replaced with a “package plant”. This “package plant” replacement could be plugged in directly to the existing distribution infrastructure. There would need to be some electrical upgrades and connectivity components to bring the system online and incorporate into CCWD’s Supervisory Control and Data Acquisition (aka SCADA) system.

No policies or actions are required to achieve the above described project benefits.

Description of Potential Adverse Physical Effects

Minimal, if any, adverse physical effects would be expected to result from project implementation, since it would be constructed within the footprint of the existing facility. The project would replace existing facilities and equipment which would create no further land, water, or air quality disturbance. With the exception of a small physical construction window during which there would be some noise impacts to the surrounding community, CCWD anticipates no lasting adverse effects related to the project. CCWD would presumably work with the selected construction and environmental consultant to reduce impacts to the surrounding physical community. CCWD would also plan to conduct outreach to the Sheep Ranch residential community to keep local stakeholders apprised of the project.

Description of Whether the Project Effectively Addresses Long-Term Drought Preparedness

The project would allow CCWD to conserve and reuse a portion of the backwash water that is currently disposed of, a function that is not currently available. This would amount to a 1 percent savings of total water produced at the plant, or about 4,368 gallons annually (0.01 AFY). Therefore, the project effectively addresses long-term drought preparedness by promoting water reuse and recycling.

Direct Water Related Benefit to a DAC

The project will provide a direct benefit to the Sheep Ranch community, which falls squarely in a DAC census block area. Further justification is provided in the attachment 7 "DAC assistance".

Water Related Need of the DAC

The Sheep Ranch community, a DAC, has its water supply served solely by a very small water treatment (the SRWTP) that has historical issues with water supply reliability, drinking water regulatory compliance, and source water treatability. When the plant is shut down due to high turbidity in the local surface water supply, the area must rely on the water stored in the distribution system. When that is depleted, CCWD must import water into the area using trucks. This is considered to be a critical water supply issue to this DAC.

How the Proposed Project will Address the Need of the DAC

The project will provide for better treatment reliability of the Sheep Ranch treatment system, which during historical storm events has had to shut down for extended periods. During several of the episodes water has had to be trucked in from outside of the region. Replacing the outdated filtration system would allow for better flexibility and treatment above the current capabilities, meaning that these shutdown events would be minimized, and potentially eliminated. This would reduce reliance on imported water that CCWD has historically trucked from the Stanislaus River watershed to the Sheep Ranch community. This benefits the system by achieving long term efficiencies that are costly and typically should be reserved as "stop-gap" measures.

Additionally, the project would address regulatory compliance needs of the DAC. CCWD would be assured of federal drinking water compliance for protection of human health through the 100% mechanical removal of Giardia and Cryptosporidium. The SRWTP would be given full removal credit for the new membrane filter. SWRCB DDW is responsible for ensuring drinking water facilities are properly removing or inactivating these and other waterborne pathogens.

Project Performance Monitoring Plan

Project Performance Monitoring Plan **Project: Sheep Ranch Water Treatment Plant Compliance Project**		
Proposed Physical Benefits	**Targets**	**Measurement Tools and Methods**
Primary benefit: Water supply saved	Save 0.06 AF/year of water supply through reduction in imported water and reuse of backwash water.	Tools and Methods: Water supply saved will be measured through the use of records of imported water volumes associated with plant shutdowns, and plant design and project approval by SWRCB DDW for the reuse of backwash water. Locations: Data will be collected at the SRWTP Data to be collected: Records of imported water volumes, plant design and project approval by SWRCB DDW Monitoring data will be used to compare pre- and post-project imported water volumes. In addition, plant design and project approval by SWRCB DDW will be used to show

		the ability of the SRWTP to reuse backwash water as a supply. The monitoring tools and targets are appropriate for the benefits claimed because they will provide a direct measurement of the water saved through imported water reduction and provide evidence of the use of backwash water.
Secondary benefit: Water quality improved	Reduce coagulant use and release of the following: Alum: -1.0 mg/L Aluminum: -12,800 lb Potassium: -18,600 lb Sulfur: -30,600 lb	<u>Tools and Methods</u>: Performance improvements will be measured through records of coagulant dosage concentration in the form of alum. The loading of aluminum, potassium and sulfur will be calculated based on the chemical formula for alum, the volume of water treated and the volume of alum used. <u>Locations</u>: Data will be collected at the SRWTP. <u>Data to be collected</u>: Records of alum dosage and plant treatment volume. Monitoring data will be used to compare pre- and post-alum dosage, which can then be used to calculate the loading of aluminum, potassium and sulfur. The monitoring tools and targets are appropriate for the benefits claimed because they will provide a direct and clear way of comparing pre- and post-project coagulant usage to determine whether water quality has been improved through aluminum, potassium and sulfur loading reduction.

Cost Effectiveness Analysis

Cost Effectiveness Analysis (Table 6 from PSP)		
Project Name: Sheep Ranch Water Treatment Plant Compliance Project		
Question 1	Types of benefits provided as shown in previous tables	• Water supply saved • Water quality improved
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as proposed project been identified?	No
	If no, why?	A new "package plant" incorporating the best available technology approved by SWRCB DDW is the most appropriate alternative to replace the current filtration system at SRWTP. It has also been recommended that the current filtration unit be

		upgraded/replaced at the SRWTP by technical staff from the SWRCB DDW. CCWD intends to review all available technologies and choose one that best fits the application at SRWTP.
	If yes, list the methods (including the proposed project) and estimated costs.	Not applicable
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.	The proposed project is expected to be the least cost alternative. Staff have provided manufacturer quotes for the preferred package plant. However, since there are a multitude of available options that may be suitable for this application, staff would likely review multiple alternatives at the time of going out for bid and purchase. Staff will evaluate available applications that are appropriate for the replacement of the current filtration system at the time of bidding and purchase of the new plant. Staff will need to evaluate not only based on total purchase price, but also consider lifetime replacement and operations and maintenance costs. The capital purchase of the skid mounted filtration plant that is chosen may not be the least cost alternative "up front", but will be the least cost alternative over the project lifecycle.
Comments: Not applicable.		

MAC Region Water Conservation Program

Project Description

Project Proponent: Amador Water Agency (AWA); Project Partners: Calaveras County Water District (CCWD), Amador Tuolumne Community Action Agency (ATCAA), Foothill Conservancy

The MAC Region Water Conservation Program is a partnership between AWA, CCWD, Foothill Conservancy and ATCAA to implement a regional water conservation program. The MAC Region Water Conservation Program will implement a number of conservation measures, with each of the above agencies responsible for a different components. Because the MAC region is geographically large and diverse and includes many water purveyors and interest groups, this program will be implemented through the cooperative efforts of four agencies throughout the region. The specific elements to be implemented by each partner are identified below.

- AWA will implement several conservation measures as part of its ongoing conservation program, including a plumbing/appliance program that will provide giveaways and rebates for fixtures ($20,000 worth of water conservation devices, including high efficiency showerheads, "instant off" sink shutoffs, toilet bowl kits, faucet aerators; 100 high efficiency washing machine rebates; 20 commercial/industrial/institutional plumbing retrofit rebates; and 100 high efficiency toilet rebates), and a turf replacement/smart irrigation system program (50,000 square feet of turf replacement and 100 smart irrigation controller rebates).
- CCWD will implement several conservation measures in cooperation with the Calaveras Public Utility District (CPUD), including water conservation supply giveaways (1,250 automatic shutoff hose timers, 2,500 low-flow showerheads, 2,175 five-minute shower timers, 2,500 faucet aerators, 12,500 toilet leak detection tablets, 1,000 soil moisture meters), indoor/outdoor conservation audits by a water conservation specialist, and water conservation rebates (50 smart irrigation controllers rebates, 80 high-efficiency toilet rebates, 30 high-efficiency clothes washer rebates, irrigation efficiency upgrades).
- ATCAA will implement a home-level water conservation program, focusing on disadvantaged households, that will perform water surveys to detect leaks and opportunities to reduce water use, install water saving devices. This program is a companion program to the program being implemented in the Tuolumne-Stanislaus IRWM Region, funded under Prop 84, Round 2. It's expected that approximately 900 homes will apply, and 240 homes will receive this service. Assistance is expected to include: 384 low flow showerheads, 720 low flow aerators, 84 low flow toilets, 82 high-efficiency washing machines, 82 high-efficiency dishwashers, winterizing spigots and water pipes at 36 homes, adjusting sprinkler systems at 36 homes, adjusting sprinkler timers at 20 homes, repairing sprinkler valve leaks at 41 homes, spreading mulch, installing drip irrigation, performing lawn improvements, and fixing household leaks.
- Foothill Conservancy will implement a rain barrel demonstration and distribution program. The demonstration program will include a rain barrel demonstration constructed in a DAC. As part of the distribution program, 64 530-gallon rain barrels will be given to residents in Amador and Calaveras counties along with technical guidance.

Water conservation has been identified as a need both within the region and statewide, particularly given that California is in its fourth year of serious drought. Water rights are being curtailed, and state mandated conservation is in effect. Water agencies in the MAC Region have begun enforcing water use restrictions in response to the drought, highlighting the need for implementation of conservation programs.

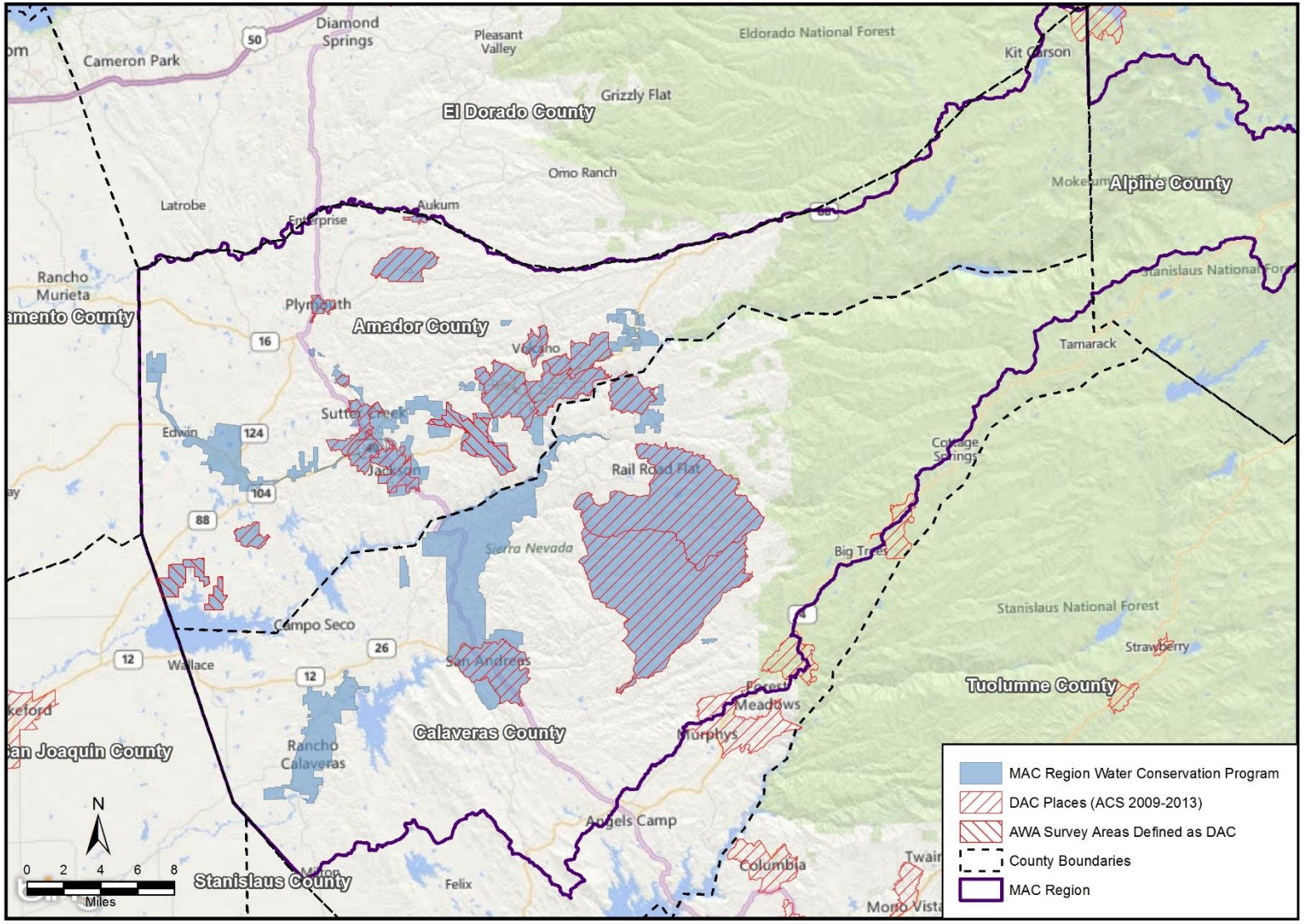
The MAC Region Water Conservation Program is estimated to provide a benefit of 275 acre-feet per year (AFY) of water supply conserved. In addition, installation of rain barrels by the Foothill Conservancy is expected to reduce stormwater pollutant concentrations by 0.01 mg/L or 2 lb/year of Total Suspended Solids (TSS), 0.0003 mg/L of 0.04 lb/year of Total Kjeldahl Nitrogen (TKN) and 0.0001 mg/L or 0.01 lb/year of Total Phosphorus (TP). The ultimate outcome of the project will be to ensure that ongoing water conservation occurs in order to ensure that water supplies available to the region are put to their maximum reasonable and beneficial use.

This project will help to address the current needs of the MAC Region by supporting following goal of the MAC IRWM Plan: promote water conservation, and manage stormwater flows and transport of sediment and contaminants.

Project Map

Figure 2-7 shows the MAC Region Conservation Program location (encompassing populated areas in Calaveras and Amador Counties within the MAC Region's boundaries), as well as affected water resources (local streams which will benefit from reduced stormwater runoff through the use of rain barrels and reduced irrigation runoff) and DACs in the area. Note that the ATCAA's home-level water conservation program will cover the IRWM region's area within Amador and Calaveras Counties, but will focus only on disadvantaged households; therefore, mapping the location of each household is not possible at this time. There are no facilities associated with the project. Monitoring locations will be determined based on the locations of customers who choose to take part in the Conservation Program, and therefore cannot be mapped at this time.

Figure 2-7: MAC Region Water Conservation Program Map



Project Physical Benefits

The primary physical benefit of the MAC Region Water Conservation Program will be water supply saved through implementation of water conservation measures, while the secondary physical benefit will be improvement of water quality through reduction of landscape runoff.

Table 2-6: Annual Project Physical Benefit – MAC Region Water Conservation Program – Water Supply Saved

Table 5 (from PSP) – Annual Project Physical Benefits **Project Name: MAC Region Water Conservation Program** **Type of Benefit Claimed: Water Supply Saved** **Units of the Benefit Claimed : acre-feet per year (AFY)** **Anticipated Useful Life of Project: 23 years**			
(a)	**(b)**	**(c)**	**(d)**
	Physical Benefits		
Year	**Without Project**	**With Project**	**Change Resulting from Project (c) – (b)**
2015	0	0 – Construction	0
2016	0	79	79
2017	0	157	157
2018	0	218	218
2019-2035	0	275	275
2036	0	218	218
2037	0	157	157
2038	0	79	79

Comments:

Benefit schedule: The conservation components to be implemented by each agency are assumed to have a lifespan of 20 years, and will be implemented on the following schedule:

AWA: Benefits will be realized immediately upon project implementation, and ramp-up evenly during the implementation period between 2016 and 2017 as shown in the project schedule in Attachment 5 (19 AF in 2016 and 37 AF in 2017). Project benefits ramp down after 20 years.

CCWD: Benefits will be realized immediately upon project implementation, and ramp up evenly during the implementation period between 2016 and 2019 as shown in the project schedule in Attachment 5 (58 AF in 2016, 115 AF in 2017, 173 AF in 2018, and 230 AF in 2019). Project benefits ramp down after 20 years.

ATCAA: Benefits will be realized immediately upon project implementation, and ramp up evenly during the four year implementation period between 2016 and 2019 as shown in the project schedule in Attachment 5 (4 AF in 2016, 7 AF in 2017, 11 AF in 2018, and 14 AF in 2019). Project benefits ramp down after 20 years.

Foothill Conservancy: Benefits to be realized immediately upon project implementation, and will fully begin in 2017 as shown in the project schedule in Attachment 5 (0.1 AF beginning in 2017). Project benefits end after 20 years.

Given ramp-up and ramp-down times, the overall project life will be 23 years.

Benefit estimates: The water supply benefits listed in this table are a roll-up of the benefits provided by each of the conservation components to be implemented by each project partner. Detailed calculations can be found below under "Technical Analysis of Physical Benefits Claimed".

Table 2-7: Annual Project Physical Benefit – MAC Region Water Conservation Program – Water Quality Improved

Table 5 (from PSP) – Annual Project Physical Benefits **Project Name: MAC Region Water Conservation Program** **Type of Benefit Claimed: Water Quality Improved through Stormwater Runoff Reduction** **Units of the Benefit Claimed: TSS: mg/L and lb** **TKN: mg/L and lb** **TP: mg/L and lb** **Anticipated Useful Life of Project: 20 years**			
(a)	**(b)**	**(c)**	**(d)**
	Physical Benefits		
Year	**Without Project**	**With Project**	**Change Resulting from Project (c) – (b)**
2015-2016	TSS: 0.01 mg/L TKN: 0.0003 mg/L TP: 0.0001 mg/L TSS: 2 lb TKN: 0.04 lb TP: 0.01 lb	TSS: 0.01 TKN: 0.0003 mg/L TP: 0.0001 mg/L TSS: 2 lb / year TKN: 0.04 lb/yr TP: 0.01 lb/yr	TSS: 0 mg/L TKN: 0 mg/L TP: 0 mg/L TSS: 0 lb / year TKN: 0 lb/yr TP: 0 lb/yr
2017-2035	TSS: 0.01 mg/L TKN: 0.0003 mg/L TP: 0.0001 mg/L TSS: 2 lb TKN: 0.04 lb TP: 0.01 lb	TSS: 0 mg/L TKN: 0 mg/L TP: 0 mg/L TSS: 0 lb / year TKN: 0 lb/yr TP: 0 lb/yr	TSS: -0.01 mg/L TKN: -0.0003 mg/L TP: -0.0001 mg/L TSS: -2 lb / year TKN: -0.04 lb/yr TP: -0.01 lb/yr

Comments: Water quality improved is based on the reduction in stormwater runoff from a household due to the installation of rain barrels. Foothill Conservancy will implement a residential rain barrel giveaway in which they'll give out 64 rain barrels. Assuming each rain barrel has a capacity of 530 gallons and will fill up once per year, this will yield 33,920 gallons of water or 0.1 AFY. Under the without project scenario, 0.1 AFY would continue to runoff properties.

These water quality constituent concentrations and loadings were then calculated using the following steps, which are detailed in the next section:

1. Determine average parcel area
2. Determine the rooftop area on an average parcel (because the areas in question are primarily rural residential, the rooftop area reflects the majority of impervious area on the parcel)
3. Determine the pervious area on an average parcel (calculated by subtracting rooftop area from total parcel area)
4. Calculate average annual runoff from a typical rooftop by estimating annual rainfall on the average rooftop area
5. Calculate average annual runoff from a pervious area on a typical parcel by estimating annual rainfall on the non-rooftop parcel area
6. Determine without-project weighted runoff concentrations by applying average constituent concentrations for impervious area to rooftop runoff and average constituent concentrations for pervious area to pervious area runoff
7. Determine without-project weighted runoff concentrations by applying average constituent concentrations for impervious area to rooftop runoff (minus runoff captured from project implementation) and average constituent concentrations for pervious area to pervious area runoff
8. Compare with- and without-project concentrations

Benefits will be realized immediately upon project implementation, and will fully begin in 2016 as shown in the project schedule in Attachment 5. Project benefits end after 20 years.

Technical Analysis of Physical Benefits Claimed

Primary Benefit: Water Supply Saved

Explanation of Need for the Project

The State of California is currently experiencing one of the most severe droughts on record, which has severely depleted statewide water supplies. The MAC Region has experienced this first hand given that the Region is completely dependent on local supplies, with 98% of supply being derived from local surface water, which is heavily impacted by drought. With no wet years occurring since in 2011, the Region is in the middle of yet another multiple year drought.

Water conservation has been identified as a need both within the region and statewide, particularly given current extreme drought conditions. Water rights are being curtailed, and state-mandated conservation is in effect. AWA declared a Stage 2 Water Warning, asking that all customers achieve up to a 30% reduction in their monthly water use over 2013 usage, among other water savings requirements. Other agencies have implemented similar water savings requirements in the MAC Region, highlighting the need for implementation of conservation programs.

Estimates of Without-Project Conditions

Without the project, these conservation initiatives would not occur, 276 AFY of water will not be conserved, and the full water demand of the MAC Region would continue to be placed on local water suppliers.

Description of Methods Used to Estimate Benefits

Estimation of the physical benefits was completed using the number of conservation measures and devices to be implemented applied to the average water savings from each conservation measure or device. In total, the MAC Region Water Conservation Program is expected to save 275 AFY of water supply per year. The following calculations were used to estimate water supply saved through implementation of each project partner's conservation component:

- AWA: AWA's will implement several conservation components that will provide 37 AFY (rounded) of supply benefits, including providing the following low flow plumbing fixtures and rebates:
    - Residential retrofit giveaways at 16.2 AFY (Reference: RMC Water and Environment, 2010. AWA Water Conservation Plan. Page 3-3, adjusted to assume that three times as many showerheads could be provided. Although a mixture of showerheads, aerators and toilet conservation kits will be provided, the number of showerheads serves as the representative water supply savings)
    - 100 high efficiency washing machines at 8,000 gallons each, or 2.5 AFY total (Assuming 400 loads/household/year with non-conserving washing machines using 40 gal/load and HECWs using 20 gal/load.) (Reference: RMC Water and Environment, 2010. AWA Water Conservation Plan. Page 3-9)
    - 20 commercial, industrial and institutional plumbing retrofits for 4 AFY total (Reference: RMC Water and Environment, 2010. AWA Water Conservation Plan. Page 3-15)
    - 100 rebates for high efficiency toilets at 3 AFY (Reference: RMC Water and Environment, 2010. AWA Water Conservation Plan. Page 3-27, scaled up to 100 rebates from 30 rebates)
    - Turf replacement rebates for 50,000 square feet of turf at 4.7 gallons per month per square foot or 8.7 AFY total (50,000 sq ft x 4.7 gallons per sq ft per month x 12 months = 2,820,000 gallons/yr = 8.7 AF) (Reference: Public Policy Institute of California, July 2006. "Lawns and Water Demand in California", California Economic Policy. Page 8, Figure 6)

- 100 rebates for smart irrigation controllers at 2.7 AFY (100 controllers x 8,800 gallons per controller = 880,000 gallons or 2.7 AFY)

- CCWD: CCWD's water conservation program will implement several conservation components that will provide 224 AFY (rounded) of supply benefits, including providing the following:
  - Low-flow showerhead giveaway at 67 AFY (2,500 showerheads x 8,760 gallons saved per showerhead per year=21,900,000 gallons/year)(Reference: AM Conservation Group, 2015. Earth Showerhead. Specifications Sheet. http://www.amconservationgroup.com/wp-content/uploads/2015/04/Earth-Showerheads-Spec-Sheet_R2.pdf)
  - Five-minute shower timer giveaway at 64 AFY (Assuming showers are reduced from 11 minutes to 5 minutes using a 1.5 gpm showerhead. 2,175 timers x 2.9 showers per household per day x 1.5 gpm x 6 min x 365 days/year = 20,720,138 gallons/year)
  - Faucet aerator giveaway at 80 AFY (2,500 aerators x 10,512 gallons saved per unit per year = 26,280,000 gallons/year) (Reference: AM Conservation Group, 2015. Pressure Compensating Bubble Spray Faucet Aerator. Specifications Sheet. http://www.amconservationgroup.com/wp-content/uploads/2015/01/N3210B-PC-N3104-PC-Pressure-Compensated-Aerators-Spec-Sheet.pdf)
  - Toilet leak detection tablet giveaway at 7.7 AFY (12,500 tablets x 200 gallons per day = 2,500,000 gallons/year)(Reference: US EPA, 2015. Water Trivia Facts. http://water.epa.gov/learn/kids/drinkingwater/water_trivia_facts.cfm)
  - Soil moisture meter giveaway (1,250 soil moisture meters, not quantifiable)
  - Automatic shutoff hose timer giveaways (500 shutoff hose timers, not quantifiable)
  - Smart irrigation controller rebates at 1.4 AFY (50 smart irrigation controllers x 8,800 gallons/year = 440,000 gallons/year)(Reference: EPA, 2015. WaterSense Labeled Irrigation Controllers. http://www.epa.gov/watersense/products/controltech.html)
  - High-efficiency toilet rebates at 3.2 AFY (80 high-efficiency toilets x 13,000 gallons per year = 1,040,000 gallons/year)(Reference: EPA, 2015. WaterSense Toilets. http://www.epa.gov/watersense/products/toilets.html)
  - High-efficiency clothes waster rebates at 0.9 AFY (Assuming old washers use 45 gallons/load and new washers use 13 gallons per load. 30 high efficiency clothes washers x (45 gallons/load – 13 gallons/load) x 300 loads per year = 288,000 gallons/year)
  - Irrigation efficiency upgrade rebates cannot be quantified in terms of water savings
  - Indoor/outdoot conservation audits cannot be quantified in terms of water savings
- ATCAA: ATCAA's home-level water conservation program will provide benefits of approximately 14 AFY (rounded) of supply saved by evaluating 240 homes, and implementing water conservation measures as needed to maximize each home's water savings. The sources of these numbers are based on an online search of average water savings per device, and an assumed average of devices per home and number of homes that will require the device. This is calculated as follows:
  - Low flow showerhead installation at 1.3 AFY (192 homes x 2 devices per home x 1 gallon reduction per unit x 3 per day x 365 days per year = 420,480 gallons/year)
  - Low flow aerators installation at 1.5 AFY (240 homes x 3 devices per home x 0.6 gallon reduction per unit x 3 per day x 365 days per year = 473,040 gallons/year)
  - Low flow toilet installation at 0.8 AFY (84 homes x 1 device per home x 2 gallon reduction per unit x 4 per day x 365 days per year = 245,280 gallons/year)
  - Replace washing machines at 0.8 AFY (82 homes x 1 device per home x 20 gallon reduction per unit x 1 use every 2 days x 365 days per year = 268,056 gallons/year)
  - Replace dishwasher at 0.6 AFY (82 homes x 1 device per home x 6 gallon reduction per unit x 1 use per day x 365 days per year = 178,704 gallons/year)
  - Winterize spigots and water pipes 0.2 AFY (36 homes x 50 gallon reduction x 0.1 per day x 365 days per unit = 65,700 gallons/year)
  - Adjust sprinkler system 4 AFY (36 homes x 100 gallon reduction x 365 days = 1,314,000 gallons/year)

- Adjust sprinkler timers 2.2 AFY (197 homes x 100 gallon reduction x 365 days = 718,320,000 gallons/year)
- Repair sprinkler valve leaks 0.02 afy (41 homes x 0.4 gallons reduction per unit x 365 days = 5,957 gallons)
- Household leak detection and repair 3 AFY (Estimated average of 1,000,000 for 240 home)
- Spreading mulch, installing drip irrigation, performing lawn aeration and fixing household leaks could not be quantified.

- Foothill Conservancy: Foothill Conservancy will implement a residential rain barrel giveaway in which they'll give out 64 rain barrels. Assuming each rain barrel has a capacity of 530 gallons and will fill up once per year, this will yield 33,920 gallons of water or 0.1 AFY.

Identification of New Facilities, Policies, and Actions Required

No new facilities will be required to obtain the physical benefits. However, in order to realize the project benefits, the water conservation plumbing fixtures described above must be installed and the programs must be implemented as described.

No new policies or actions are required.

Description of Potential Adverse Physical Effects

There are no potential adverse physical effects of implementing the MAC Region Conservation Program. Implementation will generally involve on-site replacement of indoor plumbing fixtures and rain barrels and replacement of turf, all of which are designed to reduce water demand and runoff.

Description of Whether the Project Effectively Addresses Long-Term Drought Preparedness

Overall, the MAC Conservation Program will implement a number of conservation measures that will save 275 AFY of water supply. Program will therefore help to effectively address long-term drought preparedness by promoting water conservation.

Secondary Benefit: Water Quality Improved through Stormwater Runoff Reduction

Explanation of Need for the Project

Several waterways in the MAC Region are 303(d) listed for a variety of constituents, including: pesticides (Bear Creek, Dry Creek, Mokelumne River), pathogens (Dry Creek, Bear Creek), nutrients (San Antonio Creek, Bear Creek, Mokelumne River), sediment (San Antonio Creek), and metals (Bear Creek, Mokelumne River). Although TMDLs haven't been established for these waters yet, stormwater runoff is considered a contributor of pesticides, pathogens, nutrients, sediment, and metals to receiving water bodies.

Estimates of Without-Project Conditions

Without the project, conservation efforts will not occur, 275 AFY of water will not be conserved, and the full water demand of the MAC Region will continue to be placed on local water suppliers and on the local groundwater supply.

Description of Methods Used to Estimate Benefits

Using rain barrels will allow runoff to be captured and applied directly for landscaping purposes as opposed to running off and reaching the Mokelumne River and its tributaries. It is assumed that all constituents present in the runoff that is captured in the rain barrel are instead used on-site and taken up by onsite vegetation and / or attenuated in the soils; as such, the reduction in loading to adjacent waterways is equivalent to the quantity captured and used onsite. The equivalent reduction in concentration of key constituents present in residential runoff following project implementation was calculated as follows:

1. Determine average parcel area

2. Determine the rooftop area on an average parcel (because the areas in question are primarily rural residential, the rooftop area reflects the majority of impervious area on the parcel)
3. Determine the pervious area on an average parcel (calculated by subtracting rooftop area from total parcel area)
4. Calculate average annual runoff from a typical rooftop by estimating annual rainfall on the average rooftop area
5. Calculate average annual runoff from a pervious area on a typical parcel by estimating annual rainfall on the non-rooftop parcel area
6. Determine without-project weighted runoff concentrations by applying average constituent concentrations for impervious area to rooftop runoff and average constituent concentrations for pervious area to pervious area runoff
7. Determine without-project weighted runoff concentrations by applying average constituent concentrations for impervious area to rooftop runoff (minus runoff captured from project implementation) and average constituent concentrations for pervious area to pervious area runoff
8. Compare with- and without-project concentrations

Each step is described in further detail below.

1. **Determine Average Parcel Area.** An average parcel area was calculated as 8.1 acres by performing GIS analysis using parcel shapefiles provided by Amador County and Calaveras County.
2. **Determine rooftop area on an average parcel.** An average rooftop area was obtained by measuring the areas of rooftops in various cities that will be targeted as part of the DAC Residential Rain Catchment Demonstration and Distribution Project component using Google Earth satellite imagery, and is shown in Table 2-8. The average rooftop size is calculated as 2,130 square feet, or 0.05 acres.

Table 2-8: Rooftop Size Analysis

Place	Roof Size
Pine Grove	2,250 sq ft
	2,000 sq ft
	2,550 sq ft
Volcano	1,500 sq ft
	1,300 sq ft
	3,200 sq ft
Fiddletown	1,900 sq ft
	1,800 sq ft
	1,200 sq ft
San Andreas	1,600 sq ft
	2,600 sq ft
	2,400 sq ft
Buena Vista	1,800 sq ft
	2,900 sq ft
	3,000 sq ft
Average	2,130 sq ft (rounded)

3. **Determine pervious area on an average parcel.** Pervious area on an average parcel is approximately equal to total parcel area minus rooftop area. For this project, total average parcel area (step 1) equals 8.1 acres and average rooftop area (step 2) equals 0.05 acres; as such, total average pervious parcel area equals 8.05 acres.
4. **Calculate average annual rooftop runoff.** Average precipitation for Amador County and Calaveras County (the target project areas) is estimated using a representative city, Jackson California, which has an average annual precipitation of 31.13 inches or 2.6 feet (Intellicast, 2015. Historic Average Jackson California. http://www.intellicast.com/local/history.aspx? location=USCA0520). Based on this average precipitation and the available rooftop area, the total average volume of stormwater falling on rooftops is estimated as 4.1 AFY per parcel.
5. **Calculate average runoff from pervious areas.** In general, only precipitation above and beyond evapotranspiration (ET) rates would be expected to run off of pervious surfaces. The following table presents average monthly precipitation and average monthly evapotranspiration rates for Jackson, CA.

Table 2-9: Estimated Annual Runoff from Pervious Surfaces

Month	Average Rainfall (in)[1]	Average ET (in)[2]	Assumed Runoff (in)[3]
Jan	5.85	1.24	4.61
Feb	5.33	1.96	3.37
Mar	5.41	3.10	2.31
Apr	2.33	4.80	0
May	0.94	6.51	0
Jun	0.35	7.8	0
Jul	0.16	8.99	0
Aug	0.13	7.75	0
Sept	0.63	5.70	0
Oct	1.72	3.72	0
Nov	3.89	1.80	2.09
Dec	4.2	0.93	3.27
Total			15.65

1. Source: Intellicast, 2015. Historic Average Jackson California. http://www.intellicast.com/local/history.aspx?location=USCA0520
2. Source: CIMIS, 2015. Reference Evapotranspiration Zones. Data for Zone 13. http://www.cimis.water.ca.gov/App_Themes/images/etozonemap.jpg
3. Runoff from pervious areas estimated as precipitation greater than ET.

As shown in this table, it is assumed that an average of 15.7 inches or 1.3 feet of rain per year run off of pervious areas in the project vicinity. Applying this to the average parcel pervious area of 8.05 acres, this equates to an average annual runoff from pervious areas of 10.5 AFY per parcel.

6. **Determine without-project runoff concentrations.** EPA conducted a study of urban storm water discharges in 1997-98 (http://water.epa.gov/scitech/wastetech/guide/stormwater/). The study was based largely on existing literature and data on best management practices (BMPs) used to control urban storm water runoff. Determine with-project runoff concentrations. Table 4-1 of this study presents median typical constituent concentrations in runoff from a variety of urban land uses, including the following.

Table 2-10: Median Concentrations of Key Pollutants in Runoff

	Median Runoff Concentrations (mg/L)	
Constituent	Residential	Open Space / Non-Urban
Total Suspended Solids (TSS)	101	70
Total Kjeldahl Nitrogen (TKN)	1.9	0.965
Total Phosphorus	0.383	0.121

For the purposes of estimating runoff concentrations, runoff concentrations for rooftop / impervious areas were assumed to be equal to cited median values for "residential" land use, while runoff concentrations from pervious areas were assumed to be equal to "open space / non urban" land use. The following table presents the weighted concentrations of key constituents for the without-project condition.

Table 2-11: Without-Project Concentrations of Key Pollutants in Residential Runoff in Project Area

Constituent	Annual Loading from Rooftop (mg/yr)	Annual Loading from pervious areas (mg/yr)	Total Annual Loading (mg/yr)	Weighted Concentration (mg/L)
Methodology:	(constituent conc. * 4.1 AF * 1,233,482 L/AF)	(constituent conc. * 10.5 AF *1,233,482 L/AF)	(Rooftop + Pervious Area loading)	(Total loading/yr / [14.6 AFY * 1,233,482 L/AF])
TSS	510,784,896	906,609,270	1,417,394,166	78.71
TKN	9,608,825	12,498,256	22,107,081	1.228
TP	1,936,937	1,567,139	3,504,076	0.195

7. **Determine without-project runoff concentrations.** To calculate with-project concentrations, the same methodology is followed except it is assumed that rooftop runoff is reduced by the volume of one rain barrel, or 530 gallons (0.002 AF), as shown below.

Table 2-12: With-Project Concentrations of Key Pollutants in Residential Runoff in Project Area

Constituent	Annual Loading from Rooftop (mg/yr)	Annual Loading from pervious areas (mg/yr)	Total Annual Loading (mg/yr)	Weighted Concentration (mg/L)
Methodology:	(constituent conc. * 4.098 AF * 1,233,482 L/AF)	(constituent conc. * 10.5 AF *1,233,482 L/AF)	(Rooftop + Pervious Area loading)	(Total loading/yr / [14.6 AFY * 1,233,482 L/AF])
TSS	510,784,896	906,609,270	1,417,394,166	78.69
TKN	9,608,825	12,498,256	22,107,081	1.227
TP	1,936,937	1,567,139	3,504,076	0.195

8. **Compare with- and without-project runoff concentrations.** The difference in concentration of total parcel runoff associated with one rain barrel filling up one time over the course of the year is therefore equal to:
   - TSS: 0.01 mg/L
   - TKN: 0.0003 mg/L (0.3 µg/L)
   - TP: 0.0001 mg/L (0.1 mg/L)

More significant / ecologically important is the reduction in loading achieved through the project. Assuming 64-530 gallon rain barrels are implemented, at the concentrations cited above, this equates to the following reductions in loading to the watershed:

- TSS: 2 lb / year (64 barrels * 530 gallons / barrel * 101 mg / L * 0.264 liters / gallon * 2.2e-6 lb / mg)
- TKN: 0.04 lb/yr (64 barrels * 530 gallons / barrel * 1.9 mg / L * 0.264 liters / gallon * 2.2e-6 lb / mg)
- TP: 0.01 lb/yr (64 barrels * 530 gallons / barrel * 0.383 mg / L * 0.264 liters / gallon * 2.2e-6 lb / mg)

Identification of New Facilities, Policies, and Actions Required

No new facilities will be required to obtain the physical benefits. However, in order to realize the above described benefits, 64 rain barrel installations must be competed. No new policies or actions are required.

Description of Potential Adverse Physical Effects

There are no potential adverse physical effects of implementing the MAC Region Conservation Program. Implementation will generally involve on-site replacement of indoor plumbing fixtures and rain barrels, and replacement of turf, all of which are designed to reduce water demand and runoff.

Description of Whether the Project Effectively Addresses Long-Term Drought Preparedness

Overall, the MAC Conservation Program will implement a number of conservation measures that will save 275 AFY of water supply. Program will therefore help to effectively address long-term drought preparedness by promoting water conservation.

Direct Water Related Benefit to a DAC

Water Related Need of the DAC

As described above, the State is experiencing a multiple-year drought. The MAC Region is almost entirely dependent on local surface water to meet its demand, which is highly susceptible to drought. The members of DACs in the MAC Region have no resources to conserve water, even though they seek to lower their water bills and meet mandatory demand reduction targets. When members of DACs are cited or fined for failing to conserve, payment is a hardship and can result in their water being shut off. High on the list of water-related needs of the MAC Region's DACs is affordable water. This project will address this need through the installation of low- or no-cost conservation measures and conservation education.

How the Proposed Project will Address the Need of the DAC

The MAC Region Conservation Program will directly address the needs of the DACs by installing low- or no-cost conservation measures and providing conservation educational materials to raise awareness. In particular, ATCAA's home-level water conservation program will target disadvantaged households using ATCAA's State-approved prioritization process. Those households applying for the program with the lowest income and greatest need will be assisted immediately.

Project Performance Monitoring Plan

Project Performance Monitoring Plan **Project: MAC Region Water Conservation Program**		
Proposed Physical Benefits	**Targets**	**Measurement Tools and Methods**
Primary benefit: Water Supply Saved	Save water supply by reducing potable water demand by 275 AFY	<u>Tools and Methods</u>: The MAC Region Water Conservation Program will provide an accounting of the potable water saved based on the number of water conserving devices that were given away, devices provided through rebates or installed by agencies, and conservation measures implemented. Savings will be calculated using the assumptions used above in estimating benefits under Technical Analysis of Physical Benefits Claimed - Description of Methods Used to Estimate Benefits. <u>Locations:</u>

		Data will be collected within each program partner's service area. <u>Data to be Collected:</u> Water savings data based on the number of water conserving devices that were given away, devices provided through rebates or installed by agencies, and conservation measures implemented Monitoring data will be used to measure performance by estimating the potable water saved based on the number of water conserving devices that were given away, devices provided through rebates or installed by agencies, and conservation measures implemented, and applying an assumption of the water savings per device or conservation measure. The monitoring tools and targets are appropriate for the benefits claimed because they will provide a reasonable estimate of the water savings through installation of water conserving devices that were given away, devices provided through rebates or installed by agencies, and conservation measures implemented based on standard water savings reported by water agencies and nonprofit organizations.
Secondary benefit: Water Quality Improved through Stormwater Runoff Reduction	Improve water quality by reducing stormwater pollutant concentrations by the following: TSS: -0.01 mg/L TKN: -0.0003 mg/L TP: -0.0001 mg/L TSS: -2 lb / year TKN: -0.04 lb/yr TP: -0.01 lb/yr	<u>Tools and Methods</u>: The MAC Region Water Conservation Program will provide an accounting of the reduced stormwater runoff by measuring the actual number of rain barrels installed and confirmed by inspections, and multiplied by the assumption that each rain barrel will fill once per year, and prevent that volume of water from running off to local waterways. The stormwater pollutant concentrations calculations described above will then be applied to the estimated volume of stormwater captured. <u>Locations:</u> Stormwater data will be collected at each location where rain barrels have been installed. <u>Data to be Collected:</u> The number of rain barrels installed multiplied by their capacity and estimated pollutant concentration will be collected. Monitoring data will be used to measure performance by taking the number of rain barrels installed, and assuming that each fills one time per year and reducing an equal amount of stormwater runoff from urban areas. The estimated pollutant concentrations captured by each rain

		barrel will then be calculated to obtain estimated pollutant concentration and loading reductions. The monitoring tools and targets are appropriate for the benefits claimed because they will provide a reasonable, conservative estimate of stormwater pollutant concentration reduced through collection of stormwater in rain barrels, and provide an estimate of progress in meeting the target.

Cost Effectiveness Analysis

Cost Effectiveness Analysis (Table 6 from PSP)		
Project Name: MAC Region Water Conservation Program		
Question 1	Types of benefits provided as shown in previous tables	Water Supply Saved Water Quality Improved through Stormwater Runoff Reduction
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as proposed project been identified?	No
	If no, why?	The MAC Region Water Conservation Program is comprised of several measures that will reduce potable water demand in the MAC Region. These measures are generally accepted across the state as best management practices (BMPs) for reducing water demand, including by the California Urban Water Conservation Council (CUWCC) which has outlined BMPs recommended for implementation by water agencies as the best alternatives for conserving water and reducing demand. The practices to be implemented as part of this Project include these BMPs. No alternative methods were considered to achieve the same types of benefits because no other projects can completely eliminate the potable water requirement of residential water users like the conservation practices to be implemented as part of this Project can.
	If yes, list the methods (including the proposed project) and estimated costs.	Not applicable
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.	Not applicable
Comments: Not applicable.		