Attachment 7: Technical Justification of Projects

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Proposal Description and Summary of Benefits

This proposal consists of the following three integrated projects, selected for their ability to collectively achieve the following vision and theme of this Proposal:

Address critical water supply and quality needs of disadvantaged communities in the Mokelumne-Amador-Calaveras IRWM Region while maximizing water supply reliability and public benefit.

- Lake Camanche Lateral Replacement Project – Phase 2
- Camanche Area Regional Water Supply Project (CARWSP) – Phase 1
- Ponderosa Way Restoration Project – Phase 1

Together, these projects account for the full lifecycle of water resources management to address the critical water supply and water quality needs of the MAC IRWM Region. Table 7-1 summarizes the physical benefits that would be achieved through implementation of this Proposal.

Table 7-1: Summary of Proposed Physical Benefits

Project	Benefit Summary
Water Supply	
Lake Camanche Laterals Replacement Project – Phase 2	• 0.8 billion gallons of supply conserved
Camanche Area Regional Water Supply Project – Phase 1	• 9.1 billion gallons of high quality supply delivered • 1 billion gallons of supply conserved
Water Quality	
Lake Camanche Laterals Replacement Project – Phase 2	• 6,258 pounds chlorine avoided
Camanche Area Regional Water Supply Project – Phase 1	• 6,752 milligram per liter (mg/L) reduction in iron concentration • 279 mg/L reduction in manganese concentration
Ponderosa Way Restoration Project – Phase 1	• 9,400-ton reduction in sediment loading to the Mokelumne River
Ecosystem Improvement	
Lake Camanche Laterals Replacement Project – Phase 2	• 6,258 pounds chlorine discharge to environment avoided
Camanche Area Regional Water Supply Project – Phase 1	• 257,133 tons iron discharge to environment avoided • 10,625 tons manganese discharge to environment avoided
Ponderosa Way Restoration Project – Phase 1	• 9,400 ton reduction in sediment loading to aquatic environments
Recreation Benefits	
Ponderosa Way Restoration Project – Phase 1	• Enhanced access to: o 17 miles of trails o 8.4 river miles of whitewater boating o 2,000 acres of Mokelumne Canyon • 260,000 additional recreation visitor days per year
Energy-Related Benefits	
Lake Camanche Laterals Replacement Project – Phase 2	• Reduction in energy demand of approximately 131,421 kWh
Other Physical Benefits	
Lake Camanche Laterals Replacement Project – Phase 2	• 1,471 avoided emergency repair events

Relationship Between Proposed Projects

Each proposed Project is intrinsically linked to the other projects included in this Proposal. The vision and theme of this Proposal is:

Address critical water supply and quality needs of disadvantaged communities in the Mokelumne-Amador-Calaveras IRWM Region while maximizing water supply reliability and public benefit.

The projects included in this proposal work together to achieve this Proposal vision. The critical water supply and water quality needs of DACs in the region are threefold:

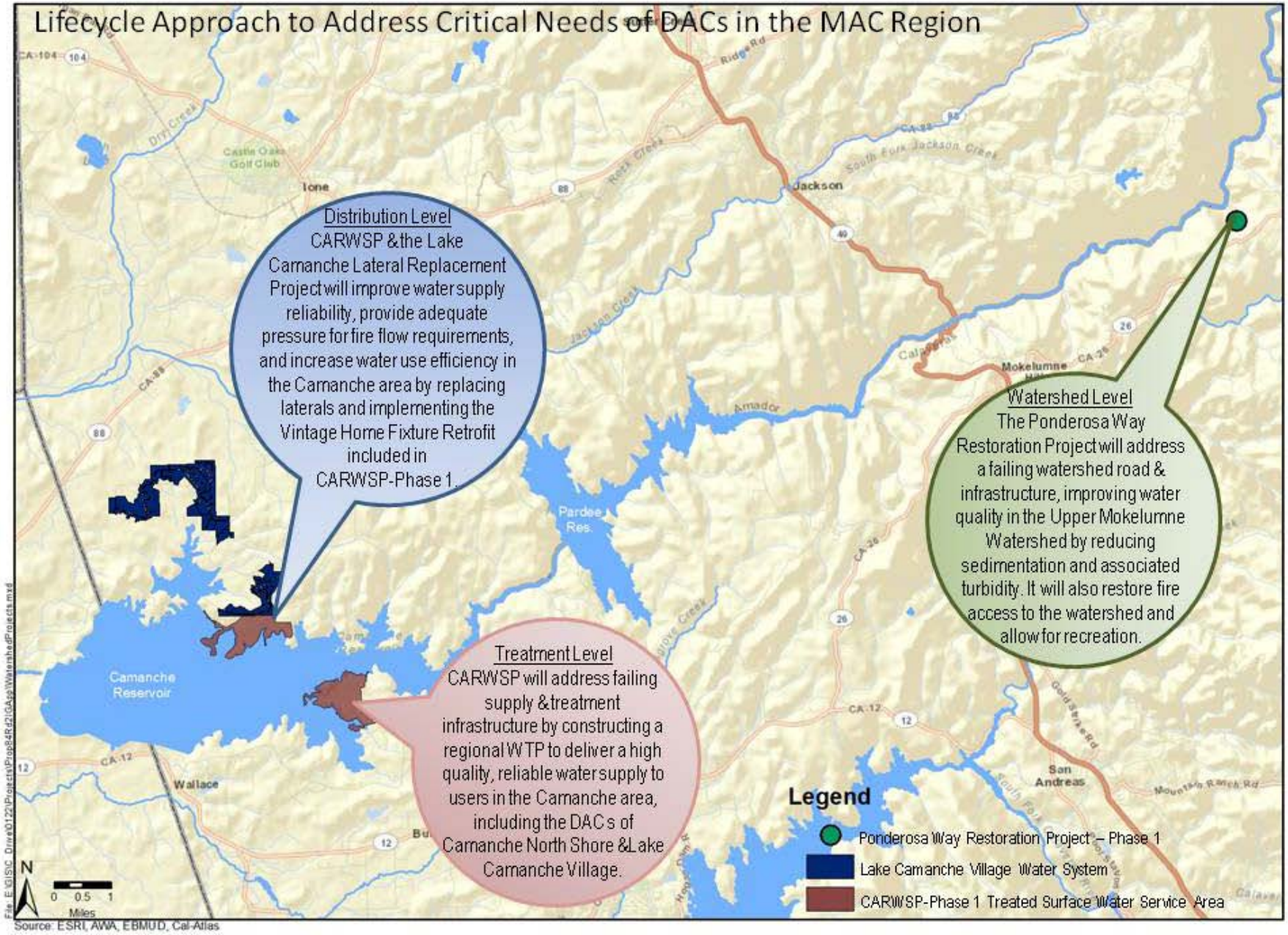
1. Maximize existing resources by addressing aging infrastructure and water system integrity
2. Secure reliable and high quality supplies
3. Protect the local environment and water quality while preserving recreation and public access

It should be noted that the specific benefits identified for each project can be realized independently. However, failure to implement any of the proposed projects would prevent the holistic, watershed-based improvements intended to be generated by this proposal.

The MAC IRWM region recognizes the benefit of an integrated, holistic approach to addressing water management challenges. As such, this proposal implements a lifecycle approach to addressing critical needs of DACs, correcting issues at all levels of water resource management, from the watershed to the treatment plant to the distribution system, and ultimately at the tap. Because this proposal is focused on meeting the needs of disadvantaged communities, the projects included herein reflect the most cost-effective alternatives to provide meaningful benefits to local disadvantaged communities, as discussed below.

Objective 1: Maximize existing resources by addressing aging infrastructure and water system integrity

All three projects work together to address this need from the watershed to the end user, as follows.


Lifecycle Approach to Address Critical Needs of DACs in the MAC Region
Distribution Level
CARWSP &the Lake Camanche Lateral Replacement Project will improve water supply reliability, provide adequate pressure for fire flow requirements, and increase water use efficiency in the Camanche area by replacing laterals and implementing the Vintage Home Fixture Retrofit included in CARWSP-Phase 1.
Watershed Level
The Ponderosa Way Restoration Project will address a failing watershed road & infrastructure, improving water quality in the Upper Mokelumne Watershed by reducing sedimentation and associated turbidity. It will also restore fire access to the watershed and allow for recreation.
Treatment Level
CARWSP will address failing supply &treatment infrastructure by constructing a regional WTP to deliver a high quality, reliable water supply to users in the Camanche area, including the DACs of Camanche North Shore &Lake Camanche Village.
Legend
Ponderosa Way Restoration Project – Phase 1
Lake Camanche Village Water System
CARWSP-Phase 1 Treated Surface Water Service Area
Camanche Reservoir
Pardee Res.
Ione
Jackson
Wallace
San Andreas
Castle Oaks Golf Club
Amador
Mokelumne
N
0 0.5 1
Miles
Source: ESRI, AWA, EBMUD, Cal-Atlas

- **At the watershed level**, the Ponderosa Way Restoration Project – Phase 1 will address a failing watershed road that is significantly impacting water resources. Currently, Ponderosa Way is severely eroding, and is a major source of sediment loading to the Mokelumne River. The Proposal will address "infrastructure" needs at the watershed level by restoring Ponderosa Way to control erosion and protect
- **At the treatment plant level**, the CARWSP – Phase 1 project will address failing supply and treatment infrastructure, replacing failing groundwater wells currently in use in the Camanche Area North Shore (CANS) and Camanche Area South Shore (CASS) areas and upgrading the failing South Shore treatment plant.
- **At the distribution system level**, the CARWSP – Phase 1 Project will provide emergency storage to meet critical supply shortages and assist in providing adequate pressure for fire flow requirements. The Lake Camanche Lateral Replacement Project - Phase 2 will extend a critical local program to replace aging distribution system infrastructure a DAC. The local community cannot afford to replace these leaky laterals which waste water and threaten system integrity, reliability, and quality. This program represents a means to enhance water system efficiency, maximizing existing water resources, maintaining reliability, and improving quality for a disadvantaged community.

Objective 2: Secure reliable and high quality supplies

The projects were selected for their ability to address reliability and quality issues from the source to the tap.

- **At the watershed level**, the Ponderosa Way Restoration Project – Phase 1 addresses a critical water quality issue: sedimentation and associated turbidity. The Upper Mokelumne River Watershed Assessment and Planning Project, completed in 2007, identified turbidity as exceeding the associated water quality benchmark. Management measure F.1 recommends implementing road maintenance to improve water quality in the watershed (Appendix 7.1, page 8-12).
- **At the treatment plant level,** the CARWSP – Phase 1 project will treat and distribute high quality surface water supplies from the Mokelumne Aqueduct in lieu of groundwater supplies which exhibit water quality problems including high iron and manganese concentrations, bacterial contamination, and hydrogen sulfide contamination.
- **At the distribution system level,** the CARWSP – Phase 1 project will assist in providing high quality and reliable supplies to the Camanche Area North Shore, Camanche Area South Shore, and Lake Camanche Village areas by distributing treated supplies to the Camanache North and South Shore areas and providing an intertie to the Lake Camanche Village system for supplemental supply and emergency storage which will also assist in correcting distribution system pressure inadequacies.

Objective 3: Protect the local environment and water quality while preserving recreation and public access

- **At the watershed level**, the Ponderosa Way Restoration Project – Phase 1 will correct severe erosion issues along the Mokelumne River, significantly reducing sediment loading to the river and improving water quality for environmental resources. In addition, the project will enable more than 17 miles of trails to be implemented and will provide recreational opportunities and no-cost water access that is currently unreachable. The Vintage Home Fixture Retrofit, a component of the CARWSP - Phase 1 project, will reduce water demands, leaving additional supplies in the River.
- **At the treatment level**, the CARWSP – Phase 1 project is expected to reduce water treatment-related waste discharges by centralizing treatment, improving treatment efficiency, and utilizing a higher quality source water. Currently, wellhead treatment is implemented to address specific water quality issues, resulting in a number of waste streams that will be significantly reduced and more effectively treated through implementation of a centralized water treatment plant, protecting the local environment.
- **At the distribution level,** the Lake Camanche Lateral Replacement Project - Phase 2 minimizes potential impacts to environmental resources by seeking to maintain existing infrastructure, preventing the need to implement new water lines which may disturb sensitive areas. Similarly, the CARWSP – Phase 1 project will minimize potential disruption to environmental resources at the distribution level by implementing a new tank for AWA which will allow AWA to continue to meet demands with existing infrastructure.

The following table demonstrates the integration of the proposed Projects in achieving the vision behind this proposal.

Table 7-2: Projects Address Critical DAC Needs from the Watershed to the Tap

Project	Maximize Resources / Address Aging Infrastructure			Secure Reliable and High Quality Supplies			Protect the Environment / Preserve Public Access		
	Watershed	Treatment	Distribution	Watershed	Treatment	Distribution	Watershed	Treatment	Distribution
Lake Camanche Lateral Replacement - Phase 2		♦	♦		♦	♦			♦
CARWSP – Phase 1		♦			♦		♦	♦	
Ponderosa Way Restoration– Phase 1	♦			♦			♦		

Technical Justification for Physical Benefits Claimed

This section summarizes the extensive technical work that has been completed to quantify and substantiate the physical benefits summarized in Table 7-1.

Project 1: Lake Camanche Lateral Replacement Project - Phase 2

The Amador Water Agency 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 classified as a DAC. The Lake Camanche Village Service Area is known as Water Improvement District #7 (WID #7) by AWA and consists of three groundwater wells, storage tanks, hydro-pneumatic tanks, and booster pumps. The AWA WID #7 service area has 733 connections and provides an average of 0.27 million gallons per day (MGD) of potable water. [Note: WID#7 is sometimes also referred to as CSA#3, which is a Community Service Area established by Amador County when it approved the Lake Camanche Village subdivision. AWA established WID#7 when it took control of the Lake Camanche water system from the county. The area contained within WID#7 and CSA#3 is identical.]

The Lake Camanche Lateral Replacement Project is structured in three phases, each consisting of replacing approximately 200 laterals. AWA is currently implementing Phase 1 of the Lake Camanche Lateral Replacement Project, which was made possible through the award of Proposition 84 implementation funds from DWR. Phase 1 includes lining the redwood tanks with geomembrane liners to reduce water losses and increase storage capacity and replacing 200 of the existing Poly-Tube service laterals with 3/4-inch copper pipe.

For Phase 2, included in this Proposal, AWA proposes the replacement of 200 additional service laterals in order to reduce the water losses in the distribution system and minimize infrastructure damage from cracked and leaky pipes.

Existing Data and Studies

Studies in support of the Lake Camanche Lateral Replacement Project include:

- 2008 Urban Drought Assistance Grant Application – In July of 2008, AWA submitted a grant application to the California Department of Water Resources (DWR) 2008 Urban Drought Assistance Grant Program for the Lake Camanche Lateral Replacement Project. Information compiled for that application was used in support of the information presented in this Proposal. (Appendix 7.2)
- Water Conservation Plan (RMC Water & Environment, 2010) – This document summarizes current water conservation programs being implemented by Amador Water Agency (AWA), and outlines a recommended program for demand management measure (DMM) implementation to levels of compliance at stated in the California Urban Water Conservation Council's Memorandum of Understanding.

Section 3.2 of the Plan describes DMM 3 (system water audits, leak detection and repair), and describes a program recommended for implementation of the DMM. The Lake Camanche Tank Lateral Replacement Project will reduce significant water losses in the system and is consistent with the recommended DMM3 program as described in the Conservation Plan. (Appendix 7.3)

- Baird, John. The Epidemic of Corrosion Part 1: Examining Pipe Life (American Water Works Association, December 2011) – This article summarizes pipe failure mechanisms related to corrosion and provides an estimate of the "typical" useful life of pipe. (Appendix 7.4)

Summary of Benefits

The projected project benefits include:

- **Water supply benefits:** The project will replace one-third of the laterals, generating 824 million gallons (MG) in supply savings over the project life.
- **Water quality improvements:** Repair of the leaking laterals will prevent treated, chlorinated water from being discharged to the Consumnes Subbasin via groundwater recharge, drainages, creeks and water bodies treated. Over the 70-year project life, 6,258 pounds of chlorine would be prevented from being discharged to receiving waters.
- **Ecosystem improvement benefits:** Repair of the leaking laterals will prevent 6,258 pounds of chlorine from being discharged to the Consumnes Subbasin via groundwater recharge, drainages, creeks and water bodies treated.
- **Energy-related benefits:** This project will reduce groundwater pumping requirements by 1.5percent, corresponding to an annual reduction in energy demand of approximately 1,877 kWh / year (approximately 131,421 kWh over the 70-year project life).
- **Other benefits:** This Project will replace 200 of the remaining 400 laterals in the Lake Camanche Village Area that require replacement following implementation of Phase 1. By replacing laterals before they fail, the project will prevent an estimated 1,471 emergency repairs over the 70-year project life.

Table 7-3 summarizes the physical benefits that would be achieved through implementation of this project.

Table 7-3: Summary of Proposed Physical Benefits – Lake Camanche Laterals Replacement Project – Phase 2

Project Benefit Summary	
Water Supply	• 0.8 billion gallons of supply conserved
Water Quality	• 6,258 pounds chlorine avoided
Ecosystem Improvement	• 6,258 pounds chlorine discharge to environment avoided
Energy-related Benefits	• Reduction in energy demand of approximately 131,421 kWh
Other Benefits	• Avoidance of 1,471 emergency lateral repairs

Background / Recent and Historical Conditions

Improving system reliability is key for areas such as the Lake Camanche Village Water System. Reliability is important not only from the standpoint of local water use, but for fire flow reliability. Lake Camanche Village is in a high to very high wildfire hazard area, and substandard storage will inhibit the ability to fight fires in the area, potentially leading to greater fire losses.

Service laterals in the Lake Camanche Village distribution system are contributing significantly to water losses in the system. The current polyethylene ("Poly-Tube") laterals were installed in the late 1970s and have become very brittle and subject to severe longitudinal cracking, catastrophically failing at an increasing rate. The failure of the service laterals does not just contribute to significant water losses; the displaced water has also caused considerable infrastructure damage.

Project implementation will conserve water supplies, improve supply reliability, and protect local habitat. Reducing system losses will also directly and immediately benefit the DAC by reducing the cost of service (achieved by cost savings associated with decreased pumping and treatment) and by increasing the sustainability of the local the groundwater supply.

Without Project Conditions

The Lake Camanche Lateral Replacement Project – Phase 2 will replace 200 leaking laterals. Losses from leaking system laterals currently equal 6percent to 9percent of system production, or about 5.8 to 8.7 MG annually. This project would replace 200 of these laterals and reduce system losses by about 1.4 MG per year.

Under the No Project Condition, existing leaking laterals would remain in service. System loss from the leaking laterals that would be replaced by this project (currently about 1.4 MG per year) would be expected to increase at a rate of 5percent per year.

Description of Benefits and Methods to Estimate Benefits

The following sections summarize project benefits and methods used to estimate benefits in the following areas:

- Water Supply
- Water Quality
- Flood Damage Reduction
- Ecosystem Improvement
- Recreation/Public Access
- Energy
- Other Physical Benefits

Water Supply 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 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. This project proposes to replace one-third of the laterals, generating a 33percent savings of total losses per year, or approximately 1.4 MG/year.

Without the project, losses are expected to increase by 5percent per year, as observed historically. The project life is estimated to be 70 years, based on the typical rule of thumb for water line longevity cited by the Chair of AWWA's Corrosion Control Committee for the California-Nevada section (refer to Appendix 7.4, page 18). Assuming a 70-year project life, and a 5 percent increase in leakage per year for the laterals that would be replaced by this project, this amounts to 824 MG over the project life.

Water Quality Benefits

Repair of the leaking laterals will prevent treated, chlorinated water from being discharged to the Consumnes Subbasin via groundwater recharge, drainages, creeks and water bodies. This will provide a water quality benefit to receiving waters.

Based on AWA's 2011 Consumer Confidence 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, this equates to 6,258 lbs of chlorine discharged to the environment from the laterals that would be replaced by this Project over the 70-year project life.

Flood Damage Reduction Benefits

There are no flood damage reduction benefits expected from this project.

Ecosystem Improvement Benefits

This will protect environmental resources and habitat, including habitat for the protected California tiger salamander, by preventing treated, chlorinated water from being discharged to the Consumnes Subbasin via groundwater recharge, drainages, creeks and water bodies. This will provide a water quality benefit by avoiding 6,258 pounds of chlorine would be prevented from being discharged to receiving waters over the 70-year project life.

Recreation/Public Access Benefits

There are no recreation / public access reduction benefits expected from this project.

Energy-Related Benefits

This project will reduce groundwater pumping requirements from approximately 91.22 MG (based on 2009 production) to approximately 89.82 MG (91.22 – 1.4). This equates to a 1.5percent reduction in production. Based on AWA operational records, the annual energy requirement of pumping stations in the lake Camanche area is approximately 125,163 kWh. A 1.5percent reduction in production would correspond to an annual reduction in energy demand of approximately 1,877 kWh / year. Over the 70-year project life, this equates to avoided energy usage of approximately 131,421 kWh.

Other Physical Benefits

The service laterals in the Lake Camanche Village distribution system are contributing significantly to water losses in the system. The current polyethylene ("Poly-Tube") laterals were installed in the late 1970s and have become very brittle and subject to severe longitudinal cracking, catastrophically failing at an increasing rate.

Emergency repair of failing laterals is a costly undertaking. Based on AWA's service records, emergency repairs were required to address eight leaking laterals in 2010 and seven leaking laterals in 2011. Without intervention, the rate of infrastructure failure is expected to increase at a rate of approximately 5percent per year, with emergency repair requirements increasing at a similar rate.

The Phase 1 Lake Camanche Laterals Replacement Project is in the process of replacing one third of the laterals in the Lake Camanche Village Area. As such, once the Phase 1 Project is complete, it is expected that the average failure rate will be reduced by approximately one third, and emergency repairs will be reduced from an average of seven to eight emergency repairs per year to approximately five emergency repairs per year. Implementation of the Phase 2 Project would address half of the remaining laterals. Without the Project, it is expected that an average of 5 emergency repairs would be completed per year, increasing at a rate of 5percent per year. With the Project, it is estimated that an average of 2.5 emergency repairs would be completed per year, also increasing at a rate of 5percent per year.

Assuming the proposed Project avoids 2.5 emergency repairs per year and emergency repair requirements of unmaintained laterals increase at a rate of 5percent per year, this translates to 1,471 avoided repairs over the course of the 70-year project life.

Facilities Required to Achieve Benefits

In order to achieve the benefits summarized above, all project components must be implemented, including:

- Replacement of 200 service laterals

Uncertainty of Benefits

Assumptions were made in estimating benefits that lead to uncertainty in the degree of benefit expected. These uncertainties include:

- **Water Supply:** In determining systems losses from the annual production and consumption data, losses were averaged (assumed uniform) over all 600 service laterals. Depending upon the actual condition of the service laterals proposed for replacement, the actual benefit could be greater or less than projected. In addition, there is uncertainty associated with rate of increase of leakage over time. These factors will affect the water savings to be achieved with each repair or replacement project.
- **Water Quality:** Water quality benefits associated with avoided chlorine usage depend upon the amount of water lost per year. The amount of water lost per year is subject to the uncertainty described previously under "water supply." In addition, the average chlorine residual for the Lake Camanche Village system of 0.91 was used to calculate chlorine losses. If the actual chlorine residual in the water losses is greater than or less than this figure, the benefit would be adjusted accordingly.
- **Other Benefits:** Avoided emergency repairs were estimated based on literature values comparing the cost of planned maintenance to the cost of unplanned maintenance. Variability in the rate of failure with and without the Project and variability in the cost of emergency repairs will result in a higher or lower avoided emergency repair cost.

Project Adverse Effects

The project will have temporary, construction-related impacts. No long-term adverse effects are expected from this project. Any adverse effects will be fully mitigated.

Annual Project Physical Benefits

The following tables summarize the expected annual benefits from this project.

Table 9 – Annual Project Physical Benefits

Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2

Type of Benefit Claimed: Avoided Water Losses

Measure of Benefit Claimed (Name of Units): MG per Year

Additional Information About this Measure: Avoided system losses

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	1	1

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Avoided Water Losses			
Measure of Benefit Claimed (Name of Units): MG per Year			
Additional Information About this Measure: Avoided system losses			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2016	0	1	1
2017	0	2	2
2018	0	2	2
2019	0	2	2
2020	0	2	2
2021	0	2	2
2022	0	2	2
2023	0	2	2
2024	0	2	2
2025	0	2	2
2026	0	2	2
2027	0	3	3
2028	0	3	3
2029	0	3	3
2030	0	3	3
2031	0	3	3
2032	0	3	3
2033	0	3	3
2034	0	4	4
2035	0	4	4
2036	0	4	4
2037	0	4	4
2038	0	4	4
2039	0	5	5
2040	0	5	5
2041	0	5	5
2042	0	5	5
2043	0	5	5
2044	0	6	6
2045	0	6	6
2046	0	6	6

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Avoided Water Losses			
Measure of Benefit Claimed (Name of Units): MG per Year			
Additional Information About this Measure: Avoided system losses			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2047	0	7	7
2048	0	7	7
2049	0	7	7
2050	0	8	8
2051	0	8	8
2052	0	9	9
2053	0	9	9
2054	0	9	9
2055	0	10	10
2056	0	10	10
2057	0	11	11
2058	0	11	11
2059	0	12	12
2060	0	13	13
2061	0	13	13
2062	0	14	14
2063	0	15	15
2064	0	15	15
2065	0	16	16
2066	0	17	17
2067	0	18	18
2068	0	19	19
2069	0	20	20
2070	0	20	20
2071	0	22	22
2072	0	23	23
2073	0	24	24
2074	0	25	25
2075	0	26	26
2076	0	27	27
2077	0	29	29

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Avoided Water Losses			
Measure of Benefit Claimed (Name of Units): MG per Year			
Additional Information About this Measure: Avoided system losses			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2078	0	30	30
2079	0	32	32
2080	0	33	33
2081	0	35	35
2082	0	37	37
2083	0	39	39
2084	0	41	41
TOTAL	0	824	824

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Avoided Chlorine Use			
Measure of Benefit Claimed (Name of Units): Pounds per Year			
Additional Information About this Measure: Avoided chlorine use due to reduces production demand			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	11	10.6
2016	0	11	11
2017	0	12	12
2018	0	12	12
2019	0	13	13
2020	0	14	14

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Avoided Chlorine Use			
Measure of Benefit Claimed (Name of Units): Pounds per Year			
Additional Information About this Measure: Avoided chlorine use due to reduces production demand			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2021	0	14	14
2022	0	15	15
2023	0	16	16
2024	0	16	16
2025	0	17	17
2026	0	18	18
2027	0	19	19
2028	0	20	20
2029	0	21	21
2030	0	22	22
2031	0	23	23
2032	0	24	24
2033	0	26	26
2034	0	27	27
2035	0	28	28
2036	0	30	30
2037	0	31	31
2038	0	33	33
2039	0	34	34
2040	0	36	36
2041	0	38	38
2042	0	40	40
2043	0	42	42
2044	0	44	44
2045	0	46	46
2046	0	48	48
2047	0	51	51
2048	0	53	53
2049	0	56	56
2050	0	59	59
2051	0	62	62
2052	0	65	65

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Avoided Chlorine Use			
Measure of Benefit Claimed (Name of Units): Pounds per Year			
Additional Information About this Measure: Avoided chlorine use due to reduces production demand			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2053	0	68	68
2054	0	71	71
2055	0	75	75
2056	0	79	79
2057	0	83	83
2058	0	87	87
2059	0	91	91
2060	0	96	96
2061	0	100	100
2062	0	105	105
2063	0	111	111
2064	0	116	116
2065	0	122	122
2066	0	128	128
2067	0	134	134
2068	0	141	141
2069	0	148	148
2070	0	156	156
2071	0	163	163
2072	0	172	172
2073	0	180	180
2074	0	189	189
2075	0	199	199
2076	0	209	209
2077	0	219	219
2078	0	230	230
2079	0	241	241
2080	0	254	254
2081	0	266	266
2082	0	279	279
2083	0	293	293
2084	0	308	308

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Avoided Chlorine Use			
Measure of Benefit Claimed (Name of Units): Pounds per Year			
Additional Information About this Measure: Avoided chlorine use due to reduces production demand			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
TOTAL	0	6,258	6,258

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Reduction in Chlorine Discharged to Environment			
Measure of Benefit Claimed (Name of Units): Pounds per Year			
Additional Information About this Measure: Avoided chlorine discharges due to leak prevention			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	11	11
2016	0	11	11
2017	0	12	12
2018	0	12	12
2019	0	13	13
2020	0	14	14
2021	0	14	14
2022	0	15	15
2023	0	16	16
2024	0	16	16
2025	0	17	17
2026	0	18	18
2027	0	19	19
2028	0	20	20
2029	0	21	21

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Reduction in Chlorine Discharged to Environment			
Measure of Benefit Claimed (Name of Units): Pounds per Year			
Additional Information About this Measure: Avoided chlorine discharges due to leak prevention			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2030	0	22	22
2031	0	23	23
2032	0	24	24
2033	0	26	26
2034	0	27	27
2035	0	28	28
2036	0	30	30
2037	0	31	31
2038	0	33	33
2039	0	34	34
2040	0	36	36
2041	0	38	38
2042	0	40	40
2043	0	42	42
2044	0	44	44
2045	0	46	46
2046	0	48	48
2047	0	51	51
2048	0	53	53
2049	0	56	56
2050	0	59	59
2051	0	62	62
2052	0	65	65
2053	0	68	68
2054	0	71	71
2055	0	75	75
2056	0	79	79
2057	0	83	83
2058	0	87	87
2059	0	91	91
2060	0	96	96
2061	0	100	100

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Reduction in Chlorine Discharged to Environment			
Measure of Benefit Claimed (Name of Units): Pounds per Year			
Additional Information About this Measure: Avoided chlorine discharges due to leak prevention			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2062	0	105	105
2063	0	111	111
2064	0	116	116
2065	0	122	122
2066	0	128	128
2067	0	134	134
2068	0	141	141
2069	0	148	148
2070	0	156	156
2071	0	163	163
2072	0	172	172
2073	0	180	180
2074	0	189	189
2075	0	199	199
2076	0	209	209
2077	0	219	219
2078	0	230	230
2079	0	241	241
2080	0	254	254
2081	0	266	266
2082	0	279	279
2083	0	293	293
2084	0	308	308
TOTAL	0	6,258	6,258

Table 9 – Annual Project Physical Benefits
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2
Type of Benefit Claimed: Reduction in Energy Demand

Measure of Benefit Claimed (Name of Units): kWh / yr Additional Information About this Measure: Avoided groundwater pumping			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015 - 2184	125,163	123,286	1,877

Table 9 – Annual Project Physical Benefits Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2 Type of Benefit Claimed: Avoided Emergency Repair Incidents Measure of Benefit Claimed (Name of Units): Incidents per Year Additional Information About this Measure: Avoided emergency repair incidents due to maintenance. Assumes risk of failure increases by 5percent per year.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2012	0.00	0.00	0.00
2013	0.00	0.00	0.00
2014	0.00	0.00	0.00
2015	5.00	2.50	2.50
2016	5.25	2.63	2.63
2017	5.51	2.76	2.76
2018	5.79	2.89	2.89
2019	6.08	3.04	3.04
2020	6.38	3.19	3.19
2021	6.70	3.35	3.35
2022	7.04	3.52	3.52
2023	7.39	3.69	3.69
2024	7.76	3.88	3.88
2025	8.14	4.07	4.07
2026	8.55	4.28	4.28
2027	8.98	4.49	4.49
2028	9.43	4.71	4.71
2029	9.90	4.95	4.95

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Avoided Emergency Repair Incidents			
Measure of Benefit Claimed (Name of Units): Incidents per Year			
Additional Information About this Measure: Avoided emergency repair incidents due to maintenance. Assumes risk of failure increases by 5percent per year.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2030	10.39	5.20	5.20
2031	10.91	5.46	5.46
2032	11.46	5.73	5.73
2033	12.03	6.02	6.02
2034	12.63	6.32	6.32
2035	13.27	6.63	6.63
2036	13.93	6.96	6.96
2037	14.63	7.31	7.31
2038	15.36	7.68	7.68
2039	16.13	8.06	8.06
2040	16.93	8.47	8.47
2041	17.78	8.89	8.89
2042	18.67	9.33	9.33
2043	19.60	9.80	9.80
2044	20.58	10.29	10.29
2045	21.61	10.80	10.80
2046	22.69	11.35	11.35
2047	23.82	11.91	11.91
2048	25.02	12.51	12.51
2049	26.27	13.13	13.13
2050	27.58	13.79	13.79
2051	28.96	14.48	14.48
2052	30.41	15.20	15.20
2053	31.93	15.96	15.96
2054	33.52	16.76	16.76
2055	35.20	17.60	17.60
2056	36.96	18.48	18.48
2057	38.81	19.40	19.40
2058	40.75	20.37	20.37
2059	42.79	21.39	21.39
2060	44.93	22.46	22.46

Table 9 – Annual Project Physical Benefits			
Project Name: Lake Camanche Area Lateral Replacement Project - Phase 2			
Type of Benefit Claimed: Avoided Emergency Repair Incidents			
Measure of Benefit Claimed (Name of Units): Incidents per Year			
Additional Information About this Measure: Avoided emergency repair incidents due to maintenance. Assumes risk of failure increases by 5percent per year.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2061	47.17	23.59	23.59
2062	49.53	24.76	24.76
2063	52.01	26.00	26.00
2064	54.61	27.30	27.30
2065	57.34	28.67	28.67
2066	60.20	30.10	30.10
2067	63.21	31.61	31.61
2068	66.37	33.19	33.19
2069	69.69	34.85	34.85
2070	73.18	36.59	36.59
2071	76.84	38.42	38.42
2072	80.68	40.34	40.34
2073	84.71	42.36	42.36
2074	88.95	44.47	44.47
2075	93.40	46.70	46.70
2076	98.07	49.03	49.03
2077	102.97	51.48	51.48
2078	108.12	54.06	54.06
2079	113.52	56.76	56.76
2080	119.20	59.60	59.60
2081	125.16	62.58	62.58
2082	131.42	65.71	65.71
2083	137.99	68.99	68.99
2084	144.89	72.44	72.44
TOTAL	2,943	1,471	1,471

Project 2: Camanche Area Regional Water Supply Project – Phase 1

The Camanche Area Regional Water Supply Project – Phase 1, once fully implemented, will address the water needs of three separate water system purveyors: Amador Water Agency, Calaveras County Water District, and East Bay Municipal Utility District (specifically, the communities adjacent to EBMUD's Camanche Reservoir). The fully-implemented Phase 1 Project will consist of a 0.5 MGD membrane filtration WTP at the Camanche South Shore (also referred to as CASS) area, a new raw water pipeline to provide raw water from the Mokelumne Aqueducts to the new treatment plant, and a new cross-Camanche Reservoir treated water pipeline from the CASS WTP to the Camanche North Shore (also referred to as CANS) area to provide treated water to the North Shore and via an intertie to Lake Camanche Village. The 0.5 MGD plant will be designed such that it can be expanded to treat up to 2.0 MGD without significant building/facility alteration (although updated environmental review may be needed). This additional capacity will be used to supply neighboring areas of Amador and Calaveras Counties, including the Lake Camanche Village area in Amador County (a disadvantaged community) in Phase 2, and the community of Wallace in Calaveras County in Phase 3.

In the area adjacent to Camanche North Shore, AWA serves the residential development of Lake Camanche Village. This development consists of approximately 2,000 parcels and was designed to be served by five water supply wells. Presently, only three wells are in service because of water quality and quantity problems. Evidence suggests that the remaining wells may also be subject to similar quality and quantity problems in the years ahead. Lake Camanche Village is a DAC as identified in the 2006 MAC IRWM Plan and in a recent income survey conducted by AWA for the area (see Attachment 10). CARWSP – Phase 1 will convey treated supplies to the CANS service area and provide water service to the adjacent Lake Camanche Village via an intertie which will provide supplemental supplies in the event of water shortages or system failures.

Existing Data and Studies

The Project is supported by a series of studies documenting the potential project benefits, including:

- *Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design* (RMC Water and Environment, 2013) – The Camanche Area Regional Water Supply Project (CARWSP) planning process was enabled by a Proposition 84IRWM planning grant received by the MAC IRWM Region. An evaluation of the feasibility of CARWSP was completed and documented in the CARWSP Feasibility Study and Conceptual Design, which identified the areas to be served by the project, determined project phasing, and detailed other parameters for project implementation such as financing, operations and maintenance requirements, and technical information. (Appendix 7.5)
- *Camanche South and North Shore Water Treatment Plants Evaluation* was completed, comparing alternative treatment plant technologies and pipeline alignments and costs. (Appendix 7.6)

- *Camanche Water Treatment Plant Replacement Project Mitigated Negative Declaration, State Clearinghouse Number 2001072084 (July 2001 Draft; September 2001 Final)* – This MND conducted the environmental impact evaluation of the proposed Camanche Regional Water Treatment Plant project as required under the California Environmental Quality Act (CEQA). Evaluated under this document were the 0.5 MGD filtration plant, the raw water pipeline connecting the Mokelumne Aqueducts to the new Camanche Regional Water Treatment Plant, and a cross-Camanche distribution pipeline. In general, the document determined that all potential environmental impacts could be mitigated, and provided recommended mitigation measures to be implemented at the time of project construction. (Appendix 7.7)
- *Camanche Regional Water System Draft Feasibility Study* (KASL, July 1999) – Performed initial evaluation of alternatives for surface water treatment to serve EBMUD's Camanche North and South Shores, AWA's Lake Camanche Village, and CCWD's Wallace and Burson service areas. This study laid the foundation for other studies and project development. (Appendix 7.8)
- Nichols, Dana. *All is Not Well Near Burson: For Residents Near Burson, Getting Water is No Mere Turn of the Tap* (RecordNet, October 20, 2005) – Article summarizing groundwater quality and quantity problems in the project area that have forced residents of the community of Burson to truck in potable supplies. (Appendix 7.9)

Summary of Benefits

The projected project benefits include:

- **Water supply benefits:** The Project will provide high quality surface water supplies to EBMUD customers in the CASS area and the CANS area, a disadvantaged community currently plagues by groundwater supply availability and quality issues. In addition, the Project would provide up to 0.5 MGD of emergency supplies to the AWA disadvantaged community of Lake Camanche Village. This Project includes Phase 1 of a three-phased Project; on completion, the full, three-phased Project will provide 2.2 MGD of reliable, high quality supply to two disadvantaged communities (CANS and Lake Camanche Village) as well as the CCWD community of Wallace. In addition, the Vintage Home Fixture Retrofit component of the project will generate 1 billion gallons of permanent water use reduction in the study area over the 50-year project life.
- **Water quality improvements:** Currently, EBMUD customers in the CASS and CANS areas and AWA customers in the Lake Camanche Village area struggle with a variety of groundwater quality issues. As discussed on pages 4-5 of the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design (Appendix 7.5), groundwater has proven to be an unreliable and often unsuitable water supply source for the Camanche area. In addition to the highly variable quantities of available groundwater, Camanche area groundwater supplies have exhibited chronic water quality issues. Based on quarterly sampling in monitoring wells north of Lake Camanche in Amador County, groundwater iron concentrations greatly exceed the secondary maximum contaminant level (MCL) of 300 micrograms per liter (μg/L), reaching concentrations as high as 7,052 μg/L. Additionally, total manganese concentrations in monitoring wells are greater than the secondary MCL of 50 μg/L, reaching concentrations as high as 329 μg/L.

- **Ecosystem improvement benefits:** Currently, wellhead treatment is implemented to remove iron and manganese. This treatment generates a waste stream. By eliminating the need for targeted iron and manganese treatment, the CARWSP Phase 1 project will reduce the need for treatment and disposal of concentrated iron and managanese sludge. Assuming 0.5 mgd of groundwater is offset by the project, this equates to a reduction in loading of 257,133 and 10,625 tons of iron and manganese to the environment over the 50-year project life, respectively.

Table 7-4 summarizes the physical benefits that would be achieved through implementation of this project.

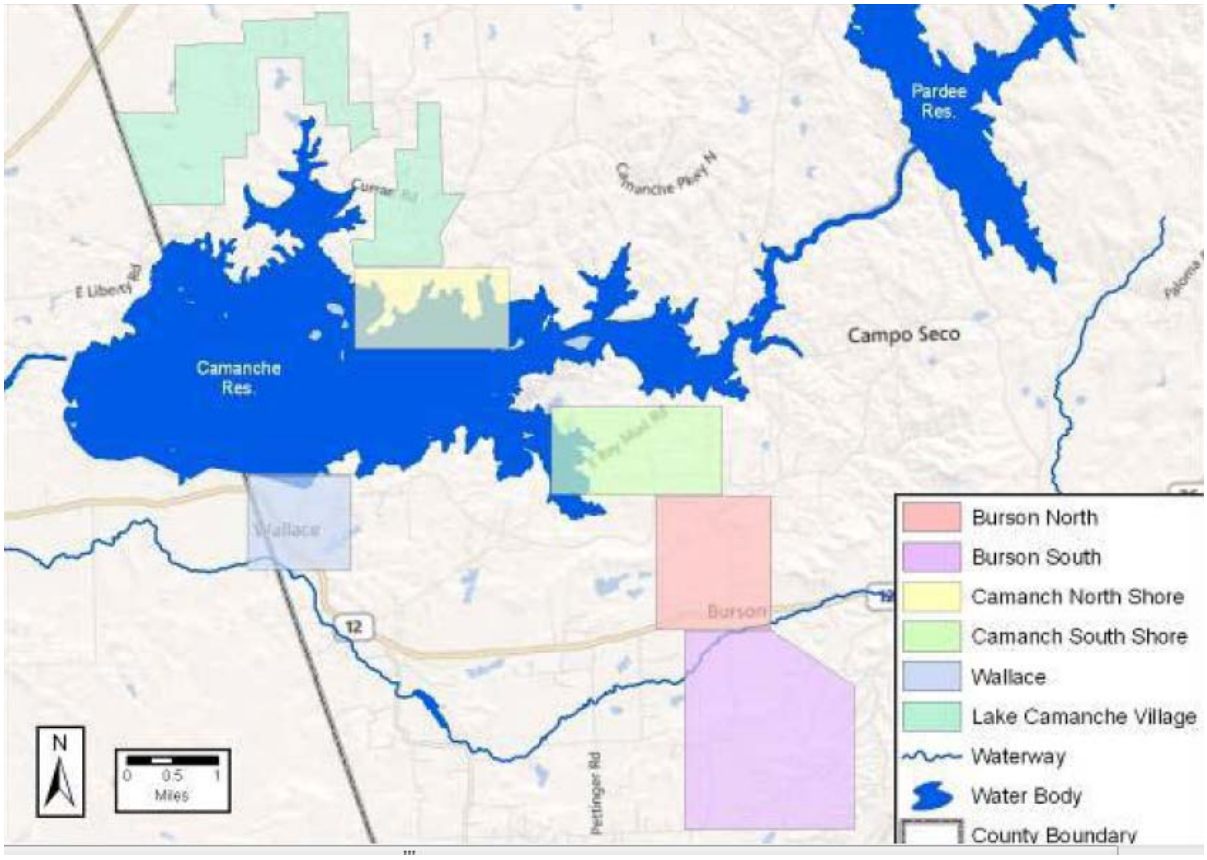
Table 7-4: Summary of Proposed Physical Benefits – Camanche Area Regional Water Supply Project – Phase 1

Project Benefit Summary	
Water Supply	• 9.1 billion gallons of high quality supply delivered • 1 billion gallons of supply conserved
Water Quality	• 6,752 mg/L reduction in iron concentration • 279 mg/L reduction in manganese concentration
Ecosystem Improvement	• 257,133 tons iron discharge to environment avoided • 10,625 tons manganese discharge to environment avoided

Background / Recent and Historical Conditions

As discussed on pages 1 and 2 of the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design (Appendix 7.5), the Camanche Area covers approximately 20-square-miles in the vicinity of Lake Camanche, as shown in Figure 7-1. The area includes Lake Camanche Village and the CANS Recreation Area in Amador County; and the communities of Wallace, Burson, and the CASS Recreation Area in Calaveras County. The area is predominantly rolling foothill grasslands with blue oaks and Foothill pines; elevations range from about 200 to 700 feet. Lake Camanche Village water supplies are currently provided by AWA, and CANS and CASS water supplies are provided by EBMUD. The community of Wallace is in the process of being annexed to the CCWD water supply system. The community of Burson is not part of a larger water supply system and operates as a network of private wells.

Figure 7-1: Camanche Area

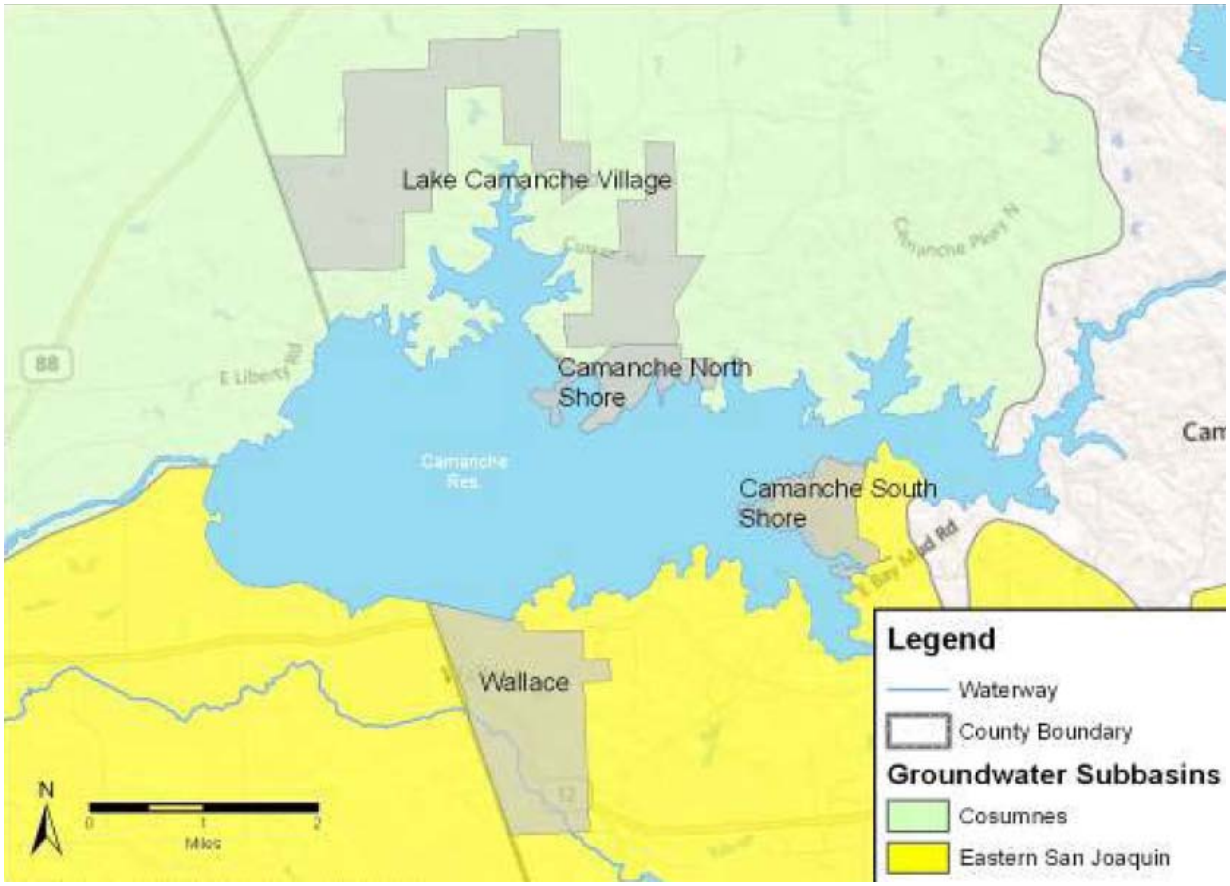


The primary water supply source in the Camanche area is groundwater. Groundwater quantity and quality in the Camanche area vary considerably among well sites due to the region's geology and the small and unpredictable yields of groundwater system that typifies this area of the Sierra foothills. Wells serving areas in Amador County north of Lake Camanche are located within the Cosumnes Subbasin portion of the San Joaquin Valley Groundwater Basin, while wells serving areas south of Lake Camanche are located in the Eastern San Joaquin Subbasin.

Located on the eastern fringe of the San Joaquin Valley Groundwater Basin, groundwater resources in the Camanche area originate in fractured rock systems typical of the foothills as well as the alluvial systems characteristic of the San Joaquin Valley geology to the west.

Over the years, groundwater has proven to be an unreliable and often unsuitable water supply source for the Camanche area. AWA currently supplies Lake Camanche Village with groundwater using four wells that pump from the Cosumnes Sub-basin portion of the San Joaquin Valley Groundwater Basin (see Figure 7-2). One of the wells, on the easterly side of the Village, was taken out of operation from September 2010 to July 2011 due to elevated turbidity and odor levels; this well is now being operated at reduced production levels.

Figure 7-2: Camanche Area Groundwater Basins



Additionally, groundwater elevations decreased significantly during the 1960s and 1970s. Although groundwater elevations have rebounded within the last two decades, there is still a slight overdraft. Due to concerns with groundwater quality and quantity, AWA is seeking to reduce the dependence of Lake Camanche Village on groundwater as its primary water supply by introducing an alternative supply to meet a portion of demands. AWA would continue to utilize the existing groundwater system at a reduced rate, enabling conjunctive use and reducing stress on the groundwater basin.

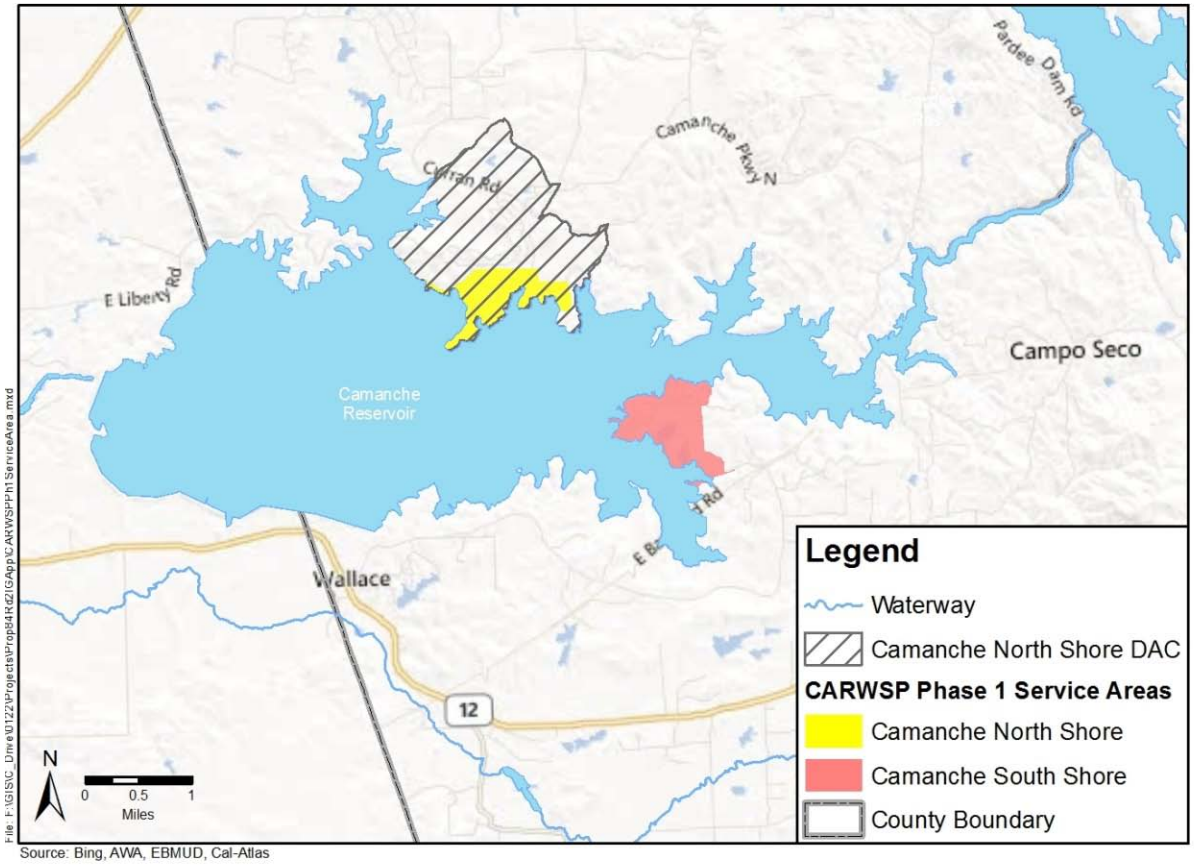
In addition to the highly variable quantities of available groundwater, Camanche area groundwater supplies have exhibited chronic water quality issues. Groundwater quantity and quality concerns have prompted EBMUD, AWA, and CCWD to partner in the development of a Camanche Area Regional Water Supply Plan, which identified a preferred solution to correct the critical drinking water quality issues in the Camanche area. The project proposed for funding is Phase 1 of this Plan.

Based on the American Community Survey (ACS) census place data, Camanche North Shore is a DAC with an associated median household income (MHI) of $41,848, compared to the statewide MHI of $48,706. Census data is gathered and compiled at the census tract, census block group, and census designated place (CDP) level and sometimes does not reflect a

small enough area or community. Lake Camanche Village and Wallace have associated CDPs, but the places cover a much larger area than the service areas themselves. The Lake Camanche Village CDP is not a DAC, but an income survey completed for Lake Camanche Village service area in 2010 determined that its MHI is less than 80percent of the Statewide MHI and therefore a DAC.

The area served by the proposed project, and local DAC boundaries, are shown on Figure 7-3.

Figure 7-3: Camanche Area DACs Served by Proposed Project



Without Project Conditions

Without the Project, highly unreliable groundwater supplies would require an alternative source to be identified. In 2012, as part of the MAC IRWM Plan Update, CARWSP was identified as a project that could potentially engage multiple water suppliers in the MAC region in developing a regional solution to address critical water supply and water quality needs of select disadvantaged communities in the region. The potential project partners, EBMUD, AWA, and CCWD, undertook the Camanche Area Regional Water Supply Plan (CARWSP) Feasibility Study and Conceptual Design (supported with Proposition 84 funding). A key task of the study (Task 3 - Water Supply Alternatives Analysis) identified and evaluated potential water supplies for their suitability in meeting Camanche area demands.

The alternatives evaluated and summary of conclusions reached were as follows (refer to pages 9 – 15 of Appendix 7.5):

- Groundwater - Groundwater quantity and quality in the area varies considerably among well sites due to the region's geology and the small and unpredictable yields of the groundwater subbasins in this area of the Sierra foothills. Over the years, groundwater has proven to be an unreliable and often unsuitable water supply source for the Camanche area. In addition to the highly variable quantities of available groundwater, Camanche area groundwater quality has also been a chronic issue (elevated levels of nitrates, iron, manganese, and boron, hydrogen sulfide, heterotrophic plate counts, and total coliform). These impaired groundwater quantity and quality conditions have rendered groundwater alone to be an unsuitable water supply for the Camanche area.
- Surface Water - EBMUD owns and operates Pardee and Camanche Reservoirs on the Mokelumne River. Camanche Reservoir is currently the water supply source for the existing Camanche South Shore WTP. This 417,120 acre-foot reservoir is located approximately 10 miles downstream from Pardee Reservoir which has a maximum storage capacity of 197,950 acre-feet (AF). Water is conveyed through three Mokelumne Aqueducts and flows by gravity approximately 83 miles to EBMUD's service area in the San Francisco Bay area.

  During the environmental review process for the Camanche WTP Replacement Project, EBMUD determined that the most cost-effective way to serve surface water to the Camanche area would be to convey raw water from the Mokelumne Aqueducts. The Mokelumne Aqueducts were also identified as the preferred Camanche area water supply source in the 2003 Camanche South and North Shore Water Treatment Plant Evaluation. It has been determined that up to 2.8 mgd of additional water supply could be safely available from Pardee Reservoir via the Mokelumne Aqueduct.

- Stormwater - Due to the significant cost associated with implementing widespread rainwater harvesting, the unreliability of stormwater supplies, the limited demands that could be met with harvested rainwater (outdoor demands only), and the need to provide complete redundancy for those supplies in the event rainwater supplies are not available, stormwater is not considered to be a viable supply to meet Camanche area demands.
- Conservation - Based on the analysis completed in the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design, water conservation may be a viable alternative to offset a portion of demands currently being met with groundwater supplies in the service area.
- Conjunctive Use - The groundwater resources in the Camanche area are problematic and would not allow for the extensive application of conjunctive use since, as previously described, the quantity and quality of groundwater has led to the development of the CARWSP study. Limited conjunctive use opportunities may be

achieved through coordinated management of surface water supplies and existing groundwater supply facilities. For example, AWA could meet a portion of user demands in the DAC community of Lake Camanche Village using a combination of water conservation and treated surface water, while still relying on groundwater to meet peak demands.

The conclusion reached by the Water Supply Alternatives Analysis was that conjunctive management of groundwater and treated surface water diverted from the Mokelumne Aqueduct, combined with a targeted water conservation program, is the best and most suitable approach to addressing Camanche area water supply and quality problems (refer to page 15 of Appendix 7.5). Water conservation would help offset new potable water supplies required, and similarly, relying on groundwater to meet peak demands and provide emergency and/or backup supply would minimize the size of a surface WTP. Conjunctive management of existing groundwater and surface water supplies provides a reliable, high quality water supply; improves flexibility; and reduces stress on the over-drafted groundwater basins. The study recommended that the project be implemented in a series of three phases (refer to Appendix 7.5, page 28).

***Due to Groundwater Supply and Quality Issues, Residents of Nearby Burson Must Truck in Water, as Pictured Here** (from RecordNet article All is Not Well in Burson, Dana M. Nichols, Oct 20, 2005: http://www.recordnet.com/apps/pbcs.dll/article?AID=/20051020/NEWS01/510200340&SearchID=73223946845221)*

If the CARWSP project is not implemented, residents will need to truck in potable water supplies, as is currently done in the nearby Burson area (refer to Appendix 7.9). Assuming that one tenth of the 0.5 mgd which would be met by CARWSP – Phase 1 is intended to meet potable demands and the remaining 90% of the 0.5 mgd demand could continue to be met by unreliable groundwater supplies for nonpotable uses, approximately 0.05 mgd of potable supplies would be required to be trucked to the area. This equates to 1.5 MG/month, or 18.25 MG/year. Over the assumed 50-year life of the project, this would result in 913 MG of potable supplies being trucked into the area.

Further, this Project represents Phase 1 of a three-phased Project. Phases 2 and 3 would expand the treatment plant to serve the communities of Lake Camanche Village (a DAC) and Wallace, respectively. Without this Project, Phases 2 and 3 could not proceed, and high quality, reliable surface supplies could not be provided to Lake Camanche Village or Wallace.

Finally, without the Project, an estimated 558 of units with dated, high-water-using showerheads and toilets would remain in place in the CANS, CASS, and Lake Camanche

Village areas (Table 6, page 14 of the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design, Appendix 7.5). As such, an estimated 54,825 gallons per day (20 MG/year) would be wasted through use of non-conserving fixtures. Over the 50-year life of the Project, this amounts to 1 billion gallons (BG) conserved.

Description of Benefits and Methods to Estimate Benefits

The following sections summarize project benefits and methods used to estimate benefits in the following areas:

- Water Supply
- Water Quality
- Flood Damage Reduction
- Ecosystem Improvement
- Recreation/Public Access
- Energy
- Other Physical Benefits

Water Supply Benefits

The project will replace unreliable groundwater supplies with highly reliable supplies from the Mokelumne River via the Mokelumne Aqueduct. As described on pages 10-11 of the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design (Appendix 7.5), the primary source of water supply in the Camanche area is groundwater. Groundwater quantity and quality in the area varies considerably among well sites due to the region's geology and the small and unpredictable yields of the groundwater sub-basin(s) in this area of the Sierra foothills.

The CANS area has similar groundwater quantity and quality issues. During completion of the Camanche South and North Shore WTPs Evaluation by EBMUD in May of 2003, multiple water supply sources were evaluated as potential sources for the CANS WTP, including existing groundwater wells. All of the wells also had low production rates that could not be sustained, and if the wells were operated without rest periods, production would rapidly drop.

Mokelumne River supplies are highly reliable and serve as the primary water supply for EBMUD. AWA and EBMUD have sufficient water rights to address the needs of the areas to be served by the project, as shown in the following table (adapted from page 30 of the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design, provided as Appendix 7.5). The surface water source that will supply CARWSP is the Mokelumne River. Project water will be diverted from EBMUD's Mokelumne Aqueduct at a location proximate to Camanche South Shore and conveyed via a 12" pipeline to the Regional Water Treatment Plant for treatment. Once all phases of the project have been constructed, the parties will revisit particular arrangements regarding water rights and agency responsibilities as associated with CARSWP.

Because the proposed project is Phase 1 of the full, three-phased Project, which would provide supply to the CANS area as well as emergency supply capacity for AWA's Lake

Camanche Village area, the only water rights to be exercised are those of EBMUD. When future phases proceed, AWA and CCWD water rights would need to be reviewed; however, based on preliminary analysis they appear to be sufficient to accommodate the full project.

Table 7-5: Anticipated Water Rights for CARWSP

Partner Agency	Area Served (Place of Use)	Anticipated Water Right / Entitlement	CARWSP Phase
EBMUD	Camanche South Shore Camanche North Shore	EBMUD holds water rights to Mokelumne River water supply (Permit #10478 – Pardee / Camanche).	Phase 1, 2
AWA	Lake Camanche Village	AWA has a pre-1914 contractual right from PG&E to 15,000 acrefeet per year (AFY) of Mokelumne River water.	Phase 2
CCWD	Wallace	The State of California has reserved 27,000 AFY of Mokelumne River water for use by water agencies serving Calaveras County.	Phase 3

The highly unreliable groundwater supplies in the area must be addressed. If this project is not implemented, the only viable alternative would be to truck in potable water supplies, as is currently done in the nearby Burson area.

Assuming that one tenth of the 0.5 mgd which would be met by CARWSP – Phase 1 is intended to meet potable demands and the remaining 90percent of the 0.5 mgd demand could continue to be met by unreliable groundwater supplies for nonpotable uses, approximately 0.05 mgd of potable supplies would be required to be trucked to the area. This equates to 1.5 MG/month, or 18.25 MG/year. Over the assumed 50-year life of the project, this would result in 913 MG of potable supplies being trucked into the area.

In addition, the Project would replace dated, non-conserving showerheads and toilets in an estimated 558 units in the CANS, CASS, and Lake Camanche Village areas (Table 6, page 14 of the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design, provided as Appendix 7.5). Toilets and showerheads have historically improved in efficiency over time, with a marked improvement in toilet flushing and showerhead efficiency observed beginning in 1992, with implementation of the National Energy Policy Act. This Act reduced the maximum flushing volume of new toilets sold in the United States to 1.6 gallons per flush (gpf) and mandated that new showerhead faucets not exceed a flowrate of 2.5 gallons per minute (gpm). Many units within Lake Camanche Village, CANS, CASS, and Wallace were constructed prior to 1992. As such, many of the existing dwelling units in the service area are expected to have non-conserving water fixtures, including toilets and showerheads.

The Vintage Homes Fixture Retrofit portion of the proposed Project would replace all high water using toilets and showerheads in the CANS and Lake Camanche Village areas through implementation of a two-pronged water conservation program:

- Showerhead rebate program: $25 rebates to replace showerheads with low-flow fixtures.
- Toilet replacement program: Full toilet replacement program, including installation.

Table 7-6: Potential Water Savings – Vintage Home Fixture Retrofit Program[1,2]

	Existing No. of Units	Units Requiring New Fixtures	Showerhead Replacement Water Savings (gpd)	Toilet Replacement Water Savings (gpd)	Total Water Savings (gpd)	Phase 1 Water Savings (gpd)
Lake Camanche Village	733	367	11,285	24,773	36,058	36,058
CANS	161	113	3,475	7,628	11,103	11,103
CASS	111	78	2,399	5,265	7,664	7,664
Wallace	100	30	923	2,025	2,948	0
Total	**1,230**	**588**	**18,082**	**39,691**	**57,773**	**54,825**

1. Assumes non-conserving showerheads use 5.5 gpm, while new, low-flow showerheads use 2.5 gpm. Residents were assumed to take an average of 0.5 showers per day with an average duration of 8.2 minutes per shower (AWWA Research Foundation, 1999). Non-conserving toilets were estimated to use 7.0 gpf while new, low-flow toilets use 1.6 gpf. People were assumed to flush an average of 5 times per day.
2. Based on Table 6 of the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design (Appendix 7.5, page 14).

The Vintage Home Fixture Retrofit was designed to maximize participation by including a showerhead rebate sufficient to cover the full cost of a new showerhead, which can be easily installed by the end user. Since toilet installation is more challenging and may provide a deterrent for customers who would otherwise utilize the toilet replacement program, the toilet replacement program was structured to include both the cost of the toilet and installation to maximize participation.

It is currently estimated that 70percent of the existing units in Lake Camanche Village, 50percent of existing units in CANS and CASS areas, and 30percent of the existing units in Wallace contain non-conserving toilets and showerheads. By replacing these non-conserving showerheads with low water use fixtures, it is estimated that approximately 54,825 gallons per day (20 MG/year) could be conserved in the CASS, CANS, and Lake Camanche Village areas. Over the 50-year life of the Project, this amounts to 1 BG conserved.

Water Quality Benefits

The project will correct chronic groundwater problems in the CANS area, and establish a foundation for expanding service to Lake Camanche Village (another disadvantaged community) and the nearby community of Wallace.

Currently, EBMUD customers in the CANS area and AWA customers in the Lake Camanche Village Area struggle with a variety of groundwater quality issues. As discussed on pages 4-5 of the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design (Appendix 7.5), groundwater has proven an unreliable and often unsuitable water supply source for the Camanche area. In addition to the highly variable quantities of available groundwater, Camanche area groundwater supplies have exhibited chronic water quality issues. Based on quarterly sampling in monitoring wells north of Lake Camanche in Amador County, groundwater iron concentrations greatly exceed the secondary MCL of 300 micrograms per liter (μg/L), reaching concentrations as high as 7,052 μg/L. Additionally, total manganese concentrations in monitoring wells are greater than the secondary MCL of 50 μg/L, reaching concentrations as high as 329 μg/L.

The following table summarizes groundwater quality issues in the CANS area based on the Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design (Appendix 7.5, page 12). In addition to the quality issues cited in this table, the report indicates that all of the wells also had low production rates that could not be sustained, and if the wells were operated without rest periods, production would rapidly drop.

Table 7-7: Groundwater Quality Issues in the CANS Area

Well	Date Constructed	Water Quality Issues
1	1948	• Non-potable water supply • Nitrate problems
2	1977 (rebuilt in 2000)	• High in iron and manganese; hydrogen sulfide present; coliform present if too much water is pumped.
3	1979	• High in iron and manganese; hydrogen sulfide present; high • heterotrophic plate counts
4	1999	• Was drilled to provide replacement water supply for Well No.2 in 1997, and at the time, tested positive for total coliform • High in iron, manganese, boron and hydrogen sulfide

This Project will replace use of unreliable, low quality groundwater supplies by the CANS community DAC with high quality, reliable Mokelumne River surface water taken from the Mokelumne Aqueducts. Water quality in Mokelumne River supplies is well-documented in the Upper Mokelumne River Watershed Assessment and Management Plan (Appendix 7.1). Based on this report, iron in the Mokelumne Aqudeuct supply average below documented CANS groundwater iron concentrations of 7,052 ug/L and well below the secondary drinking water standard of 300 ug/L. Similarly, Mokelumne Aqueduct manganese concentrations average below documented CANS groundwater concentrations reaching 329 ug/L and well below the secondary MCL of 50 μg/L.

Conservatively assuming Lake Camanche surface water supplies reach the secondary standard for iron and manganese, the project would result in a concentration reduction of approximately 6,752 mg/L and 279 mg/L of iron and manganese, respectively. Assuming 0.5

mgd of groundwater is offset by the project, this equates to a reduction in total iron and manganese of 6,752 and 279 pounds, respectively.

Without the Project, poor quality groundwater supplies would require an alternative source to be identified. Currently, the only viable alternative would be to truck in potable water supplies, as is currently done in the nearby Burson area.

By replacing 0.5 MGD of poor quality groundwater supplies that fail to achieve secondary standards for several constituents with reliable, high quality surface water supplies, this project will avoid the need to truck in potable supplies for CASS and CANS, a disadvantaged community.

Flood Damage Reduction Benefits

The project will not provide quantifiable flood damage reduction benefits.

Ecosystem Improvement Benefits

Currently, wellhead treatment is implemented to remove iron and manganese. This treatment generates a waste stream. By eliminating the need for targeted iron and manganese treatment, the CARWSP Phase 1 project will reduce the need for treatment and disposal of concentrated iron and managanese sludge.

Conservatively assuming Lake Camanche surface water supplies reach the secondary standard for iron and manganese, the project would result in a concentration reduction of approximately 6,752 mg/L and 279 mg/L of iron and manganese, respectively. Assuming 0.5 mgd of groundwater is offset by the project, this equates to a reduction in loading of 257,133 and 10,625 tons of iron and manganese to the environment over the 50-year project life, respectively.

Recreation/Public Access Benefits

The project will not provide recreation / public access benefits.

Energy-Related Benefits

The project will not provide quantifiable energy-related benefits.

Other Physical Benefits

The project will not provide other quantifiable physical benefits.

Facilities Required to Achieve Benefits

In order to achieve the benefits summarized above, all Phase 1 project components must be implemented, including:

- Vintage Home Fixture Retrofit Components
- Mokelumne Aqueduct connection
- Raw water pipeline from Mokelumne Aqueduct to WTP
- 0.5 MGD WTP (expandable to 2 mgd)

Uncertainty of Benefits

The following uncertainties could affect the degree of benefits achieved by the project.

- **Water supply:** The number of aged fixture in place in the project area is an estimate, based on discussion with water agency staff. A greater percentage of aged fixtures in the study area would mean greater conservation potential, and a lower percentage of aged fixtures would mean a lower conservation potential. Similarly, the precise water savings achieved depend upon the following:
    1. Flow rates of existing fixtures. Flow rates of existing fixtures were fairly conservatively assumed. Replacement of fixtures using more water than assumed would result in greater water savings. Replacement of fixtures using less water would result in lower water savings than currently estimated.
    2. Customer participation. Greater participation than currently envisioned would result in greater conservation savings, and lower participation would result in lower savings.
- **Water quality:** Degree of water quality improvement has been estimated based on historic groundwater quality. Groundwater quality has been observed to be declining; as such, the actual water quality benefits are expected to be greater than estimated.
- **Ecosystem Improvement:** Degree of water quality improvement has been estimated based on historic groundwater quality. Groundwater quality has been observed to be declining; as such, the actual water quality benefits are expected to be greater than estimated.

Project Adverse Effects

The project will have temporary, construction-related impacts. No long-term adverse effects are expected from this project. Any adverse effects will be fully mitigated.

Annual Project Physical Benefits

The following tables summarize the expected annual benefits from this project.

Table 9 – Annual Project Physical Benefits

Project Name: Camanche Area Regional Water Supply Project - Phase 1

Type of Benefit Claimed: Surface Water River Supplied to CASS, CANS

Measure of Benefit Claimed (Name of Units): MG per Year

Additional Information About this Measure:

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	0	183	183

Table 9 – Annual Project Physical Benefits			
Project Name: Camanche Area Regional Water Supply Project - Phase 1 Type of Benefit Claimed: Surface Water River Supplied to CASS, CANS Measure of Benefit Claimed (Name of Units): MG per Year Additional Information About this Measure:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)

Table 9 – Annual Project Physical Benefits			
Project Name: Camanche Area Regional Water Supply Project - Phase 1 Type of Benefit Claimed: Water Conserved through Vintage Home Fixture Retrofit Measure of Benefit Claimed (Name of Units): MG per Year Additional Information About this Measure:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	0	20	20

Table 9 – Annual Project Physical Benefits			
Project Name: Camanche Area Regional Water Supply Project - Phase 1 Type of Benefit Claimed: Reduction in Iron Concentration Measure of Benefit Claimed (Name of Units): mg/L Additional Information About this Measure: Conservatively assumes surface water iron cocnetrations equal to the MCL			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	7,052	300	6,752

Table 9 – Annual Project Physical Benefits			
Project Name: Camanche Area Regional Water Supply Project - Phase 1 Type of Benefit Claimed: Reduction in Managanese Concentration Measure of Benefit Claimed (Name of Units): mg/L Additional Information About this Measure: Conservatively assumes surface water manganese concetrations equal to the MCL			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	329	50	279

Table 9 – Annual Project Physical Benefits Project Name: Camanche Area Regional Water Supply Project - Phase 1 Type of Benefit Claimed: Reduction in Iron Loading to Environment Measure of Benefit Claimed (Name of Units): tons / year Additional Information About this Measure: Conservatively assumes surface water iron cocnetrations equal to the MCL			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	5,371	228	5,143

Table 9 – Annual Project Physical Benefits Project Name: Camanche Area Regional Water Supply Project - Phase 1 Type of Benefit Claimed: Reduction in Manganese Loading to Environment Measure of Benefit Claimed (Name of Units): tons / year Additional Information About this Measure: Conservatively assumes surface water iron cocnetrations equal to the MCL			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	251	38	212

Project 3: Ponderosa Way Restoration Project – Phase 1

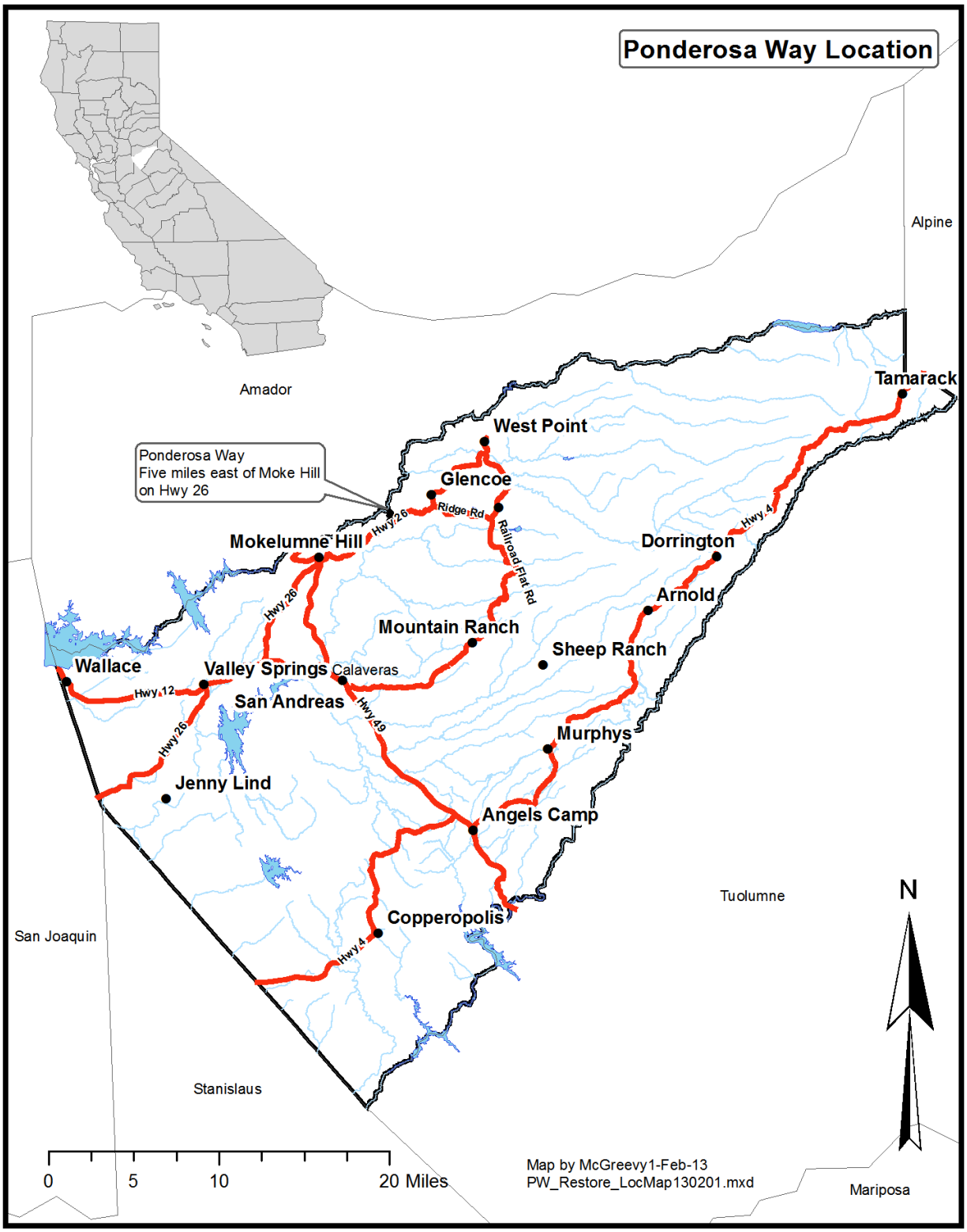
The Ponderosa Way Restoration Project focuses on the restoration of a segment of Ponderosa Way from Highway 26 to the Main Stem Mokelumne River, a distance of 2 miles with an elevation change from 1,900 feet to 800 feet (Figure 7-4). Ponderosa Way was built in 1934 by Franklin Roosevelt's Civilian Conservation Corps (CCC) to provide transportation for firefighters and provide a 200 foot wide fuel break. The public also used the road to access Mokelumne Canyon and the River for recreation. The road is now 79 years old and its drainage system has degraded causing deep rutting and three slides with gullying on the outside edge, causing severe siltation of Alabama Gulch, Dutchmans Gulch, and the Mokelumne River. The erosion process is further accelerated by four-wheel drive vehicular traffic during the wet season. With each storm, the drainage system further degrades, the ruts deepen and the gullies grow. During a deluge in January 2011, a blocked culvert forced Alabama Creek over its banks and washed the lower 700 foot segment of the road into the River. Without road restoration, maintenance and traffic control, winter erosion will continue unabated. The purpose of this project is to restore Ponderosa Way to minimize erosion, provide watershed access to the fire service, and open river access to the public for recreation.

The Ponderosa Way Restoration Project is divided into three phases. Phase 1, the Restoration of Ponderosa Way, for which funding is being requested, includes road restoration to minimize road erosion and river siltation, restore watershed access to CAL FIRE and BLM for fire prevention and suppression, and to the general public for recreation. The return of public access to the river will trigger Phase 2, the development of river recreation on the Main Stem Mokelumne River to include commercial whitewater boating.

Phase 2, the Development of Ponderosa Way Boat Launch, will open the Ponderosa Whitewater Run, 2.8 miles of class II/III rapids down to the Electra Powerhouse and connecting with the popular 5.8 mile Electra Whitewater Run. As part of FERC Agreement P-137, PG&E will install, operate, and maintain information signage, parking signage, a staff gage, unpaved parking for six vehicles, and a portable toilet during the boating season (See *Mokelumne River Project, FERC Project No. 137, Mokelumne Relicensing Settlement Agreement, Appendix A, Section 15. Whitewater Boating Access Facility Recommendation, Ponderosa Way run Put-in Facilities,* provided as Appendix 7.11).

Phase 3, the Long-term Maintenance of Ponderosa Way and the Boat Launch, will be a collaborative effort between PG&E, BLM, and Calaveras County Public Works. PG&E will operate and maintain the facilities at the Boat Launch and will also provide $25,000 annually to BLM for two River Rangers during the whitewater season (See Contribution for River Rangers and Recreation Technician in FERC Project No. 137, Mokelumne Relicensing Settlement Agreement).

Figure 7-4: Ponderosa Way Restoration Project Location



Phase 1, which will optimize road drainage and minimize long-term maintenance on Ponderosa Way, as well as restore public access to the Mokelumne River, is ready for implementation. Planning, design, environmental documentation, and permitting are already complete.

Existing Data and Studies

The Project is supported by studies documenting the potential project benefits, including:

- Ponderosa Way Restoration Project letter from Jan Bray, Calaveras Area Forester, Tuolumne-Calaveras Unit at the California Department of Forestry and Fire Protection to Calaveras County Public Works, dated October 22, 2012 – the letter summarizes an on-site assessment conducted by Jan Bray, a Professional Engineer and Certified Professional in Soil and Erosion Control, of Ponderosa Way. The letter provides recommendations of improvements including restoration measures and the installation of a gate (Appendix 7.10)
- Mokelumne River Project FERC Project No. 37, Mokelumne Relicensing Settlement Agreement (2000) – Appendix A, Section 15, describes the second and third phases of the Ponderosa Way Restoration Project. (Appendix 7.11)

Summary of Benefits

The projected project benefits include:

- **Water quality improvements:** The project will improve water quality by significantly reducing sediment loading to the Mokelumne River, which is the primary drinking water source for more than 1 million people. The restored Ponderosa Way will also provide watershed access to the fire service for the prevention and suppression of wildfires and their negative impacts on water quality.
- **Ecosystem improvement benefits:** The project will improve water quality by significantly reducing sediment loading to the Mokelumne River, improving water quality for habitat. The restored Ponderosa Way will also provide watershed access to the fire service for the prevention and suppression of wildfires, minimizing damage to habitat and environmental resources such as those observed from the 2004 Power Fire.
- **Recreation/Public Access:** The Phase 1 project, in particular the public access aspect, is a necessary first step that must be implemented prior to Phase 2, in which PG&E will install, operate, and maintain information signage, parking signage, a staff gage, unpaved parking for six vehicles, and a portable toilet during the boating season, enhancing recreation.
- **Energy:** The project will provide energy reduction benefits by eliminating the need to remove tons of sediment from the river due to major erosion events.

Table 7-8 summarizes the physical benefits that would be achieved through implementation of this project.

Table 7-8: Summary of Proposed Physical Benefits – Ponderosa Way Restoration Project – Phase 1

Project Benefit Summary	
Water Quality	• 9,400 ton reduction in sediment loading to the Mokelumne River
Ecosystem Improvement	• 9,400 ton reduction in sediment loading to aquatic environments
Recreation	• Enhanced access to: o 17 miles of trails o 8.4 river miles of whitewater boating o 2,000 acres of Mokelumne Canyon • 2,600 additional recreation visitor days per year

Background / Recent and Historical Conditions

Ponderosa Way is steep with an average grade of 11 percent. By design, runoff sheets to the inside ditch where it is collected by 30 culverts that drain under the road and discharge over the outside bank where it descends downhill to Dutchman Gulch, Alabama Gulch, and the Mokelumne River. While this system functioned well for approximately 79 years, time has taken its toll on the drainage system, and the roadway has rutted while culverts have day-lighted, degraded, corroded, and frequently block with sediment and/or debris from the road. Erosion is minimal on segments with a functional storm drain system. In contrast, segments with damaged or blocked culverts force large volumes of runoff down the road surface at high velocity causing rutting and erosion. The runoff that is eventually collected by a functional culvert is discharged over the outside bank where it sometimes cuts deep gullies into the hillside conveying silt along with stormwater. The erosion process is further accelerated by four-wheel drive vehicular traffic during the wet season. With each storm, the conditions worsen. In January 2011, a blocked culvert in Alabama Gulch caused a section of Ponderosa Way to be washed out near the Mokelumne River. Without road restoration, maintenance and traffic control, winter road erosion and river siltation will continue unabated.

While the annual amount of silt discharged into the river is unknown, the following estimates provide insight as to the order of magnitude.

- In October 2012, Calaveras County Public Works graded the road and used an estimated 800 tons of decomposed granite to fill the deep ruts implying that this tonnage had eroded into the gulches and river.

- There are three slides on the outside edge of the road. 'Big Slide' has developed into a gully measuring 20 feet wide, 7 feet deep and 140 feet downhill which translates into 622 cubic yards or an estimated 750 tons of eroded soil. 'Little Slide' measures 10 feet wide, 7 feet deep, and 12 feet

downhill, which translates to 37 tons of eroded soil. The 'River Slide' discharges directly into the Mokelumne River and measures 29 feet wide, 8 feet deep, and 22 feet downhill which equates to 246 tons of eroded soil.

While Public Works has filled ruts, graded, and remediated two major sources of erosion in October 2012, the ditch system requires additional culverts, the slides need retaining walls, and the surface needs to be sealed with compacted road base. The rains in November and December 2012 and January 2013 have already started the rutting process once again. While the work of the volunteer 'Ditch Detail' can slow this process, the road will eventually be lost to erosion if the Ponderosa Way Restoration Project is not completed.

In addition, in 2004, the North Fork of the Mokelumne River was the site of a wildfire known as the "Power Fire." The Power Fire burned a significant area along the North Fork of the Mokelumne River, and caused major water quality issues downstream. Maintenance of Ponderosa Way for watershed access to facilitate fire prevention/suppression will reduce the risk of a catastrophic fire by minimizing its spread and preventing associated water quality impacts.[1]

The following images demonstrate the problem and list the required restoration techniques.

Ponderosa Way Below Quarry

WP 8

- Culvert exposed & broken
- Remediation
  - Replace inside 20' of culvert
  - Fill ruts, compact and grade

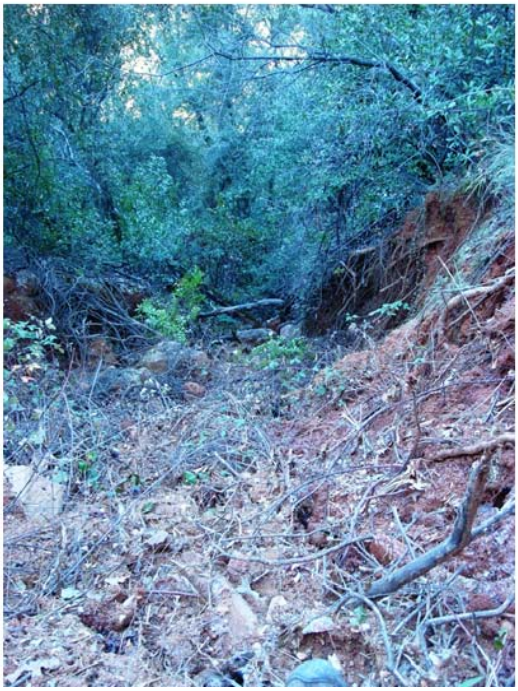
[1] Water quality impacts caused by the Power Fire are discussed on pages 68 – 72 of Appendix J of the Upper Mokelumne River Watershed Assessment and Planning Project Final Report, provided as Appendix 7-1.

Ponderosa Way at 'Big' Slide

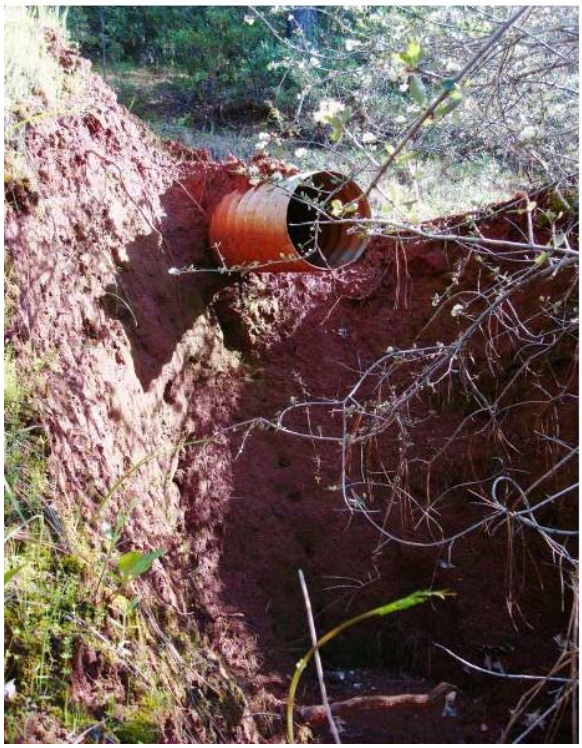
WP 19a

- Outboard slide
- Restoration:
  - Remove culvert
  - Fill slide, compact
  - Rip ruts, fill, grade
  - Install new culvert 20' downhill

Ponderosa Way–Inside "Big Slide" 120' below road
L: Looking up; R: Looking down



Ponderosa Way- 'Little' Slide

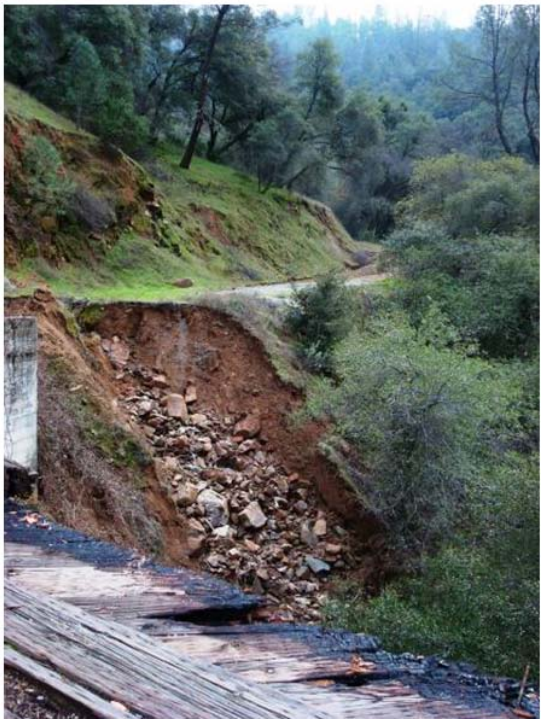


WP 21

- Catchment blocked
- Culvert exposed
- Outside slide
- Restoration:
  - Open catchment
  - Fill slide, compact
  - Rip ruts, fill, grade

Ponderosa Way
Erosion & Slide at River (January 2011)

Discharge at river
Slide and gully eroded ~246 tons of dirt



Ponderosa Way: November Rills after October Grading & Rain

Without Project Conditions

Without road restoration, maintenance and traffic control, winter road erosion and river siltation will continue unabated. Ponderosa Way will continue to erode, and sedimentation to the river is expected to occur at historical rates or greater. It is estimated that, without the Project, an average of approximately 188 tons of sediment per year will erode and discharge to the river.

In addition, the rutted condition of Ponderosa Way prevents its use for recreational river access and for management of fire fuels. Traditionally, Ponderosa Way was used by residents of nearby disadvantaged communities as a means of no-cost to access the river and a variety of popular swimming holes along the Way. Since it has fallen into disrepair, it can no longer be used for easy River access, and the once popular family swimming holes have become a hot spot for illegal activity, due in part to their inaccessibility. Without the Project, this trend is expected to continue into the future, and one of the few no-cost recreational alternatives available to the region will be lost.

Phase 1 of the project is a necessary first step that must be implemented prior to implementation of Phases 2 and 3. In Phase 2, PG&E will install, operate, and maintain information signage, parking signage, a staff gage, unpaved parking for six vehicles, and a portable toilet during the boating season. Phase 3, the Long-term Maintenance of Ponderosa

Way and the Boat Launch, will be a collaborative effort between PG&E, BLM, and Calaveras County Public Works. PG&E will operate and maintain the facilities at the Boat Launch and will also provide $25,000 annually to BLM for two River Rangers during the whitewater season. Without implementation of Phase 1, the new recreational facilities to be installed by PG&E and the ongoing maintenance support will not be realized, and the community will continue to struggle to prevent Ponderosa Way from sliding down the hill and into the River.

Lastly, without the Project, Ponderosa Way will continue to provide little to no value as a fire break or access road for fire and fuels management, leaving the Region vulnerable to wild fire impacts to public safety and property, as well as water quality.

Description of Benefits and Methods to Estimate Benefits

The following sections summarize project benefits and methods used to estimate benefits in the following areas:

- Water Supply
- Water Quality
- Flood Damage Reduction
- Ecosystem Improvement
- Recreation/Public Access
- Energy
- Other Physical Benefits

Water Supply Benefits

No water supply benefits are expected to be generated by project implementation.

Water Quality Benefits

The project will improve water quality by significantly reducing sediment loading to the Mokelumne River, which is the primary drinking water source for more than 1 million people. Calaveras County Public Works has estimated the reduction in sediment loading to the Mokelumne River expected as a result of this project as follows.

- **Reduction in road erosion from Ponderosa Way directly into Mokelumne River:** An estimated 800 tons of road surface eroded below a breached levee at Alabama Gulch during the deluge in Jan-2011. This estimate was based on the amount of fill required to fill ruts & re-grade the road. Assuming this level of silt deposition occurs an average of once every ten years, road restoration would reduce annual sedimentation of the river by 80 tons at this location.
- **Reduction in erosion from Ponderosa Way from the outside slide and gullying at bottom discharge into river:** 266 tons of silt were removed following the deluge in January 2011. Tonnage was estimated by Calaveras County Public Works staff based on the volume of gullies, calculated from linear measurements. Assuming this level of silt deposition occurs an average of once every ten years, the average annual reduction of sediment per year at this location would be approximately 26.6 tons.
- **Reduction in erosion from two road slides and gullying into a 0.4-mile stretch of Alabama Gulch:** An estimated 750 tons of silt has eroded from 'Big Slide' and 20 tons from 'Little Slide' over the last 10 years. This tonnage was calculated by Calaveras County Public Works staff based on the estimated volume of gullies

calculated from linear measurements. This equates to an annual reduction of 75 tons of sediment per year at this location.

- **Reduction in erosion from one road slide draining into 0.7 miles of Dutchman Gulch:** Approximately 32 tons of sediment has eroded over the last five years. This tonnage was estimated by Calaveras County Public Works staff based on the estimated volume of gullies from linear measurements. This equates to an annual reduction of 6.4 tons of sediment per year at this location.

In total, this amounts to an average annual reduction in sediment loading of approximately 188 tons / year, or 9,400 tons over the 50-year project life.

Flood Damage Reduction Benefits

The project is not expected to provide flood damage reduction benefits.

Ecosystem Improvement Benefits

The project will improve water quality by significantly reducing sediment loading to the Mokelumne River (described under water quality, above), improving water quality for habitat.

Recreation/Public Access Benefits

The Ponderosa Way Restoration Project – Phase 1 is a necessary first step that must be implemented prior to Phase 2, in which PG&E will install, operate, and maintain information signage, parking signage, a staff gage, unpaved parking for six vehicles, and a portable toilet during the boating season, enhancing recreation and public access. In addition, Ponderosa Way provides access to a variety of recreational assets, including:

- 8.5 miles of whitewater boating on the Mokelumne River down to Middle Bar (river miles measured by the Calaveras Parks and Recreation Commission using ArcMap).
- More than 17 miles of trails in a developing trail system in the Mokelumne Canyon, including the Mokelumne Coast to Crest Trail, Butterfield Trail and the Mokelumne Canal Trail. Trails were plotted by the Calaveras Parks and Recreation Commission and measured in ArcMap.
- 850 acres of wild BLM and PG&E land in the Mokelumne Canyon near Ponderosa Way. Over 2,000 acres will be accessible when the Mokelumne Coast to Crest Trail is opened in 2015. This acreage was measured by the Calaveras County Parks and Recreation Commission using ArcMap

The Upper Mokelumne River watershed is home to approximately 10,000 residents (Upper Mokelumne River Watershed Assessment and Management Plan, page 4-4). Assuming only one percent of watershed residents take advantage of enhanced recreation access on a weekly basis during spring and summer months, then an additional 2,600 recreation visitor days per year would be created (10,000 * 1 / 100 * 52 / 2).

Energy-Related Benefits

No energy-related benefits are expected to accrue from project implementation.

Other Physical Benefits

No other quantifiable physical benefits are expected to accrue from project implementation.

Facilities Required to Achieve Benefits

In order to achieve the benefits summarized above, all project components must be implemented, including:

- Road restoration
- Installation of a heavy duty gate near Highway 26

Uncertainty of Benefits

The benefits claimed are based on the following assumptions, which contribute to the uncertainty of benefits:

- Water Quality: Sediment load reduction benefits are based on estimated tonnage removed in past restoration efforts, as well as calculations of the volume of gullies. Uncertainty associated with these estimates could affect the degree of benefit of the project. In addition, the degree of erosion depends upon hydrologic conditions. As increase or decrease in storm frequency and / or severity compared to historical conditions could affect the benefits realized.
- Ecosystem Improvement: Same as above.

Project Adverse Effects

The project will have temporary, construction-related impacts. No long-term adverse effects are expected from this project. Any adverse effects will be fully mitigated.

Annual Project Physical Benefits

The following tables summarize the expected annual benefits from this project.

Table 9 – Annual Project Physical Benefits

Project Name: Ponderosa Way Restoration Project - Phase 1

Type of Benefit Claimed: Reduction in Sediment Loading to Mokelumne River

Measure of Benefit Claimed (Name of Units): tons / year

Additional Information About this Measure: Based on estimated historical loading due to erosion

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	0	188	188

Table 9 – Annual Project Physical Benefits			
Project Name: Ponderosa Way Restoration Project - Phase 1			
Type of Benefit Claimed: Reduction in Sediment Loading to Aquatic Habitats			
Measure of Benefit Claimed (Name of Units): tons / year			
Additional Information About this Measure: Based on estimated historical loading due to erosion			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	0	188	188

Table 9 – Annual Project Physical Benefits			
Project Name: Ponderosa Way Restoration Project - Phase 1			
Type of Benefit Claimed: Miles of Trails with Improved Access			
Measure of Benefit Claimed (Name of Units): miles of trails			
Additional Information About this Measure:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	0	17	17

Table 9 – Annual Project Physical Benefits			
Project Name: Ponderosa Way Restoration Project - Phase 1 Type of Benefit Claimed: Miles of Whitewater Boating with Improved Access Measure of Benefit Claimed (Name of Units): miles of whitewater boating Additional Information About this Measure: Whitewater boating on the Mokelumne river down to Middle Bar			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	0	9	9

Table 9 – Annual Project Physical Benefits			
Project Name: Ponderosa Way Restoration Project - Phase 1 Type of Benefit Claimed: Acres of Mokelumne Canyon with Improved Access Measure of Benefit Claimed (Name of Units): acres of Mokelumne Canyon lands accessible Additional Information About this Measure: Assumes Mokelumne Coast to Crest Trail is completed in 2015			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	0	2,000	2,000

Table 9 – Annual Project Physical Benefits			
Project Name: Ponderosa Way Restoration Project - Phase 1 Type of Benefit Claimed: Increased Recreation Visitor Days Measure of Benefit Claimed (Name of Units): Visitor Days Additional Information About this Measure:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015-2064	0	2,600	2,600

Appendices

The following Appendices have been provided on the CD included at the end of this proposal.

Appendix	Filename
Appendix 7-1 - Upper Mokelumne River Watershed Assessment and Planning Project Final Report, Chapter 8 and Appendix J	Att7_IG2_TechJust_2of2
Appendix 7-2 - 2008 Urban Drought Assistance Grant Application	Att7_IG2_TechJust_2of2
Appendix 7-3 - Water Conservation Plan (RMC Water & Environment, 2010)	Att7_IG2_TechJust_2of2
Appendix 7-4 – Baird, John. The Epidemic of Corrosion Part 1: Examining Pipe Life, American Water Works Association, December 2011.	Att7_IG2_TechJust_2of2
Appendix 7-5 - Camanche Area Regional Water Supply Plan Feasibility Study and Conceptual Design (RMC Water and Environment, 2013)	Att7_IG2_TechJust_2of2
Appendix 7-6 - Camanche South and North Shore Water Treatment Plants Evaluation	Att7_IG2_TechJust_2of2
Appendix 7-7 - Camanche Water Treatment Plant Replacement Project Mitigated Negative Declaration, State Clearinghouse Number 2001072084 (July 2001 Draft; September 2001 Final)	Att7_IG2_TechJust_2of2
Appendix 7-8 - Camanche Regional Water System Draft Feasibility Study (KASL, July 1999)	Att7_IG2_TechJust_2of2
Appendix 7-9 - Nichols, Dana. All is Not Well Near Burson: For Residents Near Burson, Getting Water is No Mere Turn of the Tap (RecordNet, October 20, 2005)	Att7_IG2_TechJust_2of2
Appendix 7-10 - Ponderosa Way Restoration Project letter from Jan Bray, Calaveras Area Forester, Tuolumne-Calaveras Unit at the California Department of Forestry and Fire Protection to Calaveras County Public Works, dated October 22, 2012	Att7_IG2_TechJust_2of2
Appendix 7-11 - Mokelumne River Project, FERC Project No. 137, Mokelumne Relicensing Settlement Agreement, Appendix A	Att7_IG2_TechJust_2of2