PROJECT JUSTIFICATION

This attachment provides the project justification for the various projects contained in this Proposal and is organized as follows:

Project Summary Table – A table showing how each project addresses IRWM Project Elements of the 2015 IRWM Grant Solicitation. This table is consistent with PSP Table 4.

Regional Map – An illustration of the IRWM regional boundary and the location of each project contained in the Proposal.

Project Specific Information – Information for each project is provided in the following order:

- Project description
- Project-specific map
- Description of project physical benefits and technical analysis of physical benefits claimed
- Discussion on direct water-related benefit to a disadvantaged community (DAC)
- Project Performance Monitoring Plan
- Cost-effectiveness analysis of the project.

Table 2.1 – 2015 IRWM Grant Solicitation Project Summary Table (PSP Table 4)						
IRWM Project Element		Water Wise Incentive Program	Camrosa Recycled Water Pipeline	Pleasant Valley Mutual Water Company Desalter	Moorpark Desalter Phase 1	Santa Clara River Steelhead Coalition Restoration
IR.1	Water supply reliability, water conservation, and water use efficiency	✓	✓	✓	✓	✓
IR.2	Stormwater capture, storage, clean-up, treatment and management	✓				
IR.3	Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands					✓
IR.4	Non-point source pollution reduction, management, and monitoring	✓				
IR.5	Groundwater recharge and management projects		✓		✓	✓
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users		✓	✓	✓	
IR.7	Water banking, exchange, reclamation, and improvement of water quality			✓	✓	
IR.8	Planning and implementation of multipurpose flood management programs					
IR.9	Watershed protection and management	✓		✓	✓	✓
IR.10	Drinking water treatment and distribution			✓	✓	
IR.11	Ecosystem and fisheries restoration and protection					✓

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Kern County

Santa Barbara County

Ventura County

Los Angeles County

Pacific Ocean

	Project Sites
1	Water Wise Incentive Program
2	Camrosa-CamSan Recycled Water Interconnection
3	Pleasant Valley Mutual Water Company Desalter
4	Moorpark Desalter Phase 1
5	Santa Clara River Steelhead Coalition Restoration Project

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Legend

- Project Sites
- Los Padres National Forest
- Watersheds Coalition Ventura County Boundary
- Counties

B118 Groundwater Basins

- ARROYO SANTA ROSA VALLEY
- CONEJO
- CUDDY RANCH
- CUYAMA VALLEY
- HIDDEN VALLEY
- LAS POSAS VALLEY
- LOCKWOOD VALLEY
- OJAI VALLEY
- PLEASANT VALLEY
- SIMI VALLEY
- THOUSAND OAKS
- TIERRA REJADA
- UPPER OJAI VALLEY
- VENTURA RIVER VALLEY

Santa Clara River Valley Sub-Basins

- FILLMORE
- MOUND
- OXNARD PLAIN FOREBAY
- OXNARD PLAIN PRESSURE
- PIRU
- SANTA PAULA

0 2.5 5 Miles

Kennedy/Jenks Consultants

Watersheds Coalition of Ventura County
2015 IRWMP Implementation Grant
Ventura County, California

Regional Map

K/J 1544223.00
July 2015

WATER WISE INCENTIVE PROGRAM

A program to provide outdoor water use efficiency rebates to customers in western Ventura County to produce 2,350 acre feet (AF) in water savings.

IMPLEMENTING AGENCY: City of San Buenaventura (Ventura Water)

PROJECT DESCRIPTION

With conservation fatigue setting in after nearly four years of drought, Ventura Water, City of Santa Paula and Casitas Municipal Water District are looking for new programs to encourage greater water use efficiency among customers. Historically, conservation rebate programs have been an effective means to promote water conservation, however no such incentive program has been available to customers of those three agencies. These areas are outside of, and cannot participate in, the popular Metropolitan Water District of Southern California rebate program. In addition, Ventura Water demands are projected to exceed existing supplies by 2020, which increases the urgency to implement effective means to reduce water demands.

Ventura Water is proposing the Water Wise Incentive Program, a new regional water conservation initiative that focuses on providing outdoor water use efficiency incentives to customers of Ventura Water, the City of Santa Paula and Casitas Municipal Water District (see the project map provided on the following page). This Program will result in estimated water savings of 235 acre-feet per year (AFY) over ten years and reduced loads of nitrogen by 24.2 pounds (lbs) per year and phosphorus by 0.3 lbs per year.

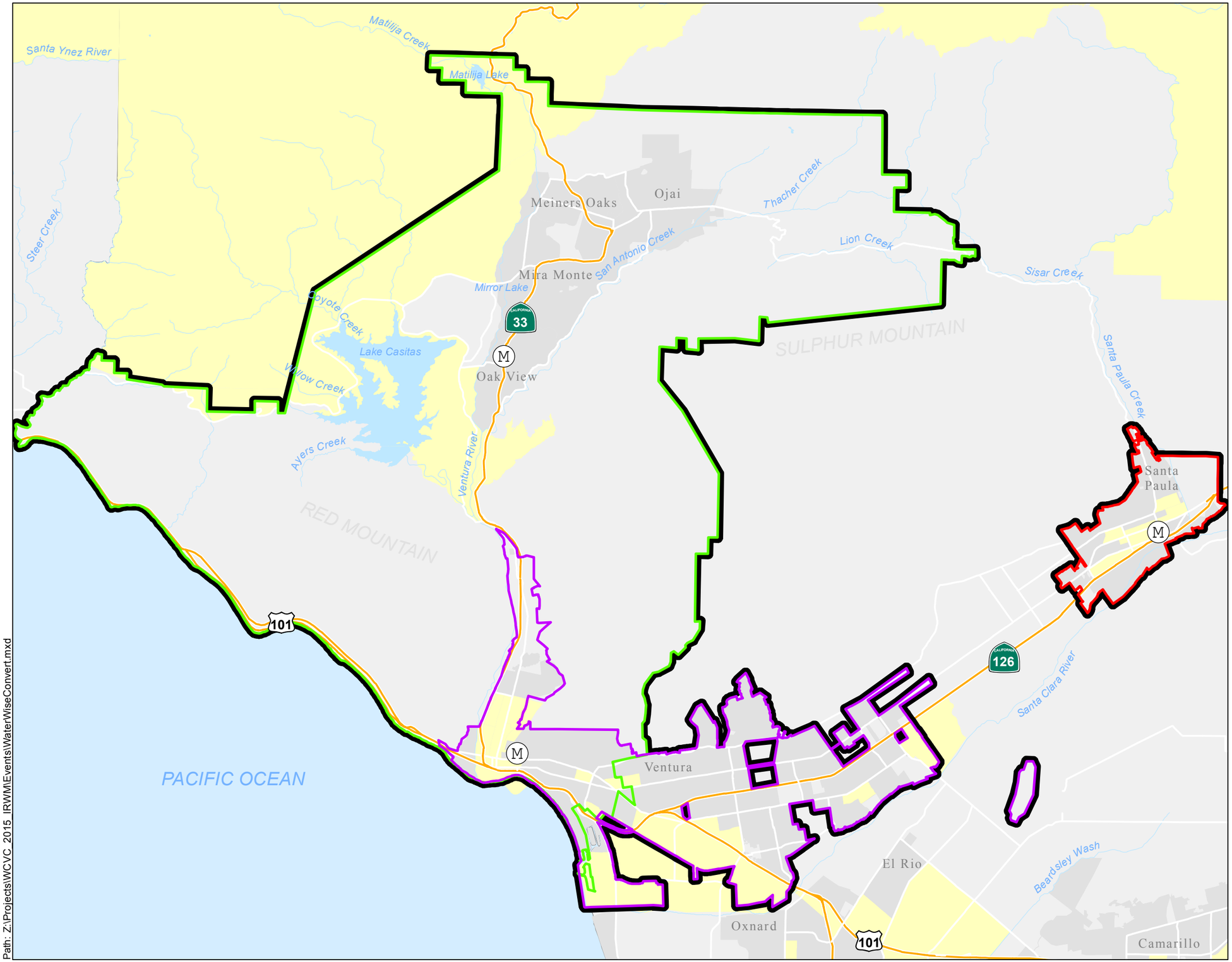
The Program will offer rebates for turf removal, weather-based irrigation controllers, high-efficiency (HE) nozzles, and rainwater harvesting and reuse devices. Water use audits will be conducted to identify the appropriate combination of landscape water efficiency measures or devices for a given property and to verify pre- and post-turf replacement, where applicable. Upon verification of the purchase of materials/devices and turf replacement, funds will be reimbursed to the customer. For rain capture devices, customers will also have the option of using participating retailers to receive an immediate 50% discount (rebate) or purchase elsewhere and submit receipts for 50% reimbursement, up to the maximum rebate.

The program proposes converting at least 1,050,000 square feet (sf) (and up to 2,000,000 sf) of turf to ocean friendly gardens, thereby resulting in estimated water savings of at least 42.95 AF. Rebates of $2 per square foot of turf removed will be provided to qualifying customers. Residential customers will be able to purchase discounted smart controllers or soil moisture sensors to reduce total irrigation demands by an estimated 145 AF. A total of 500 water based irrigation controllers will be distributed with rebates of up to $150 available per customer. Residential customers will be able to receive up to 25 free HE nozzles per customer for a total of 1,000 customers, which generate an estimated water savings of 37.9% for a total of 1723.5 AF. The program will also distribute 250 rain barrel rebates worth $45 that will have the potential to save an estimated 52.6 AF by capturing and reusing stormwater. Increasing landscape water use efficiency will also help reduce the amount of urban runoff and the amount of related pollutants entering local surface waters.

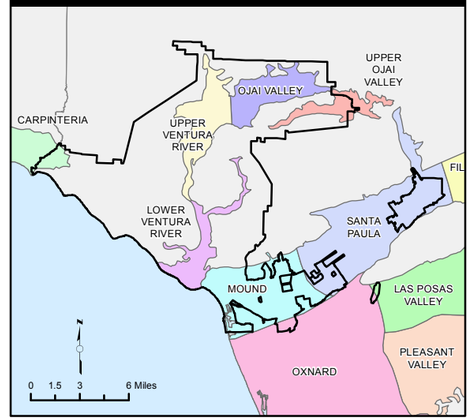
The Program was launched on July 1, 2015 within the Ventura Water service area, and received 238 applications in less than two weeks. Upon grant award, the Program will be expanded to the service areas of City of Santa Paula and Casitas Municipal Water District. This Program provides an important financial incentive to encourage water use efficiency and will help project partners meet their demands and urban water use reduction targets.

How the Project Addresses a Current Need of the Region

The multi-year, statewide drought has reduced the availability of and increased competition for water supplies across Ventura County. In the early drought stages, agencies of western Ventura County still had water supplies that exceeded demands, these same agencies are now facing future supply shortfalls. Ventura Water is projecting shortfalls of more than 5,000 AFY by 2020. Meanwhile, conservation fatigue has set in, making increased water use efficiency a greater challenge without direct incentives. By incentivizing increased water use efficiency and reducing water demands, this project will help Ventura Water to reduce pressures on shared water resources, including local surface and groundwater supplies and imported water, and will help the participating agencies to comply with current and potential upcoming water use reduction mandates.



GROUNDWATER BASINS



Legend

- Monitoring Site
- Ventura Water Service Area
- Santa Paula City Limits
- Casitas Municipal Water District Service Area
- Project Area
- Rivers/Streams
- Water Body
- Disadvantaged Communities

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2015 IRWM Implementation Grant
Ventura County, California

Water Wise Incentive Program

July 2015

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PROJECT PHYSICAL BENEFITS

The following primary and secondary physical benefits are expected from this project:

- Primary Benefit: Saves 235 AFY in water supplies
- Secondary Benefit: Improves water quality by reducing nitrogen loading by 3.55 mg/L

Each benefit is discussed in further detail below, with an overview of each benefit expected over the project life and a technical analysis of the physical benefit claimed. Following the project benefits discussion, a cost-effectiveness analysis of the project compared to its alternatives is provided.

TECHNICAL ANALYSIS OF PHYSICAL BENEFITS CLAIMED

Primary Benefit: Saves 235 AFY in water supplies

As is shown in Table 2.2, this project provides water conservation and rain harvesting benefits totaling 235 AFY in potable water savings.

Table 2.2 – Annual Project Physical Benefits
Project Name: Water Wise Incentive Program
Type of Benefit Claimed: Water savings (primary benefit)
Units of the Benefit Claimed : Acre-feet per year (AFY)
Anticipated Useful Life of Project (years): 10

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2015	0	94	94
2016	0	212	212
2017- 2024	0	235	235
2025	0	141	141
2026 (Final year of project)	0	24	24

Comments: The Water Wise Incentive Program will begin providing water conservation rebates in July 2015. At full implementation (between 2017 and 2024), these incentives will save approximately 235 AFY of water. Water savings from these measures are phased in from 2015 to 2017, and are assumed to have a 10 year useful life.

1. Explanation of need for the project including recent and historical conditions

Western Ventura County has been experiencing significant water supply challenges as a result of the multi-year drought, including decreasing and impaired surface water supplies and declining groundwater levels. Among the agencies experiencing these significant drought impacts and anticipating water shortages are the Ventura Water service area, Casitas Municipal Water District and the City of Santa Paula. These agencies, the Water Wise Incentive Program project partners, rely exclusively on local supplies and are currently unable to receive imported water from the State Water Project (SWP).

Ventura water supplies primarily include surface water from Lake Casitas, provided by Casitas Municipal Water District, Ventura River surface supplies and groundwater from the Mound, Oxnard Plain and Santa Paula basins. Due to the drought, the City of Ventura has lost 70% of its normal Ventura River supply, and extractions from the Foster Park wells (recharged from the Ventura River) are not expected in 2015 or 2016. Groundwater from the Fox Canyon Groundwater Management Agency (FCGMA) area (Mound, Oxnard Plain, and Santa Paula

groundwater basins) made up approximately 64% of 2015 supplies for the City of Ventura, as opposed to roughly 47% in 2010 (RBF Consulting, 2015 page 34; City of Ventura, 2011 page 33). However, groundwater levels are declining in these three basins (UWCD 2013, page 3; UCWD 2012, page 10) and seawater intrusion is already impacting the Oxnard Plain due to declining groundwater levels (FCGMA, 2014a, page 4). In addition, FCGMA has curtailed groundwater supplies, including through adoption of Emergency Ordinance E, on April 11, 2014, which required 20% reductions in groundwater pumping in FCGMA basins (FCGMA, 2014b, page 1).

The reduced groundwater supply availability of the Santa Paula Basin is also a huge concern for the City of Santa Paula which primarily depends on groundwater from that basin and has no option for SWP imports (City of Santa Paula, 2011, page 41).

Lake Casitas is the primary source of water supply for Casitas Municipal Water District, which as mentioned above, also services the City of Ventura (CMWD, 2011, pages 16 and 26). However, for the first time since 1968, levels in Lake Casitas are below 50% of full volume (RBF Consulting, 2015, page 31). Lower water levels are also resulting in significant water quality impairments that in turn exacerbate lake water supply issues (CMWD, 2011 page 54; FSI, 2013 page 1).

With declining local supplies and limited options to receive SWP water supplies in the near future, these agencies are facing imminent water shortages. Ventura Water is projecting shortfalls of over 5,000 AFY by 2020 and has already incurred overdraft fees for excess withdrawal from Lake Casitas (City of Ventura, 2015; City of Ventura, 2014, page 5-2). Ventura Water will have to implement mandatory conservation measures and/or penalties in order to curtail water demands, if existing conditions persist (City of Ventura, 2014, pages ES-2, 5-2).

In addition to the agencies' issues related to meeting demand, the Governor issued an executive drought order to reduce water consumption, which included a directive for replacing turf with drought tolerant landscapes (Brown, 2015). The Region has already been implementing water conservation measures to comply with Senate Bill X7-7, which calls for a 20% reduction in baseline per-capita water use by 2020. However, with nearly four years of drought, so-called conservation fatigue is setting in, making increased water conservation by customers increasingly difficult without additional incentives. While, conservation rebate programs have historically been effective means to promote water conservation, no such incentive program has been available to customers of the partner agencies, Ventura Water, City of Santa Paula and Casitas Municipal Water District. These areas lie outside of, and cannot participate in, the popular Metropolitan Water District of Southern California rebate program.

Water demand-side strategies are vital in order for these agencies to meet demands with existing water supplies. Moreover, outdoor use makes up the largest portion of typical residential water use, making improved outdoor water use efficiency a high priority for water demands reductions. The Water Wise Incentive Program will provide the necessary means to produce significant reductions in customer water use and help address the growing discrepancies between water supplies and demands.

2. Estimates of without project conditions with respect to this benefit

Without this project, project partners, which include Ventura Water, the City of Santa Paula and Casitas Municipal Water District will continue to face imminent water shortages with few to no options to incentivize increased water use, without implementing mandatory conservation measures. Without this project, up to 235 AFY of local water supplies will continue to be used inefficiently on outdoor water use or would not be captured with rain capture devices. As a result up to 235 AFY would continue to be drawn from already stressed local surface and groundwater resources and/or partner agencies would risk not meeting customer water demands by up to 235 AFY.

3. Descriptions of methods used to estimate physical benefits

There are four program elements included in this project – 1) turf removal rebate, 2) HE nozzles for irrigation, 3) weather-based irrigation controllers (WBICs), and 4) rain harvesting supplies. With implementation of these elements in the amounts proposed by the Program, a total of 235 AFY in water supplies can be saved and used more efficiently.

Methods to estimate savings for each of these program elements are discussed below. All water savings measures are assumed to have a useful lifetime of 10 years.

a) Turf removal rebate: The Program proposes converting at least 1,050,000 sf of turf to ocean friendly gardens. Related water savings are calculated using the State Model Water Efficient Landscape Ordinance (MWELO) Estimate Total Water Use (ETWU) formula (Ventura Water, 2015 page 11). The California Department of Water Resources has extensive data on crop coefficients (also known as plant factors) for numerous species, including turf grasses. According to these data, cool season turf has a crop coefficient of 0.8, while low water using plants have a coefficient range of 0.1-0.3 (DWR, 2000 pages 6 and 12). Taking the high end of this range and the Region's evapotranspiration rate of 43 inches, the water usage for turf grass and low water using plants is calculated:

Turf grass: 1,050,000 sf x 43 in. x 0.8 x 0.62 (conversion to gallons) = 22,394,400 gallons or 68.73 AF.

Low water using plants: 1,050,000 sf x 43 in. x 0.3 x 0.62 = 8,397,900 gallons or 25.77 AF.

Based on the difference of those water use figures, converting 1,050,000 square feet of turf will yield approximately 42.95 AFY in water savings (68.73 AFY without the project minus 25.77 AFY with the project).

b) HE nozzles: Conventional nozzles disperse roughly two gallons per minute. Over an average annual use of 5,616 minutes, these nozzles use 11,232 gallons per year. Field studies show HE nozzles produce water savings in the range of 10 to 30% (Alliance for Water Efficiency, 2011, page 175). A savings of 20% is commonly found for Southern California (Maddaus Water Management Inc., 2014), and is assumed for this grant application. This Program will rebate 25,000 nozzles, thereby resulting in total annual savings of approximately 172.35 AFY.

c) WBICs: Raftelis Financial Consultants, Inc. has compiled Ventura Water residential usage statistics that show the average single-family residence uses approximately 2,100 cubic feet per bi-monthly period, or roughly 94,248 gallons per year with conventional irrigation (RFCI, 2012, page 24). CUWCC compiled statistics on the impact of single-family residential WBICs from five studies and found that, on average, they save approximately 10% of total water use (CUWCC, 2014, page 7). This Program will provide rebates for 500 WBICs, thereby resulting in annual water savings of approximately 14.5 AFY (500 WBICs x 0.1 savings x 94,248 gallons/year/household divided by 325,851 gallons/AF).

d) Rain harvesting: H2ouse.com and The Ecology Center provide a standard equation for calculating rainwater harvesting that incorporates rainfall and catchment area (roof area draining to storage) (2015). This project will provide rebates for two 50-gallon rain barrels per household, for 125 households (a total of 250 barrels). Catchment area is assumed to be 1,500 sf, a conservative estimate given that the average roof size in nearby Orange County is 3,000 sf. With an average annual rainfall of 14.67 inches (WRCC, 2015) and assuming 125 households would receive rain barrels, this project will provide approximately 5.26 AFY in rainwater harvesting (125 households x 1,500 sf catchment area x 14.67 inches of rainfall x 0.623 conversion to gallons = 1,713,639 gallons, or 5.26 AFY).

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

No new facilities, policies, or actions are required to obtain this physical benefit. Direct rebates and/or reimbursements will be provided by project partners in order for agency customers to implement water saving devices and activities.

5. Description of any potential adverse physical effects

The Water Wise Incentive Program is an administrative program that provides rebate incentives to customers and no potential adverse physical effects are expected from implementation. Rain harvesting measures proposed in this project do not produce savings significant enough to threaten groundwater recharge. In general, water conservation will reduce revenues for project partners as less water is sold. However, this is a consideration for rate setting while implementing any water efficiency program and would not result in adverse physical effects.

6. Description of whether the proposed project effectively addresses long-term drought preparedness

This project addresses long-term drought preparedness according to four of the six criteria identified in the Statewide Priorities for the IRWM Grant Program.

First, the project will contribute to the objective to "promote water conservation, conjunctive use, reuse and recycling." The project is a regional water conservation initiative that will promote increased water conservation and outdoor water use efficiency including rain harvesting.

Second this Program will directly "improve residential landscape irrigation efficiency" by providing incentives to facilitate implementation of low water use irrigation devices, turf removal/conversion, as well as rain capture for potential irrigation with rainwater.

Third, by facilitating implementation of outdoor water use efficiency mechanisms, that have an estimated lifetime of at least ten years, this project directly helps "achieve long-term reduction of water use." While the claimed project life of turf replacement is ten years, with proper care, turf replacement can provide water savings lasting multiple decades.

Finally, groundwater is a major source of water supply for Ventura Water and the City of Santa Paula and the water basins are experiencing significant declines in groundwater level, and one of them is becoming increasingly impacted by seawater intrusion. Water demand reductions enabled by this project will help relieve pressures on those groundwater basins. As a result, this project contributes to more "efficient groundwater basin management."

Summary of primary benefit

This project will save approximately 235 AFY of water through improved water use efficiency measures, including conversion to ocean friendly gardens, WBICs and HE nozzles, and rain harvesting. Water conserved through this project will help relieve stressed surface and groundwater supplies and will help the region meet its water demands. In addition, turf replaced through this project will help the State achieve the Governor's turf conversion goal, outlined in the Governor's 2015 executive order.

Secondary Benefit: Improves water quality by reducing nitrogen loading by 3.55 mg/L

As is shown in Table 2.3, the project will improve water quality by reducing 3.55 mg/L of nitrogen by eliminating runoff from properties where turf removal occurred. Overall, this project will reduce nitrogen loads by 24.2 lbs per year due to turf removal and WBIC installation.

1. Explanation of need for the project including recent and historical conditions

As described under the project primary benefit discussion, Ventura Water, the City of Santa Paula and Casitas Municipal Water District are in dire need to reduce water demands in the face of water shortages and complete dependence on limited local water supplies. Water demand-side strategies are vital in order for these agencies to meet demands with existing water supplies. In addition, outdoor water use, being the largest use of residential water use, is a particularly high priority for water use efficiency and conservation incentive programs.

Table 2.3 – Annual Project Physical Benefits **Project Name: Water Wise Incentive Program** **Type of Benefit Claimed: Improved water quality – reduction in nitrogen (secondary benefit)** **Units of the Benefit Claimed : Milligrams per liter (mg/L)** **Anticipated Useful Life of Project (years): 10**			
(a)	**(b)**	**(c)**	**(d)**
	Physical Benefits		
Year	**Without Project**	**With Project**	**Change Resulting from Project (c) – (b)**
2015 to 2026	3.55 mg/L	0	-3.55 mg/L
Comments: The Water Wise Incentive Program will eliminate 3.55 mg/L of nitrogen (total nitrogen) loading by eliminating runoff from properties that convert turf to ocean friendly gardens, which will begin in 2015. Additional details on water quality benefits are discussed below.			

Apart from the water supply implications, outdoor water use also has significant water quality implications. Runoff from landscape irrigation is a significant source of non-point source pollution in urban environments, including total nitrogen and phosphorus loads that can impact local water bodies. In fact, a study conducted in 2013 found that urban irrigation runoff carried approximately 3.55 mg of Total Nitrogen and 0.043 mg of Total Phosphorus per liter of runoff (Gardner, et al., 2013, page 55) within the Ventura Water service area. Dry weather runoff, which occurs from over-irrigation and uncontrolled irrigation, is a substantial portion of runoff during dry weather months and often carries fertilizers, pesticides, and other pollutants (e.g., pathogens, coliform bacteria, salts) into the storm drain system and local streams (Gardner et al., 2013, pages 55 and 99). Fertilizer use can also contribute to contamination of stormwater runoff with high levels of nutrients. These contaminated runoff flows are a threat to local surface water quality and contribute to impaired conditions. There is an algae and nutrient TMDL for the Ventura River which requires a reduction of 9,240 lbs of total nitrogen and an 86.2-pound reduction in total phosphorus from the City of Ventura's Municipal Separate Storm Sewer System (MS4) system (LARWQCB, 2012 page 75).

This Program helps improve water quality and reduce total nitrogen and phosphorus loading by improving outdoor water use efficiency, reducing fertilizer needs and reducing contaminated runoff that impacts local surface waters.

2. Estimates of without project conditions with respect to this benefit

Without this project, landscaping across the partner agency service areas would continue to have high demands for irrigation water and would therefore continue to contribute to urban runoff issues. Without this project, irrigation runoff would continue to occur at existing rates and would continue to carry approximately 3.55 mg of Total Nitrogen and 0.043 mg of Total Phosphorus per liter of runoff (Gardner et al., 2013, page 55) into local surface waters including the Ventura River. Annually, nutrient loads would amount to approximately 24.2 lbs of total nitrogen and 0.3 lbs of total phosphorus without the project, thereby hindering achievement of the algae and nutrient TMDL targets for the Ventura River.

3. Descriptions of methods used to estimate physical benefits

A 2013 study found that urban irrigation runoff carried approximately 3.55 mg/L of nitrogen (as total nitrogen) per liter of runoff (Gardner et al., 2013, p.55) within the Ventura Water service area. When converted to lbs. per AF, runoff carries roughly 9.65 lbs/AF of nitrogen. (Water quality findings of the Ventura Water service area are assumed to be representative of the entire project area.)

With turf replacement and conversion to gardens with drought-tolerant plants, it is assumed that 100% of the irrigation runoff is eliminated, because it is assumed that these converted gardens will not require irrigation. Thus, with the project, there would be a water quality impact of 0 mg/l nitrogen because there is no nitrogen-contaminated runoff, and without the project there would be a water quality impact of 3.55 mg/L of nitrogen. The overall water quality benefit is a reduction of nitrogen loading by 3.55 mg/L.

Based on total volumes of water anticipated to be saved through implementation of this project and nitrogen concentrations stated above, there will be a total annual reduction in nitrogen loading by 24.2 lbs.

The total mass loading is based on the following:

Urban irrigation runoff is assumed to comprise approximately 5% of total outdoor water use; of the rest, 15% infiltrates the ground and the remaining 80% lost to evapotranspiration. Given the concentrations of nitrogen in urban irrigation runoff described above, the 42.95 AFY of water savings from turf replacement alone is expected to reduce runoff by 2.15 AFY (42.95 AFY * 5%) and result in a reduction of 20.7 lbs. of nitrogen loading.

Studies show that WBICs reduce irrigation runoff by at least half, and therefore WBICs are assumed to reduce nutrient loading by half in this analysis. WBIC installation is expected to save 14.5 AFY, thereby reducing runoff by 0.36 AFY (14.5 AFY * 5% * 50%). As a result, WBICs reduce nitrogen loading by 3.5 lbs. per year.

A reduction in runoff and nutrient loading is also expected from use of HE nozzles – however, no studies were available to estimate the runoff savings from nozzle replacement.

Project implementation will also reduce total phosphorous concentrations by 0.043 mg/L and reduce total loads by 0.3 lbs per year based on the same mechanisms, calculations and assumptions as were made for nitrogen estimates.

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

Please see related discussion under primary benefit section.

5. Description of any potential adverse physical effects

Please see related discussion under primary benefit section.

6. Description of whether the proposed project effectively addresses long-term drought preparedness

Please see related discussion under primary benefit section.

Summary of secondary benefit

The project's overall water quality benefit is a reduction of nitrogen by 3.55 mg/L. Based on total annual water savings, this project will thereby result in a reduction in nitrogen loads by 24.2 lbs. Similarly, the project will reduce total phosphorus concentrations by 0.043 mg/L and reduce total phophorus loads by 0.3 lbs per year.

Reduced runoff achieved by this project will contribute to achieving the TMDL goals of reducing Total Nitrogen by 9,240 pounds and Total Phosphorus by 86.2 pounds in City of Ventura's MS4 system, thereby improving water quality in the Ventura River.

DIRECT WATER-RELATED BENEFIT TO A DAC

The proposed project area does not encompass a DAC.

PROJECT PERFORMANCE MONITORING PLAN

Table 2.4 – Project Performance Monitoring Plan		
Project: Water Wise Incentive Program		
Physical Benefits	Targets	Measurement tools and methods
1. Water Conservation	Reduce residential outdoor water demand by 235 AFY	Compare average historical residential water demand for the City of Ventura, City of Santa Paula, and Casitas Municipal Water District against average residential water demand after project implementation. Review third party administrator completion reports.
2. Water Quality Improvement	Reduce nitrogen concentrations from runoff by 3.55 mg/L and total annual nitrogen loads by 24.2 lbs	Calculate total annual nitrogen load reductions based on academic literature and actual implementation results of turf removal and WBICs.

Primary Benefit:

The water conservation benefit has a target of 235 AFY in reduced residential outdoor water demand based on calculated water savings for the number and types of rebates provided under the Water Wise Incentive Program. The water conservation benefit performance will be measured by comparing average historical residential water demands against post-implementation residential water demands for all project partners (Ventura Water, City of Santa Paula, and Casitas Municipal Water District). These water demand comparisons will be based on annual customer use data collected by the individual partner agencies. Post-implementation water use data will be adjusted for factors that could skew the results, including population growth. Third-party administrator completion reports will provide additional data to increase robustness of the anlyses and will also provide insight on the effectiveness of individual rebates based on the customer use data comparisons. The demand comparison method is most effective to evaluate project performance in relation to water conservation targets.

Secondary Benefit:

The water quality target is to reduce nitrogen concentrations from runoff by at least 3.55 mg/L, which is based on literature estimates for urban runoff. Annual nitrogen load reductions are targeted to be 24.2 lbs based on proposed quantities of turf removal and WBICs and associated water savings estimates. Actual load reductions will be calculated based on actual quantities of water savings mechanisms implemented, which will be obtained from third-party administrator completion reports in addition to literature estimates for urban runoff concentrations. Water quality calculations will be adjusted if new, peer-reviewed, credible data become available.

COST EFFECTIVENESS ANALYSIS

This section presents a cost-effectiveness analysis comparing relevant project alternatives to the proposed project. None of the potential project alternatives were found to provide the same combination of water savings and water quality benefits that is provided by the proposed project. Answers to cost-effectiveness analysis questions are presented in summary form in Table 2.5 with narrative description for each option provided below.

The total cost for this project is $2,500,000. In present value terms, the total project cost is approximately $2,401,744 in 2015 dollars using a 6% discount rate. The cost per AF of this option is roughly $1,400. There are no operation and maintenance (O and M) costs for project partners.

Table 2.5 – Cost Effective Analysis Project Name: Water Wise Incentive Program	
Question 1	Types of benefits provided as shown in Tables 2.2 and 2.3: • Saves 235 AFY in water supplies • Improves water quality by reducing nitrogen loading by 3.55 mg/L
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? • No - alternative projects do not achieve the same types and amounts of physical benefits as the proposed project.
	If no, why? • No other project alternative provides the same level of benefits and water quality improvement as the proposed project. Increased groundwater pumping is not possible, potential use of imported SWP water if new facilities could be constructed to deliver the water to rights-holders does not provide the demand reduction or water quality benefits as the proposed project, and recycled water projects would not be economically feasible in comparison to the proposed project. Other options such as greywater use or conversion to pervious streets also do not provide the same level of benefits as the proposed project or have feasibility concerns.
	If yes, list the methods (including the proposed project) and estimated costs. • Not applicable.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. • Not applicable.

No other project alternative provides the same level of water savings and water quality improvement benefits. Increased groundwater pumping is not an option. Groundwater allocations in the area are strictly regulated and groundwater supplies have been curtailed recently to address groundwater declines and prevent further seawater intrusion as well as to limit risk of subsidence. Use of SWP supplies is a possibility since Ventura Water has unused SWP allocation, however SWP water use would require costly infrastructure to bring supplies to the area and would not meet the goals of reducing demand and improving water quality. Additionally, SWP water supplies are becoming increasingly unreliable due to increased competition and dry weather conditions.

Recycled water options exist to increase water supplies, but the amount of recycled water produced would need to be much greater than the amount of savings resulting from the proposed project, in order to make a recycled water project comparable in terms of cost per AF of supply. For instance, the City of Ventura has considered recycled water interconnections that would allow the Ventura Water Reclamation Facility (VWRF) to pump 13 million gallons per day (MGD) of post-secondary and post-tertiary treated wastewater to the Oxnard Advanced Water Purification Facility (AWPF) for eventual reuse in irrigation and groundwater injection. These new facilities would require approximately $95.5 million in capital costs with annual operational costs of $1 million (Kennedy/Jenks Consultants, 2013 pages 47-48). The cost per AF of this option at full delivery of 13 MGD is approximately $480, however it is unclear whether demands could be combined to utilize this capacity in the same time frame as the proposed project.

None of these water supply options would produce the same reduction in nitrogen and phosphorus loading that can be expected with the proposed project.

The 2013 study from Gardner, et al. considered the following additional alternatives for better management of the Ventura River Watershed: residential greywater systems, a scalping plant in Ojai, infiltration basins, water rate increases, conversion to pervious streets, and utilization of San Antonio Creek Spreading Grounds. However, the only alternatives that can be directly implemented by the project partners would be rate increases, residential greywater systems, and the conversion to pervious streets. Rate increases were not considered in this analysis because the savings are uncertain, both immediately and over time.

According to the 2013 study, laundry-to-landscape systems are the simplest greywater systems, costing anywhere between $100 and $1,000 to install. The systems consist of either a pumped or gravity-fed line that can take water from washing machines and distribute it to exterior irrigation lines. Assuming an average household size of three people doing six loads of laundry per week and a 35 gallon/load washing machine, this system would yield approximately 11,000 gallons per year in greywater production, and therefore reduce the equivalent amount of outdoor irrigation demand. Using a 10-year project life, greywater would yield a per-unit cost of approximately $300 to $3,000 per AF. Cheaper installation would require a significant amount of effort on the part of the customer while more expensive options could not be fully rebated and would likely result in very high costs for the customer. Ventura Water investigated residential greywater system costs and found significantly higher costs per system. In addition, these systems were found to have complex maintenance requirements potentially impacting the reliability of savings from these systems.

The conversion to pervious streets would be extremely costly and would not result in long-term conservation or water demand reductions. Pervious streets would not provide any increased water supply needed to overcome the current drought and would therefore also create little to no resiliency against future droughts. Conversion of residential streets to pervious asphalt would only save approximately 58 AFY and cost roughly $10,900/AF to implement (Gardner, et al., 2013 page 82).

References

Alliance for Water Efficiency. 2011. Water Conservation Tracking Tool User Guide: A Tool for Planning and Tracking Urban Water Conservation Programs. Version 2.0. July.

Brown, Edmund G. 2015. Executive Order B-29-15. April. Accessible at: http://gov.ca.gov/docs/4.1.15_Executive_Order.pdf

California Department of Water Resources (DWR). 2000. A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California: The Landscape Coefficient Method and WUCOLS III. University of California Cooperative Extension, California Department of Water Resources. August.

California Urban Water Conservation Council (CUWCC). 2014. Residential WBICs: An Update About Costs & Savings. March.

Casitas Municipal Water District (CMWD). 2011. 2010 Urban Water Management Plan. Casitas Municipal Water District. June. Accessible at: http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Casitas%20Municipal%20Water%20District/Casitas%20MWD%202010%20UWMP.pdf

City of Santa Paula. 2011. Final 2010 Urban Water Management Plan Update. Prepared by Milner-Villa Consultants. June. Accessible at: http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Santa%20Paula,%20City%20of/SantaPaula-Final-UWMP-June-2011-all.pdf

City of Ventura, Ventura Water. 2015. Personal Communication with Ventura Water Staff. June and July.

City of Ventura, Ventura Water. 2014 Comprehensive Water Resources Report. Prepared by RBF Consulting. May. Accessible at: http://www.cityofventura.net/files/file/public-works/water/2014%20Comprehensive%20Water%20Resources%20Report.pdf

City of Ventura, Ventura Water. 2011. 2010 Urban Water Management Plan. Prepared by Kennedy/Jenks Consultants. June. Accessible at:

http://www.water.ca.gov/urbanwatermanagement/2010uwmps/San%20Buenaventura,%20City%20of/UWMP_Ventura_Final_7-07-11.pdf

The Ecology Center. 2015. Accessed June, 2015. Accessible at: http://theecologycenter.org/events/harvest-the-rain

FCGMA. 2014a. Fox Canyon GMA Basin Management Objectives Report Card, Pleasant Valley Basin, 2014. Accessible at: http://www.fcgma.org/public-documents/reports

FCGMA. 2014b. Emergency Ordinance - E. April. Accessible at: http://www.fcgma.org/images/ordinances_legislation/Emergency_Ordinance_E_-_Orig._Signed_optimizer2.pdf

FSI. 2013.Lake Casitas Water Quality Study. Prepared for Casitas Municipal Water District by Flow Science Incorporated. March, 2013.

Gardner, R., N. Iqbal, A. Love, B. Ponto, J. Sahl, D. Yocum. 2013. Sustainable Water Use in the Ventura River Watershed. Bren School of Environmental Science & Management, University of California Santa Barbara. March. Accessible at: http://www2.bren.ucsb.edu/~keller/courses/GP_reports/Ventura%20River%20Final%20Report.pdf

H2ouse. 2015. Accessed June, 2015. Accessible at: http://www.h2ouse.org/tour/rain-harvesting.cfm

Kennedy/Jenks Consultants. 2013. Final Ventura-Oxnard Recycled Water Interconnect Feasibility Study. Prepared for the City of Ventura. September.

Maddaus Water Management. 2014. DSS Water Demand and Conservation Model.

LARWQCB. 2012. Algae, Eutrophic Conditions, and Nutrients Total Maximum Daily Loads for Ventura River and its Tributaries. California Regional Water Quality Control Board, Los Angeles Region. Revised Draft. November. Accessible at: http://www.waterboards.ca.gov/losangeles/board_decisions/basin_plan_amendments/technical_documents/73_New/Docs/Nov/Staff%20report_Revised%20Draft_11-16-12.pdf

RBF Consulting, 2015. 2015 Comprehensive Water Resources Report. Prepared for Ventura Water by RBF Consulting. Final Report, May 2015.

RFCI, 2012. Ventura Water Cost of Service and Rate Design Study Report. Raftelis Financial Consultants, Inc. March.

United Water Conservation District (UWCD) , 2013. 2011 Santa Paula Basin Annual Report. Professional Paper 2012-001. September 2013. Accessible at: http://www.unitedwater.org/images/stories/reports/GW-Conditions-Reports/SP%20Basin%202011%20Annual%20Report%20Sept%202013%20-%20final.pdf

UWCD, 2012. Groundwater and Surface Water Conditions Report—2011. Open-File Report 2012-02. May 2012. Accessible at: http://www.unitedwater.org/images/stories/reports/GW-Conditions-Reports/GW_and_SW_Conditions_Report_-%202011.pdf

US EPA, 2012. Ventura River Reaches 3 & 4 Total Maximum Daily Loads for Pumping & Water Diversion-Related Water Quality Impairments. December.

Ventura Water. 2015. Ventura Friendly Landscape Incentive Plan. Prepared by Jill Santos. Accessible at: http://www.cityofventura.net/files/file/Final%202015%20%20Ventura%20Friendly%20Landscape%20Incentive%20Plan.pdf

WRCC. 2015. City of Ventura, California Rainfall. Western Regional Climate Center. Accessed July, 2015. Accessible at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca9285

CAMROSA RECYCLED WATER PIPELINE

A pipeline to intercept excess tertiary-treated recycled water from the City of Camarillo Sanitary District to deliver to local water users.

IMPLEMENTING AGENCY: Camrosa Water District (Camrosa)

PROJECT DESCRIPTION

Camrosa currently delivers approximately 1,000 AFY of tertiary treated recycled water from the Camrosa Water Reclamation Facility (CWRF) for irrigation at California State University Channel Islands (CSUCI) and various agricultural users near the CWRF. Abutting this portion of the Camrosa service area to the west is the Pleasant Valley County Water District (PVCWD), which relies primarily on groundwater from the southern portion of the Pleasant Valley Basin. This portion of the Basin is overstressed and threatened by seawater intrusion. PVCWD currently receives a small amount of surplus nonpotable surface water from Camrosa when available, but this is a minimal offset to groundwater pumping and PVCWD has indicated that its customers are eager for recycled water. At the same time, the City of Camarillo Sanitary District (CamSan) has excess recycled water which will soon be diverted away from the Conejo Creek and to the regional Salinity Management Pipeline (SMP) for disposal via the Recycled Water Interconnection, which is currently being funded under Proposition 84, Round 1.

The Camrosa Recycled Water Pipeline will consist of a 3,000 feet, 16-inch pipe that will tee off of CamSan's Interconnection (see the project map provided on the following page). The Pipeline will allow Camrosa to intercept up to 500 AFY of CamSan's highly treated recycled water for beneficial uses rather than being sent to ocean discharge. This water will be delivered primarily to PVCWD to help offset groundwater pumping in the southern portion of the Pleasant Valley Basin. By enabling PVCWD to offset 500 AFY of groundwater pumping with recycled water that is already being produced, it is estimated that over 150 megawatt hours of energy can be saved.

The Recycled Water Pipeline will run across agricultural fields through which Camrosa already has easements for other pipelines, tunnel under the Calleguas Creek, and connect with Camrosa's storage ponds that currently retain recycled water produced at the CWRF and nonpotable water diverted from Conejo Creek. The water would be delivered to PVCWD via Camrosa's existing pipelines leading from the storage ponds to PVCWD.

This project provides near-term drought relief by providing water to agricultural customers, allows recycled water to be put to beneficial use rather than wasted to the ocean and over the long-term provides flexibility for moving, storing, and distributing recycled water. The Camrosa Recycled Water Pipeline will increase beneficial use of recycled water while making effective use of infrastructure funded under Proposition 84, Round 1– the CamSan/Camrosa Recycled Water Interconnection. In addition, by providing recycled water to offset groundwater pumping, the project will help improve Basin conditions as described below.

How the Project Addresses a Current Need of the Region

Ongoing drought conditions have resulted in significant declines in groundwater levels across Ventura County. The southern portion of the Pleasant Valley Basin is a prime example of a basin that has been experiencing significant declines in recent years. In the lower aquifer system of the Basin, groundwater levels have dropped from 25 feet below sea level in October 2011 to 110 feet below sea level in May 2014. The Pleasant Valley Basin has a hydrologic connection to the Oxnard Plain Basin, which is experiencing seawater instruction. As groundwater levels decline in the Pleasant Valley Basin this connection means it is vulnerable to seawater intrusion. Therefore, offsetting groundwater pumping is crucial in the southern portion of the Basin. The Camrosa Recycled Water Pipeline will enable PVCWD to use recycled water in-lieu of groundwater, relieving pressures on the Basin and helping meet sustainability objectives of FCGMA, which manages and protects groundwater resources within its boundaries, including the Pleasant Valley Basin. Over the long-term, the pipeline will become a piece of the broader recycled water system, providing a connection to recycled water storage ponds and to agricultural users.

S Lewis Rd

Salinity Management Pipeline

Calleguas Creek

Pancho Rd

Calle Quetzal

CamSan Treatment Plant

CamSan/Camrosa Recycled Water Interconnection

Howard Rd

Cawelti Rd

Conejo Creek

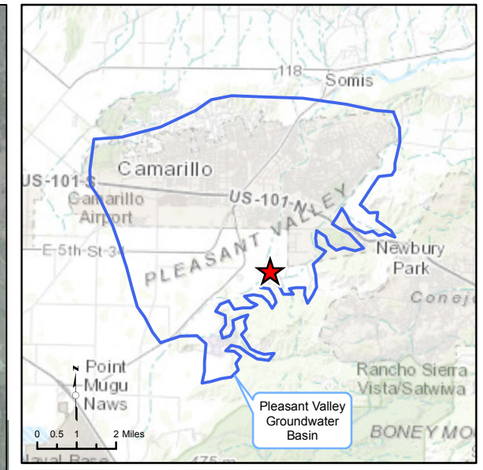
PVCWD Pipeline

Camrosa Recycled Water Pipeline

M

Calleguas Creek

Camrosa Storage Ponds



Legend

- M — Monitoring Site
- Camrosa Recycled Water Pipeline (Proposed)
- PVCWD Pipeline (Existing)
- Salinity Management Pipeline (Existing)
- CamSan/Camrosa Recycled Water Interconnection (Prop 84, Round 1)

N

0 500 1,000

Feet

Kennedy/Jenks Consultants

Watersheds Coalition of Ventura County
2015 IRWM Implementation Grant
Ventura County, California

Camrosa Recycled Water Pipeline

July 2015

Path: Z:\Projects\WCVC_2015_IRWM\Events\CamrosaRecycleWaterPipeline_.mxd

PROJECT PHYSICAL BENEFITS

The following primary and secondary physical benefits are expected from this project:

- Primary benefit: Provides 500 AFY of recycled water for beneficial uses
- Secondary benefit: Reduces local energy use by 150,335 kilowatt-hours (kWh) per year by providing recycled water in-lieu of groundwater pumping

Each benefit is discussed in further detail below.

TECHNICAL ANALYSIS OF PHYSICAL BENEFITS CLAIMED

Primary Benefit: Provides 500 AFY of recycled water for beneficial uses

As is shown in Table 2.6, the Camrosa Recycled Water Pipeline will make 500 AFY of recycled water available for beneficial uses, water that would otherwise be discharged to the ocean.

Table 2.6 – Annual Project Physical Benefits

Project Name: Camrosa Recycled Water Pipeline
Type of Benefit Claimed: Recycled water supply provided (primary benefit)
Units of the Benefit Claimed: Acre-feet per year (AFY)
Anticipated Useful Life of Project (years): 5

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2017 to 2021	0	500	500

Comments: The project will make 500 AFY of recycled water available for beneficial use for at least five years. The Camrosa Water District will obtain the recycled water from the City of Camarillo Sanitary District. Without the project the water would be discharged to the ocean.

1. Explanation of need for the project including recent and historical conditions

Ongoing drought conditions have resulted in significant declines in groundwater levels across Ventura County. The southern portion of the Pleasant Valley Basin is a prime example of a basin that has been experiencing significant declines in recent years. Groundwater users in that portion of the basin are therefore eagerly looking for alternative supplies in order to continue to meet their water demands and help offset declining groundwater resources.

PVCWD, a customer of Camrosa, lies within the Pleasant Valley Groundwater Basin, serving water to agricultural customers within the basin. Historically, PVCWD's water supplies have come from groundwater from the southern portion of the Pleasant Valley Basin and a limited amount from surface flows from the Santa Clara River. In recent years however, water from PVCWD's traditional sources has become increasingly limited. PVCWD relies primarily on groundwater from the southern portion of the Pleasant Valley Basin, however the southern portion of the Pleasant Valley Basin is in a state of overdraft and is increasingly vulnerable to seawater intrusion (Bachman, 2013, pages 6-7; FCGMA, 2014a, page 4). In 2014, water levels at two representative wells within the southern portion of the basin were measured at 81 and 110 feet *below* mean sea level, respectively; in contrast, the basin management objective for those wells is 20 feet *above* mean sea level (FCGMA, 2014a, page 4). Further, limiting groundwater availability is the fact that, in 2014, FCGMA reduced the amount of groundwater pumping permitted in the Pleasant Valley Basin through an emergency ordinance (FCGMA, 2014b, page 1). At the same time,

surface flows from the Santa Clara River have been nearly unavailable in recent years due to drought conditions and litigation (Camrosa Water District, 2015).

PVCWD currently receives a small amount of surplus nonpotable surface water from Camrosa when available from the Camrosa Water Reclamation Facility (CWRF), however it only provides a minimal offset to groundwater pumping. The reduction in water supplies available to PVCWD has already impacted agricultural customers, who have fallowed fields and increased the time between harvesting and replanting to reduce demands. Therefore, PVCWD customers are eager for recycled water to increase overall water supplies.

Meanwhile, the City of Camarillo Sanitary District (CamSan) produces tertiary-treated recycled water at its Camarillo Water Reclamation Plant (City of Camarillo, 2011, page 47) and delivers a portion to agricultural users near Camarillo and discharges excess recycled water into Conejo Creek. In 2010, for example, more than 2,500 AFY was discharged into Conejo Creek (City of Camarillo, 2011, page 50). Currently, this recycled water effluent exceeds the total maximum daily load (TMDL) for salts, which CamSan is now addressing by constructing its Recycled Water Interconnection. The Interconnection, currently being funded under Proposition 84, Round 1, will divert excess recycled water effluent away from the Conejo Creek and to the Calleguas Municipal Water District (Calleguas) SMP for ocean disposal.

The proposed Camrosa Recycled Water Pipeline would bridge the gap between demand for recycled water and excess recycled water supplies by intercepting the excess recycled water effluent from CamSan and making it available for beneficial use by PVCWD. In exchange for receiving recycled water, PVCWD will reduce groundwater pumping in the stressed southern portion of the Pleasant Valley Basin by an equivalent amount.[1] This pipeline would provide much needed, near-term drought relief. In the long-term the pipeline adds flexibility to the recycled water system by enabling continued transport of surplus recycled water. The pipeline will link the recycled water system to recycled water storage (the Camrosa storage ponds), which is not otherwise available, and to agricultural customers, meaning peak flows or seasonal surplus when urban demand is low can be put to beneficial use rather than wasted to the ocean.

2. Estimates of without project conditions with respect to this benefit

Without the project, 500 AFY of recycled water produced by CamSan would be discharged to the ocean without being put to beneficial use. Meanwhile, demands by PVCWD for at least 500 AFY of recycled water would be unmet and PVCWD would continue pumping groundwater at current rates from the southern portion of the Pleasant Valley Groundwater Basin to meet demands. Groundwater pumping would continue to contribute to overdraft and seawater intrusion issues in the southern portion of the Pleasant Valley Basin, and PVCWD would continue looking for additional alternative supplies in the face of ongoing drought and in anticipation of potential additional curtailments or FCGMA pumping restrictions.

3. Descriptions of methods used to estimate physical benefits

In 2010, CamSan discharged more than 2,500 AFY of recycled water effluent into Conejo Creek (City of Camarillo, 2011, page 50). With the project, CamSan has agreed to provide 500 AFY of the recycled water for five years to Camrosa,[2] which will in turn be made available to PVCWD. The recycled water would be available via the Camrosa Recycled Pipeline starting in 2017.

The recycled water will meet Title 22 requirements; there will be no restrictions on how PVCWD can use the water for agricultural purposes.

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[1] With the project, PVCWD will transfer its FCGMA pumping credits to Camrosa. However, Camrosa will not use the pumping credits for additional groundwater pumping. Camrosa already has sufficient pumping credits for the amount of groundwater that the district can extract from the northeast part of the Pleasant Valley Basin (Bachman, 2013, page 6).

[2] This is a very conservative assumption. It is likely that CamSan will be able to deliver more water and for a longer period of time than the stated 500 AFY for five years to Camrosa. However, the existing contract with CamSan has a 5-year term.

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

The Camrosa Recycled Water Pipeline will require installation of 3,000 feet of 16-inch pipe as well as an outlet control structure and valves at Camrosa's existing non-potable water storage ponds.

In addition, the proposed project requires the completion of CamSan's 1.7 mile Recycled Water Interconnection, currently being funded under Proposition 84, Round 1. The Recycled Water Interconnection has two phases. The first phase of the Interconnection has already been built; the bidding for the second phase is scheduled to be complete by the end of 2015 and construction by early to mid-2016.

5. Description of any potential adverse physical effects

With the project, recycled water effluent from CamSan will be used for agricultural purposes by PVCWD in the Pleasant Valley Basin and would offset a like amount of local groundwater use. Significant physical impacts are not anticipated with this tradeoff. With respect to water quality and potential salt implications with the use of recycled water, the CamSan effluent average TDS concentration is similar to PVCWD well TDS levels based on available well records from 2011 (PVCWD, 2011 pages 1-10) and CamSan effluent records from 2008 to 2014 (Camarillo Sanitary District, 2015, page 1). Anecdotally, however, PVCWD well water quality has been declining, so that the use of recycled water by PVCWD may in fact have beneficial impacts to salts within the basin and for agricultural customers (Camrosa Water District, 2015). In addition, it is anticipated that salt levels in the recycled water produced by CamSan will likely decrease over time as the City of Camarillo desalter comes online because influent to the CamSan treatment facility would in turn have overall lower salt concentrations.

To avoid impacts to Calleguas Creek, the project will use a trenchless drilling method for creek crossing. Moreover, energy use impacts for recycled water use compared to groundwater pumping in relation to this project would have beneficial impacts, as described further below.

Potential project impacts will be thoroughly evaluated during the Initial Study of this project.

6. Description of whether the proposed project effectively addresses long-term drought preparedness

This project addresses long-term drought preparedness by making surplus water supplies available for beneficial use and improving overall sustainability of local water resources. Specifically, the project addresses three of the identified Statewide Priorities for drought preparedness for the IRWM Grant Program.

The project meets long-term drought preparedness as it "promotes water conservation, conjunctive use, reuse, and recycling." The project increases the availability of recycled water for beneficial uses and thereby promotes the use of recycled water within the Pleasant Valley Basin as an alternative and supplemental supply to declining groundwater supplies.

Second, the project results in "efficient groundwater basin management." PVCWD currently pumps groundwater in the southern portion of the Pleasant Valley Basin. This portion of the basin is in overdraft and is vulnerable to seawater intrusion. With the recycled water made available through this project, PVCWD will be able to offset a portion of its groundwater pumping in the southern portion of the Pleasant Valley Basin allowing for in-lieu recharge. This offset will relieve pressures on the basin and help meet sustainability objectives of the FCGMA proposed Groundwater Sustainability Plan, including helping to address long-term groundwater level decline and seawater intrusion (FCGMA, 2015, pages 1-2).

Third, the project establishes a system intertie between CamSan and Camrosa facilities. The Camrosa Recycled Water Pipeline will connect to CamSan's Recycled Water Interconnection to intercept excess recycled water from CamSan's Water Reclamation Plant. This intertie helps bridge the gap between recycled water demands and surplus recycled water supplies and over the long-term provides flexibility for moving, storing, and distributing recycled water.

Summary of primary benefit

Camrosa will make 500 AFY of recycled water available for beneficial uses, thereby helping to offset local groundwater pumping. Without the project, the 500 AFY would be discharged to the ocean.

Secondary Benefit: Reduces local energy use by 150,335 kilowatt-hours per year by providing recycled water in-lieu of groundwater pumping

Camrosa will make 500 AFY of recycled water available to PVCWD, thereby enabling PVCWD to offset a like amount of groundwater from the lower aquifer. Transporting the recycled water via the Camrosa Recycled Water Pipeline for use by PVCWD requires overall less energy than pumping a like amount of groundwater through PVCWD wells, as shown in Table 2.7. Using less energy, in turn, results in fewer greenhouse gas emissions.

Table 2.7 – Annual Project Physical Benefits

Project Name: Camrosa Recycled Water Pipeline

Type of Benefit Claimed: Energy saved (secondary benefit)

Units of the Benefit Claimed : Kilowatt-hours (kWh)

Anticipated Useful Life of Project (years): 5

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2017 to 2021	182,835	32,500	-150,335

Comments: It takes 65 kilowatt-hours (kWh) of energy to deliver one AF of water to PVCWD from Camrosa . In comparison, it takes 365.67 kWh of energy for the PVCWD to pump one AF of groundwater. Since, PVCWD would be receiving 500 AFY of recycled water from Camrosa in-lieu of pumping a like amount of groundwater, there will be an energy savings of 150,335 kWh each year.

The reduced energy requirements in turn results in 104 fewer metric tons of carbon dioxide, a greenhouse gas, emitted each year.

1. Explanation of need for the project including recent and historical conditions

There is a great need for alternative water supplies to offset groundwater pumping from the southern portion of the Pleasant Valley Basin. The basin is in an overdraft state and is vulnerable to seawater intrusion (Bachman, 2013, pages 6-7; FCGMA, 2014a, page 4). At the same time, groundwater pumping has been restricted to protect groundwater resources, and surface water resources are extremely limited. This situation is impacting PVCWD, a Camrosa customer, who primarily depends on groundwater pumping to meet its agricultural water needs. PVCWD is looking for alternative supplies, particularly recycled water, to offset groundwater pumping.

CamSan produces tertiary-treated recycled water at its Camarillo Water Reclamation Plant (City of Camarillo, 2011, page 47), delivering a portion to agricultural users near Camarillo and discharging excess recycled water into Conejo Creek. With completion of construction of the CamSan Recycled Water Interconnection, funded under Proposition 84, Round 1, excess recycled water effluent will be discharged to the SMP for ocean disposal. With the increasing needs of water supply alternatives to offset groundwater pumping, there is a need to bridge the gap between surplus recycled water supplies and recycled water demands. (See also project need discussion related to primary benefit.)

While looking for alternative supplies, the Watersheds Coalition of Ventura County IRWM participants are aware of the critical need to seek projects that can provide increased water supply reliability while also addressing key climate change strategies, including reducing energy consumption and greenhouse gas emissions.

The Camrosa Recycled Water Pipeline would bridge the gap between demand for recycled water and excess recycled water supplies by intercepting the excess recycled water effluent from CamSan and making it available for beneficial use by PVCWD. In exchange for receiving the recycled water, PVCWD will reduce groundwater

pumping in the stressed southern portion of the Pleasant Valley Basin by an equivalent amount.[3] This groundwater pumping offset, has energy use implications, as every AF of recycled water delivered to PVCWD via the Camrosa Recycled Water Pipeline has substantially lower energy requirements than every AF of groundwater produced by PVCWD.

2. Estimates of without project conditions with respect to this benefit

Without the project, PVCWD would not be able to offset 500 AFY of groundwater pumping with recycled water and would continue to consume 182,835 kWh of energy each year to pump 500 AFY of groundwater instead. Without the project, PVCWD would not have the option to reduce energy consumption or greenhouse gas emissions by offsetting groundwater pumping with Camrosa's recycled water deliveries.

At the same time, groundwater pumping would continue to contribute to overdraft and seawater intrusion issues in the southern portion of the Pleasant Valley Basin, and PVCWD would continue looking for additional alternative supplies to meet water demands.

3. Descriptions of methods used to estimate physical benefits

With the project, CamSan has agreed to provide 500 AFY of the recycled water for five years to Camrosa,[4] which will in turn be used by PVCWD to offset groundwater supplies.

It takes 365.67 kWh of energy for PVCWD to pump one AF of groundwater. Pumping 500 AFY therefore requires 182,835 kWh of energy. In comparison, it takes 65 kWh of energy for Camrosa to deliver one AF of water to PVCWD. Receiving 500 AFY of recycled water, therefore consumes 32,500 kWh of energy each year (Camrosa Water District, 2015). By offsetting 500 AFY of groundwater pumping with recycled water via the Camrosa Recycled Water Pipeline, there is an energy savings of 150,335 kWh each year (182,835 kilowatt-hours – 32,500 kilowatt-hours=150,335 kilowatt-hours).

According to EPA's greenhouse gas equivalencies calculator, the energy savings of 150,335 kilowatt-hours each year results in 104 fewer metric tons of carbon dioxide, a greenhouse gas, emitted each year (Environmental Protection Agency, 2015).

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

Please see related discussion under primary benefit section.

5. Description of any potential adverse physical effects

Please see related discussion under primary benefit section.

6. Description of whether the proposed project effectively addresses long-term drought preparedness

Please see related discussion under primary benefit section.

Summary of secondary benefit

500 AFY of groundwater pumping will be offset with a like amount of recycled water provided via the Camrosa Recycled Water Pipeline. That groundwater pumping offset through the use of recycled water will result in energy savings of 150,355 kWh each year. The reduced energy usage in turn results in 104 fewer metric tons of carbon dioxide emitted each year.

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[3] With the project, PVCWD will transfer its FCGMA pumping credits to Camrosa. However, Camrosa will not use the pumping credits for additional groundwater pumping. Camrosa already has sufficient pumping credits for the amount of groundwater that the district can extract from the northeast part of the Pleasant Valley Basin (Bachman, 2013, page 6).

[4] This is a very conservative assumption. It is likely that CamSan will be able to deliver more water, and for a longer period of time, than the stated 500 AFY for five years to Camrosa. However, the existing contract with CamSan has a 5-year term.

DIRECT WATER-RELATED BENEFIT TO A DAC

The proposed project area does not encompass a DAC.

PROJECT PERFORMANCE MONITORING PLAN

Table 2.8 - Project Performance Monitoring Plan		
Project: Camrosa Recycled Water Pipeline		
Physical Benefits	Targets	Measurement tools and methods
1. New Water Supply	500 AFY of recycled water	Collect and analyze metered delivery readings of recycled water from the Camrosa Recycled Water Pipeline
2. Energy Savings	150,335 kWh per year	Calculate energy savings based on metered deliveries data and energy use data available for PVCWD wells and Camrosa Recycled Water Pipeline.

Primary Benefit:

The new water supply benefit has a target of 500 AFY, which is the amount of recycled water that will be made available via the Camrosa Recycled Water Pipeline. In order to evaluate achievement of the new water supply target, recycled water flows will be measured at the end of the Camrosa Recycled Water Pipeline. Meter readings will occur regularly and will be totaled to determine the cumulative recycled water supply per year of operation. Cumulative flow meter readings are the most effective and therefore appropriate means to evaluate whether actual deliveries meet new water supply targets.

Secondary Benefit:

Energy savings from implementation of the project are estimated to be 150,335 kWh per year, which is the target for the secondary benefit. Achievement of the energy savings target will be calculated using actual meter data, described above, in combination with energy use data available for PVCWD wells and Camrosa Recycled Water Pipeline deliveries. The energy savings will be the calculated difference between energy use by PVCWD wells and energy use for recycled water deliveries.

COST EFFECTIVENESS ANALYSIS

This section presents a cost-effectiveness analysis comparing relevant project alternatives to the proposed project. The project alternatives considered are (1) purchasing recycled water from the City of Oxnard's Advanced Water Purification Facility, part of Oxnard's Groundwater Recovery Enhancement and Treatment Program and (2) purchasing imported water from the SWP via Calleguas. Answers to cost-effectiveness analysis questions are presented in summary form in Table 2.9 with narrative description for each option provided below.

The capital costs for the Camrosa Recycled Water Pipeline are approximately $0.8 million, or $0.7 million in present value 2015 dollars. PVCWD also has annual costs for purchasing 500 AFY of recycled water from Camrosa. However, these costs are minimal, less than $2 per AF (Camrosa Water District, 2013, page 2). In total, the capital and annual costs of the project are about $0.7 million in present value 2015 dollars.

Table 2.9 – Cost Effective Analysis **Project name: Camrosa Recycled Water Pipeline**	
Question 1	Types of benefits provided as shown in Tables 2.6 and 2.7: • Provides 500 AFY of recycled water for beneficial uses • Reduces local energy use by 150,335 kilowatt-hours per year by providing recycled water in-lieu of groundwater pumping
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? • Yes
	If no, why? • Not applicable
	If yes, list the methods (including the proposed project) and estimated costs. Total capital and annual costs of the proposed Camrosa Recycled Water Pipeline are approximately $0.7 million in present value 2015 dollars. Alternative projects include: (1) Purchasing recycled water from the City of Oxnard's Advanced Water Purification Facility for a cost of $10.3 million in present value 2015 dollars, and (2) Purchasing imported water from the SWP via Calleguas for a cost of $2.8 million in present value 2015 dollars. See additional discussion below.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. Not applicable – the proposed project is the least-cost alternative.
Comments: See discussion below.	

Alternative1: Purchasing recycled water from the City of Oxnard's Advanced Water Purification Facility

Without the project, PVCWD may be able to purchase recycled water from the City of Oxnard's Advanced Water Purification Facility, which will produce up to 28,000 AFY of recycled water at full build-out (City of Oxnard, 2012, page 3-16). PVCWD would obtain recycled water from the Advanced Water Purification Facility through a pipe connecting the facility to Calleguas' SMP. The recycled water would be transported via the SMP, in the reverse direction of the brine that is typically placed in the SMP (i.e., the recycled water would move away from the ocean). The California Regional Water Quality Control Board, Los Angeles Region, has approved the use of the SMP for the movement of recycled water from Oxnard to PVCWD (California Regional Water Quality Control Board, Los Angeles Region, 2015, page 1; City of Oxnard, 2015, page 1).

The pipe connecting the Advanced Water Purification Facility would be constructed by 2017 and is estimated to cost $10 million, or $9.7 million in present value 2015 dollars. In addition, PVCWD would purchase 500 AFY for five years at $300 per AF from Oxnard for a cost of $0.8 million, or $0.6 million in present value 2015 dollars. In present value 2015 dollars, the total cost of this alternative project is $10.3 million (Camrosa Water District, 2015).

Alternative 2: Purchasing imported water from the SWP via Calleguas

As another alternative, PVCWD could purchase imported water from the SWP via Calleguas. The Tier 1 price of purchasing imported water from Calleguas in 2016 is estimated to be $1,403.30 per AF (Calleguas Municipal

Water District, 2015, page 2). The total annual cost to purchase 500 AFY between 2017 to 2021, is $2.8 million in present value 2015 dollars.[5]

However, besides being more expensive than the proposed project, purchasing SWP water from Calleguas would not achieve the same physical benefits as the project. Purchasing SWP water requires more energy than it would take to deliver CamSan recycled water to PVCWD (or even for PVCWD to pump groundwater, as it would do under the without-project scenario). In 2007, Calleguas estimated that importing and treating one AF of SWP water to Ventura County requires 4,090 kWh of energy (Calleguas Municipal Water District, 2007, pages 3-4) , whereas the recycled water delivery via the Camrosa Recycled Water Pipeline would require 65 kWh per AF and groundwater pumping would require 365.67 kWh of energy as described above.

Moreover, future deliveries from the SWP are uncertain. In 2014, water deliveries from the SWP were 5% of requests, and in 2015, deliveries were 15% of requests. Reduced deliveries from the SWP may continue in future years particularly during periods of drought.

REFERENCES

Bachman, Steven. 2013. Conejo Creek Project: Effects of Two Project Scenarios. December. Accessible at: http://ventura.granicus.com/MetaViewer.php?view_id=45&event_id=424&meta_id=401847

California Regional Water Quality Control Board, Los Angeles Region. 2015.Water Recycling Requirements and Waste Discharge Requirements for City of Oxnard Groundwater Recovery, Enhancement, and Treatment Program – Nonpotable Reuse Phase 1 Project. June.

Calleguas Municipal Water District. 2015. Calleguas MWD 2016 Adopted Water Rates. Accessible at: http://www.calleguas.com/images/docs-financial/water_rates.pdf

Calleguas Municipal Water District. 2007. CO_2 Emissions and Imported State Project Water to Ventura County. January.

Camarillo Sanitary District. 2015. Camarillo Water Reclamation Plant Effluent Averages for 2008 to 2014. July.

Camrosa Water District. “Personal Communication with Ian Prichard.” June and July 2015.

Camrosa Water District. “Notice of Water Rate Hearing.” March 8, 2013. Accessible at: http://www.camrosa.com/documents/ratestudy400dpi.pdf

City of Camarillo. 2011. 2010 Urban Water Management Plan. May.

City of Oxnard. “City of Oxnard Receives Unanimous Permit Approval from the Los Angeles Regional Water Quality Control Board.” July 9, 2015. Accessible at: http://www.oxnardnews.org/page.aspx?id=1024

City of Oxnard. 2012. City of Oxnard 2010 Urban Water Management Plan. May. Accessible at: http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Oxnard,%20City%20of/CityofOxnard_2010UWMP_PublicDraft_May2012.pdf

Environmental Protection Agency. “Greenhouse Gas Equivalencies Calculator.” Accessed July 29, 2015. Accessible at: http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results

[5]The cost of “Alternative 2: Purchasing imported water from the SWP via Calleguas” is underestimated in this analysis because it is assumed that the real (above inflation) cost of purchasing SWP water from Calleguas does not increase over the 2017 to 2021 time period. In fact, Calleguas expects rate increases at less than 6 percent a year (Calleguas Municipal Water District, 2013, page 8). Accounting for inflation, the real increase in Calleguas’ rate will likely be around 3 percent a year, not zero as is the conservative assumption shown here. In addition, the cost presented does not include Calleguas wheeling charges that PVCWD would have to pay.

Fox Canyon Groundwater Management Agency (FCGMA). 2015. Draft Groundwater Sustainability Plan Outline. May. Accessible at: http://ventura.granicus.com/MetaViewer.php?view_id=45&clip_id=3972&meta_id=472879

FCGMA. 2014a. Fox Canyon GMA Basin Management Objectives Report Card, Pleasant Valley Basin, 2014. Accessible at: http://www.fcgma.org/public-documents/reports

FCGMA. 2014b. Emergency Ordinance - E. April. Accessible at: http://www.fcgma.org/images/ordinances_legislation/Emergency_Ordinance_E_-_Orig._Signed_optimizer2.pdf

FCGMA. 2014c. Resolution 2014-01 of the Fox Canyon Groundwater Management Agency. March. Accessible at: http://www.fcgma.org/images/ordinances_legislation/Resolutions/Resolution_2014-01_optimized.pdf

Pleasant Valley County Water District (PVCWD). 2011. Annual Groundwater Monitoring Reports. September.

PLEASANT VALLEY MUTUAL WATER COMPANY DESALTER

Pleasant Valley Mutual Water Company will construct a desalter to treat its groundwater supplies to meet secondary drinking water standards and continue serving local water.

IMPLEMENTING AGENCY: Pleasant Valley Mutual Water Company (PVMWC)[6]

PROJECT DESCRIPTION

PVMWC is a small water company serving 1,600 primarily residential connections with approximately 1,000 AFY in demands. PVMWC's potable water supply is obtained from two groundwater wells and supplemented by approximately 327 AFY of SWP water from Calleguas. However, in recent years, PVMWC's groundwater supplies have been affected by increasingly high salt concentrations and rising groundwater levels. As of March 2015, concentrations reached 1,970 mg/L for TDS and 960 mg/L for sulfate, compared to the secondary recommended limit for TDS of 500 mg/L and limit for sulfates of 250 mg/L. PVMWC received a notice of violation of secondary drinking water standards for TDS and sulfate and is required by the Division of Drinking Water to reduce concentrations of these constituents in delivered water.

To comply with drinking water standards PVMWC could blend or replace impaired groundwater supplies with imported water. However, to avoid imported water dependence, PVMWC is proposing to construct a reverse osmosis (RO) desalter facility to treat its groundwater. The Desalter will be constructed downstream from PVMWC's existing iron and manganese treatment plant within an approximately 1,600 square foot pre-engineered building. Brine from the PVMWC Desalter will be discharged to the regional SMP being built by Calleguas via a connection with the City of Camarillo's brine discharge pipeline. See the project map on the following page.

The desalter will provide treatment for PVMWC's full groundwater allocation enabling PVMWC to avoid replacing up to 673 AFY groundwater supplies with imported water to comply with secondary drinking water standards. Through the desalter process, TDS concentrations in groundwater supplies will be reduced by 979 mg/L. The desalter will also remove salts from the watershed via the SMP and avoid the import of salts into the watershed from additional SWP water. Based on the amount of water produced at the desalter and avoided water imports, it is estimated that the desalter will remove and avoid the import of a total of 1,076 metric tons of salts per year. In addition, the project will save 1,649 MWh compared to conditions without the project as less energy is required to produce desalted water than to import water from Northern California.

The desalter will enable PVMWC to continue to use local groundwater sources, increase local water supply reliability and reduce needs for less reliable imported water supplies.

How the Project Addresses a Current Need of the Region

As is the case statewide, Ventura County is experiencing severe drought conditions, which has reduced the availability of local water supplies and is making imported water supplies increasingly competitive and limited. In addition, water imports have higher cost and energy implications relative to local water resources and are therefore overall a less preferable alternative. The desalter will enable PVMWC to continue to use local groundwater resources and is therefore crucial to avoiding increased reliance on imported water supplies, improving local water supply reliability, and maintaining affordable water supplies for the PVMWC service area.

In addition, many groundwater basins within the County, particularly in the Calleguas Creek Watershed in which PVMWC is located, are impacted by impaired water quality, particularly high salt concentrations. The PVMWC Desalter will reduce concentrations of TDS and sulfates in its groundwater supplies to enable provision of high quality drinking water. By avoiding imported water and discharging brine to the SMP, which eventually discharges to the Pacific Ocean, the desalter will also improve watershed health by exporting salts from, and avoiding salt imports to, the Calleguas Creek Watershed.

[6] The Pleasant Valley Mutual Water Company is a different entity than Pleasant Valley County Water District, the entity which will receive water from the proposed Camrosa Recycled Water Pipeline.

Path: Z:\Projects\WCVC_2015_IRWM\Events\Project 1 - Desalter.mxd

Legend

- Desalter Pipeline
- PVMWC Desalter
- M — Monitoring Site
- City of Camarillo Brine Pipeline (Not Part of Proposed Project)

N

0 150 300

Scale: Feet

Kennedy/Jenks Consultants

Watersheds Coalition of Ventura County
2015 IRWM Implementation Grant
Ventura County, California

Pleasant Valley Mutual Water Company Desalter

July 2015

PROJECT PHYSICAL BENEFITS

The following primary and secondary physical benefits are expected from this project:

- Primary Benefit: Produces 673 AFY potable water supply from local groundwater sources
- Secondary Benefit: Reduces the total dissolved solids (TDS) concentration in groundwater supplies by 979 mg/L through the desalting process

Each benefit is discussed in further detail below.

TECHNICAL ANALYSIS OF PHYSICAL BENEFITS CLAIMED

Primary Benefit: Produces 673 AFY potable water supply from local groundwater sources

As is shown in Table 2.10, PVMWC will pump high salinity groundwater from the Pleasant Valley groundwater basin and produce at least 673 AFY of potable water through the use of a desalter.

Table 2.10 – Annual Project Physical Benefits
Project Name: Pleasant Valley Mutual Water Company Desalter
Type of Benefit Claimed: Water supply produced (primary benefit)
Units of the Benefit Claimed : Acre-feet per year (AFY)
Anticipated Useful Life of Project (years): 25

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2017 to 2041	0	673	673

Comments: The PVMWC Desalter will produce 673 AFY from 2017 to 2041.

1. Explanation of need for the project including recent and historical conditions

PVMWC has two groundwater wells in the Pleasant Valley groundwater basin from which it pumps up to 673 AFY of groundwater. However, PVMWC's groundwater supplies have become increasingly impacted by high concentrations of TDS and sulfate in recent years. In May 2002, the TDS concentration was 1,280 mg/L; in May 2005, the TDS concentration was 1,600 mg/L; and in May 2015 sampling showed TDS concentrations as high as 1,970 mg/L. Similarly, the sulfate concentration was 180 mg/L in May 2008; in May 2015, the concentration was 960 mg/L (Pleasant Valley Mutual Water Company, 2015, page 1).

In October 2013, PVMWC received a notice of violation of secondary drinking water standards for TDS and sulfate from the California Department of Public Health, now the Division of Drinking Water. The notice requires PVMWC to reduce the TDS and sulfate concentrations in its delivered drinking water to meet secondary standards, which are recommended at 500 mg/L for TDS and 250 mg/L for sulfate.

In 2014, PVMWC met its 1,000 AF of customer water demands using 673 AFY (67%) groundwater and 327 AFY (33%) SWP water from Calleguas, a member agency of the Metropolitan Water District of Southern California. PVMWC has blended imported water with its groundwater supplies to reduce salt concentrations in its drinking water delivered to customers.

Based on the observed trend of rising TDS and sulfate concentrations, TDS and sulfate concentrations in PVMWC's groundwater supplies are expected to continue to increase. Eventually, TDS and sulfate concentrations will be too high to produce adequate drinking water from PVMWC's groundwater supplies even if blended with imported water. Without adequate treatment, PVMWC will no longer be able to use its groundwater supplies to meet its drinking water demands.

The PVMWC Desalter will enable PVMWC to continue using its local groundwater supplies through treatment and provide high quality drinking water to its customers. By implementing the desalter, PVMWC will be able to continue meeting its water demands with the combination of groundwater and imported water supplies rather than having to replace up to 673 AFY of currently pumped groundwater with imported water.

2. Estimates of without project conditions with respect to this benefit

Without the project, PVMWC would continue to pump and deliver its groundwater, however would continue to serve low quality drinking water, in violation of secondary drinking water standards. With ever-rising concentrations of TDS and sulfate, PVMWC would have to increase demands on imported water supplies in order to blend its groundwater supplies and would eventually have to completely replace its groundwater supplies with imported water. Over the long-term, PVMWC would not be able to use its groundwater supplies, which currently make up approximately 673 AFY of its 1,000 AFY drinking water demands. PVMWC would depend completely on imported water to meet its customer water demands, thereby increasing imported water demands by up to 673 AFY.

However, importing additional water into the basin will also increase the salt loads entering the watershed. As a result, TDS and sulfate problems in PVMWC's groundwater would be exacerbated. Also, future deliveries from the SWP are uncertain: in 2014, water deliveries from the SWP were 5% of amounts requested, and in 2015 they reached 15% of amounts requested. Reduced deliveries from the SWP may continue in future years particularly during periods of drought.

3. Descriptions of methods used to estimate physical benefits

The desalter will produce at least 673 AFY of treated groundwater to continue meeting water demands with at least 67% groundwater. Since 200 AFY of brine is discharged in the desalter process, PVMWC will pump 873 AFY of groundwater in order to produce 673 AFY from the desalter (CDM Smith Inc., 2015, page 23). Studies show that there is enough groundwater to pump 873 AFY from the Pleasant Valley basin (Bachmann, 2015, page 85).

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

PVMWC will construct the desalter facility with reverse osmosis treatment and a chemical feed system (CDM Smith Inc., 2015, page 3). The desalter would include an approximate 1,600 square foot pre-engineered building that will house the treatment equipment as well as piping, a permeate storage tank, water pumps, chemical tanks, and a brine discharge pipeline. The brine discharge pipeline will connect to the City of Camarillo's brine discharge pipeline. PVMWC and the City of Camarillo have been in communication and will formalize an agreement regarding PVMWC's proposed connection in the coming months. The City of Camarillo's brine discharge pipeline will connect to Phase 2C of Calleguas' SMP, which moves brine to the ocean for disposal. Construction of Phase 2C of the SMP is nearing completion and is scheduled to be finished by February 2016.

Also, PVMWC needs to obtain an additional 200 AFY in groundwater pumping allocation from FCGMA. The additional allocation is needed to make up for the 200 AFY that is discharged as brine. Currently PVMWC has an allocation of 673 AFY, which it will increase to at least 873 AFY with approval from FCGMA.

5. Description of any potential adverse physical effects

The desalter facility requires energy to remove the salts from the groundwater. This energy use results in greenhouse gas emissions. However, the energy use and greenhouse gas emissions resulting from the project may be considered mitigated because the project also avoids the need to import SWP water. In 2007, Calleguas estimated that importing and treating one AF of SWP water to Ventura County requires 4.09 megawatt-hours of energy, whereas the energy required for pumping one AF groundwater and moving it through a desalter takes

1.64 megawatt-hours per AF (Calleguas Municipal Water District, 2007, pages 3-4). As importing SWP water takes more energy (and thus emits more greenhouse gases) than producing water from a desalter, this desalter project causes less of an adverse physical effect relative to the without project condition.

The Initial Study of the PVMWC Desalter identified the potential to cause adverse environmental impacts, however implementation of mitigation measures outlined in the Initial Study/Mitigated Negative Declaration would reduce all potentially significant impacts to less than significant levels. Potential impacts and recommended mitigation measures are related to aesthetics (light or glare), air quality (fugitive dust and air emissions), cultural resources (archaeological and paleontological resources), and utilities and service systems (new water treatment facility).

6. Description of whether the proposed project effectively addresses long-term drought preparedness

This project addresses long-term drought preparedness in two of the ways identified in the Statewide Priorities for the IRWM Grant Program. First, the project is a "solution that yields a new water supply." Without the project, the groundwater in the Pleasant Valley Basin would soon be too salty for PVMWC to use. PVMWC would then most likely rely on imported SWP water, if available, to meet its demand.

Second, the project provides "efficient groundwater basin management." A plume of groundwater with high concentrations of TDS and sulfate is impacting the Pleasant Valley Basin. By pumping this poor quality groundwater from the basin, processing it through a desalter, and then discharging the brine to the ocean, PVMWC will help prevent the plume from contaminating higher quality groundwater in the basin and will be able to continue using groundwater as a source of drinking water supplies even during periods of water shortages. Moreover, PVMWC will not bring additional salt into the basin through imported water. The desalter will improve salts management and prevents degradation of groundwater quality. The reduction in salts in the Pleasant Valley basin improves the health of the basin and enables more sustainable use of the local groundwater resource.

Summary of primary benefit

The PVMWC Desalter will produce 673 AFY high quality potable water over a 25-year period, thereby enabling continued use of local groundwater supplies and avoiding the need to import additional SWP water.

Secondary Benefit: Reduces the TDS concentration in groundwater supplies by 979 mg/L through the desalting process

The desalter will treat PVMWC's groundwater supplies to reduce concentrations of TDS among other constituents. As is shown in Table 2.11, this project reduces the TDS concentration in groundwater supplies by 979 mg/L (from 1,466.1 mg/L to 487.1 mg/L) through the desalting process. This reduction enables PVMWC to meet secondary drinking water standards for TDS of 500 mg/L. The treatment has additional benefits of improved salts management in the watershed. Salts would be removed from the Calleguas Creek Watershed through brine discharge to the ocean via Calleguas' SMP. In addition, by avoiding additional water imports, the project will also avoid the importation of salts, contained in SWP water, to the Calleguas Creek Watershed.

1. Explanation of need for the project including recent and historical conditions

Many groundwater basins within the County, and particularly within the Calleguas Creek Watershed, in which PVMWC is located, are impacted by poor water quality, particularly high salt concentrations. Most of the soils, surface water, and groundwater in the watershed contain high levels of salts, including TDS, among other constituents. Primary sources of salts in surface water and groundwater include imported SWP water, fertilizer used in agricultural activities, and discharges from wastewater treatment plants (Larry Walker Associates 2004, LARWQCB 2007). Salts continue to accumulate, and the mass of salts and minerals currently coming into the watershed, primarily from imported water, is greater than the mass of salts leaving the watershed.

Table 2.11 – Annual Project Physical Benefits

Project Name: Pleasant Valley Mutual Water Company Desalter

Type of Benefit Claimed: Reduces the TDS concentration in groundwater supplies (secondary benefit)

Units of the Benefit Claimed : Milligrams per liter (mg/L)

Anticipated Useful Life of Project (years): 25

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2017 to 2041	1,466.1	487.1	-979

Comments: Over 2017 to 2041, the PVMWC Desalter will process water with an initial TDS concentration of 1,466.1 mg/L. After the desalting process and after blending with raw groundwater, the desalter product water will have a concentration of 487.1 mg/L, thereby resulting in a reduction of TDS by 979 mg/L.

The accumulation of salts due to historical and ongoing point and non-point source pollution poses problems for several beneficial uses within the watershed, including municipal, industrial, and agricultural water supply and habitat uses. This accumulation of salts has impaired the groundwater supplies that PVMWC uses to meet its potable water demands.

In recent years, PVMWC has been experiencing significant and increasing concentrations of TDS in its groundwater supplies. In May 2002, the TDS concentration was 1,280 mg/L; in May 2005, the TDS concentration was 1,600 mg/L; and in May 2015, sampling showed TDS concentrations as high as 1,970 mg/L. Similarly, sulfate concentrations have also shown upward trends (Pleasant Valley Mutual Water Company, 2015, page 1).

In October 2013, PVMWC received a notice of violation of secondary drinking water standards for TDS (and sulfate) from the California Division of Drinking Water. The notice specified that PVMWC must reduce its TDS (and sulfate) concentrations in its drinking water. Besides impacting the quality of water delivered to customers, the high concentration of TDS and sulfate corrodes PVMWC's water system infrastructure.

Rising salinity is also harmful to agriculture, primarily for growers of high-value strawberries and avocados who are increasingly unable to use local surface water or groundwater for irrigation without reducing agricultural productivity. High salinity levels in soils and surface water can also be detrimental to sensitive habitat and can have negative effects on ecosystems in the watershed. As a result of these factors, salt total maximum daily loads (TMDLs) have been established for the watershed; Calleguas Creek is also currently on the Clean Water Act 303(d) list of impaired waters for salts (Los Angeles Region Water Quality Control Board, 2007, page 1).

2. Estimates of without project conditions with respect to this benefit

Without the project, PVMWC's ability to use its groundwater supplies will continue to decline as a result of increasing TDS concentrations and eventually PVMWC will not be able to provide drinking water from its groundwater supplies. Until PVMWC finds an option to treat or otherwise replace water supplies with alternative sources, PVMWC will continue to be in violation of secondary drinking water standards.

With ever-rising concentrations of TDS, PVMWC would have to increase demands on imported water supplies in order to blend its groundwater supplies and would eventually have to completely replace its groundwater supplies with imported water. Importing additional water into the basin will increase the salt loads entering the watershed. Imported water delivered to Calleguas, while having a lower concentration of salt than PVMWC groundwater, still has an average of 290 mg/L TDS. Without the project, increasing amounts of salts would be imported to the Calleguas Creek Watershed.

3. Descriptions of methods used to estimate physical benefits

Based on current desalter design documents, the average TDS concentration of the raw water that will flow into the desalter is 1,466.1 mg/L (CDM Smith Inc., 2015, page 23). The TDS concentration of the desalter product water, after blending with raw groundwater, will be 487.1 mg/L (CDM Smith Inc., 2015, page 23). The difference between these concentrations is 979 mg/L. Hence, the water quality benefit is a reduction of TDS concentrations by 979 mg/L. This significant reduction will allow PVMWC to provide potable water that meets secondary drinking water standards.

The groundwater treatment also has significant implications for salinity management within the basin, which ties in directly with the need of the project described above.

The brine that is produced in the desalting process will be discharged to the ocean via Calleguas' SMP. With the production of 673 AFY from the desalter, 835 metric tons of TDS will be removed from the watershed each year, assuming an initial groundwater TDS concentration of 1,466.1 mg/L and a permeate TDS concentration of approximately 50 mg/L prior to blending.[7]

In addition, by avoiding the need to import additional SWP water, less TDS contained in SWP water will be imported into the watershed. Imported water has a long-term average TDS concentration of 290 mg/L (Calleguas Municipal Water District, 2014, page 5). By avoiding the importation of 673 AFY, 241 metric tons of TDS will not enter the watershed each year.[8]

With the project, the total amount of TDS that is either removed from the watershed via the SMP or prevented from entering the watershed is 1,076 metric tons per year (835 metric tons per year plus 241 metric tons per year). The desalter will be in operation for 25 years from 2017 to 2041.

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

Please see related discussion under primary benefit section.

5. Description of any potential adverse physical effects

Please see related discussion under primary benefit section.

6. Description of whether the proposed project effectively addresses long-term drought preparedness

Please see related discussion under primary benefit section.

Summary of secondary benefit

The project will reduce the TDS concentration in groundwater by 979 mg/L, from 1,466.1 mg/L to 487.1 mg/L, through the desalting process. In the process, and by enabling continued use of groundwater supplies, a total of 1,076 metric tons of salts will either be removed from or prevented from entering the watershed each year.

DIRECT WATER-RELATED BENEFIT TO A DAC

The proposed project area does not encompass a DAC.

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[7] Of the 673 AFY produced by the desalter, 478 AFY is permeate and 195 is raw water
Difference between raw and permeate water quality converted to metric tons
(1466.1 mg/L -50 mg/L) * 1,233,482 L/AF * 1 metric ton/1,000,000,000 mg = 1.747 metric tons of TDS/AF
Change in water quality times amount of permeate results in metric tons of TDS removed by desalter
1.747 metric tons of TDS/AFY * 478 AF = 835 metric tons of TDS per year

[8] 290 mg/L * 1,233,482 L/AF * 1 metric ton/1,000,000 mg = 0.358 metric tons of TDS/AF
0.358 metric tons of TDS/AF * 673 AF = 241 metric tons of TDS per year

PROJECT PERFORMANCE MONITORING PLAN

Table 2.12 – Project Performance Monitoring Plan		
Project: Pleasant Valley Mutual Water Company Desalter		
Physical Benefits	Targets	Measurement tools and methods
1. Water supply produced	673 AFY of treated local groundwater	Collect and analyze production meter readings from the PVMWC Desalter.
2. Water quality improved	Reduction of TDS by 979 mg/L and attainment of secondary drinking water standard recommended limit (500 mg/L)	Compare water quality data of raw groundwater to product water collected at the PVMWC Desalter.

Primary Benefit:

The water supply target is 673 AFY based on the amount of groundwater currently pumped. As part of desalter operations, PVMWC will collect product water meter data to determine how much treated groundwater is actually being produced at the desalter and made available for potable supplies. Measurements will be taken at the point of distribution. Meter readings will occur regularly and will be totaled to determine the cumulative treated water supply per year of operation. The cumulative flow meter readings are the most effective and therefore appropriate means to evaluate whether actual production rates are meeting annual water supply targets.

Secondary Benefit:

Based on the amount of water to be treated at the desalter and water quality design criteria, the water quality reduction target is set at 979 mg/L. Water quality benefits will be determined based on the differences in raw groundwater quality and the water quality of potable water produced at the PVMWC Desalter. As part of treatment plant operations, data will be continuously collected on influent groundwater TDS concentrations and product water TDS concentrations. These data will be summarized and reported monthly as a part of PVMWD's reporting to the SWRCB Division of Drinking Water. The calculated difference in TDS concentrations will be compared against TDS reduction targets. Data on product water TDS concentrations will also be compared against the secondary drinking water standards for TDS in order to ensure regulatory compliance.

COST EFFECTIVENESS ANALYSIS

This section presents a cost-effectiveness analysis comparing relevant project alternatives to the proposed project. The project alternatives considered are (1) purchasing SWP water from Calleguas, (2) purchasing treated groundwater from the City of Camarillo's desalter, and (3) purchasing treated groundwater from the Bell Ranch desalter. Answers to cost-effectiveness analysis questions are presented in summary form in Table 2.13, with a narrative description for each option provided below.

Table 2.13 – Cost Effective Analysis Project name: Pleasant Valley Mutual Water Company Desalter	
Question 1	Types of benefits provided as shown in Tables 2.10 and 2.11: • Produces 673 AFY of potable drinking water supply from local sources. • Reduces the TDS concentration in groundwater supplies by 979 mg/L, from 1,466.1 mg/L to 487.1 mg/L, through the desalting process. In the process.
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? • Yes
	If no, why? • Not applicable
	If yes, list the methods (including the proposed project) and estimated costs. The proposed project is the construction of the PVMWC Desalter. Total capital and annual costs are approximately $6.3 million in present value 2015 dollars. Alternative projects include: (1) Purchasing treated groundwater from the City of Camarillo's Desalter for a cost of $7.4 million in present value, and (2) Purchasing treated groundwater from the proposed Bell Ranch Desalter for a cost of $8.3 million in present value. Another potential option is purchasing SWP water from the Calleguas for a cost of $12.3 million in present value. However, this option would bring additional salts into the watershed with the SWP water instead of removing salts and is therefore undesirable as it does not achieve the same salt removal and avoidance benefits as the proposed project.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. Not applicable – the proposed project is the least-cost alternative.
Comments: See discussion below.	

The capital costs for the PVMWC Desalter project are approximately $3.2 million in present value 2015 dollars. The project has annual costs for operations, maintenance, and replacement. Operations costs consist of chemical usage, brine line fee, electricity, and staff time; maintenance costs are for cleaning; replacement costs are for membrane replacement. Over the life of the project, the total annual costs are approximately $3.0 million in present value 2015 dollars. In total, the capital and annual costs of the project are about $6.3 million in present value 2015 dollars.

Alternative 1: Purchasing treated groundwater from the City of Camarillo's desalter

Another alternative for PVMWC without the project is to purchase treated groundwater from the City of Camarillo's Desalter. If PVMWC decided to purchase water from the City of Camarillo's Desalter, PVMWC would construct an interconnection in 2017 costing approximately $20,000. The cost to purchase water from the City of Camarillo Desalter is estimated to be $981 per AF. Over 2018 to 2041 (the City of Camarillo Desalter will not yet be operating in 2017), the annual costs are approximately $15.8 million. In present value 2015 dollars, the project annual costs are $7.4 million. In present value 2015 dollars, the total cost of this alternative project is $7.4 million.

Besides the higher costs, the City of Camarillo Desalter, a project funded under Proposition 84 Round 2, is still in the design phase. Based on the latest estimates, this desalter will begin producing water in May 2018, so PVMWC would not be able to receive water from this desalter in 2017, as it would with the proposed project.

Alternative 2: Purchasing treated groundwater from the Bell Ranch desalter

A final alternative for PVMWC without the project is to purchase treated groundwater from the Bell Ranch Desalter. If PVMWC decided to purchase water from the Bell Ranch Desalter, PVMWC would construct a pipeline in 2020 costing approximately $500,000. The cost to purchase the water from the Bell Ranch Desalter is estimated to be 95% of the Calleguas Tier 1 price, or $1,333 per AF (Camrosa Water District, 2014, page 1). It is likely that this desalter will not be operational until 2021, so PVMWC would not be able to purchase needed water between 2017 and 2020 from this desalter. Over the 2021 to 2041 time period, PVMWC's annual costs to purchase water from the Bell Ranch Desalter are approximately $18.8 million; in present value 2015 dollars, the project annual costs are $7.9 million. In present value 2015 dollars, the total cost of this alternative project (annual and pipeline construction costs) is $8.3 million.

There are uncertainties about the feasibility and timing of this alternative. This desalter has not yet been built and it is uncertain when or whether the desalter would come online. The Bell Ranch Desalter is still in a fairly conceptual stage. Moreover, it is likely that the permitting process for this desalter will be lengthy for a couple of reasons. First, the Bell Ranch Desalter will be operated by the American Water Company, a private corporation. Second, the Bell Ranch desalter may have trouble getting the needed permits from the FCGMA because the desalter is intended to produce water that would, in part, be sold to retail water agencies located in other groundwater basins than where it will be located (FCGMA, 2015, page 1). FCGMA currently prohibits sales of groundwater that would result in transfers of groundwater between basins. Finally, this project would not be able to provide alternative water supply to PVMWC until potentially 2021.

Additional Potential Option: Purchasing SWP water

Without the project, another potential option for PVMWC would be to purchase an additional 673 AFY of SWP water from Calleguas. Currently, PVMWC purchases approximately 327 AFY from Calleguas, which is less than PVMWC's Tier 1 imported water allocation from Calleguas of 429 AFY. If PVMWC purchased an additional 673 AFY from Calleguas, PVMWC would pay the Tier 1 price on the first 102 AFY of the additional water (429 AFY – 327 AFY) and PVMWC would pay the Tier 2 price on the next 571 AFY of additional water. Calleguas' 2016 Tier 1 water rate is $1,403.30 per AF; Calleguas' 2016 Tier 2 water rate is $1,537.30 (Calleguas Municipal Water District, 2015, page 2). Purchasing the same amount of water in each year as PVMWC would otherwise produce from the desalter, the total annual costs are approximately $25.5 million over the assumed 25-year life of the desalter project, or $12.3 million in present value 2015 dollars.[9]

However, besides being more expensive than the proposed project, purchasing SWP water from Calleguas would not achieve the same overall benefits as the project. Purchasing SWP water brings additional salts into the watershed, which is highly undesirable given the salinity management problems within the watershed. In contrast, the proposed project would improve salinity management within the watershed by removing and avoiding salts as described in the secondary benefit section above. Moreover, future deliveries from the SWP are uncertain. In 2014, water deliveries from the SWP were 5% of requests; and in 2015, deliveries were 15% of requests. Similar levels of water delivery may continue in future years, particularly during periods of drought.

REFERENCES

Bachman, Steven. 2015. North Pleasant Valley Desalter Groundwater Analysis and Modelling: Report to Desalter Working Group. January.

[9]The cost of purchasing SWP water from Calleguas is underestimated because in this analysis, it is assumed that the real (above inflation) cost of purchasing SWP water from Calleguas does not increase over the 2017 to 2041 time period. In fact, Calleguas expects rate increases at less than 6 percent a year (Calleguas Municipal Water District, 2013, 8). Accounting for inflation, the real increase in Calleguas' rate will likely be around 3 percent a year, not zero as is the conservative assumption shown here.

Calleguas Municipal Water District. 2015. Calleguas MWD 2016 Adopted Water Rates. Accessible at: http://www.calleguas.com/images/docs-financial/water_rates.pdf

Calleguas Municipal Water District. 2014. Annual Water Quality Report. July. Accessible at: http://www.calleguas.com/images/docs-documents-reports/awqr.pdf

Calleguas Municipal Water District. 2007. CO_2 Emissions and Imported State Project Water to Ventura County. January.

Camrosa Water District. 2014. Board Memorandum: Desal Water LLC (Bell Ranch) Letter of Intent. September. Accessible at: http://www.camrosa.com/board_agendas/2014/September%2024,%202014/BM4%20-%20Bell%20Ranch%20Desal%20Letter.pdf

CDM Smith Inc. 2015. Design-Build Proposal Pleasant Valley Mutual Water Company TDS Removal Project. May.

Fox Canyon Groundwater Management Agency (FCGMA). 2015. Review of Draft Report Titled Groundwater Yield Analysis for a Desalter Facility at Bell Ranch, Ventura County, California Dated February 12, 2015. June.

Larry Walker Associates. 2004. Progress Report on Efforts to Address Salts on the Calleguas Creek Watershed. June.

Los Angeles Region Water Quality Control Board. 2007. Proposed Amendment to the Water Quality Control Plan – Los Angeles Region to Incorporate the Total Maximum Daily Load for Boron, Chloride, Sulfate, and TDS (Salts) in the Calleguas Creek Watershed. October. Accessible at: http://www.swrcb.ca.gov/water_issues/programs/tmdl/docs/calleguas_salts/notice.pdf

Pleasant Valley Mutual Water Company. 2015. PVMWC TDS & Sulfate Average. June.

MOORPARK DESALTER PHASE 1

A desalter and well field to produce 2,500 AFY potable water from a currently unpotable, high salinity groundwater aquifer.

IMPLEMENTING AGENCY: Ventura County Waterworks District No. 1 (VCWWD1)

PROJECT DESCRIPTION

VCWWD1 serves approximately 39,000 customers and encompasses nearly 20,000 acres including the City of Moorpark as well as unincorporated areas to the north and west. In 2014, 73% of the 12,088 AF of water delivered to VCWWD1's customers was supplied by imported water; whereas, 21% was supplied by local groundwater wells and 6% was by recycled water. Increased use of groundwater is in part limited by water quality conditions. VCWWD1 lies within the South Las Posas Groundwater Basin, which is a part of the Calleguas Creek Watershed, where salinity levels in groundwater and surface waters have been increasing over the years due to historic and ongoing urbanization and agricultural activities in the region. While brackish groundwater of the shallow aquifer is accessible and would provide a potential source of additional local supplies, the high salinity makes the groundwater unusable without treatment.

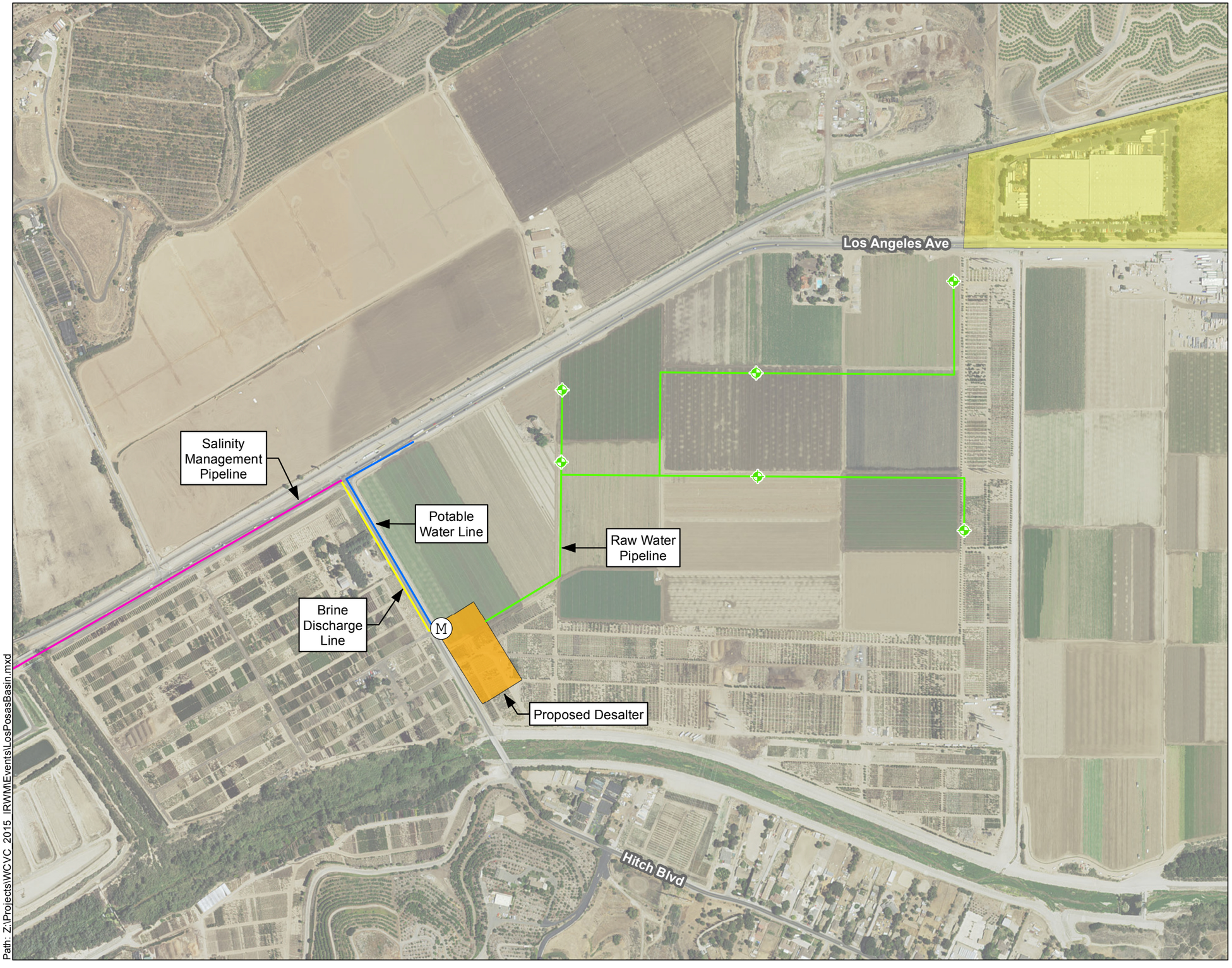
With the Moorpark Desalter Phase 1, VCWWD1 is proposing to extract high salinity groundwater from the shallow aquifer of the South Las Posas Basin at a newly constructed well field and then treat the water at a state-of-the-art desalter plant using membrane filtration technology for the removal of salts including chloride, total dissolved solids, boron, and sulfate. The new well field will consist of six 250-foot-deep wells (five production wells and one backup well). The treated water will meet Title 22 potable water standards and will be distributed to VCWWD1 customers including the Disadvantaged Community in the downtown Moorpark area via its existing water distribution system and potentially to other adjacent water agencies. See the project map on the following page. The brine generated will be discharged via a brine discharge line into the regional SMP being built by Calleguas. This project will be the first phase of a three-phase project. Phase 1 will be capable of producing 2,500 AFY of potable water. Subsequent phases, not part of this proposal, will increase facility capacity to 5,000 AFY and include a one-megawatt solar photovoltaic facility to produce and provide electrical power to the desalination facility.

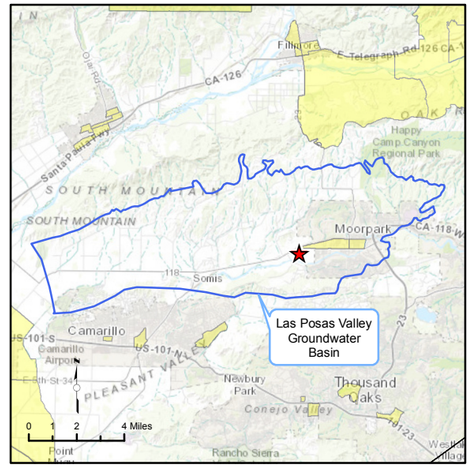
The Project will enable VCWWD1 to maximize use of currently unusable brackish water from the local shallow aquifer, within safe yields, for potable supplies. This Project will thereby increase local water supply reliability and reduce dependency on and usage of imported water by up to 2,500 AFY. Through the desalter process TDS concentrations in groundwater supplies will be reduced by 940 mg/L.

In addition, the project will remove salts from the groundwater basin and avoid salts from avoided water imports. Based on the amount of water produced at the desalter and avoided water imports, it is estimated that the desalter will remove and avoid the import of a total of 4,076 metric tons of salts per year. The project will also save 6,125 MWh, compared to conditions without the project, as less energy is required to process water through the desalter than to import water from Northern California. Furthermore, by producing groundwater from the shallow aquifer which is currently full, the Project will increase storage capacity to facilitate replenishment of the basin with higher quality stormwater runoff and other surface water sources.

How the Project Addresses a Current Need of the Region

The severe drought conditions experienced across Ventura County have created a dire need to increase local supply reliability in part due to increasingly limited imported water supplies. At the same time, many groundwater basins within the County are impacted by impaired water quality, including the South Las Posas Groundwater Basin, which is part of the Calleguas Creek Watershed where salinity is limiting beneficial uses. The salt plume is spreading and migrating into the East and West Las Posas Basins. These conditions limit local groundwater availability and further increase pressures to find alternative water supplies. The Moorpark Desalter Phase 1 will enable VCWWD 1 to increase use of local groundwater supplies by treating currently unusable brackish groundwater, thereby reducing dependence on imported water supplies and improving local supply reliability. In addition, the project will significantly improve salts management in the basin by removing and avoiding import of salts in addition to freeing up aquifer storage capacity to facilitate replenishment with higher quality surface sources.





Legend

- Proposed Wells (5 Production Wells, 1 Backup Well)
- Monitoring Site
- Raw Water Pipeline
- Potable Water Line
- Salinity Management Pipeline
- Brine Discharge Line
- Disadvantaged Communities
- Proposed Desalter

N

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Feet

Kennedy/Jenks Consultants

2015 IRWM Implementation Grant
Ventura County, California

Moorpark Desalter Phase 1

July 2015

Path: Z:\Projects\WCVC_2015_IRWM\Events\LosPosasBasin.mxd

PROJECT PHYSICAL BENEFITS

The following primary and secondary physical benefits are expected from this project:

- Primary Benefit: Produces 2,500 AFY of a new potable drinking water supply from a local groundwater source
- Secondary Benefit: Reduces TDS concentration in groundwater supplies by 940 mg/L through the desalting process

Each benefit is discussed in further detail below, with an overview of each benefit expected over the project life and a technical analysis of the physical benefit claimed. Following the project benefits discussion, a cost-effectiveness analysis of the project compared to an alternative is provided.

TECHNICAL ANALYSIS OF PHYSICAL BENEFITS CLAIMED

Primary Benefit: Increases potable drinking water supply by 2,500 AFY, obtained from a local groundwater source

As is shown in Table 2.14, the Moorpark Desalter Phase 1 will produce 2,500 AFY of potable water from groundwater pumped from the shallow aquifer of the South Las Posas Basin.

Table 2.14 – Annual Project Physical Benefits

Project Name: Moorpark Desalter Phase 1
Type of Benefit Claimed: Water supply produced (primary benefit)
Units of the Benefit Claimed : Acre-feet per year (AFY)
Anticipated Useful Life of Project (years): 30

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2019	0	1,250	1,250
2020 to 2048	0	2,500	2,500
2049	0	1,250	1,250

Comments: The Moorpark Desalter Phase 1 will begin producing water in July 2019. In 2019, the desalter will produce 1,250 AF of potable water. In years 2020 through 2048, the desalter will produce 2,500 AFY. Assuming a 30-year project life means that 1,250 AF of production should be counted in 2049, to match project startup in 2019.

1. Explanation of need for the project including recent and historical conditions

VCWWD1 serves approximately 39,000 customers in the City of Moorpark and unincorporated areas located north and west of the City (VCWWD1, 2014, page 17). In 2014, VCWWD1 met the approximately 12,000 AF demand from its customers using 73% water imported from the SWP, 21% from local groundwater wells, and 6% from recycled water. VCWWD1 receives SWP water via Calleguas, a member agency of the Metropolitan Water District of Southern California. With continued severe drought conditions and increasingly limited imported water supplies, there is a dire need to increase water supply reliability with local water resources to continue meeting the demands of VCWWD1 customers. However, increased use of local groundwater supplies is limited by groundwater quality impairments and no other viable options exist for the near future.

VCWWD1 lies within the South Las Posas Groundwater Basin which is a part of the Calleguas Creek Watershed where salinity levels in groundwater and surface waters have been increasing over the years due to historic and ongoing urbanization and agricultural activities in the Region. While brackish groundwater in the shallow aquifer of

the South Las Posas Basin is accessible to VCWWD1 and would provide a source of additional local supplies, the high salinity makes that source of groundwater unusable for potable use without treatment. The TDS concentration in the South Las Posas Basin is currently 1,340 mg/L (VCWWD1, 2015, page 1). The TDS level far exceeds the secondary drinking water maximum contaminant level (MCL) of 500 mg/L.

In addition, while the salt plume is primarily in the South Las Posas Basin, in recent years, the salt plume has been migrating into the East Las Posas Basin, contaminating the groundwater that VCWWD1 currently pumps (VCWWD1, 2014, page 42). Salinity levels in the groundwater make the water unsuitable for human consumption and limits most agricultural use of the water. In order to reduce the salinity levels in water delivered to customers, VCWWD1 currently blends the groundwater pumped from the East Las Posas Basin with imported water that has a lower salt concentration. However, importing water introduces more salts into the Callegaus Creek Watershed and does not address the spread of the brackish water plume from the South Las Posas Basin.

VCWWD1 proposes to extract the high salinity groundwater from the shallow aquifer of the South Las Posas Basin at a newly constructed well field and then treat the groundwater at a state-of-the-art desalter plant. Brine will be discharged to the ocean. The project will enable VCWWD1 to beneficially use poor quality groundwater that, without desalting, would not be a viable potable water supply. The project will thereby provide a new source of potable water to VCWWD1 from local groundwater. At the same time, the project will protect groundwater in the East Las Posas Basin and contribute to overall improved salinity management within the Calleguas Creek Watershed further enhancing local groundwater sources.

2. Estimates of without project conditions with respect to this benefit

Without the project, VCWWD1 would not have a new supply of 2,500 AFY from local sources, but rather will continue to heavily rely on imported water supplies for meeting water demands and blending with groundwater. VCWWD1 will need to continue looking for additional water supplies to increase water supply reliability into the future. Given the water quality issues, VCWWD1 will have to continue blending its groundwater supplies from the East Las Posas Basin in the short term. However, as the salt plume from the South Las Posas continues to spread and migrate into the East Las Posas Basin, the groundwater that VCWWD1 currently pumps from the East Las Posas Basin will become increasingly impaired and eventually too brackish for beneficial use even with blending. To overcome this potential disruption in local groundwater supply, VCWWD1 would most likely purchase additional imported water from Calleguas, thereby increasing overall dependence on imported supplies and losing reliability of its local water supply – groundwater.

Importing additional water into the basin will also increase the salt in the watershed. As a result, TDS problems in VCWWD1's groundwater would be exacerbated. Also, future deliveries from the SWP are uncertain: in 2014, water deliveries from the SWP were 5% of amounts requested, and in 2015 they reached 15% of amounts requested. Reduced deliveries from the SWP may continue in future years particularly during periods of drought.

3. Descriptions of methods used to estimate physical benefits

The Moorpark Desalter Phase 1 will produce 2,500 AFY of treated groundwater from the shallow aquifer of the South Las Posas Basin. Since approximately 500 AFY will be discharged as brine, VCWWD1 will pump approximately 3,000 AFY of groundwater in order to produce 2,500 AFY of potable water. Studies confirm that there is enough brackish groundwater to pump 3,000 AFY from the South Las Posas Basin (Bachman, 2015, page 61). Each AF produced by the desalter reduces the amount of water VCWWD1 would otherwise need to obtain from the SWP or another source to meet water demands. The water produced by the desalter will meet Title 22 potable water quality standards.

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

VCWWD1 will construct a well field consisting of six 250-feet-deep wells (five production wells and one backup well). A raw water pipeline will be installed to transport raw water from the well field to the desalter, the latter of which will include a cartridge filter and reverse osmosis process. The desalter will connect to Phase 2E of Calleguas' SMP, via a brine discharge line, to transport brine to the ocean for disposal. Phase 2E of the SMP is scheduled to be completed in 2018. In addition, a potable water pipeline will be installed at the desalter and will connect to the VCWWD1 potable water distribution system.

VCWWD1 will need to obtain 3,000 AFY in groundwater pumping credits from the FCGMA. FCGMA manages groundwater pumping in southern Ventura County, including in the Las Posas Basin. VCWWD1 needs 3,000 AFY in additional allocation because the pumping associated with this project is new, and VCWWD1 would not be reducing its groundwater pumping in the East Las Posas Basin.

5. Description of any potential adverse physical effects

The removal of brackish water from the South Las Posas Basin will lower the groundwater level in the shallow aquifer and could affect levels in the underlying deeper Fox Canyon Aquifer (Bachman, 2015, page 52). While this will allow for recharge with higher quality stormwater flows, the lower groundwater level may impact pumpers in the Fox Canyon Aquifer by increasing their pumping head. However, the decrease in groundwater elevation is only expected to occur in the immediate vicinity of the project area. As part of the Environmental Impact Report (in preparation), mitigation measures will be evaluated in coordination with potentially affected pumpers so as to minimize potential impacts.

Also, the desalter facility requires energy to remove salts from the groundwater. This energy use results in greenhouse gases emissions. However, the energy use and greenhouse gas emissions resulting from the project may be considered mitigated because the project also avoids the need to import additional SWP water. In 2007, Calleguas estimated that importing and treating one AF of SWP water to Ventura County requires 4.09 megawatt-hours of energy, whereas the energy required for pumping groundwater and moving it through a desalter takes 1.64 megawatt-hours per AF (Calleguas Municipal Water District, 2007, pages 3-4). As importing SWP water requires more energy (and thus creates more greenhouse gas emissions) than producing water from a desalter, this desalter project causes less of an adverse physical effect relative to the without project condition.

6. Description of whether the proposed project effectively addresses long-term drought preparedness

By pumping and treating brackish groundwater from the South Las Posas Basin, this project provides a new local water supply and helps improve the health of both the South and East Las Posas Basins. This project contributes to sustainable water supply and improved local water supply reliability even during drought. Specifically, this project addresses long-term drought preparedness in two of the ways identified in the Statewide Priorities for the IRWM Grant Program.

First, the project is a “solution that yields a new water supply.” By reducing TDS concentrations in groundwater by 940 mg/L, this project enables use of a groundwater supply that would otherwise not be a viable source for potable water. As a result, VCWWD1 will have a new local potable water supply that will improve reliability even during drought and reduce dependence on imported supplies.

Second, this project provides “efficient groundwater basin management” as it enhances salt management within the Las Posas Basin and helps sustain local groundwater use. A plume of groundwater with high concentrations of TDS exists in the South Las Posas Basin making that water source unsuitable for potable supplies. This plume is migrating to, and threatening, the East Las Posas Basin. By pumping and treating brackish water from the South Las Posas Basin, VCWWD1 will reduce the size of the plume in the South Las Posas Basin and slow and reduce its impacts on the East Las Posas Basin. The Moorpark Desalter Phase 1 will be particularly effective at improving groundwater quality because the desalter will be located six miles from the Simi Valley Wastewater Treatment Plant, which is a major source of salts in the South Las Posas Basin.

By discharging brine to the ocean and avoiding the need for additional imported supplies, the project will also remove salts from the South Las Posas Basin and prevent additional salt imports to the basin to improve the overall salts balance of the basins and watershed. Moreover, the pumping of brackish water from the South Las Posas Basin will free up aquifer storage capacity, allowing for recharge of the basin with higher quality stormwater compared to the groundwater currently in the basin (Bachman, 2015, page 61). As a result, groundwater basin management will overall be improved in order to continue serving as a reliable local water source even during shortages.

Summary of primary benefit

VCWWD1 will produce 2,500 AFY of potable water over a 30-year period, from a currently untapped local groundwater supply thereby preventing the need to import additional SWP water and improving groundwater basin health and sustainability.

Secondary Benefit: Reduces the TDS concentration in groundwater supplies by 940 mg/L through the desalting process

The project will pump and treat brackish groundwater from the South Las Posas Basin in order to reduce concentrations of TDS, among other constituents, and produce potable water. As is shown in Table 2.15, this project reduces the TDS concentration in groundwater supplies by 940 mg/L (from 1,340 mg/L to 400 mg/L) through the desalting process. The treatment has additional benefits of improved salts management in the basin and watershed. Salts would be removed from the Calleguas Creek Watershed through brine discharge to the ocean via Calleguas' SMP. In addition, by avoiding additional water imports, the project will also avoid the importation of salts contained in SWP water to the Calleguas Creek Watershed.

Table 2.15 – Annual Project Physical Benefits

Project Name: Moorpark Desalter Phase 1
Type of Benefit Claimed: Reduces the TDS concentration in groundwater supplies (secondary benefit)
Units of the Benefit Claimed : Milligrams per liter (mg/L)
Anticipated Useful Life of Project (years): 30

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
July 2019 to June 2049	1,340	400	-940

Comments: From July 2019 to June 2049, the Moorpark Desalter Project will treat groundwater with an initial TDS concentration of 1,340 mg/L. Product water from the desalter (after desalting and blending with non-desalted groundwater), will have a concentration of 400 mg/L thereby resulting in a reduction of TDS by 940 mg/L.

1. Explanation of need for the project including recent and historical conditions

VCWWD1 serves approximately 39,000 customers in the City of Moorpark and unincorporated areas located north and west of the City (VCWWD1, 2014, page 17). In 2014, VCWWD1 met the approximately 12,000 AF demand from its customers using 73% water imported from the SWP, 21% from local groundwater wells, and 6% from recycled water. With continued severe drought conditions and increasingly limited imported water supplies, there is a dire need to increase local water supply reliability to continue meeting the demands of VCWWD1 customers. However, increased use of local groundwater supplies is in part limited by groundwater quality impairments.

While brackish groundwater in the shallow aquifer of the South Las Posas Basin is accessible to VCWWD1 and would provide a source of additional local supplies, the high salinity makes that source of groundwater useless without treatment. The TDS concentration in the South Las Posas Basin is currently 1,340 mg/L (VCWWD1, 2015, page 1), far exceeding the secondary drinking water MCL of 500 mg/L.

The primary sources of salts in the watershed include SWP water, fertilizer used in agricultural activities, and discharges from wastewater treatment plants (Larry Walker Associates, 2004, page 17). In fact, the Simi Valley Wastewater Treatment Plant, upstream of Moorpark, is believed to be a major contributor to increasing concentrations of TDS in groundwater in the Las Posas Basin.

The accumulation of salts due to historical and ongoing point and non-point source pollution poses a number of problems for beneficial uses within the watershed, including municipal, industrial, and agricultural water supply and habitat. The accumulation of salts has impaired groundwater in the South Las Posas Basin, and the salt plume of the South Las Posas Basin is spreading and migrating into the East Las Posas Basin, a basin from which VCWWD1 currently pumps (VCWWD1, 2014, page 15). As a result, the groundwater that VCWWD1 pumps is becoming contaminated with high levels of TDS (VCWWD1, 2014, page 42).

Rising salinity is also harmful to agriculture, primarily for growers of high-value strawberries and avocados who are increasingly unable to use local surface water or groundwater for irrigation without reducing agricultural productivity. High salinity levels in soils and surface water can also be detrimental to sensitive habitat and can have negative effects on ecosystems in the watershed. As a result of these factors, salt total maximum daily loads (TMDLs) have been established for the watershed; Calleguas Creek is also currently on the Clean Water Act 303(d) list of impaired waters for salts (LARWQCB, 2007, page 1). In addition, salts imported into the watershed via SWP imports, in combination with background salt levels, contribute to the salts imbalance and exceedances of water quality objectives in the watershed (Bondy, 2012, page 11).

With the proposed project, VCWWD1 will be able to treat the shallow brackish groundwater of the South Las Posas Basin and reduce TDS concentrations, allowing this source to be used for potable water supplies. In addition, this project, due to its removal of TDS from the watershed via brine discharge, is listed as part of the strategy for reducing the amount of salts in the Calleguas Creek Watershed Salt and Nutrient Management Plan (DWR, 2005, page 51).

2. Estimates of without project conditions with respect to this benefit

Without the project, TDS concentrations in the South Las Posas Basin would continue to remain significantly elevated and would continue to prevent beneficial uses without treatment. The South Las Posas shallow brackish groundwater would therefore continue to exist as an unviable source for potable water supplies. In addition, the salt plume of the South Las Posas would continue to threaten groundwater of the East Las Posas Basin. As a result, without the project, the TDS concentrations in VCWWD1's groundwater are expected to increase in future years. In the short term, VCWWD1 would have to continue blending local groundwater supplies with imported water. However, eventually VCWWD1 will not be able to pump groundwater from its wells in the East Las Posas Basin due to the high concentrations of TDS.

Without the desalter treatment and associated brine discharge, salts would not be exported. Also, in order to make up for lost groundwater supplies through contamination, VCWWD1 would purchase additional imported water from Calleguas. Imported water delivered to Calleguas, while having a lower concentration of salt than the groundwater pumped by VCWWD1 in recent years, averages 290 mg/L of TDS (Calleguas Municipal Water District, 2014, page 5). Without the project, additional water that VCWWD1 would have to import would bring more salt into the Calleguas Creek Watershed, thereby exacerbating local salinity management issues.

3. Descriptions of methods used to estimate physical benefits

Currently, the TDS concentration in the shallow aquifer of the South Las Posas Basin is 1,340 mg/L (VCWWD1, 2015, page 1). The TDS concentration in the water produced by the desalter, after blending with non-desalted groundwater, will be about 400 mg/L. This product water concentration is based on the desalter product water quality objective outlined in the most current preliminary design criteria (Kennedy Jenks Consultants, 2015, page 1). The difference between these concentrations is 940 mg/L. Hence, the water quality benefit is the reduction in TDS concentration by 940 mg/L. This water quality benefit will be achieved over the useful lifetime of the project, which is expected to be 30 years.

In addition to reductions in TDS concentrations in treated water, the project will provide benefits in salinity management of the basin and watershed. The brine that is produced by the desalting process is discharged to the ocean via Calleguas' SMP. With the production of 2,500 AFY, 3,182 metric tons of TDS is removed from the watershed each year, assuming an initial groundwater TDS concentration of 1,340 mg/L and a permeate TDS

concentration of 50 mg/L prior to blending (Kennedy Jenks Consultants, 2015, page 1).[10] The project will also avoid the need to import SWP water, thus avoiding salt coming into the watershed with SWP water. Imported water has a long-term average TDS concentration of 290 mg/L (Calleguas Municipal Water District, 2014, page 5). By avoiding the importation of 2,500 AFY, 894 metric tons of TDS will not enter the watershed each year.[11] Therefore, at a production rate of 2,500 AFY, the total amount of TDS that is removed from the watershed via the SMP and prevented from entering the watershed is 4,076 metric tons per year (3,182 metric tons per year plus 894 metric tons per year).

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

Please see related discussion under primary benefit section.

5. Description of any potential adverse physical effects

Please see related discussion under primary benefit section.

6. Description of whether the proposed project effectively addresses long-term drought preparedness

Please see related discussion under primary benefit section.

Summary of secondary benefit

The project will reduce the TDS concentration of groundwater by 940 mg/L, from 1,340 mg/L to 400 mg/L, through the desalting process.

DIRECT WATER-RELATED BENEFIT TO A DAC

The proposed project does not serve at least 25% DACs, by population or area. However, the downtown Moorpark area, which is served by VCWWD1, is considered a DAC (Watersheds Coalition of Ventura County, 2015b). About 15% of the population that VCWWD1 serves is located in downtown Moorpark. This project will benefit these customers as well as all of VCWWD1's other customers.

PROJECT PERFORMANCE MONITORING PLAN

Table 2.16 – Project Performance Monitoring Plan

Project: Moorpark Desalter Phase 1		
Physical Benefits	Targets	Measurement tools and methods
1. Water supply produced	2,500 AFY of new local groundwater supply	Collect and analyze production meter readings from the Moorpark Desalter.
2. Water quality improved	Reduction of TDS by 940 mg/L	Compare water quality data of raw groundwater to product water collected at the Moorpark Desalter.

Primary Benefit:

The water supply target is 2,500 AFY based on the Moorpark Desalter Phase 1 capacity. As part of desalter operations, VCWWD1 will collect product water meter data to determine how much treated groundwater is

[10] Of the 2500 AFY produced by the desalter, 2000 AFY is permeate and 500 is raw water
Difference between raw and permeate water quality converted to metric tons
(1340 mg/L -50 mg/L) * 1,233,482 L/AF * 1 metric ton/1,000,000,000 mg = 1.591 metric tons of TDS/AF
Change in water quality times amount of permeate results in metric tons of TDS removed by desalter
1.591 metric tons of TDS/AFY * 2000 AF = 3,182 metric tons of TDS per year

[11] 290 mg/L * 1,233,482 L/AF * 1 metric ton/1,000,000 mg = 0.358 metric tons of TDS/AF
0.358 metric tons of TDS/AF * 2,500 AF = 894 metric tons of TDS per year

actually being produced at the desalter. Measurements will be taken at the point of distribution. Meter readings will occur regularly and will be totaled to determine the cumulative treated water supply per year of operation. The cumulative flow meter readings are the most effective and therefore appropriate means to evaluate whether actual production rates are meeting annual water supply targets.

Secondary Benefit:

Based on the amount of water to be treated at the desalter and water quality design criteria, the water quality reduction target is set at 940 mg/L. Water quality benefits will be determined based on the differences in raw groundwater quality and the water quality of potable water produced at the PVMWC Desalter. As part of treatment plant operations, data will be collected continuously on influent groundwater TDS concentrations and product water TDS concentrations. This data will be summarized and reported monthly as a part of VCWWD1's reporting to the SWRCB Division of Drinking Water. The calculated difference in TDS concentrations will be compared against TDS reduction targets.

COST EFFECTIVENESS ANALYSIS

This section presents a cost-effectiveness analysis comparing the relevant project alternative to the proposed project. The project alternative considered is purchasing SWP water from Calleguas. Answers to cost-effectiveness analysis questions are presented in summary form in Table 2.17 with a narrative description provided below.

The capital costs for the Moorpark Desalter project are approximately $33 million, or $29.0 million in present value 2015 dollars. The project has annual costs for operations, maintenance, and replacement. Operations costs consist of chemical usage, brine line fee, electricity, and staff time; maintenance costs are for cleaning; replacement costs are for membrane replacement and other needed repairs. Annual costs are escalated at estimated real rates of increase for different cost categories ranging from 0% real rate of increase per year for electricity and maintenance to 2.70% real rate of increase per year for chemicals. Over the life of the project, the total annual costs are approximately $20.8 million in present value 2015 dollars. In total, the capital and annual costs of the project are about $49.8 million in present value 2015 dollars.

VCWWD1 does not have any other feasible project alternatives that achieve the same types and amounts of physical benefits as the proposed project to provide a new water supply from local groundwater by reducing salt concentrations in the groundwater of the South Las Posas Basin shallow aquifer. Additional benefits from the project include protecting East Las Posas Basin supplies from salinity contamination and improving salinity management in the basins and across the watershed. The proposed project will enable potable use of an existing local groundwater source, which is currently unused due to water quality impairments. The project would pump from the South Las Posas Basin, which would reduce the spread of the brackish water plume to the East Las Posas Basin. Additionally, the project would be located directly upstream between the service area and the Simi Valley Wastewater Treatment Plant, which is the largest source of salts in the area, and is thus well situated to intercept groundwater flows from the treatment plant. Additionally, by pumping groundwater from the South Las Posas Basin shallow aquifer, aquifer storage capacity will be freed up to facilitate replenishment with higher quality stormwater.

Table 2.17 – Cost Effective Analysis Project name: Moorpark Desalter Phase 1	
Question 1	Types of benefits provided as shown in Tables 2.14 and 2.15: • Produces 2,500 AFY of a new potable drinking water supply from a local groundwater source • Reduces the TDS concentration in groundwater supplies by 940 mg/L through the desalting process and improves salinity management.
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? • No other alternatives provide the same physical benefits as the proposed project.
	If no, why? • The proposed project is the only alternative that will provide the treatment necessary to enable new production of 2,500 AFY potable water from the untapped shallow aquifer of the South Las Posas Basin in order to increase local supply reliability. At the same time, the project, unlike any potential alternative, improves salinity conditions in the basin by reducing the migration and spread of the salt plume, reducing the amount of salts in the Calleguas Creek Watershed, and facilitating recharge with higher quality stormwater. Importing additional water is the only potentially viable option to increase water supplies for VCWWD1, however if imported water was purchased from Calleguas, this would bring additional salts into the watershed and contribute to the salt imbalances and exceedance of water quality objectives in the Calleguas Creek Watershed (Bondy, 2012, page 11). Increased dependence on imported water would exacerbate salinity management issues and impact local water supply reliability. Other planned or potential desalters in the area would not provide VCWWD1 with the new water supplies achieved with the proposed project primarily due to local groundwater regulations that prohibit transferring groundwater between basins. Expansion of VCWWD1's recycled water system could provide some additional water supply, however it would only occur in future years when growth of the service area increases the amount of influent available to the wastewater treatment plant. Also recycled water expansion plans currently only include treatment for non-potable uses, not potable uses.
	If yes, list the methods (including the proposed project) and estimated costs. • Not applicable. See discussion below.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. • Not applicable.
Comments: See discussion below.	

Without the project VCWWD1 would try to obtain additional imported water to blend with increasingly brackish supplies for meeting future water needs. However, this is not a sustainable option and, in fact, impacts future local water supply reliability. Importing additional water introduces more salts into the Callegaus Creek Watershed and does not address the spread of the brackish water plume that is migrating into the East Las Posas Basin and impacting VCWWD1's local groundwater supplies. Additional water imports would further exacerbate water quality issues, like TDS, in local supplies. It is also important to note that future deliveries from the SWP are uncertain: in 2014, water deliveries from the SWP were 5% of requests, and in 2015, deliveries were 15% of requests. Reduced deliveries from the SWP may continue in future years particularly during periods of drought.

VCWWD1 may be able to purchase additional SWP from Calleguas, however, in addition to not meeting the full objectives and achieving the physical benefits of the proposed project, the imported water option would also be

more expensive. It is assumed that in drought years, VCWWD1 would purchase an additional 1,366 AFY above VCWWD1's recent demand for SWP water, while in non-drought years, VCWWD1 would purchase an additional 2,500 AFY.[12] Differences in purchase amounts are a result of the Calleguas' rate structure. Tier 1 is the lesser rate, with Tier 2 the higher rate[13]. During drought years, the additional 1,366 AFY purchased by VCWWD1 will be Tier 2 water. (In drought years, VCWWD1's Tier 1 allocation decreases such that the entire 1,366 AF is purchased under the Tier 2 water rate.) In non-drought years, the first 1,366 AFY purchased by VCWWD1 will be Tier 1 water, while the next 1,134 AFY will be Tier 2 water. Droughts are assumed for purposes of this analysis to occur twice over the next 30 years over four years, from 2019 to 2023 and 2039 to 2043.

Calleguas' 2016 Tier 1 water rate is $1,403.30 per AF; Calleguas' 2016 Tier 2 water rate is $1,537.30 (Calleguas Municipal Water District, 2015, page 2). Besides the higher Tier 2 water rate, during drought years, VCWWD1 will also incur a $3 million surcharge if it does not reduce its imported water demand (as compared to its non-drought years Tier 1 allocation). Assuming a 2% real rate of increase per year in the cost of imported water, the total annual costs are approximately $169.7 million over the assumed 30-year life of the desalter project, or $60.2 million in present value 2015 dollars. In comparison, as noted above, the proposed project would have a total cost of about $49.8 million in present value 2015 dollars.

Besides the proposed project and importing SWP water from Calleguas, VCWWD1 does not have any other viable option for increasing its water supply by 2,500 AFY. VCWWD1 already has a recycled water program (enabled in part through Proposition 50 funding) that provides water for landscape and agricultural irrigation (VCWWD1, 2014, page 14). However, the recycled water program cannot be expanded further in the short-term due to limitations on the amount of influent to the Moorpark Wastewater Treatment Plant. As the City of Moorpark grows and the amount of influent grows, the wastewater treatment plant will expand as will recycled water production (VCWWD1, 2014, page 68). However, unlike the proposed desalter which would provide a new source of potable water, the additional recycled water production in future years will only produce non-potable water.

Another potential option would be for VCWWD1 to purchase water from other desalters in the area that are in the planning stages including the PVMWC (which is another project included in this application), City of Camarillo Desalter and the Bell Ranch Desalter. However, there are difficulties in receiving water deliveries from any of these desalters in the amount needed, and no other desalter would improve salt management in the Las Posas Basin or prevent the spread of the salinity plume into the East Las Posas Basin, nor would another desalter reduce impacts from the Simi Valley WTP effluent.

The PVMWC Desalter will not have the capacity or sufficient groundwater allowance to provide 2,500 AFY to VCWWD1. In addition, the PVMWC Desalter will be located in the Pleasant Valley Basin. Under current FCGMA rules, groundwater cannot be transported from one basin to another. The City of Camarillo Desalter would have similar limitations as the PVMWC Desalter, as it produces groundwater from the Pleasant Valley Basin. The Bell Ranch Desalter is another locally proposed desalter, which could have the potential to provide groundwater to VCWWD1. However, in regards to the Bell Ranch Desalter, there are uncertainties about the feasibility and timing of this alternative. The Bell Ranch desalter is still in a fairly conceptual stage and it is uncertain when or whether indeed the desalter would come online. Formal FCGMA review and approval has not yet occurred and obtaining approval could be problematic because the desalter is intended to produce water that would, in part, be sold to retail water agencies located in other groundwater basins than where it will be located (Fox Canyon Groundwater Management Agency, 2015, page 1). Additional permitting delays could in part be triggered by the fact that the Bell Ranch desalter is proposed and will be operated by a private corporation, the American Water Company. As a result, none of the above-mentioned desalter alternatives are considered feasible alternatives to the Moorpark Desalter Phase 1.

[12]Without the project, in drought years, VCWWD1 will not purchase the entire 2,500 AFY that would have been produced by the desalter due to the high cost of the water. By only purchasing an additional 1,366 AFY of SWP water, VCWWD1 has less water to use compared to the with-project scenario. Without the project, having less water available would force VCWWD1 to implement water conservation programs resulting in additional costs not included in this analysis.

[13]The volume of water an agency can purchase at the Tier 1 rate is typically limited to 90% or less of the agency's base demand. Water in excess of the Tier 1 volume is charged at the higher Tier 2 rate. The Tier 2 rate reflects the costs of having to procure additional imported water including north of Delta transfers. The Tier 2 rate is meant to encourage users to maintain and develop local supplies.

REFERENCES

Bachman, Steven. 2015. Moorpark Desalter Groundwater Modeling: Report to Ventura County Water Works District #1. July.

Bondy, Bryan. 2012. Final Draft V.1 – Las Posas Basin-Specific Groundwater Management Plan. August 17, 2012. Accessible at: http://www.calleguas.com/images/docs-water-resources-and-quality/drafts-for-discussion/LP_BSGMP_Final_Draft_V1_081712_Text_Tables.pdf

California Department of Water Resources (DWR). 2005. Calleguas Creek Watershed Management Plan: A Cooperative Strategy for Resource Management & Protection, Integrated Regional Water Management Plan. June.

Calleguas Municipal Water District. 2015. Calleguas MWD 2016 Adopted Water Rates. Accessible at: http://www.calleguas.com/images/docs-financial/water_rates.pdf

Calleguas Municipal Water District. 2014. Annual Water Quality Report. July. Accessible at: http://www.calleguas.com/images/docs-documents-reports/awqr.pdf

Calleguas Municipal Water District. 2007. CO_2 Emissions and Imported State Project Water to Ventura County. January.

Fox Canyon Groundwater Management Agency. 2015. Review of Draft Report Titled Groundwater Yield Analysis for a Desalter Facility at Bell Ranch, Ventura County, California Dated February 12, 2015. June.

Kennedy Jenks Consultants. 2015. Moorpark Desalter PDR Design Criteria. July.

Larry Walker Associates. 2004. Progress Report on Efforts to Address Salts on the Calleguas Creek Watershed. June.

Los Angeles Region Water Quality Control Board (LARWQCB). 2007. Proposed Amendment to the Water Quality Control Plan – Los Angeles Region to Incorporate the Total Maximum Daily Load for Boron, Chloride, Sulfate, and TDS (Salts) in the Calleguas Creek Watershed. October. Accessible at: http://www.swrcb.ca.gov/water_issues/programs/tmdl/docs/calleguas_salts/notice.pdf

Ventura County Waterworks District No. 1 (VCWWD1). 2015. Moorpark Desalter TDS Level Reduction." June.

VCWWD1. 2014. 2010 Urban Water Management Plan: Ventura County Waterworks District No. 1. June. Accessible at: http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Ventura%20County%20Waterworks%20District%20%231/Ventura%20Co%20D1%20Revised%202010%20UWMP.pdf

Watersheds Coalition of Ventura County. 2015. Figure 3-17 (Revised April 2015) Disadvantaged Communities WCVC IRWM Region. April.

SANTA CLARA RIVER STEELHEAD COALITION RESTORATION

Arundo control, habitat restoration and ecosystem enhancement will be performed along six miles of the Santa Clara River to save water and improve riparian health.

IMPLEMENTING AGENCY: California Trout, Inc. (CalTrout)

PROJECT DESCRIPTION

The Santa Clara River (SCR) has been identified as a critical wildlife zone due to its size, natural resources, and potential wildlife habitat. However, man-made alterations have led to habitat degradation and invasion by non-native species. Arundo is the primary invasive species of concern, which is known to increase risks of flooding, create fire hazards, reduce the value of riparian habitat for most wildlife, and out-compete native riparian species for scarce water resources, using up to six times as much water as native vegetation.

This proposed project is an arundo control, habitat restoration and ecosystem enhancement program in the Santa Clara River floodplain along six miles of the river between Sespe Creek and Santa Paula Creek. See the project map provided on the following page. This project will remove between 30 and 50 acres of arundo and restore these areas with native vegetation. The project is part of a large-scale effort by the Coastal Conservancy to eliminate arundo from the watershed to improve water resources and habitat and expands on the UC Santa Barbara Santa Clara River Restoration project, funded by Proposition 84 Round 2. Arundo and invasive plants will be removed consistent with methods described in the California Coastal Conservancy's *Santa Clara River Parkway Strategic Plan for Arundo Treatment and Post-Treatment Revegetation* (2011). Revegetation will follow arundo removal. Passive revegetation is anticipated for areas that receive periodic flood flows. Where passive recovery is unlikely, active planting will occur using plants propagated from local seeds and cuttings and when necessary container plants. All plants will be monitored for 3-4 years from the beginning of the project to evaluate whether additional planting will be necessary. Retreatment of arundo regrowth will occur once or twice annually for at least three years to ensure that all arundo plants have been killed.

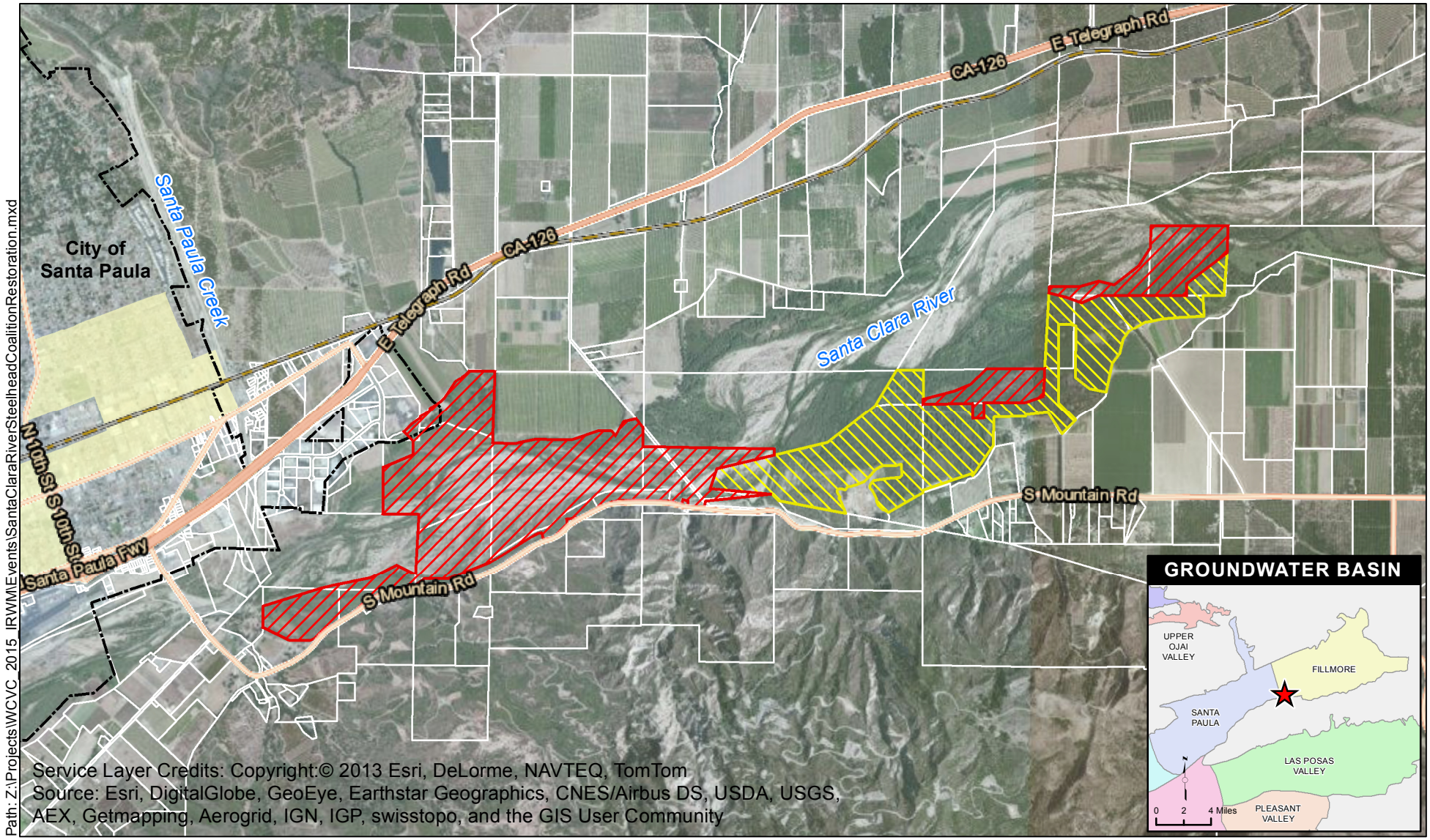
As the chair of the Santa Clara River Steelhead Coalition, CalTrout will administer and implement the project on behalf of and in cooperation with partnering member agencies, including The Nature Conservancy, University of California, Santa Barbara – Marine Science Institute's Riparian Invasion Research Laboratory, and Friends of the Santa Clara River. Restoration work will begin on properties with the highest habitat value, largest arundo populations, and that pose the greatest risk to public safety (through floods and fires). Much of the land in this area is already owned by project partners including The Nature Conservancy, Friends of the Santa Clara River, and willing landowners.

This project will save up to 800 AFY of water and restore between 30 to 50 acres of riparian habitat along the SCR. This project will thereby enhance ecosystem functions and wildlife value of the SCR, reduce flood risks from arundo biomass accumulation, and diminish the risk and impact of wildfire which impacts less-fire tolerant native riparian vegetation along the SCR. The project is an integrated approach to adapting to climate change threats.

How the Project Addresses a Current Need of the Region

The severe drought conditions experienced across Ventura County have created a dire need to increase local supply reliability while increasing water use efficiency. Arundo infestations are resulting in significant water losses across the Region, and along the SCR they are reducing groundwater availability of the Fillmore, Santa Paula, and Oxnard Plain groundwater basins. These basins serve as the sole source of water for the cities of Santa Paula and Fillmore, and the Oxnard Plain has been in a state of overdraft for over 50 years. The arundo removal and ecosystem restoration will save up to 800 AFY of water thereby reducing losses to local groundwater supplies and increasing availability for continued use into the future.

The SCR is one of the few major river systems in the state which retains much of its natural hydrology and provides ecosystem functions necessary to sustain more than 17 federally listed species. In fact it is considered the only salmon stronghold for Southern steelhead recovery in all of Southern California. The project will help improve and maintain the valuable ecosystem functions and resources to the benefit of the entire Region. Furthermore, invasive non-native species have been identified as a limiting factor to steelhead recovery and, removal is a key recovery action identified in the Southern California steelhead Recovery Plan.



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Legend

- Proposed Restoration Areas and Monitoring Locations for 2015 IRWM Implementation Grant
- Restoration Areas of Proposition 84, Rd 2
- Disadvantaged Communities

N

0 1,250 2,500

Scale: Feet

Kennedy/Jenks Consultants

Watersheds Coalition of Ventura County
2015 IRWM Implementation Grant
Ventura County, California

Santa Clara River
Steelhead Coalition Restoration

July 2015

PROJECT PHYSICAL BENEFITS

The following primary and secondary physical benefits are expected from this project:

- Primary benefit: Saves approximately 800 AFY in the Santa Clara River Watershed
- Secondary benefit: Restores and enhances 30-50 acres of riparian habitat along the Santa Clara River

The following sections discuss these benefits in more detail with an overview of each benefit expected over the project life and a technical analysis of the physical benefit claimed. Following the project benefits discussion, a cost-effectiveness analysis of the project compared to its alternatives is provided.

TECHNICAL ANALYSIS OF PHYSICAL BENEFITS CLAIMED

Primary Benefit: Saves approximately 800 AFY of water due to arundo removal

As is shown in Table 2.18, arundo removal accomplished by this project will result in annual water savings of approximately 800 AFY.

Table 2.18 – Annual Project Physical Benefits

Project Name: Santa Clara River Steelhead Coalition Restoration
Type of Benefit Claimed: Water savings (primary benefit)
Units of the Benefit Claimed : Acre feet per year (AFY)
Anticipated Useful Life of Project (years) 50

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2015	0	0	0
2016	0	250	250
2017	0	600	600
2018	0	750	750
2019 through 2065	0	800	800
2066	0	550	550
2067	0	200	200
2068	0	50	50
2069	0	0	0

Comments: The project will remove 30-50 total acres of arundo with an estimated water savings of approximately 20 AF per acre treated. Total water savings are estimated to reach 800 AFY assuming an average of 40 treated acres and water savings of 20 AF per acre. Total water savings could vary depending on the final number of acres treated and the density of arundo on the treated acres. This analysis uses the mid-range estimate of 800 AFY. Projections assume that arundo removal will be complete by 2019 and that the project will have a 50-year useful lifetime. Savings are incremental between 2016 to 2019 according to how much arundo is expected to be removed annually during implementation. Savings decline in later years of the project in the same manner that savings are phased in over the project implementation years.

1. Explanation of need for the project including recent and historical conditions

Arundo, an aggressive invasive plant species, is widespread in the Santa Clara River (SCR) Watershed and is contributing to the degradation of the SCR ecosystem. Arundo has multiple negative impacts in the riparian zone including to increase fire risk, increase flood risk, cause streambank erosion, and impair water quality. In addition, arundo has an extremely high rate of water consumption and transpiration and competes for local water supplies. Studies have shown that arundo can consume up to six times more water than native riparian plant species (Cal-IPC, 2011, pages 47-48).

Arundo's excessive water use is particularly problematic in the SCR Watershed due to the scarcity of local water supplies and dependence on local groundwater. The high water demand by arundo in the SCR effectively reduces recharge of the Fillmore, Santa Paula, and Oxnard Plain groundwater basins. The Fillmore and Santa Paula basins are the sole water sources for the cities of Fillmore and Santa Paula, respectively, and all of these basins are critical to agriculture in the area. Groundwater levels are already declining in the Santa Paula and Oxnard Plain basins, and overdraft is a pressing concern (United Water Conservation District 2013, page 3; United Water Conservation District 2012, page 10). In the Oxnard Plain, overdraft has existed for more than 50 years. It is estimated that the annual overdraft is 20,000 to 25,000 AFY (United Water Conservation District. 2012, page 10).

Apart from reducing water availability for human uses, water consumption by arundo also reduces water availability for critical ecosystem functions of the SCR. The SCR is an ecologically significant and biologically rich region of Southern California and is one of the few major river systems in the state which retains much of its natural hydrology. The SCR provides ecosystem functions necessary to sustain more than 17 federally listed species and provides one of the few remaining habitats for anadromous fish, including the endangered steelhead. This river system is considered a "salmon stronghold" for Southern steelhead recovery under the North American Salmon Stronghold Partnership, and project partners have been working toward steelhead restoration in the SCR for over a decade. Decreased river flows—a direct result of arundo proliferation in the watershed—are a direct impediment to steelhead recovery efforts in the SCR and impact other ecological restoration and species recovery projects along the river.

Reductions in the high water consumption by arundo stands in the project area is therefore a critical need, and the primary benefit of this project will be water savings of approximately 800 AFY project. These water savings will increase recharge of the local groundwater basins, will help restore instream flows that are critical to SCR ecosystem functions, and will contribute to drought preparedness through long-term water use reductions.

2. Estimates of without project conditions with respect to this benefit

Due to arundo's extremely high rate of water consumption and transpiration compared to native vegetation, its persistence significantly impacts local water supplies. Without this project approximately 800 AFY of water would continue to be excessively consumed by invasive arundo thereby continuing to reduce the availability of 800 AFY for other uses, including groundwater recharge and instream flows. This water overconsumption and resulting reductions in groundwater recharge will continue to create pressures on nearby communities that depend on reliable sources of groundwater to meet water demands and are particularly water-stressed due to ongoing drought conditions. Excessive water consumption will also continue to negatively impact river flows, which in turn result in water quality problems and impaired riparian habitat. Arundo would continue to impede steelhead recovery in the watershed and continue to threaten the existence of other fish and wildlife along the SCR. Leaving arundo in place also allows it to continue to spread more widely thereby exacerbating excessive water consumption and the negative impact it has on ecosystem functions, riparian habitat, and fire and flood risk.

3. Descriptions of methods used to estimate physical benefits

A California Invasive Plant Council study estimates that each acre of arundo uses approximately 20 AFY more water than an acre of native vegetation (Cal-IPC, 2011, pages 47-48). This is the most recent and advanced study of arundo impacts on water supplies and provides a widely accepted estimate of the water savings potential from arundo removal.

Assuming removal of arundo on 30-50 acres in the SCR floodplain, or an average of 40 acres, the project will produce water savings of approximately 800 AFY upon completion. Arundo density in the project area is estimated to be above 90%, and the project is designed to remove arundo on sites with the highest density possible (targeting 100% density).

The project lifetime has been assumed to be 50 years. This lifetime is considered to be reasonable given the strong and long-standing involvement by project partners and other related stakeholders to enhance the Santa Clara River Watershed and address the spread of arundo. For example, Friends of the Santa Clara River, a project partner and member agency of the Santa Clara River Steelhead Coalition, has been conducting restoration in the project vicinity since 2004 (Friends of the Santa Clara River, 2011, page 1). The Nature Conservancy, another project partner and member of the Santa Clara River Steelhead Coalition, began work to safeguard and enhance the lower Santa Clara River in 1999 (TNC, 2008, page 6). These efforts and collaborations will continue into the future and demonstrate the vested interest by stakeholders in maintaining project benefits.

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

This project does not require new facilities or policies in order to obtain water savings or ecological restoration benefits. The excessive consumption of water will be disrupted as soon as arundo is successfully removed. The restoration and re-establishment of native riparian habitat within the project area is an integral part of project implementation. Therefore benefits of 30-50 acres of restored riparian habitat will occur automatically with implementation. Upon completion, project partners will need to continue monitoring for the presence of arundo in the project area and if necessary re-treat the areas in order to sustain water-savings benefits.

5. Description of any potential adverse physical effects

No long-term adverse physical effects are anticipated from this project. On the contrary, the project will provide significant long-term environmental benefits. There will be temporary loss of vegetation in the high-density arundo areas, which could cause temporary disturbances to wildlife present in those areas. However, these are unavoidable disturbances during arundo removal activities and these cleared areas will be re-vegetated with native plant species to restore and enhance wildlife habitat. The arundo biomass resulting from removal activities will be taken away from the project areas to further avoid negative project impacts including potential fire or flood hazards.

6. Description of whether the proposed project effectively addresses long-term drought preparedness

The project addresses long-term drought preparedness as identified in the Statewide Priorities for the 2105 IRWM Grant Program by contributing to increased reliability of water supplies during water shortages and helping meet human and ecosystem water demands. The project will conserve approximately 800 AFY of water along the SCR over the expected 50-year project life thereby making more supplies available for human use and ecosystem demands. The project will enhance recharge of the Fillmore, Santa Paula, and Oxnard Plain groundwater basins, which can increase availability of groundwater supplies to the downstream cities of Fillmore and Santa Paula and local agricultural water users. In addition, reducing arundo water demands will benefit hydrology of the SCR. Additionally, by removing water-intensive arundo, the project will enhance groundwater recharge of the local groundwater basins and enhance in-stream flows. Removing arundo and restoring native riparian habitat in the project area will improve the overall health of the SCR and make these ecosystems more resilient to drought impacts. This project therefore directly helps “achieve long-term reduction of water use” and “provide efficient groundwater basin management.”

Summary of primary benefit

Arundo removal and revegetation of the riparian corridor will provide significant water savings in the SCR Watershed. It is estimated that this project will result in water savings of approximately 800 AFY over the 50-year project life. Increased recharge of nearby groundwater basins resulting from water use reductions is an especially important result of these water savings. Groundwater levels in the region are declining, threatening agricultural production and the water security of the Fillmore and Santa Paula communities, which depend on reliable groundwater resources. Reductions in water use by arundo will also provide valuable ecosystem benefits,

including improved instream flows that support steelhead and other aquatic species and enhanced ecosystem functions of the SCR.

Secondary Benefit: Restores and enhances 30-50 acres of riparian habitat along the Santa Clara River

As is shown in Table 2.19, this project will restore riparian habitat on 30-50 acres along the SCR, where arundo was removed. Revegetation with native plants will restore ecosystem functions of the project area and help prevent return of arundo.

Table 2.19 – Annual Project Physical Benefits
Project Name: Santa Clara River Steelhead Coalition Restoration
Type of Benefit Claimed: Restoration of riparian habitat (secondary benefit)
Units of the Benefit Claimed : Acres restored
Anticipated Useful Life of Project (years) 50

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2015	0	0	0
2016	0	10 to 15	10 to 15
2017	0	25 to 35	25 to 35
2018	0	30 to 45	30 to 45
2019	0	30 to 50	30 to 50

Comments: Passive and active re-vegetation will follow arundo removal on these sites and native riparian habitat will be re-established along the SCR within the project area. 2019 is the last year of implementation when up to 50 acres of restoration would be attained. It is assumed the 30-50 acres of restored areas would continue to exist in a restored state through the end of the project life.

1. Explanation of need for the project including recent and historical conditions

The SCR is an ecologically significant river system of Southern California and is one of the few major river systems in the State which retains much of its natural hydrology. The SCR provides ecosystem functions necessary to sustain more than 17 federally listed species and provides one of the few remaining habitats for anadromous fish, including the endangered steelhead. The river system is considered the only salmon stronghold for Southern steelhead recovery in all of Southern California. However, the rapid proliferation of invasive arundo in the SCR floodplain is a serious threat to the ecological health of the watershed and results in numerous negative impacts including impaired water quality, crowding out of native plant species, monopolizing resources, increased flood risk, erosion hazard and wildfire risk.

Arundo is highly flammable and increases fire risk along the SCR, exposing less fire-tolerant native species to increased fire threats and suppressing the function of the river as a natural fire barrier. Most recently on June 22, 2015, a man-made fire rapidly spread to 140 acres along the SCR downstream from the project area in large part as a result of the highly flammable and pervasive arundo (VC Star 2015, page 1). After fire, arundo recovers quickly and outcompetes native riparian plant species. Studies have shown that arundo has caused a decline in native species in the along the SCR by facilitating fire but also through direct competition for resources including water (Cal-IPC 2011, pages 2, 46, 149, 195).

Thick stands of arundo also obstruct river flows and create debris dams that can increase flood risks. Larger and more frequent floods can cause infrastructure damage, especially bridges, and increase streambank erosion and sedimentation, contributing to water quality impairments. Water quality impacts also ensue from decreased flows, which result in elevated water temperatures and disturbances to natural nutrient flows and in turn impact aquatic habitat.

Dominance of arundo also negatively impacts species diversity and habitat value in the SCR as arundo provides little to no habitat for wildlife and reduces food supply for native wildlife as it replaces edible native vegetation. In contrast, native species like willow and cottonwood provide valuable habitat to support wildlife species, including the endangered least bell's vireo and the southwestern willow flycatcher. Studies have found increased arundo cover along the Santa Clara River to have a direct negative impact on bird abundance and diversity, whereby a positive relationship between native willow cover and abundance and diversity of birds was indicated (Labinger, et al. 2011, pages 37, 38; Cal-IPC, 2011, page 29). A California Invasive Plant Council evaluation of arundo impacts on protected species found moderate to severe impacts on amphibians, birds, and fish, including the endangered steelhead trout (Cal-IPC 2011, pages 3, 29, 195).

Restoring between 30-50 acres of riparian habitat with this project is critical to the re-establishment and protection of native riparian habitat and ecosystem functions of the SCR. Evaluations of previous arundo removal and restoration projects along the SCR found increases in wildlife and ecological recovery of treated areas (Friends of the Santa Clara River 2011, pages 2 - 3). Further arundo removal is also beneficial to the long-term success of previous and ongoing restoration projects—to protect habitat and prevent spread and re-establishment of arundo in restored areas. This project will expand upon previous and ongoing restoration projects to optimize overall benefits to the area.

2. Estimates of without project conditions with respect to this benefit

Without the project, 30-50 acres with significant infestations of arundo in the SCR Watershed would not be restored to native conditions and would continue to be dominated by invasive arundo. Arundo will continue to negatively impact species diversity and ecosystem health along the SCR, particularly the area targeted by the project, by crowding out and outcompeting native vegetation with high habitat value, degrading water quality and aquatic habitat, worsening erosion, and increasing fire and flood risks. In addition, leaving arundo in place will facilitate further spread of the invasive plant thereby exacerbating all related impacts. Without the project steelhead recovery efforts would not be aided.

3. Descriptions of methods used to estimate physical benefits

The project will restore between 30 to 50 acres of riparian habitat along six miles of the SCR, between Sespe Creek and Santa Paula Creek. Restoration will occur through eradication of arundo from the project sites and re-vegetation with native plant species. Implementation will occur consistent with methods described in the California Coastal Conservancy's Santa Clara River Parkway Strategic Plan for Arundo Treatment and Post-Treatment Revegetation (2011) in order to ensure achievement of benefits. Locations of highest arundo density and ecological value will be prioritized to optimize the restoration benefits.

The benefits of arundo removal and revegetation of riparian areas are well established, and evaluations of previous arundo removal projects in the SCR Watershed have found increases in wildlife in restored areas (Friends of the Santa Clara River, 2011, pages 2 - 3). While long-term data on ecological recovery are not available for recent restoration projects, the project partners have observed recovery of native vegetation and wildlife populations on other restored sites, and they expect to see similar benefits from this project. The Santa Clara River Steelhead Coalition is currently pursuing funding to develop and implement a long-term steelhead monitoring program (CalTrout 2015, page 1), which may eventually provide additional data on restoration benefits.

The project lifetime has been assumed to be 50 years. This lifetime is considered to be reasonable given the strong and long-standing involvement by project partners and other related stakeholders to enhance the SCR Watershed and address the spread of arundo. For example, Friends of the Santa Clara River, a project partner and member agency of the Santa Clara River Steelhead Coalition, has been conducting restoration in the project vicinity since 2004 (Friends of the Santa Clara River, 2011, page 1). The Nature Conservancy, another project partner and member of the Santa Clara River Steelhead Coalition, began work to safeguard and enhance the lower Santa Clara River in 1999 (TNC, 2008, page 6). These efforts and collaborations will continue into the future and demonstrate the vested interest by stakeholders in maintaining project benefits.

4. Identification of all new facilities, policies, and actions required to obtain the physical benefit

Please see related discussion under primary benefit section.

5. Description of any potential adverse physical effects

Please see related discussion under primary benefit section.

6. Description of whether the proposed project effectively addresses long-term drought preparedness

Please see related discussion under primary benefit section.

Summary of secondary benefit

The SCR is an ecologically significant river system and a critical wildlife zone in part due to its natural resources and wildlife habitat potential. As one of the least altered river systems in Southern California, the SCR provides critical habitat to multiple federally listed species. It is one of few remaining rivers that can support anadromous fish like salmon and steelhead, and protecting the SCR is essential to the success of ongoing steelhead recovery efforts. Arundo threatens the ecological value of this river system by reducing instream flows, altering natural hydrology, increasing fire and flood risk, outcompeting native plant species that provide valuable wildlife habitat, and reducing biodiversity along the SCR. In addition to providing significant water-savings benefits, restoring between 30-50 acres of riparian habitat along the SCR is critical to the re-establishment and protection of native riparian habitat and ecosystem functions of the SCR.

DIRECT WATER-RELATED BENEFIT TO A DAC

The proposed project area does not encompass a DAC and will therefore not provide direct water-related benefit to a DAC.

PROJECT PERFORMANCE MONITORING PLAN

Table 2.20 – Project Performance Monitoring Plan

Project: Moorpark Desalter Phase 1		
Physical Benefits	Targets	Measurement tools and methods
Water use reduction	Save 800 AFY water	Calculate water savings based on acreage of arundo removed and academic studies of arundo water use (i.e., California Invasive Plant Council, Arundo Distribution and Impact, 2011).
Riparian habitat restoration	Restore 30 to 50 acres of riparian habitat	Collect and analyze data from transect surveys, photo documentation (fixed point photography) and aerial imagery to measure acreage of arundo removed and habitat restored with native vegetation.

Primary Benefit:

The water use reduction target is set at 800 AFY based on the amount of arundo planned to be removed with this project. Progress towards achieving the set target will be calculated based on actual acreage of arundo removed and academic literature-based data on water use of arundo. The arundo water use value currently being used is a widely accepted value from the most recent and advanced study of arundo impacts on water supplies from the California Invasive Plant Council: *Arundo Distribution and Impact* (2011, pages 47-48). Water savings calculations will be adjusted if new, peer-reviewed, credible data become available.

Secondary Benefit:

The project is targeting restoration of a total of 30 to 50 acres of riparian habitat. Progress towards meeting this target will be evaluated by collecting and analyzing data obtained from transect surveys and photo documentation to obtain acreage of arundo removed and habitat restored with native vegetation. Line transects will be established and left in place for the duration of implementation and monitoring activities. Stratified-random

sampling methods will be used to conduct monitoring, and transect locations will be selected by analyzing aerial imagery and photo documentation as appropriate. Monitoring will occur consistent with property-specific restoration plans required as part of CDFW Streambed Alteration Agreement.

COST EFFECTIVENESS ANALYSIS

Table 2.21 presents a summary of the cost-effectiveness analysis of this project. No other project alternatives can produce comparable water savings in combination with the ecological restoration benefits. Although demand-side water conservation programs can produce water savings, they cannot provide the direct ecological benefits that this restoration project provides. Similarly, focusing removal efforts on other invasive plant species would not produce the same water conservation or ecological benefits. As the dominant water-intensive species in this floodplain, its removal will have the greatest effects on instream flows and environmental quality.

Table 2.21 – Cost Effective Analysis **Project name: Santa Clara River Steelhead Coalition Restoration**	
Question 1	Types of benefits provided as shown in Tables 2.18 and 2.19: • Water savings of approximately 800 AFY in the SCR • Restoration of 30-50 acres of riparian habitat along the SCR
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? • No
	If no, why? • No other project alternative can produce both (1) the significant water savings and (2) the ecosystem restoration benefits that will be achieved with high certainty with the proposed restoration project. Although municipal demand-side conservation programs can reduce water use, they would not yield water savings benefits directly to the stream and would not have habitat restoration benefits that are in any way comparable to the arundo removal proposed by this project.
	If yes, list the methods (including the proposed project) and estimated costs. • Not applicable.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. • Not applicable.
Comments: See discussion below.	

This restoration project will treat 30-50 acres, resulting in approximately 800 AFY of savings, or a total of 40,000 AF over the 50-year life, at a cost of $561,840, or $499,950 in present value 2015 dollars. Arundo removal costs can vary considerably depending on arundo density and method of removal, so a range of acreage to be restored (30-50 acres) is being targeted. The project team expects to remove most of the arundo during the first two years of the project, so most of the implementation costs will likely be incurred in 2016 and 2017. Arundo removal will continue through 2019, as necessary together with revegetation and retreatment. The costs of revegetation and retreatment are included in the implementation costs.

Restoration projects, such as this proposed project, are unique in that they provide a multitude of benefits that cannot be achieved through any single alternative project. Arundo removal and restoration proposed by this project is the only feasible project option that can provide the anticipated water conservation and habitat restoration benefits along the Santa Clara River. As mentioned above, demand-side municipal water conservation projects would not yield water savings directly to the stream and could not yield the same habitat benefits even if

the same level of water savings could be attained. Arundo is the source of the high water consumption and habitat degradation along the Santa Clara River. Hence, only removing arundo will address the source of the problem. Similarly, no other invasive or native plant species have close to the same water consumption rate as arundo. Therefore removal of an alternative vegetation type would not provide benefits comparable to this arundo removal project. Tamarisk (also known as salt cedar) is another invasive species that is prevalent in the Santa Clara River Watershed and has high water demands compared to native riparian vegetation. However its water consumption rate is less than half that of arundo (Cal-IPC, 2011, pg. 48). Therefore its removal would not achieve comparatively significant water savings if removed and replaced by native vegetation.

In summary, the physical benefits claimed for this project include water savings of 800 AFY and between 30-50 acres of restored riparian habitat. There are no viable vegetation-based projects or demand-side conservation measures that would provide the same water savings and restoration benefits combined.

REFERENCES

California Coastal Conservancy, 2011. *Santa Clara River Parkway: Strategic Plan for Arundo Treatment and Post-Treatment Revegetation. September* 2011. Accessible at: http://www.ventura.org/wcvc/documents/PDF/SCRW/Santa_Clara_River_Arundo_Strategy_Report_2012.pdf

California Invasive Plant Council. 2011. *Arundo donax, Distribution and Impact Report*. March 2011. Accessible at: http://www.cal-ipc.org/ip/research/arundo/Arundo%20Distribution%20and%20Impact%20Report_Cal-IPC_March%202011.pdf

California Trout, 2015. *Santa Clara River Restoration*. Retrieved July 16, 2015. Accessible at: http://caltrout.org/initiatives/steelhead-salmon/santa-clara-river-restoration/

Friends of the Santa Clara River, 2011. *Restoration at the Hedrick Ranch Nature Area. July 2011*. Accessible at: http://www.fscr.org/pdfs/aa_G-016_Final_Report.pdf

Labinger, Z., J. Greaves, E. Gevirtz, 2011. *Avian Populations on the Santa Clara River in 2005 and 2006.* January 19, 2011. Accessible at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=65423&inline=true

The Nature Conservancy (TNC), 2008. Conservation Plan for the Lower Santa Clara River Watershed and Surrounding Areas. Accessible at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=60245&inline=true

United Water Conservation District, 2013. *2011 Santa Paula Basin Annual Report.* Professional Paper 2012-001. September 2013. Accessible at: http://www.unitedwater.org/images/stories/reports/GW-Conditions-Reports/SP%20Basin%202011%20Annual%20Report%20Sept%202013%20-%20final.pdf

United Water Conservation District, 2012. *Groundwater and Surface Water Conditions Report—2011*. Open-File Report 2012-02. May 2012. Accessible at: http://www.unitedwater.org/images/stories/reports/GW-Conditions-Reports/GW_and_SW_Conditions_Report_-%202011.pdf

Ventura County Star (VC Star), 2015. *River Bottom Fire Near Santa Paula 20 Percent Contained*. Retrieved July 23, 2015. Accessible at: http://www.vcstar.com/news/local-news/santa-paula/firefighters-battling-blaze-in-river-bottom-near-santa-paula_76481650