# UPPER SANTA CLARA RIVER
# 2015 IRWM Implementation Grant
## Attachment 2 – Project Justification

This attachment provides the project justification for the three projects contained in this Proposal. This Attachment is organized by project as follows:

**Project Summary Table** – A table showing how each project meets the various IRWM Project Elements of the 2015 Implementation Solicitation. This table is consistent with the Proposal Solicitation Package (PSP) Table 4.

**Project Description** – A brief and expanded project description for each Project and how each will address a current need of the Region.

**Regional and Project Maps** – A regional map showing the Upper Santa Clara River IRWM boundary and the location of each project is provided. Individual project maps are provided that include surrounding work boundaries, project facilities, water resources to be affected, and proposed monitoring locations.

**Project Physical Benefits** – For each project there is a description of its primary and secondary physical benefits.

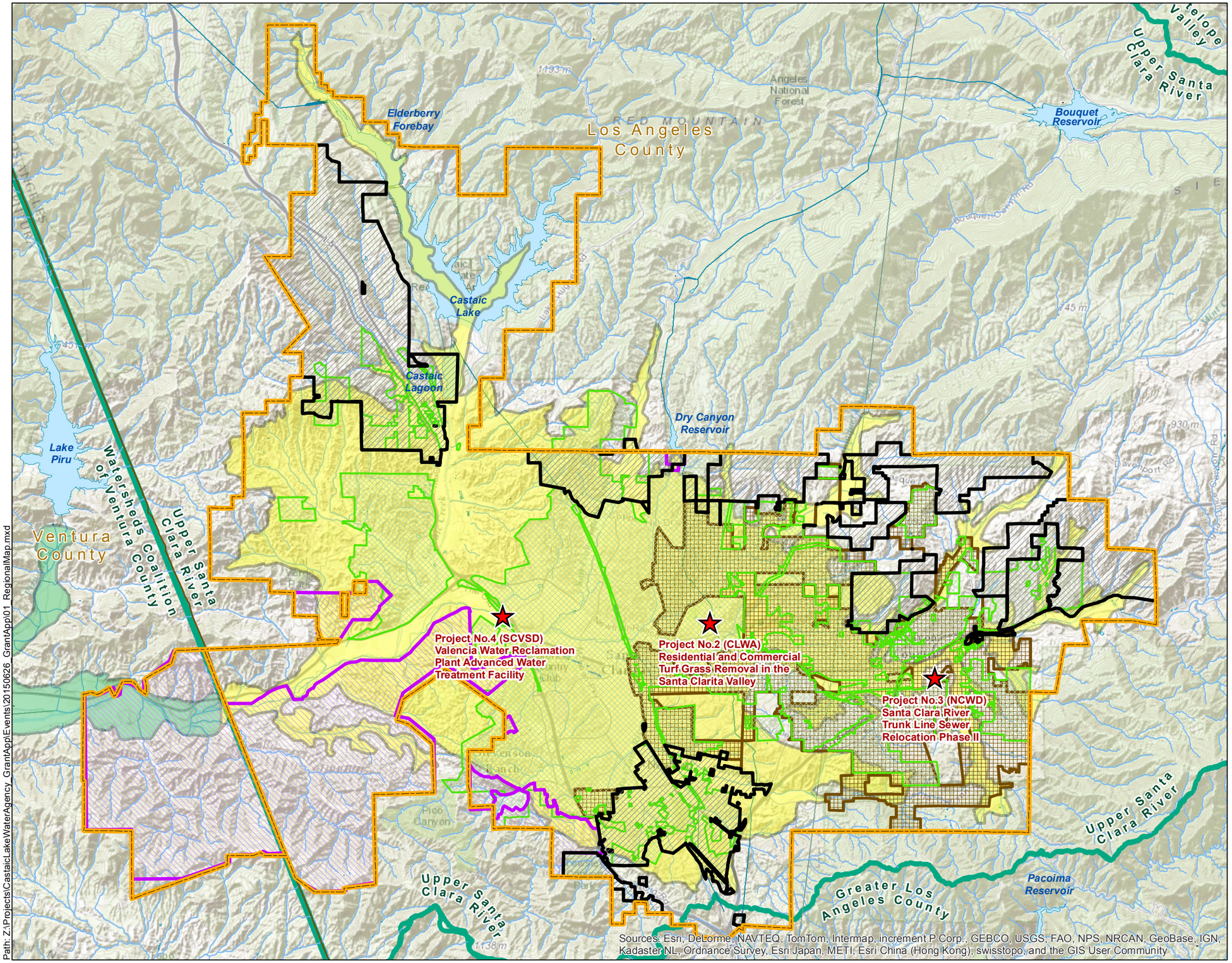
**Technical Analysis of Physical Benefits Claimed** – This section provides the technical analysis of the physical benefits claimed for each project.

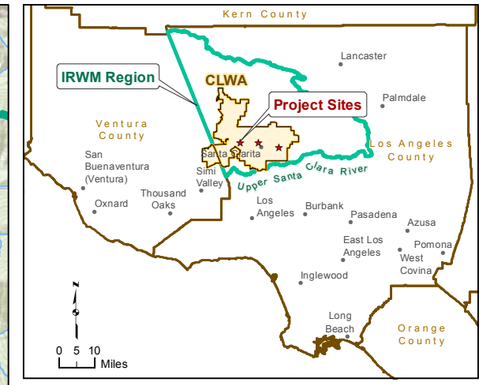
**Direct Water-Related Benefit to a Disadvantaged Community (DAC)** – This section is *not applicable* for any of the three projects in this grant proposal. While there are some areas within the Region which contain communities fitting the definition of a DAC, they do not comprise at least 25% of the project service area, and thus no DAC benefits are claimed.

**Project Performance Monitoring Plan** – For each project there are established monitoring measures to ensure the project will meet its intended benefits.

**Cost effectiveness Analysis** – For each project a cost effectiveness analysis is presented evaluating whether the physical benefits provided by the project are provided at the least possible cost.

| 2015 IRWM Grant Solicitation Project Summary Table (PSP Table 4) | | | | |
|---|---|---|---|---|
| IRWM Project Element | | CLWA Residential/ Commercial Turf Removal Programs | Santa Clara River Trunk Sewer Line Project Phase II | Valencia WRP Advanced Water Treatment Facilities |
| IR.1 | Water supply reliability, water conservation, and water use efficiency | X | X | X |
| 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 | X | | |
| IR.5 | Groundwater recharge and management projects | | X | X |
| IR.6 | Contaminant and salt removal through reclamation, desalting, other treatment technologies and conveyance of reclaimed water for distribution to users | | | X |
| IR.7 | Water banking, exchange, reclamation, and improvement of water quality | | | X |
| IR.8 | Planning and implementation of multipurpose flood management programs | | | |
| IR.9 | Watershed protection and management | | X | |
| IR.10 | Drinking water treatment and distribution | | | |
| IR.11 | Ecosystem and fisheries restoration and protection | | X | |




## Legend

- Project Sites
- Castaic Lake Water Agency Service Area Project No. 2 Proponent
- Newhall County Water District Project No. 3 Proponent
- Santa Clarita Valley Sanitation District Project No. 4 Proponent
- Valencia Water Company
- Santa Clarita Water Division
- IRWM Regional Boundaries

**Groundwater Basins**

- Santa Clara River Valley (Piru) - CASGEM Priority: High
- Santa Clara River Valley (Santa Clara River Valley East) - CASGEM Priority: High

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**Kennedy/Jenks Consultants**

Castaic Lake Water Agency
2015 IRWM Implementation Grant Application
Santa Clarita, California

**Regional Map**

K/J 1544224.00
August 2015
**Figure 1**

Path: Z:\Projects\CastaicLakeWaterAgency_GrantApp\Events\20150626_GrantApp\01_RegionalMap.mxd

Note: Project 1 is Grant Administration for all of the projects in this proposal. Therefore it is not shown as a geographical location on the map.

## PROJECT DESCRIPTION

## CLWA RESIDENTIAL AND COMMERCIAL TURF REMOVAL PROGRAMS

This Project is being implemented by Castaic Lake Water Agency (CLWA). Project Partners include: Los Angeles Waterworks District #36, Newhall County Water District (NCWD), Santa Clarita Water Division, and Valencia Water Company.

### *Brief Project Description*

These programs provide incentives to replace turf in single-family residential, multi-family residential and commercial, industrial and institutional (CII) entities within the Santa Clarita Valley (SCV).

### *Expanded Project Description*

The CLWA Residential and Commercial Turf Removal Programs will provide rebates to encourage customers of the retail water agencies served by CLWA to replace their turf with low-water using plants or permeable hardscape. The following two conservation programs will remove turf in the SCV through a single-family residential, and multi-family residential with CII turf removal program.

Single Family Residential Turf Removal Program
This is a valley-wide program that provides a per square foot incentive for supporting customers' cost to remove turf and replace it with a variety of low-water using plants or permeable hardscape. The rebate is based on dollars per square foot removed and is capped at an upper limit for single family residences of 2,500 square feet.

Multi-Family Residential and CII Turf Removal Programs
This is also a valley-wide program that provides a per square foot incentive to remove turf and replace it with a variety of low-water using plants or permeable hardscape. The rebate is based on a dollar per square foot removed, and capped at an upper limit for both multi-family and CII customers (proposed at $50,000 per water meter). Special projects (large landscape) with additional water savings are also included (e.g., large commercial centers with more than 25,000 square feet in turf).

For both residential and commercial turf grass removal programs, there are mandatory pre- and post-inspections with photo documentation and field measurements. The grass must be alive and in place at the beginning of the project for the project to be funded. Projects are funded at $2 per square foot upon completion of the project. Residential turf removal and CII turf removal will result in the estimated water savings of 181 AFY in 2016, 248 AFY in 2017, and 318 AFY in 2018, for a total of 747 AFY of savings.

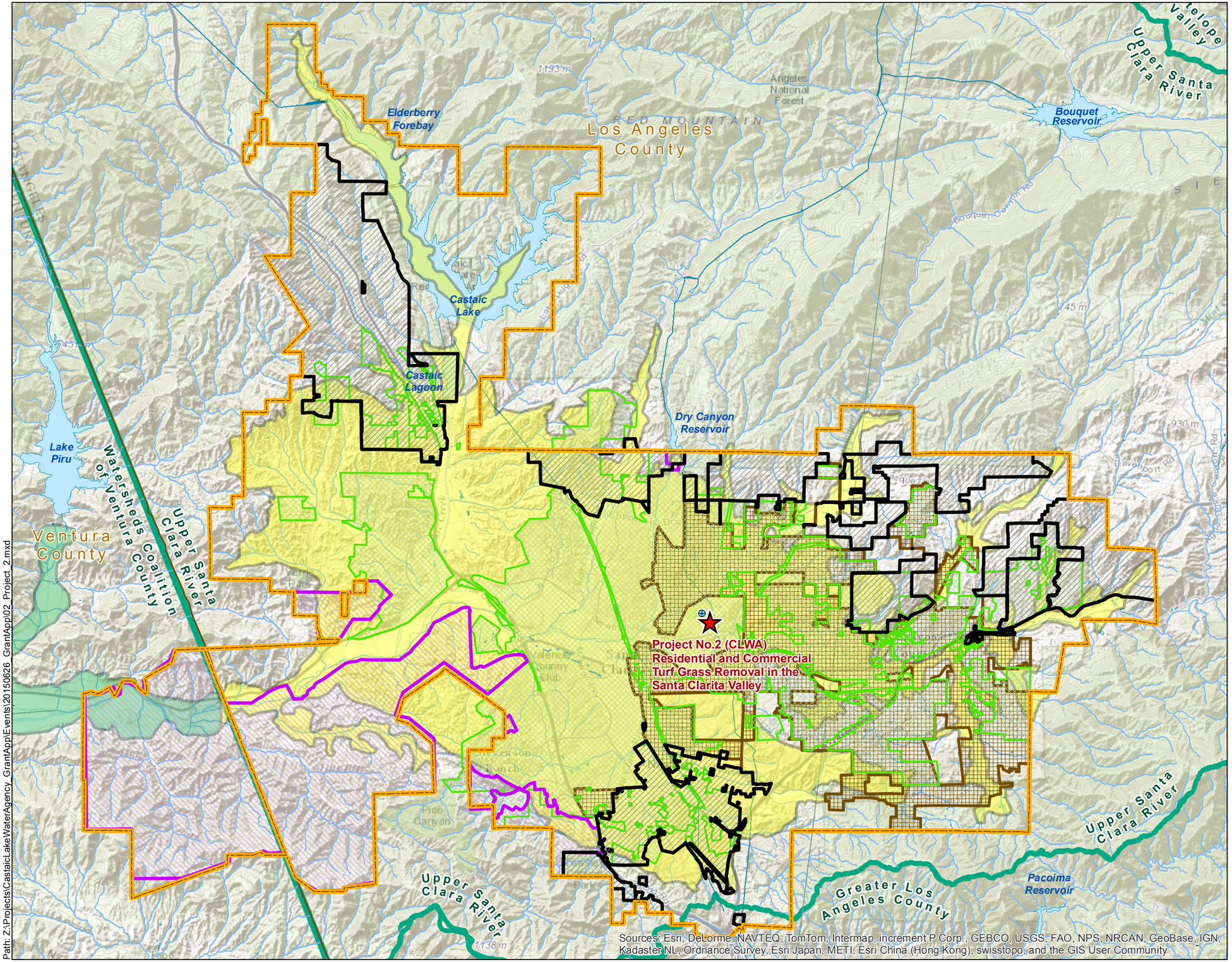
The programs are part of the 2015 update of the SCV Water Use Efficiency Strategic Plan (SCV WUE SP), and both programs (residential and commercial) have been in existence in a similar form since 2014. Over three years of potential funding, 747 AFY of water will be saved. The secondary benefits include improving water quality by decreasing runoff from irrigation and by eliminating the importation of 747 AFY of State Water Project (SWP) supplies for irrigation. Avoiding the import of SWP is expected to increase the assimilative capacity of the western portion of the underlying groundwater basin for chloride by 0.8 milligrams per Liter (mg/L).

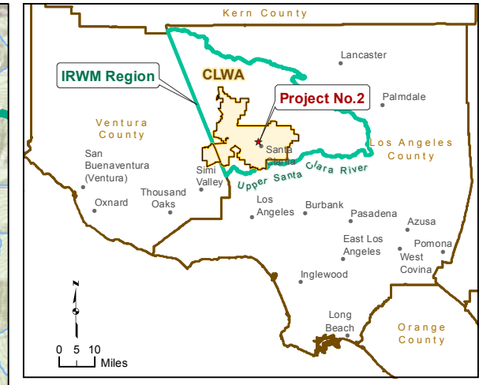
### *Addressing the Current Needs in the Region*

With the drought in the State continuing into its fourth year, SWP deliveries at an all-time low, and statewide mandated conservation, there is a great need in the Region to reduce potable demands and conserve water. The primary benefit in implementing these programs is reducing the water demand in the SCV. The SCV WUE SP provides a combination of valley-wide and retailer conservation programs to meet the 20% by 2020 conservation goal set out in Senate Bill (SB) X7-7 including the CLWA Residential and Commercial Turf Removal Programs. These two programs would be available valley-wide and would be administered by CLWA.

### *Project Map*

A map is provided showing the CLWA service area boundary, the projects' geographical location, surrounding work boundaries, and location of project activities and/or facilities as well as monitoring location and DACs within the service area. It is noted that the project will be implemented throughout the CLWA service area, at the request of individual residential and commercial entities; therefore their exact location cannot be specifically defined. These are the Latitude and Longitude in decimal degrees: 34.436578, -118.518759.




## Legend

- Project No.2 Site
- Monitoring Location
- Castaic Lake Water Agency Service Area Project No. 2 Proponent
- Newhall County Water District
- Santa Clarita Valley Sanitation District
- Valencia Water Company
- Santa Clarita Water Division
- IRWM Regional Boundaries

**Groundwater Basins**

- Santa Clara River Valley (Piru) - CASGEM Priority: High
- Santa Clara River Valley (Santa Clara River Valley East) - CASGEM Priority: High

Note:
Project will take place over entire Castaic Lake Water Aagency Service Area.

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Miles

**Kennedy/Jenks Consultants**

Castaic Lake Water Agency
2015 IRWM Implementation Grant Application
Santa Clarita, California

**Residential and Commercial Turf Removal Programs Project No. 2**

K/J 1544224.00
July 2015
**Figure 2**

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### PROJECT PHYSICAL BENEFITS

### CLWA RESIDENTIAL AND COMMERCIAL TURF REMOVAL PROGRAMS

The following primary and secondary physical benefits are expected from the CLWA Residential and Commercial Turf Removal Programs:

- Primary Benefit: 747 AFY of water conserved as result of replacing turf grass with low-water using plants or permeable hardscape.
- Secondary Benefit: Increase of 0.8 mg/L in chloride assimilative capacity in the western portion of the underlying groundwater basin (the Santa Clara River Valley East Subbasin).

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 benefits claimed. Following the technical analysis discussion, a project performance and monitoring plan is described along with a cost effectiveness analysis of the project compared to its alternatives.

#### *Primary Benefit: 747 AFY of water conserved by turf removal*

The CLWA Residential and Commercial Turf Removal Programs will provide rebates to encourage customers of the retail water agencies served by CLWA to replace their turf with low-water using plants or permeable hardscape. As is shown in Table 1, this will save 747 AFY in potable water use.

**Table 1 – Annual Project Physical Benefits (PSP Table 5)**

**Project Name: CLWA Residential and Commercial Turf Removal Programs**
**Type of Benefit Claimed: Water conservation (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 | 0 | 0 |
| **2016** | 0 | 181 | 181 |
| **2017** | 0 | 429 | 429 |
| **2018** | 0 | 747 | 747 |
| **2019** | 0 | 747 | 747 |
| **2020** | 0 | 747 | 747 |
| **2021** | 0 | 747 | 747 |
| **2022** | 0 | 747 | 747 |
| **2023** | 0 | 747 | 747 |
| **2024** | 0 | 747 | 747 |
| **2025** | 0 | 747 | 747 |
| **2026**[1] | 0 | 566 | 566 |
| **2027 (Final year of project)** | 0 | 318 | 318 |

**Comments:** The CLWA Residential and Commercial Turf Removal Programs will begin rebating turf removal in January 2016. According to the California Urban Water Conservation Council's DSS models tailored for the four retail agencies supplied by CLWA, this will yield water savings of approximately 181 AFY in 2016, 248 AFY in 2017, and 318 AFY in 2018 (Maddaus Water Management Inc, 2014). When the project is fully implemented, it will provide water savings of 747 AFY. Even though the annual water savings benefits are calculated in the DSS model using permanent savings, a conservative 10-year benefits lifespan is assumed to achieve the savings from the programs.

[1] The decrease in future benefits is a consequence of assuming a 10-year benefit lifetime. Savings that start in 2016 will have used up its lifetime by 2025, and thus the cumulative total in 2026 will be reduced by that amount (747-181=566). Additional savings added in 2018 will expire at the end of 2027 and thus the cumulative total goes to 0 in 2027.

***Secondary Benefit: Increase of 0.8 mg/L in chlorides assimilative capacity for the western portion of the Santa Clara River Valley East Subbasin***

The CLWA Residential and Commercial Turf Removal Programs will reduce the amount of chlorides introduced into the SCV watershed by eliminating the importation of 747 AFY of SWP supplies for irrigation, and by eliminating irrigation runoff from properties where turf is replaced. As is shown in Table 2, this is expected to increase the assimilative capacity[2] in the western portion of the underlying groundwater basin, the Santa Clara River Valley East Subbasin, by 0.8 mg/L.

**Table 2 – Annual Project Physical Benefits (PSP Table 5)**

**Project Name: CLWA Residential and Commercial Turf Removal Programs**
**Type of Benefit Claimed: Increase in chloride assimilative capacity (secondary benefit)**
**Units of the Benefit Claimed: 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** | 0 | 0 | 0 |
| **2016** | 0 | 0.2 | 0.2 |
| **2017** | 0 | 0.4 | 0.4 |
| **2018** | 0 | 0.8 | 0.8 |
| **2019** | 0 | 0.8 | 0.8 |
| **2020** | 0 | 0.8 | 0.8 |
| **2021** | 0 | 0.8 | 0.8 |
| **2022** | 0 | 0.8 | 0.8 |
| **2023** | 0 | 0.8 | 0.8 |
| **2024** | 0 | 0.8 | 0.8 |
| **2025** | 0 | 0.8 | 0.8 |
| **2026**[3] | 0 | 0.6 | 0.6 |
| **2027 (Final year of project)** | 0 | 0.3 | 0.3 |

**Comments:** The CLWA Residential and Commercial Turf Removal Programs will provide avoided chloride benefits in accordance with the conserved water from implementation of the Programs. All conservation programs identified in the SCV WUE SP are expected to decrease chloride concentrations in the western portion[4] of the Santa Clara River Valley East Subbasin from 77 mg/L to 72 mg/L (Geoscience Support Services, Inc. 2015, figure 30.2.f). The Turf Removal Programs will achieve roughly 15.5% of all water savings expected for the SCV WUE SP, so these programs will achieve approximately 0.8 mg/L (5 mg/L x 15.5%) of the increase in assimilative capacity. SWP supplies have a chloride concentration of approximately 76 mg/L or 0.097 MT/AF (MWD 2010 page 59). At full implementation with 747 AFY of conserved water, this project will reduce the amount of additional chlorides introduced into the SCV watershed by approximately 70 MT per year.

[2] Assimilative capacity is a quantitatively useful concept codified in the Clean Water Act and other laws and regulations. It specifically refers to the capacity for a water body to absorb constituents without exceeding a specific concentration, such as a water quality objective. For example, if the irrigation water quality objective for salt is 450 mg/L of total dissolved solids, the assimilative capacity of a water body would be the amount of salt that could be added to the ambient concentration of the water such that its new concentration would not exceed 450 mg/L.

[3] The decrease in future benefits is a consequence of assuming a 10-year benefit lifetime. Savings that start in 2016 will have used up its lifetime by 2025, and thus the cumulative total in 2026 will be reduced by that amount (0.8-0.2=0.6). Additional savings added in 2018 will expire at the end of 2027 and thus the cumulative total goes to 0 in 2027.

[4] The Salt and Nutrient Management Plan for the Santa Clara River Valley East Subbasin (Geoscience Support Services, Inc. 2015), evaluates the water quality in the underlying basin by splitting it into smaller 'management zones'. The management zone closest to the Los Angeles/Ventura County Line is the 'Castaic Management Zone'. This is the only zone that has beneficial uses of importance pursuant to the RWQCB Basin Plan. Thus while the programs will be implemented throughout the entire Subbasin, the economic benefits are really focused on that western Management Zone, which this analysis is based on.

## TECHNICAL ANALYSIS OF PHYSICAL BENFITS CLAIMED

## CLWA RESIDENTIAL AND COMMERCIAL TURF REMOVAL PROGRAMS

***Primary Benefit: 747 AFY of water conserved by turf removal***

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

With the drought in the State continuing into its fourth year, SWP deliveries at an all-time low, and statewide mandated conservation, there is a great need in the Region to reduce potable demands and conserve water. The 2008 SCV WUE SP (A&N Technical Services, 2008), and the most recent update of the plan (Maddaus Water Management Inc., and Western Policy Research, 2015) identify residential and commercial turf replacement programs as key components in an overall plan to reduce demand by 20% by 2020 in accordance with SB X7-7. CLWA's current turf replacement programs began in a similar form in 2014, with Round 2 of IRWM Implementation grant funding. These turf replacement programs will also help California meet the Governor's executive drought mandate target of removal of 50 million square feet of turf (Brown, 2015).

Ongoing drought conditions have caused CLWA's water supplies to become increasingly constrained. Approximately half of urban water demand in the CLWA service area is met with imported SWP water, however due to allocation reductions, CLWA cannot depend on these supplies to meet demands. SWP allocations are far below projected allocations for single and multiple dry year scenarios in the CLWA 2010 Urban Water Management Plan (UWMP). To address future critical dry year conditions, CLWA is dependent on a combination of demand reductions that include water efficiency and supply enhancement such as recycled water, and drought-year supplies from long-term groundwater banking programs.

Also, according to the 2015 SCV WUE SP, the SCV has unique water conservation challenges due to relatively low water rates in comparison to local affluence and historically turf-centric property development (Maddaus Water Management and Western Policy Research, 2015, page 12). While most of southern California has slowly shifted away from turf, this has not happened at the same pace in Santa Clarita. This project will continue efforts to promote residential and commercial water conservation by incentivizing resource stewardship through plant diversification in landscaping.

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

Without this project, SCV residential and commercial customers would continue to irrigate turf with approximately 747 AFY of water that could otherwise be conserved. Customers would not have an incentive to break from traditionally turf-centric landscaping and develop landscapes more natural to the climate and region. CLWA and its water retail agencies would need to develop other water conservation measures to meet the 20% reduction in baseline per-capita water use set out in SB X7-7 to address the current drought conditions. Without the project, customers will continue to use 747 AFY of potable water through outdoor irrigation over the 10 years that these programs are assumed to realize water supply benefits. CLWA would therefore continue to import the same amount of water from the SWP if available, and depend more highly on its marginal[5] source of SWP water which is purchased from the Buena Vista-Rosedale Rio-Bravo Water District (BV/RRB) in Kern County[6]. Additionally, CLWA would otherwise require the local water retailers to utilize more groundwater to meet demands.

*3. Descriptions of methods used to estimate physical benefits*

This project will refund participants $2 for every square foot of turf replaced, based on mandatory pre- and post-inspections with photo documentation and field measurements.

Water savings for turf replacement in SCV, along with other water conservation measures, are estimated using the DSS Water Demand & Conservation Model (Maddaus Water Management, 2014). The model assumes that turf replaced through this rebate program has a plant factor of 0.75, and that the combination of low-water using plants and permeable hardscape and synthetic turf replacing the turf has a plant factor of 0.5. Both the turf plant factor and replacement material plant factors are conservative: turf is often assumed to have a plant factor of 0.8, low-water using plants often have plant factors of less than 0.3 (DWR, 2000 pages 6 and 12) and some customers are replacing turf with artificial turf, which has a plant factor

[5] Marginal water source is defined as the augmentation of a water supply through the use of unconventional or "marginal" water sources. Marginal water can be used to improve the efficiency of water use and supplement intensively exploited conventional sources.

[6] CLWA typically receives part of Buena Vista's Kern River entitlements through exchange of BV/RRB's SWP supplies (Kennedy/Jenks Consultants et al., 2011).

of 0. The DSS model is based on four water retailer-specific water balance databases with average gallon use per person per day, per account statistics. These accounts are split into customer classifications (single-family, multi-family, and CII), and finally into outdoor and indoor usage, with roughly 80% of outdoor usage attributed to irrigation. The difference in plant factors between turf and replacement plants or synthetic turf yields approximately 25% in water savings. These savings are applied after other water conservation measures have been accounted for, providing a conservative estimate of savings due to turf replacement. This per-account savings is multiplied by the number of accounts affected by the project's budget to yield the total project savings for one year. Table 3 shows the number of accounts targeted over the three-year implementation period.

The single-family conservation program will target 471 accounts over 3 years with an estimated 135 AFY of savings; the multi-family and CII program will target approximately 342 accounts over 3 years with an estimated 612 AFY of savings.

**Table 3 - Approximate number of Residential and Commercial Accounts to Receive Rebates**

| Measure | 2016 | 2017 | 2018 | Total No. Accounts | Anticipated Water Savings (AF) |
|---|---|---|---|---|---|
| Single-Family Turf Replacement Program | 153 | 157 | 161 | 471 | 135 |
| Multi-Family/CII Turf Replacement Program | 112 | 114 | 116 | 342 | 612 |

The DSS model assumes that the water savings achieved through this project are permanent. However, for the purposes of this grant application, we conservatively claim 10 years of savings, realizing that the savings achieved by the project will likely last much longer.

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

No new facilities, policies, or actions are required to obtain the physical benefits for this project. CLWA has already implemented a turf replacement rebate program with Proposition 84 IRWM Implementation Grant Round 2 funding. These programs will continue turf replacement initiated by the SCV WUE SP. CLWA has the administrative capacity to implement these programs with the recent addition of more staff.

*5. Description of any potential adverse physical effects*

No potential adverse physical effects are expected from this project. Reduction of outdoor water use from this project as a result of reduced return flows from irrigation runoff is small in comparison to annual groundwater recharge, stormwater flows, and treatment plant flow contributions, and therefore not likely to affect downstream agricultural users on the Santa Clara River. Flows downstream on the river are ephemeral, and agricultural users rely on groundwater with occasional surface flows as a supplemental water source.

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

These programs address long-term drought preparedness as identified in the Statewide Priorities for the IRWM Grant Program by meeting several criteria. The programs promote water conservation by replacing turf grass with low water-use landscaping. The programs improve the local landscape by replacing turf with low-water using plants or permeable hardscape that improves overall irrigation efficiency. The turf removal programs will help SCV achieve a long-term reduction in water use. While the claimed project life of turf replacement with these programs is assumed to be ten years, with proper care of replacement landscaping, the programs can provide water savings that last much longer (MWD, 2013).

***Summary of benefit***

These turf removal programs will save approximately 747 AFY of water. Water savings achieved through these programs will help reduce reliance on stressed SWP supplies and help CLWA and its retail agencies achieve the 20% reduction in per-capita water use by 2020 in accordance with SBX7-7. The turf removed through these programs will also help the State reach its goal of removing 50 million square feet of turf statewide as outlined in the Governor's April 1, 2014 Executive Order.

***Secondary Benefit: Increase of 0.8 mg/L in chlorides assimilative capacity for the western portion of the Santa Clara River Valley East Subbasin***

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

The California Regional Water Quality Control Board (RWQCB) established a TMDL to address the elevated chloride concentration in the Upper Santa Clara River; the TMDL identified drought as the critical condition (RWQCB, 2008). The chloride water quality standard was set at 100 mg/L to protect salt-sensitive agricultural crops located downstream of the SCVSD's treatment plants in the Lower Santa Clara River Watershed, at the Ventura/Los Angeles County Line. The Santa Clara River is a source for groundwater recharge, natural habitat, and agricultural users who are negatively impacted by higher chloride concentrations (Kennedy/Jenks Consultants 2012 page 3). The Santa Clarita Valley Sanitation District owns and operates the Saugus and Valencia Water Reclamation Plants (WRPs), which discharge treated wastewater to the Santa Clara River. Several sources contribute chloride to the Santa Clara River via the WRPs, including chloride naturally present in groundwater, chloride from imported (SWP) water supplies, chlorides from residential, commercial and industrial activities, and chlorides added by treating wastewater at the WRPs (LARWQCB, 2008 page 2). In recent years, improved source control measures, largely through the community's removal of over 8,000 automatic water softeners, and construction of advanced treatment facilities, have significantly decreased chloride levels in the WRP discharges (Sanitation Districts of Los Angeles County, 2013; pages 1-5). With this reduction in chloride contributions from water softeners and from wastewater treatment, changes in chloride loading in the SCR are even more dependent on chloride levels in SWP supplies (Kennedy/Jenks Consultants 2012, page 59).

The Salt and Nutrient Management Plan for the Santa Clara River Valley East Subbasin divides the subbasin into six groundwater management zones. Each of the six management zones has established basin objectives for TDS, chloride, nitrate and sulfate. The western most management zone, that at the Los Angeles/Ventura County Line (referred to as the Castaic Valley Management Zone) currently has a chloride assimilative capacity of 73 mg/L, based on a basin objective of 150 mg/L and ambient chloride level of 77 mg/L (Geoscience Support Services, Inc. 2015, pages 87-88). The assimilative capacity for any groundwater management zone is the ability to receive more chlorides (or TDS, nitrate, or sulfate) in relation to the existing basin objective. The higher the assimilative capacity, the more capable a management zone is at handling additional water supply projects, such as recycled water, that increase chloride concentrations in the groundwater basin.

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

Without this project, the western portion of the groundwater basin will continue to have an ambient chloride concentration of approximately 77 mg/L and an assimilative capacity of 73 mg/L (which is the difference between the basin objective of 150 mg/L and the ambient chloride concentration of 77 mg/L). Without the project, CLWA will continue to introduce approximately 70 metric tons (MT) of chlorides annually to the SCV watershed by importing approximately 747 AF of SWP water.

*3. Descriptions of methods used to estimate physical benefits*

Chloride reduction achieved through implementation of all the programs in the SCV WUE SP will increase the assimilative capacity of the western portion of the groundwater basin (specifically the Castaic Valley Management Zone) by approximately 5 mg/L by reducing the chloride concentration to 72 mg/L from 77 mg/L (Geoscience Support Services, Inc. 2015, figure 30.2.f). These turf removal programs will conserve approximately 747 AFY of water at full implementation, or roughly 15.5% of the total water savings expected from the SCV WUE SP. The proposed programs are therefore expected to achieve approximately 15.5% of the 5 mg/L change in assimilative capacity, or roughly 0.8 mg/L, through a reduction in runoff from properties where turf is replaced and through avoiding imports of chlorides into the SCV though SWP water imports (Maddaus Water Management and Western Policy Research, 2015 table 6-6; Geoscience Support Services, Inc. 2015 page 6).

The exact amount of chlorides introduced through SWP supplies varies depending on operational activities along the aqueduct. Average chloride levels at Castaic Lake measured at the Jensen Plant Influent for the 2009/2010 fiscal year were 76 mg/L, or 0.097 MT/AF[7] (MWD 2010 page 59). This project conserves approximately 747 AFY of water at full

1. [7] 0.097 MT/AF = 76 mg/L x 1,233,482 L/AF x 1 g/1,000 mg x 1 MT/1,000,000 g

implementation, and therefore offsets the equivalent amount of SWP supplies, the marginal[8] supply source for CLWA. By avoiding 747 AFY of SWP imports, this project prevents approximately 70 MT of additional chlorides from entering the SCV watershed each year over the project lifetime.

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

No new facilities, policies, or actions are required by project proponents to obtain this physical benefit.

*5. Description of any potential adverse physical effects*

No adverse physical effects are expected from this project. See primary benefit for justification for why there can be no adverse physical effects.

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

These programs address long-term drought preparedness as identified in the Statewide Priorities for the IRWM Grant Program by meeting several criteria. The programs improve the local landscape by replacing turf with low-water using plants or permeable hardscape that improves overall irrigation efficiency. The turf removal programs will help SCV achieve a long-term reduction in water use. While the claimed project life of turf replacement with these programs is assumed to be ten years, with proper care of replacement landscaping, the programs can provide water savings that last much longer (MWD, 2013).

***Summary of benefit***

These programs will increase the assimilative chloride capacity of the western portion of the Santa Clara River Valley East Subbasin, specifically the Castaic Management Zone, by approximately 0.8 mg/L, and prevent 70 MT of additional chlorides from being introduced to the SCV watershed annually.

[8] Marginal water source is defined as the augmentation of a water supply through the use of unconventional or "marginal" water sources. Marginal water can be used to improve the efficiency of water use and supplement intensively exploited conventional sources.

## PROJECT PERFORMANCE MONITORING PLAN

## CLWA RESIDENTIAL AND COMMERCIAL TURF REMOVAL PROGRAMS

This section presents the monitoring measures for the CLWA Residential and Commercial Turf Removal Programs that will help ensure the intended benefits are realized. Table 4 and the information provided below are guidance for developing a complete Project Performance Monitoring Plan to track performance of each project, and as identified as Task 9 in the Work Plan, Budget, and Schedule.

**Table 4 - Project Performance Monitoring Plan (PSP Table 6)**

**Project: CLWA Commercial and Residential Turf Removal Programs**

| Proposed Physical Benefits | Targets | Measurement tools and methods |
|---|---|---|
| Water conservation | Reduce outdoor water demand by 747 AFY | Compare average 2011-2014 outdoor water demand within the CLWA service area against average outdoor water demand after project implementation.<br><br>Record the number of rebates issued.<br><br>Calculate the square footage of turf removed. |
| Enhanced water quality | Increase the assimilative capacity for chlorides by 0.8 mg/L | Comparing chloride concentrations at the Ventura/Los Angeles County Line under existing conditions and comparing the data against the anticipated chloride concentration when the programs are fully implemented. |

### *Tools Used to Monitor Project Performance and Set Interim Targets*

To monitor project performance, CLWA will contract with an outside consultant to study a representative sample of program participants' water use before and after turf removal. Modifications to the programs may need to be made based on performance. The target after three years is to save 747 AFY as a result of replacing turf grass with low-water use plants and permeable hardscape.

SCVSD monitors the effluent at the Valencia (and Saugus) WRPs for chloride.

### *Data Collection and Types of Analyses Used*

CLWA will hire a consultant to collect water meter data for turf replacement participants from each participating agency. Data will be maintained and conveyed in spreadsheets, hard-copy, and/or electronically as PDFs. Customer water meter data will be analyzed before and after turf replacement. CLWA will keep records on rebates issued and the amount of turf removed.

The Salt and Nutrient Management Plan includes a water quality monitoring program for chlorides (and other constituents) throughout the groundwater basin. SCVSD also monitors the effluent at the Valencia WRPs for chloride. Data will be maintained and conveyed in spreadsheets, hard-copy, and/or electronically in PDFs. Monitoring data will be analyzed at regular time intervals to assess chloride reductions. The reduction in chlorides by 0.8 mg/L from an increase in assimilative capacity will be evaluated by comparing the chloride concentration at the Ventura/Los Angeles County Line under existing conditions and comparing the data against the anticipated chloride concentration when the programs are fully implemented. This will monitor project performance and help to identify interim targets.

### *Appropriateness of Monitoring Tools and Targets for Benefits Claimed*

The identified monitoring tools and targets are appropriate for the identified benefits. The monitoring target for the project goal of reducing the water demand is to quantify the number of rebates and verify the square footage of turf removal. These verifications can then be used to calculate the estimated water savings and compare it to the measured water savings. Water quality monitoring is routinely done throughout the basin by the water purveyors and the SCVSD for a number of programs and to meet regulatory requirements. Therefore, the monitoring targets based on experience and technical documentation are appropriate for the benefits.

***How Monitoring Data will be used to Measure Project Performance***

The proposed measurement tools and methods for the turf removal programs will effectively monitor project performance and target progress. The measurement tools as identified in the table above are straight-forward and easily obtainable. There are two types of measuring tools used for this project; the first a simple water meter comparison of before the project and after the project to determine the water savings from the project. The second and third measuring tools are actual document records of the rebates being used and turf being removed. All measurement tools are effective in monitoring the progress and performance of the Programs.

SCVSD has already complied with the Regional Board's monitoring requirements with the annual progress report required under the USCR Chloride TMDL Implementation Plan. Their measurement tools and methods have proven effective to date for monitoring progress. SWP water chloride data from local water purveyors and data collected by the SCVSD will be continued; inclusive of monitoring for chloride concentrations. This measurement type is also effective in monitoring the progress and performance of the Programs.

### COST EFFECTIVENESS ANALYSIS

### CLWA RESIDENTIAL AND COMMERCIAL TURF REMOVAL PROGRAMS

This section presents a cost-effectiveness analysis comparing relevant project alternatives to the proposed project. The project alternative considered is the expansion of recycled water use in the SCV. Answers to cost-effectiveness analysis questions are presented in summary form in Table 5, with narrative description for each option provided below.

| **Table 5 – Cost Effective Analysis (PSP Table 7)**<br>**Project Name: CLWA Residential and Commercial Turf Removal Programs** | |
|---|---|
| Question 1 | *Types of benefits provided as shown in Table 5:*<br><br>1) 747 AFY in water savings<br>2) Increase of 0.8 mg/L in chloride assimilative capacity in the western portion of the Santa Clara River Valley East Subbasin (Castaic Valley Groundwater Management Zone) |
| Question 2 | *Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified?*<br><br>Yes |
| | *If no, why?*<br><br>Not applicable. |
| | *If yes, list the methods (including the proposed project) and estimated costs*:<br><br>The proposed project has costs of $3,892,307. Annualized over ten years using a 5.5% cost of capital, this project costs approximately $691/AF.<br><br>The alternative supply option to meet demand was determined to be the expansion of CLWA's recycled water system. The annualized cost of expanding the recycled water system would be approximately $2,041/AF, when capital costs are annualized over 30 years and annual operations and maintenance costs are included. In addition to being the more expensive water supply option, this alternative does not meet the secondary goal of the proposed project to help increase chloride assimilative capacity in the Clarita Groundwater Management Zone. |
| 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.*<br><br>Not applicable - the proposed project is the least cost alternative. |

The total costs for this project are $3,892,307, or $3,465,164 in present value 2015 dollars. These costs are for direct distribution of turf replacement rebates, and there are no operating and maintenance (O&M) costs for CLWA. The proposed turf replacement programs will save 747 AFY of water. When project costs annualized over ten years using 5.5% cost of capital as the interest rate, this would result in cost of $691 per AF[9].

A number of other water conservation measures have already been implemented by CLWA, and therefore significant savings through other conservation components is not feasible. Other supply options such as greywater use were considered but deemed infeasible according to the water use efficiency strategy plan - leaving recycled water expansion as the most feasible alternative.

Expanding the SCV's recycled water capacity by 1.7 MGD is the next supply option sufficient enough to meet growing demand (Maddaus Water Management and Western Policy Research, 2015, page 6-6). This would require capital development and operating costs for three phases of expansion of approximately $52.2 million and $225,000, respectively. The unit cost of this alternative is approximately $2,041 per AF[10]. This is significantly more expensive than the proposed

[9] The annualized cost is $516,384. The cost per AF is $516,384/747 AF = 691/AF.

[10] The annualized cost is approximately $3.6 million per year when capital costs are annualized using a 5.5% cost of capital and a 30-year amortization period. After adding O&M costs, the cost per AF is $3,816,641 /1,870 AF= $2,041 per AF.

turf replacement project. CLWA and the SCV Family of Water Suppliers (which include CLWA, the four retail agencies and the City of Santa Clarita) have had a long-standing commitment to water conservation and offer a variety of programs, informational materials, and incentives to help water customers become more water-efficient. Progress with previous water conservation programs has left turf replacement as the highest remaining priority program to achieve water savings. The importance of leading the area away from its turf aesthetic has become even more apparent during the current historic California drought.

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## PROJECT DESCRIPTION

## SANTA CLARA RIVER TRUNK SEWER LINE PROJECT PHASE II

This Project is being implemented by Newhall County Water District (NCWD).

### *Brief Project Description*

This project replaces exposed sewer line in the Upper Santa Clara River to preserve and protect the environment and community from potential sewage release.

### *Expanded Project Description*

This project is located in the Eastern Reach of the Upper Santa Clara River. There is approximately 5,000 feet of trunk sewer line located within the main channel of the Santa Clara River that is maintained by NCWD. This project will abandon the existing sewerage facilities located within the river and construct a new trunk sewer line outside of the river, protecting the environment and the community from exposure to a sewage spill if the existing trunk line is damaged during storm events. NCWD has owned and operated this trunk line since the late 1960's and has previously combated trunk sewer line breakage by preventative maintenance and proactive responses. Nevertheless, the threat of an accidental release has become increasingly evident and moving the sewage flow out of the riverbed is now a priority. A line break would be detrimental to the ecosystems in and around the river and also could affect downstream groundwater wells within the Region.

The Project is proposed in two phases. Phase I, funded by the Proposition 84 Round 1 Implementation Grant, now complete, provided for the engineering, planning, and environmental permitting process associated with relocating/abandoning the trunk sewer line in the Santa Clara riverbed.

Phase II is the construction phase. It is the physical abandonment of the gravity fed portion of the trunk sewer line evaluated in Phase I. Construction activities would include the cutting, lowering, and capping of manholes to grade. After the new sewer trunk line has been installed outside of the river and all service connections have been made, the existing sewer will be completely abandoned in place per the recommendations made by both the Army Corps of Engineers and California Department of Fish and Wildlife.

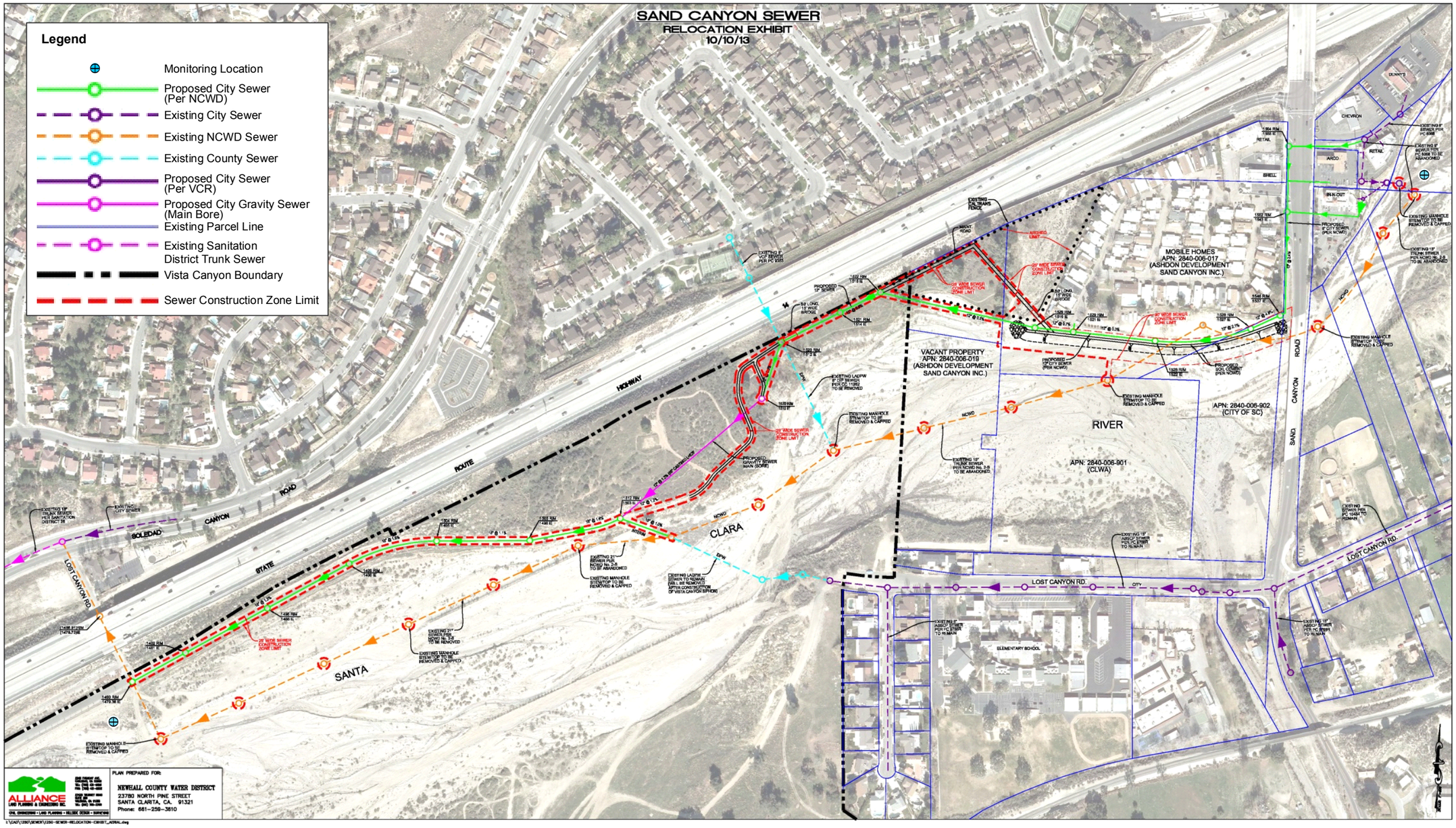
With the project, NCWD will replace the existing trunk sewer line located in the riverbed of the Santa Clara River that is susceptible to breaking during large storm events. By eliminating this possibility, the project protects downstream groundwater wells that the Santa Clarita Water Division (SCWD) uses for its drinking water supply and by eliminating the possibility of a break, the project protects habitat in the area from raw sewage contamination.

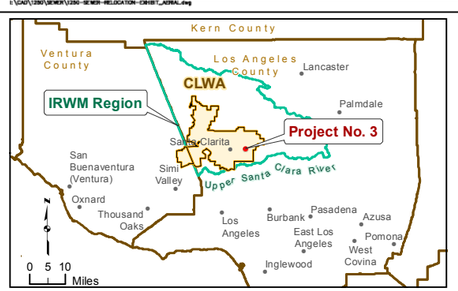
### *Addressing the Current Needs in the Region*

The Santa Clara River is dry most of the year. However, it is susceptible to flooding and high amounts of seasonal flows when they occur. Within the riverbed, NCWD maintains a portion of trunk sewer line in the Canyon Country area of Santa Clarita. When rainfall amounts are significant, the Santa Clara River swells and impacts the area occupied by the trunk line. The large river flow erodes the dirt around the sewer line and propels debris that could cause a line break. A line break would cause an unauthorized release of raw sewage in the Santa Clara River. Not only would a line break be detrimental to the ecosystems in and around the river, but also could affect pumping of the downstream groundwater wells within the Region.

### *Project Map*

A map is provided showing the NCWD service area boundary, the project's geographical location, surrounding work boundaries, and location of project activities and/or facilities as well as monitoring location and DACs within the service area. These are the Latitude and Longitude in decimal degrees: 34.421575, -118.426781.




**Kennedy/Jenks Consultants**

Castaic Lake Water Agency
2015 IRWM Implementation Grant Application
Santa Clarita, California

**Santa Clara River Trunk Sewer Line Relocation Phase II**
**Project No. 3**

K/J 1544224.00
July 2015
**Figure 3**

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### PROJECT PHYSICAL BENEFITS

### SANTA CLARA RIVER TRUNK SEWER LINE PROJECT PHASE II

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

- Primary Benefit: Protects 912.5 AF of groundwater every ten years that is used for drinking water supply.
- Secondary Benefit: Protects two (2) acres of habitat from contamination every ten years.

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 technical analysis discussion, a project performance monitoring plan is described followed by a cost effectiveness analysis of the project compared to its alternatives.

***Primary Benefit: Protects 912.5 AF of groundwater every ten years that is used for drinking water supply***

NCWD will abandon in place an existing trunk sewer line located within the riverbed of the Santa Clara River and replace it with a new trunk sewer line located adjacent to, but outside of, the riverbed in upland areas. Constructing a new trunk sewer line out of the riverbed will safeguard nearby groundwater wells that without the project, could be contaminated if the existing trunk sewer line broke[11]. As is shown in Table 6, the project is expected to protect 912.5 AF of water supply once every ten years that would otherwise be lost due to trunk sewer line breaks with accompanying spills.

**Table 6 – Annual Project Physical Benefits (PSP Table 5)**
**Project Name: Newhall County Water District - Santa Clara River Trunk Sewer Line Project Phase II**
**Type of Benefit Claimed: Water supply protected (primary benefit)**
**Units of the Benefit Claimed : Acre-feet per year (AFY)**
**Anticipated Useful Life of Project (years): 100**

| (a) | (b) | (c) | (d) |
|---|---|---|---|
| | Physical Benefits | | |
| Year | Without Project | With Project | Change Resulting from Project (c) – (b) |
| 2019 to 2022 | 0 | 0 | 0 |
| 2023 | 0 | 912.5 | 912.5 |
| 2024 to 2032 | 0 | 0 | 0 |
| 2033 | 0 | 912.5 | 912.5 |
| 2034 to 2042 | 0 | 0 | 0 |
| 2043 | 0 | 912.5 | 912.5 |
| 2044 to 2052 | 0 | 0 | 0 |
| 2053 | 0 | 912.5 | 912.5 |
| 2054 to 2062 | 0 | 0 | 0 |
| 2063 | 0 | 912.5 | 912.5 |
| 2064 to 2072 | 0 | 0 | 0 |
| 2073 | 0 | 912.5 | 912.5 |
| 2074 to 2082 | 0 | 0 | 0 |
| 2083 | 0 | 912.5 | 912.5 |
| 2084 to 2092 | 0 | 0 | 0 |
| 2093 | 0 | 912.5 | 912.5 |
| 2094 to 2102 | 0 | 0 | 0 |
| 2103 | 0 | 912.5 | 912.5 |
| 2104 to 2112 | 0 | 0 | 0 |
| 2113 | 0 | 912.5 | 912.5 |

[11]It should be noted that the trunk sewer line located within the riverbed of the Santa Clara River will not actually be removed from the riverbed; however, sewage will no longer flow in the trunk sewer line located within the riverbed.

**Table 6 – Annual Project Physical Benefits (PSP Table 5)**

**Project Name:** **Newhall County Water District - Santa Clara River Trunk Sewer Line Project Phase II**
**Type of Benefit Claimed:** **Water supply protected (primary benefit)**
**Units of the Benefit Claimed :** **Acre-feet per year (AFY)**
**Anticipated Useful Life of Project (years):** **100**

| (a) | (b) | (c) | (d) |
|---|---|---|---|
| | **Physical Benefits** | | |
| **Year** | **Without Project** | **With Project** | **Change Resulting from Project (c) – (b)** |
| **2114 to 2118** | 0 | 0 | 0 |

**Comments:** During large storm events, the trunk sewer line located within the riverbed of the Santa Clara could break. Without the project, it is assumed that the trunk sewer line would release raw sewage into the river during a pipe break every ten years. Groundwater wells near the Santa Clara River produce 3,650 AF of drinking water each year. The Santa Clarita Water Division (SCWD), which uses the nearby groundwater wells, would not pump the groundwater wells for three months after a trunk sewer line break.

A return period for large storms is uncertain, but based on the history of flooding events in the area it is assumed that large storms will occur once every five years. A break in the sewer causing a spill is assumed to occur once every other storm, or once every ten years. In a three month stoppage of groundwater pumping, 912.5 AF would not be pumped (3,650 AF multiplied by one-quarter of the year). With the project, this loss in water supply would be avoided every ten years beginning in 2023 over the 100-year anticipated useful life of the project. Thus the over the lifetime of the project 912.5 AF of groundwater will be protected.

***Secondary Benefit: Protects two acres of habitat from contamination every ten years***

NCWD will abandon in place a currently used trunk sewer line located within the riverbed of the Santa Clara River with a new trunk sewer line located outside of the riverbed. Constructing a new trunk sewer line out of the riverbed will safeguard nearby habitat that could be contaminated by a raw sewage release if the trunk sewer line were to break. As is shown in Table 7, the amount of habitat expected to be protected is approximately 2 acres.

**Table 7 – Annual Project Physical Benefits (PSP Table 5)**

**Project Name: Newhall County Water District - Santa Clara River Trunk Line Sewer Relocation Phase II**
**Type of Benefit Claimed: Habitat protected (secondary benefit)**
**Units of the Benefit Claimed : Acres**
**Anticipated Useful Life of Project (years): 100**

| (a) | (b) | (c) | (d) |
|---|---|---|---|
| | Physical Benefits | | |
| Year | Without Project | With Project | Change Resulting from Project (c) – (b) |
| 2019 to 2022 | 0 | 0 | 0 |
| 2023 | 0 | 2 | 2 |
| 2024 to 2032 | 0 | 0 | 0 |
| 2033 | 0 | 2 | 2 |
| 2034 to 2042 | 0 | 0 | 0 |
| 2043 | 0 | 2 | 2 |
| 2044 to 2052 | 0 | 0 | 0 |
| 2053 | 0 | 2 | 2 |
| 2054 to 2062 | 0 | 0 | 0 |
| 2063 | 0 | 2 | 2 |
| 2064 to 2072 | 0 | 0 | 0 |
| 2073 | 0 | 2 | 2 |
| 2074 to 2082 | 0 | 0 | 0 |
| 2083 | 0 | 2 | 2 |
| 2084 to 2092 | 0 | 0 | 0 |
| 2093 | 0 | 2 | 2 |
| 2094 to 2102 | 0 | 0 | 0 |
| 2103 | 0 | 2 | 2 |
| 2104 to 2112 | 0 | 0 | 0 |
| 2113 | 0 | 2 | 2 |
| 2114 to 2118 | 0 | 0 | 0 |

**Comments:** During large storm events, the trunk sewer line located within the riverbed of the Santa Clara River could break. Without the project, it is assumed that the trunk sewer line would break every ten years, releasing raw sewage into the surrounding area. There are roughly 300 equivalent dwelling units connected to the section of the trunk sewer line located in the riverbed of the Santa Clara River. Assuming that there are 3.3 people per dwelling unit and that residential sewer flow rates are 90 gallons per person per day, there would be about 89,000 gallons flowing through the trunk sewer line each day. If all 89,000 gallons of sewage spilled during a line break and each gallon contaminated a square foot of land, the 89,000 gallons would contaminate roughly two acres (one acre is 43,560 square feet). With the project, this loss in habitat would be avoided every ten years over the 100-year anticipated useful life of the project, beginning in 2023. Thus the over the lifetime of the project 20 acres of habitat will be protected.

## TECHNICAL ANALYSIS OF PHYSICAL BENFITS CLAIMED

## SANTA CLARA RIVER TRUNK SEWER LINE PROJECT PHASE II

***Primary Benefit - Protects 912.5 AF of groundwater every ten years that is used for drinking water supply***

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

NCWD currently maintains a trunk sewer line that is located within the riverbed of the Santa Clara River in the Canyon Country area of the City of Santa Clarita. The trunk sewer line has been maintained by NCWD since its installation in 1968. During significant rainfall events, the Santa Clara River swells, causing debris to be swept into the river and dirt to erode around the trunk sewer line. If a large piece of debris moving at a high rate of speed hits the trunk sewer line, the line could break. If the trunk sewer line breaks, raw sewage would be released into the river, impacting nearby groundwater wells.

There have been storm events in recent years that have caused damage to the trunk sewer line. In 2005, there was damage to a section of piping, causing a raw sewage release. In 2014, there was significant erosion around two manholes, resulting in $100,000 in damage. Instead of continuing preventative maintenance and extending the life of the line in place, NCWD proposes to construct a new trunk sewer line out of the riverbed and in the adjacent upland area. The planning, engineering, and environmental permitting of this project received funding during Proposition 84 IRWM Implementation Grant Round 1.

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

As long as the trunk sewer line is located in the riverbed, it is at risk from being damaged by debris carried by stormflows and could release sewage into the river. This would interrupt water pumping from downstream SCWD groundwater wells that produce an average of 3,650 AFY. With a trunk sewer line break, it is estimated that these wells would be out of production for three months, causing a loss in pumping of 912.5 AFY. It is assumed that a trunk sewer line break would occur once every ten years. The first break is assumed to occur in 2023.To make up for this loss of water, SCWD would purchase additional imported water from CLWA. CLWA imports SWP water from the Sacramento-San Joaquin Delta to Castaic Lake through SWP facilities. Water from Castaic Lake is treated at CLWA's Earl Schmidt Filtration Plant or the Rio Vista Water Treatment Plant and is delivered to SCWD through distribution lines owned and operated by CLWA. Currently, SCWD's customers demand about 30,000 AFY (Castaic Lake Water Agency, 2014, 28). In 2014, SCWD purchased 85% of its water supply from CLWA (Castaic Lake Water Agency, 2015, 3).

*3. Descriptions of methods used to estimate physical benefits*

With completion of the project, NCWD will avoid the possibility of a break in the trunk sewer line that moves raw sewage in the Canyon Country area of Santa Clarita. A sewer line break in the existing line would cause release of raw sewage into the stream channel, requiring SCWD to stop pumping from their groundwater wells located downstream for three months to allow for cleanup. In three months, SCWD's wells pump roughly 912.5 AF.

A return period for large storms is uncertain, but based on the history of flooding events in the area it is assumed that large storms will occur once every five years. A break in the sewer causing a spill is assumed to occur once every other storm, or once every ten years. During that time, lost groundwater pumping will be replaced by additional SWP water imported to the region by CLWA.

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

NCWD will construct the new trunk sewer line in three phases. During Phase A, NCWD will install pipe along Sand Canyon Road and Delone Street, at the eastern edge of the project area. During Phase B, NCWD will install pipe westward from Sand Canyon Road to the Mitchell-Dyer Hill area. In Phase C, NCWD will "jack and bore" underneath the Mitchell-Dyer Hill and install pipe westward to Lost Canyon Road. The total length of the new trunk sewer line is approximately 5,700 linear feet (NCWD, 2014, page 1). As part of the project, there will also be bank stabilization and protection. The project is scheduled to be complete in September 2019.

The existing trunk sewer line, although it will no longer be in operation, will not be removed from the riverbed (NCWD, 2014, page 1). The manholes, exposed due to significant erosion resulting from a 2014 storm event, will be cut below the elevation of the riverbed.

NCWD has already received the necessary permits to carry out the project from the U.S. Army Corps of Engineers and the California Department of Fish and Wildlife (California Department of Fish and Wildlife, 2014, page 1). In addition, NCWD has applied for 401 Certification from the California Regional Water Quality Control Board, Los Angeles Region.

*5. Description of any potential adverse physical effects*

There are several sites near the planned construction that are suspected to contain cultural resources of the Fernandeño Tataviam Band of Mission Indians (Fernandeño Tataviam Band of Mission Indians, 2014, page 2). When construction takes place nearby these locations, tribal representatives will be on-site for consultation and monitoring. If cultural resources are encountered, the artifacts will be given to the Fernandeño Tataviam Band of Mission Indians or reinterred in the ground.

In addition, there is a mobile home park and several businesses that are currently connected to the existing trunk sewer line in the riverbed of the Santa Clara River. These entities will need to reconnect onsite sewer pipes to the new trunk sewer line once construction is complete; this impact is expected to be minimal.

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

The 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". While not actually creating a new water supply, the project protects a water supply that is currently used, but subject to disruption if the trunk sewer line breaks. If the trunk sewer line breaks, SCWD would purchase imported water, if available. By constructing a new trunk sewer line outside of the riverbed, the project allows for the use of a local water source without disruption, thereby avoiding a spill and exacerbating the water supply situation during future drought restrictions.

Second, the project provides "efficient groundwater basin management". Without the project, SCWD will not be able to use its groundwater resources as desired due to sewer trunk line breaks. During drought conditions, such as the current drought, the availability of local groundwater becomes more important as imported supplies are drastically curtailed. However, with the project, SCWD can pump its typical 3,650 AFY of groundwater every year because the trunk sewer line will not break.

***Summary of benefit***

With the project, NCWD will replace the existing trunk sewer line located in the riverbed of the Santa Clara River that is susceptible to breaking during large storm events. By eliminating this possibility, the project protects downstream groundwater wells that SCWD uses for its drinking water supply.

***Secondary Benefit - Protects two acres of habitat from contamination every ten years***

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

Besides impacting nearby domestic groundwater wells, a raw sewage release from a trunk sewer line break would impact the surrounding ecosystem. Extensive patches of high-quality riparian habitat exist along the length of the Santa Clara River downstream of the project area and the river serves as an important wildlife corridor. In particular, 26 special-status wildlife species have been recorded within the Region, including two endangered fish, the unarmored three-spined stickleback and steelhead trout, and three other federal endangered species including the southwestern willow flycatcher, yellow-legged frog, and the Arroyo toad (City of Santa Clarita, 2010, page 33). According to the California Natural Diversity Database and the California Native Plant Society, 17 special-status plant species have been recorded as present within the project region (City of Santa Clarita, 2010, page 24). This includes four species federally listed as endangered. Avoiding potential future releases of raw sewage into the riverbed will help protect these species and the habitat on which they depend.

There have been storm events in recent years that have caused damage to the trunk sewer line. In 2005, there was damage to a section of piping, causing a raw sewage release. In 2014, there was significant erosion around two manholes, resulting in $100,000 in damage. Instead of continuing preventative maintenance and extending the life of the line in place, NCWD proposes to construct a new trunk sewer line out of the riverbed and in the adjacent upland area. The planning, design/engineering, and environmental permitting of this project were completed with funding from a Proposition 84 Round 1 Implementation grant.

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

If the trunk sewer line located in the riverbed continues to be used to move raw sewage, it could release the sewage into the river if struck during a significant runoff event by a large piece of debris that breaks the line. The sewage would impact the ecosystem.

A return period for large storms is uncertain, but based on the history of flooding events in the area it is assumed that large storms will occur once every five years. A break in the sewer causing a spill is assumed to occur once every other storm, or once every ten years.

*3. Descriptions of methods used to estimate physical benefits*

With completion of the project, NCWD will avoid the possibility of a break in the trunk sewer line that moves raw sewage in the Canyon Country area of Santa Clarita. A break in the existing line would cause release of raw sewage into the stream channel, damaging approximately two acres of habitat. The calculation supporting this is explained as follows: there are roughly 300 equivalent dwelling units connected to the section of the trunk sewer line located in the riverbed of the Santa Clara River. Assuming that there are 3.3 people per dwelling unit and that residential sewer flow rates are 90 gallons per person per day, there would be about 89,000 gallons flowing through the trunk sewer line each day. If all 89,000 gallons of sewage spilled during a line break and each gallon contaminated an additional square foot, the 89,000 gallons would contaminate roughly two acres (one acre is 43,560 square feet). It is assumed that a trunk sewer line break would occur once every ten years. The first break is assumed to occur in 2023.

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

NCWD will construct the new trunk sewer line in three phases. During Phase A, NCWD will install pipe along Sand Canyon Road and Delone Street, at the eastern edge of the project area. During Phase B, NCWD will install pipe westward from Sand Canyon Road to the Mitchell-Dyer Hill area. In Phase C, NCWD will “jack and bore” underneath the Mitchell-Dyer Hill and install pipe westward to Lost Canyon Road. The total length of the new trunk sewer line is approximately 5,700 linear feet (NCWD, 2014, page 1). As part of the project, there will also be bank stabilization and protection. The project is scheduled to be complete in June 2019.

The existing trunk sewer line, although it will no longer be used to move sewage, will not be removed from the riverbed (NCWD, 2014, 1). The manholes, exposed due to significant erosion resulting from the 2014 storm event, will be cut below the elevation of the riverbed.

NCWD has already received the necessary permits to carry out the project from the U.S. Army Corps of Engineers and the California Department of Fish and Wildlife (California Department of Fish and Wildlife, 2014, page 1). In addition, NCWD has applied for 401 Certification from the California Regional Water Quality Control Board, Los Angeles Region.

*5. Description of any potential adverse physical effects*

There are several sites near the planned construction that are known to contain cultural resources of the Fernandeño Tataviam Band of Mission Indians (Fernandeño Tataviam Band of Mission Indians, 2014, page 2). When construction takes place nearby these locations, tribal representatives will be on-site for consultation and monitoring. If cultural resources are encountered, the artifacts will be given to the Fernandeño Tataviam Band of Mission Indians or reinterred.

In addition, there is a mobile home park and several businesses that are currently connected to the existing trunk sewer line in the riverbed of the Santa Clara River. These entities will need to reconnect onsite sewer pipes to the new trunk sewer line once construction is complete; this impact is expected to be minimal.

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

The 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". While not actually creating a new water supply, the project protects a water supply that is currently used, but subject to disruption if the trunk sewer line breaks. If the trunk sewer line breaks, SCWD would purchase imported water, if available. By constructing a new trunk sewer line outside of the riverbed, the project allows for the use of a local water source without disruption, thereby better preparing it to withstand any future drought restrictions that may occur at the same time as a spill.

Second, the project provides "efficient groundwater basin management". Without the project, SCWD will not be able to use its groundwater resources as desired due to trunk sewer line breaks. During drought conditions, such as the current drought, the availability of local groundwater becomes more important as imported supplies are drastically curtailed. However, with the project, SCWD can pump its typical 3,650 AFY of groundwater every year because the trunk sewer line will not break.

***Summary of benefit***

With the project, NCWD will replace a currently used trunk sewer line located in the riverbed of the Santa Clara River that is susceptible to breaking during large storm events. By eliminating the possibility of a break, the project protects habitat in the area from raw sewage contamination.

## PROJECT PERFORMANCE MONITORING PLAN

## SANTA CLARA RIVER TRUNK SEWER LINE PROJECT PHASE II

This section presents the monitoring measures for the Santa Clara River Trunk Sewer Line Project Phase II that will help ensure the intended benefits are realized. Table 8 and the information provided below are guidance for developing a complete Project Performance Monitoring Plan to track performance of each project, and as identified as Task 9 in the Work Plan, Budget, and Schedule.

**Table 8 - Project Performance Monitoring Plan (PSP Table 6)**
**Project: Santa Clara River Trunk Sewer Line Project Phase II**

| Proposed Physical Benefits | Targets | Measurement tools and methods |
|---|---|---|
| Water quality improvement/protection | Reduce risk of sewer spill. Removal of active sewer line from riverbed. Protection of 912.5 AF of groundwater every ten years. | Document linear feet of active sewer line in river pre- and post-project. |
| Habitat Enhancement/protection | Reduce risk of sewer spill. Removal of active sewer line from riverbed. Protection of 2 acres of habitat from contamination every ten years. | Document linear feet of active sewer line in river pre- and post-project. |

### *Tools Used to Monitor Project Performance and Set Interim Targets*

NCWD, in coordination with the SCWD who operate downstream groundwater wells from the exposed trunk sewer line will monitor water quality before the project is implemented and after the project is implemented to document the successful removal of the sewer line in the river, and installation of a fully functioning new sewer line adjacent to the river, out of the riverbed. Survey data will be collected before and after the project to show that there is less sewer line in the river channel and hence less risk to water quality and habitat.

Constructing a new trunk sewer line out of the riverbed will safeguard nearby habitat that could be contaminated by a raw sewage release if the trunk sewer line broke. Habitat conditions along the riverbank during and after implementation of the project will be monitored and recorded.

### *Data Collection and Types of Analyses Used*

Groundwater wells near the Santa Clara River produce 3,650 AF of drinking water each year. The SCWD, which uses the nearby groundwater wells, would not pump the groundwater wells for three months after a trunk sewer line break. In a three month stoppage of groundwater pumping, 912.5 AF is not pumped (3,650 AF divided by one-quarter of the year). With the project, this loss in water supply would be avoided every ten years beginning in 2023 over the 100-year anticipated useful life of the project.

There are roughly 300 equivalent dwelling units connected to the section of the trunk sewer line located in the riverbed of the Santa Clara River. Assuming that there are 3.3 people per dwelling unit and that residential sewer flow rates are 90 gallons per person per day, there would be about 89,000 gallons flowing through the trunk sewer line each day. If all 89,000 gallons of sewage spilled during a line break and each gallon contaminated a square foot of land, the 89,000 gallons would contaminate roughly two acres (one acre is 43,560 square feet). With the project, this loss in habitat would be avoided every ten years over the 100-year anticipated useful life of the project, beginning in 2023. NCWD will document this during and after the project is complete.

NCWD, in coordination with the SCWD who operate downstream groundwater wells from the exposed trunk sewer line will monitor water quality before the project is implemented and after the project is implemented to document the successful removal of the sewer line in the river, and installation of a fully functioning new sewer line adjacent to the river, out of the riverbed. The survey data will show that there is less sewer line in the river channel and hence less risk to water quality and habitat.

### *Appropriateness of Monitoring Tools and Targets for Benefits Claimed*

The identified monitoring tools and targets for the benefits claimed are appropriate for the identified benefits. There are very clear objectives for the project which pertain to a possible sewer line break and the associated adverse impacts. By monitoring the conditions of the abandoned sewer line, the associated groundwater and habitat conditions, claimed benefits will be easily identified.

### *How Monitoring Data will be used to Measure Project Performance*

The proposed measurement tools and methods for the project will effectively monitor project performance and target progress. The measurement tools as identified in the table above are straight-forward and easily obtainable. The measurement types are effective in monitoring the progress and performance of the Programs.

### COST EFFECTIVENESS ANALYSIS

### SANTA CLARA RIVER TRUNK SEWER LINE PROJECT PHASE II

This section presents a cost-effectiveness analysis comparing relevant project alternatives to the proposed project. The project alternatives considered are (1) constructing a sewer pump station instead of boring through the Mitchell-Dyer Hill (but otherwise having the same location setup as the proposed project), and (2) constructing a siphon across the Sand Canyon Road Bridge to connect to an existing sewer at Lost Canyon Road (a different location setup than the proposed project). Answers to cost effectiveness analysis questions are presented in summary form in Table 9, with narrative description for each option provided below.

| **Table 9 – Cost Effective Analysis (PSP Table 7)**<br>**Project name: Newhall County Water District - Santa Clara River Trunk Line Sewer Project Phase II** | |
|---|---|
| Question 1 | *Types of benefits provided as shown in Tables 6 and 7 (PSP Table 5)*<br><br>1) The project protects 912.5 acre-feet of groundwater every ten years that is used for drinking water supply.<br>2) The project also protects two acres of habitat from contamination every ten years. |
| Question 2 | *Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified?*<br><br>Yes |
| | *If no, why?*<br><br>Not applicable |
| | *If yes, list the methods (including the proposed project) and estimated costs.*<br><br>The proposed project is the NCWD - Santa Clara River Trunk Sewer Line Project Phase II. Total costs are approximately $3.5 million ($3,482,000 for construction) in present value 2015 dollars. Alternative projects include:<br><br>(1) Constructing a sewer pump station instead of boring through Mitchell-Dyer Hill for a cost of $4.6 million in present value 2015 dollars, and<br><br>(2) Constructing a siphon across the Sand Canyon Road Bridge to connect to an existing sewer at Lost Canyon Road for a cost of $3.8 million in present value 2015 dollars. |
| 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.*<br><br>Not applicable – the proposed project is the least cost alternative. |

The capital costs for the Santa Clara River Trunk Sewer Line Project Phase II are approximately $4.0 million, or $3.5 million in present value 2015 dollars. This project does not have any additional annual operations and maintenance costs beyond those incurred now without the project, so the capital costs represent the total cost of the project.

**Alternative 1: Constructing a sewer pump station instead of boring through the Mitchell-Dyer Hill**

One alternative that NCWD could pursue in the absence of the proposed project is constructing a sewer pump station instead of boring through the Mitchell-Dyer Hill; all other components of the project would be the same as the proposed project. The capital costs of this project are $5.1 million, or $4.5 million in present value 2015 dollars (Alliance Land Planning & Engineering, 2012, page 3).[12] This project would also have annual costs for inspecting the pump station. Inspection would

[12]The capital cost shown for Alternative 2, $5.1 million, is $0.6 million more than shown in the Alliance Land Planning & Engineering report from 2012. The additional $0.6 million is for costs not included in the 2012 report, including costs for sewer abandonment, construction administration, and monitoring activities.

happen every other year, costing $17,500 per inspection. Across all years, the annual costs are $0.9 million, or $0.1 million in present value 2015 dollars. Totaling the capital and annual costs, this alternative costs $4.6 million in present value 2015 dollars.

**Alternative 2: Constructing a siphon across the Sand Canyon Road Bridge to connect to an existing sewer at Lost Canyon Road**

Another project alternative is for NCWD to construct a siphon across the Sand Canyon Road Bridge to connect to an existing sewer at Lost Canyon Road. This alternative is a fundamental change in the movement of sewage compared to either the proposed project or Alternative 1. The capital costs of this project are $4.1 million, or $3.6 million in present value 2015 dollars (Alliance Land Planning & Engineering, 2012, page 3).[13] This project would also have annual costs for inspecting the pump station. Inspection would happen every other year, costing $17,500 per inspection. Across all years, the annual costs are $0.9 million, or $0.1 million in present value 2015 dollars. Totaling the present value capital and annual costs, this alternative costs $3.8 million in present value 2015 dollars.

**References**

Alliance Land Planning & Engineering, 2012. Sand Canyon Sewer Relocation Alternatives Feasibility Analysis. November.

California Department of Fish and Wildlife, 2014. Notification of Lake or Streambed Alteration, Notification Number 1600-2014-0052-R5, Newhall County Water District – Sand Canyon Sewer Line Relocation Project.

Castaic Lake Water Agency, 2014. 2013 Santa Clarita Valley Water Report. June.

Castaic Lake Water Agency, 2015. The Santa Clarita Valley 2015 Water Quality Report.

City of Santa Clarita, 2010. Draft Environmental Impact Report, Volume I. SCH No. 2007071039. Prepared by Impact Sciences, Inc. October.

Fernandeño Tataviam Band of Mission Indians, 2014. Sand Canyon Sewer Relocation Project. March .

Newhall County Water District, 2014. Notice of Intent to Adopt a Mitigated Negative Declaration. February.

[13] The capital cost shown for Alternative 3, $4.1 million, is $0.6 million more than shown in the Alliance Land Planning & Engineering report from 2012. The additional $0.6 million is for costs not included in the 2012 report, including costs for sewer abandonment, administration, and monitoring activities.

## PROJECT DESCRIPTION

## VALENCIA WATER RECLAMATION PLANT ADVANCED WATER TREATMENT FACILITIES

This Project is being implemented by the Santa Clarita Valley Sanitation District (SCVSD).

### *Project Description*

Design and construction of advanced water treatment facilities at Valencia WRP, reducing chloride concentrations in wastewater and making advanced treated recycled water available for reuse.

### *Expanded Project Description*

The Valencia Water Reclamation Plant (WRP) Advanced Water Treatment Facilities Project is a component of Alternative 2 of the SCVSD Facilities Plan (referred to as the Chloride Compliance Plan), which is a comprehensive approach for the Valencia WRP and Saugus WRP to comply with the Chloride Total Maximum Daily Load (TMDL) which was established to address the elevated chloride concentrations in the Upper Santa Clara River. As part of the Chloride Compliance Plan, SCVSD is in the process of implementing the ultraviolet (UV) disinfection facilities at Valencia WRP and Saugus WRP, which received funding through the 2014 Proposition 84 IRWM Drought Grant and a Round 2 Proposition 84 IRWM Implementation Grant, respectively.

The Chloride Compliance Plan also includes the Membrane Filtration and Reverse Osmosis at the Valencia WRP (MF/RO Facilities), which are necessary to achieve the remainder of the reduction in chloride levels in the Santa Clara River in order for both the Valencia WRP and Saugus WRP to comply with the Chloride TMDL. The MF/RO Facilities include installation of MF/RO equipment and appurtenant electrical, mechanical, and control systems. The complete MF/RO Facilities consists of five trains: three trains for treatment of Valencia WRP flow, one train for treatment of Saugus WRP flow, and one train for backup. This grant application requests funding for the three trains for treatment of Valencia WRP flow, referred to as the Advanced Water Treatment Facilities.

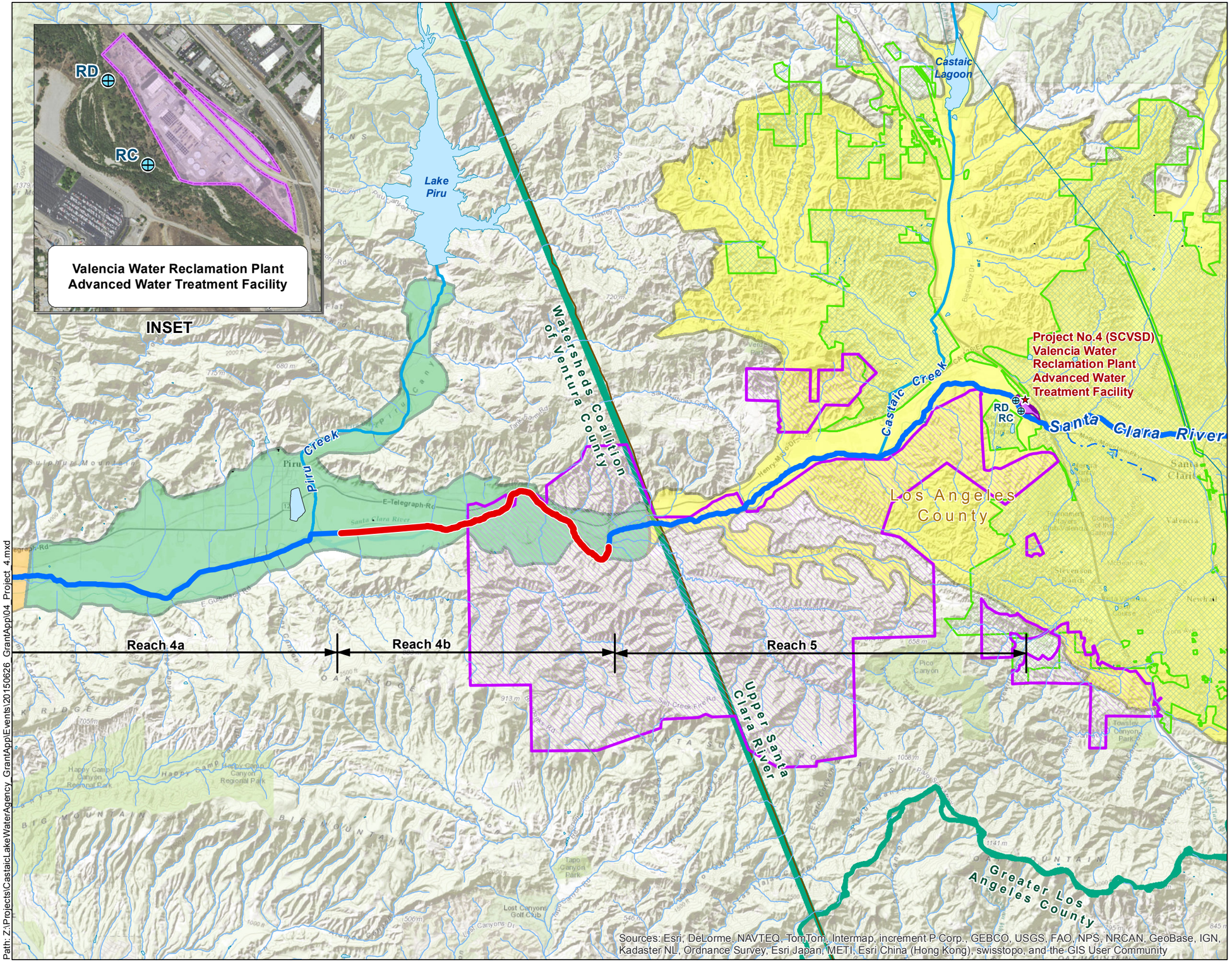
This Project will design and construct 4.5 million gallons per day (MGD) of MF/RO facilities to remove up to 26 milligrams/liter (mg/L) of chloride from the SCVSD treated wastewater effluent in drought years and up to 11 mg/L of chloride during non-drought years. This ultra-clean water will be blended with tertiary effluent to achieve regulatory compliance. In addition, the Project will also produce up to 2.6 MGD of advanced treated recycled water that will be available for reuse, and will provide additional water quality improvements for the following constituents (as well as others): ammonia as nitrogen (51% removal), nitrate (89% removal), organic nitrogen (90% removal), total nitrogen (85% removal), sulfate (98% removal) and Total Dissolved Solids (96% removal).

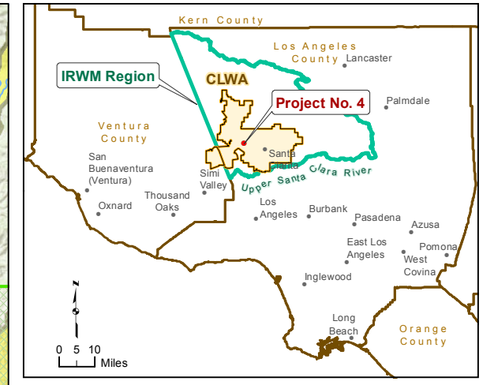
### *Addressing the Current Needs in the Region*

This project addresses water quality impacts and conflicts caused by nonattainment of the Chloride TMDL, which is exacerbated during drought conditions such as the current prolonged drought. In particular, the project addresses recurring increases in chloride loadings to the WRPs due to cyclical increases in chloride levels in drinking water supplies, which rise during droughts and contribute to noncompliance with receiving water standards. Advanced water treatment (MF/RO facilities) at the Valencia WRP will reduce chloride levels in treated wastewater discharged to the Santa Clara River. Additionally, SCVSD will potentially make up to 2.6 MGD of advanced treated recycled water available for potable reuse during times when this water is not needed for compliance purposes, thereby helping to address recurring drought-related water supply needs in the Region.

### *Project Map*

A map is provided showing the SCVSD service area boundary, the project's geographical location, surrounding work boundaries, and location of project activities and/or facilities as well as monitoring location and DACs within the service area. These are the Latitude and Longitude in decimal degrees: 34.2554, -118.3527.




## Legend

- Project Sites
- Surface Water Monitoring Locations
  RC: Upstream Monitoring Station
  RD: Downstream Monitoring Station
- Salt Sensitive Crop Use
- Santa Clarita Valley Sanitation District Project No. 4 Proponent
- Valencia Water Company
- IRWM Regional Boundaries

**Groundwater Basins**

- Santa Clara River Valley (Filmore) - CASGEM Priority: Medium
- Santa Clara River Valley (Piru) - CASGEM Priority: High
- Santa Clara River Valley (Santa Clara River Valley East) - CASGEM Priority: High

N

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Miles

**Kennedy/Jenks Consultants**

Castaic Lake Water Agency
2015 IRWM Implementation Grant Application
Santa Clarita, California

**Valencia Water Reclamation Plant**
**Advanced Water Treatment Facilities**
**Project No. 4**

K/J 1544224.00
July 2015
**Figure 4**

Path: Z:\Projects\CastaicLakeWaterAgency_GrantApp\Events\20150626_GrantApp\04_Project_4.mxd

## PROJECT PHYSICAL BENEFITS

## VALENCIA WATER RECLAMATION PLANT ADVANCED WATER TREATMENT FACILITIES

The following primary and secondary physical benefits are expected from the Valencia WRP Advanced Water Treatment Facilities (Project):

- Primary Benefit: Reduction in the concentration of chlorides in the effluent discharged from the Valencia WRP by up to 26 mg/L in drought years and up to 11 mg/L in non-drought years.
- Secondary Benefit: Production of reverse osmosis (RO) permeate of up to 2.6 MGD in non-drought years, which can be available for potable water reuse during drought conditions.

Each physical benefit is discussed individually below, with an overview of each benefit expected over the project life and a technical analysis of the physical benefit claimed. Following the technical analysis discussion, a project performance monitoring plan is described followed by a cost effectiveness analysis of the Chloride Compliance Plan and its alternatives.

### *Primary Benefit: Reduction in the concentration of chlorides in effluent discharged from the Valencia WRP*

As shown in Table 10, this Project will reduce the chloride concentration in the Valencia WRP effluent by up to 26 mg/L in drought years and up to 11 mg/L in non-drought years.

**Table 10 – Annual Project Physical Benefits (PSP Table 5)**

**Project Name: Valencia WRP Advanced Water Treatment Facilities**
**Type of Benefit Claimed: Reduction in the concentration of chlorides in effluent discharged from the Valencia WRP**
**Units of the Benefit Claimed : Milligrams per liter (mg/L) of chloride**
**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 to 2021** | 0 | Up to 26 mg/L | Up to 26 mg/L |
| **2022 to 2028** | 0 | Up to 11 mg/L | Up to 11 mg/L |
| **2029 to 2031** | 0 | Up to 26 mg/L | Up to 26 mg/L |
| **2032 to 2038** | 0 | Up to 11 mg/L | Up to 11 mg/L |
| **2039 to 2041** | 0 | Up to 26 mg/L | Up to 26 mg/L |
| **2042 to 2048** | 0 | Up to 11 mg/L | Up to 11 mg/L |
| **2049** | 0 | Up to 26 mg/L | Up to 26 mg/L |

**Comments:** Operation of the Valencia WRP will be different in drought years compared to non-drought years because of elevated chloride levels as a result of drought conditions. During drought years, the Valencia WRP will operate at maximum capacity to reduce chloride concentrates up to 26 mg/L. During non-drought years, the Valencia WRP will operate as needed to reduce chloride concentrations up to 11 mg/L (Henry, 2015).

For this analysis, it is assumed that three years of drought conditions will be followed by seven-years of non-drought conditions, which is consistent with assumptions previously made in the SCVSD Chloride Compliance Facilities Plan and Environmental Impact Report (referred to as the SCVSD Facilities Plan; Sanitation Districts of Los Angeles County, 2013). Drought years are assumed to occur in the first three years of the 10-year cycle.

***Secondary Benefit: Production of RO permeate (advanced treated water) of up to 2.6 MGD***

As shown in Table 11, this project will produce RO permeate of up to 2.6 MGD in non-drought years, which can be available for potable water reuse.

**Table 11 – Annual Project Physical Benefits (PSP Table 5)**

**Project Name:** **Valencia WRP Advanced Water Treatment Facilities**
**Type of Benefit Claimed:** **Production of reverse osmosis (RO) permeate available for potable water reuse**
**Units of the Benefit Claimed :** **Million gallons per day (MGD)**
**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 to 2021** | 0 MGD | 0 MGD | 0 MGD |
| **2022 to 2028** | 0 MGD | Up to 2.6 MGD | Up to 2.6 MGD |
| **2029 to 2031** | 0 MGD | 0 MGD | 0 MGD |
| **2032 to 2038** | 0 MGD | Up to 2.6 MGD | Up to 2.6 MGD |
| **2039 to 2041** | 0 MGD | 0 MGD | 0 MGD |
| **2042 to 2048** | 0 MGD | Up to 2.6 MGD | Up to 2.6 MGD |
| **2049** | 0 MGD | 0 MGD | 0 MGD |

**Comments:** Operation of the Valencia WRP will be different in drought years compared to non-drought years because of elevated chloride levels as a result of drought conditions. During drought years, all 4.5 MGD of RO permeate produced will be used to reduce chloride concentrations up to 26 mg/L. To comply with the Chloride TMDL during non-drought years, of the 4.5 MGD of RO permeate produced, 1.9 MGD will be used to reduce chloride concentrations up to 11 mg/L and up to 2.6 MGD of RO permeate will be made available for potable water reuse (Henry, 2015).

This analysis assumes three-years of drought conditions followed by seven-years of non-drought conditions, which is consistent with the SCVSD Facilities Plan (Sanitation Districts of Los Angeles County, 2013). Drought years are assumed to occur during the first three years of the 10-year cycle.

## TECHNICAL ANALYSIS OF PHYSICAL BENFITS CLAIMED

## VALENCIA WATER RECLAMATION PLANT ADVANCED WATER TREATMENT FACILITIES

***Primary Benefit: Reduction in the concentration of chlorides in effluent discharged from the Valencia WRP by up to 26 mg/L in drought years and up to 11 mg/L in non-drought years***

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

When the California Regional Water Quality Control Board (RWQCB) established a TMDL to address the elevated chloride concentration in the Upper Santa Clara River, the TMDL identified drought as the critical condition (RWQCB, 2008). The chloride water quality standard was set at 100 mg/L to protect salt-sensitive agricultural crops located downstream of the SCVSD's treatment plants in the Lower Santa Clara River Watershed.

Several sources contribute chloride to the Santa Clara River via the Valencia WRP: approximately 85 mg/L (64%) of chloride is naturally present from imported water supplies and local groundwater basins during drought years (70 mg/L during non-drought years; Kennedy/Jenks, 2012; page 47); SCVSD estimates that residential, commercial and industrial activities contribute approximately 37 mg/L (28%) of chloride; and SCVSD estimates that approximately 11 mg/L (8%) of chloride is added by treating wastewater at the Valencia WRP. In recent years, improved source control measures, largely through the community's removal of over 8,000 automatic water softeners, significantly decreased chloride levels in the WRP discharges (Sanitation Districts of Los Angeles County, 2013; page 1-5). However, increases in chloride levels because of the recent drought overshadow these chloride reduction gains.

In 2013, the SCVSD Board of Directors approved the SCVSD Facilities Plan, which provides a plan of action for the Valencia WRP and Saugus WRP to comply with the Chloride TMDL. Four alternatives were identified in the SCVSD Facilities Plan, and ultimately, Alternative 2 (referred to as the Chloride Compliance Plan) was determined as the low cost alternative and the recommended project. As part of the Chloride Compliance Plan, SCVSD is in the process of implementing the ultraviolet (UV) disinfection facilities at Valencia WRP and Saugus WRP, which received funding through a 2014 Proposition 84 IRWM Drought Grant and a Round 2 Proposition 84 Implementation IRWM Grant, respectively. The Chloride Compliance Plan also includes the MF/RO Facilities at the Valencia WRP, necessary to achieve the remainder of the reduction in chloride levels in the Santa Clara River in order for both the Valencia WRP and Saugus WRP to comply with the Chloride TMDL. This Project comprises a portion of the MF/RO Facilities necessary for the Valencia WRP to comply with the Chloride TMDL.

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

Without the Project, the Valencia WRP would exceed the Chloride TMDL limit of 100 mg/L and, therefore, violate discharge requirements set by the Los Angeles RWQCB pursuant to the federal Clean Water Act and the state's Porter Cologne Act (Sanitation Districts of Los Angeles County, 2013; page 6-14). Violations would result in fines to the SCVSD, which would be passed on to the SCVSD's ratepayers (Sanitation Districts of Los Angeles County, 2013; page 6-14). Water quality would not be improved in the Upper Santa Clara River, which would result in non-attainment of the chloride water quality objective in the Santa Clara River located downstream of the Valencia WRP. Therefore, the "no project" alternative is not viable.

*3. Descriptions of methods used to estimate physical benefits*

SCVSD projected chloride levels in Valencia WRP effluent during drought and non-drought conditions using historical chloride contributions from imported water, the SCV community, and SCVSD facilities. This analysis, detailed in the response to number 1 above, shows that the chloride input is 133 mg/L during drought years and 118 mg/L during non-drought years. The SCVSD will reduce effluent chlorides to 100 mg/L through the combination of this Project and UV disinfection facilities. The UV disinfection facility will remove up to 7 mg/L of chlorides starting in 2019. This Project will remove the remainder needed to achieve an effluent chloride concentration of 100 mg/l, which is up to 26 mg/L of chlorides during drought years and up to 11 mg/L during non-drought years. MF/RO systems, such as this Project, are capable of removing chloride levels in the range of up to 200 mg/L at the Valencia WRP (Hokanson et al., 2007; page 8).

As part of the treatment process, the MF/RO Facilities will produce a high-quality water called reverse osmosis permeate (RO permeate; Sanitation Districts of Los Angeles County, 2013; page 7-4). The Project will produce approximately 4.5 MGD of RO permeate (Henry, 2015). RO permeate will be blended with a portion of Valencia WRP flow, that was not processed by MF/RO, to provide a net removal of up to 26 mg/L of chlorides during drought years and a removal of 11 mg/L

of chlorides and production of up to 2.6 MGD of RO permeate during non-drought years.[14] After construction and startup of all components of the Chloride Compliance Plan, the effluent discharged from the Valencia WRP is expected to comply with the Chloride TMDL of 100 mg/L. Water quality analyses of influent and effluent chloride concentrations of the facilities will monitor the reduction in chloride concentration.

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

This Project is a portion of the MF/RO Facilities described in the Chloride Compliance Plan and will be constructed within the boundaries of the Valencia WRP. The MF/RO Facilities include installation of MF/RO equipment and appurtenant electrical, mechanical, and control systems. The complete MF/RO Facilities consists of five trains: three trains for treatment of Valencia WRP flow, one train for treatment of Saugus WRP flow, and one train for backup; this grant application requests funding for the three trains for treatment of Valencia WRP flow. The benefits described herein are from the three treatment trains of the Valencia WRP flow, otherwise referred to as the "Advanced Water Treatment Facilities."

5. *Description of any potential adverse physical effects*

The MF/RO Facilities will consume energy and produce associated emissions during construction and operations. Energy use and emissions during construction are considered short term and temporary. Some construction activities will require connections to existing power sources and will slightly increase short-term, onsite electricity demand; however, the increase in energy demand would be temporary and would comply with all applicable federal, state, and local energy efficiency policies and standards (Sanitation Districts of Los Angeles County, 2013, page 13-4). Construction-generated emissions for the Chloride Compliance Plan, of which the Project is one component, will meet all maximum daily level thresholds except for nitrogen oxides (Sanitation Districts of Los Angeles County, 2013, page 10-24).[15]

Once constructed, the MF/RO Facilities will consume 9.7 Gigawatt hours per year (GWh/year; Sanitation Districts of Los Angeles County, 2013, page 13-5).[16] This is a relatively small portion of the total power required for the Chloride Compliance Plan, which is 107 GWh/year (Sanitation Districts of Los Angeles County, 2013, page 13-5). Operation of the MF/RO Facilities will be powered through electricity obtained from the regional grid distributed by Southern California Edison; therefore, no emissions will be generated at the Valencia WRP as a result of this Project (Sanitation Districts of Los Angeles County, 2013, page 10-30).

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

This Project addresses long-term drought preparedness through "promoting water reuse," as described in the *Secondary Benefit* section of this attachment. This Project will also improve the quality of surface water in the Santa Clara River that eventually recharges the local and down gradient groundwater basins. This Project will improve water quality for downstream agricultural interests and better prepare the region for the effect of drought on chloride concentrations in the Santa Clara River. This Project will also reduce chloride levels discharged from the Valencia WRP effluent to the Santa Clara River to meet the Chloride TMDL, which identified drought as the critical condition (RWQCB, 2008). Over the past 15 years, chloride levels in the Santa Clara River have led to conflict among watershed stakeholders, including agricultural interests. During drought years chloride levels are higher because chloride levels are not diluted by rainfall (Sanitation Districts of Los Angeles County, 2013; page 4-8). As such, droughts intensify conflicts among watershed stakeholders.

***Summary of benefit***

This Project will reduce the chloride concentration in the Valencia WRP effluent by up to 26 mg/L in drought years and up to 11 mg/L in non-drought years. As such, this Project will help the SCVSD comply with the Chloride TMDL during drought and non-drought years and is expected to improve the quality of surface water in the Santa Clara River that eventually recharges the local and down gradient groundwater basins.

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[14] A total of 4.5 MGD of RO permeate is needed to remove chlorides during drought years to meet the TMDL target. During non-drought years, 1.9 MGD of RO permeate is needed to remove chloride to meet the target ([4.5 MGD * 11 mg/L of Chloride) / 26 mg/L of Chloride]), which leaves 2.6 MGD of RO permeate (4.5 MGD - 1.9MGD) available for potable water reuse (Henry, 2015).

[15] Emissions are estimated for the Chloride Compliance Plan, and are not broken out by project component.

[16] Power required for the MF/RO Facilities was calculated based on design flow averaged over 10 years, assuming 3 years of drought (Sanitation Districts of Los Angeles County, 2013; page 10-24).

***Secondary Benefit: Production of up to 2.6 MGD of RO permeate (advanced treated water)***

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

The SCV is reliant on imported water sources: approximately half of the SCV's water supply is imported water and the SWP is the primary source of SCV's imported water (Sanitation Districts of Los Angeles County, 2013, page 4-2). In an effort to reduce reliance on imported Sacramento-San Joaquin Delta water supplies, this Project will produce up to 2.6 MGD of advanced treated recycled water, or RO permeate, during non-drought years that will be available for potable reuse during drought conditions. RO permeate enhances water supply reliability within the Region because it can be stored in local groundwater basins via surface spreading or direct injection for use during droughts.

There are several possible uses for RO permeate. For example, CLWA's Water Resources Reconnaissance Study outlines a groundwater reuse concept that replenishes the local groundwater basin with available RO permeate from the Valencia and Saugus WRPs (Carollo Engineers, 2015, page 4-1). Reusing the RO permeate has several potential benefits, including blending for groundwater replenishment, aquifer storage and recovery, and opportunities to implement direct potable reuse in the future (Carollo Engineers, 2015, page 4-1). On July 28, 2015, a letter from CLWA addressed to SCVSD expressed CLWA's intent to analyze these opportunities made from availability of RO permeate (CLWA 2015).

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

Without the Project, the Valencia WRP would not create high-quality treated recycled water, or RO permeate, for potable reuse. As such, there would be fewer opportunities for reduced reliance on imported water supplies, or the potential for urban water use efficiency by making water available for potable reuse.

*3. Descriptions of methods used to estimate physical benefits*

MF/RO equipment associated with this project will treat a portion of Valencia WRP flow to remove chloride, as well as numerous other pollutants, and produce 4.5 million MGD of RO permeate (Henry, 2015). SCVSD will blend RO permeate with a portion of Valencia WRP flow that was not processed by MF/RO, to achieve the desired chloride removal. During drought years, all RO permeate will be used to reduce chloride concentrations. During non-drought years, influent Valencia WRP chloride concentrations drop and, therefore, reduced chloride concentrations require less RO permeate. During these non-drought years, approximately 1.9 MGD[17] of RO permeate is required to reduce chloride concentration to meet the Chloride TMDL (Henry, 2015). As such, up to 2.6 MGD[18] of RO permeate is available for potable water reuse during non-drought years. The amount of RO permeate produced will be monitored using plant flow metering data at Valencia WRP.

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

The Santa Clarita Valley Sanitation District will be working with local water agencies to define a specific project to use the RO permeate to utilize this resource (CLWA, 2015). Through this process, additional infrastructure, policies and actions that will be required to bring the secondary physical benefits to fruition will be identified.

*5. Description of any potential adverse physical effects*

The MF/RO project will consume energy and produce associated emissions during construction and operations. Energy use and emissions during construction are considered short term and temporary. Some construction activities will require connections to existing power sources and will slightly increase short-term, onsite electricity demand; however, the increase in energy demand would be temporary and would comply with all applicable federal, state, and local energy efficiency policies and standards (Sanitation Districts of Los Angeles County, 2013, page 13-4). Construction-generated emissions for the Chloride Compliance Plan, of which the Project is one component, will meet all maximum daily level thresholds except for $NO_X$ (Sanitation Districts of Los Angeles County, 2013, page 10-24).[19]

[17] 1.9 MGD = (4.5 MGD * 11 mg/L of Chloride) / 26 mg/L of Chloride)
[18] 2.6 MGD of RO permeate = 4.5 MGD of total RO permeate – 1.9 MGD of RO permeate needed during non-drought years
[19] Emissions are estimated for the Chloride Compliance Plan, and are not broken out by project component.

Once constructed, the MF/RO Facilities will consume 9.7 Gigawatt hours per year (GWh/year; Sanitation Districts of Los Angeles County, 2013, page 13-5).[20] This is a relatively small portion of the total power required for the Chloride Compliance Plan, which is 107 GWh/year (Sanitation Districts of Los Angeles County, 2013, page 13-5). Operation of the MF/RO Facilities will be powered through electricity obtained from the regional grid distributed by Southern California Edison; therefore, no emissions will be generated at the Valencia WRP as a result of this Project (Sanitation Districts of Los Angeles County, 2013, page 10-30).

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

This Project addresses long-term drought preparedness through "promoting water reuse." This Project produces up to 2.6 MGD of advanced treated recycled water, or RO permeate, that will be available for potable reuse. The water produced from the project can be recharged into groundwater basins during non-drought years for use during drought-years. This Project will improve water supply reliability in the SCV, which currently relies on the Sacramento-San Joaquin Delta for approximately half of its water supply (Carollo Engineers, 2015, page 3-7).

***Summary of benefit***

This Project will produce advanced treated recycled water, or RO permeate, of up to 2.6 MGD in non-drought years for potable reuse during drought years. This project will reduce the SCV's reliance on imported water.

[20] Power required for the MF/RO Facilities was calculated based on design flow averaged over 10 years, assuming 3 years of drought (Sanitation Districts of Los Angeles County, 2013; page 10-24).

### PROJECT PERFORMANCE MONITORING PLANS

### VALENCIA WATER RECLAMATION PLANT ADVANCED WATER TREATMENT FACILITIES

This section presents the monitoring measures for the Valencia WRP Advanced Water Treatment Facilities that will help ensure the intended benefits are realized. Table 12 and the information provided below are guidance for developing a complete Project Performance Monitoring Plan to track performance of each project, and as identified as Task 9 in the Work Plan, Budget, and Schedule.

**Table 12 - Project Performance Monitoring Plan (PSP Table 6)**
**Project: Valencia WRP Advanced Water Treatment Facilities**

| Proposed Physical Benefits | Targets | Measurement tools and methods |
|---|---|---|
| Reduction in the concentration of chlorides in effluent discharged from the Valencia WRP | Reduce the chloride loading in the Valencia WRP effluent by up to 26 mg/L in drought years and up to 11 mg/L in non-drought years | Determining the reduction of chloride concentrations from Valencia WRP influent and effluent, when the advanced treatment facilities are operational. Reductions in chloride concentrations by other Valencia WRP processes will be accounted for. |
| Production of RO permeate (or advanced treated water) | Produce RO permeate of up to 2.6 MGD in non-drought years, which can be available for potable water reuse. | Plant and RO permeate flow metering data at Valencia WRP |

#### *Tools Used to Monitor Project Performance and Set Interim Targets*

SCVSD monitors the effluent at the Valencia (and Saugus) WRPs for chloride.

The interim target for chloride concentration shall be represented by the interim chloride limit for Valencia WRP, which is required by the Regional Board until 7/1/19, when the advanced treatment facilities are operational. The interim chloride limit is equivalent to the sum of SWP chloride concentration plus 97 mg/L, expressed as a 12-month rolling average. SCVSD will report to the Regional Board on compliance with the interim chloride limit on an annual basis.

The interim target for recycled water availability shall be 500 AFY of tertiary treated water until 7/1/19, when the advanced treatment facilities are operational [If necessary, insert reference to 2014 SCV Water Report, which indicates 500 AFY of RW use in 2014]. SCVSD will monitor and record plant flow and tertiary treated water metering data at the Valencia WRP.

#### *Data Collection and Types of Analyses Used*

SCVSD will continue to monitor the effluent at the Valencia WRPs for chloride and RO permeate production. Data will be maintained and conveyed in spreadsheets, hard-copy, and/or electronically in PDFs. Monitoring data will be analyzed at regular time intervals to assess chloride reductions and production of RO permeate. The reduction in the chloride loading in the Valencia WRP effluent by up to 26 mg/L in drought years and up to 11 mg/L in non-drought years is estimated by comparing the chloride concentration with the existing chlorine disinfection system against the anticipated chloride concentration reduction when the advanced treatment facilities are operational. During drought years, RO facilities will reduce chlorides and all RO permeate will be blended to reduce chloride concentrations. During non-drought years, Valencia WRP's chloride concentrations drop and, therefore, reducing chloride concentrations requires less RO permeate. The SCVSD will determine the reduction of chloride concentrations from Valencia WRP influent and effluent when the advanced treatment facilities are operational. Reductions in chloride concentrations by other Valencia WRP processes will be accounted for.

#### *Appropriateness of Monitoring Tools and Targets for Benefits Claimed*

The identified monitoring targets for the Valencia WRP Advanced Water Treatment Facilities are appropriate for the identified benefits. SCVSD will utilize quantifiable and verifiable monitoring equipment and laboratory methods. Therefore, the monitoring targets that the SCVSD has identified based on their experience are appropriate for the benefits.

***How Monitoring Data will be used to Measure Project Performance***

The proposed measurement tools and methods for the Valencia WRP Advanced Water Treatment Facilities Project will effectively monitor program performance and target progress. SCVSD will comply with the Regional Board's monitoring requirements through the submittal of the annual compliance report required under the USCR Chloride TMDL Implementation Plan. Their measurement tools and methods have proven effective to date for monitoring progress.

### COST EFFECTIVENESS ANALYSIS

### VALENCIA WATER RECLAMATION PLANT ADVANCED WATER TREATMENT FACILITIES

This section presents a cost-effectiveness analysis comparing relevant project alternatives discussed in the Facilities Plan/EIR to the alternative that includes the proposed Project. The project alternatives considered are discussed below.

| **Table 13 – Cost Effective Analysis (PSP Table 7)**<br>**Project name: Valencia WRP Advanced Water Treatment Facilities** | |
|---|---|
| Question 1 | *Types of benefits provided as shown in Tables 10 and11 (PSP Table 5)*<br><br>1) Reduction in the concentration of chlorides in effluent discharged from the Valencia WRP<br>2) Production of RO permeate available for potable water reuse |
| Question 2 | *Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified?*<br><br>Yes. A detailed alternatives analysis was conducted with four feasible alternatives. All four of the alternatives evaluated addressed chloride loading and alternatives for brine disposal. This Project is included in Alternative 2 (Chloride Compliance Plan), which is the least-cost alternative. |
| | *If no, why?*<br><br>Not applicable |
| | *If yes, list the methods (including the proposed project) and estimated costs.*<br><br>The sum of capital and O&M costs over the project lifetime are shown in present value 2015 dollars.<br><br>Alternative 1 - MF/RO With Brine Disposal via Pipeline, $184.2 million.<br><br>Alternative 2 (*this Project is part of this Alternative 2*) - MF/RO, UV, and Brine Minimization with Brine Disposal via Deep Well Injection, $166 million.<br><br>Alternative 3 - MF/RO and UV with Brine Disposal via Trucking, $194.6 million.<br><br>Alternative 4 - AWRM (Phase I & II), $221.3 million. |
| 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.*<br><br>Not applicable - Alternative 2 (Chloride Compliance Plan), which includes this Project, is the least cost alternative. |

Costs are presented in this section based on the alternatives identified in the SCVSD Facilities Plan, 2013, with updated information from the SCVSD on the Valencia WRP Advanced Water Treatment Facilities proposed in this application. The Project is only one part of the preferred alternative identified in the EIR to comply with the chloride TMDL, and the MF/RO Project does not stand alone as an option for compliance. Therefore, the fully developed alternatives as presented in the EIR are presented here with accompanying cost information.

Four alternatives were identified in the SCVSD Facilities Plan, 2013. Alternative 4 was originally the environmentally preferred alternative, however it became infeasible due to the lack of required support from key stakeholders, and a determination that it would not garner the necessary regulatory approvals. The Project presented here is a portion of the MF/RO Facilities component of Alternative 2. Alternative 2 was originally presented as the backup to the recommended project (Alternative 4) that became infeasible, thus it became the low cost alternative and the recommended project.

The present value of capital costs for the Valencia WRP MF/RO portion of Alternative 2, as proposed in this grant application is $27.7 million in 2015 dollars. The present value of O&M costs of this alternative total $17.3 million per year

in 2015 dollars. Thus, the present value of capital and O&M costs for the project alternative totals $45 million in 2015 dollars. The present value cost of Alternative 2, as shown in Table 13, is $166 million, with $119.6 million in present value capital cost and $46.4 million in present value O&M cost. Thus, the present value of the Valencia WRP MF/RO portion in this grant application is 27.1% of the full Alternative 2 cost.

The four project alternatives considered are discussed below.

**Alternative 1 – MF/RO with Brine Disposal via Pipeline**

In this alternative, a portion of the Valencia WRP's tertiary-treated wastewater would receive advanced treatment via MF/RO facilities to remove chloride. The low chloride RO product water would be combined with the remaining tertiary-treated wastewater to produce a blend that meets the chloride TMDL limit of 100 mg/L for chloride. Brine from the MF/RO facilities would be disposed via a pipeline to an existing trunk sewer within the Joint Outfall System JOS. From there, brine would flow to the Sanitation Districts' Joint Water Pollution Control Plant (JWPCP) in the City of Carson, and eventually to the ocean using the JWPCP's existing ocean outfall. MF/RO facilities would be constructed at the Valencia WRP site. The primary MF/RO facilities would be sized to produce 7.1 MGD of RO product water, which would result in 1.3 MGD of brine. This brine would be treated by a second-pass RO system located adjacent to the primary MF/RO facilities. The second-pass RO system would produce 0.6 MGD of RO product water and 0.6 MGD of brine. The product water from the primary and second-pass RO systems would be combined and blended with tertiary-treated wastewater to meet discharge limits. Brine from the second-pass RO system would be disposed via a 37-mile pipeline consisting of 6-inch diameter force main and 10-inch diameter gravity sections. A pump station at the Valencia WRP and an offsite booster pump station would be constructed to convey brine over the Newhall Pass. The existing chlorine-based disinfection systems would remain at the Valencia WRP and Saugus WRP. To meet chloride TMDL requirements for Saugus WRP discharge, approximately 2.3 MGD of the RO product water would be pumped to the Saugus WRP for blending with tertiary-treated wastewater. The RO product water conveyance system would consist of a pump station at the Valencia WRP and 3.5 miles of 16-inch diameter pipeline.

The present value for this project alternative is projected as $184.2 million, with the capital costs of $136.3 million and the O&M costs of $47.9 million over the expected 30-year life of the alternative.

**Alternative 2 – MF/RO, UV, and Brine Minimization with Brine Disposal via Deep Well Injection**

In this alternative, a portion of the Valencia WRP's tertiary-treated wastewater would receive advanced treatment via MF/RO facilities to remove chloride. The low chloride RO product water would be combined with the remaining tertiary-treated wastewater to produce a blend that meets the chloride TMDL limit of 100 mg/L for chloride. UV disinfection would replace the existing chlorine-based disinfection systems at both WRPs and would be located within the existing WRPs property boundary. Conversion to UV disinfection would reduce the size of the MF/RO facilities to 5.6 MGD and the amount of brine from the primary RO system to 1.0 MGD. The second-pass RO system would produce 0.5 MGD of RO product water and 0.5 MGD of brine. MF/RO facilities would be constructed at the Valencia WRP site. The SCVSD Facilities Plan indicated that brine from the MF/RO facilities would be disposed via Deep Well Injection (DWI). Although DWI is a proven method, there is significant concern about if this alternative can be implemented by the compliance deadline. Since the certification of the SCVSD Facilities Plan, the SCVSD learned that the specific parcel of land that was the preferred site for the DWI was no longer available because of a conservation easement (SCVSD, 2015). The SCVSD is currently exploring alternative options for brine minimization and disposal. Currently, the most feasible alternative is brine minimization, such as through enhanced membrane systems, to concentrate the brine and significantly reduce the number of truck loads per day needed for disposal (SCVSD, 2015). This alternative appears to have a similar range of capital costs, but potentially higher O&M costs than the approved compliance project (SCVSD, 2015). Depending on the cost, it is likely that the project can be implemented within the rate structure approved in 2014 (SCVSD, 2015). To meet the chloride TMDL requirements for Saugus WRP discharge, approximately 1.8 MGD of the RO product water would be pumped to the Saugus WRP for blending with tertiary-treated water. The RO product water conveyance system would require construction of a pump station at the Valencia WRP and 3.5 miles of 14-inch diameter pipeline.

The Project in this grant proposal is a portion of the MF/RO Facilities described in this Alternative 2 and includes the three trains for treatment of Valencia WRP flow.

The present value for this project alternative is projected as $166 million, with the capital costs of $119.7 million and the O&M costs of $46.4 million over the expected 30-year life of the alternative. Project costs are not updated to reflect changes in the brine disposal for this project alternative; SCVSD is still evaluating alternatives.

**Alternative 3 – MF/RO and UV with Brine Disposal via Trucking**

In this alternative, a portion of the Valencia WRP's tertiary-treated wastewater would receive advanced treatment via MF/RO facilities to remove chloride. The low chloride RO product water would be combined with the remaining tertiary-treated wastewater to produce a blend that meets the chloride TMDL limit of 100 mg/L for chloride. Brine would be disposed via trucking to an unloading terminal. From there, brine would be conveyed to the JWPCP via the existing sewage system and eventually to the ocean using the JWPCP's existing ocean outfall. UV disinfection would replace the existing chlorine-based disinfection systems at both WRPs and would be located within the existing WRPs property boundary. Conversion to UV disinfection would reduce the size of the MF/RO facilities to 5.6 MGD and the amount of brine from the primary RO system to 1.0 MGD. The second-pass RO system would produce 0.5 MGD of RO product water and 0.5 MGD of brine. MF/RO facilities would be constructed at the Valencia WRP site. The trucking operation would require acquisition and development of properties for truck loading and unloading terminals. The loading terminal would be located on a one-acre property adjacent to the northern boundary of the Valencia WRP and would consist of four brine loading stations, paving and fencing. A 500,000 gallon brine storage tank (approximately 70-foot in diameter) would be constructed at the Valencia WRP or at the loading terminal to accommodate disruptions in the trucking operation. A pump station at the Valencia WRP and a brine conveyance pipeline would be constructed to deliver brine to the loading terminal. The unloading terminal would require a two-acre property located in the unincorporated Los Angeles County community of City Terrace. The unloading terminal would also consist of four brine loading stations, paving and fencing. An 18-inch diameter pipeline would be constructed from the unloading terminal to the City Terrace Trunk Sewer. The trucking operation would involve 90 truck trips per day during peak conditions and 60 trips per day on average.

The present value for this project alternative is projected as $194.6 million, with the capital costs of $96.5 million and the O&M costs of $98.1 million over the expected 30-year life of the alternative.

**Alternative 4 – Alternative Water Resources Management Plan (AWRM) (Phase I & II) – Also known as the alternative compliance plan**

This alternative would consist of two phases: Phase I and Phase II. Based on predictions of future water supply chloride levels, Phase I elements were estimated to be sufficient to meet a chloride limit of 181 mg/L at Reach 4B of the Santa Clara River. Phase II represented a formal backup plan in case Phase I facilities could not consistently provide water quality in the Santa Clara River that complies with the modified chloride limits.

Phase I would include construction of UV disinfection facilities at the Valencia WRP and Saugus WRP, salt management facilities in the Piru Subbasin, and use of supplemental water. UV disinfection facilities would be located within the existing WRP's property boundary. Salt management facilities would consist of approximately five groundwater extraction wells in the eastern portion of the Piru Subbasin, approximately six groundwater extraction wells in the western portion of the Piru Subbasin, at least one pump station for each well field, and a 36-inch diameter, 6-mile long pipeline to deliver blended groundwater to a point in the Santa Clara River with perennial flow (near the Fillmore Fish Hatchery). The supplemental water system would consist of a 24-inch diameter pipeline less than 1 mile long to two or three existing or new groundwater wells. The low chloride water provided by these wells would be added to the Valencia WRP discharge to meet the required limit at Reach 4B of the Santa Clara River during peak conditions. To replace this water and ensure no net loss of water supply to the SCV, additional water would be imported by CLWA on the SCVSD's behalf. This replacement water would be obtained from the Buena Vista-Rosedale Rio Bravo (BV/RRB) Project in the Central Valley of California under existing agreements between CLWA and the BV/RRB operator and would be conveyed using existing infrastructure.

Phase II would include MF/RO facilities at the Valencia WRP, a brine disposal system, and an RO product water conveyance system to Ventura County. For the purposes of cost estimating and evaluating alternatives, MF/RO facilities producing 2 MGD of product water and 0.4 MGD of brine are assumed, and would be located as described for Alternative 1. Similar to Alternatives 1, 2 and 3, the MF/RO facilities are assumed to include second-pass RO for brine minimization, which would reduce brine flows to 0.2 MGD. DWI is the recommended method of brine disposal. Similar to Alternative 2, brine would be conveyed to DWI Site A via a pump station located at the VWRP and a 6-inch diameter, 2.5-mile long force main. Three injection wells would be constructed at Site A along with appurtenant facilities such as injection pumps, chemical storage tanks, and electrical switchgear. The RO product water conveyance system to Ventura County may be needed to supply low-

chloride water for users of river water during drought if SCR chloride levels are expected to exceed 181 mg/L after implementation of MF/RO facilities. The conveyance system would consist of a 24-inch diameter, 12-mile pipeline from the Valencia WRP to the eastern portion of the Piru Subbasin.

The present value for this project alternative is projected as $221.3 million, with the capital costs of $178.4 million and the O&M costs of $42.9 million over the expected 30-year life of the alternative.

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