# Santa Clarita Valley Water Use Efficiency Strategic Plan Program (CLWA-3)

## Summary

The Santa Clarita Valley (SCV) Water Use Efficiency (WUE) Strategic Plan (SP) identifies several programs to achieve WUE goals for the region. The CLWA-3 plan focuses on the following five water conservation programs, four of which are currently being implemented and have been partially funded through a Round 1 Implementation Grant from DWR:

- Santa Clarita Valley Large Landscape Audit and Incentive Program

  This program offers $25 rebates to large dedicated irrigation sites for weather-based irrigation controllers (WBICs) at active sites, as well as $300 per acre-foot saved rebates for water-saving landscape modifications.

- Santa Clarita Valley Commercial, Industrial, and Institutional (CII) Audit and Customized Incentive Program

  This program offers WBIC and landscape modification rebates identical to those in the Large Landscape Audit and Incentive Program to CII customers within the SCV.

- Santa Clarita Valley Landscape Contractor Certification and Weather-based Irrigation Controller Program

  This program offers training workshops in classrooms, online, and in the field to both residents and landscape contractors in the valley. Recipients of the program learn about WUE, installing WBICs, hydrozoning, and high distribution uniformity. Recipients are also eligible for free WBICs, as well as free inspections after self-installation. This program has been modified from previous versions to include cheaper, more accessible online educational classes, and it focuses primarily on residential customers.

- High-Efficiency Clothes Washer (HECW) Machine Program

  This program offers $100 rebates to single- and multi-family residences for HECWs, with an additional $100 rebate per household available through retailers.

- Cash-for-Grass (C4G) Rebate Program

  This is a new program that uses Long Beach Water Department's "Lawn to Garden" program as a model. It creates an online application and online class during which residents are able to apply for turf-replacement funds and train in water-saving landscaping practices.

Each of these programs is currently being implemented, except for the C4G Rebate Program. Grant funding would cover a portion of implementation cost of all individual programs from October 1, 2013 to September 30, 2015. A summary of all benefits and costs of the project are provided in Table 8-1. Monetized benefits and non-monetized benefits are presented in this attachment, while physically quantified (but not monetized) benefits are described in Attachment 7.

**TABLE 8-1: BENEFIT-COST ANALYSIS OVERVIEW**

| | Present Value |
|---|---|
| **Costs** – Total Capital and O&M | **$2,194,116** |
| **Monetizable Benefits** | |
| Avoided Imported Water Supply Costs | $2,647,683 |
| Avoided Clothes Washer Energy Costs | $113,201 |
| Avoided Wastewater Treatment | $419,455 |
| Total Monetizable Benefits | **$3,180,339** |
| **Physically Quantified Benefit or Cost (Not Monetized)** | **Project Life Total** |
| Avoided SWP Import Carbon Emissions | 2,016 MT |
| Avoided Clothes Washer Carbon Emissions | 377 MT |
| Avoided Introduction of Chlorides into the Watershed | 384 MT |
| **Qualitative Benefit or Cost** | **Qualitative Indicator*** |
| Provides Education Benefits | + |
| Provides Technology Benefits | + |
| Helps Meets State Water Conservation Mandate | + + |
| Improved Social Health and Safety | + |
| Avoided Water Quality Impacts of Urban Runoff | + |
| Avoided Disinfection By-Product Precursors | + |
| Reduced Demand for Net Diversions from the Delta | + |
| Improved Water Supply Reliability | + |
| Avoided Street Maintenance | + |
| Improved Operational Flexibility for CLWA | + |

* Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease net benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

CLWA = Castaic Lake Water Agency.
O&M = operations and maintenance.
SWP = State Water Project.

## Non-monetized Benefits Analysis (Section D2)

Table 8-2 shows the non-monetized benefits checklist for the project. Narrative descriptions of the benefit categories marked "Yes" in the following the table are provided in the narrative description of qualitative benefits section after the table.

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| | **Community/Social Benefits** | |
| | **Will the proposal** | |
| 1 | **Provide education or technology benefits?** | Yes |
| | Examples are not limited to, but may include:<br>- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?<br>- Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management?<br>- Provide some other education or technological benefit? | |
| 2 | **Provide social recreation or access benefits?** | No |
| | Examples are not limited to, but may include:<br>- Provide new or improved outdoor recreation opportunities?<br>- Provide more access to open space?<br>- Provide some other recreation or public access benefit? | |
| 3 | **Help avoid, reduce, or resolve various public water resources conflicts?** | Yes |
| | Examples are not limited to, but may include:<br>- Provide more opportunities for public involvement in water management?<br>- Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?<br>- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)? | |
| 4 | **Promote social health and safety?** | Yes |
| | Examples are not limited to, but may include:<br>- Increase urban water supply reliability for firefighting and critical services following seismic events?<br>- Reduce risk to life from dam failure or flooding?<br>- Reduce exposure to water-related hazards? | |
| 5 | **Have other social benefits?** | No |
| | Examples are not limited to, but may include:<br>- Redress or increase inequitable distribution of environmental burdens?<br>- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups? | |
| | **Environmental Stewardship Benefits:** | |
| | **Will the proposal** | |
| 6 | **Benefit wildlife or habitat in ways that were not quantified in Attachment 7?** | No |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| | Examples are not limited to, but may include:<br>- Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat?<br>- Contribute to an existing biological opinion or recovery plan for a listed special status species?<br>- Preserve or restore designated critical habitat of a listed species?<br>- Enhance wildlife protection or habitat? | |
| **7** | **Improve water quality in ways that were not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Cause an improvement in water quality in an impaired water body or sensitive habitat?<br>- Prevent water quality degradation?<br>- Cause some other improvement in water quality? | |
| **8** | **Reduce net emissions in ways that were not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Reduce net production of greenhouse gases?<br>- Reduce net emissions of other harmful chemicals into the air or water? | |
| **9** | **Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3 or D4?** | No |
| | **Sustainability Benefits:**<br>**Will the proposal** | |
| **10** | **Improve the overall, long-term management of California groundwater resources?** | No |
| | Examples are not limited to, but may include:<br>- Reduce extraction of non-renewable groundwater?<br>- Promote aquifer storage or recharge? | |
| **11** | **Reduce demand for net diversions for the regions from the Delta?** | Yes |
| **12** | **Provide a long-term solution in place of a short-term one?** | No |
| **13** | **Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?** | No |
| | Examples are not limited to, but may include:<br>- Reduce net energy use on a permanent basis?<br>- Increase renewable energy production?<br>- Include new buildings or modify buildings to include certified LEED features?<br>- Provide a net increase in recycling or reuse of materials?<br>- Replace unsustainable practices with recognized sustainable practices? | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| **14** | **Improve water supply reliability in ways not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Provide a more flexible mix of water sources?<br>- Reduce likelihood of catastrophic supply outages?<br>- Reduce supply uncertainty?<br>- Reduce supply variability? | |
| **15** | **Other: Avoided Street Maintenance and Increased Operational Efficiency for CLWA.** | Yes |

### Narrative Description of Qualitative Benefits

Descriptions of the non-monetized benefits marked "Yes" from the checklist in Table 8-2 are described below.

## Provide Education or Technology Benefits

### Provides Education Benefits

All of the programs that comprise the CLWA-3 Water Conservation Project have a mandatory educational component, except for the HECW Rebate program. The Large Landscape and CII programs include training for customers on use and expectations for WBICs, and the C4G program offers an online class during which residents learn about water-saving landscaping practices and how to replant with low-water use landscapes. The Landscaper Contractor Certification and WBIC program has expanded to include online classes, which discuss weather-based irrigation use, installation and programming, and overall landscape management practices. Information regarding efficient water use practices will provide benefits as long as the participant employs them, and may also increase the likelihood of that customer to participate in future water conservation initiatives.

### Provides Technology Benefits

The Large Landscape, CII, and residential WBIC programs also have the potential to implement and test the effectiveness of new smart controller technology. Approximately half of the WBICs that will be installed through the Large Landscape Program will be fitted for this technology, which uses centralized information and planning to irrigate large, dedicated urban landscapes. With this technology, multiple "satellite" controllers are controlled through a centralized computer system, which allows for monitoring and control of multiple irrigation system parameters, including flow rates, pressures, pumps, and master valve operation, from a single location.

## Helps Avoid, Reduce, or Resolve Public Water Resources Conflicts

Water conservation measures implemented under this project allow CLWA to comply with state water conservation mandates. The Water Conservation Act of 2009, or Senate Bill X7-7 (SBX7-7), outlines statewide water conservation targets for both urban and agricultural water customers. Water savings achieved through the CLWA-3 project will help CLWA and its retail agencies to meet state targets (outlined in SBX7-7) of a 10% reduction in potable water demand by the end of 2015, and a 20% reduction in potable water consumption by 2020.

## Promotes Social Health and Safety

Additional safety benefits accrue to residents who use public areas that receive new WBICs. Because WBICs control irrigation based on temperature, the public walkways and bikeways, such as those in city and county parks, do not ice over due to irrigation during freezing temperatures.

## Improves Water Quality in Ways That Were Not Quantified in Attachment 7

### Avoided Water Quality Impacts of Urban Runoff

In addition to reducing total chloride levels, water conservation directly reduces watershed pollution due to urban runoff. Urban irrigation runoff can include pollutants such as chemicals and bacteria, which can flow from urban landscapes into existing water bodies. Given that SCV is a densely populated area with high usage of chemicals such as fertilizers and pesticides for residential and commercial landscaping, these substances can easily flow into the Santa Clara River.

### Avoided Disinfection By-Product Precursors

The reduction in SWP imports as a result of these WUE initiatives will also reduce levels of bromide and total organic carbon (TOC), two substances that combine with treatment chemicals to form harmful disinfection by-products such as trihalomethanes. While secondary standards for bromide and TOC in drinking water have not been set, importing water with high levels of both makes it more difficult for CLWA to treat water to meet federal standards for disinfection by-products. Increased levels of disinfection by-products require additional operational costs to control concentrations of by-products in treated water.

### Reduces Demand for Net Diversions from the Delta

By reducing the use of imported SWP water, the CLWA-3 will augment in-stream flows in the Delta, or will offset other diversions that may otherwise reduce flows. Reduced demands on Delta supplies will also help reduce the overall salinity of the Delta and improve Delta habitat.

Maintaining the Delta's environmental condition is vital to maintaining and improving the viability of the region. The Delta provides drinking water to 25 million people, supports thousands of industries and irrigation of 750,000 acres of agriculture, and serves as home to hundreds of plant, animal, and fish species – some of which are listed as threatened or endangered. The Delta's 1,600 square miles of marshes, islands, and sloughs support at least half of migratory water birds on the Pacific Flyway; 80% of California's commercial fisheries; and recreational uses, including boating, fishing, and windsurfing.

Delta resources are in a state of crisis. Fish populations, including salmon and Delta smelt, have declined dramatically in recent years. The levee system is aging, and vulnerability of the Delta to flooding, sea level rise, or a major earthquake has contributed to concerns about possible levee collapse. In addition, water quality problems continue, and there is little consensus on how to manage water resources through storage.

## Improves Water Supply Reliability in Ways Not Quantified in Attachment 7

The reliability of a water supply refers to its ability to meet water demands on a consistent basis, even in times of drought or other constraints on source water availability. The proposed project will help address reliability issues for Los Angeles County Waterworks #36, Newhall County Water District, Santa Clarita Water Division, and the Valencia Water Company by offsetting the use of imported water delivered by the SWP. As noted above, the reliability of imported water is subject to a number of natural and human forces, ranging from increased population growth (and the accompanying increased demands), to drought and earthquakes, to environmental regulations and water rights determinations.

Although interest in water supply reliability is increasing (e.g., due to increasing water demands and concerns about climate-related events), only a few studies have directly attempted to quantify its value (i.e., through nonmarket valuation studies; see for example Carson and Mitchell, 1987, CUWA, 1994, Griffen and Mjelde, 2000, Raucher et al., 2013). The results from these studies indicate that residential and industrial (i.e., urban) customers seem to value supply reliability quite highly. Stated preference studies find that water customers are willing to pay approximately $100 to over $500 per household per year in 2012 dollars for total reliability (i.e., a 0% probability of their water supply being interrupted in times of drought).

The challenge in applying these values to determine a value of increased reliability as a result of the CLWA-3 project is in recognizing how to reasonably interpret these survey-based household monetary values. The values noted above reflect a willingness to pay per household to ensure complete reliability (zero drought-related use restrictions in the future), whereas the CLWA-3 project only enhances overall reliability and does not guarantee 100% reliability. Thus if applied directly to the number of households within the CLWA service area, the dollar values from the studies would overstate the reliability value provided by the project.

A simple way to roughly adjust for this "whole versus part" problem is to attribute a portion of the total value of reliability to the portion of the problem that is solved by the project. To adjust for the partial improvement in reliability from the CLWA-3, it is assumed that household willingness to pay for improved reliability is directly proportional to the amount of conserved water, as a percentage of the total potable water supply. This represents the percentage of total supply that has been improved in terms of overall reliability (i.e., by offsetting imported water demand with local sources).

For example, the project will offset more than 379 acre-feet per year (AFY) of imported water beginning in 2015. In 2020, roughly halfway through the lifetime of the project's benefits, total water demand within CLWA's service area will be about 71,908 AFY (without the project) (Kennedy/Jenks Consultants et al., 2011). Thus about 0.5% of total potable demand will eliminated as a result of the project. To obtain a lower bound estimate for the value of improved reliability associated with this water, it is assumed that households within the CLWA service area are willing to pay about $0.50 per year ($100 multiplied by 0.5%). Applying this dollar value per household to the approximately 96,133 households within the collective service areas would result in $48,067 of benefits in 2020. Taking into account increasing population and changing demands, this calculation could be completed for each year of the project's useful life.

Because of the uncertainty involved in applying these numbers to this situation, this benefit estimate is not included in the tables. However, it is provided here to give an idea of the potential magnitude of this benefit.

### Other: Avoided Street Maintenance

Over-irrigation caused by inefficient urban systems has additional impacts on roadways. Reducing over-irrigation will prevent water from carrying trash into streets, as well as damaging roads by infiltrating cracks and undermining the integrity of the pavement.

### Other: Increased Operational Efficiency for CLWA

As total water demand reduction increases water supply reliability, it also allows water agencies to have additional operational flexibility. By avoiding water imports, which fluctuate in consistency, water retailers can plan shutdowns and maintenance operations more efficiently.

## Monetized Benefits Analysis (Section D3)

Several monetized benefits are expected to accrue over the expected 14-year life of the project. Those include avoided costs due to imported marginal water supply from SWP, avoided clothes washer energy costs, and avoided wastewater treatment costs.

## Avoided Imported Water Supply Costs

Water savings through more efficient irrigation controllers, practices, turf, and HECWs is expected to be approximately 3,960 acre-feet (AF) over the 14-year benefits lifetime of this project. Actual savings over the lifetimes of each program will likely be higher, as this estimate does not factor in water savings from the landscape modifications of the Large Landscape and CII programs or water savings from landscaping contractors improving their WUE through the Landscape Contractor and Residential WBIC program. The HECW and C4G programs also use conservative estimates in water consumption and program benefit lifetime, respectively. Where applicable, estimates were based on findings and consumption data from similar, previously implemented programs.

The estimated water savings will result in an equivalent amount of avoided imported water, which currently costs $800 per acre-foot for CLWA's marginal source of SWP water (CLWA, 2013). Given the recent and projected rate of change of SWP supplies, this cost is expected to increase in real terms over the benefits lifetime of the project. We estimate that the cost of SWP imports will rise at a real rate (above inflation) of 3.5% annually through 2020, after which prices will likely escalate at a rate of 1.5% annually. Assuming this rise in rates, we approximate the present value of all future benefits of avoided water imports over the 14-year life of project benefits to be $2,647,683.

## Avoided Clothes Washer Energy Costs

Switching from standard clothes washers to high-efficiency machines provides water savings, as well as the benefit of avoiding energy costs associated with heating the equivalent amount of saved water. The HECW program is the only program in this project that provides avoided water heating benefit associated with water conservation savings.

The energy required to heat water for residential washing machines varies depending on the number of loads per household, the type of high-efficiency machine purchased, and the individual machine settings used for each household. The Alliance for Water Efficiency estimates that switching to a HECW saves 0.0036 kWh/gallon in electricity use (Alliance for Water Efficiency, 2011). This estimate for energy consumption per gallon is based on participants' energy use from previous conservation programs, which were subject to these same uncertainties, and is most likely a reasonable estimate of household energy use for the CLWA-3 project.

Using the average 2012 retail electricity price for California of $0.15/kWh (Energy Information Administration, 2013), we estimate that the 1,160.9 megawatt hour (MWh) of electricity saved by reducing water demand by 990 AF will save single-family residential customers approximately $14,511 per year. The present value of all future benefits over the 14-year lifespan of the project is $113,201.

## Avoided Wastewater Treatment Costs

Water savings achieved through HECWs has an additional benefit of preventing the equivalent amount of wastewater treatment at the Santa Clarita Valley Sanitation District's (SCVSD's) Water Reclamation Plants (WRPs). The HECW program is projected to save approximately 990 AF of water over the project benefits lifetime. Using the SCVSD's average cost of wastewater treatment of $652 per acre-foot, we estimate that HECW rebates will avoid approximately $53,771 per year in sanitation expenses over the 14-year lifetime of the project benefits, in 2012 dollars (CLWA, 2013). The present value of these future benefits is $419,455.

Table 8-3 summarizes the annual monetized benefits from the project.

# Santa Clarita Valley Water Use Efficiency Strategic Plan Program (CLWA-3)

**TABLE 8-3: ANNUAL BENEFIT**

| (All benefits in 2012 dollars)<br>Project: Santa Clarita Valley Water Use Efficiency Strategic Plan Program (CLWA-3) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
| **2012** | Avoided SWP Water Imports | | | | | $800 | | | |
| **2013** | Avoided SWP Water Imports | AF | 0 | 47.44 | 47.44 | $828 | $39,281 | 0.943 | **$ 37,058** |
| | HECW Energy Savings | kWH | 0 | 12,093.03 | 12,093.03 | $0.15 | $1,814 | 0.943 | **$1,711** |
| | Avoided Wastewater Treatment | AF | 0 | 10.31 | 10.31 | $652 | $6,721 | 0.943 | **$6,341** |
| **2014** | Avoided SWP Water Imports | AF | 0 | 237.20 | 237.20 | $857 | $203,279 | 0.890 | **$ 180,918** |
| | HECW Energy Savings | kWH | 0 | 60,465.15 | 60,465.15 | $0.15 | $9,070 | 0.890 | **$8,072** |
| | Avoided Wastewater Treatment | AF | 0 | 51.54 | 51.54 | $652 | $33,607 | 0.890 | **$29,910** |
| **2015** | Avoided SWP Water Imports | AF | 0 | 379.53 | 379.53 | $887 | $336,630 | 0.840 | **$282,641** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.840 | **$12,184** |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.840 | **$45,147** |
| **2016** | Avoided SWP Water Imports | AF | 0 | 379.53 | 379.53 | $918 | $348,412 | 0.792 | **$275,975** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.792 | **$11,495** |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.792 | **$42,592** |
| **2017** | Avoided SWP Water Imports | AF | 0 | 379.53 | 379.53 | $950 | $360,607 | 0.747 | **$269,466** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.747 | **$10,844** |

# Santa Clarita Valley Water Use Efficiency Strategic Plan Program (CLWA-3)

**TABLE 8-3: ANNUAL BENEFIT**

| (All benefits in 2012 dollars)<br>Project: Santa Clarita Valley Water Use Efficiency Strategic Plan Program (CLWA-3) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value (1) | Annual $ Value (1) (f) x (g) | Discount Factor (1) | Discounted Benefits (1) (h) x (i) |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.747 | **$40,181** |
| **2018** | Avoided SWP Water Imports | AF | 0 | 379.53 | 379.53 | $983 | $373,228 | 0.705 | **$263,111** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.705 | **$10,230** |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.705 | **$37,907** |
| **2019** | Avoided SWP Water Imports | AF | 0 | 379.53 | 379.53 | $1,018 | $386,291 | 0.665 | **$256,906** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.665 | **$9,651** |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.665 | **$35,761** |
| **2020** | Avoided SWP Water Imports | AF | 0 | 379.53 | 379.53 | $1,053 | $399,811 | 0.627 | **$250,846** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.627 | **$9,105** |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.627 | **$33,737** |
| **2021** | Avoided SWP Water Imports | AF | 0 | 379.53 | 379.53 | $1,069 | $405,808 | 0.592 | **$240,197** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.592 | **$8,589** |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.592 | **$31,827** |
| **2022** | Avoided SWP Water Imports | AF | 0 | 379.53 | 379.53 | $1,085 | $411,895 | 0.558 | **$230,000** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.558 | **$ 8,103** |

## Santa Clarita Valley Water Use Efficiency Strategic Plan Program (CLWA-3)

### TABLE 8-3: ANNUAL BENEFIT

(All benefits in 2012 dollars)
Project: Santa Clarita Valley Water Use Efficiency Strategic Plan Program (CLWA-3)

| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
|---|---|---|---|---|---|---|---|---|---|
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value (1) | Annual $ Value (1) (f) x (g) | Discount Factor (1) | Discounted Benefits (1) (h) x (i) |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.558 | **$30,026** |
| **2023** | Avoided SWP Water Imports | AF | 0 | 342.39 | 342.39 | $1,102 | $377,171 | 0.527 | **$198,689** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.527 | **$7,645** |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.527 | **$28,326** |
| **2024** | Avoided SWP Water Imports | AF | 0 | 193.87 | 193.87 | $1,118 | $216,761 | 0.497 | **$107,724** |
| | HECW Energy Savings | kWH | 0 | 96,744.24 | 96,744.24 | $0.15 | $14,512 | 0.497 | **$7,212** |
| | Avoided Wastewater Treatment | AF | 0 | 82.47 | 82.47 | $652 | $53,771 | 0.497 | **$26,723** |
| **2025** | Avoided SWP Water Imports | AF | 0 | 72.16 | 72.16 | $1,135 | $81,894 | 0.469 | **$38,395** |
| | HECW Energy Savings | kWH | 0 | 84,651.21 | 84,651.21 | $0.15 | $12,698 | 0.469 | **$5,953** |
| | Avoided Wastewater Treatment | AF | 0 | 72.16 | 72.16 | $652 | $47,050 | 0.469 | **$22,059** |
| **2026** | Avoided SWP Water Imports | AF | 0 | 30.93 | 30.93 | $1,152 | $35,624 | 0.442 | **$15,757** |
| **Last Year of Project Life** | HECW Energy Savings | kWH | 0 | 36,279.09 | 36,279.09 | $0.15 | $5,442 | 0.442 | **$2,407** |
| | Avoided Wastewater Treatment | AF | 0 | 30.93 | 30.93 | $652 | $20,164 | 0.442 | **$8,919** |
| | | | | **Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)** | | | | | **$3,180,339** |

# Santa Clarita Valley Water Use Efficiency Strategic Plan Program (CLWA-3)

## Project Economic Costs

Initial costs for the project total $2,499,620, including direct administration costs of $124,620 of the total project budget, and comprise administration and reporting. The budget also includes implementation of the water conservation programs, at $2,175,000. This expense includes the costs of WBIC, landscape modification, and HECW rebates, as well as costs for the educational components of each program. The remainder of the total budget comprises contingency implementation costs, which account for extra inspections or unforeseen expenses regarding the rebates. There are no expected operational or maintenance costs expected after the two-year implementation, which begins on October 1, 2013 and ends on September 30, 2015, and all costs are expected to be distributed evenly over this time period. Table 8-4 summarizes the economic costs of the project.

**TABLE 8-4: ANNUAL COSTS OF PROJECT**

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Santa Clarita Valley Water Use Efficiency Strategic Plan Program (CLWA-3) | | | | | | | | | | |
| | Initial Costs Grand Total Cost from Table 4-2 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| **2013** | $312,453 | | | | | | | $312,453 | 0.943 | **$294,767** |
| **2014** | $1,249,810 | | | | | | | $1,249,810 | 0.890 | **$1,112,326** |
| **2015** | $937,358 | | | | | | | $937,358 | 0.840 | **$787,023** |
| **2016** | | | | | | | | | | |
| **2017** | | | | | | | | | | |
| **…..** | | | | | | | | | | |
| **Last Year of Project Life - 2026** | | | | | | | | | … | |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | **$2,194,116** |
| **Comments:** | | | | | | | | | | |

Notes:
(1) If any, based on opportunity costs, sunk costs and associated costs.
(2) The incremental change in O&M costs attributable to the project.

## Project Benefits and Cost Summary

Benefits from all five programs will accrue to beneficiaries beginning with project implementation on October 1, 2013. Avoided SWP water costs, as well as avoided residential electricity expenditures and avoided wastewater treatment costs stemming from HECW replacement, will produce at least some benefits over the 14-year lifespan of benefits, from 2013 to 2016. The present value of all benefits, in 2012 dollars, is $3,180,339. The present value of the total project cost, to be incurred between October 1, 2013 and September 30, 2015, is $2,194,116. The project is expected to yield a positive present value net benefit of $986,223.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, the main uncertainties are associated with avoided costs due to SWP imports and avoided clothes washer energy usage. These issues are listed in Table 8-5.

**TABLE 8-5: OMISSIONS, BIASES, AND UNCERTAINTIES, AND THEIR EFFECT ON THE PROJECT**

| Benefit or Cost Category | Likely Impact on Net Benefits* | Comment |
|---|---|---|
| Avoided SWP Imports | + | Water savings estimates for each program are based on conservative benefit lifetime and baseline usage figures. Actual water savings, and costs associated with importing SWP water, will likely be higher. |
| Avoided Clothes Washer Energy Costs | U | Estimates of energy savings due to HECW replacement are based on several factors that vary between households. Water consumption and energy savings due to HECWs is based off of a similar 2012 program, so the variation is likely to be small. |

*Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

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# Santa Clarita Water Division (SCWD) WUE Programs (SCWD-2)

## Summary

The Santa Clarita Water Division (SCWD) Water Use Efficiency (WUE) Strategic Plan (SP) identifies 10 programs to achieve WUE goals for the SCWD's service area within Santa Clarita Valley (SCV). The SCWD-2 plan focuses on the following three water conservation programs, two of which have been implemented previously:

- High-Efficiency Irrigation Nozzle Distribution

  This program will expand the existing FreeSprinklernozzles.com distribution website to offer a greater variety of high-efficiency irrigation nozzles to residential, commercial, industrial, and institutional customers.

- Residential and Commercial Rebate Program

  SCWD will expand an existing program, which incentivizes high-efficiency toilets and weather-based irrigation controllers, to include rebates for high-efficiency clothes washers (HECWs). Two other sub-programs incentivizing ultra-low flow and zero-water urinals have not been implemented previously, nor are they part of this expansion, due to staffing and monetary restrictions.

- Large Landscape Water Budgets

  This is a new program that targets large landscaping sites with dedicated irrigation meters. The SCWD will educate customers and encourage water-saving practices specific to their landscaping sites.

A summary of all benefits and costs of the project are provided in Table 8-1. Monetized benefits and non-monetized benefits are presented in this attachment, while physically quantified (but not monetized) benefits are described in Attachment 7.

**TABLE 8-1: BENEFIT-COST ANALYSIS OVERVIEW**

| | Present Value |
|---|---|
| **Costs** – Total Capital and O&M | **$281,081** |
| **Monetizable Benefits** | |
| Avoided Imported Water Supply Costs | $735,244 |
| Avoided Clothes Washer Energy Costs | $30,197 |
| Avoided Wastewater Treatment Costs | $111,894 |
| Total Monetizable Benefits | **$877,335** |
| **Physically Quantified Benefit or Cost (Not Monetized)** | **Project Life Total** |
| Avoided Carbon Emissions from Imported Water | 541.8 MT |
| Avoided Import of Chlorides | 103.2 MT |
| Avoided Clothes Washer Carbon Emissions | 108.4 MT |
| **Qualitative Benefit or Cost** | **Qualitative Indicator*** |
| Increased Education Benefits | + |
| Improved Ability to Meet State Water Conservation Mandate | + |
| Increased Public Safety | + |
| Reduced Water Quality Impacts from Urban Irrigation Runoff | + |
| Avoided Disinfection By-Product Precursors | + |

**TABLE 8-1: BENEFIT-COST ANALYSIS OVERVIEW**

| | Present Value |
|---|---|
| Reduced Net Diversions from the Delta | + |
| Improved Water Supply Reliability | + |
| Avoided Street Maintenance | + |
| Improved Operational Efficiency for CLWA | + |

* Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease net benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

CLWA = Castaic Lake Water Agency.
MT = metric tons.
O&M = operations and maintenance.
SWP = State Water Project.

## Non-monetized Benefits Analysis (Section D2)

Table 8-2 shows the non-monetized benefits checklist for the project. Narrative descriptions of the benefit categories marked "Yes" in the following table are provided in the narrative description of qualitative benefits section after the table.

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| | **Community/Social Benefits** | |
| | **Will the proposal** | |
| **1** | **Provide education or technology benefits?** | Yes |
| | Examples are not limited to, but may include:<br>- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?<br>- Develop, test or document a new technology for water supply, water quality, or flood damage reduction management?<br>- Provide some other education or technological benefit? | |
| **2** | **Provide social recreation or access benefits?** | No |
| | Examples are not limited to, but may include:<br>- Provide new or improved outdoor recreation opportunities?<br>- Provide more access to open space?<br>- Provide some other recreation or public access benefit? | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| **3** | **Help avoid, reduce or resolve various public water resources conflicts?** | Yes |
| | Examples are not limited to, but may include:<br>- Provide more opportunities for public involvement in water management?<br>- Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?<br>- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)? | |
| **4** | **Promote social health and safety?** | Yes |
| | Examples are not limited to, but may include:<br>- Increase urban water supply reliability for fire-fighting and critical services following seismic events?<br>- Reduce risk to life from dam failure or flooding?<br>- Reduce exposure to water-related hazards? | |
| **5** | **Have other social benefits?** | No |
| | Examples are not limited to, but may include:<br>- Redress or increase inequitable distribution of environmental burdens?<br>- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups? | |
| | **Environmental Stewardship Benefits:**<br>**Will the proposal** | |
| **6** | **Benefit wildlife or habitat in ways that were not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Cause an increase in the amount or quality of terrestrial, aquatic, riparian, or wetland habitat?<br>- Contribute to an existing biological opinion or recovery plan for a listed special status species?<br>- Preserve or restore designated critical habitat of a listed species?<br>- Enhance wildlife protection or habitat? | |
| **7** | **Improve water quality in ways that were not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Cause an improvement in water quality in an impaired water body or sensitive habitat?<br>- Prevent water quality degradation?<br>- Cause some other improvement in water quality? | |
| **8** | **Reduce net emissions in ways that were not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Reduce net production of greenhouse gases?<br>- Reduce net emissions of other harmful chemicals into the air or water? | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| **9** | **Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?** | No |
| | **Sustainability Benefits:**<br>**Will the proposal** | |
| **10** | **Improve the overall, long-term management of California groundwater resources?** | No |
| | Examples are not limited to, but may include:<br>- Reduce extraction of non-renewable groundwater?<br>- Promote aquifer storage or recharge? | |
| **11** | **Reduce demand for net diversions for the regions from the Delta?** | Yes |
| **12** | **Provide a long-term solution in place of a short-term one?** | No |
| **13** | **Promote energy savings or replace fossil fuel-based energy sources with renewable energy and resources?** | No[1] |
| | Examples are not limited to, but may include:<br>- Reduce net energy use on a permanent basis?<br>- Increase renewable energy production?<br>- Include new buildings or modify buildings to include certified LEED features?<br>- Provide a net increase in recycling or reuse of materials?<br>- Replace unsustainable practices with recognized sustainable practices? | |
| **14** | **Improve water supply reliability in ways not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Provide a more flexible mix of water sources?<br>- Reduce likelihood of catastrophic supply outages?<br>- Reduce supply uncertainty?<br>- Reduce supply variability? | |
| **15** | **Other (if the above listed categories do not apply, provide non-monetized benefit description)?** | Yes |

[1] This benefit category is marked as no because it was already described as a physically quantified benefit in Attachment 7.

## Narrative Description of Qualitative Benefits

Descriptions of the non-monetized benefits marked "Yes" from the checklist in Table 8-2 are described below.

### Provides Education or Technology Benefits

Through the Large Landscape Budget program, customers with large, dedicated irrigation sites are taught about more efficient water use practices and devices that they can use on their property. For this project, water savings from large landscape budgets are calculated over a 10-year lifetime, but knowledge of the benefits of efficient water use methods can last much longer. Customers who augment their practices to

achieve water savings can employ the same practices elsewhere, and the education provided through this program can encourage people to participate in other water conservation programs.

## Helps Avoid, Reduce, or Resolve Public Water Resources Conflicts

Water conservation measures implemented under this project allow SCWD to comply with state water conservation mandates. The Water Conservation Act of 2009, or Senate Bill X7-7 (SBX7-7), outlines statewide water conservation targets for both urban and agricultural water customers. Water savings achieved through the SCWD WUE programs will help SCV to meet the state targets outlined in SBX7-7: a 10% reduction in potable water demand by the end of 2015, and a 20% reduction in potable water consumption by 2020.

## Promotes Social Health or Safety

The High-Efficiency Irrigation Nozzle Distribution Program provides additional safety benefits for the public in the SCWD service area. high-efficiency nozzles decrease urban irrigation runoff onto public bike paths and walkways, therefore reducing icing hazards in sub-freezing temperatures.

## Improves Water Quality in Ways That Were Not Quantified in Attachment 7

### Reduced Water Quality Impacts of Urban Irrigation Runoff

Water quality benefits derived from reduced import of chlorides into the SCV are quantified and described in Attachment 7. The SCWD-2 programs provide additional water quality benefits through reduced urban irrigation runoff. Pollutants such as bacteria and man-made chemicals are carried into existing bodies of water through runoff caused by over-irrigation. SCV is a densely populated area and likely has a high rate of fertilizer and pesticide application for residential and commercial landscaping purposes. Over-irrigation causes these contaminants to flow from urban settings and eventually infiltrate the Santa Clara River.

### Avoided Disinfection By-Product Precursors

The reduction in SWP imports as a result of these WUE initiatives will also reduce levels of bromide and total organic carbon (TOC), two substances that combine with treatment chemicals to form harmful disinfection by-products such as trihalomethanes. While secondary standards for bromide and TOC in drinking water have not been set, importing water with high levels of both makes it more difficult for CLWA to treat water to meet federal standards for disinfection byproducts. Increased levels of disinfection byproducts require additional operational costs in order to control concentrations of byproducts in treated water.

## Reduces Demand for Net Diversions from the Delta

By reducing the use of imported SWP water, the CLWA-3 will augment in-stream flows in the Bay-Delta or will offset other diversions that may otherwise reduce flows. Reduced demands on Delta supplies will also help to reduce the overall salinity of the Delta and improve Delta habitat.

Maintaining the Delta’s environmental condition is vital to maintaining and improving the viability of the region. The Delta provides drinking water to 25 million people, supports thousands of industries and irrigation of 750,000 acres of agriculture, and serves as home to hundreds of plant, animal, and fish species – some of which are listed as threatened or endangered. The Delta’s 1,600 square miles of marshes, islands, and sloughs support at least half of migratory water birds on the Pacific Flyway; 80% of California’s commercial fisheries; and recreational uses including boating, fishing, and windsurfing.

Delta resources are in a state of crisis. Fish populations, including salmon and Delta-smelt, have declined dramatically in recent years. The levee system is aging, and vulnerability of the Delta to flooding, sea level

rise, or a major earthquake has contributed to concerns about possible levee collapse. In addition, water quality problems continue, and there is little consensus on how to manage water resources through storage.

## Improves Water Supply Reliability in Ways Not Quantified in Attachment 7

The reliability of a water supply refers to its ability to meet water demands on a consistent basis, even in times of drought or other constraints on source water availability. This project will help address reliability issues for SCWD by offsetting the use of imported water delivered from the SWP. As noted above, the reliability of imported water is subject to a number of natural and human forces, ranging from increased population growth (and the accompanying increased demands), to drought and earthquakes, to environmental regulations and water rights determinations.

Although interest in water supply reliability is increasing (e.g., due to increasing water demands and concerns about climate-related events), only a few studies have directly attempted to quantify its value (i.e., through nonmarket valuation studies). The results of these studies indicate that residential and industrial (i.e., urban) customers seem to value supply reliability quite highly. Stated preference studies find that water customers are willing to pay approximately $100 to $535 per household per year in 2012 dollars for total reliability (i.e., a 0% probability of their water supply being interrupted in times of drought).

The challenge in applying these values to determine a value of increased reliability as a result of the SCWD-2 project is in recognizing how to reasonably interpret these survey-based household monetary values. The values noted above reflect a willingness to pay per household to ensure complete reliability (zero drought-related use restrictions in the future), whereas the SCWD-2 project only enhances overall reliability and does not guarantee 100% reliability. Thus if applied directly to the number of households within the SCWD service area, the dollar values from the studies would overstate the reliability value provided by the project.

A simple way to roughly adjust for this “whole versus part” problem is to attribute a portion of the total value of reliability to the portion of the problem that is solved by the project. To adjust for the partial improvement in reliability from the SCWD-2 project, it is assumed that household willingness to pay for improved reliability is directly proportional to the amount of conserved water that will offset imported water, as a percentage of the total potable water supply. This represents the percentage of total supply that has been improved in terms of overall reliability (i.e., by offsetting imported water demand with local sources).

For example, the project will offset approximately 1,064 AF of imported water over a total of 14 years, averaging 76 AFY. In 2020, total water demand within SCWD’s service area is projected to be about 27,757 AFY (without the project) (Kennedy/Jenks Consultants et al., 2011). Thus about 0.27% of yearly potable demand will be reduced by conservation incentives available as a result of the project (76 AF divided by 27,757 AF). To obtain a lower-bound estimate for the value of improved reliability associated with this water, it is assumed that households within the SCWD’s service area are willing to pay about $0.27 per year ($100 multiplied by 0.27%). Applying this dollar value per household to the approximately 40,444 households within the SCWD service area would result in $10,920 of benefits in 2020. Taking into account increasing population and changing demands, this calculation could be completed for each year of the project’s useful life.

Due to the uncertainty involved in applying these numbers to this situation, this benefit estimate is not included in the tables. However, it is provided here to give an idea of the potential magnitude of this benefit.

## Other: Avoided Street Maintenance

Over-irrigation caused by inefficient urban systems has impacts on roadways. Reducing over-irrigation will prevent water from carrying trash into streets, as well as damaging roads by infiltrating cracks and undermining the integrity of the pavement.

### Other: Improved Operational Efficiency for CLWA

Full implementation of the project will offset the use of 613 AFY of imported SWP water. This will help wholesale imported water provider CLWA directly in their supply operations, allowing for longer shutdowns and improving system reliability. The value of this increased operational flexibility is not monetized in the benefit tables.

## Monetized Benefits Analysis (Section D3)

Several monetized benefits are expected to accrue over the expected 14-year life of the project. Those include avoided imported water costs, avoided energy costs for clothes washers, and avoided wastewater treatment costs.

### Avoided Imported Water Supply Costs

Water savings through more efficient irrigation controllers, practices, and HECWs is expected to be approximately 1,064 AF over the 14-year benefits lifetime of this project. The estimated water savings will result in an equivalent amount of avoided imported water, which currently costs $800 per acre-foot for CLWA's marginal source of SWP water (CLWA, 2013). Given the recent and projected rate of change of SWP supplies, this cost is expected to increase in real terms over the benefits lifetime of the project. We estimate that the cost of SWP imports will rise at a real rate (above inflation) of 3.5% annually through 2020, after which prices will likely escalate at a rate of 1.5% annually. The total present value benefit of avoided water imports is calculated to be $735,244 over the 14-year life of all project benefits.

### Avoided Clothes Washer Energy Costs

Switching from standard clothes washers to HECWs provides water savings, as well as the benefit of avoiding energy costs associated with heating the equivalent amount of saved water. Because outdoor irrigation rarely, if ever, uses heated water, this benefit applies solely to water saved through the HECW program.

Energy required to heat water for residential and commercial washing machines varies depending on the type of HECW purchased and user preferences. The Alliance for Water Efficiency estimates that switching to a HECW saves 0.0036 kilowatt hour (kWh)/gallon in electricity use (Alliance for Water Efficiency, 2011). This estimate for energy consumption per gallon is based on residential participants' energy use from previous conservation programs, which were subject to these same uncertainties, and is most likely a reasonable estimate of residential household energy use for the SCWD-2 HECW program. If any rebated machines are used for commercial purposes, energy costs would likely increase because the average retail electricity price for commercial customers is 85% that of residential customers, but each machine is likely to see much more than a 17% increase in use over residential users.

Using the average 2012 retail electricity price for California of $0.15/kWh (Energy Information Administration, 2013), we estimate that the 309.7 MWh of electricity saved by reducing water demand by 264 AF will save customers approximately $30,198.

### Avoided Wastewater Treatment Costs

Water savings achieved through HECWs have secondary benefits of preventing the equivalent amount of water from having to be treated by the Santa Clara Valley Sanitation District (SCVSD). The HECW program is projected to save approximately 264 AF of water over the project benefits lifetime. Using the SCVSD's average cost to treat wastewater of 652 per acre-foot, we estimate that HECW rebates will prevent approximately $111,894 in sanitation expenses over the 14-year lifetime of the project benefits, in 2012 dollars (CLWA, 2013).

Table 8-3 summarizes the annual benefits from the project.

## Santa Clarita Water Division (SCWD) WUE Programs (SCWD-2)

### TABLE 8-3: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)

| (All benefits should be in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: Santa Clarita Water Division Water Use Efficiency Programs (SCWD-2) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value (1) | Annual $ Value (1) (f) x (g) | Discount Factor (1) | Discounted Benefits (1) (h) x (i) |
| **2012** | Avoided SWP Imports | | | | | $800 | | | |
| **2013** | Avoided SWP Imports | AF | 0 | 16.25 | 16.25 | $828 | $13,455 | 0.943 | **$12,693** |
| | HECW Energy Savings | MWh | 0 | 3.23 | 3.23 | $150 | $484 | 0.943 | **$456** |
| | Avoided Wastewater Treatment | AF | 0 | 2.75 | 2.75 | $652 | $1,793 | 0.943 | **$1,692** |
| **2014** | Avoided SWP Imports | AF | 0 | 87.75 | 87.75 | $857 | $75,200 | 0.890 | **$66,928** |
| | HECW Energy Savings | MWh | 0 | 16.13 | 16.13 | $150 | $2,419 | 0.890 | **$2,153** |
| | Avoided Wastewater Treatment | AF | 0 | 13.75 | 13.75 | $652 | $8,965 | 0.890 | **$7,979** |
| **2015** | Avoided SWP Imports | AF | 0 | 156 | 156.00 | $887 | $138,368 | 0.840 | **$116,176** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.840 | **$3,250** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.840 | **$12,043** |
| **2016** | Avoided SWP Imports | AF | 0 | 156 | 156.00 | $918 | $143,211 | 0.792 | **$113,436** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.792 | **$3,066** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.792 | **$11,362** |

## Santa Clarita Water Division (SCWD) WUE Programs (SCWD-2)

### TABLE 8-3: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)

| (All benefits should be in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: Santa Clarita Water Division Water Use Efficiency Programs (SCWD-2) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
| 2017 | Avoided SWP Imports | AF | 0 | 156 | 156.00 | $950 | $148,223 | 0.747 | **$110,761** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.747 | **$2,893** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.747 | **$10,719** |
| 2018 | Avoided SWP Imports | AF | 0 | 142.5 | 142.50 | $983 | $140,135 | 0.705 | **$98,790** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.705 | **$2,729** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.705 | **$10,112** |
| 2019 | Avoided SWP Imports | AF | 0 | 88.5 | 88.50 | $1,018 | $90,077 | 0.665 | **$59,907** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.665 | **$2,575** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.665 | **$9,540** |
| 2020 | Avoided SWP Imports | AF | 0 | 48 | 48.00 | $1,053 | $50,565 | 0.627 | **$31,725** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.627 | **$2,429** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.627 | **$9,000** |

## Santa Clarita Water Division (SCWD) WUE Programs (SCWD-2)

### TABLE 8-3: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)

| (All benefits should be in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: Santa Clarita Water Division Water Use Efficiency Programs (SCWD-2) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
| 2021 | Avoided SWP Imports | AF | 0 | 48 | 48.00 | $1,069 | $51,324 | 0.592 | **$30,379** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.592 | **$2,291** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.592 | **$8,490** |
| 2022 | Avoided SWP Imports | AF | 0 | 48 | 48.00 | $1,085 | $52,094 | 0.558 | **$29,089** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.558 | **$2,162** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.558 | **$8,010** |
| 2023 | Avoided SWP Imports | AF | 0 | 48 | 48.00 | $1,102 | $52,875 | 0.527 | **$27,854** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.527 | **$2,039** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.527 | **$7,556** |
| 2024 | Avoided SWP Imports | AF | 0 | 41.5 | 41.50 | $1,118 | $46,401 | 0.497 | **$23,060** |
| | HECW Energy Savings | MWh | 0 | 25.81 | 25.81 | $150 | $3,871 | 0.497 | **$1,924** |
| | Avoided Wastewater Treatment | AF | 0 | 22.00 | 22.00 | $652 | $14,344 | 0.497 | **$7,129** |

## Santa Clarita Water Division (SCWD) WUE Programs (SCWD-2)

**TABLE 8-3: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| (All benefits should be in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: Santa Clarita Water Division Water Use Efficiency Programs (SCWD-2) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
| 2025 | Avoided SWP Imports | AF | 0 | 19.25 | 19.25 | $1,135 | $21,846 | 0.469 | **$10,242** |
| | HECW Energy Savings | MWh | 0 | 22.58 | 22.58 | $150 | $3,387 | 0.469 | **$1,588** |
| | Avoided Wastewater Treatment | AF | 0 | 19.25 | 19.25 | $652 | $12,551 | 0.469 | **$5,884** |
| 2026 | Avoided SWP Imports | AF | 0 | 8.25 | 8.25 | $1,152 | $9,503 | 0.442 | **$4,203** |
| Last Year of Project Life | HECW Energy Savings | MWh | 0 | 9.68 | 9.68 | $150 | $1,452 | 0.442 | **$642** |
| | Avoided Wastewater Treatment | AF | 0 | 8.25 | 8.25 | $652 | $5,379 | 0.442 | **$2,379** |
| | | | | | **Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)** | | | | **$877,335** |

## Project Economic Costs

Total project costs amount to $295,500 for full implementation of this project. Costs for the HECW Program are distributed evenly over the two-year project implementation period, which runs from October 1, 2013 to September 30, 2015. This includes both distribution and processing costs for 1,000 rebates. Costs to distribute high-efficiency nozzles are distributed evenly over the two-year project life, but an additional $30,000 is required in the first quarter of the first year for website development. Large landscape budgets will be developed only in the second year of the project, but program costs are distributed evenly over that year. Administration and reporting costs total $15,000. Maintenance costs are shown for the Large Landscape Water Budget program to provide a follow-up annual report written to Large Landscape Water Budget program participants to show the change in water consumption at their properties. This expense is expected to last over the first 5 years of the program, by which time participants are expected to be very familiar with the program and follow-up to be no longer needed. The present value of all project costs is $281,081. Table 8-4 summarizes the economic project costs.

## Santa Clarita Water Division (SCWD) WUE Programs (SCWD-2)

### TABLE 8-4: ANNUAL COSTS OF PROJECT

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Santa Clarita Water Division Water Use Efficiency Programs (SCWD-2) | | | | | | | | | | |
| | Initial Costs | | Annual Costs [2] | | | | | | Discounting Calculations | |
| | Grand Total Cost from Table 4-3 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| **2013** | $60,688 | | | | | | | $60,688 | 0.94340 | **$57,252** |
| **2014** | $127,750 | | | | | | | $127,750 | 0.89000 | **$113,697** |
| **2015** | $107,063 | | | | $710 | | | $107,773 | 0.83962 | **$90,488** |
| **2016** | | | | | $5,680 | | | $5,680 | 0.79209 | **$4,499** |
| **2017** | | | | | $5,680 | | | $5,680 | 0.74726 | **$4,244** |
| **2018** | | | | | $5,680 | | | $5,680 | 0.70496 | **$4,004** |
| **2019** | | | | | $5,680 | | | $5,680 | 0.66506 | **$3,778** |
| **2020** | | | | | $4,970 | | | $4,970 | 0.62741 | **$3,118** |
| **2021** | | | | | | | | $0 | 0.59190 | **$0** |
| **2022** | | | | | | | | $0 | 0.55839 | **$0** |
| **2023** | | | | | | | | $0 | 0.52679 | **$0** |
| **2024** | | | | | | | | $0 | 0.49697 | **$0** |
| **2025** | | | | | | | | $0 | 0.46884 | **$0** |
| **2026** | | | | | | | | $0 | 0.44230 | **$0** |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | | **$281,081** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |

**Comments: Maintenance costs are shown for the Large Landscape Water Budget program to provide a follow-up annual report written to Large Landscape Water Budget program participants to show the change in water consumption at their properties. This expense is expected to last over the first 5 years of the program, by which time participants are expected to be very familiar with the program and follow-up to be no longer needed.**

Notes:
(1) If any, based on opportunity costs, sunk costs and associated costs.
(2) The incremental change in O&M costs attributable to the project

## Project Benefits and Cost Summary

The present value of avoided SWP imports, HECW energy savings, and avoided wastewater treatment is $877,335. The present value of total project costs is approximately $281,081, yielding a net project benefit of $596,254. The SCWD-2 project will also provide 1,548.1 MWh of electricity savings, 541.8 MT of reduced carbon emissions, and a 103.2 MT reduction in imported chlorides, all due to foregone water imports over the 14-year span of benefits. HECWs will additionally prevent 108.4 MT of carbon emissions over the same span.

This project will provide additional benefits that have not yet been quantified. Large landscape budget development will promote water conservation education, and all programs will help to achieve statewide potable water demand reduction goals. Efficient irrigation will provide public safety in the form of less icing of public walkways and roads. These WUE measures will reduce urban irrigation runoff, thus helping to prevent pollutants from contaminating local water bodies, and reduce overall demand for diversions from scarce water sources.

Energy savings achieved through the residential and commercial HECW program and by avoiding imported water will reduce carbon dioxide emissions. Finally, water savings achieved through all programs will result in a more stable water supply by preventing reliance on imported water, and will allow for greater operational flexibility of water management facilities.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, the main uncertainties are associated with imported water and avoided energy costs. These issues are listed in Table 8-5.

**TABLE 8-5: OMISSIONS, BIASES, AND UNCERTAINTIES, AND THEIR EFFECT ON THE PROJECT**

| Benefit or Cost Category | Likely Impact on Net Benefits* | Comment |
|---|---|---|
| Avoided Imported Water Supply Costs | + | Water savings estimates for each program are based on conservative benefit lifetime and baseline usage figures. Actual water savings, and costs associated with importing SWP water, will likely be higher. |
| Avoided Clothes Washer Energy Costs | U | Estimates of energy savings due to HECW replacement are based on several factors that vary among households. Water consumption and energy savings due to HECWs is based off of a similar 2012 program, so the variation is likely to be small. |

*Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

## References

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

CLWA. 2013. Email from Jeff Ford, Castaic Lake Water Agency, containing costs of imported water and wastewater treatment, sent to Stratus Consulting Inc., Boulder, CO.

Energy Information Administration. 2013. Electric Power Monthly with Data for November 2012. U.S. Department of Energy. January.

Kennedy/Jenks Consultants, Luhdorff and Scalmanin Consultant Engineers, and Stacy Miller Public Affairs. 2011. 2010 Urban Water Management Plan, Final. Prepared for Castaic Lake Water Agency, Valencia Water Company, Los Angeles County Waterworks Division #36, Newhall County Water District, Santa Clarita Water Division. Prepared by Kennedy/Jenks Consultants, Nancy Clemm P.E., Luhdorff and Scalmanin Consulting Engineers, and Stacy Miller Public Affairs. June.

# Foothill Feeder Connection (CLWA-8)

## Summary

The purpose of this project is to increase the amount of imported water that the Castaic Lake Water Agency (CLWA) can process through its recently expanded Rio Vista Water Treatment Plant (RVWTP). Before it is used by CLWA, the imported water moves through Castaic Lake to the Metropolitan Water District of Southern California's Foothill Feeder Pipeline. Water taken by CLWA from the Foothill Feeder is sent to CLWA's 102-inch raw water pipeline that feeds CLWA's Rio Vista Water Treatment Plant (RVWTP). The connection was intended to be a temporary structure. Construction of this permanent Foothill Feeder connection will include installation of approximately 200 feet, 48-inch diameter pipeline; a 140 cubic feet per second (cfs)/90 million gallons per day (MGD) turnout structure, valve vault, and meter vault; and installation of electrical and supervisory control and data acquisition (SCADA) equipment.

The current water connection that conveys water from the Foothill Feeder to the RVWTP can only supply 60 MGD, even though, after a recent expansion, the RVWTP is capable of treating 66 MGD (Kennedy/Jenks Consultants, 2012). Moreover, the 60 MGD connection, built in 1996, was meant to be temporary. This project will create a new, permanent connection to the RVWTP so that the plant can obtain its capacity of 66 MGD, an increase of six MGD, or 6,720 AFY, over its current capacity.[1] The new connection will have a maximum capacity of 90 MGD, so that it can accommodate planned expansions of the RVWTP. The new connection will have a design life of 50 years.

A summary of all benefits and costs of the project are provided in Table 8-1. Monetized benefits and non-monetized benefits are presented in this attachment, while physically quantified benefits are described in Attachment 7.

**TABLE 8-1: BENEFIT-COST ANALYSIS OVERVIEW**

| | Present Value |
|---|---|
| **Costs** – Total Capital and O&M | **$41,273,114** |
| **Monetizable Benefits** | |
| Avoided Future Marginal Recycled Water Expansion Costs | $43,371,149 |
| Avoided Future Marginal Water Conservation Program Costs | $11,675,955 |
| Total Monetizable Benefits | **$55,047,104** |
| **Qualitative Benefit or Cost** | **Qualitative Indicator*** |
| Increased Water Education Programming | + |
| Increased Safety Due to Improved Seismic Stability | + |
| Increased Water Supply System Reliability | + |
| Increased Greenhouse Gas Emissions | – |
| Increased Operational Flexibility and Treatment Reliability for CLWA | + + |

* Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease net benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

CLWA = Castaic Lake Water Agency
O&M = operations and maintenance

[1] One MGD is approximately 1,120 acre-feet per year.

## Non-monetized Benefits Analysis (Section D2)

Table 8-2 shows the non-monetized benefits checklist for the project. Narrative descriptions of the benefit categories marked "Yes" in the following the table are provided in the narrative description of qualitative benefits section after the table.

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| | **Community/Social Benefits** | |
| | **Will the proposal** | |
| 1 | **Provide education or technology benefits?** | Yes |
| | Examples are not limited to, but may include:<br>- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?<br>- Develop, test or document a new technology for water supply, water quality, or flood damage reduction management?<br>- Provide some other education or technological benefit? | |
| 2 | **Provide social recreation or access benefits?** | No |
| | Examples are not limited to, but may include:<br>- Provide new or improved outdoor recreation opportunities?<br>- Provide more access to open space?<br>- Provide some other recreation or public access benefit? | |
| 3 | **Help avoid, reduce or resolve various public water resources conflicts?** | No |
| | Examples are not limited to, but may include:<br>- Provide more opportunities for public involvement in water management?<br>- Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?<br>- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)? | |
| 4 | **Promote social health and safety?** | Yes |
| | Examples are not limited to, but may include:<br>- Increase urban water supply reliability for fire-fighting and critical services following seismic events?<br>- Reduce risk to life from dam failure or flooding?<br>- Reduce exposure to water-related hazards? | |
| 5 | **Have other social benefits?** | No |
| | Examples are not limited to, but may include:<br>- Redress or increase inequitable distribution of environmental burdens?<br>- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups? | |
| | **Environmental Stewardship Benefits:** | |
| | **Will the proposal** | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| **6** | **Benefit wildlife or habitat in ways that were not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Cause an increase in the amount or quality of terrestrial, aquatic, riparian, or wetland habitat?<br>- Contribute to an existing biological opinion or recovery plan for a listed special status species?<br>- Preserve or restore designated critical habitat of a listed species?<br>- Enhance wildlife protection or habitat? | |
| **7** | **Improve water quality in ways that were not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Cause an improvement in water quality in an impaired water body or sensitive habitat?<br>- Prevent water quality degradation?<br>- Cause some other improvement in water quality? | |
| **8** | **Reduce net emissions in ways that were not quantified in Attachment 7?** | Neg |
| | Examples are not limited to, but may include:<br>- Reduce net production of greenhouse gases?<br>- Reduce net emissions of other harmful chemicals into the air or water? | |
| **9** | **Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?** | No |
| | **Sustainability Benefits:** | |
| | **Will the proposal** | |
| **10** | **Improve the overall, long-term management of California groundwater resources?** | No |
| | Examples are not limited to, but may include:<br>- Reduce extraction of non-renewable groundwater?<br>- Promote aquifer storage or recharge? | |
| **11** | **Reduce demand for net diversions for the regions from the Delta?** | No |
| **12** | **Provide a long-term solution in place of a short-term one?** | No |
| **13** | **Promote energy savings or replace fossil fuel-based energy sources with renewable energy and resources?** | No |
| | Examples are not limited to, but may include:<br>- Reduce net energy use on a permanent basis?<br>- Increase renewable energy production?<br>- Include new buildings or modify buildings to include certified LEED features?<br>- Provide a net increase in recycling or reuse of materials?<br>- Replace unsustainable practices with recognized sustainable practices? | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| **14** | **Improve water supply reliability in ways not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Provide a more flexible mix of water sources?<br>- Reduce likelihood of catastrophic supply outages?<br>- Reduce supply uncertainty?<br>- Reduce supply variability? | |
| **15** | **Other: Increased Operational Flexibility and Treatment Reliability for CLWA?** | Yes |

[1] This benefit category is marked as no because it was already described as a physically quantified benefit in Attachment 7.

## Narrative Description of Qualitative Benefits

Descriptions of the non-monetized benefits marked "Yes" from the checklist in Table 8-2 are described below.

### Provide Education or Technology benefits

The project will provide education benefits to local school children. CLWA has an ongoing water education program with Bridgeport Elementary School, which is a short walk from where the new connection will be built. The water education program focuses on the science and practice of water resources, water treatment, and water conservation. The CLWA Board of Directors places a high priority on instilling conservation in young children as a means of reducing the amount of water required to meet future community demand. The proximity of the project to this school presents a unique opportunity for the teachers and the project manager to take students and teachers to the project site where they can observe firsthand how water is conveyed and how infrastructure projects are carried out.

### Promote Social Health and Safety

The new connection will provide improved seismic stability, thereby better protecting human lives, infrastructure, and property (Flow Science Incorporated, 2009). Seismic stability will be improved in five ways:

1. The new connection will be a single riser pipe rather than three separate risers. This will provide better stability and protection against pipe rupture should a seismic event occur.
2. Moreover, in the event of a pipe rupture, the new turnout can be isolated from the Foothill Feeder by a motor operated conical plug valve that can be closed by Metropolitan Water District's Supervisory Control and Data Acquisition system, rather than the currently used manually operated butterfly valve. This will reduce the consequences of flooding.
3. The new meter will be a magnetic flow meter, which will provide more stable and accurate flow measurements than the existing Venturi Meter.
4. Both the plug valve and the meter will be installed inside separate vaults designed to current seismic codes, replacing the existing meter within a vault designed to previous seismic codes.

5. Two manually operated butterfly valves will be installed downstream of the meter instead of the current setup of just one butterfly valve. This will provide better protection from potential flooding caused by a ruptured pipe.

## Improve Water Quality in Ways That Were Not Quantified in Attachment 7

The project will help improve water quality. CLWA operates a perchlorate treatment facility that processes 3.5 MGD of groundwater. In addition to perchlorate, the groundwater contains detectable levels of the volatile organic compounds trichloroethylene (TCE) and tetrachloroethylene (PCE). The concentrations of these compounds are below the maximum contaminant level, but the perchlorate treatment does not remove them. Instead, CLWA blends the groundwater with imported water in order to reduce the TCE and PCE concentrations to non-detectable levels. Usually this goal is met, but sometimes trace levels are still detected. The additional capacity provided by the new connection would allow for more imported water to be blended with the groundwater, thereby reducing the concentrations of TCE and PCE to undetectable levels.

## Increase Net Emissions in Ways That Were Not Quantified in Attachment 7

With the project, CLWA will purchase imported water. The imported water will come from CLWA's marginal source of water, which is water purchased from the Buena Vista-Rosedale Rio-Bravo Water Districts (BV/RRB) in Kern County. 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). In contrast, without the project, CLWA will obtain half of the additional supply they need from recycled water and half by reducing their demand for water (through water conservation measures). In comparing the with- and without-project conditions in terms of energy requirements, the with-project requires more energy. Consequently, the with-project condition will result in more greenhouse gas emissions relative to the without-project condition.

## Improve Water Supply Reliability in Ways Not Quantified in Attachment 7

The project will increase the reliability of CLWA's water system. This occurs for three reasons:

1. The new connection will allow 90 MGD of water to pass through, not just the 66 MGD that the RVWTP can currently process. When planned expansions of RVWTP are made in the future, the connection will already be large enough to process up to 90 MGD of water.
2. The new connection is meant to be a permanent structure, rather than the current connection which was meant to be temporary when constructed in 1996.
3. Without the project, CLWA would need to produce recycled water and implement water conservation measures. While recycled water and demand reduction (through water conservation measures) are generally believed to increase reliability relative to obtaining more imported water, recycled water and demand reduction have limitations. In particular, recycled water is only available during the irrigation season without adding expensive storage. And there are water quality and geographic constraints on using recycled water, while further gains from water conservation become increasingly difficult to obtain over time.

   Even so, the reliability improvements from undertaking the project are at least partially diminished compared to a fully reliable source with the project because the project increases CLWA's dependence on imported water. The reliability of imported water via the State Water Project (SWP) has a projected average future reliability of 60%, as this water is subject to a number of natural and human forces, ranging from increased population growth (and accompanying increased demands), to drought and earthquakes, to environmental regulations and water rights determinations (AECOM, 2012).

## Other: Increased Operational Flexibility and Treatment Reliability for CLWA

With the new connection, the RVWTP can treat more water, providing CLWA with operational flexibility between RVWTP and the Earl Schmidt Filtration Plant;[2] CLWA's other water treatment facility. In particular, the increased capacity of the RVWTP to treat water makes it easier to perform annual maintenance at the Earl Schmidt Plant, as CLWA can completely shut-down the Earl Schmidt Plant for multiple weeks during periods of low water demand due to RVWTP's increased capacity to process water.

# Monetized Benefits Analysis (Section D3)

Two monetized benefits are expected to accrue over the expected 50 year life of the project. These include: (1) Avoided Transmission and Distribution of Recycled Water and (2) Avoided Water Conservation Measures.

## Avoided Future Marginal Recycled Water Expansion Costs

Based on CLWA's latest projections from planning discussions, the first year projected by CLWA that demand would be too great to simply pump more groundwater to cover demand during the June through September period would be 2020. Thus, of the additional 6,720 AFY that the new connection could deliver to the plant, only 2,240 AFY (6,720 AFY * 1/3 of the year) will actually be delivered with the project starting in 2020.

If this project does not occur, CLWA plans to meet half of the expanded base demand by 2020 with expanded recycled water deliveries, and half through expanded conservation. Thus, for the recycled water potion of the without-project baseline, CLWA will need to construct a pump station, reservoir, and transmission and distribution pipelines in order to process an additional 1,120 AF of recycled water per year, or half of the increase in water quantity that the RVWTP could produce if the project occurred.

A similar CLWA recycled water project that transmits and distributes 500 AFY of water had capital costs of $27,025,000 (Castaic Lake Water Agency, 2012). Scaling these capital costs to 1,120 AF of recycled water per year, the amount needed without the project, would cost $60,536,000 [(1,120 AF/500 AF)*$27,025,000]. The capital costs are for a pump station, reservoir, and transmission and distribution pipelines. Besides the capital costs, there are also operations and maintenance (O&M) costs of transmitting and distributing 1,120 AF of recycled water per year. Based on transmitting and distributing recycled water at CLWA's Valencia and Saugus Water Reclamation Plants, O&M costs are assumed to be 0.5% of the capital costs, or $302,680 per year.

However, with the project, CLWA will not need additional recycled water, and so will not need to expend the capital and operations and maintenance costs associated with the recycled water. Because of this, these costs are avoided, creating a benefit if the project is undertaken.

The present value of this benefit over the 50 year expected useful life of the project is $43,371,149.

## Avoided Future Marginal Water Conservation Program Costs

Without the project, CLWA would meet the other half of the expected demand by 2020 with expanded water conservation programs. The water conservation measures that would reduce demand by 1,120 AFY (the other half of the water quantity produced with the project) would need to be in place by 2020. Water conservation measures that CLWA could implement in its service area include new standards for plumbing fixtures, landscape irrigation, and buildings.

2 The Earl Schmidt Filtration Plant has a treatment capacity of 56 MGD.

CLWA has a water conservation program already in place. The costs of this water conservation program, which conserves 986 AFY, are $1,000,000 per year (A&N Technical Services, 2008). It is important to note that the cost per acre-foot conserved in this program is likely an underestimate of the cost per acre-foot conserved in the future as the costs for additional conservation programs not already undertaken has been shown in the water use efficiency strategic plan to increase significantly (A&N Technical Services, 2008). Even so, scaling the already in place program in order to conserve 1,120 AF would cost $1,135,903 per year [(1,120 AF/986 AF)*$1,000,000]. This cost would be avoided in the with-project condition because the RVWTP would be able to process enough water to meet the demands of CLWA's customers without implementing additional water conservation measures.

The present value of this benefit over the 50 year expected useful life of the project is $11,675,956. Table 8-3 shows the avoided costs from the project.

# Foothill Feeder Connection (CLWA-8)

**TABLE 8-3: ANNUAL COSTS OF AVOIDED PROJECTS**

| (All avoided costs should be in 2012 dollars) | | | | | | |
|---|---|---|---|---|---|---|
| Project: Foothill Feeder Connection Project | | | | | | |
| | Costs | | | | Discounting Calculations | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| | Alternative (Avoided Project Names): Future Marginal Recycled Water Expansion Costs and Future Marginal Water Conservation Program Costs | | | | | |
| Year | Avoided Capital Costs | Avoided Replacement Costs | Avoided Operations and Maintenance Costs | Total Cost Avoided for Individual Alternatives (b) + (c) + (d) | Discount Factor | Discounted Costs (e) x (f) |
| **2010** | | | | $0 | 1.00000 | **$0** |
| **2011** | | | | $0 | 1.00000 | **$0** |
| **2012** | | | | $0 | 1.00000 | **$0** |
| **2013** | | | | $0 | 0.94340 | **$0** |
| **2014** | | | | $0 | 0.89000 | **$0** |
| **2015** | | | | $0 | 0.83962 | **$0** |
| **2016** | | | | $0 | 0.79209 | **$0** |
| **2017** | | | | $0 | 0.74726 | **$0** |
| **2018** | | | | $0 | 0.70496 | **$0** |
| **2019** | $60,536,000 | | | $60,536,000 | 0.66506 | **$40,259,897** |
| **2020** | | | $1,438,583 | $1,438,583 | 0.62741 | **$902,585** |
| **2021** | | | $1,438,583 | $1,438,583 | 0.59190 | **$851,495** |
| **2022** | | | $1,438,583 | $1,438,583 | 0.55839 | **$803,297** |
| **2023** | | | $1,438,583 | $1,438,583 | 0.52679 | **$757,827** |
| **2024** | | | $1,438,583 | $1,438,583 | 0.49697 | **$714,931** |
| **2025** | | | $1,438,583 | $1,438,583 | 0.46884 | **$674,464** |

# Foothill Feeder Connection (CLWA-8)

## TABLE 8-3: ANNUAL COSTS OF AVOIDED PROJECTS

| (All avoided costs should be in 2012 dollars) | | | | | | |
|---|---|---|---|---|---|---|
| Project: Foothill Feeder Connection Project | | | | | | |
| | Costs | | | | Discounting Calculations | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| | Alternative (Avoided Project Names): Future Marginal Recycled Water Expansion Costs and Future Marginal Water Conservation Program Costs | | | | | |
| Year | Avoided Capital Costs | Avoided Replacement Costs | Avoided Operations and Maintenance Costs | Total Cost Avoided for Individual Alternatives (b) + (c) + (d) | Discount Factor | Discounted Costs (e) x (f) |
| **2026** | | | $1,438,583 | $1,438,583 | 0.44230 | **$636,286** |
| **2027** | | | $1,438,583 | $1,438,583 | 0.41727 | **$600,270** |
| **2028** | | | $1,438,583 | $1,438,583 | 0.39365 | **$566,293** |
| **2029** | | | $1,438,583 | $1,438,583 | 0.37136 | **$534,238** |
| **2030** | | | $1,438,583 | $1,438,583 | 0.35034 | **$503,998** |
| **2031** | | | $1,438,583 | $1,438,583 | 0.33051 | **$475,470** |
| **2032** | | | $1,438,583 | $1,438,583 | 0.31180 | **$448,557** |
| **2033** | | | $1,438,583 | $1,438,583 | 0.29416 | **$423,167** |
| **2034** | | | $1,438,583 | $1,438,583 | 0.27751 | **$399,214** |
| **2035** | | | $1,438,583 | $1,438,583 | 0.26180 | **$376,617** |
| **2036** | | | $1,438,583 | $1,438,583 | 0.24698 | **$355,299** |
| **2037** | | | $1,438,583 | $1,438,583 | 0.23300 | **$335,188** |
| **2038** | | | $1,438,583 | $1,438,583 | 0.21981 | **$316,215** |
| **2039** | | | $1,438,583 | $1,438,583 | 0.20737 | **$298,316** |
| **2040** | | | $1,438,583 | $1,438,583 | 0.19563 | **$281,430** |
| **2041** | | | $1,438,583 | $1,438,583 | 0.18456 | **$265,500** |
| **2042** | | | $1,438,583 | $1,438,583 | 0.17411 | **$250,472** |

# Foothill Feeder Connection (CLWA-8)

## TABLE 8-3: ANNUAL COSTS OF AVOIDED PROJECTS

| (All avoided costs should be in 2012 dollars) | | | | | | |
|---|---|---|---|---|---|---|
| Project: Foothill Feeder Connection Project | | | | | | |
| | Costs | | | | Discounting Calculations | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| | Alternative (Avoided Project Names): Future Marginal Recycled Water Expansion Costs and Future Marginal Water Conservation Program Costs | | | | | |
| Year | Avoided Capital Costs | Avoided Replacement Costs | Avoided Operations and Maintenance Costs | Total Cost Avoided for Individual Alternatives (b) + (c) + (d) | Discount Factor | Discounted Costs (e) x (f) |
| **2043** | | | $1,438,583 | $1,438,583 | 0.16425 | **$236,294** |
| **2044** | | | $1,438,583 | $1,438,583 | 0.15496 | **$222,919** |
| **2045** | | | $1,438,583 | $1,438,583 | 0.14619 | **$210,301** |
| **2046** | | | $1,438,583 | $1,438,583 | 0.13791 | **$198,397** |
| **2047** | | | $1,438,583 | $1,438,583 | 0.13011 | **$187,167** |
| **2048** | | | $1,438,583 | $1,438,583 | 0.12274 | **$176,573** |
| **2049** | | | $1,438,583 | $1,438,583 | 0.11579 | **$166,578** |
| **2050** | | | $1,438,583 | $1,438,583 | 0.10924 | **$157,149** |
| **2051** | | | $1,438,583 | $1,438,583 | 0.10306 | **$148,254** |
| **2052** | | | $1,438,583 | $1,438,583 | 0.09722 | **$139,862** |
| **2053** | | | $1,438,583 | $1,438,583 | 0.09172 | **$131,945** |
| **2054** | | | $1,438,583 | $1,438,583 | 0.08653 | **$124,477** |
| **2055** | | | $1,438,583 | $1,438,583 | 0.08163 | **$117,431** |
| **2056** | | | $1,438,583 | $1,438,583 | 0.07701 | **$110,784** |
| **2057** | | | $1,438,583 | $1,438,583 | 0.07265 | **$104,513** |
| **2058** | | | $1,438,583 | $1,438,583 | 0.06854 | **$98,597** |
| **2059** | | | $1,438,583 | $1,438,583 | 0.06466 | **$93,016** |

## Foothill Feeder Connection (CLWA-8)

### TABLE 8-3: ANNUAL COSTS OF AVOIDED PROJECTS

| (All avoided costs should be in 2012 dollars) | | | | | | |
|---|---|---|---|---|---|---|
| Project: Foothill Feeder Connection Project | | | | | | |
| | Costs | | | | Discounting Calculations | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| | Alternative (Avoided Project Names): Future Marginal Recycled Water Expansion Costs and Future Marginal Water Conservation Program Costs | | | | | |
| Year | Avoided Capital Costs | Avoided Replacement Costs | Avoided Operations and Maintenance Costs | Total Cost Avoided for Individual Alternatives (b) + (c) + (d) | Discount Factor | Discounted Costs (e) x (f) |
| **2060** | | | $1,438,583 | $1,438,583 | 0.06100 | **$87,751** |
| **2061** | | | $1,438,583 | $1,438,583 | 0.05755 | **$82,784** |
| **2062** | | | $1,438,583 | $1,438,583 | 0.05429 | **$78,098** |
| **2063** | | | $1,438,583 | $1,438,583 | 0.05122 | **$73,678** |
| **2064** | | | $1,438,583 | $1,438,583 | 0.04832 | **$69,507** |
| | | | | | **Total Present Value of Discounted Costs (Sum of Column (g))** | **$55,047,104** |
| | | | | | **(%) Avoided Cost Claimed by Project** | **100%** |
| | | | | | **Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)** | **$55,047,104** |

**Comments: The avoided capital cost is the cost of constructing a tertiary-treated wastewater treatment plant capable of producing 1,120 acre-feet of recycled water each year.**

**The avoided operations and maintenance costs in a given year consist of two items: (1) the operations and maintenance costs associated with producing 1,120 acre-feet of recycled water each year and (2) the operations and maintenance costs associated with implementing water conservation measures that reduce water demand by 1,120 AFY.**

## Project Economic Costs

The Foothill Feeder Connection Project has both initial and annual costs.

There are two sources of initial costs for this project:

1. The cost for the connection itself, including costs for pipes, meters, and interconnection valves. The interconnection valves link the Foothill Feeder to the Foothill Feeder Connection to CLWA's infrastructure, leading to the RVWTP. In addition, there are costs associated with obtaining easements from the City of Santa Clarita.
2. A portion of the cost associated with expanding the RVWTP plant (and pipeline connected to the plant). This cost will be included in this economic analysis because without the expanded plant (and pipeline) there would be no benefits from installing the new connection. In 2010, RVWTP's capacity increased from being able to process 30 MGD to 66 MGD; this cost $45,000,000. Thus, the portion of costs to assign to this project is $45,000,000 multiplied by the ratio of six MGD (the increase in capacity of the Foothill Feeder Connection) to 36 MGD (the increase in capacity of the RVWTP), or $7,500,000 [$45,000,000*(6 MGD/36 MGD)].

In total, the non-discounted initial costs are $11,837,305. The total discounted present value initial costs are $11,375,669 in 2012 dollars using a 6% discount rate.

There are two sources of annual costs for this project:

1. The operations and maintenance cost associated with the Foothill Feeder Connection. These costs are assumed to be $50,000 per year and begin in 2015, the first year the connection will be operational. These costs are classified as "maintenance."
2. The costs of processing an additional 2,240 AF of imported water per year, through the RVWTP. CLWA's marginal water source is water purchased from the Buena Vista-Rosedale Rio-Bravo Water Districts (BV/RRB) in Kern County. CLWA typically receives part of Buena Vista's Kern River entitlements through exchange of BV/RRB's State Water Project supplies (Kennedy/Jenks Consultants et al., 2011). The cost of obtaining this water was $800 per acre-foot in 2012; the cost is anticipated to increase, in real terms, by 3.5% per year through 2020 and by 1.5% per year from 2021 through the end of the project. It is assumed that CLWA will import the additional 2,240 AF of water per year beginning in 2020, the year that CLWA would need to be producing recycled water and implementing water conservation measures in the absence of the project, and continue to import this amount of water for the remainder of the connection's lifetime. These costs are classified as operations costs in this analysis.

The undiscounted annual costs, to be expended from 2015 through 2064, total $152,611,816 over that time period. The total discounted present value of annual costs is $30,624,585 in 2012 dollars using a 6% discount rate.

As is shown in Table 8-4, the discounted present value of initial costs and annual costs total $41,273,114. Table 8-4 summarizes the economic project costs for the project.

**TABLE 8-4: ANNUAL COSTS OF PROJECT**

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Foothill Feeder Connection Project | | | | | | | | | | |
| | | | Annual Costs [2] | | | | | | Discounting Calculations | |
| Year | Initial Costs Grand Total Cost from Table 4-4 (row (i), column (d)) (a) | Adjusted Grant Total Cost[1] (b) | Admin (c) | Operation (d) | Maintenance (e) | Replacement (f) | Other (g) | Total Costs (a) +…+ (g) (h) | Discount Factor (i) | Discounted Project Costs (h) x (i) (j) |
| **2010** | $7,500,000 | | | | | | | $7,500,000 | 1.00000 | **$7,500,000** |
| **2011** | | | | | | | | $0 | 1.00000 | **$0** |
| **2012** | $13,812 | | | | | | | $15,056 | 1.00000 | **$15,056** |
| **2013** | $207,244 | | | | | | | $258,919 | 0.94340 | **$244,263** |
| **2014** | $3,302,488 | | | | | | | $4,063,330 | 0.89000 | **$3,616,349** |
| **2015** | | | | | $50,000 | | | $50,000 | 0.83962 | **$41,981** |
| **2016** | | | | | $50,000 | | | $50,000 | 0.79209 | **$39,605** |
| **2017** | | | | | $50,000 | | | $50,000 | 0.74726 | **$37,363** |
| **2018** | | | | | $50,000 | | | $50,000 | 0.70496 | **$35,248** |
| **2019** | | | | | $50,000 | | | $50,000 | 0.66506 | **$33,253** |
| **2020** | | | | $2,359,722 | $50,000 | | | $2,409,722 | 0.62741 | **$1,511,889** |
| **2021** | | | | $2,395,118 | $50,000 | | | $2,445,118 | 0.59190 | **$1,447,261** |
| **2022** | | | | $2,431,044 | $50,000 | | | $2,481,044 | 0.55839 | **$1,385,402** |
| **2023** | | | | $2,467,510 | $50,000 | | | $2,517,510 | 0.52679 | **$1,326,193** |
| **2024** | | | | $2,504,523 | $50,000 | | | $2,554,523 | 0.49697 | **$1,269,520** |
| **2025** | | | | $2,542,091 | $50,000 | | | $2,592,091 | 0.46884 | **$1,215,273** |
| **2026** | | | | $2,580,222 | $50,000 | | | $2,630,222 | 0.44230 | **$1,163,350** |
| **2027** | | | | $2,618,925 | $50,000 | | | $2,668,925 | 0.41727 | **$1,113,649** |
| **2028** | | | | $2,658,209 | $50,000 | | | $2,708,209 | 0.39365 | **$1,066,076** |
| **2029** | | | | $2,698,082 | $50,000 | | | $2,748,082 | 0.37136 | **$1,020,540** |
| **2030** | | | | $2,738,553 | $50,000 | | | $2,788,553 | 0.35034 | **$976,952** |
| **2031** | | | | $2,779,632 | $50,000 | | | $2,829,632 | 0.33051 | **$935,230** |

**TABLE 8-4: ANNUAL COSTS OF PROJECT**

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Foothill Feeder Connection Project | | | | | | | | | | |
| | | | Annual Costs [2] | | | | | | Discounting Calculations | |
| Year | Initial Costs Grand Total Cost from Table 4-4 (row (i), column (d)) (a) | Adjusted Grant Total Cost[1] (b) | Admin (c) | Operation (d) | Maintenance (e) | Replacement (f) | Other (g) | Total Costs (a) +…+ (g) (h) | Discount Factor (i) | Discounted Project Costs (h) x (i) (j) |
| **2032** | | | | $2,821,326 | $50,000 | | | $2,871,326 | 0.31180 | **$895,293** |
| **2033** | | | | $2,863,646 | $50,000 | | | $2,913,646 | 0.29416 | **$857,065** |
| **2034** | | | | $2,906,601 | $50,000 | | | $2,956,601 | 0.27751 | **$820,472** |
| **2035** | | | | $2,950,200 | $50,000 | | | $3,000,200 | 0.26180 | **$785,444** |
| **2036** | | | | $2,994,453 | $50,000 | | | $3,044,453 | 0.24698 | **$751,915** |
| **2037** | | | | $3,039,370 | $50,000 | | | $3,089,370 | 0.23300 | **$719,819** |
| **2038** | | | | $3,084,960 | $50,000 | | | $3,134,960 | 0.21981 | **$689,096** |
| **2039** | | | | $3,131,235 | $50,000 | | | $3,181,235 | 0.20737 | **$659,686** |
| **2040** | | | | $3,178,203 | $50,000 | | | $3,228,203 | 0.19563 | **$631,534** |
| **2041** | | | | $3,225,876 | $50,000 | | | $3,275,876 | 0.18456 | **$604,585** |
| **2042** | | | | $3,274,264 | $50,000 | | | $3,324,264 | 0.17411 | **$578,788** |
| **2043** | | | | $3,323,378 | $50,000 | | | $3,373,378 | 0.16425 | **$554,094** |
| **2044** | | | | $3,373,229 | $50,000 | | | $3,423,229 | 0.15496 | **$530,455** |
| **2045** | | | | $3,423,827 | $50,000 | | | $3,473,827 | 0.14619 | **$507,826** |
| **2046** | | | | $3,475,185 | $50,000 | | | $3,525,185 | 0.13791 | **$486,164** |
| **2047** | | | | $3,527,313 | $50,000 | | | $3,577,313 | 0.13011 | **$465,427** |
| **2048** | | | | $3,580,222 | $50,000 | | | $3,630,222 | 0.12274 | **$445,576** |
| **2049** | | | | $3,633,926 | $50,000 | | | $3,683,926 | 0.11579 | **$426,573** |
| **2050** | | | | $3,688,434 | $50,000 | | | $3,738,434 | 0.10924 | **$408,382** |
| **2051** | | | | $3,743,761 | $50,000 | | | $3,793,761 | 0.10306 | **$390,968** |
| **2052** | | | | $3,799,917 | $50,000 | | | $3,849,917 | 0.09722 | **$374,297** |
| **2053** | | | | $3,856,916 | $50,000 | | | $3,906,916 | 0.09172 | **$358,339** |

# Foothill Feeder Connection (CLWA-8)

## TABLE 8-4: ANNUAL COSTS OF PROJECT

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Foothill Feeder Connection Project | | | | | | | | | | |
| | | | Annual Costs [2] | | | | | | Discounting Calculations | |
| Year | Initial Costs Grand Total Cost from Table 4-4 (row (i), column (d)) (a) | Adjusted Grant Total Cost[1] (b) | Admin (c) | Operation (d) | Maintenance (e) | Replacement (f) | Other (g) | Total Costs (a) +…+ (g) (h) | Discount Factor (i) | Discounted Project Costs (h) x (i) (j) |
| **2054** | | | | $3,914,770 | $50,000 | | | $3,964,770 | 0.08653 | **$343,061** |
| **2055** | | | | $3,973,491 | $50,000 | | | $4,023,491 | 0.08163 | **$328,436** |
| **2056** | | | | $4,033,094 | $50,000 | | | $4,083,094 | 0.07701 | **$314,435** |
| **2057** | | | | $4,093,590 | $50,000 | | | $4,143,590 | 0.07265 | **$301,032** |
| **2058** | | | | $4,154,994 | $50,000 | | | $4,204,994 | 0.06854 | **$288,201** |
| **2059** | | | | $4,217,319 | $50,000 | | | $4,267,319 | 0.06466 | **$275,918** |
| **2060** | | | | $4,280,579 | $50,000 | | | $4,330,579 | 0.06100 | **$264,158** |
| **2061** | | | | $4,344,787 | $50,000 | | | $4,394,787 | 0.05755 | **$252,901** |
| **2062** | | | | $4,409,959 | $50,000 | | | $4,459,959 | 0.05429 | **$242,124** |
| **2063** | | | | $4,476,109 | $50,000 | | | $4,526,109 | 0.05122 | **$231,807** |
| **2064** | | | | $4,543,250 | $50,000 | | | $4,593,250 | 0.04832 | **$221,930** |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | | **$41,273,114** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |

**Comments: The initial costs consist of costs for the new Foothill Feeder Connection and a portion of the costs for the expanded Rio Vista Water Treatment Plant. The operation costs are the costs to purchase 2,240 AF of imported SWP water through the Buena Vista-Rosedale Rio-Bravo Water Districts in Kern County, beginning in 2020. The maintenance costs are the costs to maintain the Foothill Feeder Connection. These costs begin in 2015, the first year the Foothill Feeder is operational.**

Notes:
(1) If any, based on opportunity costs, sunk costs and associated costs.
(2) The incremental change in O&M costs attributable to the project.

# Foothill Feeder Connection (CLWA-8)

## Project Benefits and Cost Summary

The total present value monetizable benefits from this project are $55,047,104, while total present value costs are $41,273,114. Thus, monetizable benefits are greater than costs.

There are several positive non-monetized benefits: increased operational flexibility and treatment reliability for CLWA, increased water education programming, increased safety due to improved seismic stability, and improved water quality. Increased operational flexibility and treatment reliability in particular is an important non-monetized benefit. A negative non-monetized effect of the project is recognized due to increased greenhouse gas emissions from use of additional imported SWP water compared to a combination of recycled water and conservation measures without the project.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, main uncertainties are associated with the avoided transmission and distribution of recycled water and the avoided water conservation measures. These issues are listed in Table 8-5.

**TABLE 8-5: OMISSIONS, BIASES, AND UNCERTAINTIES, AND THEIR EFFECT ON THE PROJECT**

| Benefit or Cost Category | Likely Impact on Net Benefits* | Comment |
|---|---|---|
| Avoided Transmission and Distribution of Recycled Water | U | Without the project, it is assumed that CLWA will need the additional 1,120 AF of recycled water per year beginning in 2020. However, CLWA may face greater (smaller) demand for water than expected, meaning the recycled water infrastructure would need to be in place earlier (later) than 2020. |
| Avoided Transmission and Distribution of Recycled Water | U | The capital and O&M costs attributed to the recycled water transmission and distribution are based on the costs for actual CLWA recycled water operations (albeit of smaller scale). However, the actual costs of constructing and operating a plant in this case may differ from previous projects. |
| Avoided Water Conservation Measures | + | CLWA has already implemented water conservation measures, which form the basis for the amount of avoided costs in this analysis. Presumably, the first items that CLWA targeted in their water conservation measures to reduce water demand were those that were easiest and least expensive, the proverbial “low hanging fruit.” Moving into the future, reducing the same amount of water demand will be more difficult and expensive. Thus, net benefits are likely understated because the costs of the avoided water conservation measures implemented without the project would probably be higher than the analysis assumes. The 2008 Santa Clarita Valley Water Use Efficiency Strategic Plan identified but did not adopt some conservations measures with significantly higher cost per AF that could nevertheless be needed with aggressive conservation in the future (A&N Technical Services, 2008). |

**TABLE 8-5: OMISSIONS, BIASES, AND UNCERTAINTIES, AND THEIR EFFECT ON THE PROJECT**

| Benefit or Cost Category | Likely Impact on Net Benefits* | Comment |
|---|---|---|

*Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

## References

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# Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

## Summary

This project is Phase 1 of a proposal by the Newhall County Water District (NCWD) to build a pellet water softening treatment plant. The purpose of this plant would be to improve drinking water quality for 3,800 of NCWD's connections by an estimated 182 mg/L reduction in hardness. Phase 1 of the project involves three studies. First, a water quality analysis is necessary to determine the area's suitability for a pellet softener treatment plant. Next, these results will be incorporated into a conceptual design, which will determine appropriate sizing, chemical and input needs, land requirements and capital, and operations and maintenance (O&M) costs. Finally, a rate study and consumer demand analysis is needed to determine consumers' reaction to potential rate increases involved with the project.

Because the benefits of this project will not be realized until construction of the plant is completed under a later phase of the overall project, benefits for this portion of the project have been apportioned using ratios of cost estimates. The present value of the Phase 1 budget is $177,620 and it is estimated that the entire plant would cost roughly $5.9 million for construction and O&M costs over the project lifetime. Therefore, expected benefits assigned to this portion of the project are $177,620 / $5,918,812 = 3% of the total benefits from the completion of the plant.

A summary of all benefits and costs of the project are provided in Table 8-1. Monetized benefits and non-monetized benefits are presented in this attachment, while physically quantified (but not monetized) benefits are described in Attachment 7.

**TABLE 8-1: BENEFIT-COST ANALYSIS OVERVIEW**

| | Present Value |
|---|---|
| **Costs** – Total Capital and O&M | **$177,620** |
| **Monetizable Benefits** | |
| Avoided Costs of Personal Softeners | $531,926 |
| Reduction in Household Costs from Reduced TDS in Drinking Water | $1,755 |
| Total Monetizable Benefits | **$533,681** |
| **Physically Quantified Benefit or Cost (Not Monetized)** | **Project Life Total** |
| Production of Useful Sand-Calcium Carbonate "Pellets" | 82 cubic yards annually |
| **Qualitative Benefit or Cost** | **Qualitative Indicator*** |
| Program Is A Model for Other Districts | + |
| Provides An Equitable Solution, Providing Everyone With Softer Water Cheaper Than Individual Purchase | + |
| Fewer Alternative Canister Softener Deliveries Mean Less Greenhouse Gas Emissions | + |
| Long Term Solution In Place of a Short Term One | + |
| Option Value for Information About Full Cost of Plant | + + |

* Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease net benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

TDS = total dissolved solids

## Non-monetized Benefits Analysis (Section D2)

Table 8-2 shows the non-monetized benefits checklist for the project. Narrative descriptions of the benefit categories marked "Yes" in the following the table are provided in the narrative description of qualitative benefits section after the table.

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| | **Community/Social Benefits** | |
| | **Will the proposal** | |
| 1 | **Provide education or technology benefits?** | Yes |
| | Examples are not limited to, but may include:<br>- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?<br>- Develop, test or document a new technology for water supply, water quality, or flood damage reduction management?<br>- Provide some other education or technological benefit? | |
| 2 | **Provide social recreation or access benefits?** | No |
| | Examples are not limited to, but may include:<br>- Provide new or improved outdoor recreation opportunities?<br>- Provide more access to open space?<br>- Provide some other recreation or public access benefit? | |
| 3 | **Help avoid, reduce or resolve various public water resources conflicts?** | No |
| | Examples are not limited to, but may include:<br>- Provide more opportunities for public involvement in water management?<br>- Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?<br>- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)? | |
| 4 | **Promote social health and safety?** | No |
| | Examples are not limited to, but may include:<br>- Increase urban water supply reliability for fire-fighting and critical services following seismic events?<br>- Reduce risk to life from dam failure or flooding?<br>- Reduce exposure to water-related hazards? | |
| 5 | **Have other social benefits?** | Yes |
| | Examples are not limited to, but may include:<br>- Redress or increase inequitable distribution of environmental burdens?<br>- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups? | |
| | **Environmental Stewardship Benefits:** | |
| | **Will the proposal** | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| **6** | **Benefit wildlife or habitat in ways that were not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Cause an increase in the amount or quality of terrestrial, aquatic, riparian, or wetland habitat?<br>- Contribute to an existing biological opinion or recovery plan for a listed special status species?<br>- Preserve or restore designated critical habitat of a listed species?<br>- Enhance wildlife protection or habitat? | |
| **7** | **Improve water quality in ways that were not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Cause an improvement in water quality in an impaired water body or sensitive habitat?<br>- Prevent water quality degradation?<br>- Cause some other improvement in water quality? | |
| **8** | **Reduce net emissions in ways that were not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Reduce net production of greenhouse gases?<br>- Reduce net emissions of other harmful chemicals into the air or water? | |
| **9** | **Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?** | No |
| | **Sustainability Benefits:**<br>**Will the proposal** | |
| **10** | **Improve the overall, long-term management of California groundwater resources?** | No |
| | Examples are not limited to, but may include:<br>- Reduce extraction of non-renewable groundwater?<br>- Promote aquifer storage or recharge? | |
| **11** | **Reduce demand for net diversions for the regions from the Delta?** | No |
| **12** | **Provide a long-term solution in place of a short-term one?** | No |
| **13** | **Promote energy savings or replace fossil fuel-based energy sources with renewable energy and resources?** | No |
| | Examples are not limited to, but may include:<br>- Reduce net energy use on a permanent basis?<br>- Increase renewable energy production?<br>- Include new buildings or modify buildings to include certified LEED features?<br>- Provide a net increase in recycling or reuse of materials?<br>- Replace unsustainable practices with recognized sustainable practices? | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| **14** | **Improve water supply reliability in ways not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Provide a more flexible mix of water sources?<br>- Reduce likelihood of catastrophic supply outages?<br>- Reduce supply uncertainty?<br>- Reduce supply variability? | |
| **15** | **Other: Option value for full information about the cost and community support for the plant?** | Yes |

[1] This benefit category is marked as no because it was already described as a physically quantified benefit in Attachment 7.

## Narrative Description of Qualitative Benefits

Descriptions of the non-monetized benefits marked "Yes" from the checklist in Table 8-2 are described below.

### Provide education or technology benefits

*Program is one of the first of its kind, a model for other districts*

Although pellet based softening plants are common in places such as the Netherlands, their adaptation has been much less widespread in the United States. The NCWD pellet water softening treatment plant will be only the second centralized softening plant in the area (the other is a demonstration plant at neighboring Valencia Water Company), and the largest to date. NCWD hopes to serve as a model for other districts on using innovative, centralized technologies for softening water.

### Have other social benefits

*Provides an equitable solution, providing everyone with softer water cheaper than individual purchase of systems*

The NCWD pellet water softening treatment plant will address the inequitable aesthetic burdens of hard water. Based on data from nearby Valencia Water Company (VWC), currently only 52% of homes have personal, point-of-use water softeners (Kennedy/Jenks Consultants, 2009). Part of the issue is cost: personal water softener servicing can be expensive and costs run about $780 per year for a typical family of four (Culligan Water, 2013). As a centralized system, the NCWD pellet water softening treatment plant provides everyone with soft water, regardless of household income and personal resources. Further, this equality is *not* achieved by simply shifting the environmental burden amongst homes in a zero-sum game. Instead, water quality is improved for *everyone* – including homes that may already have a personal water softening system.

### Reduce net emissions in ways that were not quantified in Attachment 7

Since automatic water softeners were outlawed in 2003, the most common type of personal water softening systems has been canister-based. Canister systems store the ion-exchange brine solution in tanks rather than discharging into the waste stream, and must be replaced every month on average. Typically this is done using a subscription delivery service. By eliminating the need for these canister based systems, the NCWD Pellet Water Softening Treatment Plant would also eliminate the need for these deliveries, reducing greenhouse gas emissions as a result.

### Provide a Long-Term Solution in Place of a Short-Term One

With regular maintenance and upkeep, pellet water softening treatment plants can remain in operation more than 50+ years. Meanwhile, the canisters that alternative personal, point-of-use systems typically use must be replaced once a month. In addition, the non-canister portion of the unit has a relatively short lifespan compared to the proposed plant, typically 12 years.

### Other – Option Value for Information About Full Cost and Community Support for the Plant

A unique aspect of this phase of the project is that it provides a lot more information going forward. In other words, one of the main benefits of this phase is the information it provides about the full cost of the plaint. Right now, the total $5.9 million present value cost of capital and O&M involves a substantial amount of uncertainty. Once this phase is complete more will be known about the true costs, and the desirability of moving forward with the project.

This information is worth something; essentially this study provides an option value. Consider: in the *worst* case, the true costs (known with more precision after Phase 1) will turn out to be higher than the benefits, and the plant will *not* be built. The downside, in other words, is bounded from below at the cost of phase one (roughly $178,000 in discounted 2012 dollars).

The *upside*, however, has no such bound. It may turn out once this phase is complete that the actual costs turn out to be lot lower than initially thought. In this case the plant will be built and NCWD customers will receive substantial benefits. This argument—the high upside, limited downside associated with resolving uncertainty—is one of the reasons this project under consideration likely has positive expected value.

## Monetized Benefits Analysis (Section D3)

Several monetized benefits are expected to accrue over the expected life of the project. Those include:

### Avoided Costs of Point of Use Softeners for 1,951 Households

A centralized, pellet-based treatment plant provides water preferable to personal, point-of-use systems, making them unnecessary. One of the main monetizable benefits then is that once the softener plant is operational, NCWD customers will no longer have to incur personal water softeners. Monetizing these benefits requires (1) knowing how many households currently have their own softeners, and (2) knowing how much a personal water softener costs each family each year.

A 2009 study by the neighboring VWC found 52% of their customers installed some sort of personal, point-of-use water softening system (Kennedy/Jenks Consultants, 2009). Given the 3,800 households affected by this proposed pellet water softening treatment plant in NCWD, and assuming ownership rates similar to VWC, construction of this plant will make 1,976 point-of-use water softeners unnecessary (3,800 households multiplied by 52% equals 1,976 households). We adjust this number by down by 46, which is the number of remaining AWS estimated by the Sanitation District to be remaining in the NCWD service area. Thus, the number of avoided non-self regenerating water softeners is estimated to be 1,930 (1,976 minus 46). A total of 57.9 households with avoided AWS is apportioned to this study based on the ratio of the cost of this phase of the project to the overall project cost (1,930 households multiplied by 3% is 57.9 households).

Meanwhile, households with a canister-based personal system pay an estimated $65 per month, or $780 annually on average, based on typical costs for a family of four in Newhall provided by Culligan Water. (Culligan Water, 2013). Apportioning this benefit using the ratio of cost to the full project of 3%, resulting in 57.9 households affected, results in a present value benefit of avoided point of use non-AWS softener costs of $531,926.

There are some uncertainties associated with this estimate. First, the 52% figure is estimated using data from VWC, not NCWD, although the communities are similar in terms of water quality. Second, the estimate of avoided costs is for NCWD, but is only one estimate.

## Reduction in Household Costs From Reduced TDS and Hardness in Drinking Water

The NCWD pellet water softening treatment plant is meant to reduce water hardness, which is a subset of total dissolved solids (TDS). Because the valuation literature for TDS is relatively more developed compared to water hardness, reductions here are monetized in terms of TDS rather than reductions in water hardness. Under normal conditions, there is a linear relationship between TDS and hardness in SWP water (Bookman Edmonston Engineering Inc., 1999).

Although TDS levels in water are not considered to be a health issue, they are of concern for several reasons. Some level of TDS is desirable in drinking water and gives it a pleasant taste, but as levels increase beyond 500 mg/L, many people complain about the taste. For this reason, US EPA has set a secondary (aesthetic) drinking water standard for TDS of 500 mg/L.

A study by Bookman-Edmonston Engineering for the Metropolitan Water District of Southern California (MWD) and the U.S. Bureau of Reclamation (USBR) pulled together all the literature on effects from a reduction in TDS of water delivered by MWD to households in its service area (Bookman-Edmonston, 1999). The study estimated a $35 million reduction in household costs from a 100 mg/L reduction TDS levels. This means the value per household per mg/L reduction in TDS levels is $0.082 (updated to 2012 dollars). Multiplying $0.082 by 1,849 households results in $151.62 per mg/L of reduction for all households total. Apportioning that value by the 3% ratio of project costs results in $4.55 per mg/L.

This value can used to estimate the effects of a reduction in TDS on NCWD households that were not already softening their water, which is 3,800 households minus 1,951 households assumed to be softening currently, or 1,849 households. The TDS concentration reduction anticipated from the NCWD pellet water softening treatment plant is 5%, or 655 mg/L TDS multiplied by 5% is a reduction of 32.75 mg/L. Multiplying this reduction by the apportioned benefit per mg/L of $4.55 results in an annual savings of $148.96 for the affected households. The present value of this benefit over the project lifetime is $1,755. Table 8-3 summarizes the annual benefits from the project.

# Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

**TABLE 8-3: ANNUAL BENEFIT**

| (All benefits should be in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: Pellet Water Softening Treatment Plant (NCWD-2) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
| 2018 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.70496 | **$31,837** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.70496 | **$105** |
| 2019 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.66506 | **$30,035** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.66506 | **$99** |
| 2020 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.62741 | **$28,335** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.62741 | **$93** |
| 2021 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.59190 | **$26,731** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.59190 | **$88** |
| 2022 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.55839 | **$25,218** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.55839 | **$83** |
| 2023 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.52679 | **$23,791** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.52679 | **$78** |
| 2024 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.49697 | **$22,444** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.49697 | **$74** |
| 2025 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.46884 | **$21,174** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.46884 | **$70** |
| 2026 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.44230 | **$19,975** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.44230 | **$66** |
| 2027 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.41727 | **$18,845** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.41727 | **$62** |
| 2028 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.39365 | **$17,778** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.39365 | **$59** |

# Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

## TABLE 8-3: ANNUAL BENEFIT

| (All benefits should be in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: Pellet Water Softening Treatment Plant (NCWD-2) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
| 2029 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.37136 | **$16,772** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.37136 | **$55** |
| 2030 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.35034 | **$15,822** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.35034 | **$52** |
| 2031 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.33051 | **$14,927** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.33051 | **$49** |
| 2032 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.31180 | **$14,082** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.31180 | **$46** |
| 2033 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.29416 | **$13,285** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.29416 | **$44** |
| 2034 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.27751 | **$12,533** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.27751 | **$41** |
| 2035 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.26180 | **$11,823** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.26180 | **$39** |
| 2036 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.24698 | **$11,154** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.24698 | **$37** |
| 2037 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.23300 | **$10,523** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.23300 | **$35** |
| 2038 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.21981 | **$9,927** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.21981 | **$33** |
| 2039 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.20737 | **$9,365** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.20737 | **$31** |

# Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

## TABLE 8-3: ANNUAL BENEFIT

| (All benefits should be in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: Pellet Water Softening Treatment Plant (NCWD-2) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value (1) | Annual $ Value (1) (f) x (g) | Discount Factor (1) | Discounted Benefits (1) (h) x (i) |
| 2040 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.19563 | **$8,835** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.19563 | **$29** |
| 2041 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.18456 | **$8,335** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.18456 | **$27** |
| 2042 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.17411 | **$7,863** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.17411 | **$26** |
| 2043 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.16425 | **$7,418** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.16425 | **$24** |
| 2044 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.15496 | **$6,998** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.15496 | **$23** |
| 2045 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.14619 | **$6,602** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.14619 | **$22** |
| 2046 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.13791 | **$6,228** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.13791 | **$21** |
| 2047 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.13011 | **$5,876** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.13011 | **$19** |
| 2048 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.12274 | **$5,543** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.12274 | **$18** |
| 2049 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.11579 | **$5,229** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.11579 | **$17** |
| 2050 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.10924 | **$4,933** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.10924 | **$16** |

# Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

## TABLE 8-3: ANNUAL BENEFIT

| (All benefits should be in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: Pellet Water Softening Treatment Plant (NCWD-2) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value [1] | Annual $ Value [1] (f) x (g) | Discount Factor [1] | Discounted Benefits [1] (h) x (i) |
| 2051 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.10306 | **$4,654** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.10306 | **$15** |
| 2052 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.09722 | **$4,391** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.09722 | **$14** |
| 2053 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.09172 | **$4,142** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.09172 | **$14** |
| 2054 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.08653 | **$3,908** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.08653 | **$13** |
| 2055 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.08163 | **$3,687** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.08163 | **$12** |
| 2056 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.07701 | **$3,478** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.07701 | **$11** |
| 2057 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.07265 | **$3,281** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.07265 | **$11** |
| 2058 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.06854 | **$3,095** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.06854 | **$10** |
| 2059 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.06466 | **$2,920** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.06466 | **$10** |
| 2060 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.06100 | **$2,755** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.06100 | **$9** |
| 2061 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.05755 | **$2,599** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.05755 | **$9** |

# Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

**TABLE 8-3: ANNUAL BENEFIT**

| (All benefits should be in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: Pellet Water Softening Treatment Plant (NCWD-2) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value (1) | Annual $ Value (1) (f) x (g) | Discount Factor (1) | Discounted Benefits (1) (h) x (i) |
| 2062 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.05429 | **$2,452** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.05429 | **$8** |
| 2063 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.05122 | **$2,313** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.05122 | **$8** |
| 2064 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.04832 | **$2,182** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.04832 | **$7** |
| 2065 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.04558 | **$2,059** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.04558 | **$7** |
| 2066 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.04300 | **$1,942** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.04300 | **$6** |
| 2067 | a | households | 57.9 | 0 | 57.9 | $780.00 | $45,162.00 | 0.04057 | **$1,832** |
| | b | mg/L | 655 | 622.3 | 32.75 | $4.55 | $148.96 | 0.04057 | **$6** |
| | | | | **Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)** | | | | | **$533,681** |
| **Comments:** | | | | | | | | | |

Note:
(1) Complete these columns if dollar value is being claimed for the benefit.

## Project Economic Costs

Table 8-4 summarizes the economic project costs for the project. Budgeted costs include plant design, water quality analysis, rate study and consumer demand analysis. This portion of the project is a feasibility study, and no construction costs are included. The present value of costs for this phase of the project are expected to total $177,620 when discounted to 2012 dollars using a 6% discount rate.

# Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

## TABLE 8-4: ANNUAL COSTS OF PROJECT

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Pellet Water Softening Treatment Plant (NCWD-2) | | | | | | | | | | |
| | Initial Costs Grand Total Cost from Table 4-5 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| **2012** | | | | | | | | - | 1.00000 | - |
| **2013** | 40,000 | | | | | | | 40,000 | 0.94300 | **$37,720** |
| **2014** | 110,000 | | | | | | | 110,000 | 0.89000 | **$97,900** |
| **2015** | 50,000 | | | | | | | 50,000 | 0.84000 | **$42,000** |
| **2016** | | | | | | | | - | 0.79209 | - |
| **2017** | | | | | | | | - | 0.74726 | - |
| … | | | | | | | | | | |
| **Last Year of Project Life** | | | | | | | | | … | |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | | **$177,620** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |
| **Comments:** | | | | | | | | | | |

Notes:
(1) If any, based on opportunity costs, sunk costs and associated costs.
(2) The incremental change in O&M costs attributable to the project.

## Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

The cost for the full pellet water softening treatment plant is expected to total $5 million in total costs of the plant and associated studies. O&M costs of running the plant are expected to total $228,000. Assuming that the plant is operational by 2020, and that construction happens over the three years leading up to 2020, the present value of estimated costs associated with the full water softening treatment plant are estimated to total $5,918,812 when discounted to 2012 dollars using a 6% discount rate. The estimated costs associated with the full project are shown in Table 8-5.

# Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

## TABLE 8-5: COST OF FULL PROJECT

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Pellet Water Softening Treatment Plant (NCWD-2) | | | | | | | | | | |
| | Initial Costs Grand Total Cost from Table 4-5 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| **2012** | | | | | | | | - | 1.00000 | - |
| **2013** | | | | | | | | - | 0.94300 | - |
| **2014** | | | | | | | | - | 0.89000 | - |
| **2015** | | | | | | | | - | 0.84000 | - |
| **2016** | | | | | | | | - | 0.79209 | - |
| **2017** | 1,666,667 | | | | | | | 1,666,667 | 0.74726 | **1,245,430** |
| **2018** | 1,666,667 | | | | | | | 1,666,667 | 0.70496 | **1,174,934** |
| **2019** | 1,666,667 | | | | | | | 1,666,667 | 0.66506 | **1,108,429** |
| **2020** | | | | 228,000 | | | | 228,000 | 0.62741 | **143,050** |
| **2021** | | | | 228,000 | | | | 228,000 | 0.59190 | **134,953** |
| **2022** | | | | 228,000 | | | | 228,000 | 0.55839 | **127,314** |
| **2023** | | | | 228,000 | | | | 228,000 | 0.52679 | **120,108** |
| **2024** | | | | 228,000 | | | | 228,000 | 0.49697 | **113,309** |
| **2025** | | | | 228,000 | | | | 228,000 | 0.46884 | **106,895** |
| **2026** | | | | 228,000 | | | | 228,000 | 0.44230 | **100,845** |
| **2027** | | | | 228,000 | | | | 228,000 | 0.41727 | **95,136** |
| **2028** | | | | 228,000 | | | | 228,000 | 0.39365 | **89,751** |
| **2029** | | | | 228,000 | | | | 228,000 | 0.37136 | **84,671** |
| **2030** | | | | 228,000 | | | | 228,000 | 0.35034 | **79,878** |
| **2031** | | | | 228,000 | | | | 228,000 | 0.33051 | **75,357** |
| **2032** | | | | 228,000 | | | | 228,000 | 0.31180 | **71,091** |

**TABLE 8-5: COST OF FULL PROJECT**

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Pellet Water Softening Treatment Plant (NCWD-2) | | | | | | | | | | |
| | Initial Costs Grand Total Cost from Table 4-5 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| **2033** | | | | 228,000 | | | | 228,000 | 0.29416 | **67,067** |
| **2034** | | | | 228,000 | | | | 228,000 | 0.27751 | **63,271** |
| **2035** | | | | 228,000 | | | | 228,000 | 0.26180 | **59,690** |
| **2036** | | | | 228,000 | | | | 228,000 | 0.24698 | **56,311** |
| **2037** | | | | 228,000 | | | | 228,000 | 0.23300 | **53,124** |
| **2038** | | | | 228,000 | | | | 228,000 | 0.21981 | **50,117** |
| **2039** | | | | 228,000 | | | | 228,000 | 0.20737 | **47,280** |
| **2040** | | | | 228,000 | | | | 228,000 | 0.19563 | **44,604** |
| **2041** | | | | 228,000 | | | | 228,000 | 0.18456 | **42,079** |
| **2042** | | | | 228,000 | | | | 228,000 | 0.17411 | **39,697** |
| **2043** | | | | 228,000 | | | | 228,000 | 0.16425 | **37,450** |
| **2044** | | | | 228,000 | | | | 228,000 | 0.15496 | **35,330** |
| **2045** | | | | 228,000 | | | | 228,000 | 0.14619 | **33,330** |
| **2046** | | | | 228,000 | | | | 228,000 | 0.13791 | **31,444** |
| **2047** | | | | 228,000 | | | | 228,000 | 0.13011 | **29,664** |
| **2048** | | | | 228,000 | | | | 228,000 | 0.12274 | **27,985** |
| **2049** | | | | 228,000 | | | | 228,000 | 0.11579 | **26,401** |
| **2050** | | | | 228,000 | | | | 228,000 | 0.10924 | **24,906** |
| **2051** | | | | 228,000 | | | | 228,000 | 0.10306 | **23,497** |
| **2052** | | | | 228,000 | | | | 228,000 | 0.09722 | **22,167** |
| **2053** | | | | 228,000 | | | | 228,000 | 0.09172 | **20,912** |

# Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)

## TABLE 8-5: COST OF FULL PROJECT

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Pellet Water Softening Treatment Plant (NCWD-2) | | | | | | | | | | |
| | Initial Costs Grand Total Cost from Table 4-5 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| **2054** | | | | 228,000 | | | | 228,000 | 0.08653 | **19,728** |
| **2055** | | | | 228,000 | | | | 228,000 | 0.08163 | **18,612** |
| **2056** | | | | 228,000 | | | | 228,000 | 0.07701 | **17,558** |
| **2057** | | | | 228,000 | | | | 228,000 | 0.07265 | **16,564** |
| **2058** | | | | 228,000 | | | | 228,000 | 0.06854 | **15,627** |
| **2059** | | | | 228,000 | | | | 228,000 | 0.06466 | **14,742** |
| **2060** | | | | 228,000 | | | | 228,000 | 0.06100 | **13,908** |
| **2061** | | | | 228,000 | | | | 228,000 | 0.05755 | **13,120** |
| **2062** | | | | 228,000 | | | | 228,000 | 0.05429 | **12,378** |
| **2063** | | | | 228,000 | | | | 228,000 | 0.05122 | **11,677** |
| **2064** | | | | 228,000 | | | | 228,000 | 0.04832 | **11,016** |
| **2065** | | | | 228,000 | | | | 228,000 | 0.04558 | **10,393** |
| **2066** | | | | 228,000 | | | | 228,000 | 0.04300 | **9,804** |
| **2067** | | | | 228,000 | | | | 228,000 | 0.04057 | **9,249** |
| **2068** | | | | 228,000 | | | | 228,000 | 0.03827 | **8,726** |
| **2069** | | | | 228,000 | | | | 228,000 | 0.03610 | **8,232** |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | | **$5,918,812** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |

**Comments:**

Notes:
(1) If any, based on opportunity costs, sunk costs and associated costs.
(2) The incremental change in O&M costs attributable to the project.

## Project Benefits and Cost Summary

Total apportioned benefits are $533,681, while the costs for this phase of the project are $177,602. Thus, estimated benefits for the project are greater than the costs by $356,061. The project would also provide non monetized benefits. It provides educational and technology benefits, provides a long-term solution in place of a short-term one, and reduces net emission from trucks replacing canisters for water softening units. Perhaps most important is the option value of this study; the fact the potential *upside* (i.e. the costs of full construction turn out to be lower than anticipated) is so much greater than the *downside* (where the plant does not get built), means this phase of the project likely has positive expected value as a whole.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, the main uncertainties are associated with estimating the full costs of the pellet water softening treatment plant. These issues are listed in Table 8-6.

**TABLE 8-6: OMISSIONS, BIASES, AND UNCERTAINTIES, AND THEIR EFFECT ON THE PROJECT**

| Benefit or Cost Category | Likely Impact on Net Benefits* | Comment |
|---|---|---|
| Option value; uncertainty about full cost of plant | + + | Uncertainty about full cost of plant will be resolved after this phase, proponents will only build only if the community is willing to pay for the plant; large upside relative to downside |
| Number of homes with water softeners now | U | The benefits depend on how many homes currently have water softeners; this is an estimate with some uncertainty. |
| Cost of operating personal water softener | U | The estimate used for the avoided cost of softening water was provided by a Culligan Water representative in Newhall. Estimates from other providers could be greater and lower than this estimate. |

*Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

## References

Bookman Edmonston Engineering Inc., 1999. Salinity Management Study Final Report – Long-term Strategy and Recommended Action Plan. Technical Appendices. For the Metropolitan Water District of Southern California and the United States Bureau of Reclamation. June.

Culligan Water, 2013. Estimated annual water softener service costs for a typical family of four. Personal communication from Newhall, CA employee. March 2013.

Kennedy/Jenks Consultants, 2009. Final Report Groundwater Softening Demonstration Project. Prepared for Valencia Water Company. December.

# Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)

## Summary

The Santa Clarita Valley Sanitation District (Sanitation District) operates two water reclamation plants (WRPs) in the Santa Clarita Valley, the Saugus and Valencia WRPs. The Saugus and Valencia WRPs discharge treated wastewater into the Upper Santa Clara River, which contains chloride in excess of the water quality objective for the Upper Santa Clara River of 100 mg/L. Because residential automatic water softeners (AWS) have been the largest controllable source of chloride, the source control efforts have focused on the removal of these units. To help reduce contributions from this source, the Sanitation District has been implementing an Automatic Water Softener Public Outreach Program since February 2003. Phases I and II of this program have removed 7,900 AWS, reducing chloride concentrations by more than 50 mg/L. Despite these gains, concentrations in 2011 were still about 18 mg/L over the 100 mg/L water quality objective, in part due to an estimated 500 remaining active AWS. This project will implement the final phase of the Automatic Water Softener Rebate and Public Outreach Program, which will remove the remaining AWS. The program will consist of home inspections, issuing Notices of Violations to residents that still have their AWS, issuing rebates to residents that remove their AWS, chloride monitoring, and public outreach. The Sanitation District estimates removing these remaining AWS will reduce chloride concentrations by approximately 5 mg/L.

A summary of all benefits and costs of the project are provided in Table 8-1. Monetized benefits and non-monetized benefits are presented in this attachment, while physically quantified (but not monetized) benefits are described in Attachment 7.

**TABLE 8-1: BENEFIT-COST ANALYSIS OVERVIEW**

| | Present Value |
|---|---|
| **Costs** – Total Capital and O&M | **$2,987,860** |
| **Monetizable Benefits** | |
| Avoided chloride treatment plant costs | $7,669,367 |
| Reduce potable water demand | $79,016 |
| Total Monetizable Benefits | **$7,748,383** |
| **Physically Quantified Benefit or Cost** | **Project Life Total** |
| Avoided greenhouse gas emissions associated with MF/RO plant | 994 MT $CO_2$ equivalent |
| **Qualitative Benefit or Cost** | **Qualitative Indicator*** |
| Program is one of the first of its kind, model for other districts | + |
| Web portal clearinghouse for information on water softeners and conditioning systems that do not discharge added chloride to the sewer system | + |
| Reduces water resource conflicts by reducing downstream pollutants | + |
| Addresses equity, fairness issues through removal of relatively small numbers of AWS that are hurting larger community | + |
| Households where AWS are removed may need to obtain alternatives or use harder water | – |

**TABLE 8-1: BENEFIT-COST ANALYSIS OVERVIEW**

| | Present Value |
|---|---|
| * Direction and magnitude of effect on net benefits:<br>+ = Likely to increase net benefits relative to quantified estimates.<br>+ + = Likely to increase net benefits significantly.<br>– = Likely to decrease net benefits.<br>– – = Likely to decrease net benefits significantly.<br>U = Uncertain, could be + or –. | |
| MF/RO = microfiltration / reverse osmosis. | |

## Non-monetized Benefits Analysis (Section D2)

Table 8-2 shows the non-monetized benefits checklist for the project. Narrative descriptions of the benefit categories marked "Yes" in the following the table are provided in the narrative description of qualitative benefits section after the table.

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| | **Community/Social Benefits** | |
| | **Will the proposal** | |
| **1** | **Provide education or technology benefits?** | Yes |
| | Examples are not limited to, but may include:<br>- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?<br>- Develop, test or document a new technology for water supply, water quality, or flood damage reduction management?<br>- Provide some other education or technological benefit? | |
| **2** | **Provide social recreation or access benefits?** | No |
| | Examples are not limited to, but may include:<br>- Provide new or improved outdoor recreation opportunities?<br>- Provide more access to open space?<br>- Provide some other recreation or public access benefit? | |
| **3** | **Help avoid, reduce or resolve various public water resources conflicts?** | Yes |
| | Examples are not limited to, but may include:<br>- Provide more opportunities for public involvement in water management?<br>- Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?<br>- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)? | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| **4** | **Promote social health and safety?** | No |
| | Examples are not limited to, but may include:<br>- Increase urban water supply reliability for fire-fighting and critical services following seismic events?<br>- Reduce risk to life from dam failure or flooding?<br>- Reduce exposure to water-related hazards? | |
| **5** | **Have other social benefits?** | Yes |
| | Examples are not limited to, but may include:<br>- Redress or increase inequitable distribution of environmental burdens?<br>- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups? | |
| | **Environmental Stewardship Benefits:** | |
| | **Will the proposal** | |
| **6** | **Benefit wildlife or habitat in ways that were not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Cause an increase in the amount or quality of terrestrial, aquatic, riparian, or wetland habitat?<br>- Contribute to an existing biological opinion or recovery plan for a listed special status species?<br>- Preserve or restore designated critical habitat of a listed species?<br>- Enhance wildlife protection or habitat? | |
| **7** | **Improve water quality in ways that were not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Cause an improvement in water quality in an impaired water body or sensitive habitat?<br>- Prevent water quality degradation?<br>- Cause some other improvement in water quality? | |
| **8** | **Reduce net emissions in ways that were not quantified in Attachment 7?** | No[1] |
| | Examples are not limited to, but may include:<br>- Reduce net production of greenhouse gases?<br>- Reduce net emissions of other harmful chemicals into the air or water? | |
| **9** | **Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?** | No |
| | **Sustainability Benefits:** | |
| | **Will the proposal** | |

# Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| **10** | **Improve the overall, long-term management of California groundwater resources?** | No |
| | Examples are not limited to, but may include:<br>- Reduce extraction of non-renewable groundwater?<br>- Promote aquifer storage or recharge? | |
| **11** | **Reduce demand for net diversions for the regions from the Delta?** | No |
| **12** | **Provide a long-term solution in place of a short-term one?** | No |
| **13** | **Promote energy savings or replace fossil fuel-based energy sources with renewable energy and resources?** | No[1] |
| | Examples are not limited to, but may include:<br>- Reduce net energy use on a permanent basis?<br>- Increase renewable energy production?<br>- Include new buildings or modify buildings to include certified LEED features?<br>- Provide a net increase in recycling or reuse of materials?<br>- Replace unsustainable practices with recognized sustainable practices? | |
| **14** | **Improve water supply reliability in ways not quantified in Attachment 7?** | No |
| | Examples are not limited to, but may include:<br>- Provide a more flexible mix of water sources?<br>- Reduce likelihood of catastrophic supply outages?<br>- Reduce supply uncertainty?<br>- Reduce supply variability? | |
| **15** | **Other – Social Costs** | Yes |

[1] This benefit category is marked as no because it was already described as a physically quantified benefit in Attachment 7.

## Narrative Description of Qualitative Benefits

Descriptions of the non-monetized benefits marked "Yes" from the checklist in Table 8-2 are described below.

## Provide Educational and Technology Benefits

*Program is one of the first of its kind, model for other districts*

As one of the first of its kind, the Sanitation District Automatic Water Softener Rebate and Outreach program has served as a model for other water and sanitation public entities, both in California and throughout the nation. The Sanitation District has fielded calls from interested water resource managers in nearby Inland Empire, Dixon, Ventura County, and Santa Paula. This project has been particularly valuable due to its multi-faceted approach, which includes public outreach and education, rebates, localized water quality monitoring, examining AWS purchase records, home inspections and reaching out to vendors. By undertaking this comprehensive, overarching approach and documenting what works, the Sanitation District program will

continue to serve as critical resource for any cities or water/sanitation districts undertaking similar programs going forward.

*Web portal clearinghouse for information on water softeners and conditioning systems that do not discharge added chloride to the sewer system*

Hard water can have unpleasant aesthetic effects, and Sanitation District understands people may be looking for alternatives once their AWS are removed. To help, it has put together a comprehensive website listing with more than 50 chloride-free alternatives. The site (www.lacsd.org/chloride) contains reviews and allows users to filter and browse by brand, technology, price and rating. It also provides local installation information. This is a unique resource – groups such as Consumer Reports do not typically review whole house water softening and conditioning systems – and the site gets substantial traffic from people both in and outside of the Sanitation District.

## Help Avoid, Reduce or Resolve Various Public Water Resource Conflicts

*Helps meet state mandated requirements*

The project will help the Sanitation District meet waste discharge requirements for chloride for the final effluent from Valencia and Saugus WRPs. The Sanitation District is firmly committed to reducing chloride sources in the sewerage system to the maximum extent technologically and economically feasible, and will continue to explore innovative and effective means to bring about this reduction. The Sanitation District has been working cooperatively with the Los Angeles Regional Water Quality Control Board towards the end of meeting chloride reduction requirements.

## Have Other Social Benefits

*Addresses equity, fairness issues through removal of relatively small numbers of AWS that are hurting larger community*

The Sanitation District has approximately 83,000 connections. The vast majority of these are law abiding households that either removed their AWS after they were banned or never had one in the first place. Only about 500 households operating illegal AWS remain, but they are affecting the larger community, who without their removal, would end up paying for additional advanced treatment or fines imposed by the state through potential rate increases.

## Other – Social Costs

*Households where AWS are removed may need to obtain alternatives or use harder water and experience associated impacts*

All else equal, households where AWS are removed will likely face harder water. Although they are primarily aesthetic, costs of hard water may include unpleasant taste and a residue on glass dishes. However, these adverse physical affects can be mitigated somewhat installing alternatives to AWS (e.g. a canister based systems) which do not emit chloride into the wastewater.

There are costs to installing these alternatives, both monetary and otherwise. The monetary costs are offset somewhat by the rebate, although in many cases the rebate may not cover the full cost of a non-chloride discharging alternative. The Sanitation District has done their best to reduce the non-monetary costs, largely by making researching and obtaining alternatives as easy as possible. Their website catalogs and includes consumer reviews for more than 50 whole-house water softening and conditioning systems that do not discharge added chloride to the sewer system. Each system includes contact information for local installation.

# Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)

## Monetized Benefits Analysis (Section D3)

Several monetized benefits are expected to accrue over the expected 25 year life of the project. Those include:

### Avoided Chloride Treatment Plant Costs

Since the Sanitation District implemented the Automatic Water Softener Rebate and Outreach Program in 2003, it has removed more than 7,900 AWS, reducing chloride concentrations by more than 50 mg/L (Sanitation Districts of Los Angeles County, 2012). Despite these gains, the chloride concentration in effluent from the WRPs is still higher than the state mandated limit of 100 mg/L. In order to meet the 100 mg/L limit, it will most likely be necessary to build a MF/RO plant. By removing approximately 5 mg/L of chloride concentration attributed to the remaining AWS, the rebate program allows the Sanitation District to build a relatively smaller (and less expensive) MF/RO plant (Santa Clarita Valley Sanitation District, 2013).

Capital expenditures associated with the MF/RO plant include MF/RO treatment facilities, a permeate pipeline from Valencia WRP to Saugus WRP, a brine pipeline from Valencia WRP to the Joint Outfall System for the WRPs. All facilities were sized to reduce chloride concentration from the highest anticipated level to 100 mg/L, using non-linear calculations. Three main chloride sources in addition to the AWS component were considered in sizing: the water supply component including chloride from local groundwater and imported water; the community component including chloride from shampoos, detergents, and other factors; and chloride loading from disinfection at the WRPs. Sizing for the worst case loading consisted of using a worst case scenario for the water supply component of 85 mg/L. The reduction in facility sizing due to the rebate and public outreach program involved redoing the calculations assuming a 5 mg/L chloride reduction due to AWS removal.

The Sanitation District has estimated that approximately $2.8 million in capital is estimated to be avoided in MF/RO treatment costs at Valencia WRP. Approximately $500,000 in capital cost is estimated to be avoided for the permeate pipeline from Valencia WRP to Saugus WRP and the associated pump station. Approximately $1.5 million in capital cost is estimated to be avoided for the brine pipeline from Valencia WRP to the Joint Outfall System and associated pump stations. In total, the project is expected to avoid capital costs of approximately $5 million dollars.

The Sanitation District also estimated the reduction in operations and maintenance costs due to AWS removal. The project is estimated to reduce operation and maintenance costs for MF/RO at Valencia WRP by approximately $300,000 per year, the permeate pipeline to Saugus WRP and the pump station by approximately $20,000 per year, and brine pipeline and pump station(s) by approximately $80,000 per year. The total avoided operations and maintenance costs are estimated to be $400,000 per year.

Exact timing of construction and beginning of operation of the MF/RO plant is currently uncertain. For purposes of this analysis, the Sanitation District estimates that plant will be operational in 2018 and that construction would be accomplished in 2016 and 2017. Therefore, the assumed plant capital costs are split equally between 2016 and 2017, resulting in a $2.5 million savings each year from the project. It is assumed the $400 thousand in annual operating savings start the next year and last for 25 years.

When using DWR's standard 6% discount rate, the present value of avoided MF/RO plant capital and O&M costs is $7.67 million in 2012 dollars. Table 8-3 summarizes the avoided costs from the project.

# Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)

## TABLE 8-3: ANNUAL COSTS OF AVOIDED PROJECTS

| (All avoided costs should be in 2012 dollars) | | | | | | |
|---|---|---|---|---|---|---|
| Project: Automatic Water Softener Rebate and Public Outreach Program (SCVWD-1) | | | | | | |
| | Costs | | | | Discounting Calculations | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| | Alternative (Avoided Project Name): _____ | | | | | |
| | Avoided Project Description: | | | | | |
| Year | Avoided Capital Costs | Avoided Replacement Costs | Avoided Operations and Maintenance Costs | Total Cost Avoided for Individual Alternatives (b) + (c) + (d) | Discount Factor | Discounted Costs (e) x (f) |
| **2013** | | | | 0 | 0.94340 | **0** |
| **2014** | | | | 0 | 0.89000 | **0** |
| **2015** | | | | 0 | 0.83962 | **0** |
| **2016** | 2,500,000 | | | 2,500,000 | 0.79209 | **1,980,234** |
| **2017** | 2,500,000 | | | 2,500,000 | 0.74726 | **1,868,145** |
| **2018** | | | 400,000 | 400,000 | 0.70496 | **281,984** |
| **2019** | | | 400,000 | 400,000 | 0.66506 | **266,023** |
| **2020** | | | 400,000 | 400,000 | 0.62741 | **250,965** |
| **2021** | | | 400,000 | 400,000 | 0.59190 | **236,759** |
| **2022** | | | 400,000 | 400,000 | 0.55839 | **223,358** |
| **2023** | | | 400,000 | 400,000 | 0.52679 | **210,715** |
| **2024** | | | 400,000 | 400,000 | 0.49697 | **198,788** |
| **2025** | | | 400,000 | 400,000 | 0.46884 | **187,536** |
| **2026** | | | 400,000 | 400,000 | 0.44230 | **176,920** |
| **2027** | | | 400,000 | 400,000 | 0.41727 | **166,906** |
| **2028** | | | 400,000 | 400,000 | 0.39365 | **157,459** |
| **2029** | | | 400,000 | 400,000 | 0.37136 | **148,546** |
| **2030** | | | 400,000 | 400,000 | 0.35034 | **140,138** |
| **2031** | | | 400,000 | 400,000 | 0.33051 | **132,205** |

**TABLE 8-3: ANNUAL COSTS OF AVOIDED PROJECTS**

| (All avoided costs should be in 2012 dollars) | | | | | | |
|---|---|---|---|---|---|---|
| Project: Automatic Water Softener Rebate and Public Outreach Program (SCVWD-1) | | | | | | |
| | Costs | | | | Discounting Calculations | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| | Alternative (Avoided Project Name): _____ | | | | | |
| | Avoided Project Description: | | | | | |
| Year | Avoided Capital Costs | Avoided Replacement Costs | Avoided Operations and Maintenance Costs | Total Cost Avoided for Individual Alternatives (b) + (c) + (d) | Discount Factor | Discounted Costs (e) x (f) |
| **2032** | | | 400,000 | 400,000 | 0.31180 | **124,722** |
| **2033** | | | 400,000 | 400,000 | 0.29416 | **117,662** |
| **2034** | | | 400,000 | 400,000 | 0.27751 | **111,002** |
| **2035** | | | 400,000 | 400,000 | 0.26180 | **104,719** |
| **2036** | | | 400,000 | 400,000 | 0.24698 | **98,791** |
| **2037** | | | 400,000 | 400,000 | 0.23300 | **93,199** |
| **2038** | | | 400,000 | 400,000 | 0.21981 | **87,924** |
| **2039** | | | 400,000 | 400,000 | 0.20737 | **82,947** |
| **2040** | | | 400,000 | 400,000 | 0.19563 | **78,252** |
| **2041** | | | 400,000 | 400,000 | 0.18456 | **73,823** |
| **2042** | | | 400,000 | 400,000 | 0.17411 | **69,644** |
| | | | | **Total Present Value of Discounted Costs (Sum of Column (g))** | | **7,669,367** |
| | | | | **(%) Avoided Cost Claimed by Project** | | |
| | **Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)** | | | | | |
| **Comments:** | | | | | | |

# Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)

## Reduce Potable Water Demand

Each AWS uses, on average, more than 4,400 gallons of water a year, and the Sanitation District anticipates removing the 500 operational AWS will result in annual reduction in potable water demand of approximately 6.78 AFY. This 6.78 AF benefit occurs as long as the removed AWS would have remained operational, assumed here as 25 years past completion of removal in 2015.

The estimated water savings will result in an equivalent amount of avoided imported water. CLWA has a contractual SWP Table A amount of 95,200 AFY of water from SWP. However, the marginal source of SWP water for CLWA is the water purchased from the Buena Vista-Rosedale Rio-Bravo Water Districts (BV/RRB) in Kern County. 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). This source currently costs roughly $800 per acre-foot (CLWA, 2013). Given the recent and projected rate of change of SWP supplies, this cost is expected to increase in real terms over the benefits lifetime of the project. We estimate that the cost of SWP imports will rise at a real rate (above inflation) of 3.5% annually through 2020, after which prices will likely escalate at a rate of 1.5% annually. We calculate the present value of future benefits of avoided water imports over the 25-year life of project benefits to be $79,016.

The main uncertainties associated with this benefit involve the quantity of potable water saved, which are average estimates and can vary depending on household water use, pre-treated water quality and AWS model. In addition, this benefit assumes households where AWS are removed do not replace them with other water-consuming alternatives. It is also possible that as water hardness increases once their AWS are removed, households may change their consumption habits. For example, they may use even less if they perceive hard water as inferior to their formerly treated soft water. Finally, the cost of the marginal water source is an estimate which also involves some degree of uncertainty.

Table 8-4 summarizes the annual water supply benefit from the project.

# Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)

**TABLE 8-4: ANNUAL BENEFIT**

(All benefits should be in 2012 dollars)

**Project: Automatic Water Softener Rebate and Public Outreach Program (SCVWD-1)**

| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
|---|---|---|---|---|---|---|---|---|---|
| **Year** | **Type of Benefit** | **Measure of Benefit (Units)** | **Without Project** | **With Project** | **Change Resulting from Project (e) – (d)** | **Unit $ Value (1)** | **Annual $ Value (1) (f) x (g)** | **Discount Factor (1)** | **Discounted Benefits (1) (h) x (i)** |
| **2012** | | | | | | 800.00 | | 1.00000 | |
| **2013** | | | | | | 828.00 | | 0.94340 | |
| **2014** | | | | | | 856.98 | | 0.89000 | |
| **2015** | | | | | | 886.97 | | 0.83962 | |
| **2016** | | | | | | 918.02 | | 0.79209 | |
| **2017** | Water Savings | AF | 0 | 6.78 | 6.78 | 950.15 | $6,442 | 0.74726 | **$4,814** |
| **2018** | Water Savings | AF | 0 | 6.78 | 6.78 | 983.40 | $6,667 | 0.70496 | **$4,700** |
| **2019** | Water Savings | AF | 0 | 6.78 | 6.78 | 1017.82 | $6,901 | 0.66506 | **$4,589** |
| **2020** | Water Savings | AF | 0 | 6.78 | 6.78 | 1053.45 | $7,142 | 0.62741 | **$4,481** |
| **2021** | Water Savings | AF | 0 | 6.78 | 6.78 | 1069.25 | $7,250 | 0.59190 | **$4,291** |
| **2022** | Water Savings | AF | 0 | 6.78 | 6.78 | 1085.29 | $7,358 | 0.55839 | **$4,109** |
| **2023** | Water Savings | AF | 0 | 6.78 | 6.78 | 1101.57 | $7,469 | 0.52679 | **$3,934** |
| **2024** | Water Savings | AF | 0 | 6.78 | 6.78 | 1118.09 | $7,581 | 0.49697 | **$3,767** |
| **2025** | Water Savings | AF | 0 | 6.78 | 6.78 | 1134.86 | $7,694 | 0.46884 | **$3,607** |
| **2026** | Water Savings | AF | 0 | 6.78 | 6.78 | 1151.88 | $7,810 | 0.44230 | **$3,454** |
| **2027** | Water Savings | AF | 0 | 6.78 | 6.78 | 1169.16 | $7,927 | 0.41727 | **$3,308** |
| **2028** | Water Savings | AF | 0 | 6.78 | 6.78 | 1186.70 | $8,046 | 0.39365 | **$3,167** |
| **2029** | Water Savings | AF | 0 | 6.78 | 6.78 | 1204.50 | $8,167 | 0.37136 | **$3,033** |
| **2030** | Water Savings | AF | 0 | 6.78 | 6.78 | 1222.57 | $8,289 | 0.35034 | **$2,904** |
| **2031** | Water Savings | AF | 0 | 6.78 | 6.78 | 1240.91 | $8,413 | 0.33051 | **$2,781** |
| **2032** | Water Savings | AF | 0 | 6.78 | 6.78 | 1259.52 | $8,540 | 0.31180 | **$2,663** |
| **2033** | Water Savings | AF | 0 | 6.78 | 6.78 | 1278.41 | $8,668 | 0.29416 | **$2,550** |

# Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)

**TABLE 8-4: ANNUAL BENEFIT**

(All benefits should be in 2012 dollars)

**Project: Automatic Water Softener Rebate and Public Outreach Program (SCVWD-1)**

| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
|---|---|---|---|---|---|---|---|---|---|
| **Year** | **Type of Benefit** | **Measure of Benefit (Units)** | **Without Project** | **With Project** | **Change Resulting from Project (e) – (d)** | **Unit $ Value (1)** | **Annual $ Value (1) (f) x (g)** | **Discount Factor (1)** | **Discounted Benefits (1) (h) x (i)** |
| **2034** | Water Savings | AF | 0 | 6.78 | 6.78 | 1297.59 | $8,798 | 0.27751 | **$2,441** |
| **2035** | Water Savings | AF | 0 | 6.78 | 6.78 | 1317.05 | $8,930 | 0.26180 | **$2,338** |
| **2036** | Water Savings | AF | 0 | 6.78 | 6.78 | 1336.81 | $9,064 | 0.24698 | **$2,239** |
| **2037** | Water Savings | AF | 0 | 6.78 | 6.78 | 1356.86 | $9,200 | 0.23300 | **$2,143** |
| **2038** | Water Savings | AF | 0 | 6.78 | 6.78 | 1377.21 | $9,338 | 0.21981 | **$2,052** |
| **2039** | Water Savings | AF | 0 | 6.78 | 6.78 | 1397.87 | $9,478 | 0.20737 | **$1,965** |
| **2040** | Water Savings | AF | 0 | 6.78 | 6.78 | 1418.84 | $9,620 | 0.19563 | **$1,882** |
| **2041** | Water Savings | AF | 0 | 6.78 | 6.78 | 1440.12 | $9,764 | 0.18456 | **$1,802** |
| **2042** | Water Savings | AF | 0 | 0 | 0 | 1461.73 | $- | 0.17411 | **$-** |
| | | | | | **Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)** | | | | **$79,016** |

Comments:

Note:
(1) Complete these columns if dollar value is being claimed for the benefit.

# Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)

## Project Economic Costs

Table 8-5 summarizes the economic project costs for the project. The total budgeted amount for the project is $3,371,563. The primary budgeted economic costs associated with this project include the rebate and removal costs, home inspections, outreach and monitoring. All money is expected to be spent (and the AWS removed) by the end of 2016. Total present value costs are estimated to be $2,987,860 when discounted to 2012 dollars using a 6% discount rate.

**TABLE 8-5: ANNUAL COSTS OF PROJECT**

| (All costs should be in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: Automatic Water Softener Rebate and Public Outreach Program (SCVWD-1) | | | | | | | | | | |
| | Initial Costs Grand Total Cost from Table 4-6 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| **2010** | $80,114 | | | | | | | $80,114 | 1.00000 | **$80,114** |
| **2011** | $320,457 | | | | | | | $320,457 | 1.00000 | **$320,457** |
| **2012** | $338,103 | | | | | | | $338,103 | 1.00000 | **$338,103** |
| **2013** | $434,346 | | | | | | | $434,346 | 0.94300 | **$409,588** |
| **2014** | $665,975 | | | | | | | $665,975 | 0.89000 | **$592,718** |
| **2015** | $693,153 | | | | | | | $693,153 | 0.83962 | **$581,985** |
| **2016** | $839,415 | | | | | | | $839,415 | 0.79209 | **$664,895** |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | | **$2,987,860** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |

**Comments:**

Notes:
(1) If any, based on opportunity costs, sunk costs and associated costs.
(2) The incremental change in O&M costs attributable to the project.

# Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)

## Project Benefits and Cost Summary

The expected benefits of the Sanitation District rebate project outweigh the costs by $4.76M, largely due to the avoided advanced wastewater treatment costs. Additional monetary benefits include the reduction of imported water through the removal of water-consuming AWS. The project also includes educational and technology benefits, improves social equity, and reduces water resource conflicts. Uncertain, more qualitative costs include the costs of hard water or alternative water softening or conditioning systems for households where AWS are removed. With an estimated 500 operational AWS, these costs are unlikely to be large, and it is expected the overall rebate project provides significant benefits.

This analysis of costs and benefits is based on available data and certain assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, the main uncertainties are associated with the avoided cost of the advanced wastewater treatment facilities and the annual benefit from the avoided water loss. These issues are listed in Table 8-6.

**TABLE 8-6: OMISSIONS, BIASES, AND UNCERTAINTIES, AND THEIR EFFECT ON THE PROJECT**

| Benefit or Cost Category | Likely Impact on Net Benefits* | Comment |
|---|---|---|
| Avoided MF/RO plant costs | U | There is some uncertainty associated with the estimate of chloride concentration reduction from AWS removal of 5 mg/L. If a different change in chloride concentration is assumed, then the avoided capital and O&M costs for the project will also be different. |
| Avoided MF/RO plant costs | U | The final compliance project will be considered by the Sanitation District Board in October 2013. However, the likely outcome of the Facilities Planning and EIR process is expected to be a project that includes advanced wastewater treatment and will be predicated on removal of AWS. |
| Annual benefit from avoided water loss | – | The project avoids water loss from avoided wasting of water during the AWS regeneration process. The savings used assumes that there will be no replacement of AWS with alternatives that use water. It is difficult to assess this possibility. |

*Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

## References

CLWA. 2013. IRWMP Water Savings Calcs. Excel spreadsheet with water use statistics provided to Stratus Consulting Inc., Boulder, CO.

Kennedy/Jenks Consultants, Luhdorff and Scalmanin Consultant Engineers, and Stacy Miller Public Affairs. 2011. 2010 Urban Water Management Plan, Final. Prepared for Castaic Lake Water Agency, Valencia Water Company, Los Angeles County Waterworks Division #36, Newhall County Water District, Santa Clarita Water Division. Prepared by Kennedy/Jenks Consultants, Nancy Clemm P.E., Luhdorff and Scalmanin Consulting Engineers, and Stacy Miller Public Affairs. June.

Santa Clarita Valley Sanitation District, 2013. Impact of AWS Removal on SCV Chloride Compliance Alts. Draft. Document sent to Stratus Consulting, Boulder, CO.

Sanitation Districts of Los Angeles County, 2012. 2012 Chloride Source Identification/Reduction, Pollution Prevention, and Public Outreach Plan. November.

# USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1)

## Summary

This project proposes an invasive weed control (especially Arundo donax, or arundo) and habitat restoration program in the Upper Santa Clara River watershed in two locations. One is near the City of Santa Clarita at the confluences of San Francisquito Creek and Bouquet Canyon Creek with the Santa Clara River (project SC-1). The second project site is on private land owned by a group of homeowners along the upper reaches of Bouquet Canyon Creek (project BCN-1). Two other invasive plant species – tamarisk and tree tobacco – will be controlled along with arundo when the plants are co-located. The Santa Clara River and its upper watersheds are some of the last watershed in Southern California in a relatively natural state. These riparian areas have one of the most extensive and diverse riparian habitats in the area and are critical wildlife migration corridors for the region. Arundo is the most problematic weed in southern California coastal rivers where it causes extensive flood damage, increases fire risk, and uses substantially more water than native vegetation.

This project expands off the Santa Clara River Arundo and Tamarisk Removal Program (SCARP). SCARP is a long-term eradication, monitoring, and maintenance plan to guide and facilitate the implementation of arundo and/or tamarisk removal projects within the upper Santa Clara River watershed. This program has consisted of demonstration projects, permitting, and educational programs as well as low impact removal. An EIR prepared in 2006 showed the impacts of removal of arundo and tamarisk to the Santa Clara River and its tributaries (VCRCD, 2006a). The findings showed that without removal, the plants would continue to spread and decrease the current water resources and cause a decline in native habitats. The project found that herbicide application with the proposed approach will not impact groundwater quality. Education programs for landowners and stakeholders further expanded the efforts to remove these species. Portions of the SCARP Site Specific Plan were funded with a Department of Water Resources Round 1 Implementation Grant.

A summary of all benefits and costs of the project are provided in Table 8-1. Monetized benefits and non-monetized benefits are presented in this attachment, while physically quantified (but not monetized) benefits are described in Attachment 7.

**TABLE 8-1: BENEFIT-COST ANALYSIS OVERVIEW**

| | **Present Value** |
|---|---|
| **Costs** – Total Capital and O&M | $545,918 |
| **Monetizable Benefits** | |
| Avoided imported water supply costs | $7,289,618 |
| Physically Quantified Benefit or Cost (Not Monetized) | **Project Life Total** |
| Avoided Introduction of Additional Chlorides Into the Watershed | 2,037 MT |
| Avoided $CO_2$ Emissions | 10,689 MT |
| Qualitative Benefit or Cost | **Qualitative Indicator*** |
| Provide Education/Technology Benefits | + |
| Reduced Fire Hazards | + + |
| Reduced Flooding Impacts | + + |
| Improved Wildlife Habitat | + + |
| Improved Surface and Groundwater Quality | + + |
| Decreased Stream Bank Erosion | + + |

**TABLE 8-1: BENEFIT-COST ANALYSIS OVERVIEW**

| | Present Value |
|---|---|
| Improved Groundwater Resources Management | + |
| Reduced Demand for Net Diversion from the Delta | + |
| Improved Water Supply Reliability | + |
| Improved Operational Flexibility for CLWA | + |

* Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease net benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

CLWA = Castaic Lake Water Agency
O&M = operations and maintenance
$CO_2$ = carbon dioxide

## Non-monetized Benefits Analysis (Section D2)

Table 8-2 shows the non-monetized benefits checklist for the project. Narrative descriptions of the benefit categories marked "Yes" in the following the table are provided in the narrative description of qualitative benefits section after the table.

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| | **Community/Social Benefits** | |
| | **Will the proposal** | |
| **1** | **Provide education or technology benefits?** | Yes |
| | Examples are not limited to, but may include:<br>- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?<br>- Develop, test or document a new technology for water supply, water quality, or flood damage reduction management?<br>- Provide some other education or technological benefit? | |
| **2** | **Provide social recreation or access benefits?** | No |
| | Examples are not limited to, but may include:<br>- Provide new or improved outdoor recreation opportunities?<br>- Provide more access to open space?<br>- Provide some other recreation or public access benefit? | |
| **3** | **Help avoid, reduce or resolve various public water resources conflicts?** | No |
| | Examples are not limited to, but may include:<br>- Provide more opportunities for public involvement in water management? | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| | - Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?<br>- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)? | |
| **4** | **Promote social health and safety?** | Yes |
| | Examples are not limited to, but may include:<br>- Increase urban water supply reliability for fire-fighting and critical services following seismic events?<br>- Reduce risk to life from dam failure or flooding?<br>- Reduce exposure to water-related hazards? | |
| **5** | **Have other social benefits?** | No |
| | Examples are not limited to, but may include:<br>- Redress or increase inequitable distribution of environmental burdens?<br>- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups? | |
| | **Environmental Stewardship Benefits:**<br>**Will the proposal** | |
| **6** | **Benefit wildlife or habitat in ways that were not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Cause an increase in the amount or quality of terrestrial, aquatic, riparian, or wetland habitat?<br>- Contribute to an existing biological opinion or recovery plan for a listed special status species?<br>- Preserve or restore designated critical habitat of a listed species?<br>- Enhance wildlife protection or habitat? | |
| **7** | **Improve water quality in ways that were not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Cause an improvement in water quality in an impaired water body or sensitive habitat?<br>- Prevent water quality degradation?<br>- Cause some other improvement in water quality? | |
| **8** | **Reduce net emissions in ways that were not quantified in Attachment 7?** | No[1] |
| | Examples are not limited to, but may include:<br>- Reduce net production of greenhouse gases?<br>- Reduce net emissions of other harmful chemicals into the air or water? | |
| **9** | **Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?** | No |
| | **Sustainability Benefits:** | |

**TABLE 8-2: NON-MONETIZED BENEFITS CHECKLIST (PSP TABLE 12)**

| No. | Question | Enter "Yes", "No", or "Neg" |
|---|---|---|
| | **Will the proposal** | |
| **10** | **Improve the overall, long-term management of California groundwater resources?** | Yes |
| | Examples are not limited to, but may include:<br>- Reduce extraction of non-renewable groundwater?<br>- Promote aquifer storage or recharge? | |
| **11** | **Reduce demand for net diversions for the regions from the Delta?** | Yes |
| **12** | **Provide a long-term solution in place of a short-term one?** | No |
| **13** | **Promote energy savings or replace fossil fuel-based energy sources with renewable energy and resources?** | No[1] |
| | Examples are not limited to, but may include:<br>- Reduce net energy use on a permanent basis?<br>- Increase renewable energy production?<br>- Include new buildings or modify buildings to include certified LEED features?<br>- Provide a net increase in recycling or reuse of materials?<br>- Replace unsustainable practices with recognized sustainable practices? | |
| **14** | **Improve water supply reliability in ways not quantified in Attachment 7?** | Yes |
| | Examples are not limited to, but may include:<br>- Provide a more flexible mix of water sources?<br>- Reduce likelihood of catastrophic supply outages?<br>- Reduce supply uncertainty?<br>- Reduce supply variability? | |
| **15** | **Other: Improved operational flexibility for CLWA** | Yes |

[1] This benefit category is marked as no because it was already described as a physically quantified benefit in Attachment 7.

## Narrative Description of Qualitative Benefits

Descriptions of the non-monetized benefits marked "Yes" from the checklist in Table 8-2 are described below.

### Provide Education/Technology Benefits

The project will be located within the City of Santa Clarita in a highly visible area bordered by recreational trails. This will allow the City to demonstrate a natural resource management project to the public, and increase public awareness of problems associated with invasive species.

## Promote Public Health and Safety

### Reduced Fire Hazards

Removal of arundo in the project area will contribute to reduced fire hazard. Under natural conditions, riparian areas act as firebreaks, but as they are overcome by invasive species, they not only enable wildfires to spread more rapidly, but they can also become sites where fires may originate. Arundo, in particular, is highly flammable and burns more intensely than native riparian vegetation even when green (VCRCD 2006b from Bell 1997; Dudley 2000).

Several accounts have suggested that infestations of arundo have increased fuel loads as well as fire frequency and intensity along riparian corridors. Growing from 13 to 26 feet in height, and as fast as 4 inches per day (Coffman et. al. 2010), arundo produces abundant flammable biomass that accumulates during the summer and fall months (Coffman et. al 2010 from Rundel, 2000). Further, several researchers have suggested that fire may increase the ability of arundo to invade natural riparian systems (studies identified in Coffman et al. 2010), and that it may be part of an invasive plant-fire regime cycle, changing riparian ecosystems from primarily flood-defined to fire-defined systems (Coffman et. al. from Bell 1997).

Coffman et. al. 2010 evaluated the influence of wildfire on arundo invasion by investigating its relative rate of reestablishment versus native riparian species after the Simi/Verdale wildfire burned 300 acres of riparian woodlands along the Santa Clara River in October 2003 (upstream of the project area). Post-fire arundo growth rates and productivity were compared to those of native woody riparian species in plots established before and after the fire. The researchers found that arundo re-sprouted within days after the fire, and exhibited higher growth rates and productivity compared to native riparian plants. One year post-fire, arundo density was nearly 20 times higher and productivity was 14–24 times higher than for native woody species.

The study concludes that the greater dominance of arundo after the wildfire increased the susceptibility of riparian woodlands along the Santa Clara River to subsequent fire, potentially creating an invasive plant-fire regime cycle. Decreased moisture content and increased surface-to-volume ratio of arundo versus native vegetation may lead to altered or increased fire susceptibility or increased probability of ignition in these systems. Addition of this fuel to the riparian ecosystem has increased vertical continuity (i.e., the structure of fuel allows fire to spread from surface to crowns of shrubs and trees). Due to its tall growth form, infestations of Arundo mixed with native species may spread fire vertically into the canopy of riparian trees.

The October 2003 Simi/Verdale wildfire provides an excellent example of the invasive plant-fire regime cycle that arundo invasion has created. The wildfire reached the Santa Clara River from the north, crossed the broad riverbed through large stands of arundo, and then burned through thousands of hectares of native shrublands and non-native grasslands before again entering extensive riparian woodlands intermixed with arundo to the west along the river. Without the presence of arundo, it is believed that the Santa Clara River would have served as a better fire break, and the fire would not have burned as many acres.

### Reduced Flooding Impacts

Both arundo and tamarisk are known to increase the potential for erosion of adjacent lands along the Santa Clara River. Both plants can alter stream geomorphology by trapping and stabilizing sediment, which narrows stream channels, widens floodplains, and causes increased flooding (VCRCD, 2006b). Large stands of arundo may also obstruct flows and shunt floodwaters into areas that historically have not experienced water flow. This can exacerbate bank erosion problems and lead to an unnatural increase in the loss of adjacent public and private property that is often valuable farmland (VCRCD, 2006b).

Furthermore, frequent flooding of the roadway along Bouquet Canyon Creek has been a consistent problem. Unlike native willows, which lay down flat during a flood, arundo remains standing, forming bottlenecks that

cause overflow of the creek bed and flooding of the roadway. The 2005 El Nino season is a case in point. Statements from road maintenance responders during the 2005 El Nino season flooding state, " large amounts of water and debris on roadway caused pavement wash out and damage, …, culverts clogged , trees killed and downed. Culvert completed clogged forcing stream onto road." While flooding events on Bouquet Canyon Road are not wholly attributable to invasive weed "bottlenecks", they have contributed to road damages exceeding $2,047,027 (Los Angeles County Department of Public Works, 2013).

## Benefit Wildlife or Habitat in Ways That Were Not Quantified in Attachment 7

Arundo and tamarisk threaten native riparian habitats and the wildlife that depends upon these habitats by excluding native plants from water resources, growing space, and sunlight. Arundo often forms dense monocultures that exclude native vegetation by monopolizing water resources, shading, and altering flood regimes critical to the establishment of native riparian vegetation (Bell 1997; Dudley 2000). The salt-laden leaf litter of tamarisk also precludes such native understory from establishing. Both plants do not offer the same amount of shade as native vegetation (Carpenter 1998).

Both arundo and tamarisk reduce habitat quality and food supply for native wildlife, including insects and bird species (Bell 1997; Dudley 2000). Insects and other grazers are not able to use arundo as a food source due to the noxious chemicals it contains and its defensive cellular structure (Bell 1997). This is particularly important for federal and state listed species, such as least Bell's vireo, southwestern willow flycatcher, and yellow-billed cuckoo, which utilizes insects as a food source. Documented decreases in wildlife usage of riparian areas have occurred due to massive stands of arundo (Dudley 2000).

Based on a review of pertinent literature and of historical sensitive plant species locations identified in the California Natural Diversity Database (CDFG 2002), a total of 19 special status plant species and 21 special status wildlife species have the potential to occur within the broader SCARP project area. Of these 21 species, eight are federally listed under the Federal Endangered Species Act. Specific species of concern associated with this project include the unarmored three-spine stickleback, western pond turtle, and red legged frog.

Removal of arundo and tamarisk, and native plant reestablishment through this project will allow restoration of high quality habitat in the project area.

## Improve Water Quality in Ways That Were Not Quantified in Attachment 7

### Improved Surface and Groundwater Quality

Being a giant grass, arundo provides little shade along the river compared to native vegetation such as willows, sycamores, and live oaks, which have strong branches that can support wide spreading growth habitat, and/or large leaves that shade streamside habitats in the summer.

Where arundo is dominant, the lack of shade causes water temperatures in the river to increase compared to areas where native vegetation is dominant, which can ultimately lead to a reduction in dissolved oxygen, making the water unsuitable for aquatic organisms (VCRCD 2006b from Bell 1997). In addition, increased light exposure and temperature may encourage algal blooms, which can increase pH levels and severely reduce available habitat for aquatic organisms (VCRCD 2006b from Adamus et al. 1997). Increased pH also facilitates the conversion of usable ammonia to a toxic byproduct, which degrades water quality. All of these changes can adversely affect beneficial uses of the river, including habitat for rare and sensitive species.

Manipulation of water resources to benefit agriculture and urbanization has caused severe impairment of the natural flow activity of the river and may be responsible for the decline of dependent species in the watershed. Water quality in segments of the lower Santa Clara River are also impaired by several point and non-point source pollutants, including TDS (total dissolved solids), chloride, coliform, sulfate, ammonia, pH, and toxaphene (Stillwater Sciences 2008). Several reaches of the lower Santa Clara River, including the

estuary, were listed on the 2006 303(d) list of impaired waters by the Los Angeles Regional Water Quality Control Board – (LARWQCB 2007). In addition, several pollutants of concern have been identified in stormwater discharge to the river, including total and fecal coliform, mercury, polyaromatic hydrocarbons, pesticide residues including DDT, suspended solids, copper, lead, thallium, bis(2-ethylhexyl) phthalate, and phosphorous (Stillwater Sciences 2008). Poor water and introduced, invasive species may be responsible for the decline of some species in the watershed (Kelley 2004).

#### Decreased Stream Bank Erosion

Both arundo and tamarisk are known to increase the potential for erosion of adjacent lands along the Santa Clara River. Both plants can alter stream geomorphology by trapping and stabilizing sediment, which narrows stream channels, widens floodplains, and causes increased flooding (VCRCD, 2006b). Large stands of arundo may also obstruct flows and shunt floodwaters into areas that historically have not experienced water flow. This can exacerbate stream bank erosion problems and lead to an unnatural increase in the loss of adjacent public and private property that is often valuable farmland (VCRCD 2006b).

### Improve the Overall, Long-Term Management of California Groundwater Resources

This project will reduce the uptake of scarce water resources by non-native plants, improving the overall, long-term management of California groundwater resources.

### Reduce Demand for Net Diversions from the Delta

By reducing the use of imported SWP water, this project will augment in-stream flows in the Sacramento-San Joaquin Delta or will offset other diversions that may otherwise reduce flows. Reduced demands on Delta supplies also will help reduce the overall salinity of the Delta and improve Delta habitat.

Maintaining the Delta's environmental condition is vital to maintaining and improving the viability of the region. The Delta provides drinking water to 25 million people, supports irrigation of 4.5 million acres of agriculture, and serves as home to 750 plant and animal species. The Delta's 1,600 square miles of marshes, islands, and sloughs support at least half of migratory water birds on the Pacific Flyway; 80% of California's commercial fisheries; and recreational uses including boating, fishing, and windsurfing.

Delta resources are in a state of crisis. Fish populations, including salmon and Delta-smelt, have declined dramatically in recent years. The levee system is aging, and vulnerability of the Delta to flooding, sea level rise, or a major earthquake has contributed to concerns about possible levee collapse which would result in devastating impacts to both water supply and habitat.

### Improve Water Supply Reliability

The project will offset 420 AFY of imported SWP water use for water retailers served by CLWA, which in total serves approximately 43,000 AF of SWP water to its retailers (Kennedy/Jenks Consultants et al., 2011). The reliability of a water supply refers to its ability to meet water demands on a consistent basis, even in times of drought or other constraints on source water availability. The reliability of imported water is subject to a number of natural and human forces, ranging from increased population growth (and accompanying increased demands on the SWP system), to drought and earthquakes, to environmental regulations and water rights determinations.

Although interest in water supply reliability is increasing (e.g., due to increasing water demands and concerns over climate-related events), only a few studies have directly attempted to quantify its value (i.e., through nonmarket valuation studies). The results from these studies indicate that residential and industrial (i.e., urban) customers seem to value supply reliability quite highly (i.e., through nonmarket valuation studies, see for example Carson and Mitchell, 1987; CUWA, 1994; Griffin and Mjelde, 2000; Wolfe, 2007; and Raucher

et al, 2013). Stated preference studies find that water customers are willing to pay $100 to $535 per household per year for total reliability (i.e., a 0% probability of their water supply being interrupted in times of drought).

Due to the uncertainty involved in applying these numbers to this situation, this benefit estimate is not monetized.

### Improved Operational Flexibility for CLWA

Water savings achieved by the project will offset the use of 420 AFY of imported SWP water. This will help CLWA directly in its supply operations, allowing for longer shutdowns and improving system reliability. The value of this increased operational flexibility is not monetized in the benefit tables.

## Summary of Non-Monetized Benefits

Although none of the benefits outlined above are monetizable, they serve to significantly increase the value of the proposed project. These benefits include:

- Education/technology
- Wildlife/habitat
- Improved water quality
- Improved groundwater resources management
- Reduce demand for net diversion for the region from the Delta
- Improved water supply reliability
- Reduced stream bank erosion
- Decreased fire hazard
- Improved operational flexibility for CLWA

## Monetized Benefits Analysis (Section D3)

The project is expected to result in avoided imported water costs for water retailers served SWP water by CLWA. The monetization of this benefit is discussed below.

### Avoided Imported Water Supply Costs

The annual benefits were calculated based on the physical change in water savings calculated in Attachment 7. Annual physical benefits were identified for water savings where every acre of arundo treated results in a water savings of 20 AFY. A total of 42 acres of arundo will be treated in this project, resulting in a water savings of 840 AFY. It is estimated that on average about 50% of the water saved as a result of this project will be recovered from the regional groundwater aquifer. The remaining water will be available as surface flows downstream. CLWA purveyors will use the groundwater made available by this project in lieu of imported SWP water, because groundwater is a much less expensive source of supply. Thus approximately 420 AFY of saved groundwater is assumed to be used every year by retailers supplied SWP water by CLWA. This will result total imported water savings of 21,000 AF over the assumed 50-year life of the project.

The estimated water savings will result in an equivalent amount of avoided imported water, which currently costs roughly $800 per acre-foot for CLWA's marginal source of SWP water (CLWA, 2013). Given the recent and projected rate of change of SWP supplies, this cost is expected to increase in real terms over the benefits lifetime of the project. We estimate that the cost of SWP imports will rise at a real rate (above inflation) of 3.5% annually through 2020, after which prices will likely escalate at a rate of 1.5% annually.

Assuming this rise in rates, we approximate the present value of all future benefits of avoided water imports over the 50-year life of project benefits to be $7,289,618. A summary of monetized benefits for this project is shown in Table 8.3.

**TABLE 8-3: ANNUAL BENEFIT**

| (All benefits in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value (1) | Annual $ Value (1) (f) x (g) | Discount Factor (1) | Discounted Benefits (1) (h) x (i) |
| **2012** | | | | | | 800.00 | | 1.00000 | |
| **2013** | | | | | | 828.00 | | 0.94340 | |
| **2014** | Avoided imported water | AF | 0 | 296 | 296.24 | 856.98 | $253,867 | 0.89000 | **$225,941** |
| **2015** | Avoided imported water | AF | 0 | 405 | 405.02 | 886.97 | $359,238 | 0.83962 | **$301,623** |
| **2016** | Avoided imported water | AF | 0 | 420 | 420.00 | 918.02 | $385,568 | 0.79209 | **$305,406** |
| **2017** | Avoided imported water | AF | 0 | 420 | 420.00 | 950.15 | $399,063 | 0.74726 | **$298,203** |
| **2018** | Avoided imported water | AF | 0 | 420 | 420.00 | 983.40 | $413,030 | 0.70496 | **$291,170** |
| **2019** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,017.82 | $427,486 | 0.66506 | **$284,302** |
| **2020** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,053.45 | $442,448 | 0.62741 | **$277,597** |
| **2021** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,069.25 | $449,085 | 0.59190 | **$265,812** |
| **2022** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,085.29 | $455,821 | 0.55839 | **$254,528** |
| **2023** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,101.57 | $462,658 | 0.52679 | **$243,723** |
| **2024** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,118.09 | $469,598 | 0.49697 | **$233,376** |
| **2025** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,134.86 | $476,642 | 0.46884 | **$223,468** |
| **2026** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,151.88 | $483,792 | 0.44230 | **$213,981** |
| **2027** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,169.16 | $491,048 | 0.41727 | **$204,897** |
| **2028** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,186.70 | $498,414 | 0.39365 | **$196,199** |
| **2029** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,204.50 | $505,890 | 0.37136 | **$187,870** |
| **2030** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,222.57 | $513,479 | 0.35034 | **$179,894** |
| **2031** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,240.91 | $521,181 | 0.33051 | **$172,257** |
| **2032** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,259.52 | $528,999 | 0.31180 | **$164,944** |
| **2033** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,278.41 | $536,934 | 0.29416 | **$157,942** |

# USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1)

**TABLE 8-3: ANNUAL BENEFIT**

| (All benefits in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value (1) | Annual $ Value (1) (f) x (g) | Discount Factor (1) | Discounted Benefits (1) (h) x (i) |
| **2034** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,297.59 | $544,988 | 0.27751 | **$151,237** |
| **2035** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,317.05 | $553,162 | 0.26180 | **$144,816** |
| **2036** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,336.81 | $561,460 | 0.24698 | **$138,669** |
| **2037** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,356.86 | $569,882 | 0.23300 | **$132,782** |
| **2038** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,377.21 | $578,430 | 0.21981 | **$127,145** |
| **2039** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,397.87 | $587,106 | 0.20737 | **$121,747** |
| **2040** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,418.84 | $595,913 | 0.19563 | **$116,579** |
| **2041** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,440.12 | $604,852 | 0.18456 | **$111,629** |
| **2042** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,461.73 | $613,925 | 0.17411 | **$106,890** |
| **2043** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,483.65 | $623,133 | 0.16425 | **$102,353** |
| **2044** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,505.91 | $632,480 | 0.15496 | **$98,008** |
| **2045** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,528.49 | $641,968 | 0.14619 | **$93,847** |
| **2046** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,551.42 | $651,597 | 0.13791 | **$89,863** |
| **2047** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,574.69 | $661,371 | 0.13011 | **$86,048** |
| **2048** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,598.31 | $671,292 | 0.12274 | **$82,395** |
| **2049** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,622.29 | $681,361 | 0.11579 | **$78,897** |
| **2050** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,646.62 | $691,581 | 0.10924 | **$75,548** |
| **2051** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,671.32 | $701,955 | 0.10306 | **$72,340** |
| **2052** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,696.39 | $712,485 | 0.09722 | **$69,269** |
| **2053** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,721.84 | $723,172 | 0.09172 | **$66,329** |
| **2054** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,747.67 | $734,019 | 0.08653 | **$63,513** |
| **2055** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,773.88 | $745,030 | 0.08163 | **$60,816** |

# USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1)

**TABLE 8-3: ANNUAL BENEFIT**

| (All benefits in 2012 dollars) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Project: USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1) | | | | | | | | | |
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| Year | Type of Benefit | Measure of Benefit (Units) | Without Project | With Project | Change Resulting from Project (e) – (d) | Unit $ Value (1) | Annual $ Value (1) (f) x (g) | Discount Factor (1) | Discounted Benefits (1) (h) x (i) |
| **2056** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,800.49 | $756,205 | 0.07701 | **$58,235** |
| **2057** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,827.50 | $767,548 | 0.07265 | **$55,762** |
| **2058** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,854.91 | $779,061 | 0.06854 | **$53,395** |
| **2059** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,882.73 | $790,747 | 0.06466 | **$51,128** |
| **2060** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,910.97 | $802,609 | 0.06100 | **$48,958** |
| **2061** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,939.64 | $814,648 | 0.05755 | **$46,879** |
| **2062** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,968.73 | $826,867 | 0.05429 | **$44,889** |
| **2063** | Avoided imported water | AF | 0 | 420 | 420.00 | 1,998.26 | $839,270 | 0.05122 | **$42,984** |
| **2064** | Avoided imported water | AF | 0 | 124 | 123.77 | 2,028.24 | $251,025 | 0.04832 | **$12,129** |
| **2065** | Avoided imported water | AF | 0 | 15 | 14.99 | 2,058.66 | $30,849 | 0.04558 | **$1,406** |
| | | | | **Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)** | | | | | **$7,289,618** |

**Comments: The USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1) Project will avoid the use of 420 AFY of SWP water, which is half of the total water savings calculated as a result of arundo removal. The cost of CLWA's marginal source of SWP water is $800/AF in 2012 dollars. This cost is assumed to escalate at a 3.5% real rate through 2020 and a 1.5% real rate thereafter.**

Note:
(1) Complete these columns if dollar value is being claimed for the benefit.

# USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1)

## Project Economic Costs

Initial projects costs for this project total $572,225. This covers cost of invasive species removal and initial spraying of re-sprouts. Maintenance costs for re-spraying sprouts and monitoring will also be needed to maintain invasive species removal. Annual maintenance costs for the SC-1 and BCN-1 portions of the project combined are assumed to be $6,000 per year for 6 years following project implementation. These costs are assumed to be expended after initial costs of the project have been expended, over 4 years through 2020. As shown in Table 8-4, the present value of initial and maintenance costs for the project total is $545,918.

# USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1)

## TABLE 8-4: ANNUAL COSTS OF PROJECT

| (All costs in 2012 Dollars) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Project: USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1) | | | | | | | | | | |
| | Initial Costs Grand Total Cost from Table 4-7 (row (i), column (d)) | Adjusted Grant Total Cost[1] | Annual Costs [2] | | | | | | Discounting Calculations | |
| | | | Admin | Operation | Maintenance | Replacement | Other | Total Costs (a) +…+ (g) | Discount Factor | Discounted Project Costs (h) x (i) |
| Year | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
| **2012** | | | | | | | | $ - | 1.00000 | **$ -** |
| **2013** | $401,869 | | | | | | | $401,869 | 0.94340 | **$379,121** |
| **2014** | $148,731 | | | | | | | $148,731 | 0.89000 | **$132,370** |
| **2015** | $17,450 | | | | | | | $17,450 | 0.83962 | **$14,651** |
| **2016** | $4,175 | | | | | | | $4,175 | 0.79209 | **$3,307** |
| **2017** | | | | | $6,000 | | | $6,000 | 0.74726 | **$4,484** |
| **2018** | | | | | $6,000 | | | $6,000 | 0.70496 | **$4,230** |
| **2019** | | | | | $6,000 | | | $6,000 | 0.66506 | **$3,990** |
| **2020** | | | | | $6,000 | | | $6,000 | 0.62741 | **$3,764** |
| | | | | | | | | **Total Present Value of Discounted Costs (Sum of column (j))** | | **$545,918** |
| | | | | | | | | **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries** | | |

Notes:
(1) If any, based on opportunity costs, sunk costs and associated costs.
(2) The incremental change in O&M costs attributable to the project.

# USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1)

## Project Benefits and Cost Summary

The present value of avoided SWP water imports enabled by groundwater savings as a result of the project totals $7,289,618. The present value of total costs for the project totals $549,470, for a net benefit from the project of $6,740,148.

In addition to the monetized benefit of avoided water imports, there are a wide range of important non-monetized benefits from the project. The project enables reduced fire and flooding risk, greatly improved wildlife habitat, improved water supply reliability, reduced stream bank erosion, improved water quality in the Santa Clara River and in groundwater, improved groundwater management, and improved operational flexibility for CLWA.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, the main uncertainties are associated with the amount of water savings achieved by replacing arundo with native vegetation. This issue is discussed in Table 8-5.

**TABLE 8-5: OMISSIONS, BIASES, AND UNCERTAINTIES, AND THEIR EFFECT ON THE PROJECT**

| Benefit or Cost Category | Likely Impact on Net Benefits* | Comment |
|---|---|---|
| Avoided Imported Water Supply Costs | + + | Water savings estimates are based on a very conservative assumption made by researchers on the arundo stand transpiration rate compared to the transpiration rate for native vegetation. Although transpiration rates of 40 mm/day were found, researchers conservatively used a value of 20 mm/day as their recommended estimate (California Invasive Plant Council, 2011). As a result, the savings from natural replacement of native vegetation instead of arundo is likely significantly under-estimated, and therefore the value of avoided SWP water imports is also underestimated. |

*Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
+ + = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

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## TABLE 20: PROPOSAL BENEFITS AND COSTS SUMMARY

**Proposal: Upper Santa Clara River**

**Agency: Castaic Lake Water Agency**

| Project | Project Proponent | Total Present Value Project Costs (1) | Total Present Value Project Benefits: From Section D3 – Monetized (2) | Total Present Value Project Benefits: From Section D4 – Flood Damage Reduction (3) | Total Present Value Project Benefits: Total | From Section D1 – Cost-Effectiveness Analysis, Cost Savings | From Section D2 – Briefly describe the main Non-monetized benefits |
|---|---|---|---|---|---|---|---|
| (a) | (b) | (c) | (d) | (e) | (f) = (d) + (e) | (g) | (h) |
| **Santa Clarita Valley Water Use Efficiency Strategic Plan Programs (CLWA-3)** | Castaic Lake Water Agency (CLWA) | 2,194,116 | 3,180,339 | - | 3,180,339 | | The project helps meet the state water conservation mandate, improves water supply reliability, improves operational flexibility for CLWA, promotes social health and safety, avoids water quality impacts of urban runoff, and reduces net demand on the Delta. |
| **Santa Clarita Water Division Water Use Efficiency Programs (SCWD-2)** | Santa Clarita Water District (SCWD) | 281,081 | 877,335 | - | 877,335 | | The project helps meet the state water conservation mandate, improves water supply reliability, improves operational flexibility for CLWA, promotes social health and safety, avoids water quality impacts of urban runoff, and reduces net demand on the Delta. |
| **Foothill Feeder Connection (CLWA-8)** | Castaic Lake Water Agency (CLWA) | 41,273,114 | 55,047,104 | - | 55,047,104 | | The project increases safety due to improved seismic stability, increases water supply system reliability and accommodates system expansion, increases operational flexibility and treatment reliability for CLWA, and increases water education programming. |
| **Pellet Water Softening Treatment Plant - Phase 1 (NCWD-2)** | Newhall County Water District (NCWD) | 177,620 | 533,681 | - | 533,681 | | The project provides valuable information about cost and community support for a pellet-based water softening treatment plant, provides an equitable solution to hardness in drinking water, providing everyone with softer water cheaper than through individual purchase, and will result in fewer alternative canister softener deliveries meaning less greenhouse gas emissions. |
| **Automatic Water Softener Rebate and Public Outreach Program (SCVSD-1)** | Santa Clarita Valley Sanitation District (SCVSD) | 2,987,860 | 7,748,382 | - | 7,748,382 | | The project reduces chloride levels in the discharges from its two water reclamation plants, provides a web portal clearinghouse for information on water softeners and conditioning systems that do not discharge added chloride to the sewer system, reduces water resource conflicts by reducing downstream pollutants, addresses equity and fairness issues through removal of relatively small numbers of AWS that are hurting larger community, provides a program that is one of the first of its kind and a model for other districts, |
| **USCR Arundo/Tamarisk Removal Program (SCARP) Implementation (SC-1/BCN-1)** | City of Santa Clarita, Bouquet Canyon Creek homeowners | 545,918 | 7,289,618 | - | 7,289,618 | | The project reduces fire hazards by removing arundo, reduces flooding impacts, improves wildlife habitat, improves surface and groundwater quality, decreases stream bank erosion, improves groundwater resources management, reduces demand for net diversion from the Delta, improved water supply reliability, and improved operational flexibility for CLWA |