Gateway Integrated Multi-Benefit Regional Water Management Project

Technical Justification

Los Angeles Gateway Water Management Authority

Pico Rivera Emergency Intertie

Project Physical Benefits

The intertie project will prevent the need to import water via tanker trucks in the event of an emergency such as an earthquake or other event causing a rupture or equivalent interruption in the City's water supply lines or migrating contamination from the TCE and PCE contaminated plume to the north.

The volume of 1,500 acre-feet (AF) used in the case of a supply interruption was estimated using the following information[1]:

February 2013 Well No. 1 Production = 246.60 AF

January 2013 Well Production = 268.41 AF

Assuming an average production rate of 250 AF per month:

Estimated production for 6 months = 250 AF x 6 months

Total Volume = 1,500 AF

Water quality of the water provided by the intertie (during the period of the emergency) will be substantially better than the alternative of providing water via tanker truck. The intertie water will be from a source with known quality control procedures in place. Trucked in water will be from the best available source that can be found on short notice and using the best available trucks available on short notice. The term "best available" suggests an unknown and unguaranteed water quality. Additionally, if the emergency is widespread, a shortage of water and tanker trucks is likely.

One of the two primary wells of the northern system is currently undergoing monthly monitoring for VOC's and the second primary well (being in close proximity to the contamination) is subject to potential contamination. Being able to provide water from the intertie will improve the water by not drawing from a contaminated source.

This project will result in energy saved and a significant reduction in greenhouse gases in the event of an emergency by avoiding the need for numerous truck trips (delivering water, portable toilets, etc.).

In the event of an emergency, there will be no supplied water to the fire hydrants, necessitating an unpredictable number of trips by emergency vehicles and more substantial release of carbon dioxide and other greenhouse gases as compared to being able to extinguish the fire in a timely manner.

Alternatives for Addressing Water Quality Objectives

The City of Pico Rivera provides water service to over 65,000 residents through two separate water suppliers, which are currently not physically connected. This project will allow the suppliers to support each other during major emergencies. At present, there are no backup water sources available within the service area to continue to provide water services under emergency conditions.

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[1] City of Pico Rivera Water Authority, *Monthly Water Production Report*, February 2013.

In an emergency situation, the Pico Rivera water system in the northern part of the City is susceptible to the following:

1. Potential groundwater contamination in the Plant No. 1 located in the northern part of the City due to presence of VOC in the groundwater in Whittier Narrows Area
    a. One of the two primary wells of the northern system, Well No. 2, recently indicated the presence of Trichloroethylene (TCE) and Perchloroethylene (PCE) in the water and is currently undergoing monthly monitoring for VOC's as directed by the California Department of Health Services.
    b. The other well of the northern system, Well No. 1, is located in close proximity to Well No. 2 and is therefore susceptible to the same contamination. In the case that Well No. 1 is determined to be contaminated, the City will be forced to import water until an alternative is provided.
2. Loss of water supply due to a catastrophic event such as an earthquake.
3. Loss of fire flow capacity and supplemental capacity in the western part of the City.

Below are the two scenarios for an emergency situation.

I. **No Intertie**: estimated of cost for ***purchasing*** water from other agencies for a period of six (6) months if all three (3) event conditions above occur twice in 30 year study period:

Total volume of water purchased:	1,500 acre-feet (AF)
At a Unit Cost of $1,032 per AF:	$1,548,000
Administrative and Other Associated Costs:	10% or $154,800
Per Occurrence:	$1,702,800
Total Cost for Two (2) Occurrences:	$3,405,600

II. **Intertie and Main Constructed**: estimated cost for ***transferring*** water from wells in the south to serve service areas in the north for a period of six (6) months if all three (3) event conditions above occur twice in 30 year study period:

Total volume of water transferred:	1,500 acre-feet (AF)
At a Unit Cost of $350 per AF:	$525,000
Administrative and Other Associated Costs:	10% or $52,500
Per Occurrence:	$577,500
Total Cost for Two (2) Occurrences:	$1,115,000

TOTAL BENEFIT (2012): $3,405,600 – $1,155,000 =

$2,250,600 (OR $75,020 PER YEAR IN 2012)

Another alternative to address the current emergency issue would be to install backup water wells, water mains, and water storage tanks. However, this option is cost prohibitive considering the short duration of an emergency water need and the likelihood of occurrence of such event.

Annual Physical Benefits

This project will provide 1,500 AF of water supply available to the City of Pico Rivera. Since the benefits of this project will be observed during emergency situations rather than at a constant rate or anticipated frequency, the annual physical benefits are limited to the amount of water which would otherwise be unavailable (see Table 1). See Attachment 8 herewith for additional benefits.

Table 1: Annual Project Physical Benefits.

Name: Gateway Integrated Multi-Benefit Regional Water Management Project – Pico Rivera Intertie
Type of Benefit Claimed: providing uninterrupted supply of water with good quality
Measure of Benefit Claimed (Name of Units): Intertie installed; 1,500 acre-feet available

Physical Benefits			
Year Ending June of	**Without Project Emergency Acre-ft available**	**With Project Emergency Acre-ft available**	**Change Resulting from Project In acre-ft available**
2014	0	0	0
2015	0	1,500	1,500
2016	0	1,500	1,500
2017	0	1,500	1,500
2018	0	1,500	1,500

Advance Groundwater Wellhead Treatment Facility

Project Physical Benefits

This project will recover and treat impaired groundwater to increase local drinking water supplies and provide reliability for the City of Signal Hill service area to meet water demands. The Project will reduce demands for purchasing imported water from the Metropolitan Water District of Southern California (MWD), and increase the City's local water supply source. The projected Wellhead Treatment Facility yield is expected to be approximately 1,700 acre-feet per year (AFY).

The benefits include treating local impaired groundwater for potable use to satisfy current and future water demands and providing a reliable local water supply source of approximately 1,700 acre-feet per year (AFY) from an otherwise unusable source. Benefits will be received immediately following the complete of construction when the treatment facilities will be operational and producing potable water to the distribution system. Local dependency on imported water from Metropolitan Water District would be reduced, thereby alleviating freshwater shortages. A sustainable infrastructure would be constructed with this treatment facility and would provide long-term benefits to the City of Signal Hill's water service area. In addition, by utilizing local groundwater in lieu of MWD water, there will also be a reduction of 1,310 tons of carbon dioxide released into the atmosphere annually. This pollution reduction will occur by reductions in the amount of energy that would have been used to pump this same amount of imported water over the Tehachapi Mountains and into Southern California.

Organic colored water is currently present in the aquifer systems the City wants to utilize. The color concentrations have accumulated in the groundwater to the point that it exceeds the Maximum Contaminant Level (MCL) in drinking water by almost four times, therefore the water cannot be used as a municipal supply source without treatment. If the project is not constructed, future demands would need to be served with imported water from MWD.

Annual Physical Benefits

This project will provide 1,700 acre-feet of groundwater supply available to the City of Signal Hill, which would otherwise be unavailable (see Table 2).

Table 2: Annual Project Physical Benefits.

Name: Gateway Integrated Multi-Benefit Regional Water Management Project - Wellhead Treatment Facility
Type of Benefit Claimed: Treating impaired groundwater to use as a potable source thereby reducing import water demand
Measure of Benefit Claimed (Name of Units): Acre-Feet per year

Physical Benefits			
Year	**Groundwater Available (Acre-Feet) Without Project**	**Groundwater Available (Acre-Feet) With Project**	**Change Resulting from Project In Acre-Feet per Year Available**
2013	0	1,700	1,700
2014	0	1,700	1,700
2015	0	1,700	1,700
2016	0	1,700	1,700

By utilizing local groundwater, there will be a reduction of 1,310 tons of carbon dioxide released into the atmosphere annually (see Table 3). This pollution reduction will occur by reductions in the amount of energy that would have been used to pump this same amount of imported water over the Tehachapi Mountains and into Southern California (see Table 4).

Table 3: Annual Project Physical Benefits – Greenhouse Gas Emissions.

Name: Gateway Integrated Multi-Benefit Regional Water Management Project - Wellhead Treatment Facility
Type of Benefit Claimed: Reduction of greenhouse gas emissions.
Measure of Benefit Claimed (Name of Units): Metric Tons of reduced greenhouse gas emissions.

Physical Benefits			
Year	**Reduced Greenhouse Gas Emissions (Metric Tons) Without Project**	**Reduced Greenhouse Gas Emissions (Metric Tons) With Project**	**Change Resulting from Project Greenhouse Gas Emissions In Metric Tons Reduced Per Year**
2014	0	0	0
2015	0	1,310	1,310
2016	0	1,310	1,310

Greenhouse gas (GHG) valuation is based on 2013 Reserve Price Notices published by the California Environmental Protection Agency Air Resources Board (ARB) as part of the State's Cap-and-Trade Program. The program is a central element of California's Global Warming Solutions Act (AB 32) and covers major sources of GHG emissions in the State such as refineries, power plants, industrial facilities, and transportation fuels. The regulation includes an enforceable GHG cap that will decline over time. ARB will distribute allowances, which are tradable permits, equal to the emission allowed under the cap. Not only do ARB auctions generally curtail the production of GHGs, but they also raise substantial funds for the State.[2]

[2] Los Angeles Times, "California's First Carbon-Credit Auction Raises $290 Million," November 20, 2012.

Table 4: Indirect GHG Emissions from Electricity Use.

Emissions Scenario	Potable Water Estimate	Electrical Consumption Factor	Annual Electrical Consumption	CO_2 Emission Factor (5)	CH_4 Emission Factor (4)	N_2O Emission Factor (4)	CO_2 Emission	CH_4 Emission	N_2O Emission	Annual CO_2e Emissions
	MG/yr	kwh/MG	MWh/yr	lbs/MWh	lbs/MWh	lbs/MWh	$MTCO_2/yr$	$MTCH_4/yr$	MTN_2O/yr	$MTCO_2e/yr$
Groundwater	463.69	3786.63	1755.82	630.89	0.0302	0.0081	502.46	0.0241	0.0065	504.98
SWP East Branch CA Aqueduct (1)	463.69	9820.43	4553.63	630.89	0.0302	0.0081	1303.1	0.0624	0.0167	**1309.59**

(1): Wilkinson et al (2006)
(2): Methodology taken from CCAR GHG Emissions Protocol 3.1 (2009)
(3): Chart layout taken from UC Davis - Appendix 3: Greenhouse Gas Calculations
(4): CH_4 and N_2O factors retrieved from CCAR (2009)
(5): CO_2 Emission Factor retrieved from CCAR Pup_Metrics_June-2009.xls

Assumptions:
- Natural Gas is not a factor in this calculation
- Southern California Edison provides all power

Catch Basin Trash Inserts and Face Plate Screens Project Physical Benefits

Project Physical Benefits

The Gateway Water Management Authority (GWMA) proposes a project which will retrofit stormwater catch basins within thirteen cities located in Los Angeles County, significantly decreasing the amount of trash observed in waterbodies adjacent to the participating cities as well as downstream tributaries. The waterbodies immediately affected by this project include the Los Angeles River, the San Gabriel River, the Los Cerritos Channel, and Coyote Creek.

Trash is a well-known nuisance and concern within the Los Angeles County Region. For example, in the Gateway Region, the City of Long Beach collects large amounts of trash at the mouth of the Los Angeles River, due to trash being carried down the Los Angeles River. Debris tonnage observed at the mouth of the Los Angeles River is listed in Table 5 below.

Table 5: Storm Debris Collection Summary for Long Beach: Debris is measured in Tonnage.[3]

Storm Year	1st Quarter (July – Sept.)	2nd Quarter (Oct. – Dec.)	3rd Quarter (Jan. – Mar.)	4th Quarter (Apr. – June)	Total
1994-95	*436*	*509*	*3576*	*702*	*5,224*
1995-96	*504*	*344*	*3100*	*645*	*4,593*
1996-97	*350*	*2361*	*601*	*681*	*3,993*
1997-98	*647*	*3650*	*4016*	*977*	*9,290*
1998-99	*565*	*720*	*532*	*1274*	*3,091*
1999-2000	*781*	*176*	*1664*	*1223*	*3,844*
2000-01	*757*	*581*	*2625*	*474*	*4,437*
2001-02	*424*	*739*	*288*	*407*	*1,858*
2002-03	*430*	*752*	*2564*	*884*	*4,630*
2003-04	*299*	*779*	*607*	*951*	*2,636*
2004-05	*273*	*4390*	*6176*	*1416*	*12,255*
2005-06	*561*	*495*	*862*	*670*	*2,591*

Effective since September 23, 2008, the Los Angeles Trash Total Maximum Daily Load (TMDL) requires permit holders within the Los Angeles River watershed to reduce trash flows into the Los Angeles River by 10% per year, reaching zero trash by the year 2016[4] (see Table 6 below). Compliance with this regulatory measure will eliminate more than 800,000 pounds of waste from accumulating in storm drains that wash out to flood control channels.

[3] City of Long Beach *L.A. River Debris Summary* (as of June 2006). As reprinted in *Los Angeles River Trash TMDL* p. 19.
[4] Los Angeles Regional Water Quality Control Board, *Los Angeles River Trash TMDL*, p. 26, 2007.

Table 6: Los Angeles River Watershed Trash Effluent Limitations[5] per Storm Year[6] in gallons of uncompressed trash.[7]

Permittees	*Baseline*	*2012 (30%)*	*2013 (20%)*	*2014 (10%)*	*2015 (3.3%)*	*2016[8] (0%)*
Bell Gardens	13500	4050	2700	1350	446	0
Commerce	58733	17620	11747	5873	1938	0
Downey	39063	11719	7813	3906	1289	0
Pico Rivera	13953	4186	2791	1395	460	0
South Gate	43904	13171	8781	4390	1449	0
Vernon	47203	14161	9441	4720	1558	0

For areas not subject to a Trash TMDL, the Municipal Separate Storm Sewer System (MS4) Permit, effective on December 28, 2012, requires for cities to install trash excluders, or equivalent devices, on or in catch basins or outfalls to prevent the discharge of trash to the MS4 or receiving water no later than four years after the effective date of the Order[9]. Therefore, by implementing this project participating cities will be complying with the requirements set forth by the MS4 Permit.

Trash pollution is a critical concern to the water quality of Los Angeles County waterbodies. Not only are certain trash items contributing to sediment contamination, harming wildlife, and inhibiting aquatic vegetation, but also some trash items are potential sources of bacteria and toxic substances. Preventing trash from contaminating the Los Angeles County waterbodies will improve water quality and protect aquatic habitat.

In addition to protecting the environment, preventing trash contamination will enhance public interest in the rivers and beaches of Los Angeles and may promote participation in restoration activities. Removal of trash will help promote public recreation, particularly in beach areas that are consistently polluted with trash. By promoting public recreation in local areas, the project will reduce greenhouse gas and carbon dioxide emissions by reducing vehicle miles traveled. The affected waterbodies are recreational assets to the Gateway Region. The recreational value of these waterbodies is not being used to its potential due to water quality issues, including trash pollution. Many residents may seek other venues for picnics, water-related activities, and outdoor recreation of better water quality. Trash compromises the visual appearance and makes the waterbodies of the Gateway Region less inviting. More usable, inviting waterbodies will reduce vehicle miles traveled necessary to find a suitable outdoor recreation venue for local residents.

Finally, this project also has potential to augment local water supplies. Los Angeles River, San Gabriel River, Los Cerritos Channel, and Coyote Creek have each been identified for the potential beneficial use for municipal and domestic supply (MUN)[10]. Until water quality is improved, these waterbodies are not suitable for potable water use and can be considered a wasted potable water source. Removing trash from these waterbodies is one step closer to creating additional potable water sources for the Gateway Region.

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[5] Effluent limitations are expressed as allowable trash discharge relative to baseline Waste Load Allocations specified in Table 7-2.2 of the Basin Plan.
[6] Storm year is defined as October 1 to September 30 herein.
[7] California Regional Water Quality Control Board, *ORDER NO. R4-2012-0175*, Attachment O, 2012.
[8] Permittees shall achieve their final effluent limitation of zero trash discharge for the 2015-2016 storm year and every year thereafter.
[9] California Regional Water Quality Control Board, ORDER NO. R4-2012-0175, p. 132, 2012.
[10] Los Angeles Region Water Quality Control Board, *Water Quality Control Plan Los Angeles Region*, October 28, 2011.

Alternatives for Addressing Water Quality Objectives

Each participating city currently maintains a weekly or bi-weekly street sweeping schedule. This method reduces waste loads, however it does not eliminate trash completely. The GWMA proposes to retrofit a significant amount of catch basins with Automatic Retractable Screen (ARS) units and/or Connector Pipe Screen (CPS) units, which the Los Angeles Regional Water Quality Control Board (Regional Board) has certified as full capture devices[11]. This construction project coupled with weekly or bi-weekly street sweeping already conducted in each participating city will result in complete compliance for the cities subject to the Los Angeles River Trash TMDL and reduce trash observed in surrounding waterbodies. This project, if chosen, will help to achieve a significant milestone in the efforts to improve the water quality of the Los Angeles Beaches.

There are three methods that the Regional Board has identified for addressing trash. The first method, institutional controls, involves litter prohibition ordinances (which are already in place in most cities) along with frequent ground trash collection via street sweeping, manual pickup, and storm drain clean-outs. The capital investment required to implement institutional controls is generally small; however, the labor costs associated may be high resulting in a more costly long-term solution.[12] Institutional controls are also, by their nature, the least effective at completely excluding trash from affected waterbodies. The second method, partial capture system with institutional controls, is a combination of catch basin cleanouts and manual trash pickup. Finally, the third method is the full capture treatment system.

The GWMA is proposing a comprehensive, regional program that will install full capture devices in a significant amount of catch basins in 13 of the remaining cities not covered by previously awarded funding. The installation of full capture devices, along with periodic clean-outs and regular street sweeping, will greatly reduce trash within the Los Angeles County waterbodies.

The project proposes a trash elimination method that is much more effective than institutional controls alone, and at the same time is less expensive than other similar measures such as the Vortex Separation Systems. The project will eliminate trash in several Los Angeles County waterbodies. Because of the lower costs associated with the combination of installing catch basin inserts and maintaining regular street sweeping and storm drain cleaning, the project executes the most cost-effective and efficient alternative. Additionally, the goal of zero trash will be reached in a shorter period of time than if alternate methods are recommended.

Annual Physical Benefits

The Regional Board has certified the proposed CPS units as full capture devices,[11] therefore the installation of the devices along with current street sweeping activities implemented by the participating cities is anticipated to result in zero trash pollution within the sub-watersheds of the affected areas. Table 7 represents the anticipated annual project benefits in terms of trash percentage observed from the current conditions of affected areas. Without implementation of this project the trash percentage observed from the current conditions of affected waterbodies is not anticipated to decrease. This

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[11] Los Angeles Regional Water Quality Control Board, *Los Angeles River Trash TMDL*, p. 3, 2007.
[12] Los Angeles Regional Water Quality Control Board, *Los Angeles River Trash TMDL*, p. 30, 2007.

postulation is based on recent studies showing the steady trash concentration observed in Long Beach (see Table 5 above).

Table 7: Annual Project Physical Benefits.

Name: Gateway Integrated Multi-Benefit Regional Water Management Project - Catch Basin Retrofit
Type of Benefit Claimed: Trash Elimination
Measure of Benefit Claimed (Name of Units): Percentage of Current Trash in Waterbodies
Additional Information About this Measure: The physical benefit is not based on a specific unit of measurement, but rather a percentage of observed pollution based on TMDL requirements.

Physical Benefits

Year	Without Project	With Project	Change Resulting from Project
2013	100%	100%	-
2014	100%	60%	-
2015	100%	30%	-
2016	100%	0%	**A difference of 100% trash elimination will be achieved by 2016.**

Disadvantaged Communities Schools Retrofit Program

Project Physical Benefits

The Central Basin Municipal Water District (CBMWD) proposes a retrofit program to promote water and energy conservation, with an emphasis on water conservation, focused on disadvantaged communities. The three main project components are conservation, education, and outreach. The cornerstone of the project is retrofitting sanitary devices and irrigation equipment at 5 middle schools in 5 different cities and school districts. The sanitary devices to be used include flush-valve toilets, tank-type toilets, one-pint urinals, waterless urinals, showerheads and faucet aerators. The irrigation equipment includes weather-based irrigation controllers and rotating nozzles, with turf removal and replacement by demonstration gardens showcasing drought-tolerant landscaping. The education component will be designed to increase student, faculty and staff knowledge of water and energy conservation and runoff reduction. It will use a curriculum package entitled, Conservation Connection: Water & Energy in Southern California produced by the Metropolitan Water District of Southern California, and adapted from Conservation Connection: Water & Energy Use in California, which was developed in 2004 by CBMWD and West Basin Municipal Water District through a grant from the Department of Water Resources. The third component is community outreach, which will include providing conservation and rebate literature to parents, social media updates, web page development, gardening classes, public service announcements, and possibly press releases. The program will be implemented over 3 school years and 3 fiscal years. Based on detailed analysis of one of the five schools, water consumption will be reduced by approximately 24.5 acre-feet per year per school once both indoor and outdoor retrofits are completed at each school for a total savings of approximately 122.5 acre-feet per year. Additional reductions in water use will accrue over time through the impacts of the conservation curriculum and community outreach.

The project objective is to help reduce water use and increase water conservation over time. Retrofitting is designed to save water near-term, and education and outreach to give school communities tools to connect their water use with the need for conservation. Learning objectives include: identify water uses across the state and region; identify ways of stretching our water supply; assess personal, home, and school water habits; and create a plan to save water and energy at home and at school.

Physical benefits include:

- Increase in water use efficiency
- Decrease in water consumption
- Reduction in irrigated turf
- Reduction in urban runoff
- Reduction in transport of pollutants on adjacent roadways

Gateway Integrated Multi-Benefit Regional Water Management Project

Technical Justification

Approach

Central Basin Municipal Water District (CBMWD) gathered data on a sample set of public intermediate schools within their service area. This data includes: number of Toilets (tank type and flush valve type), urinals, irrigation controllers, rotating nozzles and faucet aerators. Assumptions were made on the student population based on the average of enrollment of the five targeted schools and the number of associated fixtures. CBMWD used this data to demonstrate an approximated value of water savings that could be seen by retrofitting the existing devices with High Efficiency Toilets, waterless urinals, low flow rotating nozzles, low flow faucet aerators, weather based irrigation controllers and by removing turf areas. Water usage was based off of assumptions and not actual water consumption data. Assumptions were made on number of teachers, domestic water use characteristics, and irrigation trends. Acreage was conservative and determined from aerial photos.

Entered Values are in:

Middle School Data

Number of Tank Type Toilets:	75	Each
Number of Flush Valve Toilets:	75	Each
Number of Urinals:	25	Each
Number of Irrigation Controllers:	5	Each
Number of Rotating Nozzles:	225	Each
Number of Faucets:	175	Each

Typical Water Consumption per Existing Devices

Tank Type Toilets:	4.5	Gallons per Flush
Flush Valve Toilets:	3	Gallons per Flush
Weighted Average Toilets:	3.8	Gallons per Flush
Urinals:	2.5	Gallons per Flush
Irrigation*:	N/A	Gallons per Year
Faucets:	3	Gallons per Minute

**Irrigation usage includes usage of controllers and rotating nozzles*

Estimated Water Consumption for Existing Conditions

Number of Students:	1462	Persons
Student-Teacher Ratio	10%	Ratio
Number of Adults:	146	Persons
Total Population:	1,608	Persons
Toilets Usage:	9,047	Gallons Per Day
Toilets Usage:	1,628,404	Gallons Per School Year
Urinals Usage:	4,021	Gallons Per Day
Urinals Usage:	723,735	Gallons Per School Year
Irrigated Area:	8.3	Acres
Water Volume Used Per Acre:	3.0	Feet Per Year
Irrigation*:	24.9	Acre-Feet per Year
Irrigation*:	8,113,690	Gallons Per Year
Faucet Usage:	241	Gallons Per Day
Faucet Usage:	43,424	Gallons Per School Year

**Irrigation usage includes usage of controllers and rotating nozzles*
Consumption based on average of 2 toilet flushes per day per 75% of population; and, 2 flushes of urinals per 50% of population; 3 uses of faucet per 100% of population for 10 seconds
School year set to 180 days

Estimated Total Water Consumption for Existing Conditions Per School Year

Toilets Usage:	1,628,404	Gallons
Urinals Usage:	723,735	Gallons
Irrigation Usage*:	8,113,690	Gallons
Faucet Usage:	43,424	Gallons
TOTAL WATER USE:	**10,509,253**	**Gallons**

**Irrigation usage includes usage of controllers and rotating nozzles*

Gateway Integrated Multi-Benefit Regional Water Management Project

Technical Justification

Typical Water Consumption/Savings per Existing Devices

High Efficiency Toilets:	1.5	Gallons per Flush
Zero Water Urinals:	0	Gallons per Flush
Rotating Nozzles:	1,000	Gallons per Year
Low Flow Faucet Aerators:	0.5	Gallons per Minute
Weather Based Irrigation Controllers*:	3.0	Savings Acre-Feet per Year per Controller

**Savings not consumption*

Estimated Water Consumption After Retrofit

Number of Students:	1462	Persons
Student-Teacher Ratio	10%	Ratio
Number of Adults:	146	Persons
Total Population:	1,608	Persons
Toilets Usage:	3,619	Gallons Per Day
Toilets Usage:	651,362	Gallons Per School Year
Urinals Usage:	0	Gallons Per Day
Urinals Usage:	0	Gallons Per School Year
Irrigated Area:	8.3	Acres
Water Volume Used Per Acre:	3	Feet Per Year
Existing Irrigation Water Consumption*:	20.8	Acre-Feet per Year
Water Volume Saved by Retrofit Per Acre*:	15.0	Acre-Feet per Year
Retrofit Irrigation Water Consumption*:	5.8	Acre-Feet per Year
Retrofit Irrigation Water Consumption*:	1,873,643	Gallons Per Year
Low Flow Faucet Aerators:	40	Gallons Per Day
Faucet Usage:	7,237	Gallons Per School Year

**Irrigation usage includes usage of controllers and rotating nozzles*
Consumption based on average of 2 toilet flushes per day per 75% of population; and,
2 flushes of urinals per 50% of population; 3 uses of faucet per 100% of population for 10 seconds
School year set to 180 days

Estimated Total Water Consumption for Retrofit Conditions Per School Year

Toilets Usage:	651,362	Gallons
Urinals Usage:	0	Gallons
Irrigation Usage:	1,873,643	Gallons
Faucet Usage:	7,237	Gallons
TOTAL RETROFIT WATER USE:	**2,532,242**	**Gallons**

Water Consumption Existing Conditions:	**10,509,253**	**Gallons**
Water Consumption Retrofit Conditions:	**2,532,242**	**Gallons**
ESTIMATED WATER USE SAVINGS:	**7,977,011**	**Gallons**

Annual Physical Benefits

Table 8: Annual Project Physical Benefits.

Name: Gateway Integrated Multi-Benefit Regional Water Management Project – Disadvantaged Communities Schools Retrofit Program
Type of Benefit Claimed: Water reduction/conservation
Measure of Benefit Claimed (Name of Units): Acre-Feet of potable water savings.

Physical Benefits			
Year	**Potable Water Savings (Reduced Imported Water) (Acre-Feet) Without Project**	**Potable Water Savings (Reduced Imported Water) (Acre-Feet) With Project**	**Change Resulting from Project Acre-Feet Imported/Groundwater Saved Per Year**
2014	0	40.8	40.8
2015	0	81.6	81.6
2016	0	122.4*	122.4*

*122.4 AF estimate for five sites.

Central Basin Municipal Water District (CBMWD) gathered data on a sample set of public intermediate schools within their service area. This data includes: number of Toilets (tank type and flush valve type), urinals, irrigation controllers, rotating nozzles and faucet aerators. Assumptions were made on the student population based on the average of enrollment of the five targeted schools and the number of associated fixtures. CBMWD used this data to demonstrate an approximated value of water savings that could be seen by retrofitting the existing devices with High Efficiency Toilets, waterless urinals, low flow rotating nozzles, low flow faucet aerators, weather based irrigation controllers and by removing turf areas. Water usage was based off of assumptions and not actual water consumption data. Assumptions were made on number of teachers, domestic water use characteristics, and irrigation trends. Acreage was conservative and determined from aerial photos.

Conservation Connection Curriculum Teacher Guide and Student Book