C. Title Page

Project Title: Effluent Reuse Study (OCSD Project No. SP-173)

Applicant: Orange County Sanitation District
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Study Description:
The Orange County Sanitation District (OCSD) Effluent Reuse Study (Study), will evaluate alternatives, make recommendations, and present an implementation plan for wastewater collection and treatment facilities improvements needed to support expansion of the Groundwater Replenishment System (GWRS) and develop other water reuse opportunities.

The GWRS is a water supply project jointly sponsored by OCSD and Orange County Water District (OCWD) that supplements existing water supplies by providing a new, reliable, high-quality source of water to recharge the Orange County Groundwater Basin, to protect it from degradation due to seawater intrusion, and to provide a water source for industrial uses. Operational since 2008, GWRS produces up to 70 million gallons per day (MGD) of purified recycled water. OCSD currently delivers 100 MGD of treated wastewater from its Plant No. 1 to GWRS for recycling and sends the remaining 100 MGD into the Pacific Ocean.

When it begins operation in April 2015, the GWRS Initial Expansion will require 135 MGD of treated wastewater to produce 100 MGD of purified recycled water. OCSD has an existing agreement with OCWD to provide more treated wastewater; however, available flows from Plant No. 1 are limited to about 90% of that demand. The immediate focus of the Effluent Reuse Study will be to identify modifications that will enable OCSD to fulfill its commitment to the GWRS Initial Expansion.

OCSD and OCWD anticipate another expansion of GWRS. The GWRS Final Expansion will require a total treated wastewater flow from OCSD of 179 MGD in order to produce 130 MGD of purified recycled water. The Effluent Reuse Study will investigate collection system and treatment plant improvement alternatives to identify how OCSD can best support the GWRS Final Expansion. Options include recycling Plant No. 2 effluent as well as treating more urban runoff.

In addition, the Effluent Reuse Study will evaluate future water recycling opportunities to achieve OCSD's vision of 100% water recycling. The Study will also identify any environmental impacts attributed to reduction of the ocean discharge.

In summary, the Effluent Reuse Study will investigate treatment plant and collection system improvements needed to (1) fulfill commitments for the GWRS Initial Expansion, (2) support the GWRS Final Expansion, and (3) develop an implementation plan for achieve OCSD's goal of recycling 100% of its treated wastewater.

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E. Technical Proposal and Evaluation Criteria

This technical proposal consists of three parts in accordance with the USBR Funding Opportunity Announcement No. R15AS00015, "WaterSMART: Development of Feasibility Studies under the Title XVI Water Reclamation and Reuse Program for Fiscal Year 2015":

E.1.Executive Summary;
E.2.Technical Study Description; and
E.3.Evaluation Criteria.

E.1. Technical Proposal: Executive Summary

Date: March 3, 2015

Applicant Name: Orange County Sanitation District

City: Fountain Valley

County: Orange County

State: California

Project Summary: The Orange County Sanitation District (OCSD) Effluent Reuse Study will investigate ways to recycle more of its treated wastewater that is presently discharged to the Pacific Ocean. Approximately half of the secondary effluent (100 MGD) is currently reused as source water for the Groundwater Replenishment System (GWRS) in partnership with Orange County Water District. The remainder (100 MGD) is sent to the ocean. The GWRS Initial Expansion will begin operation in April 2015. OCSD and OCWD are anticipating the GWRS Final Expansion, which will produce 130 MGD of purified recycled water. Modifications of OCSD's facilities are needed to serve the GWRS Initial and Final Expansions. Looking beyond GWRS, OCSD will also evaluate other water reclamation opportunities. OCSD's goal is to recycle and reuse 100% of its effluent. The Effluent Reuse Study will evaluate treatment plant and collection system improvements needed to: (1) fulfill OCSD's commitments for the GWRS Initial Expansion, (2) support the GWRS Final Expansion, and (3) develop an implementation plan for achieve OCSD's goal of recycling 100% of its treated wastewater.

Length of Time: 16 months

Estimated Completion Date: August 31, 2016

E.2. Technical Proposal: Technical Study Description

Elements of the OCSD Effluent Reuse Study (Project No. SP-173) are described below.

Effluent Reuse Study Description

The Effluent Reuse Study (Study) will investigate treatment plant and collection system modifications needed to fulfill commitments for the Groundwater Replenishment System (GWRS) Initial Expansion, support the GWRS Final Expansion, and assess the feasibility of recycling 100% of its treated wastewater. Currently, OCSD recycles about half of its secondary effluent and discharges the remainder to the Pacific Ocean. OCSD's objective is 100% water reuse.

The GWRS is a water supply project jointly sponsored by OCSD and Orange County Water District (OCWD) that supplements existing water supplies by providing a new, reliable, high-quality source of water to recharge the Orange County Groundwater Basin, to protect it from degradation due to seawater intrusion, and to provide a water source for industrial uses. Operational since January 2008, GWRS is the world's largest advanced water purification system for potable reuse and currently produces 70 MGD of purified recycled water that meets or exceeds drinking water standards. GWRS takes OCSD's treated wastewater that otherwise would be sent to the Pacific Ocean and purifies it using a three-step advanced process consisting of microfiltration (MF), reverse osmosis (RO), and ultraviolet disinfection/advanced oxidation (UV/AOP). Allowing for process recovery factors, GWRS requires approximately 93 MGD of secondary effluent to produce 70 MGD of purified recycled water. The potable reuse water is injected into a seawater intrusion barrier and pumped to recharge basins where it percolates into the groundwater basin.

OCSD operates the third largest wastewater system on the West Coast, consisting of over 650 miles of trunk sewer lines, two wastewater treatment plants, and an ocean outfall system. In 2013, the OCSD Board of Directors approved a new five-year Strategic Plan that identified water recycling as a fundamental goal. OCSD recognizes the value of enhancing water supply reliability in a time of persistent drought. Reusing this local resource will support California's efforts to provide a safe, sustainable water supply.

OCSD is a publicly-owned water resource recovery agency with two treatment plants: Plant No. 1 in Fountain Valley and Plant No. 2 in Huntington Beach. Together both plants currently treat nearly 190 MGD of wastewater for approximately 2.5 million people in north and central Orange County in Southern California **(Figure 1)**. The OCSD service area covers 471 square miles and includes 21 cities, three special districts, and portions of unincorporated Orange County **(Figure 2)**.

Plant No. 1 has a secondary treatment rated capacity of 182 MGD, and Plant No. 2 has a secondary treatment rated capacity of 150 MGD. OCSD treats wastewater at these facilities using three processes: preliminary treatment, advanced primary treatment, and secondary treatment. The majority of the treated wastewater (secondary effluent), from Plant No. 1 is sent to OCWD for further treatment and reuse. All of the treated wastewater (secondary effluent) from Plant No. 2 is discharged to the ocean via the OCSD outfall disposal system.

While the combined rated capacity of the OCSD plants is 332 MGD, the actual wastewater flows have declined due to water conservation efforts, averaging around 190 MGD in total. OCSD currently delivers approximately 100 MGD of treated wastewater from Plant No. 1 to OCWD for water reclamation; OCSD discharges about 100 MGD to the Pacific Ocean.

Figure 1: OCSD Location in California

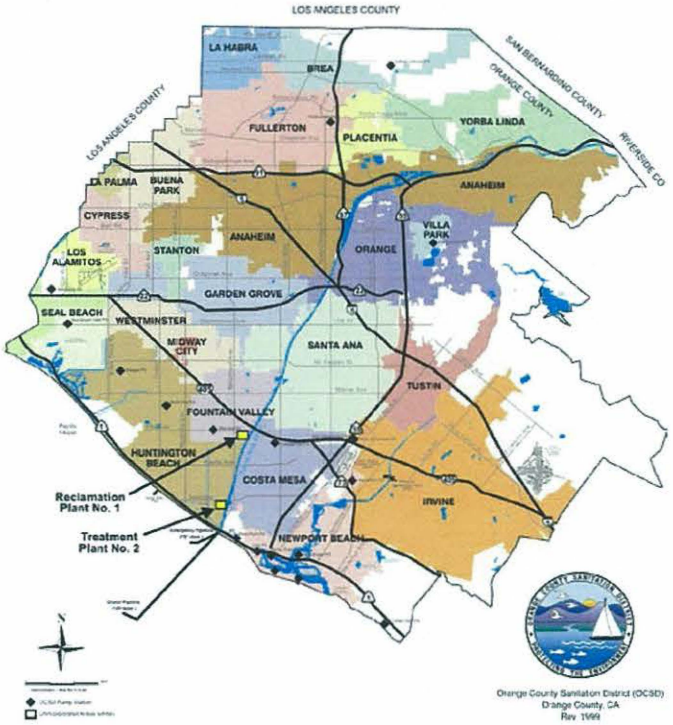

Figure 2: OCSD Service Area Map

In addition to GWRS, approximately 6 MGD of OCSD's treated wastewater from Plant No. 1 is used by OCWD's Green Acres Project (GAP). The GAP is a water recycling facility that produces disinfected tertiary effluent for irrigation, industrial, and other approved Title 22 uses. The GAP treatment facilities consist of tertiary filtration and chlorine disinfection. Recycled water is pumped to the GAP distribution system.

GWRS was planned, designed, and constructed to allow for expansion. Building upon the success of the original GWRS, OCWD is presently constructing the GWRS Initial Expansion. Once the GWRS Initial Expansion is complete in April 2015, OCSD has an agreement to send 135 MGD of treated wastewater to OCWD, which will then be used by GWRS to produce 100 MGD of purified recycled water. Together, the GWRS Initial Expansion and GAP will receive essentially the entire secondary effluent flow from Plant No. 1. Plant No. 1 existing secondary effluent flows average only about 126 to 131 MGD. With 6 MGD pumped to GAP, this leaves only 120 to 125 MGD of secondary effluent available for the GWRS Initial Expansion, which falls short of the required 135 MGD. In the near-term, more treated wastewater is needed for the GWRS Initial Expansion.

Looking towards the future, OCWD is anticipating a Final Expansion of GWRS. The GWRS Final Expansion will require a total treated wastewater flow from OCSD of 173 MGD in order to produce 130 MGD of purified recycled water, which is the ultimate planned production capacity of GWRS. Adding the 6 MGD needed for GAP, OCSD needs to deliver a total of 179 MGD for reclamation.

Through this Effluent Reuse Study, OCSD desires to understand what it needs to do to prepare for the GWRS Final Expansion. By supporting the GWRS Final Expansion, OCSD will be able to recycle

up to 75% of the wastewater generated in its service area. This Effluent Reuse Study will also support an immediate need by investigating ways for OCSD to fulfill its commitment to OCWD by increasing flows to supply the GWRS Initial Expansion. In addition, this Effluent Reuse Study will evaluate water reclamation alternatives to achieve OCSD's vision of 100% water recycling.

Effluent Reuse Study Scope of Work

The Scope of Work for the Effluent Reuse Study will involve numerous elements that collectively comprise a comprehensive assessment of the feasibility of recycling treated wastewater from Plant No. 2 and the conveyance system requirements to support the GWRS Initial and Final Expansions as well as future water reclamation opportunities. The Study will also identify any environmental impacts and permit modifications attributed to additional water recycling. The Study tasks include:

1. Evaluate treatment alternatives for non-reclaimable flows which are not suitable sources for GWRS.
2. Evaluate flow equalization alternatives for GWRS Final Expansion.
3. Evaluate pump station and conveyance alternatives from Plant No. 2 to GWRS.
4. Evaluate water quality differences between OCSD Plant No. 1 and Plant No. 2 secondary treatment processes; identify improvements to Plant No. 2 secondary treatment processes needed for water recycling.
5. Evaluate potential impacts of increased water recycling on the local environment and OCSD's National Pollutant Discharge Elimination System (NPDES) permit requirements.
6. Develop a hydraulic model for both treatment plants.
7. Evaluate the potential to bring in more dry-weather urban runoff into both treatment plants.
8. Quantify the amount of secondary effluent available for further recycling beyond GWRS Final Expansion.
9. Determine the optimum collection system diversion settings that will maximize reuse opportunities at both treatment plants.
10. Identify future water recycling opportunities.
11. Develop GWRS Final Expansion Implementation Plan.
12. Identify potential grant opportunities.
13. Investigate ways to increase secondary effluent flows to GWRS Initial Expansion.

Each task is discussed in the following subsections. The Scope of Work incorporates the USBR requirements for a Title XVI feasibility study. **Table 1** on the following page provides a preliminary checklist to cross-reference the Study tasks with the USBR Feasibility Study requirements.

Study Task 1 – Background Development

Task 1 will involve collecting information, including previous reports, master plans, flow studies, GIS data/files/base maps, and hydraulic models. A costing program with unit costs (e.g., $/MGD, $/MG, $/HP) will be developed to use throughout the Study for comparing alternatives.

Study Task 2 – Non-Reclaimable Flow Treatment Evaluation

The Santa Ana River Interceptor (SARI) is part of the OCSD collection system that extends over 90 miles into Riverside and San Bernardino Counties. The SARI contains brines discharged from groundwater desalters and ion exchange plants, treated effluent from the Stringfellow Superfund

Table 1. Effluent Reuse Study Cross-Reference with USBR Feasibility Study Requirements

OCSD Study Tasks / USBR Requirements	1. Background development	2. Non-reclaimable flow treatment	3. Flow equalization	4. Plant No. 2 pump station and	5. Plant No. 2 secondary process water quality	6. Impacts to environment & NPDES permit	7. Plant Nos. 1 an 2 hydraulic models	8. Urban runoff collection	9. Potential for future water recycling	10. Optimize collection diversions	11. Implementation plan	12. Potential grant opportunities	13. Increase flows for GWRS Initial
Introductory information	✓												
Statement of problems and needs	✓												
Water reclamation and reuse opportunities		✓		✓				✓	✓				✓
Description of alternatives		✓	✓	✓	✓		✓	✓	✓	✓			✓
Economic analysis		✓	✓	✓				✓		✓	✓		
Selection of the proposed Title XVI project											✓		
Environmental consideration and potential benefits						✓					✓		
Legal and institutional requirements		✓									✓		
Financial capability of sponsor											✓	✓	
Research needs						✓			✓		✓		

Site Pretreatment Plant, and municipal wastewater. Current flows from inland counties are 11.5 MGD, which is expected to increase to 30 MGD by 2040. In Orange County, about 23 MGD of domestic wastewater is added to the SARI as it flows to Plant No. 2 for treatment. Constituents of concern in the SARI for water reuse are total dissolved solids, N-nitrosodimethlyamine (NDMA), 1,4-dioxane, methylisothiocyanate, perchlorate, and boron.

In addition, non-reclaimable sidestream flows need to be separately treated with SARI because they contain polymers with NDMA: (1) centrate/filtrate flows from thickening and dewatering processes; (2) dissolved air flotation thickener underflow; and (3) brine from GWRS (discharged to the ocean).

OCWD's operating permit for GWRS prohibits recycling SARI flows. In order to expand recycling opportunities at Plant No. 2, the SARI stream, which is blended with other wastewaters, would need to be treated separately from the other influent flows and discharged to the Pacific Ocean.

Under Task 2, alternatives will be evaluated for segregating treating SARI and sidestream flows. The analysis will include concept designs and layouts and estimated construction and operating costs to recommend an alternative for implementation. Separate treatment facilities for these non-reclaimable flows will enable OCSD to maximize the volume of reclaimable treated wastewater.

Study Task 3 – Flow Equalization Evaluation

Flow equalization will attenuate the diurnal wastewater flow pattern and provide a more constant flow rate for wastewater treatment and/or water reclamation. Effectively, flow equalization will maximize the volume of recycled water produced by storing peak daytime flows and supplementing low nighttime flows. OCWD has equalization tanks for GWRS Initial Expansion that store peak secondary effluent flows and supplement feedwater flow to GWRS during diurnal low flow periods. More equalization storage would be needed for the GWRS Final Expansion.

The Study will evaluate flow equalization alternatives for the GWRS Final Expansion. The treated wastewater storage and pumping requirements will be quantified to enable the GWRS Final Expansion to produce 130 MGD of purified recycled water.

Task 3 will develop alternatives for flow equalization to maximize recycled water production. The analysis will develop concept designs and layouts and compare their ease of implementation and estimated construction and operation costs. A recommendation will be made for implementation.

Study Task 4 – Plant No. 2 Pump Station and Conveyance Evaluation

For the GWRS Final Expansion, secondary effluent from both OCSD treatment plants will be needed to provide the required 179 MGD of feedwater. Plant No. 1's rated capacity is limited to 182 MGD of raw influent wastewater. Allowing for losses in sludge and sidestreams, Plant No. 1's rated effluent capacity is restricted to 150 to 160 MGD. Supplemental flow from Plant No. 2 will be needed for the GWRS Final Expansion. Another consideration involves the need to split the wastewater flow fairly evenly between the two plants in order to maintain optimal secondary treatment at each site.

A pump station and conveyance system will be needed to transfer Plant No. 2 effluent to GWRS. Task 4 will evaluate alternative locations for a pump station, compare concept designs and layouts in terms of treatment operational impacts, site space limitations, future water reuse opportunities, as well as estimated construction and operation costs, and recommend a solution.

Study Task 5 – Plant No. 2 Secondary Treatment Process Water Quality

Task 5 will determine the water quality differences between OCSD Plant No. 1 and Plant No. 2 secondary treatment processes. Currently, GWRS receives secondary effluent from Plant No. 1 trickling filters and two activated sludge processes.

Plant No. 2 features trickling filter solids contact and oxygen activated sludge processes. Samples of Plant No. 2 influent and effluent will be taken and analyzed to compare its water quality with that of Plant No. 1. Constituents included in the analysis will be those typically monitored by OCWD for GWRS as well as others that may be of concern in the SARI.

Task 5 will identify improvements that could be made to the Plant No. 2 secondary treatment processes to improve its water quality for delivery to the GWRS Final Expansion.

Study Task 6 – GWRS Final Expansion Impacts to Environment and NPDES Permit

Task 6 will assess the potential environmental impacts on ocean water quality and marine life that could result from implementation of the modifications needed to supply the GWRS Final Expansion. The OCSD Ocean Monitoring group will conduct a Whole Effluent Toxicity (WET) Assessment in parallel with the Effluent Reuse Study. The WET Assessment will address the toxicity potential of the projected reduction in the effluent discharged to the Pacific Ocean. As OCSD reuses more secondary effluent, the ocean discharge would be significantly reduced, but would chiefly consist of brine. The Study will evaluate treatment options for brine that will be discharged to the ocean.

Task 6 will also review and assess potential impacts on OCSD's NPDES permit that could be related to the GWRS Final Expansion. OCSD's ocean discharge would be reduced in volume as more treated wastewater is recycled, and the GWRS Final Expansion will produce more brine.

Study Task 7 – Plant No. 1 and Plant No. 2 Hydraulic Models

Task 7 of the Study will build a hydraulic model of the process piping, pumping and associated facilities at Plant Nos. 1 and 2, the ocean outfall, and multiple interplant pipelines as impacted by existing and future planned operational issues in order to plan for increased water reclamation. The model will be used to analyze the hydraulic behavior of existing and foreseeable future operational scenarios, including the GWRS Final Expansion. Key operational and capacity related challenges will be identified and possible solutions developed to support expanded water reuse.

The hydraulic model will be used to evaluate if the reduced effluent discharge to the ocean resulting from the increased effluent diversion to the GWRS Final Expansion will deteriorate the condition of the OCSD ocean outfall. The potential for the outfall pipe to become clogged during low flows will be studied and possible mitigation measures to prevent clogging will be presented.

Study Task 8 – Urban Runoff Collection Opportunities

The Study will identify locations where more dry weather urban runoff can be collected in OCSD's service area and treated. Task 8 will explore ways to bring more urban runoff into the collection system, thereby reliably increasing the volume of effluent for reuse. At the same time, treating more urban runoff will help to alleviate dry weather runoff as a source of pollution in inland waterways and at the coast.

In 2000, OCSD adopted a dry weather urban runoff policy to assist in remediation of the public health and environmental problems associated with up to 10 MGD of urban runoff. Since the policy was adopted, OCSD has been collecting and treating urban runoff ranging from 0.2 to 3.3 MGD from 18 diversion systems within the service area.

The Effluent Reuse Study will ascertain potential impacts to the collection system, treatment processes, existing permits and the environment by treating more urban runoff. Locations where new urban runoff divisions can be made will be identified and described with concept-level drawings, and the costs to implement those diversions will be estimated.

Study Task 9 – Potential for Water Recycling Beyond GWRS Final Expansion

Task 9 of the Study will determine the amount of secondary effluent that would be available for reuse after supplying the GWRS Final Expansion. Potential opportunities for recycling any remaining water will be studied. This effort will identify new water recycling opportunities and assess the impacts on OCSD's facilities, and provide input to alleviate those challenges in order to achieve OCSD's goal of 100% reuse.

Study Task 10 – Optimize Collection Diversions for GWRS Final Expansion

The Study will determine the optimum collection system diversion settings that will maximize reuse opportunities at both OCSD treatment plants. Appropriate diversion settings that will improve wastewater flows to optimize reuse potential will be determined. Diversions that maximize water reuse will focus on re-routing Orange County municipal wastewater flows out of the SARI. This separation could increase wastewater flows available for water recycling. Options will be evaluated and recommendations will be made for implementation to support the GWRS Final Expansion and future reuse opportunities.

Study Task 11 – GWRS Final Expansion Implementation Plan

An implementation plan will be prepared summarizing the evaluations, conclusions and recommendations for the preceding tasks. Under Task 11, a report compiling information, findings, and results from the above technical memoranda will be prepared. The report will include an Implementation Plan with a schedule for the recommended project(s) that are necessary to support the GWRS Initial and Final Expansions along with other recycled water project(s) to accomplish OCSD's vision of 100% reuse.

Study Task 12 – Potential Grant Opportunities

OCSD plans to pursue funding opportunities for the Effluent Reuse Study and subsequent resulting project(s) for implementation and as applicable to support the GWRS Final Expansion and increased water recycling opportunities. Task 12 will ensure that the Effluent Reuse Study will comply with USBR's Manual WTR11-01 *"Title XVI Water Reclamation and Reuse Program Feasibility Study Review Process"*. **Table 1** summarizes how the Effluent Reuse Study matches the USBR requirements

Study Task 13 – GWRS Initial Expansion Flows

The Effluent Reuse Study will investigate ways to increase secondary effluent flows to the GWRS Initial Expansion. OCSD anticipates delivering up to 125 MGD to GWRS when the Initial Expansion construction is complete in April 2015. In order for the GWRS Initial Expansion to produce its full 100 MGD purified recycled water capacity, OCSD needs to provide 135 MGD of secondary effluent. The available secondary effluent supply from Plant No. 1 will fall short by about 10 MGD due to enhanced water conservation efforts. This task will evaluate plant operations to recommend changes to satisfy GWRS Initial Expansion needs.

E.3. Technical Proposal: Evaluation Criteria

This section of the Technical Proposal describes how the Effluent Reuse Study (OCSD Project No. SP-173) will address each criterion and subcriterion in the WaterSMART Development of Feasibility Studies under the Title XVI Water Reclamation and Reuse Program.

E.3.1. Evaluation Criterion 1: Statement of Problems and Needs - 10 points

Orange County received only 4.63 inches of rain (from Santa Ana station records) during 2014 and only 2.75 inches in 2013. On average Orange County receives about 13 inches per year. Prolonged drought conditions in California have reduced available water supplies and emphasized the need to maximize water reclamation, develop local water supplies, promote conservation, and enhance water use efficiency. The drought is very real and the water supply problems and needs are local, regional, and statewide and extend to most of the western United States.

In 2014, Governor Jerry Brown declared a drought state of emergency in California and signed into law a $687 million drought relief package to deal with the water shortage. Funding for water conservation and projects expanding the use of recycled water to ease drought concerns is part of this emergency legislation.

Within the OCSD service area, residents and businesses in north and central Orange County receive about 30% of their water supply from sources outside the region. Imported water is purchased from Metropolitan Water District of Southern California (MWD) by its member agencies. In north and central Orange County, MWD member agencies include the cities of Anaheim, Fullerton, and Santa Ana and the Municipal Water District of Orange County (MWDOC). These agencies provide drinking water to communities in the OCSD service area. MWD, which gets its water supplies from the Colorado River and the State Water Project, is faced with shortages that require conservation and possible rationing. Restrictions on Colorado River water use have limited imported water supplies in California. Significant court-ordered restrictions on diversions from the Bay-Delta due to various environmental factors have severely cut back the State Water Project water supply deliveries to Southern California. Prolonged drought conditions have limited the Sierra Nevada snowpack to historic low levels and reservoir storage volumes throughout the State are likewise at record lows.

Approximately 70% of the drinking water supply is local groundwater. The Orange County Groundwater Basin is managed by OCWD and replenished by recharging captured water diverted from the Santa Ana River, storm water, purchased imported water, and purified recycled water produced by the GWRS. OCSD and OCWD are co-sponsors of the GWRS. OCSD recognizes the value of its treated wastewater as a local resource and one of the solutions to address the water shortage. The GWRS presently uses about half of OCSD's available treated wastewater supply as feedwater to produce purified recycled water for groundwater recharge. More treated wastewater is needed for planned GWRS expansions and other reuse opportunities.

OCSD's Effluent Reuse Study will support the region's goals of improving local water supply reliability by substituting recycled water for existing potable water demands. The Santa Ana Watershed Project Authority (SAWPA) "One Water One Watershed" (OWOW) is an Integrated Regional Water Management Plan (IRWMP) developed within the Santa Ana River Watershed, which includes the OCSD service area. The feasibility of recycling more treated wastewater (secondary effluent) that is currently discharged to the ocean is one of the developing concepts included in the OWOW because it would help achieve the IRWMP goals. Evaluating the feasibility of increasing water recycling and effluent reuse at OCSD's facilities is an important step towards achieving water independence in the watershed.

More than 40 billion gallons of treated wastewater are discharged to the Pacific Ocean each year via the OCSD outfall. By reducing this ocean discharge, increased water reclamation would put the

water to use in Orange County and benefit the entire region and state by directly offsetting imported water demands and replacing them with recycled water. The Effluent Reuse Study will help OCSD support increased water reclamation.

E.3.2. Evaluation Criterion 2: Water Reclamation and Reuse Opportunities - 15 points

OCSD is already a leader in water recycling as a co-sponsor of GWRS and supporter of GAP. OCSD supplies the source water, treated wastewater from Plant No. 1, to GWRS for production of purified recycled water for groundwater recharge by OCWD. OCSD also furnishes secondary effluent from Plant No. 1 to GAP for production of recycled water. OCSD is keenly aware that these two water reclamation projects utilize essentially all of the effluent from Plant No. 1, and yet, all of the secondary effluent from Plant No. 2 is discharged to the ocean. Recovery of this "lost" resource, Plant No. 2 treated wastewater, is a central element of this Effluent Reuse Study.

OCSD desires to expand its water reuse commitments by evaluating the feasibility of modifying its collection system and/or treatment plant processes to increase treated wastewater supplies for recycling. OCSD's goal is to recycle and reuse 100% of its effluent. The Effluent Reuse Study will look beyond GWRS and GAP to investigate the feasibility of implementing other water recycling projects to maximize beneficial uses of treated wastewater. Opportunities for water reuse abound in Orange County because of the success of earlier reclamation projects.

1. *Describe how the feasibility study will investigate potential uses for reclaimed water (e.g., environmental restoration, fish and wildlife, groundwater recharge, municipal, domestic, industrial, agricultural, power generation, and recreation).*

The GWRS is planned for expansion up to an ultimate production capacity of 130 MGD. The Study will evaluate alternatives to support GWRS expansion by modifying the OCSD facilities to increase treated wastewater flows. Thus, the first potential use for recycled water has already been identified: groundwater recharge.

Preliminary research forming the basis for the Effluent Reuse Study has discovered reuse opportunities beyond GAP and possibly more groundwater recharge beyond the GWRS Final Expansion. Many areas of Orange County are not presently well-served with recycled water. Possible uses of recycled water could include cooling water for the nearby AES power plant and industrial uses approved for disinfected tertiary effluent. Recycled water could be used for wetlands, benefitting fish, wildlife, and birds at the Bolsa Chica Environmental Reserve near Plant No. 2. With full advanced treatment, more groundwater recharge opportunities may exist for purified recycled water, for example, a new seawater intrusion barrier in the Bolsa Gap area where seawater can encroach inland towards potable aquifers, or possible expansion of the Talbert Seawater Intrusion Barrier and/or Mid-Basin Injection. Reclaiming more OCSD effluent could supply additional injection wells and other customers in these areas.

Study Tasks 2 and 3 will develop and evaluate ways of modifying the OCSD facilities to separate non-reclaimable wastewater from municipal wastewater that can be treated and recycled. A significant use of the reclaimable treated wastewater will be at the GWRS Final Expansion for the purpose of increasing groundwater recharge by 30 MGD.

A confirmed recycled water use that will be evaluated in Study Task 13 is maximizing treated wastewater flows sent to the GWRS Initial Expansion beginning operation in April 2015. Available secondary effluent flows from Plant No. 1 fall short of the required 135 MGD of feedwater by about 10 MGD. OCSD has an existing agreement with OCWD to supply approximately 135 MGD of secondary effluent for advanced treatment and groundwater replenishment via existing injection wells and spreading basins. The Effluent Reuse Study will assist OCSD to support this immediate contracted recycled water use for groundwater recharge.

Study Task 9 will research and evaluate potential markets for reuse after supplying the GWRS. As noted above, possible uses include sustaining local wetlands and supplying cooling water and industrial demands, as well as developing more groundwater recharge.

2. *Describe the potential water market available to use any recycled water that might be produced upon completion of a water reuse project, as well as methods to simulate recycled water demand and methods to eliminate obstacles for use of reclaimed water.*

The primary recycled water market is groundwater recharge via the GWRS Initial and Final Expansions. GWRS was originally conceived to be implemented in three phases, the first of which began operation in 2008 producing 70 MGD of purified recycled water. The GWRS Initial Expansion is scheduled to begin operation in April 2015, increasing purified recycled water production from 70 to 100 MGD. OCSD has an existing agreement with OCWD to supply 135 MGD of treated wastewater to the GWRS Initial Expansion for recycled water production. OCWD is planning the GWRS Final Expansion, which, together with GAP, will require 179 MGD of treated wastewater to produce 130 MGD of purified recycled water for groundwater recharge, plus 6 MGD of tertiary-treated recycled water for irrigation uses.

In order to support increased water reclamation, OCSD is conducting the Effluent Reuse Study to investigate ways to modify its collection and treatment facilities to reclaim more treated wastewater. The main obstacle for recycled water reuse is the lack of available treated wastewater to provide feedwater for GWRS expansions and other uses. Modifications of the OCSD facilities are needed to overcome that issue.

Looking beyond the known recycled water market, OCSD has the ultimate goal of recycling all of its treated wastewater. As discussed above in Item #1, many areas of southwestern Orange County lack recycled water service. Many parks, golf courses, and schoolyards irrigate with potable water because recycled water service is unavailable. Much of the wastewater from these communities flows to Plant No. 2, where it is treated and discharged to the ocean. The potential water market for recycled water supports development of a water reclamation project at Plant No. 2. Implementation of a full advanced treatment project at Plant No. 2 would produce purified recycled water that could supply new injection wells, forming the Bolsa Gap Seawater Intrusion Barrier.

3. *Describe the sources of water that will be investigated for potential reclamation, including impaired surface and ground waters.*

The Effluent Reuse Study will investigate the following sources of water for potential reclamation:

- Secondary effluent that is currently discharge to the Pacific Ocean - Plant No. 2 treated wastewater (approximately 75 MGD of secondary effluent discharged to the ocean following

start-up of the GWRS Initial Expansion). As described above, Study Tasks 2, 3, and 5 will investigate modifications to OCSD's collection and treatment systems to recycle Plant No. 2 flows.

- Segregation of Non-SARI wastewater - Potential separate treatment of the Santa Ana River Interceptor (SARI) wastewater. (SARI contains brines from groundwater desalters and ion exchange plants, treated effluent from the Stringfellow Superfund Site Pretreatment Plant, and municipal wastewater. Reuse of SARI flows is currently prohibited by the GWRS permit.). Study Task 2 will investigate ways to separate SARI wastewater from other OCSD wastewater, thereby increasing the volume of secondary effluent available for reuse.
- Urban runoff - OCSD currently has the ability to treat up to 10 MGD of dry weather urban runoff. Since the policy was adopted in 2000, OCSD has been collecting and treating urban runoff ranging from 0.2 to 3.3 MGD from local diversion systems. It is estimated that more diversions could increase urban dry weather runoff by an additional 2.6 to 4.3 MGD. Study Task 8 will investigate opportunities to increase the capture and treatment of more dry weather urban runoff to boost wastewater flows and maximize recycled water production.

E.3.3. Evaluation Criterion 3: Description of Potential Alternatives - 15 points

Potential alternatives will involve indirect and direct potable reuse. Because OCSD is a reclamation partner with OCWD and presently provides treated wastewater for GWRS and GAP, OCSD is very familiar with all types of water recycling and reuse alternatives.

1. *Describe the objectives all alternatives will be designed to meet. What other water supply alternatives will be investigated as part of the Title XVI feasibility study?*

The main purpose of the Effluent Reuse Study is to look at treatment plant and conveyance modifications needed to support the GWRS Final Expansion, which is the primary alternative for recycling and focus of the Study. Looking beyond that initial objective, other alternatives will be developed and evaluated to meet OCSD's ultimate objective of 100% reuse. The Study will investigate alternatives to increase indirect and direct potable reuse. In order to "utilize every available drop of effluent", the alternatives may involve combinations of these reuses to maximize and optimize recycling of approximately 75 MGD (84,000 AFY) of secondary effluent that OCSD discharges to the Pacific Ocean from its Plant No. 2 in Huntington Beach. Modifications of OCSD's facilities will be studied to determine the best approach to maximizing treated wastewater flows to GWRS Initial and Final Expansions, as well as increasing recycled water use in Orange County.

Other water supply alternatives that will be investigated as part of the Study will include urban runoff collection and treatment opportunities. OCSD currently treats about 3 MGD of dry weather urban runoff at its wastewater treatment facilities, and has the ability to handle up to 10 MGD. One of the tasks of the Study is investigating ways to capture, divert, and treat more dry weather urban runoff to increase the volume of recycled water and at the same time, help alleviate this source of pollution in inland waterways and at the coast.

2. *Provide a general description of the proposed project that will be the subject of a Title XVI feasibility study.*

The Effluent Reuse Study will develop a proposed project that achieves OCSD's goal of providing 179 MGD of treated wastewater to OCWD for: (1) GWRS Final Expansion to produce 130 MGD of purified recycled water for indirect potable reuse via groundwater recharge; and (2) GAP to produce 6 MGD of tertiary disinfected recycled water for irrigation and other non-potable uses. The Study will investigate near-term solutions to enable OCSD to fully supply the GWRS Initial Expansion, which requires 135 MGD of secondary effluent to produce its full rated capacity of 100 MGD of purified recycled water. The Study will also determine the amount of secondary effluent that would be available for reuse after supplying the GWRS Final Expansion and identify potential opportunities for recycling that remaining treated wastewater, effectively achieving OCSD's ultimate goal of 100% reuse.

It is envisioned that the proposed project will consist of three components:

- Modifications to provide the full 135 MGD of treated wastewater for GWRS Initial Expansion and GAP;
- Facilities to improve collection and wastewater treatment systems to enable OCSD to provide 179 MGD of secondary effluent for GWRS Final Expansion and GAP; and
- Other water reclamation at Plant No. 2.

The selected project will (1) maximize recycled water use, (2) be cost effective, and energy efficient, (3) promote environmental stewardship by reducing ocean discharges and enhancing water conservation, and (4) be implementable and locally sustainable. OCSD envisions that the selected project will continue and extend its existing partnership with OCWD to realize the ultimate GWRS. The project will involve partnerships with OCSD's member agencies and associated water agencies to expand local water independence in Orange County.

3. *Describe alternative measures or technologies for water reclamation, distribution, and reuse that will be investigated as part of the feasibility study.*

Treatment processes will be required to comply with Title 22 Water Recycling Criteria for recycled water production. At a minimum, these measures will most likely involve tertiary filtration and disinfection of secondary effluent at Plant No. 2. Filtration methods could include media filtration or microfiltration (MF). Disinfection could include chlorination with sodium hypochlorite or ultraviolet (UV) light irradiation.

For indirect or direct potable reuse alternatives, full advanced treatment consisting of MF, RO and UV/AOP will be required. For GWRS Final Expansion, these treatment processes will be an extension of the proven advanced water purification facilities. The distribution systems serving the Talbert Seawater Injection Barrier and Anaheim Forebay spreading basins already exist and are sized for the ultimate flow.

Brine management will be an important element of the Effluent Reuse Study. Alternatives will need to address the quality of the waste and brine streams from GWRS and the new recycled water facilities and/or new advanced water purification facility because those brines will be discharged to the Pacific Ocean and required to comply with OCSD's NPDES permit.

Lastly, the Study will investigate options to handle wastewater conveyed by the Santa Ana River Interceptor (SARI) to Plant No. 2. The SARI extends inland into Riverside and San Bernardino

Counties and collects brines from groundwater desalters and ion exchange plants, treated effluent from the Stringfellow Superfund Site Pretreatment Plant, and municipal wastewater. SARI wastewater is mixed with that from other sewers at Plant No. 2. It may be necessary to segregate the SARI flows and treat its wastewater separately in order to recycle other Plant No. 2 wastewater because the GWRS and GAP permits preclude recycling SARI flows.

E.3.4. Evaluation Criterion 4: Stretching Water Supplies - 15 points

The combination of long-term drought, environmental restrictions, and population increases means that our limited water supplies need to be stretched and utilized as efficiently as possible. The Effluent Reuse Study will investigate and develop a major resource, treated wastewater discharged to the ocean, making beneficial use of that new local water supply.

1. *Describe the potential for the project to reduce, postpone, or eliminate the development of new or expanded water supplies. Include description of any specific issues that will be investigated or information that will be developed as part of the Title XVI feasibility study.*

With Orange County's population projected to keep increasing, Southern California is facing future water supply shortages as current supplies are swindling. Climatic changes have resulted droughts and environmental restrictions have reduced imported water availability. The Effluent Reuse Study will evaluate ways to utilize treated wastewater to offset and reduce imported water demands.

Total water demands are expected to increase from approximately 480,000 AFY to 558,000 AFY by 2035 **(Figure 3,** from OCWD's Long-Term Facilities Plan that evaluated water supply issues and trends in Orange County). The demands are divided up based on the various water supply sources available within the OCSD service area, which is effectively the same as that served by OCWD. Water needs in this area are met primarily with a combination of groundwater, imported water, and recycled water. This report shows that the volume of imported water purchases from Metropolitan Water District of Southern California (MWD) and Municipal Water District of Orange County (MWDOC) is projected to increase significantly, unless other water sources can be developed.

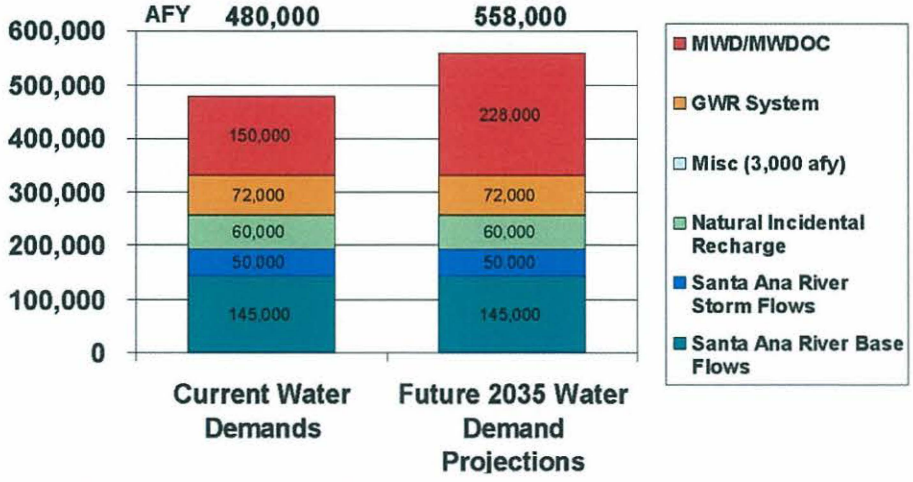

Figure 3. Current and Future Water Demands Within the OCSD

Groundwater pumping from the Orange County Groundwater Basin has been a major source of supply. In order to sustain production from the basin, without overdrafting and causing adverse impacts such as increased seawater intrusion or subsidence, water must be replenished using

projects like GWRS. As a co-sponsor of GWRS, OCSD's goal is to utilize the remainder of its secondary effluent as source water for GWRS Expansions plus other recycled water opportunities that will increase local water supplies and offset imported water demands. Besides supplying GWRS, OCSD also furnishes secondary effluent for GAP, which provides recycled water for non-potable uses, reducing potable water demands by and imported water needs.

2. *Describe the potential for the project to reduce or eliminate the use of existing diversions from natural watercourses or withdrawals from aquifers. Include description of any specific issues that will be investigated or information that will be developed as part of the Title XVI feasibility study.*

The Effluent Reuse Study will investigate alternatives and recommend a Title XVI project for implementation that will reduce the need to import water from Northern California (State Water Project) and the Colorado River. Recycling up to 75 MGD (84,000 AFY) of treated wastewater that is discharged from OCSD's Plant No. 2 to the Pacific Ocean will directly offset the demands on the Sacramento-San Joaquin Bay Delta and the Colorado River by reducing imported water demands in Orange County. As discussed above in Section 3.3, Item #2, the selected project will likely involve implementation of improvements at OCSD's collection and treatment facilities to supply more treated wastewater for: (1) GWRS Initial Expansion; (2) GWRS Final Expansion; and other reuse systems at Plant No. 2.

3. *Describe the potential for the project to reduce the demand on existing Federal water supply facilities. Include description of any specific issues that will be investigated or information that will be developed as part of the Title XVI feasibility study.*

Implementation of a new water reclamation project will reduce the need to import water into the region from Northern California via the State Water Project to Southern California by providing a local water supply to offset imported water use on a gallon-for-gallon basis. The Effluent Reuse Study will assess the feasibility of alternatives to best use approximately 75 MGD (84,000 AFY) of treated wastewater that is presently discharged to the Pacific Ocean from OCSD's Plant No. 2. The selected Title XVI project in the Study will directly reduce the demand on the Sacramento-San Joaquin River Delta. By reducing water demands on the Delta and offsetting those demands by supplying local Orange County demands with recycled water, the Study will support the Central Valley Project, which is an existing Federal water supply facility that is dependent on the Sacramento-San Joaquin River Delta. Because many of the water management facilities of the Central Valley Project, which is supervised by the Bureau of Reclamation, and the California State Water Project, reductions in demand achieved by expanding water recycling and reuse by implementing a Title XVI project will benefit the entire State of California.

E.3.5. Evaluation Criterion 5: Environment and Water Quality - 15 points

California has recently experienced statewide drought caused by consecutive years of below-average rainfall. Restrictions on Colorado River water use have limited imported water supplies in California. Significant court-ordered restrictions on diversions from the Bay-Delta due to various environmental factors have severely cut back the State Water Project water supply deliveries to Southern California.

The Effluent Reuse Study will develop and evaluate alternatives, comparing many factors, including potential impacts on the local environmental and water quality. The outcome of the Study will be a recommended plan to implement a project comprised of modifications and upgrades at OCSD's collection system and treatment facilities that will increase water reclamation in Orange County while protecting the environment and improving water quality. Implementation of the selected Title XVI Project will reduce the need to import water into Orange County, which supports the reduction of the large scale pumping activities of the federal water project. It will also reduce discharges to the Pacific Ocean by recycling treated wastewater.

1. *Describe the potential for the project to improve the quality of surface or groundwater, including description of any specific issues that will be investigated or information that will be developed as part of the Title XVI feasibility study.*

The Effluent Reuse Study will investigate alternatives for indirect potable reuse, including both groundwater recharge and seawater intrusion prevention. Building upon the success of the original GWRS with its partner OCWD, OCSD's Study will examine opportunities to use more secondary effluent to provide source water for: (1) GWRS Initial Expansion; (2) GWRS Final Expansion; and (3) other potable reuse at Plant No. 2.

The GWRS Initial Expansion will utilize more treated wastewater to produce 100 MGD (103,000 AFY) of purified recycled water to recharge the Orange County Groundwater Basin and protect it from degradation due to seawater intrusion. Task 13 of the Effluent Reuse Study will evaluate and recommend modifications in OCSD's facilities to supply the full 135 MGD secondary effluent feedwater volume required by GWRS. At present, Plant No. 1 has an effluent shortfall of 10 to 15 MGD as a result of water conservation. This shortfall will restrict the production capability of the GWRS Initial Expansion by about 10% when it begins operation in April 2015.

The Effluent Reuse Study will evaluate alternatives and develop and implementation plan to modify OCSD's collection and treatment facilities to enable it to supply 179 MGD of treated wastewater for the GWRS Final Expansion and GAP. The GWRS Final Expansion will produce 130 MGD of purified recycled water for groundwater replenishment and water quality protection by preventing seawater intrusion. The high quality, low salinity of the GWRS purified recycled water meets all drinking water standards and exceeds (is better than) the water quality of alternative imported water sources. Without an adequate treated wastewater supply for the GWRS Final Expansion, more imported water with higher salinity will be needed to recharge the groundwater basin.

Task 5 of the Study will compare the water qualities of alternative source waters with the water quality of existing GWRS feedwater. A comparison between Plant No. 1 effluent (existing GWRS feedwater) and Plant No. 2 effluent will be useful in estimating potential issues that may be associated with recycling treated wastewater from Plant No. 2.

Task 6 will assess potential environmental impacts on ocean water quality and marine life that could result from implementation of the modifications needed to supply the GWRS Final Expansion and water reuse opportunities to bring OCSD closer towards its goal of 100% reclamation. As more treated wastewater is recycled, OCSD's ocean discharge would be significantly reduced in volume and likely to chiefly consist of brine from the GWRS RO process. This Study will identify how the

brine discharge will impact the OCSD NPDES permit, forecast potential environmental impacts to the ocean, and evaluate facilities needed to handle the brine.

Task 8 of the Study will identify locations in OCSD's service area where more dry weather urban runoff can be collected and conveyed to its wastewater treatment plants. One of the benefits of capturing more dry weather runoff is increasing the volume of treated wastewater for reuse. At the same time, treating more urban runoff will help alleviate dry weather runoff as a source of pollution in inland surface waterways and at the coastal water-land interface that can result in beach closures.

Lastly, the Effluent Reuse Study will determine the volume of treated wastewater than remains to be recycled after fulfilling the needs of the GWRS. One of the potential alternatives is a new advanced water treatment facility that would supply purified recycled water for injection at Bolsa Gap. The Bolsa Gap in Huntington Beach is one of many geological features along the California coastline where freshwater aquifers are vulnerable to seawater intrusion from the Pacific Ocean. More purified recycled water would be needed to supply a new Bolsa Seawater Intrusion Barrier in the same way as the GWRS Talbert Seawater Intrusion Barrier to protect the groundwater basin.

2. *Describe the potential for the project to improve flow conditions in a natural stream channel, including description of any specific issues that will be investigated or information that will be developed as part of the Title XVI feasibility study.*

The Effluent Reuse Study will investigate opportunities to reduce the discharge of treated wastewater to the Pacific Ocean. OCSD discharges secondary effluent from Plant No. 2 via a five-mile long ocean outfall. While the ocean is not a natural stream channel, a critical issue for OCSD in the evaluation of alternatives is protection of the off-shore environment in terms of water quality and habitat. As more treated wastewater is recycled, the discharge to the ocean will be diminished and likely composed largely of brines from the advanced treatment facilities. Task 6 of the Study will investigate these environmental issues.

The Study will also address ways to increase the capture and treatment of urban runoff, bringing those dry weather runoff streams into wastewater treatment facilities before they flow into inland waterways, storm channels, and eventually drain into the Santa Ana River. Issues examined by the Study will include maximizing the capture of urban runoff, treating and utilizing it as a source of recycled water. This will improve flow conditions and reduce runoff pollution in waterways, flood control channels, and river. Task 10 of the Study will evaluate and recommend collection system diversions that will not only increase the volume of treated wastewater available for recycling, but also improve the water quality and flow conditions of existing channels (e.g., Peters and Lane Channels) that are tributary to Peters Canyon Wash and San Diego, which in turn, flow into Newport Bay. Other urban runoff diversions (e.g., Delhi Channel and Big Canyon) that drain into Newport Bay have also been proposed and will be investigated in the Study.

3. *Describe the potential for the project to provide water or habitat for federally listed threatened or endangered species, including description of any specific issues that will be investigated or information that will be developed as part of the Title XVI feasibility study.*

The Delta Smelt **(Figure 4)** is endemic to the upper Sacramento-San Joaquin estuary of California; it mainly inhabits the freshwater-saltwater mixing zone of the estuary, except during its spawning season, which primarily takes place during the early spring months from March until May. Because

of its one-year life cycle and relatively low fecundity, it is very susceptible to changes in the environmental conditions of its native habitat.

Restricting water withdrawals from the Bay-Delta will protect the endangered Delta Smelt and other species dependent upon that water habitat. At the same time, OCSD will be able to reliably support Orange County's water supply needs by substituting a local, reliable supply of 130 MGD (145,000 AFY) of purified recycled water for groundwater recharge, thereby directly offsetting imported water demands. The Effluent Reuse Study will investigate how OCSD can improve its collection and treatment facilities to supply more treated wastewater for recycling and reuse for groundwater replenishment and other uses that presently depend on imported water supplies. Conserving imported water reduces pumping from the Bay-Delta and provides water supply diversity that protects the environment and benefits endangered species that depend on sensitive habitat.

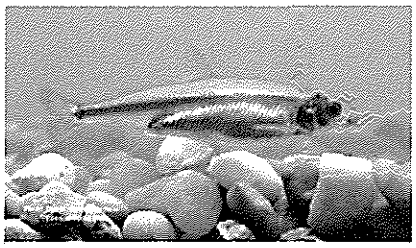

Figure 4. Delta Smelt

Locally, the GWRS Initial and Final Expansions will produce more purified recycled water, increasing production from 70 to 130 MGD, which will construct more spreading basins. Maintenance to improve or maintain percolation rates involves drying the basins and scraping off the fine deposits. The result of this maintenance is that the basin bottoms are regularly disturbed and do not develop a true natural habitat for fish. On the other hand, the majority of the wildlife is avian, which are generally adaptable to the changing foraging conditions.

Sensitive species that have been recorded near the spreading basins are birds. These include one Federal and State endangered species: California least tern, albeit these are inconsistent visitors to the area **(Figure 5)**. If present, however, the tern could feast on mosquito fish that are stocked in various recharge basins as a vector control agent.

The Effluent Reuse Study will develop and implementation plan to supply more treated wastewater for the GWRS Initial and Final Expansions and supplemental spreading basins. One benefit of the OCSD Title XVI project would be expanded purified recycled water production for spreading, which could benefit local birds, including the California least tern.

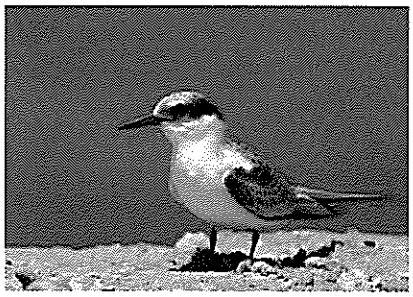

Figure 5. California Least Tern

Recycled water from OCSD's Plant No. 2 could also be used to supplement natural sources diminished by drought at the Bolsa Chica Wetlands in Huntington Beach. Many species of wildlife, birds, reptiles, and marine animals reside in the wetlands year-round or seasonally. These include federally endangered or threatened species like the California Least Tern **(Figure 5)**, California Coastal Gnatcatcher, and Western Snowy Plover **(Figure 6)**, which nest at Bolsa Chica Wetlands. Other federal species of special concern at Bolsa Chica Wetlands are the Wandering Skipper Butterfly and Two-striped Garter Snake.

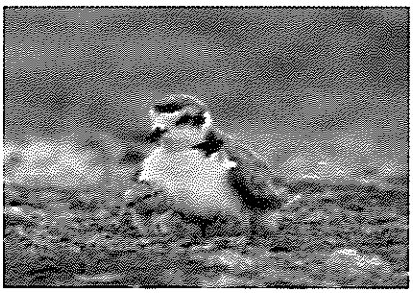

Figure 6. Western Snowy Plover

E.3.6. Evaluation Criterion 6: Legal and Institutional Requirements - 10 points

OCSD along with OCWD are co-sponsors of the GWRS. OCSD and OCWD have an existing joint operating agreement for GWRS and GAP. As part of that agreement, OCSD has made a commitment to supply 135 MGD of treated wastewater (secondary effluent) for the GWRS Initial Expansion. The legal requirements for this element of the Effluent Reuse Study are already in place. Task 13 of the Study will identify ways for OCSD to increase flow to the GWRS Initial Expansion. OCSD anticipates delivering 120 to 125 MGD of secondary effluent when the GWRS Initial Expansion is complete in April 2015. This is 10 to 15 MGD less than what is needed by OCWD. The Study will evaluate flows and plant operations to recommend modifications for implementation to help OCSD fulfill its commitment.

The OCSD-OCWD partnership is anticipated to continue in the future as the GWRS Final Expansion is implemented. It is anticipated that a similar agreement between the two agencies will be adopted by their respective Boards of Directors to realize the ultimate 130 MGD purified recycled water capacity of GWRS. In order to fulfill that proposed agreement, OCSD is pursuing the Effluent Reuse Study to find ways to provide 179 MGD for the GWRS Final Expansion and GAP. OCWD fully supports OCSD's Effluent Reuse Study, as evidenced by its **letter of support** at the end of this application.

By way of background, OCSD is a regional agency and provides wastewater collection, treatment, and disposal for 23 cities and three sanitary districts in north-central Orange County **(Figures 1 and 2)**. The legal and institutional requirements for the Effluent Reuse Study are already in addressed by agreements between OCSD and its member agencies. The Study will evaluate potential partnerships between OCSD and local water agencies to support implementation of the selected Title XVI project. One of the evaluation criteria used to rank the alternatives will be legal and institutional requirements. OCSD recognizes that agreements with partners may be needed to facilitate implementation of the water recycling facilities. OCSD has demonstrated its cooperation in similar water recycling projects by being a co-sponsor with OCWD of GWRS and GAP. OCSD also has an agreement with SAWPA that governs the SARI and specifies source control requirements.

E.3.7. Evaluation Criterion 7: Renewable Energy and Energy Efficiency - 10 points

The Study will compare the energy required to produce recycled water for alternative uses with the energy required to import water to the region. The selected project will save energy by reducing the volume of imported water pumped to Orange County and utilizing local recycled water. The power required to convey imported water to Southern California ranges from 2,000 to 4,000 kilowatt-hours per acre-foot (kWh/AF). It is estimated that delivery of imported water to Southern California requires about 3,170 kWh/AF because the water must be pumped over the Tehachapi Mountains. (From CEC, 2006. *"Refining Estimates of Water-Related Energy Use in California"*, prepared for CEC by Navigant Consulting, Inc. in 2006, CEC-500-2006-118)

In comparison, the energy required for production and distribution of recycled water ranges from 250 to 750 kWh/AF. Based on the average of these ranges of energy required for these two water supplies, the difference (about 3,000 kWh/AF less 500 kWh/AF) results in a significant energy savings, approximately 2,500 kWh/AF. By reusing the surplus 75 MGD (84,000 AFY) of Plant No. 2 effluent as recycled water, the region could achieve an annual energy saving of nearly 210 million kWh/yr by increasing water recycling.

Associated with this huge potential energy savings would be a massive reduction of greenhouse gas emissions. Based on an average factor for the entire state of California to transport water of 0.435 lbs of CO_2/kWh (from Department of Energy, 2006. *"Carbon Dioxide Emissions Rate"*), implementation of the selected project developed in the Study would reduce greenhouse gas emissions by approximately 91,350,000 lbs of CO_2/yr by reducing imported water demands.

While the above numbers represent very preliminary estimates, the potential energy savings will clearly be an important factor evaluated in the Effluent Reuse Study. Methods of incorporating renewable energy and energy efficiency into the water recycling alternatives will be emphasized.

E.3.8 Evaluation Criterion 8: Watershed Perspective - 10 points

The Effluent Reuse Study will develop and evaluate alternatives that promote and apply both a regional (Orange County and Southern California) and a watershed (Santa Ana River Watershed) perspective to water resource management. The Study will assess the feasibility of implementing the adaptation strategies in the *"Santa Ana Watershed Basin Study"*, which is the WaterSMART Basin Study completed by Reclamation in September 2013, as listed in **Table 2**.

The Study will evaluate the feasibility of alternative water reuse approaches and recommend a project that will implement the adaptation strategies and address the imbalance between water supply and demand identified in the *"Santa Ana Watershed Basin Study"* by expanding the Orange County's recycled water supply and reducing effluent discharge to the Pacific Ocean. In order to achieve OCSD's goal, the selected alternative project must increase recycled water use by utilizing approximately 75 MGD of treated wastewater that is currently being discharged to the ocean. Conserving imported water, particularly during dry years and periods of supply shortages, in an energy efficient manner aligns with the adaptation strategies for the region.

Table 2. Applicable Adaptation Strategies from "Santa Ana Watershed Basin Study"

Santa Ana River Watershed (SARW) Adaptation Activities Supported by the Effluent Reuse Study[1]	Description
Improve operational efficiency	Promote systems re-operations, water transfers, and improved local and regional water conveyance. Optimize operational efficiency, promote water transfers, and develop regional water projects.
Increase water supply	Promote conjunctive management and groundwater storage; consider brackish and ocean desalination opportunities and more recycled water use, and local and regional surface storage opportunities. Identify watershed supply sources and increase storage capacity, and improve surface water operating efficiencies.

[1] From Table 5: "SARW Adaptation Strategies", *"Santa Ana Watershed Basin Study"*, Reclamation, 2013.

The Effluent Reuse Study is also consistent with the California Department of Water Resources (DWR) water management goals, which align with Reclamation's WaterSMART Basin Study *"Santa Ana Watershed Basin Study"* for California. In the *California Water Plan Update 2009,* DWR recognizes the benefits of improving water supply reliability and protecting water quality and environmental conditions.

Lastly, another region-wide resources plan, the SAWPA OWOW IRWMP emphasizes increased water supply diversity and improved water management in the Santa Ana River Watershed. OCSD is located within in SAWPA's boundary and participated in the OWOW Plan which was adopted in November 2010. The OWOW Plan states use of recycled water is a reliable, economically feasible, and environmentally sensitive means to preserve the State's potable water resources, assist with drought mitigation, and reduce the demand on potable water supplies. OCSD's Effluent Reuse Study is included in the OWOW and will lead towards increased recycled water use and reduce reliance on imported water supplies, conserving drinking water sources.

F. Required Permits or Approvals

No permits are required for development of the Effluent Reuse Study. The OCSD Board of Directors will approve the contract with the consultant selected to complete the Study. The Study is already included in OCSD's approved budget. OCSD will follow its standard consultant selection process which will involve (1) issuing a Request for Proposals for the Study, which is a competitive process; (2) receipt and review by OCSD staff of proposals received from consulting firms; (3) interviews of short-listed firms, if needed to discern qualifications; (4) staff recommendation of the selected firm to the OCSD Board of Directors; and (5) approval of the contract with the selected firm by the OCSD Board of Directors. The Study schedule calls for approval of the contract to the winning consulting firm by the OCSD Board of Directors in April 2015 and issuance of the notice to proceed in May 2015.

G. Funding Plan and Letters of Commitment

OCSD will fund the entire non-Federal share of the Effluent Reuse Study costs from OCSD's fees and sewer rates. No other source of non-Federal funding other than OCSD will be required to complete the Study. Funds for the Study are already in OCSD's approved budget.

Table 3 summarizes the non-Federal and other Federal funding sources for this Project. This application reflects the Group II amount of Federal funding (up to $450,000) designated in the Funding Opportunity Announcement. All non-Federal funding will be provided by OCSD.

Table 3: Summary of Non-Federal and Federal Funding Sources

Funding Sources	Funding Amount
Non-Federal Entities	
1. Orange County Sanitation District	*$2,350,000*
Non-Federal Subtotal	$2,350,000
Other Federal Entities	
1. None	*$0*
Other Federal Entities Subtotal	$0
Requested Reclamation Funding	$450,000
Total Study Funding	$2,800,000

H. Official Resolution

The official Resolution of OCSD Board of Directors authorizing this application and committing OCSD to the financial and legal obligations associated with receipt of WaterSMART Grant financial assistance has been agendized for the Board meeting on March 25, 2015. The adopted Resolution will be submitted to the Bureau of Reclamation before the April 2, 2015, deadline.

I. Budget Proposal

The proposed budget for the Effluent Reuse Study is presented in this section.

I.1. General Requirements

The total Study budget is estimated at $2,800,000.

I.2. Budget Proposal Format

The Study budget proposal is presented in Reclamation's recommended format described in the WaterSMART Funding Opportunity Announcement.

Table 4 below presents the funding sources for the Effluent Reuse Study. **Table 5** on the following page details the estimated Study cost and provides the required breakdown.

Table 4. Funding Sources

Funding Sources	Percent of Total Project Cost	Total Cost By Source
Recipient Funding	83.9%	$2,350,000
Reclamation Funding	16.1%	$450,000
Other Federal Funding	0.0%	$0
Totals	100.0%	$2,800,000

OCSD obtains its funds primarily from user fees. The Effluent Reuse Study is included in the OCSD Strategic Plan and is already included in the OCSD Budget. Furthermore, OCSD has identified future sources of funding to provide the revenue stream for implementation of the selected Title XVI Project based on the outcome of the Effluent Reuse Study. At this time, OCSD has no plans to borrow funds to support this project.

I.3 Budget Narrative Format

Estimated costs for the OCSD P1-101 Project are presented earlier in this section using the Reclamation's template format as **Table 5**. The cost estimate shows the breakdown activities, cost categories, unit prices and quantities. The estimated project budget also shows the split between the Federal share of the costs and the non-Federal share of the costs for each item. The form of the budget narrative presents the following information.

1. *Salaries and Wages*. Labor hours, salaries and wages are itemized by specific task. The labor rates and estimated hours are shown for each task.

Table 5. Budget Proposal

Budget Item Description	Computations		Recipient Funding	Reclamation Funding	Total Cost
	Rate/Unit Price	Quantity			
DISTRICT Salaries and Wages					
Engineering Manager	$ 80	120	$ 9,600	$ -	$ 9,600
Environmental Compliance Manager	$ 80	120	$ 9,600	$ -	$ 9,600
Operations Manager	$ 78	130	$ 10,075	$ -	$ 10,075
Operations Supervisor	$ 73	260	$ 18,850	$ -	$ 18,850
Project Manager	$ 65	2380	$ 154,700	$ -	$ 154,700
Process Engineer	$ 65	510	$ 33,150	$ -	$ 33,150
Compliance Engineer	$ 65	430	$ 27,950	$ -	$ 27,950
Collections Engineer	$ 65	170	$ 11,050	$ -	$ 11,050
Principal Environmental Specialist	$ 65	170	$ 11,050	$ -	$ 11,050
Senior Environmental Specialist	$ 60	170	$ 10,200	$ -	$ 10,200
Lead Plant Operator	$ 60	260	$ 15,600	$ -	$ 15,600
Senior Laboratory Analyst	$ 55	170	$ 9,350	$ -	$ 9,350
Administrative Assistant	$ 49	170	$ 8,330	$ -	$ 8,330
Subtotal			$ 329,505	$ -	$ 329,505
Fringe Benefits (See Note 1)			$ 329,505	$ -	$ 329,505
Total Feasibility Labor			**$ 659,010**	**$ -**	**$ 659,010**
Other Direct District Costs					
Supplies/Materials					
Office Supplies & Copies	$ 990	1	$ 990	$ -	$ 990
Total Direct Costs			**$ 990**	**$ -**	**$ 990**
TOTAL DISTRICT COSTS			**$ 660,000**	**$ -**	**$ 660,000**
CONSULTANT Salaries And Wages					
Principal Engineer	$ 90	450	$ 31,984	$ 8,516	$ 40,500
Project Manager	$ 75	1200	$ 71,075	$ 18,925	$ 90,000
Project Engineer	$ 55	4300	$ 186,769	$ 49,731	$ 236,500
Staff Engineer	$ 45	2400	$ 85,290	$ 22,710	$ 108,000
Geotechnical Engineer/Geologist	$ 55	200	$ 8,687	$ 2,313	$ 11,000
Electrical Engineer	$ 50	400	$ 15,794	$ 4,206	$ 20,000
Structural Engineer	$ 60	400	$ 18,953	$ 5,047	$ 24,000
Environmental Investigator	$ 60	500	$ 23,692	$ 6,308	$ 30,000
CADD Drafter/Graphics	$ 35	800	$ 22,112	$ 5,888	$ 28,000
Clerical	$ 25	800	$ 15,794	$ 4,206	$ 20,000
Subtotal Design Cost			$ 480,149	$ 127,851	$ 608,000
Fringe Benefits (See Note 2)			$ 1,056,329	$ 281,271	$ 1,337,600
Total Feasibility Study Cost			**$ 1,536,478**	**$ 409,122**	**$ 1,945,600**
Other Direct Consultant Costs					
Travel					
Mileage	$ 0.575	1565	$ 711	$ 189	$ 900
Supplies/Materials					
Office Supplies & Printing/Copies	$ 91,300	1	$ 72,101	$ 19,199	$ 91,300
Laboratory Testing					
Water Quality Sampling and Analyses	$ 102,200	1	$ 80,709	$ 21,491	$ 102,200
Total Direct Costs			**$ 153,521**	**$ 40,879**	**$ 194,400**
TOTAL CONSULTANT COSTS			**$ 1,690,000**	**$ 450,000**	**$ 2,140,000**
Total Direct Costs			**$ 2,350,000**	**$ 450,000**	**$ 2,800,000**
Indirect Costs - 0%			**$ -**	**$ -**	**$ -**
Total Project Costs			$ 2,350,000	$ 450,000	$ 2,800,000

NOTES:

1. Fringe Benefits for District Labor are estimated at: 100%
2. Fringe Benefits for Consultant Labor estimated at: 220%
3. All salaries are estimated as of January 2014.

The Program Manager for the Effluent Reuse Study (SP-173) is:

a. Program Manager: Cindy Murra
   Title: Project Manager

Other key personnel include:

b. Engineering Supervisor: Eros Yong
c. Engineering Manager: Kathy Millea
d. Director of Engineering: Robert Thompson

2. *Fringe Benefits.* Fringe benefits include paid vacation, holidays, sick leave, plus health insurance and retirement plan benefits. Fringe benefits are estimated as percentage of the direct labor cost. The percentage used for fringe benefits is shown in the notes at the bottom of the Budget Proposal in **Table 5**.

3. *Travel.* Only local travel will be needed for this project. Local travel is estimated based on mileage at standard rates.

4. *Equipment.* Equipment used for the Study will involve standard computers and copiers, which are not specifically charged to the cost of the Study.

5. *Materials and Supplies.* Office supplies are included in the budget. Typical materials and supplies will include copies and printing.

6. *Contractual.* Work that will be accomplished by consultants is listed separately with a breakdown. OCSD plans to use consultants for preparation of the Study. Included as a direct cost for the consultants are laboratory testing expenses for water quality sampling and analysis.

7. *Reporting.* Administration of the Study, including information on budgeting, expenditures, schedule, progress reporting will comply with the Reclamation Manual Directives and Standards (WTR 11-01) for feasibility studies. Quarterly reports will be submitted with invoices as the project progresses. A final report will be submitted at completion of the project.

8. *Other.* No other costs are envisioned for the Study.

9. *Indirect Costs.* No indirect costs are associated with the Study.

10. *Total Cost.* The total cost of the Effluent Reuse Study is shown in the budget along with the proposed Federal and non-Federal cost-share amounts.

I.4. Budget Form

Form SF-424A Budget Information – Non-Construction Programs follows on the next page.

SINCE 1933

ORANGE COUNTY WATER DISTRICT

ORANGE COUNTY'S GROUNDWATER AUTHORITY

February 23, 2015

Bill Steele
Area Manager
U.S. Bureau of Reclamation
27708 Jefferson Ave., Suite 202
Temecula CA 92590

Re: OCSD's– Effluent Reuse Study Project No. SP-173

Dear Mr. Steele:

I am writing to show our support for the Orange County Sanitation District's (OCSD) Effluent Reuse Study and its application for the USBR Title XVI WaterSmart grant.

The study will develop an implementation plan for facility improvements needed to support the Groundwater Replenishment System (GWRS) Final Expansion. The GWRS is a water supply project jointly sponsored by OCSD and the Orange County Water District (OCWD). OCSD recognizes the value of its treated wastewater as a local resource and one of the solutions to address the water shortage.

GWRS supplements existing water supplies by providing a new, reliable, high-quality source of water to recharge the Orange County Groundwater Basin. Approximately 70 percent of the drinking water supply is local groundwater. Operational since 2008, GWRS produces up to 70 million gallons per day (MGD) of purified recycled water. OCSD currently delivers 100 MGD of treated wastewater from its Plant No. 1 in Fountain Valley to the GWRS for recycling and sends the remaining 100 MGD into the Pacific Ocean.

When it begins operation in April 2015, the GWRS initial expansion will require 135 MGD of treated wastewater to produce 100 MGD of purified recycled water. OCSD has an existing agreement with OCWD to provide more treated wastewater; however, available flows from Plant No. 1 are limited to about 90 percent of that demand. The immediate focus of the Effluent Reuse Study will be to identify modifications that will enable OCSD to fulfill its commitment to the GWRS Initial Expansion.

OCSD and OCWD anticipate another expansion of GWRS. The GWRS Final Expansion will require a total treated wastewater flow from OCSD of 179 MGD in order to produce 130 MGD of purified recycled water.

We hope that USBR will consider the important contribution that this proposed project can make to alleviate current and future drought impacts to our region. We look forward to learning the outcome of your review of this submittal.

Please feel free to contact me with any questions you might have.

Sincerely,

Michael R. Markus, P.E., D.WRE, BCEE, F.ASCE
General Manager