THE CITY OF SAN DIEGO

REPORT TO THE CITY COUNCIL

DATE ISSUED: May 15, 2012 REPORT NO: 12-059

ATTENTION: Natural Resources & Cultural Committee
Agenda of May 23, 2012

SUBJECT: Recycled Water Study Draft Final Report

REFERENCE: Resolution Number R-304617 of the City Council authorizing negotiation and execution of a cooperative agreement with San Diego Coastkeeper and the San Diego Chapter of Surfrider Foundation; and taking related actions, adopted January 27, 2009.

REQUESTED ACTION:

1. Accept the Recycled Water Study as fulfillment of the elements outlined in Resolution R-304617; and
2. Accept the Recycled Water Study as fulfillment of the elements outlined in the City's Cooperative Agreement with San Diego Coastkeeper and the San Diego Chapter of Surfrider Foundation, dated February 17, 2009.

STAFF RECOMMENDATION:
Approve Requested Actions

SUMMARY:
The passage of the Ocean Pollution Reduction Act (OPRA) by Congress in 1994 allowed San Diego to continue applying for permit modifications which allow the discharge of chemically enhanced primary treated wastewater into the ocean. In 2010, the United States Environmental Protection Agency (USEPA) granted the City of San Diego its third 301(h) modification to its National Pollutant Discharge Elimination System Permit (Permit), allowing the City to continue to operate the Point Loma Wastewater Treatment Plant (Point Loma) as a chemically-enhanced primary treatment facility. The City's Permit will expire on July 31, 2015.

During the 2010 Permit renewal application process, San Diego Coastkeeper and the San Diego Chapter of Surfrider Foundation entered into a Cooperative Agreement (Agreement) with the City to conduct a Recycled Water Study (Study) with the objective of identifying ways to maximize reuse and minimize flows to Point Loma. The City Council authorized the execution of the Agreement on January 27, 2009. In accordance with the Agreement, both of these organizations provided their support to USEPA's decision to grant the modified permit, and were key Study stakeholders. The City's responsibility per the Agreement is to complete the Study within two years of the date the Permit became effective (August 1, 2010).

The Final Draft Study Report (attached) outlines the two-year effort undertaken, including but not limited to: stakeholder involvement, a non-potable customer market assessment, evaluation of metropolitan wastewater flow quantities and quality, development of reuse options, and a financial analysis.

Study Implementation and Funding

Implementation of the Study was undertaken by the Public Utilities Department's Long-Range Planning and Water Resources Division. The Department assembled a team of City staff and consultants to prepare the study which was funded by the Metropolitan Sewer Utility Fund.

Stakeholder Participation

The Metropolitan Participation Agencies, Independent Rates Oversight Committee and San Diego County Water Authority had stakeholder representation in addition to San Diego Coastkeeper and Surfrider Foundation. Stakeholder representatives provided feedback at bi-monthly status update meetings, participated in technical workshops to brainstorm and refine the reuse alternatives, and commented on all technical memoranda and the project report.

Study Documents

The following technical memoranda were produced as part of the study, along with the final report:

Technical Memorandum	*Date Submitted to Stakeholders*
#1 - Non-potable Reuse Market Assessment	November 2009
#2 - Regional Non-potable Reuse Recycled Water Demand	November 2009
#3 - Frame Work Planning	April 2010
#4 - Wastewater Supply and Treatment	October 2010
#5 - Recycled Water Demand and Delivery	November 2011
#6 - Coarse Screening	January 2011
#7 - Fine Screening Session	February 2011
#8 - Financial Analysis	May 2011

Drivers for Increasing Reuse

The term, "reuse" refers to the beneficial reuse of wastewater that has undergone a high level of treatment. The Cooperative Agreement sets forth the primary Study goal of maximizing reuse in the Metropolitan Sewerage System (Metro System) Service Area to minimize flows to Point Loma. Minimizing Point Loma flows will reduce the extent, and therefore cost, of secondary upgrades; it will also benefit the environment by reducing ocean discharges. The requirements for upgrading Point Loma to secondary at its current rated capacity of 240 million gallons per day (mgd) have been studied on multiple occasions, with capital costs estimated on the order of $1.2 billion (2011$). The high cost is due to site limitations, as there is minimal space to construct additional facilities at the current site. In order to accommodate new secondary treatment facilities, complex measures such as stacking basin facilities and cutting into the

adjacent cliffs, would be necessary. The reuse strategies developed in the Study are expected to reduce Point Loma flows by 135 mgd and reduce the capital cost of secondary upgrades by more than 37%, to approximately $710 million (2011$).

Reuse would also increase local water supplies, and this aligns with the City and region's efforts to diversify the local supply portfolio. The region has historically relied on imported supplies from Northern California and the Colorado River for 80 to 90 percent of the total water need. Recent trends of increasing costs and constraints that limit the availability of imported supplies, underscore the need to continue to develop local sources of water. The cost of imported untreated water was $904 per acre-foot in 2011, and is projected to reach $2,000 per acre-foot by the year 2020. The life-cycle costs associated with the reuse alternatives developed in the Study are comparable. The financial analysis is documented in the Study Report.

Key Considerations

Along with the challenges associated with Point Loma upgrades and long-term imported water supplies, the following were considered in the development of the Study's reuse alternatives:

- Uncertainty of future Permit modifications – Point Loma's is the last modification granted to a major municipality
- The Metro System is a regional system, serving 16 participating agencies. See system map in Figure 1. Total system flows are projected to reach 278 mgd by the year 2050.
- Balancing diverse stakeholder interests
- Regulatory and public approval of indirect potable reuse is still needed – indirect potable reuse utilizing City of San Diego reservoirs is integral to the Study's reuse alternatives. Its implementation will require the California Department of Public Health to develop regulatory requirements, which do not currently exist.

Development of Reuse Opportunities

The Study evaluated both non-potable and indirect potable reuse opportunities. San Diego's non-potable reuse (NPR) customers have most commonly used recycled water that has undergone a high level of (tertiary) treatment and is safe for non-drinking purposes like irrigation and cooling towers. Indirect potable reuse (IPR) involves putting the recycled water through an even more advanced treatment process so that it can be added to raw or untreated water supplies in either surface reservoirs or groundwater basins; the water would be subsequently treated at a conventional water treatment plant before being distributed for drinking purposes.

During the Study a market assessment of potential retail and wholesale non-potable customers was performed. The assessment identified approximately 27 mgd of new demand from potential customers who are scattered across the service area. There are a few focus areas in which some of this demand is concentrated because of the high occurrence of potential customers. The demand in these focus areas is approximately 8 mgd. The estimated capital cost to build new recycled water facilities to serve this 8-mgd demand ranges from $430 to $550 million (2011$); costs incurred by customers to retrofit their sites to receive the recycled water are not included in these estimates. The cost to serve the entire 27 mgd of potential demand would be far greater because customers outside of the 8-mgd focus areas are so widely dispersed and would require a much more extensive system expansion.

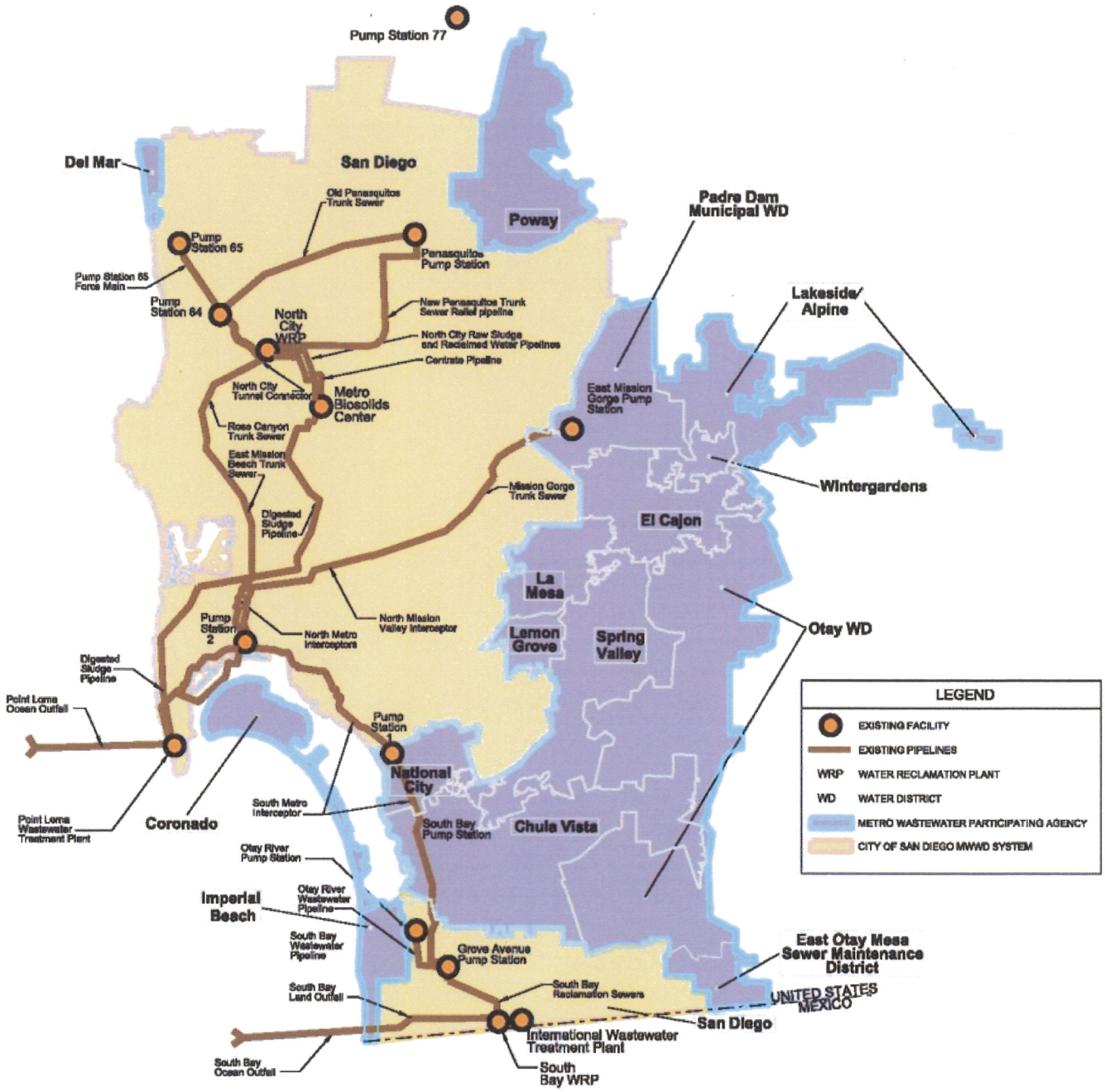

Figure 1 – Metro Sewerage System and Service Area

The high cost of system expansion for just an 8-mgd reduction in Point Loma flows shifted the Study's non-potable focus to infill customers only. These infill customers are close enough to existing distribution system infrastructure, such that capital improvements required to serve them are minimal. Future infill demand is estimated at 7-mgd and would increase non-potable demands from 11 to 18 mgd. The Study's reuse alternatives incorporate 18 mgd of non-potable demand and do not include any extensive system expansion.

In keeping with the objective of finding ways to maximize reuse, indirect potable reuse options were explored. Indirect potable reuse (IPR) involves putting recycled water through an advanced treatment process, adding the advanced-treated water to raw water supplies in either surface reservoirs or groundwater basins, and then treating it at a conventional water treatment plant before distributing it for drinking purposes. The Study evaluated options for IPR through groundwater recharge, but the amount of groundwater basin data available does not sufficiently support sizing a potential project. As the City continues to conduct groundwater basin investigations, new data can be integrated into future recycled water master planning updates. The City's ongoing evaluations of the feasibility of using the San Vicente Reservoir in an IPR/reservoir augmentation concept were leveraged to estimate the potential of this mode of IPR. The reduction in Point Loma flows possible through reservoir augmentation is estimated to be 83 mgd.

The Study developed five reuse alternatives, and elements common to them all include:

Table 1 – Reuse Alternatives' Common Elements	
Total average-daily reuse derived from reuse alternatives	101 mgd
Total NPR	*18 mgd*
Total IPR	*83 mgd*
Total reduction in Point Loma flows	135 mgd
Total IPR to San Vicente Reservoir	*68 mgd*
Total Net Diversion to South Bay Reclamation Plant[1,2]	*62 mgd*
Future Helix Water District Reuse Project	*5 mgd*
Total Projected Metro System 2050 flows	278 mgd
Total resultant Point Loma flows	143 mgd

[1]3 mgd of solids are returned to Point Loma
[2]Depending on actual amount of NPR served from South Bay, 38 to 47 mgd will be discharged through the South Bay Outfall

Reuse Facilities

The key facilities required to produce the reuse shown in Table 1 can be categorized as treatment, storage, and conveyance. Treatment facilities include the existing North City and South Bay Reclamation Plants (North City and South Bay), as well as a proposed Harbor Drive facility located near Lindbergh Field. Some of the alternatives also considered additional treatment located in Mission Valley and the Mission Gorge area. Pump station and pipeline facility requirements were also evaluated for conveying different types of flows to and from the treatment facilities for: 1) diverting wastewater flows to treatment facilities; 2) conveying advanced –treated water from treatment facilities to either the San Vicente or Lower Otay Reservoirs; and 3) transporting solid wastes from treatment processes to solids-handling facilities. See Figures 2 and 3 for the treatment facility locations in the northern and southern portions of the Metro System.

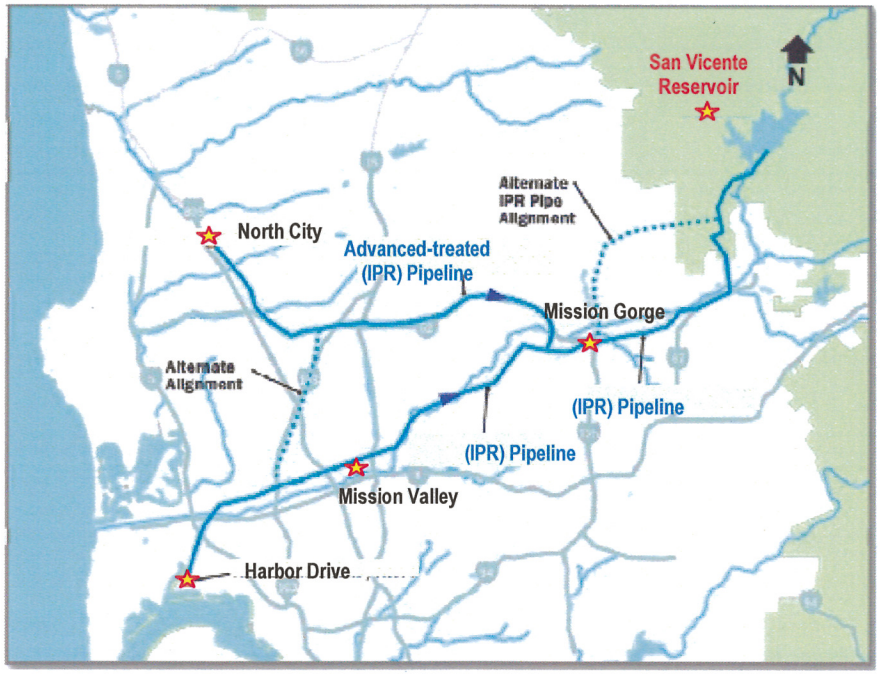

Figure 2 – Northern System Treatment Facility Locations

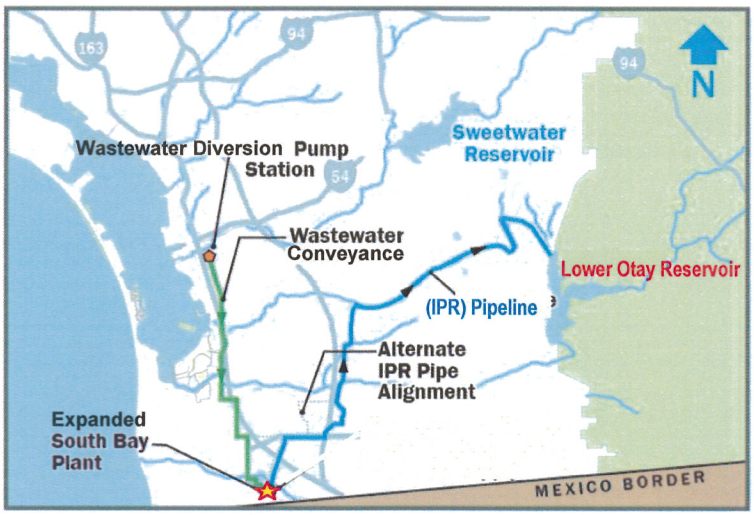

Figure 3 – Southern System Treatment Location

Leveraging Existing Treatment Capacity

Both North City and South Bay have the treatment capacity to increase their production of recycled water. Also, both sites have room to expand to 1) further increase their production capacity, 2) to add the capability of producing *advanced treated* water, or both.

North City. North City has the capacity to treat 30 mgd. Wastewater flows to North City are projected to reach 30 mgd in 2035, the Study's planning horizon. One North City alternative is to recycle the full 30 mgd, serve NPR demands, and then run the remaining recycled water through a new advanced treatment facility located on the vacant City-owned lot across the street. After accounting for treatment losses, this approach would yield 9 mgd of NPR and 15 mgd of

IPR, resulting in a Point Loma flow reduction of up to 24 mgd. The advanced-treated water would be conveyed to San Vicente Reservoir (San Vicente).

The second North City alternative would expand the plant capacity by 15 mgd and divert additional wastewater flows to the plant from Morena Boulevard, increasing the amount of IPR to 27 mgd. This alternative would require both increased recycling and new advanced treatment capabilities at North City. Up to 36-mgd of reduction in Point Loma flows is possible with this North City alternative.

South Bay. South Bay has the capacity to treat 15 mgd, and it has its own ocean outfall. Wastewater flows to South Bay are projected to be 13 mgd in 2035. The single South Bay alternative developed in the Study seeks to leverage the City's capacity in the outfall as well as the site's capacity to house a 65-mgd treatment facility. An additional 47 mgd of wastewater flow would be diverted to South Bay, and increased recycling and new advanced treatment capabilities would be required. After accounting for treatment losses this approach would yield 9 mgd of NPR and 15 mgd of IPR piped to the City's Lower Otay Reservoir. Remaining flows to South Bay would be treated to secondary standards and discharged through the South Bay Outfall. A 62-mgd reduction in Point Loma flows (after 3 mgd of solids are returned to Point Loma) is possible with this South Bay alternative.

New Treatment Facilities

Harbor Drive. The North City and South Bay alternatives maximize the use of available space at both plants. Total Metro System wastewater flows are projected to reach 278 mgd by 2050, and thus more reuse opportunities were explored. The 23-acre Harbor Drive Site is located near the convergence of the North and South Metro Interceptors, which carry all of the flows that ultimately continue on to Point Loma. The conceptual Harbor Drive treatment facility would be the largest among all the alternatives, as it has access to such a large quantity of wastewater. Preliminary evaluations show that the site could accommodate up to 53 mgd of recycling and advanced treatment, but a more detailed follow-on site study should be conducted to confirm this.

Two Harbor Drive alternatives were evaluated. One would place all advanced and recycled water treatment at Harbor Drive. The second alternative addresses the possibility that the site may not be large enough for all of this treatment. In that case, the Study looked at siting only recycling facilities at Harbor Drive and building an advanced treatment facility on City-owned property in Mission Valley. Depending on the alternative, as well as on how much is diverted upstream at North City, the Harbor Drive facility would produce between 40 and 53 mgd of IPR water.

Mission Gorge. Finally, a Mission Gorge treatment facility was considered which would capture and treat flows in the easterly part of the Metro System service area, rather than allowing them to continue west for treatment, only to be pumped back to San Vicente. Based on flows available to this location, 7 mgd of IPR water could be produced and sent to San Vicente.

Table 2 shows the treatment strategy associated with each Reuse Alternative. Each alternative would reduce Point Loma Flows by 135 mgd (average daily).

Table 2 – Treatment Site Strategy Versus Alternative					
	Reuse Alternative				
Treatment Strategy	***A1***	***A2***	***B1***	***B2***	***B3***
Expand South Bay and divert additional 47 mgd of wastewater to the facility	X	X	X	X	X
Maximize use of current North City capacity			X	X	X
Expand North City and divert flows from Morena Boulevard and Interstate 8	X	X			
Build new Harbor Drive Treatment Facility for both recycling and advanced treatment		X		X	X
Build new Mission Valley Facility to Relieve Harbor Drive Capacity Need	X		X		
Include City-Padre Dam MWD joint-agency Mission Gorge Treatment Plant					X

Implementation Costs

Fifty-year life cycle costs were estimated for each of the alternatives and ranged from $2.7 to $3.4 billion ($1700 to $1900 per acre-foot of reuse water produced). The Final Draft Study Report explains three different tiers of savings that would effectively lower the alternatives' life-cycle costs. The three tiers are detailed below.

1.) The first savings tier includes costs associated with wastewater capital improvement projects (CIP) that could be eliminated through the implementation of the reuse alternatives. These are primarily capital and operating costs associated with the Point Loma secondary upgrades at its full current capacity of 240 mgd.

2.) Savings derived from reduced salinity comprises the second savings tier. Advanced-treated water has extremely low salinity and will dilute other higher-salinity raw water reservoir supplies. Overall reduced salinity will lead to savings in water treatment plant operational costs.

3.) The third savings tier refers to savings associated with leaving Point Loma as a chemically-enhanced primary treatment plant and foregoing secondary upgrades altogether. This third tier was evaluated only to illustrate a potentially lower cost bookend. The Study's basic assumption is that Point Loma must eventually be upgraded to secondary remains. Table 3 shows the estimated savings and resultant net cost of the recycled water for each tier.

Table 3 – Range of Reuse Alternative Implementation Costs (2011$)			
Savings Tier	***Avoided CIP Cost***	***Avoided Annual O&M Cost***	***Net Cost of Water Produced***
Gross Cost	Not applicable	Not applicable	$1700-$1900/ac-ft
Tier 1 (Wastewater)	$557M	$27.6M	$1100-$1300/ac-ft
Tier 2 (Reduced Salinity)	$100/ac-ft		$1000-$1200/ac-ft
Tier 3 (Maintain Advanced Primary Treatment @ PLWTP)	$463M	$13M	$600-$800/ac-ft

Figure 4 shows how the reuse implementation costs are projected to compare to future imported costs for untreated water.

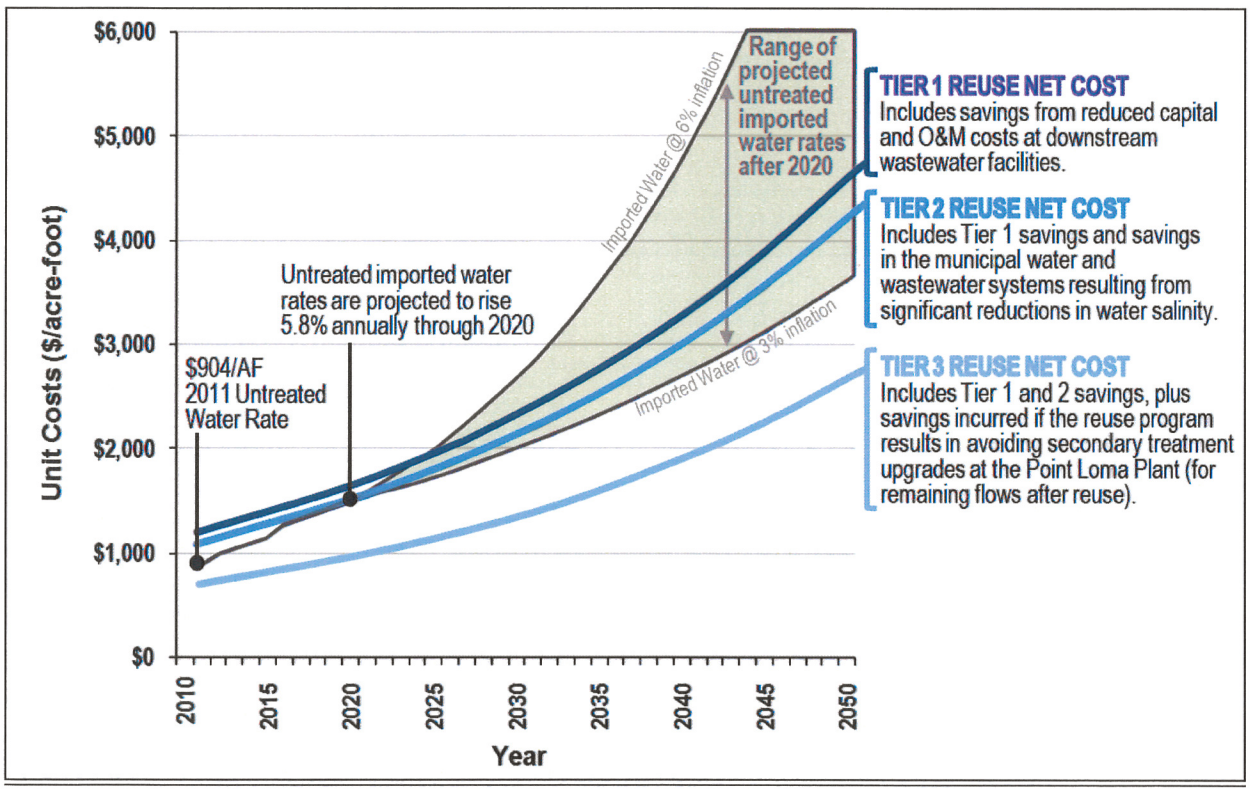

Figure 4 – Reuse versus Imported Water Cost Comparison

Summary of Reuse Benefits

The Study concluded that the following benefits are possible through the implementation of any one of the five reuse alternatives:

- Reduce flows to Point Loma by 135 mgd, thereby reducing the capital cost of secondary treatment upgrades from $1.2 billion to $710 million (37% savings).
- Annual operations and maintenance savings of $27 million (2012$).
- Create 101 mgd of NPR and IPR at a cost comparable to projected imported water costs.
- Reduce water supply salinity.
- Full utilization of existing water recycling capacity.

Follow-On Evaluations

The Study's reuse alternatives were developed at a master planning level. If a decision is made to implement any of the alternatives, follow-on evaluations would be necessary to gain clarity regarding these key implementation factors:

- *Water Purification Demonstration Project (Demonstration Project) Results and Potable Reuse Regulations*. Defining a regulatory framework for IPR through reservoir augmentation is one of the Demonstration Project's major tasks. The requirements set forth in that framework may affect the scopes and costs of the IPR facilities included in the Study's reuse alternatives.
- *Detailed Financial Analyses*. Allocating costs of the reuse alternatives between water and wastewater funding sources must be determined so that rate impacts and detailed financing plans can be prepared.
- *Technical Considerations*. Related evaluations include: detailed site studies, refinement of a solids-handling strategy, ongoing coordination with wastewater and water facilities planning, and continued refinement of peak wet-weather flow strategies.
- *Point Loma Permit Renewal Application Process*. Coordinate any reuse implementation with the Point Loma Permit renewal process.

EQUAL OPPORTUNITY CONTRACTING:
Not applicable at this time.

FISCAL CONSIDERATIONS:
Not applicable at this time. An analysis of costs to implement each of the themes is presented in the Final Draft Study Report. When a decision is made to pursue any of these alternative(s), additional authorization for funding will be required.

PREVIOUS COUNCIL and/or COMMITTEE ACTION:
On January 27, 2009, the City Council adopted Resolution R-304617 authorizing negotiation and execution of a cooperative agreement with San Diego Coastkeeper and San Diego Chapter of the Surfrider Foundation to execute the Recycled Water Study.

COMMUNITY PARTICIPATION AND PUBLIC OUTREACH EFFORTS:
Community participation in this Study included representatives from the Metropolitan Participating Agencies, the Independent Rates Oversight Committee, the San Diego County Water Authority, San Diego Coastkeeper, and the San Diego Chapter of the Surfrider Foundation.

KEY STAKEHOLDERS AND PROJECTED IMPACTS:

The stakeholders in this Study included San Diego Coastkeeper, the San Diego Chapter of the Surfrider Foundation, the Metropolitan Participating Agencies, the Independent Rates Oversight Committee, and the San Diego County Water Authority. The stakeholders were active participants in this Study, and the Final Draft Study Report was developed with input from all stakeholders.

Roger S. Bailey
Director of Public Utilities

Attachment: 1. Recycled Water Study Report