On-Site Water Reclamation Feasibility Evaluation

At the City of Coronado Municipal Golf Course
San Diego County, California

MWDSC Innovative Supply Program

RIPLEY PACIFIC COMPANY
WATER REUSE INFRASTRUCTURE

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Dana Ripley and Mike Huck, May 20, 2005

1. Executive Summary

Due to consecutive years of below normal precipitation in the southwestern United States, the reliability of water supplies for urban, agricultural, and environmental needs has become a concern for all large scale water users in the region. This is particularly evident for all water users in seven states dependent on the Colorado River basin for either local or imported water. Because the potential for water shortages may be imminent throughout the Southwest, the need for alternative water supplies with a higher reliability has gained increased attention by policy-makers at all levels of government.

Recycled water in urban areas has long been recognized as a non-potable water source with relatively high reliability for those areas where it is available. Golf courses are logical users of recycled water because of the large water demands at a single location that are well suited to using high quality, yet non-potable, water. While golf courses are logical users of recycled water, surveys indicate that only about 20% of golf courses in the Metropolitan Water District of Southern California (MWDSC) service area currently utilize recycled water. The remaining 80% use either local groundwater or surface water, or imported water from the San Francisco Bay-Delta or the Colorado River.

The primary constraint to expanding the use of recycled water for golf course irrigation is the lack of pipeline infrastructure needed to transport recycled water from existing wastewater treatment plants to golf course locations. On-site water recycling (OSR) is a potential viable alternative for golf course sites that are beyond existing or planned pipeline networks of existing water recycling systems. The OSR concept overcomes this constraint by intercepting untreated sewage located in the immediate vicinity of a golf course or large turf irrigator, and treats the influent to water quality standards acceptable for turf irrigation in urban areas. The OSR concept, therefore, produces recycled water at the point of water demand and eliminates the need for pipeline infrastructure from existing wastewater treatment facilities.

Seeking to test the technical and economic feasibility of the OSR concept further, the Southern California Golf Association responded to the MWDSC Innovative Supply Program (ISP) proposal solicitation in late 2003. The ISP was seeking innovative water supply and water conservation concepts that would apply to the MWDSC service area. In June 2004, MWDSC awarded an ISP grant to SCGA to evaluate the feasibility of the OSR concept at one golf course site in southern California.

The City of Coronado municipal golf course was chosen by SCGA as the preferred OSR evaluation site for the ISP study for the following reasons:

- Irrigation demands are currently supplied entirely by water imported by MWDSC. There is no local supplemental supply of irrigation water.
- The Coronado golf course is a public facility owned by the City of Coronado and is not subject to limited use by a private membership.
- There are no existing wastewater treatment facilities of any kind on Coronado Island. The City of Coronado, in combination with the North Island Naval Air Station and the Naval Amphibious Base, export all wastewater (untreated) to the City of San Diego wastewater system.
- All of wastewater conveyed to the City of San Diego Point Loma wastewater facility is discharged directly to the Pacific Ocean.
- Coronado Island is physically isolated from mainland San Diego, and extension of recycled water pipelines from the existing City of San Diego water reclamation plants which is not considered economically feasible at present. A recycled water pipeline could be extended to the downtown San Diego parallel to the Transbay sewer force main, however there are no plans to extend recycled water distribution lines to the downtown area.
- The Coronado golf course represents a single user demand of about 330 acre-feet per year (AFY) that could potentially use non-potable recycled water. In combination with Tidelands Park owned by the San Diego Port Unified District north of the golf course and the CalTrans landscaping along State Route 75, the total irrigation demand increases to about 420 AFY for these three adjoining irrigators.
- Wastewater generated by the City and the military bases is far in excess of the minimum 420 AFY required by the OSR facility. Both gravity and pressure sewer collection pipelines are in the immediate vicinity of the golf course site. These pipelines provide potential intercept points for wastewater import to the OSR facility.

- City of Coronado management, golf course, and public facilities staff agreed to participate in the OSR evaluation and provide the necessary input data for evaluation[1]. City staff is aware of the vulnerability of imported water supplies and has the desire to investigate alternative water supplies for the golf course and other public turf areas that may have higher reliability during local or regional drought periods.

This report presents the findings of the OSR feasibility evaluation conducted between June and October 2004. An OSR system with a rated capacity[2] of 400,000 gallons per day (gpd) is recommended to supply the Coronado golf course, Tidelands Park, and the CalTrans State Route 75 landscaped easement with supplemental irrigation water. During the peak irrigation season, the OSR system could be operated at above its rated capacity to supply a seasonal peak irrigation demand of 600,000 gpd. The proposed system would supply 100% of the total annual irrigation demand of these three adjoining irrigators. The proposed OSR treatment facility would be located in an area on the golf course currently used for composting green waste referred to as the "Mulch Site." Untreated wastewater would be intercepted from an 18" diameter sewage force main at the intersection of Pomona Avenue and Strand Way. Treated effluent from the OSR would be discharged to the existing and potentially new ponds on the golf course, and pressurized for irrigation. A new irrigation mainline distribution system for the golf course is considered necessary to accommodate the recycled water supply from the on-site ponds. Residual biosolids from the OSR facility would be returned to the sewer collection system by reversing flow temporarily in the influent force main during the early morning hours. Excess capacity exists in the downstream pipelines and Transbay pump station during these morning hours. All of the above elements of the OSR system are considered technically feasible and would meet all water quality and health/safety requirements of the State of California and the U.S. Environmental Protection Agency.

The estimated implementation cost of the OSR facilities is approximately $12.4 million. The estimated per acre-foot (af) cost is $2,740. This estimate includes operational costs and amortizes capital costs over 30 years at a discount rate of 5%. This cost does not include profit and overhead and administration costs of the OSR facility operator. This compares to an existing delivered cost of about $950/af that the City currently pays to California American Water Company Coronado District (CalAm-Coronado) for golf course irrigation water.

[1] See Appendix A, Memorandum of Understanding between Southern California Golf Association and City of Cornonado.
[2] Rated capacity with redundancy provisions.

If rebates from water wholesalers and wastewater volume credits are considered, the net cost for irrigation water is reduced to $1,850/af which is about a $900/af premium over current delivered potable water rates. This rate is also about 20% higher than the highest coastal southern California delivered potable water rate surveyed.

If water and sewer facility capacity credits (FCCs) are included as a benefit for OSR effluent production, then net costs could be reduced to $750/af. Tabulation of FCC values is speculative, however, FCC values are anticipated to increase in direct proportion to water and sewer connection fee increases charged to homebuilders and commercial developers. The FCC tabulation presented in this report is based on existing water and sewer rate structures charged by the City of San Diego and San Diego County Water Authority, and these rate structures could potentially increase significantly in the near future.

In addition to OSR production costs, site user costs may be incurred to rehabilitate or replace existing irrigation systems at Coronado golf course, Tidelands Park, and the CalTrans State Route 75 easement. The total estimated cost for these site improvements $2.5 million and is not included in the per af costs presented above.

In addition to the technical and economic feasibility considerations of the OSR project, there are a number of related non-project aspects that ultimately may influence the viability of the project as presented in this report. These non-project factors may include:

- Reliability and future cost of imported water sources, i.e., the Bay-Delta and Colorado River;
- Production and delivery costs, environmental impacts, and energy intensity of producing other "new" water supplies in Southern California such as agricultural exchanges or desalination;
- Future treatment costs for San Diego's Point Loma wastewater treatment plant and whether treatment of effluent beyond advanced primary will be required for discharge to the Pacific Ocean;
- Whether delivery of high quality imported water used once and then discharged to the Pacific Ocean is in fact sustainable on a long term basis.

The scope of this report is limited to the economic and technical aspects of the specific OSR facility proposed at the Coronado golf course. The economics are based on estimated costs of implementation and current rate structures for water and sewer services in the City of Coronado (and three other California coastal communities) as of April 2005. However, the ultimate decision to proceed or not with any OSR facility in Coronado may well be made as much by the non-project considerations listed above as by any specific technical or economic conclusions presented in this report.

The conclusions of this report can be summarized as follows:

- The concept of on-site water reclamation to produce tertiary recycled water for golf course and other turf irrigation at the Coronado golf course and adjoining irrigators is technically feasible within the regulatory frameworks established by the State of California and the Environmental Protection Agency.
- The OSR treatment facility can be sited on an area on the golf course that will not appreciably impact the layout of the golf course, and would be sufficiently distant from homes on Glorietta Boulevard that aesthetic impacts would be minimal to both homeowners and pedestrians on that street.
- The OSR treatment facility can be designed with full building enclosure and integral odor/noise control provisions that would minimize any impact to golfers passing on adjacent fairways.
- The cost of effluent production without incentives and rebates indicates that the system is not viable as an economically stand-alone project at this point in time.
- The cost of effluent production net of volume credits and water wholesaler incentives improves the economic viability of the project, but it cannot be considered economically viable with these credits and incentives alone at this point in time.
- The cost of effluent production net of volume credits, incentive credits, and (estimated) facility capacity credits (FCCs) appears to be significantly below existing potable water rates and therefore would be considered economically viable at the present time under this economic scenario. While the concept of FCCs might be considered speculative at this point, they represent significant benefits realized by water/sewer wholesalers and retailers for “off-loading” existing infrastructure and freeing this capacity for other customers or other uses.