

PROJECT MEMORANDUM

Project Name: Santa Clara River Estuary Special Studies **Date:** September 16, 2011
Client: City of San Buenaventura
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Subject: Recommendations for Phase 2 of the Special Studies for the Santa Clara River Estuary
Draft Memorandum

INTRODUCTION

The City of San Buenaventura (City) has been required by the Los Angeles Regional Water Quality Control Board (RWQCB) to conduct three interrelated “Special Studies for the Santa Clara River Estuary” as a condition of the City’s NPDES discharge permit (CA0053651) for the Ventura Water Reclamation Facility (VWRF). The special studies are intended to provide information necessary to determine: 1) whether the VWRF tertiary treated flow discharged in the existing condition to the Wildlife/Polishing Ponds and then to the Santa Clara Estuary (SCRE) creates fuller realization of beneficial uses as necessary to confirm “enhancement” under the California Enclosed Bays and Estuaries Policy; and 2) if alternative VWRF discharge scenarios might be achieved that improve and/or further optimize beneficial uses in the SCRE and its watershed. Workplans for the special studies were originally developed with Stakeholder input and were submitted to the RWQCB in September 2008 and approved in December 2008. The scope and schedule of these studies (collectively referred to as the “Phase 1 Studies”) included the following:

- Estuary Subwatershed Study – This study synthesized historical and more recently collected information regarding the SCRE in terms of current ecosystem functioning under existing conditions (characterized by tertiary treated VWRF flows discharged to the Wildlife/Polishing Ponds and then to the SCRE) to determine if the current discharge results in fuller realization of beneficial uses within receiving waters as required to confirm “enhancement.” In addition, this study included a thorough assessment of a range of representative potential future flow scenarios and management measures that might be implemented (if determined in Phase 2 studies to be feasible) as necessary to achieve further improvement in, and/or optimization of beneficial uses within the SCRE and its subwatershed. The submission draft of this Study, titled “Final Synthesis Report” was provided to RWQCB in March 2011. Following additional Stakeholder comments and an August 18, 2011 Stakeholder Workshop on the submission draft of the Study, an Amended Final Report and a Project Memorandum Responding to Stakeholder Comments on the March submission draft of the Study accompany this memorandum, and are being submitted to the RWQCB on September 16, 2011 as ordered by the RWQCB.
- Treatment Wetlands Feasibility Study – This study evaluates at a planning concept level the feasibility of implementing a constructed treatment wetland to achieve additional reductions in

nutrients, copper and other metals in the VWRF tertiary treated discharge to further promote improvements in receiving water for beneficial uses. Submitted March 2010.

- Recycled Water Market Study – This study evaluates and quantifies at a conceptual planning level the feasibility of expanding the City’s existing reclaimed water system through evaluation of potential users within a five-mile radius of the VWRF (study area) for purposes of providing an alternative to discharging VWRF flows to the SCRE. Submitted March 2010.

SUMMARY OF PHASE 1 STUDY RESULTS

Estuary Subwatershed Study. The SCRE is designated to support eleven of the twenty four beneficial uses recognized for protection under the water quality control plan (Basin Plan) for the Los Angeles Region. Because of the sensitivity of some of these uses, particularly those related to recreation (REC-1, REC-2), aquatic habitat (MAR, EST, SPWN, MIGR), wildlife (WILD), and special status species (RARE), any future changes to the SCRE and its existing hydrology and water balance must be carefully considered as to the potential impact on these uses. The selected focal species and study question in the approved Phase 1 Study Workplans centered primarily upon these uses. Habitat conditions for four focal species (southern steelhead [*Oncorhynchus mykiss*], tidewater goby [*Eucyclogobius newberryi*], western snowy plover [*Charadrius alexandrinus nivosus*], and California least tern [*Sternula antillarum browni*]) were considered in the assessment of the existing SCRE and in a series of VWRF tertiary treated flow discharge alternatives ranging from No Action, to elimination of surface discharge from the Wildlife/Polishing Ponds to the SCRE, to complete elimination of VWRF discharges to the Wildlife/Polishing Ponds and the SCRE. Assessment of all alternatives focused on the dry-weather closed-mouth summer/fall period identified as the most critical period for discharge influence on the SCRE.

The evidence and analysis in the Amended Final Report of the Estuary Subwatershed Study show that the current VWRF flows to the Wildlife/Polishing Ponds and then the SCRE provide fuller realization of existing receiving water beneficial uses relative to that expected under a zero-discharge scenario (Alternative 6A) as shown in the Amended Final Report Section 11.8; Table 11-4. Fuller realization of receiving water beneficial uses occurs with current levels of VWRF tertiary treated discharge because, for example, the current discharge (as compared to the absence of discharge) provides for additional habitat for tidewater goby and steelhead and unique off-channel habitats for those sensitive species within the SCRE, and provides for a number of beneficial uses at the VWRF Wildlife/ Polishing Ponds (RARE, WET, WILD, REC-2), none of which would be present under a zero-discharge scenario (Alternative 6A).

Nevertheless, based on the evidence and results set forth in the Amended Final Report, alternative VWRF discharge scenarios, if feasible to implement, would further improve and/or optimize beneficial uses in the SCRE and its subwatershed, provided that the discharge scenarios incorporate additional treatment of VWRF discharge to reduce nutrients together with tertiary treated discharge reductions to the SCRE during dry-season, closed-mouth conditions. Such a discharge alternative would improve beneficial uses by, for example, reducing certain periods of low dissolved oxygen (DO) in localized areas of the SCRE as well as the frequency and duration of algal blooms within the SCRE, which together may benefit steelhead over-summering in and least tern foraging within the SCRE. Similarly, reductions in discharge volume during dry weather closed-mouth conditions are predicted to reduce SCRE water surface

elevation, or stage, potentially benefitting steelhead and tidewater goby by reducing the potential for unseasonal breaching due to a variety of causal mechanisms, and potentially benefitting REC-2 by making dry weather campground flooding less likely. Accordingly, receiving water beneficial uses can be improved or optimized, as determined feasible and appropriate in future phases of this project, by implementing one of the nutrient reduction/dry weather, closed-mouth discharge volume reduction alternatives identified in the Amended Final Report, or by implementing other discharge management actions involving tertiary treated discharge volume reductions in dry weather closed-mouth conditions, together with discharge nutrient treatment improvements.

Treatment Wetlands Feasibility Study. The submitted Treatment Wetlands Feasibility Report evaluated at a conceptual, planning level the feasibility and opportunity to reduce nutrients, copper and other metals in VWRF tertiary treated effluent through the implementation of treatment wetlands. The existing VWRF effluent meets permit limits for conventional constituents (e.g. BOD, TSS) and for metals, and planned upgrades to be completed in Fall 2011 will allow the existing VWRF to meet a new lower limit of 10 mg-N/L for nitrates ($\text{NO}_3 + \text{NO}_2$). Although wetlands can further reduce certain pollutants in the existing VWRF discharge, current discharge concentrations of these pollutants were below background levels for all constituents evaluated, with the exception of nutrients. Depending upon flow volume requirements of one or more of the alternatives developed under the Estuary Subwatershed Study, additional nutrient treatment process upgrades at the VWRF plan, or a wetland design accommodating a hydraulic residence time of 4–12 days, or some combination of upgrades and multi-day residence time within treatment wetlands would be required to meet the identified background levels of nitrates in the SCRE, depending upon season and water temperature.

Recycled Water Market Study. The submitted Recycled Water Market Study evaluated at a conceptual, planning level the potential for increasing recycled water use within five miles of the VWRF. Opportunities evaluated included expanding the City's existing urban irrigation recycled water system, agricultural irrigation and groundwater recharge. Expanding the urban irrigation system would entail construction of an extensive pipe network to urban reuse sites throughout the City to divert up to an additional 3.7 million gallons per day (MGD) of tertiary treated discharge in the summer, but likely less than an additional 1 MGD could be diverted in the winter. Diversion of tertiary treated discharge to agricultural irrigation would require very expensive capital improvements to add advanced treatment (microfiltration followed by reverse osmosis) to reduce the total dissolved solids (TDS) and chloride concentrations in the recycled water to concentrations that are recommended for irrigating the crops grown in the area. While it is likely, technically feasible to provide a diversion of up to an additional 11 MGD to agricultural irrigation in the summer months, agricultural irrigation would be an extremely expensive option. In this Phase 1 Study, groundwater recharge was only considered in conjunction with diverting tertiary treated discharges to United Water Conservation District (UWCD) for percolation at their existing recharge pits/spreading basins. While recharge could potentially divert up to 12.7 MGD seasonally, this option has the greatest uncertainty with respect to regulatory and institutional feasibility, and may still require extremely expensive advanced treatment. Depending on the flow diversion requirements, this Study determined that recycled water projects could be implemented for the purpose of diverting the VWRF discharge on a seasonal basis, provided that diversion requirements take into account technical constraints on diversion, such as public health and safety, design and capacity, and/or operational constraints that may make diversions at certain times infeasible or inappropriate to implement.

RECOMMENDATIONS FOR PHASE 2 STUDIES

The NPDES permit and the approved Workplans identified a second phase (“Phase 2 Studies”) needed to: (i) develop any additional information identified by the Phase 1 Studies to assure protection of the sensitive wildlife and aquatic resources and habitats of the SCRE; and (ii) integrate the conclusions of all three of the Phase 1 Studies into a process for selection, environmental review, and design of a preferred VWRf discharge/diversion alternative or combination of alternatives to create a discharge regime that further optimizes beneficial uses of the SCRE. Because of the relatively short monitoring period for some data used in the Phase 1 Studies, and due to additional data and information identified in comments on the submitted March 2011 submission draft of the Estuary Subwatershed Study as important to obtain, but beyond the scope of the 2008 Workplans, we are providing the recommendations for elements that could potentially be included as part of Phase 2 to help increase confidence that adoption of any new VWRf discharge and/or diversion regime further optimizes beneficial uses of the SCRE. Ultimately, the accepted Phase 2 Studies will involve analyzing, evaluating, designing, and reviewing the preferred combination of discharge/diversion alternatives to optimize beneficial uses within the SCRE and its subwatershed, including potential implementation of treatment wetlands and an expansion of water recycling. The City can then engage in a third phase of this project, devoted to engineering, obtaining all relevant permits, financing and constructing the preferred alternative.

The recommendations outlined below were developed from RWQCB and Stakeholder feedback, as well as our understanding of important data gaps, and should be viewed as components of potential Phase 2 studies. The scoping and initiation of any Phase 2 studies will be done at a later date through coordination with the RWQCB and consultation with the appropriate Resource Agencies.

Estuary Subwatershed Studies: Although a number of concerns were expressed in Stakeholder and Agency comments on the March 2011 submitted draft of the Estuary Subwatershed Report regarding the potential risks of habitat loss that may occur following implementation of flow diversion alternatives, there was general consensus on the need to implement additional treatment of the VWRf discharge to reduce nutrients along with some amount of discharge flow reductions to the SCRE during the dry season. Broader concerns regarding flow reductions that might be appropriate to implement ranged from the need for additional hydraulic data (flow, stage, groundwater elevation, and bathymetry) to represent conditions over a range of water year types, and also expanded water quality sampling to better represent baseline nutrient conditions, groundwater quality conditions, and algal dynamics in the SCRE. Specific elements identified during review of the Phase 1 Study that may be included in the Phase 2 Study include:

1. Potential additional alternatives could be developed, including:
 - a. Refined estimates of future wastewater flows to the VWRf recognizing the effect of improved water use efficiency and potential additional dry weather storm water diversions on flows to be treated at the VWRf.
 - b. Inclusion of projected fish passage flows in the Santa Clara River expected as part of the UWCD ESA habitat conservation planning efforts in the water balance used to assess appropriate VWRf flows to the SCRE.

- c. Develop estimates of baseflow resulting from percolation and river discharge at upstream treatment or habitat wetlands sites.
 - d. Consider alternatives that include natural wetland habitat created by restoration of the flooded portions of the McGrath State Beach campground. .
 - e. Consider diversion of VWRF discharge to the City of Oxnard Groundwater Recovery Enhancement and Treatment (GREAT) Program.
2. Potential additional data collection could be conducted to validate and improve the current water balance and to better predict the following: 1) relationships of volume, area, and habitat to stage; and 2) the effect of VWRF discharge regimes. This additional data collection could include the following information over a range of water year types, if they occur during a defined study period (i.e., dry, average, and wet years):
 - a. Up-to-date high-resolution SCRE topographic data (e.g., LiDAR) for developing updated SCRE bathymetry (currently represented by 2005 conditions).
 - b. SCRE stage and floodplain water table elevation data at current monitoring locations.
 - c. Additional groundwater data to determine floodplain water table elevations and groundwater gradients upstream of Harbor Blvd., potentially at the McGrath Property on the north bank floodplain (pending cooperation with property owner, The Nature Conservancy [TNC]).
 - d. Discharge flow measurements at the outlet of the Wildlife/Polishing Ponds.
 - e. River dry season, low-flow discharge measurements at the Victoria Ave. bridge and the Harbor Blvd bridge combined with periodic observations of surface flow from agricultural ditches between the two bridges.
 - f. Evapotranspiration measurements adjacent to the SCRE, potentially at the VWRF.
3. Potential additional water quality measurements needed to improve the resolution of the current nutrient balance:
 - a. Monthly water quality measurements of the various flow components of the water balance (VWRF Pond discharge, groundwater, and river flow). Groundwater sampling for nutrients at the current monitoring well locations and wells to be installed upstream of Harbor Blvd. bridge.
 - b. One or more intensive (one month) sampling periods during closed mouth conditions that include continuous in situ water quality (DO, Temperature, pH, Conductivity, Chl-a) along with weekly samples of nutrients, algae, DO and sediment oxygen demand at representative locations.

- c. Opportunistic observations of observed surface flow from agricultural ditches between the Victoria Ave. and Harbor Blvd. bridges to confirm order of magnitude estimates of unaccounted flow sources in the existing water balance.
4. Potential additional data collection and analysis to explicitly evaluate a broader suite of species, including:
 - a. Effects of VWRf discharge on salinity and aquatic species assemblage (i.e., invertebrates, non-native fish).
 - b. Expanded toxicity testing to include brackish water adapted species more representative of other southern California estuaries.
 - c. Evaluation of sub-lethal aquatic species effects of current SCRE water quality affected by the VWRf (through literature reviews and/or other studies).
 - d. Expanded the analysis to include other fish (e.g., Pacific lamprey) and bird species not included in the original Order.
 - e. Refinement/modification of the water quality modeling approach

Treatment Wetlands Studies: There are a number of issues/changes that have arisen since the 2010 submittal of the Treatment Wetlands Report. The largest change being that additional lands are being acquired along the Santa Clara River by TNC for the purpose of restoration. In addition, we have new information regarding the potential for the McGrath beach campground to be relocated. Given this new information, the results of the Amended Final Report, and the need to integrate the findings of all three studies in the Phase 2 work effort, the elements to be further considered could include the following:

1. Develop scenarios of paired recycled water projects, wetlands projects or other VWRf discharge diversion projects. Conduct a cost-benefits analysis for all scenarios, including funding opportunities.
2. Use updated water quality monitoring data from the Phase 2 Studies to better identify background and groundwater water quality conditions in the Santa Clara River, the SCRE, and its watershed to set the goal for wetlands performance.
3. Re-evaluate siting of wetlands. Evaluate feasibility and size of new TNC lands. Depending on the scenarios identified, determine whether on-site or off-site wetlands are the preferred alternative based upon land availability, costs, and technical feasibility. For on-site wetlands, evaluate the impacts of conversion of open water habitats to emergent marsh at the existing Wildlife/Polishing Ponds. For off-site wetlands, evaluate conversion of agricultural or other land uses to wetland habitat, including impacts of pipeline corridors to existing upland species.
4. Consider opportunities to pair treatment wetlands with goals for floodplain restoration for the newly identified TNC property.

5. Engage in discussion with regulatory agencies regarding the maximum ecologically protective diversion volume and other permitting issues (e.g., NPDES permit, Army Corps of Engineers, others...). Will there be an effluent requirement after the wetlands? Or will the point of compliance still be at the Effluent Transfer Station (ETS)? Identify other site permits required to divert and discharge VWRW tertiary treated flows in other locations.
6. Evaluate options for pairing a treatment wetlands with a perched zone recharge option with underground flows returning to the river.
7. Evaluation of costs, benefits, permits, institutional agreements, and CEQA considerations required.

Recycled Water Studies: There are also a number of issues/changes that have occurred since the 2010 submittal of the Recycled Water Market Study. The City of Ventura is investigating the potential to divert discharge to the City of Oxnard's GREAT recycled water program. UWCD is in the process of implementing a new diversion program and the potential for recharge volumes for VWRW would need to be reconsidered. Also the State of California is in the process of updating the 2008 Draft Groundwater Recharge Regulations, due out in draft form in Fall 2011. Potential recharge options would need to be evaluated in light of these regulations.

1. Development of potential alternatives related to urban reuse
 - a. Evaluate feasibility and costs of decentralized treatment and reuse
 - b. Refinement of potential users and their demands.
 - c. Further evaluate pipeline alignment and costs of infrastructure
 - d. Evaluate costs, benefits, permits, institutional agreements, and CEQA considerations.
2. Development of potential alternatives related to agricultural reuse
 - a. Evaluate potential to combine service of recycled water to agricultural users on the Oxnard Plain with Oxnard with a blend of recycled water from VWRW and GREAT water from Oxnard.
 - b. Investigate storage options, including use of the VWRW Wildlife/Polishing Ponds and offsite storage locations..
 - c. Further develop and estimate costs of treatment and brine disposal options.
 - d. Consider potential alignments for pipelines and cost of infrastructure.
 - e. Evaluate costs, benefits, permits, institutional agreements, and CEQA considerations.

3. Development of potential alternatives related to groundwater recharge
 - a. Review and incorporate any changes in regulations of groundwater recharge projects into the feasibility analysis.
 - b. Consider feasibility and costs of potential discharges to the City of Oxnard GREAT Program.
 - c. Evaluate options for groundwater recharge elsewhere in the Santa Clara River watershed
 - d. Coordinate with UWCD on their planned diversion to recharge facilities and the potential for introducing recycled water in recharge facilities.
 - e. Conduct additional review of required level of treatment after discussion with UWCD and RWQCB.
 - f. Consider potential alignments for pipelines and cost of infrastructure.
 - g. Evaluate of costs, benefits, permits, institutional agreements, and CEQA considerations.
4. Potential development of scenarios of paired recycled water projects, wetlands projects and estuary diversion projects.

CONCLUSIONS/NEXT STEPS

The comprehensive list of potential elements presented above represents a significant investment of time and money by the City if all were included in the Phase 2 study. In close coordination with the RWQCB and Stakeholders, the City will need to consider which of these elements are needed to answer the question of how to optimize the discharge regime, and satisfy:

- the purpose of the Project, which based on the Phase 1 Studies, is now to determine feasible alternatives, and to identify a preferred alternative for managing VWRf discharges to further reduce nutrients in the discharge and to reduce the volume of tertiary treated flows discharged to the SCRE, particularly in dry weather, closed-mouth conditions; and
- permit requirements associated with adjusting the discharge/diversion regime and implementing the identified preferred alternative;

Schedule will also be a critical element for consideration as currently the Phase 2 study is required to be completed by March 2013. Some of the listed elements cannot feasibly be completed before the 2013 deadline.

Based on the considerations set forth in the Final Amended Estuary Subwatershed Study Report, the Responses to Stakeholder written and workshop comments on the March 2011 submission draft of the Estuary Subwatershed Report, recommended next steps to begin Phase 2 are as follows:

- City to evaluate scope, schedule and budget implications of selected Stakeholder requests for additional data, studies analysis and information in light of need to determine how to best optimize the VWRf discharge regime, project purposes as established through the Phase 1 Studies and stakeholder process, and likely permitting requirements to develop proposed Phase 2 Study elements, and an integrated scope, schedule, budget and process for the Phase 2 work effort.
- City to meet with RWQCB staff to:
 1. Review findings of studies and this memo;
 2. Determine scope of Phase 2 work;
 3. Determine if schedule for Phase 2 is adequate; and
 4. Discuss approach for consultation with and permitting by other Resources Agencies with jurisdiction.
- City to conduct a stakeholder workshop on Phase 2 Study elements, scope, schedule, budget and process
- City to move forward with the Phase 2 Study scope, schedule, budget and process, taking into account stakeholder comments and as approved by the Regional Board and the Resources Agencies.