TDS/NITROGEN MANAGEMENT PLAN FOR THE SANTA ANA RIVER BASIN

MONITORING AND ANALYSES REQUIREMENTS

REQUEST FOR PROPOSAL

FOR

CONSULTING SERVICES

FOR

SANTA ANA RIVER WASTE LOAD ALLOCATION MODEL UPDATE

NOVEMBER 7, 2016

REQUEST FOR PROPOSAL FOR CONSULTING SERVICES

FOR

SANTA ANA RIVER WASTE LOAD ALLOCATION MODEL UPDATE

1. INTRODUCTION

The Santa Ana Watershed Project Authority (SAWPA) requests proposals from qualified consultants to update, calibrate, and apply the Wasteload Allocation Model (WLAM) to estimate projected TDS and Nitrate-N concentrations of the Santa Ana River recharge water and discharge at Prado Dam. This effort satisfies monitoring and analyses requirements in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan).

The work will be performed under the supervision of the Santa Ana Watershed Project Authority, administrator for the SAWPA Basin Monitoring Program Task Force (Task Force). The Task Force was originally formed to implement the TDS and nitrate groundwater and surface water monitoring requirements of the Basin Plan. The Task Force is comprised of representatives from a number of key watershed stakeholders, including staff from the Regional Water Quality Control Board (Regional Board). SAWPA will serve as administrator of the project. Proposals are due to SAWPA by 5:00 pm on December 6, 2016.

2. BACKGROUND

The Santa Ana River watershed is located in southern California and is approximately 2,840 square miles in size. The tributaries of the Santa Ana River begin in the San Bernardino, San Gabriel, San Jacinto, and Santa Ana Mountains. The tributaries merge with the Santa Ana River which flows to the Pacific Ocean. The watershed includes portions of San Bernardino County, Riverside County, Orange County, and a small portion of Los Angeles County.

As part of the agreement to adopt the 2004 Basin Plan Amendment (Resolution No. R8-2004-0001), affected parties agreed to develop and periodically update the wasteload allocation for the upper Santa Ana River Watershed:

> "Wasteload allocations for regulating discharges of TDS and total inorganic nitrogen (TIN) to the Santa Ana River, and thence to groundwater management zones recharged by the River, are an important component of salt management for the Santa Ana Basin. As described earlier, the Santa Ana River is a significant source of recharge to groundwater management zones underlying the River and, downstream, to the Orange County groundwater basin. The quality of the River thus has a significant effect on the quality of the Region's groundwater, which is used by more than 5 million people. Control of River quality is appropriately one of the Regional Board's highest priorities.
>
> Sampling and modeling analyses conducted in the 1980's and early 1990's [sic] indicated that the TDS and total nitrogen water quality objectives for the Santa Ana River were being violated or were in danger of being violated. Under the Clean Water Act (Section 303(d)(1)(c); 33 USC 466 et seq.), violations of water quality objectives for surface waters must be addressed by the calculation of the maximum wasteloads that can be discharged to achieve and maintain compliance. Accordingly, TDS and nitrogen wasteload allocations were developed and included in the 1983 Basin Plan. The nitrogen

wasteload allocation was updated in 1991; an updated TDS wasteload allocated [sic] was included in the 1995 Basin Plan when it was adopted and approved in 1994/1995.

The wasteload allocations distribute a share of the total TDS and TIN wasteloads to each of the discharges to the River or its tributaries. The allocations are implemented principally through TDS and nitrogen limits in waste discharge requirements issued to municipal wastewater treatment facilities (Publicly Owned Treatment Works or POTWs) that discharge to the River, either directly or indirectly. Nonpoint source inputs of TDS and wasteload allocations […].

Because of the implementation of these wasteload allocations, the Orange County Water District wetlands and other measures, the TDS and TIN water quality objectives for the Santa Ana River at Prado Dam are no longer being violated, as shown by annual sampling of the River at the Dam by Regional Board staff. However, as part of the Nitrogen/TDS Task Force studies to update the TDS/nitrogen management plan for the Santa Ana Basin, a review of the TDS and TIN wasteload allocations initially contained in this Basin Plan was conducted [in 2002]. In part, this review was necessary in light of the new groundwater management zones and TDS and nitrate-nitrogen objectives for those zones recommended by the N/TDS Task Force (and now incorporated in Chapters 3 and 4). The wasteload allocations were evaluated and revised to ensure that the POTW discharges would assure compliance with established surface water objectives and would not cause or contribute to violation of the groundwater management zone objectives […]."

RWQCB, 2011, p. 5-27 to 5-31

In May 2009, the Task Force completed the 2008 Santa Ana River Wasteload Allocation Model Report Wildermuth Environmental Inc. (WEI, 2009) which updated the wasteload allocation to account for changing plans and conditions in the watershed. This included the development of six scenarios to represent a reasonable range of future (2010 and 2020) POTW wastewater production, reuse, and discharge, as well as the storm-water conservation measures being contemplated at the Seven Oaks Dam.

In January 2015, the Task Force completed an addendum to the 2008 Santa Ana River Wasteload Allocation Model Report to further assess the range of possible future conditions. This included the development and analysis of two additional modeling scenarios (Scenarios 7 and 8) and the incorporation of available data through 2012. The existing Wasteload Allocation model domain is the area in the Santa Ana Watershed that is tributary to Prado Dam.

3. OBJECTIVE

The primary objective of this project is to update, calibrate, and apply the Wasteload Allocation Model using available data through 2016, to estimate projected TDS and Nitrate-N concentrations of the Santa Ana River recharge water and discharge at Prado Dam, and to interpret the results.

4. ANTICIPATED SCOPE OF WORK

Task 1 – Update the Data Used in the Waste Load Allocation Model (WLAM)

Task 1a: Update relevant land use maps for the region

The Consultant shall use the best available land use data to represent current conditions, as the WLAM relies on land use maps to estimate the volume of stormwater runoff likely to occur in response to varying precipitation conditions.[1] To characterize probable land used in the future (2040) condition, the Consultant may rely on reasonable estimates of likely development in the region from reliable sources including, but not limited to: city and county planning agencies, census data, trend estimates from utility service providers, etc. Consultant should take into consideration that, since 2010, any new development or re-development in the region is subject to more restrictive regulations governing the volume of stormwater runoff from such areas.[2] These restrictions should be integrated into the updated WLAM. Data collection for all features needed in the updated WLAM should also be completed for the area tributary to Reach 2 of the SAR.

Task 1b: Update the stormwater management facility maps

The Consultant shall update the WLAM to accurately characterize significant infrastructure changes, as County flood control districts and local water supply agencies routinely make improvements in infrastructure that can affect the volume of runoff reaching surface streams and/or the volume of recharge to underlying groundwater basins. These include improvements such as: installing or removing concrete lining in flood control channels, constructing or enlarging diversion ponds to percolate stormwater, etc. The Consultant is not required to speculate on facilities that might be built at some future date but is encouraged to include any new facilities that are being actively designed/developed.

Task 1c: Update the historical precipitation data for the region

The Consultant shall expand the precipitation database (1950-2012) to include additional rainfall data from 2013-2016 so that the revised WLAM evaluates runoff and streamflow for a 66-year period. The WLAM relies on daily precipitation data from a wide variety of rainfall gauges throughout the region.[3] The most recent update to the WLAM used daily precipitation data for the 62-year period beginning in 1950 and ending in 2012.

Task 1d: Review and confirm the operating assumptions for Seven Oaks Dam and Prado Dam

The Consultant shall confirm that there have been no substantive changes in the procedures that govern the operation of Seven Oaks Dam and Prado Dam. The

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[1] Wildermuth Environmental, Inc. 2008 Santa Ana River Wasteload Allocation Model Report. May, 2009; see Tables 2-3, 2-4, 2-5, 2-6, 2-7 and Figure 2-6. GIS shape files are available from SAWPA.

[2] See, for example, the Area-wide Urban Stormwater Permit for Riverside County (NPDES No. CAS 618033; Order No. R8-2010-0033; pg. 91 of 117) or the Area-wide Urban Stormwater Permit for San Bernardino County (NPDES No. CAS 618036; Order No. R8-2010-0036; pg. 81 of 125).

[3] Wildermuth Environmental, Inc. 2008 Santa Ana River Wasteload Allocation Model Report. May, 2009; see Table 2-2 and Figure 2-5. Prior data files of historical rain gauge data are available from SAWPA.

current WLAM was recently revised to reflect the standard operating procedures at both dams.[4] However, if changes have occurred, the Consultant shall make appropriate adjustments in the updated WLAM to accurately reflect these revisions.

Task 1e: Update and consolidate the flow data used in the WLAM

The Consultant shall update the existing database to include all available and reliable flow data from: USGS gauging stations, POTW discharges, other non-tributary discharges (e.g. OC-59 deliveries, Arlington desalter operations, etc.), Watermaster reports, etc., as the WLAM relies on data from a wide variety of sources to characterize surface flows in the Santa Ana River and its major tributaries.[5]

Task 1f: Update and consolidate the water quality data used in the WLAM

The Consultant shall update the existing database to include all available and reliable water quality data to estimate the concentration of TDS and Nitrogen in both the discharges and receiving waters, as the WLAM relies on data from a wide variety of sources to characterize water quality conditions. This includes, but is not limited to data from: USGS, POTWs, Watermasters, CEDEN & STORET. The Consultant shallalso make reasonable efforts to locate and include data from other routine monitoring programs such as those undertaken by OCWD, the urban stormwater agencies, or in conjunction with a TMDL. In addition to Nitrogen and TDS data, the Consultant shall gather and consolidate data for other water quality parameters needed to assure adequate QA/QC or to aid in calibrating the WLAM. This may include, but is not limited to: various nitrogen species (ammonia, nitrate, TIN, TKN, etc.) and individual salt ions (chloride, sulfate, sodium, etc.) and specific conductance.

Task 1g – Perform a systematic QA/QC review of all data.

The Consultant shall perform a systematic Quality Assurance/Quality Control (QA/QC) review to identify potential errors and outliers in the flow and water quality data. The Consultant shall also review the consolidated database to identify and eliminate duplicate data. The Consultant shall document the QA/QC procedures or algorithms used and any errors or outliers identified in the process of applying these methods.

Task 2 – Update and Recalibrate the WLAM

Task 2a: Update the estimate of surface water runoff to major stream segments.

The Consultant, using information such as updated land use and precipitation data gathered during Task 1, shall estimate the daily volume of runoff, from both stormwater and landscape irrigation, that is expected to flow into the Santa Ana River (Reaches 2,3, 4 & 5) and it major tributaries including, but not limited to: San Timoteo Creek, Mill-Cucamonga Creek, Chino Creek and Temescal Creek[6]. The estimated volume of runoff shall be computed for each day based on the precipitation

[4] Wildermuth Environmental, Inc. 2008 Santa Ana River Wasteload Allocation Model Report. May, 2009; see Tables 2-8, 2-9 and Figures 2-4, 2-5, 2-7 and 2-9.

[5] Wildermuth Environmental, Inc. 2008 Santa Ana River Wasteload Allocation Model Report. May, 2009; see Figures 2-22 and 2-23.

[6] The WLAM is not presently used to evaluate streambed recharge quality for the groundwater basins underlying Temescal Creek or the general service areas for EMWD or EVMWD (aka the San Jacinto watershed). However, it is necessary to evaluate what affects any possible discharges to Temescal Creek may have on overall water quality at Prado Dam where the creek joins the Santa Ana River.

pattern in the historical record (1950-2016; approx. 24,106 days). At a minimum, the updated WLAM must be able to replicate the functionality and accuracy of the most recent (2015) WLAM and must also be able to extend that same functionality throughout Reach 2 of the Santa Ana River.

Task 2b: Update the estimate of stream flow in major stream segments.

The Consultant, using the runoff calculations from Task 2a and the other discharge data gathered in Task 1e, shall re-calibrate the WLAM so that it accurately and reliably predicts the daily instream flows measured at the same USGS gauging stations that were used to validate prior versions of the WLAM. At each station, the Consultant shall calculate and report the correlation between the predicted and measured flow values as well as the relative percent error between the two. At a minimum, the updated WLAM must be able to replicate the functionality and accuracy of the most recent (2015) WLAM and must also be able to extend that same functionality throughout Reach 2 of the Santa Ana River overlying the Orange County GMZ including calibration to SAR flow at Imperial Highway in Anaheim.

Task 2c: Update the estimated concentration of TDS in major stream segments.

The Consultant, using the validated results from Task 2b and the water quality data gathered in Task 1f, shall estimate the average daily TDS concentration in the major stream segments and calibrate the WLAM to demonstrate that these estimates correlate well with actual measured values at the same key water quality sampling stations used to validate prior versions of the WLAM and also for the SAR at Imperial Highway in Anaheim. At each station, the Consultant shall calculate and report the correlation between the predicted and measured TDS values as well as the relative percent error between the two. At a minimum, the updated WLAM must be able to replicate the functionality and accuracy of the most recent (2015) WLAM and must also be able to extend that same functionality throughout Reach 2 of the Santa Ana River overlying the Orange County GMZ.

Task 2d: Update the estimated concentration of TIN in major stream segments.

The Consultant, using the validated results from Task 2b and the water quality data gathered in Task 1f, shall estimate the average daily concentration of Total Inorganic Nitrogen (TIN) in the major stream segments and calibrate the WLAM to demonstrate that these estimates correlate well with actual measured values at the same key water quality sampling stations used to validate prior versions of the WLAM and also for the SAR at Imperial Highway in Anaheim. At each station, the Consultant shall calculate and report the correlation between the predicted and measured TIN values as well as the relative percent error between the two. At a minimum, the updated WLAM must be able to replicate the functionality and accuracy of the most recent (2016) WLAM and must also be able to extend that same functionality throughout Reach 2 of the Santa Ana River overlying the Orange County GMZ.

Task 2e: Estimate the volume of stream flow recharging from each major stream segment to the underlying groundwater management zone.

The Consultant, using the results from Task 2b, and making appropriate adjustments for soil transmissivity and losses due to evapotranspiration, shall employ the WLAM to estimate the daily volume of surface flow that percolates from each major stream segment, through the streambed sediment, into each of the underlying groundwater management zones. At a minimum, the updated WLAM must be able to replicate the functionality and accuracy of the most recent (2015) WLAM and must also be able to extend that same functionality throughout Reach 2 of the Santa Ana River overlying the Orange County GMZ, including OCWD recharge facilities in the cities of Anaheim and Orange.

Task 2f: Estimate the average daily concentration and mass of TDS recharging from each major stream segment to the underlying groundwater management zone.

The Consultant, using the results from Task 2c and Task 2e, and making appropriate adjustments for changes due to evapotranspiration, shall cause the WLAM to estimate the average daily concentration and mass of TDS that percolates from each major stream segment, through the streambed sediment to recharge the underlying groundwater management zones. At a minimum, the updated WLAM must be able to replicate the functionality and accuracy of the most recent (2015) WLAM and must also be able to extend that same functionality throughout Reach 2 of the Santa Ana River overlying the Orange County GMZ.

Task 2g: Estimate the average daily concentration and mass of TIN recharging from each major stream segment to the underlying groundwater management zone.

The Consultant, using the results from Task 2d and Task 2e, and making appropriate adjustments to reflect the Nitrogen Loss Coefficients previously approved by the Regional Board, shall cause the WLAM to estimate the average daily concentration and mass of TIN that percolates from each major stream segment, through the streambed sediment to recharge the underlying groundwater management zones. At a minimum, the updated WLAM must be able to replicate the functionality and accuracy of the most recent (2015) WLAM and must also be able to extend that same functionality throughout Reach 2 of the Santa Ana River overlying the Orange County GMZ.

Note: The software code for the most recent (2015) WLAM is available from SAWPA. It is undocumented. Consultant may elect to update the WLAM by revising existing program code or by developing all new software that provides the same functionality.

It is recommended but not required that the consultant utilize the existing Recharge Facilities Model (RFM) of OCWD groundwater recharge facilities in the cities of Anaheim and Orange. The RFM was developed in GOLDSIM software by OCWD and is available from SAWPA. If the consultant elects to not use OCWD's RFM,

then explanation should be provide regarding how the updated WLA model will account for OCWD's recharge system in Anaheim and Orange.

Task 3: Evaluate Waste Load Allocation Scenarios for Major Stream Segments

Task 3a: Specify the range of probable discharge conditions.

The Consultant, working in cooperation with the SAWPA staff, Basin Monitoring Program Task Force representatives, and the Regional Board staff, shall solicit each wastewater treatment agency's best available estimate for the following input variables:

i. Current condition: maximum expected discharge of treated wastewater and the maximum expected re-use of recycled water (both as average annual MGD)
ii. 2040 condition: maximum expected discharge of treated wastewater and the maximum expected re-use of recycled water (both as average annual MGD)
iii. Effluent limits for TIN and TDS in the most recent NPDES permit.
iv. Actual flow-weighted average TIN and TDS concentrations reported on the monthly Discharge Monitoring Reports for each wastewater agency over the last 5 years (2012-2016).

Task 3b: Use WLAM to analyze six scenarios.

The Consultant, using the validated WLAM developed in Task 2, and the input data collected in Task 3a, shall evaluate each of the six scenarios (A-F) shown in the following table:

Discharge Condition	Current Conditions	2040 Conditions
Max. discharge (zero recycle)	Scenario-A	Scenario-D
Planned recycle/discharge	Scenario-B	Scenario-E
50% of planned recycled	Scenario-C	Scenario-F

In general, there are three different discharge assumptions being evaluated for two different planning horizons. Scenarios A thru C represent the range of flows (wastewater and runoff) that may occur under current land use and population conditions. Scenarios D thru F represent the range of wastewater and runoff flows that may occur using appropriate land use and population assumptions for the year 2040.

The "Maximum Discharge" condition assumes all of the treated wastewater is disposed by discharge and none is reused as recycled water. The "Planned Condition" assumes that a specific percentage of the treated wastewater will be recycled and the remainder will be discharged. Each agency is responsible for providing its own best estimate for the volume of treated wastewater it plans to recycle. The "50% Condition" assumes that wastewater agencies are only able to recycle one-half the volume originally planned and the remainder is discharged in accordance with their NPDES permit.

There are a number of other factors that must be addressed and accounted for when specifying the exact simulation conditions that will be used to run the WLAM.[7] The Consultant shall review prior WLAM reports and make appropriate recommendations to the Basin Monitoring Program Task Force.

For each of the six scenarios, the Consultant shall use the validated WLAM to estimate all of the following parameters:

1) Daily average stream flow for each major stream segment
2) Daily average TDS & TIN concentration in each major stream segment
3) Daily average volume of surface flow recharged from each major stream segment to each underlying GMZ
4) Daily average concentration and mass of TDS & TIN recharged from Each major stream segment to each underlying GMZ
5) Daily average volume of surface flow immediately at Prado Dam
6) Daily average concentration and mass of TDS & TIN at Prado Dam

The Consultant shall use the validated WLAM to compute a daily value for all of the preceding parameters on each of the ≈24,106 days (beginning 1/1/1950 and ending 12/31/2016) using the historical precipitation data for those days. At a minimum, the updated WLAM must be able to replicate the functionality and accuracy of the most recent (2015) WLAM and must also be able to extend that same functionality throughout Reach 2 of the Santa Ana River overlying the Orange County GMZ.

Task 3c: Report results of the WLAM scenario analyses.

The Consultant, using the results from Task 3b, shall report the results for each of the major stream segment/GMZ combinations shown in the following table:

Management Zone	Overlying Stream Segment(s)
Beaumont GMZ	San Timoteo Creek - Reach 4
San Timoteo GMZ	San Timoteo Creek - Reaches 2, 3 &4
Bunker Hill-B GMZ	San Timoteo Creek - Reach 1
Colton GMZ	Santa Ana River - Reach 4 (above fault)
Riverside-A GMZ	Santa Ana River - Reach 3 & 4 (below fault)
Chino-South GMZ	Santa Ana River - Reach 3
Chino-North GMZ	Chino Creek & Mill-Cucamonga Creek
Prado Basin MZ	Santa Ana River - Reach 3 (WQOs)
Orange County GMZ	Santa Ana River - Reach 2 (+ other tributaries)[8]

The data for TIN and TDS will be reported separately. And, the results shall be presented in both tabular and graphic format similar to that used for prior WLAM

[7] See, for example, the discussion of "Planning Assumptions" in Section 4.2 of Wildermuth Environmental, Inc. 2008 Santa Ana River Wasteload Allocation Model Report. May, 2009. See also the "Scenario 8" discussion beginning on page 3 of 14 in Wildermuth Environmental, Inc. Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report: Scenario 8; January 5, 2015.

[8] All prior versions of the WLAM ended the simulation study at Prado Dam (the boundary between Reach 2 and Reach 3 of the Santa Ana River. As part of this next update, the WLAM is being extended into Reach 2; therefore, the contractor must characterize and evaluate flows from all major tributaries to this Santa Ana River segment, including recharge of water from OCWD's Groundwater Replenishment System and imported water purchased by OCWD.

reports.[9] Specifically, using the daily estimates (output values) from the WLAM, the Consultant shall compute and report the following summary statistics for all of the parameters previously listed in Task 3b:

1) Maximum value from a running 365-day (1 yr.) volume weighted average
2) Maximum value from a running 1,826 day (5 yr.) volume weighted average
3) Maximum value from a running 3,654 day (10 yr.) volume weighted average
4) Maximum value from a running 7,305 day (20 yr.) volume weighted average
5) Average value for the entire 66-year simulation period
6) % of all 365-day running average values greater than the applicable WQO and greater than the most recent ambient groundwater quality concentrations
7) % of all 1,826-day running average values greater than the applicable WQO and greater than the most recent ambient groundwater quality concentrations8) % of all 3,654-day running average values greater than the applicable WQO and greater than the most recent ambient groundwater quality concentrations
9) % of all 7,305-day running average values greater than the applicable WQO and greater than the most recent ambient groundwater quality concentrations

In addition to the statistics listed above, there are some additional special statistics that must be computed for both TDS and TIN at Prado Dam only:

10) The volume-weighted average concentration for "baseflow" conditions.[10]
11) The 5-year moving average of the 1 year volume weighted average.[11]

Note: All of the running averages are computed across the entire 66-year simulation period. And, the Consultant is instructed to "loop" the historical precipitation data where necessary to compute all of the required running averages for the entire 66-year simulation period.

The Consultant must be advised that some or all of the technical work products prepared and delivered under this contract may be required to undergo scientific peer review as part of the normal regulatory review process that the Regional Board must undertake before it can formally approve any updated Waste Load Allocation developed based on the aforementioned work products. Therefore, the Consultant must explain, in detail, all of the methods used within the updated WLAM.

Task 4: Develop WLAM for Managed Recharge in Percolation Basins

The Consultant shall develop a new WLAM module that will consider other significant sources of recharge to groundwater management zones for the purpose of facilitating future permitting efforts that are being considered by the Regional Board and the Basin Monitoring Program Task Force. It is envisioned that this new WLAM model will provide stakeholders the ability to evaluate these sources individually, as well as,

[9] See, for example, the tables and figures presented in Appendix A of Wildermuth Environmental, Inc. Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report: Scenario 8; January 5, 2015. Note that this RFP is requesting that the contractor compute and report some additional statistics not shown in these prior examples (e.g. 20 year averages and the percent of values exceeding the water quality objective).

[10] This value is computed is computed using data from water quality samples collected during summer months when the influence of stormwater runoff is minimal; see pg. 5-38 of the Santa Ana River Basin Plan for additional discussion of "baseflow" monitoring requirements.

[11] This value is computed as the mean of five contiguous annual means. This computation method results in a slightly different estimate than the value reported for a 1,826-day volume-weighted running average.

integrate the results with the surface-water WLAM to compute the collective volume and quality of recharge from multiple pathways.

Prior versions of the WLAM focused exclusively on wastewater discharges to flowing surfaces waters and the quantity and quality of water that percolates, from those surface streams, to the underlying groundwater basin. And, prior wasteload allocations, which are intended to protect groundwater quality, do not take into consideration water that is recharged to the same basins in percolation ponds that have no hydrological connection to the surface stream system. This includes: wastewater disposal ponds, diversions ponds used to harvest stormwater and recharge recycled water, the facilities built to capture and recharge water conserved behind Seven Oaks Dam, and ponds constructed to control dairy waste.

This initial effort shall be considered a Pilot Program. Consequently, the proposed scope should focus just on the few large percolation ponds where recharges are already governed by wastewater permits. This includes: the disposal ponds operated by the City of Redlands and the City of Corona, the recharge ponds operated by IEUA, and the dairy ponds overlying the Chino-North GMZ.

Task 4a: Identify the percolation ponds and recharge basins to be evaluated.

The Consultant, working with the Regional Board staff, SAWPA staff and the Basin Monitoring Program Task Force, shall identify the percolation ponds and retention basins where treated wastewater is regularly recharged to groundwater and where such discharges are presently governed by permits issued by the Regional Board. The Consultant shall prepare a GIS-layer showing the location of all ponds assessed regardless of whether it is ultimately selected for inclusion in the pilot project to expand the WLAM.

Task 4b: Characterize the volume and quality of water recharged to groundwater.

The Consultant, working with the Regional Board staff and the pond operators, shall gather and analyze data from the most recent 5 year period (2012-2016) to characterize the volume of water recharged at select ponds (Task 4a) and the average concentration of TIN and TDS in that recharge water. When computing the average TIN concentration discharged to groundwater, the Consultant shall provide separate estimates using three different nitrogen loss coefficients: -25%, -50% and -75%.

Some percolation ponds are used to recharge both stormwater and recycled water. Where this occurs, the Consultant is instructed to include both when making the required computations.

Task 4c: Summarize the results of Task 4b by Groundwater Management Zone

The Consultant, where multiple percolation ponds overlie the same GMZ, shall summarize the total volume of water cumulative recharged to that GMZ by all of those ponds. Similarly, the Consultant shall compute the average concentration of TIN and TDS for the cumulative recharge. The results shall be reported as annual averages for each of the five years evaluated and as the volume-weighted annualized average for the entire five year period.

Task 4d: Integrate results from Task 4c with the results from Task 3c

The Consultant shall combine the results from Task 4c with the results from Task 3c to estimate the total cumulative recharge from both sources and the volume-weighted collective concentration of TIN and TDS for the following five groundwater management zones: Chino-North, Chino-South, Bunker Hill-A, Bunker Hill-B and Riverside-A. As before, the results for TDS and TIN should be presented separately and in both tabular and graphic formats.

Task 5: Estimate off-channel recharge from natural precipitation

The Consultant shall use the land use data developed in Task 1a and the precipitation data developed in Task 1c to estimate the volume and quality of natural rainfall that percolates to the underlying groundwater basin. It is envisioned that the Consultant shall employ a simplified method to derive such estimates after performing the calculations necessary to compute probable daily runoff in Task 2a. Results from this task should be summarized for each of five GMZs named in Task 4d plus the Orange County GMZ.

Task 6: Run the WLAM in retrospective mode, using historical discharge data, to estimate the quantity and quality of recharge that actually occurred.

The Consultant, using historical daily precipitation data, and historical discharge data (as reported on the DMRs), shall run the current (2008) WLAM to estimate the actual volume and quality of water recharged to the six GMZ's named in Task 5 for the 12-year period commencing in January of 2005 and ending in December of 2016. Results of this analysis shall be reported as the volume-weighted average, for each of the GMZ/surface segment combinations identified in Task 3c, across the entire 12 year assessment period. In addition, Consultant shall prepare a summary comparing the estimated actual values to the WLAM projects for the same GMZs. Data and results from Task 4 and Task 5 should not be included in this Task 6 analysis.

Task 7: Compile the WLAM into a run-time software simulation package.

The Consultant shall develop a simple Windows-based graphical user interface for the WLAM to enable SAWPA, the Task Force and the Regional Board to be able to re-run the WLAM to evaluate different permit requirements without needing to seek new proposal or negotiate new contracts. Consultant updates to the WLAM shall include a standardized input file specifying the key input variables for each wastewater discharge:

1) The maximum volume of wastewater discharged (MGD), current & 2040
2) The planned volume of recycled water use (MGD), current & 2040
3) The permitted concentration of TDS, current & 2040
4) The permitted concentration of TIN, current & 2040
5) Applicable N-loss coefficient

The standardized input file shall be pre-populated with the values used in the WLAM as it was when the Regional Board reviewed and approved the final WLA. All other variables and inputs (e.g. land use, precipitation, runoff, percolation rates, etc.) would be locked off and inaccessible to casual users of the software package.

The stand-alone WLAM, or alternative modeling approach, shall report results in the same tabular and graphic format described in Task 3c. All results shall be output to

secure (unalterable) Acrobat Portable Document Format (PDF) files. The first page of that file shall identify the name of the input file and the specific input variables that have been changed from the default values in the pre-populated input file.

The objective of this Task is to provide the Regional Board staff , SAWPA staff and other users the ability to analyze alternative allocation scenarios. This can be accomplished through the inclusion of a simple Window-based graphical user interface to the WLAM or through some alternative modeling approach or spreadsheet tool developed by the Consultant, either of which would enable the user to change key input variables and rerun the model to perform alternatives analysis.

This Task includes the preparation of a user manual and training for up to 15 staff members on how to analyze scenarios, run and retrieve results from the WLAM. SAWPA will be responsible to provide an appropriate location and computers. Consultant shall be responsible for the training and relevant materials including the user manual to run the WLAM. The training workshop is expected to last between 4 to 8 hours

As part of this task, the Consultant shall be required to prepare and submit prepare model documentation suitable for peer review.

Task 8: Supplemental Scenario Analyses

The Consultant shall re-run the WLAM, using different input assumptions for the variables listed in Optional Task 2 (below), for the five year period following submission of the Final Report for Tasks 1, 2 and 3. These supplemental scenarios will not require any modifications to the WLAM simulation routines or other changes that would require the WLAM to be re-calibrated.

Task 9: Draft Task Reports, Draft and Final Report

The Consultant shall prepare draft task reports for each major task documenting the results of Tasks 1 through 6 respectively. These draft reports shall be provided to SAWPA, for review by SAWPA and members of the Task Force. The draft task reports will discussed at Task Force meeting and comments received will be incorporated.

The Consultant shall prepare a draft study report, reflecting a compilation of the draft reports and addressing all comments received from SAWPA and members of the Task Force on the previous drafts. Upon acceptance of all comments, the Consultant shall prepare a final study report in electronic format for distribution to SAWPA.

Task 10: Monthly Project Meetings

The Consultant shall prepare for and participate in up-to-18 half-day monthly meetings where they will describe project status and/or present draft and final results to the BMPTF and/or Regional or State Water Boards.

Key Project Deliverables

Task	Task Deliverables	Format
1a	Updated Land Use Maps	GIS Shape File
1b	Updated Stormwater Management Facility Maps	GIS Shape File
1c	Updated Historical Precipitation Data	Excel or Access
1d	Confirm Operating Assumptions for Dams	PDF
1e	Update Streamflow and Discharge Flow Data	Excel or Access
1f	Update Water Quality Data (Excel or Access file)	Excel or Access
1g	QA/QC Review of All Data	PDF
2a	Updated Runoff Module (native code)	Native Code
2b	Updated Surface Water Routing Module (native code)	Native Code
2c	Updated Water Quality Module for TDS (native code)	Native Code
2d	Updated Water Quality Module for TIN (native code)	Native Code
2e	Updated Groundwater Recharge Module (native code)	Native Code
2f	Updated TDS Recharge Module (native code)	Native Code
2g	Updated TIN Recharge Module (native code)	Native Code
3a	Specify range of simulated discharge/recycle conditions	PDF
3b	Estimated daily values from WLAM (Excel or Access)	Excel or Access
3c	Summary of results from Scenario Analyses	Multiple*
4a	Identify percolation ponds and recharge basins	GIS Shape File
4b	Characterize quantify and quality of recharge from ponds	Excel or Access
4c	Summary of results from Task 4b	Multiple
4d	Combine results from Task 4c & 3c	Multiple
5	Estimate off-channel recharge from natural precipitation	Excel or Access
6	Retrospective estimates of actual recharge	Multiple
7	Windows Run-time Version of WLAM	Excel or EXE
7	Model Documentation and User Manual	PDF
8	Supplemental Scenario Analyses	Multiple
9	Draft Reports and Final Report	Word
10	Monthly Task Force meetings**	Powerpoint

*Reported results must be submitted in multiple formats corresponding to the original component files. At a minimum, this includes the Word and Excel files used to prepare are text, tables, figures and graphs as well as the final PDF version of the fully assembled report.

**Some of the estimated 18 monthly meeting may take the form of progress reports or other presentations by the consultant to the Regional or State Board at public workshops and hearings.

Preliminary Project Schedule

Task	Description	Due Date
1	Update Data Used in the WLAM; Draft Report	2/30/17
2	Update and Recalibrate the WLAM; Draft Report	5/30/17
5	Estimate off-channel recharge from natural precipitation; Draft Report	6/30/17
3	Wasteload Allocation; Draft Report	8/30/17
4	Evaluation of Managed Recharge in Percolation Basins; Draft Report	9/30/17
10	Regional Board Workshop	10/20/17
9	WLAM - Final Report	12/30/17
X	Scientific and Technical Peer Review	TBD
10	Regional Board Hearing	TBD
6	Retrospective WLAM analysis of actual historical data; Draft Report	3/30/18
10	State Board Hearing	TBD
7	Run-time version of WLAM, Model Documentation and User Manual	9/30/18
8	Supplemental Scenario Analyses, Draft Report	TBD

Note: Tasks 1 through 3 are considered essential elements of the WLAM update. Tasks 4 through 8 are more discretionary. Consultants are required to estimate the level of effort and cost to complete all eight tasks. However, the Basin Monitoring Program Task Force may elect to fund or reject any task or sub-task described in this RFP for any reason.

The Task Force acknowledges that the preliminary schedule is extremely aggressive. However, this project is an update to an existing model that is already in a very high state of development. With the sole exception of extending the WLAM to cover the Orange County Groundwater Management Zone underlying Reach 2 of the Santa Ana River, the other essential elements of Tasks 1, 2 and 3 represent routine re-runs of the existing model based on new input data and relatively minor additions to the summary reports. Moreover, the updated WLAM must be fully developed by the end of 2017 so that it may be used to help derive appropriate effluent limits for NPDES permits which are due for review and reauthorization in early 2018.

Task 4 is also an important and major new addition to prior WLAM capabilities. But, since Task 4 focuses on recharge from percolation ponds that are hydrologically disconnected from the surface stream system; completing Tasks 1 through 3 is not dependent on finishing Task 4. However, results from Task 4 will likely be needed to support reauthorization of some discharge permits (e.g. for ponds operated by the City of Corona or local dairies) that are due for renewal in 2018.

Important Advice to Those Submitting Proposals

It has taken many years and many thousands of hours to develop and update the current WLAM. The WLAM, its various sub-components and the related input data is complex. It is impossible to provide a detailed description of all that is required to update the WLAM without, by necessity, repeating several hundred pages of text, tables and figures from previous documents. Therefore, the Task Force strongly advises all those preparing a proposal to thoroughly read and understand the following critical documents (which are made part of this RFP by reference):

1) Wildermuth Environmental, Inc. TIN/TDS Study - Phase 2b of the Santa Ana Watershed Wasteload Allocation; Final Technical Memorandum. October, 2002.

2) Santa Ana Regional Water Quality Control Board. Staff Report: Public Workshop for Proposed Basin Plan Amendments Related to Nitrogen and Total Dissolved Solids Management in the Santa Ana Region. November 21, 2003.

3) Santa Ana Regional Water Quality Control Board. Resolution No. R8-2004-0001 (and related Attachments to the Resolution). Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate an Updated Total Dissolved Solids (TDS) and Nitrogen Management Plan for the Santa Ana Region Including Revised Groundwater Basin Boundaries, Revised TDS and Nitrate-Nitrogen Quality Objectives for Groundwater, Revised TDS and Nitrogen Wasteload Allocations, and Revised Reach Designations, TDS and Nitrogen Objectives and Beneficial Uses for Specific Surface Waters. Adopted January 22, 2004.

4) Wildermuth Environmental, Inc. 2008 Santa Ana River Wasteload Allocation Model Report. May, 2009.

5) Wildermuth Environmental, Inc. Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report for Scenario 7 - Technical Memorandum. July, 2010.

6) Wildermuth Environmental, Inc. Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report for Scenario 8 - Final Memorandum. January 5, 2015.

7) Wildermuth Environmental, Inc. Investigation and Characterization of the Cause(s) of Recent Exceedances of the TDS Concentration Objective for Reach 3 of the Santa Ana River. February 11, 2015.

8) Wildermuth Environmental, Inc. Volume-Weighted TDS Concentration of POTW Discharge Above Prado Dam during August-September. June 15, 2015.

Above references contain embedded hyperlinks. Clicking on each reference citation will download a copy of that document.

5. PROPOSAL REQUIREMENTS

Responses to this RFP must be made according to the requirements set forth in this section for content and sequence. Failure to adhere to these requirements or to include conditions, limitations, or misrepresentations may be cause for rejection of the proposal. Any correction and resubmission by the proposer will not extend the time for evaluation of the proposal. Responses to this RFP will be prepared as concise as possible. The proposal will be 25 pages or less in length, not including resumes and project descriptions that may be included in an appendix. Submittal of boilerplate marketing materials is discouraged.

All proposals must include the following information:

1. Cover letter, including name, telephone number, fax number and address of the firm.
2. Background information about the proposer, including technical qualifications, size of firm and licenses. Description of the proposer's business (*i.e.*, individual, partnership, joint venture, *etc*.), and background information of subconsultants to be used.
3. Description of the proposer's experience. A list of similar services and project descriptions undertaken by the proposer (preferably with proposed project personnel), with beginning and ending dates, name, address, phone number, fax number, and e-mail address of a contact person for each reference.
4. Organization chart showing proposed management and project team.
5. Complete list of personnel, including subconsultants that will be dedicated to this project.
6. The names and qualifications of staff who will participate in the project.
7. A detailed description of the project approach. The project approach should describe the tools and methods that the Consultant will use to execute the work. The project approach need not repeat the Scope of Work, but should address each task, sub-task, and deliverable as well as optional tasks.
8. The fee proposal will include a breakdown of labor hours by employee billing classification, and an expense reimbursement schedule that includes the cost of non-labor and sub-consultant services. The fee proposal will be broken down by task and sub-task. All columns and rows will have totals.
9. Hourly billing rates for personnel to be assigned to the project.
10. Project schedule.
11. Miscellaneous/Exceptions. Respondents will thoroughly review the contents of this RFP and will submit all supplemental information required in this section of miscellaneous information. A draft contract agreement is enclosed within this RFP (Appendix A) that the consultant/firm will be required to sign. The respondent must identify any exceptions to that draft agreement as an element of the proposal submitted for review and consideration.

6. PROPOSED SCHEDULE

RFP Published	November 7, 2016
Proposals Due	December 6, 2016 at 5pm
Proposal Review Committee Interviews	December 12-15, 2016
Task Force Meeting – Select Preferred Proposal/Consultant	January 03, 2016
SAWPA Commission Approves Task Order	January 17, 2017
Sign Contract and Begin Work	January 18, 2017

7. SUBMITTALS

Please one electronic copy (PDF file delivered via email) to Mark Norton, Water Resources & Planning Manager and Zyanya Blancas, Administrative Assistant II, at:

Santa Ana Watershed Project Authority
11615 Sterling Avenue
Riverside, CA 92503
mnorton@sawpa.org
ZBlancas@sawpa.org

All proposals must be received by 5:00 p.m. on Tuesday, December 6, 2016. Proposals received after the stated time will not be considered. Thereafter, a review panel, composed of members of the Task Force and SAWPA staff, will conduct question and answer interviews the week of Dec. 12th–15th. If additional information is needed, contact Mark Norton at (951) 354-4221 or mnorton@sawpa.org.

8. EVALUATION CRITERIA

Evaluation of qualifications will be conducted on the following (in order of importance):

- Responsiveness to the RFP (pass/fail)
- Experience and qualifications of the assigned individuals/firm
- Project approach and understanding of needs
- Anticipated value and quality of services received
- Appropriateness of proposed fee structure
- Project schedule

SAWPA and a Proposal Review Committee, composed of members of the Task Force, reserve the sole right to evaluate and select the successful proposal. The selection process is anticipated to include an evaluation of the proposal and an interview.

9. GENERAL REQUIREMENTS

9.1 All proposers are hereby advised that this RFP is an informal solicitation and is not a commitment or offer to enter into an agreement or engage into any competitive bidding or negotiation pursuant to any statute, ordinance, rule, or regulation. SAWPA reserves the right to negotiate with any qualified source. SAWPA reserves the right to reject any or all proposals for any reason or for no reason at all.

9.2 SAWPA reserves the right to request further information from the proposer either in writing or orally. Such request will be addressed to that person or persons authorized by the proposer to represent the proposer.

9.3 SAWPA reserves the sole right to judge the proposers' representations, either written or oral.

9.4 Proposers understand and agree that submission of a proposal constitutes acknowledgement and acceptance of, and a willingness to comply with, all of the terms, conditions, and criteria contained in this RFP.

9.5 False, incomplete, or unresponsive statements in connection with a proposal may be sufficient cause for the rejection of the proposal. The valuation and determination of the

fulfillment of the above requirement will be SAWPA's responsibility and its decision will be final.

9.6 SAWPA reserves the right to interpret or change any provisions of this RFP at any time prior to the proposal submission date. Such interpretations or changes will be in the form of addenda to this RFP. Such addenda will become part of this RFP and may become part of any resultant contract. Such addenda will be made available to each person or organization that has received an RFP. Should such addenda require additional information not previously requested, a proposer's failure to address the requirements of such addenda might result in the proposal not being considered.

9.7 All proposals submitted in response to this RFP will become the exclusive property of SAWPA. At such time as SAWPA's recommendation to the SAWPA Board relative to proposal selection appears on the Board Agenda, all such proposals become a matter of public record, and will be regarded as public records, with the exception of those parts of each proposal which are defined by the proposer as business or trade secrets, and so marked, as "confidential" or "proprietary." SAWPA will not in any way be liable or responsible for the disclosure of any such proposals or any part thereof if disclosure of any such proposals or any part thereof if disclosure is required under the Public Records Act.

9.8 SAWPA will not in any way be liable for any costs incurred in connection with the preparation of any proposal submitted in response to this RFP.