TDS/NITROGEN MANAGEMENT PLAN FOR THE SANTA ANA RIVER BASIN

GROUNDWATER MONITORING REQUIREMENTS

REQUEST FOR PROPOSAL

FOR

CONSULTING SERVICES

FOR

RECOMPUTATION OF AMBIENT WATER QUALITY IN THE SANTA ANA RIVER WATERSHED FOR THE PERIOD 1996-2015

APRIL 20, 2016

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1. INTRODUCTION

The Santa Ana Watershed Project Authority (SAWPA) requests proposals from qualified consultants to compute the current-ambient water quality (AWQ) for nitrate and TDS for all groundwater management zones in the Santa Ana River watershed. This effort satisfies groundwater monitoring 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 Basin Monitoring Program Task Force (Task Force) which was formed to implement the 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 May 19, 2016.

2. BACKGROUND

The Santa Ana River watershed is located in southern California and is approximately 2,800 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 are required to complete a recomputation of ambient water quality for all groundwater management zones within the Santa Ana River Watershed once every three years. Specifically, the Basin Plan Amendment contains the following requirements:

> Groundwater monitoring requirements for TDS and nitrogen are as follows:
>
> 1. No later than June 23, 2005, Orange County Water District, Irvine Ranch Water District, Inland Empire Utilities Agency, Chino Basin Watermaster, City of Riverside, City of Corona, Elsinore Valley Municipal Water District, Eastern Municipal Water District, City of Colton, City of San Bernardino Municipal Water Department, City of Redlands, Jurupa Community Services District, Western Riverside County Regional Wastewater Authority, Lee Lake Water District, Yucaipa Valley Water District, City of Beaumont, the San Timoteo Watershed Management Authority and the City of Rialto shall submit to the Regional Board for approval, a proposed watershed-wide TDS and nitrogen monitoring program that will provide data necessary to review and update the TDS/nitrogen management plan. Data to be collected and analyzed shall

> address, at a minimum: (1) determination of current ambient quality in groundwater management zones; (2) determination of compliance with TDS and nitrate-nitrogen objectives for the management zones; (3) evaluation of assimilative capacity findings for groundwater management zones; and (4) assessment of the effects of recharge of surface water POTW discharges on the quality of affected groundwater management zones. The determination of current ambient quality shall be accomplished using methodology consistent with that employed by the Nitrogen/TDS Task Force (20-year running averages) to develop the TDS and nitrogen water quality objectives included in this Basin Plan. [Ref. 1] The determination of current ambient groundwater quality throughout the watershed must be reported by July 1, 2005, and, at a minimum, every three years thereafter.
>
> In lieu of this coordinated monitoring plan, one or more of the parties identified in the preceding paragraph may submit an individual or group monitoring plan…

The recomputation of ambient water quality was last performed for the period of 1993-2012. This scope of work is for the recomputation of ambient water quality for the period of 1996-2015.

3. Objective

The primary objective of this project is to compute current-ambient groundwater quality for TDS and nitrate-nitrogen in all 40 groundwater management zones in the Santa Ana River watershed for the period 1996-2015, and to interpret the results.

4. Scope of Work

Task 1 – Compute Ambient Water Quality for the Period of 1996 to 2015

The following sub-tasks are necessary to compute ambient water quality for the period of 1996 to 2015, according to the methodology described in the Basin Plan:

Task 1a – Data Collection

In order to perform the computation, the existing database—which contains the well information, groundwater-level data, and groundwater-quality data used for the previous computation of ambient water quality (WEI, 2011)—must be updated to include newly constructed wells and new groundwater data collected for the period 2013-15. SAWPA will provide the existing database to the Consultant as a Microsoft Access database file. Hereafter, the existing database is referred to as the "AWQ database."

The Consultant shall contact each agency listed below and collect the requisite data to perform the computation:

Beaumont, City of
Beaumont-Cherry Valley Water District
Chino Basin Watermaster
Colton, City of
Corona, City of
East Valley Water District
Eastern Municipal Water District
Elsinore Valley Municipal Water District

Elsinore Water District
Home Gardens County Water District
Lee Lake Water District
Loma Linda, City of
Muscoy Mutual Water Company
Orange County Water District
Redlands, City of
Rialto, City of
Riverside, City of
Riverside, County of (Landfill Monitoring)
Riverside-Highland Water Company
Rubidoux Community Service District
San Bernardino, City of
San Bernardino, County of (Landfill Monitoring)
San Bernardino Valley Municipal Water District
San Gorgonio Pass Water Agency
South Mesa Water Company
West Valley Water District
Western Heights Water Company
Western Municipal Water District
Yucaipa Valley Water District

The data types and data fields to be collected include:

Well Information (for new wells)

Well Name
Well Type
Well Status
Well X Coordinate
Well Y Coordinate
Ground Surface Elevation
Distance from Reference Point to Ground Surface
Reference Point Type (*e.g.*, top of casing)
Depth of Well Casing
Depth Intervals of Well Perforations

Groundwater-Level Data

Well Name
Measurement Date/Time
Depth from Reference Point to Water Level
Activity of Well During Measurement (e.g. static, pumping)
Measurement Method

Groundwater-Quality Data

Well Name
Sample Date/Time
Analyte Name
Result
Detection Limit
Unit

Groundwater-Quality Data Described Above will be Collected for the Following Analytes:

Alkalinity, Total (as CaCO3)
Bicarbonate
Calcium
Carbonate
Chloride
Electrical Conductivity (Specific Conductance)
Fluoride
Magnesium
Nitrate as NO_3 or Nitrate as Nitrogen (N)
pH
Potassium
Silica
Sodium
Sulfate
Total Dissolved Solids

If necessary, the Consultant will meet with agency staff to verify the well information and collect the data.

Task 1b – Update the physical model of Groundwater Management Zones

The objective of this task is to update the physical model of the GMZs to improve the accuracy of future AWQ determinations. The physical model consists of aquifer properties (i.e. the specific yield of the sediments) and aquifer geometry (i.e. depth to bedrock and aquifer-system layering). Updates to the physical model will be based on the improvements in the understanding of aquifer properties and aquifer geometry that have occurred since the late 1990s (when the physical model was developed). The improvements in understanding include new borehole and well information, new hydrogeologic studies, and the development of groundwater models. There may be enough new information that has been derived to justify a re-characterization of the physical model for most GMZs.

For a pilot study, the physical model of the Chino Basin GMZs should be updated to evaluate the effect of the update relative to the AWQ results for 1996-2015. If the results of the pilot study indicate that there is sufficient benefit to update the physical model for other GMZs, the physical model will be considered for the remainder of GMZs in the watershed in the (1999 – 2018) triennial ambient water quality update, as needed.

Task 1c – Process and Upload Historical Data

The objective of this task is to convert the well information, groundwater-level, and groundwater-quality data into a normalized format, quality control check and upload the data to the AWQ database. This is typically accomplished in one of two ways:

Some agencies will provide their data in a database format. This requires the reformatting and normalization of data prior to incorporation into the AWQ database. This involves identifying necessary database fields in the agency's database and mapping those fields to the AWQ database. This process often requires performing chemical conversions (*e.g.*, NO_3 as NO_3 to NO_3 as N) and unit conversions (*e.g.*, µg/L to mg/L) to preserve the structure and accuracy of the AWQ database.

Some agencies will provide data in customized spreadsheet files and/or hard copy. Hard copy lab reports and water-level measurements will need to be manually entered into a

normalized electronic file. Spreadsheets or other electronic data deliverables will need to be reformatted and normalized into the same format as the keypunched hardcopy data. This process often requires performing chemical conversions (*e.g.*, NO_3 as NO_3 to NO_3 as N) and unit conversions (*e.g.*, µg/L to mg/L) to preserve the structure and accuracy of the AWQ database.

The Consultant must describe its procedures for checking the data prior to upload to the AWQ database to ensure that (i) the data accurately reflect the data deliverable received from the agency and (ii) that no duplicated data are uploaded to the AWQ database.

Task 1c Deliverable. Following the upload of the data to the AWQ database, the Consultant will produce well-location maps and well-by-well time-series charts of the groundwater-level data, TDS data, and nitrate data. The Consultant will use the maps and time-series charts to perform a visual check of the data for obvious errors. The period for the time-series charts should be no shorter than the period of the computation (1996-2015). The Consultant will provide the maps and time-series charts to the Task Force for review and comment. If data errors are identified by the Consultant and/or the Task Force, the Consultant will work with the data provider to correct the error or agree to delete the data from the AWQ database. The Consultant will not proceed with Task 1d until the Task Force agencies have had at least two weeks to review and comment upon the AWQ database.

Task 1d – Develop Groundwater-Quality Point Statistics for Nitrate and TDS

The Consultant will perform the following steps to compute groundwater-quality point statistics for nitrate-nitrogen and TDS at each well in the watershed in a manner that is identical to the methods used to develop the objectives for the groundwater management zones (WEI, 2000a):

1. *Define the period of analysis.* A 20-year period with the latest complete set of data is required by the Basin Plan. For this effort the 20-year period is January 1, 1996 to December 31, 2015.

2. *Apply appropriate statistical tests for data-quality and reject data*. The Consultant will perform a series of tests for data-quality based on the general mineral results for each sample, if the requisite data are available. If a specific sample fails all four of the tests for data-quality, then those sample results are excluded from the process of computing statistics for TDS and nitrate-nitrogen. These tests are described in *Standard Methods for the Examination of Water and Wastewater* (Greenberg *et al.*, 1992) 1030 F. Checking Correctness of Analyses:

   a. Anion-Cation Balance

$$\%\,difference = 100 \cdot \frac{\sum cations - \sum anions}{\sum cations + \sum anions}$$

   with the following acceptance criteria:

Anion Sum (milliequivalents per liter [meq/L])	Acceptable % Difference
0 – 3	±0.2 meq/L
3 – 10	±2%
10 - 800	±2-5%

b. Measured TDS = Calculated TDS

$$1.0 < \frac{measured\ TDS}{calculated\ \ TDS} < 1.2$$

where:

calculated TDS = 0.6 (alkalinity) + Na + K + Ca + Mg + Cl + SO_4 + SiO_3 + NO_3 + F

c. Measured EC and Ion Sums

$$0.9 \cdot EC < 100 \cdot anion\ (or\ cation)\ sum, meq/L < 1.1 \cdot EC$$

d. TDS to EC Ratios

$$0.55 < \frac{measured\ TDS}{EC} < 0.7$$

and

$$0.55 < \frac{calculated\ \ TDS}{EC} < 0.7$$

3. *Compute statistics*. The Consultant will compute the mean and standard deviation statistics for each well for both TDS and nitrate-nitrogen.

4. *Annualize the data*. The Consultant will average the sample results of TDS or nitrate-nitrogen for each calendar year where more than one observation occurred during that year. Thus, only one value per year, the annual average, will be used in the computation of ambient water quality. A well may have a maximum of 20 annualized averages where data exist for each year of the recomputation period but must have a minimum of three annualized average values to continue to the statistical tests for normality and outliers.

5. *Apply appropriate statistical tests for normality and outliers*. The assumption of the "mean + t times the standard error of the mean" approach is that data are normally distributed or that a transformation can approximate a normal distribution. The use of the Shapiro-Wilk test for both normality and outlier testing was recommended and adopted by the Task Force at the June 15, 1999 meeting. (Shapiro and Wilk [1965] developed a test for normality based on normal order statistics.) In the Shapiro-Wilk test, a value for the variable W is calculated with the formula below. The calculated value of W is then compared with a critical W found in reference tables (*e.g.*, Gibbons, 1994).

$$W = \left(\sum_{i=1}^{n} a_{i,n} \cdot x_i \right)^2 \Big/ \sum_{i=1}^{n} \left(X_i - X_{avg} \right)^2$$

where: $a_{i,n}$ = coefficients based on the order of the observation, i, and the number of observations, n. (see for example, Gibbons [1994]).

X_i = i^{th} observation

X_{avg} = mean of n observations

6. *Compute the following statistics for both TDS and nitrate-nitrogen: standard error of the mean, and mean plus t times the standard error of the mean*. Mean plus t times the standard error of the mean is the statistic that will be plotted and used to define current-ambient water quality in groundwater management zones.

Task 1d Deliverable. The Consultant will prepare tables that will describe (i) the results of the tests for normality, outliers, and data quality and (ii) the statistics by well for TDS and nitrate-nitrogen of the mean, standard deviation, standard error of the mean, and mean plus t times the standard error of the mean. The Consultant will provide the tables to the Task Force for review and comment. If errors are identified by the Consultant and/or the Task Force, the Consultant will rectify the errors and re-compute the statistics. The Consultant will not proceed with Task 1e until the Task Force agencies have had at least two weeks to review and comment upon tables.

Task 1e – Estimate Regional TDS and Nitrate-Nitrogen in Groundwater

The Consultant will follow these steps to estimate regional nitrate-nitrogen and TDS in groundwater:

1. *For both TDS and nitrate, map the location of wells where statistics have been computed.* These locations will be annotated with the computed statistic. In addition, wells with mean values (but where statistics could not be computed [*e.g.*, less than the required three data points]) will also be plotted. For each management zone, the following maps will be developed:

   - TDS statistic – current ambient (1996 to 2015)

   - Nitrate-nitrogen statistic – current ambient (1996 to 2015)

   For regions with multi-layered aquifers, the Consultant will compare well construction data to the hydrostratigraphy prepared in the Phase 2A Study (WEI, 2000a) to identify which aquifers are tributary to each well, and the water-quality maps listed above will be developed for each aquifer layer.

2. *Develop and digitize contours of TDS and nitrate statistics.* The Consultant will **manually** contour the statistics for TDS and nitrate-nitrogen for each management zone and for each aquifer layer, if appropriate, taking into account:

   - management zone boundaries;

- ancillary water quality data (mean values). Ancillary water quality data will be given less weight when contouring than wells with computed statistics; however, they will be used to help guide contours in areas where there is a paucity of point statistics; and

- past contouring efforts.

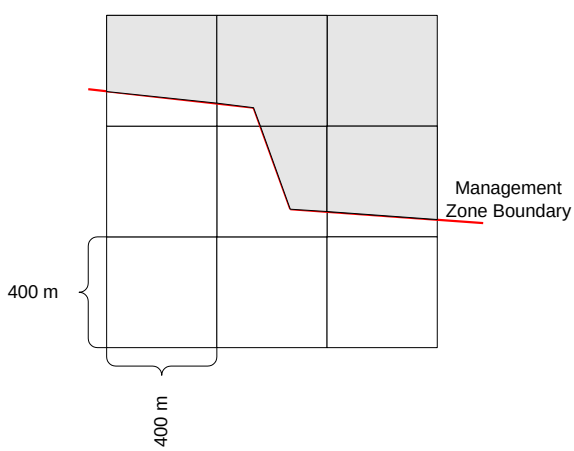
The consultant will digitize the contours into ESRI line shapefiles.

Task 1e Deliverable. The Consultant will meet with and review the contoured maps of TDS and nitrate-nitrogen with the Task Force members. If errors are identified by the Consultant and/or the Task Force during the review, the Consultant will revise the maps to correct for the errors. The Consultant will not proceed with Task 1f until the Task Force agencies have had at least one month to set up an appointment with the Consultant and review the maps.

Task 1f – Compute Current-Ambient TDS and Nitrate-Nitrogen for Management Zones

The Consultant will perform the following steps to compute volume-weighted estimates of current-ambient TDS and nitrate-nitrogen for each management zone:

1. *Overlay a rectangular grid. SAWPA* will provide the Consultant with an ESRI polygon shapefile of the watershed. Consultant will create a grid overlay of the watershed. The grid-cell size is 400x400 meters. Each grid cell is pre-assigned values for grid-cell area, elevation of the effective base of the aquifer, and specific yield of the sediments. Where a grid cell is split by a management zone boundary, it will be assigned parameters based on the apportionment of the grid cell in each management zone (determined by area).



2. *Compute volume of groundwater in storage in each grid cell.* The Consultant will prepare groundwater-elevation contour maps for each management zone for Fall 2015. The Consultant will use the groundwater elevation contour maps to calculate the volume of groundwater in each grid cell. The volume of groundwater in a grid cell for a single-layer aquifer is operationally defined as:

$$V_i = A_i * (WL_i - B_i) * SY$$

Where, V_i = volume of groundwater in i^{th} grid cell

Ai = grid cell area

WL_i = average elevation of groundwater in i^{th} grid cell (feet above mean sea level [MSL])

B_i = average elevation of the effective base of aquifer in i^{th} grid cell (feet above MSL)

SY = specific yield

For a multi-layered aquifer, the volume of groundwater in each grid cell will be computed for each layer. The top of a layer is used to calculate the water in storage if the piezometric level is above the top of the layer.

3. *Compute the volume of groundwater in each management zone.* The Consultant will compute the total volume of groundwater within a management zone by summing the volume of groundwater in all grid cells within that management zone.

4. *Estimate the current-ambient concentration of TDS and nitrate-nitrogen for each grid cell.* The Consultant will use the digitized contours of current-ambient TDS and nitrate-nitrogen to estimate the current-ambient concentration in each grid cell (and by layer, if appropriate).

5. *Compute the volume-weighted current-ambient concentrations of TDS and nitrate-nitrogen for each management zone using the following formula:*

$$C_{avg} = (1/V_T) \cdot \sum C_i \cdot V_i$$

Where, C_{avg} is the volume-weighted current-ambient concentration in a management zone

V_T is the total volume of groundwater within a management zone

C_i is the concentration in grid cell volume i

V_i is the volume of water stored in grid cell i and with concentration Ci

Task 2 – Prepare Interpretive Tools for the Recomputation of Ambient Water Quality

The ambient water quality of Santa Ana River Watershed management zones has been computed for five 20-year periods (1978-1997, 1984-2003, 1987-2006, 1990-2009, 1993-2012) since the initial computation of historical ambient water quality (1954-1973). The results of these computations indicate that groundwater quality has changed over time in most management zones. Changes in the ambient water quality determinations are likely due to actual changes in groundwater quality, the methods the Task Force uses to compute ambient water quality, or both. Listed below are a number of factors that can influence changes in ambient water quality:

1. The movement of solutes from the vadose zone to the saturated zone

2. Changes in water levels that affect groundwater storage in a management zone

3. Pumping/recharge stresses and/or groundwater flow within or between management zones that can add, remove, and/or transport TDS and nitrate-nitrogen constituents in groundwater

4. The addition or loss of wells within management zones

5. The geographic distribution of added or lost wells within management zones

6. Differences in the techniques employed to contour and interpolate water quality data

7. The elimination of three years of data from the analysis

8. The addition of three years of data to the analysis

Changes in ambient water quality that result from the first three factors are measurable hydrologic and water chemistry changes that have occurred in the aquifer system. Herein, these changes are referred to as *systemic factors*. Changes in ambient water quality that result from the last five factors are driven by the methods and techniques employed in recomputation. Herein, these changes are referred to as *methodological factors*.

In most instances, both systemic and methodological factors play a role in the computed changes in ambient water quality for a management zone. The relative roles of each factor for each management zone, however, are not easily quantified.

The Task Force desires that each of the following questions be addressed after each recomputation of ambient water quality:

- When the recomputation indicates a significant change in ambient water quality in a management zone, how can the Task Force distinguish between the methodological and systemic factors that may have influenced this change?

- Is there a method to characterize the current groundwater quality trends in management zones that could be compared against the ambient water quality results?

- What can be done to minimize the methodological factors that influence ambient water quality?

The Consultant will perform the scope of work described below to address these questions.

Task 2a – Prepare Change Maps for TDS and Nitrate-N

The objective of this task is to show, in map view, how and why ambient water quality changed from prior ambient water quality estimates for each management zone.

The Consultant will prepare maps that display a two-dimensional, color-ramped grid of ambient water quality changes for each management zone. For management zones with multiple aquifer layers, a change map will be prepared for each layer. Change maps will show the difference between the prior ambient water quality estimate (1993-2012) and the current ambient water quality estimate (1996-2015)—providing information on how ambient water quality changed spatially across the management zone. The change maps will also

display wells that were used in both recomputations. Wells will be annotated with their water-quality statistics from both recomputation periods. The wells and statistics will provide information on why the ambient water quality changed.

Task 2b – Perform Key Well Analysis of Water Quality Trends

The objective of this task is to show how and why ambient water quality has changed in each management zone, as with Task 2a, but over longer periods and at specific points within the management zone.

The Consultant will use approximately four or five "key" wells in each management zone. These wells were previously selected by WEI (2011) based on location, perforated intervals, the density and period of available water quality data, and the quality of the dataset. The exact number of key wells were based on the size and complexity of each management zone. Key wells will be symbolized and labeled on the maps prepared in Task 2a.

The Consultant will prepare TDS and nitrate-nitrogen time-series charts for each management zone, displaying raw data for the key wells (1954-2015) and the six ambient water quality estimates for the management zone. The key well data are meant to describe how groundwater quality is changing in certain areas (and depths) within each management zone. For each management zone, the Consultant will compare the trends at key wells to the ambient water quality trend for the management zone, which will help explain where and how groundwater quality is changing and how these changes are influencing ambient water quality estimates.

The Consultant will compare TDS and nitrate-nitrogen time-series for each management zone over the past (at least) 10 years and identify and quantify the rate of change in assimilative capacity for each management zone. A table by management zone of these results will be produced.

Task 2c – Perform Well-Attrition Analysis for the Recomputation of Ambient Water Quality for 1996-2015

The next ambient water quality recomputation will involve the analysis of water quality data for the period of 1996-2015. The objective of this task is to identify wells that will be lost from the next recomputation if no water quality data are collected from them during the period of 2016-18. The well-attrition analysis will provide the Task Force with a list of the most important of these wells so that they can be sampled and remain included in the recomputation for 1999-2018. The Consultant will follow these steps to perform the well-attrition analysis:

- Develop AWQ statistics for 1996-2015 using the 1993-2012 database. In effect, this will remove three years of data from the back end of the study period, and no new data will be added to the front end as data from 2016-18 have not yet been collected. This will be considered the 'worst case' scenario.

- The Consultant will compare 1993-2012 and 1996-2015 AWQ statistics to identify wells that will be lost if no new data are obtained in 2016-18. The Consultant will rank wells that may be lost by importance to future re-computation efforts.

- The Consultant will conduct research on wells that may be lost by contacting well owners and/or conducting field reconnaissance. Collect information on these wells,

such as current well status, any recent sampling information, the well's ability to be sampled, and any other information relevant to sampling the wells for water quality.

- The Consultant will summarize the results in maps and tables, and present findings to the Task Force.
- The Consultant will follow-up with the owners of the most important set of wells that will be lost and assist with data-collection efforts as necessary.

Task 3 – Prepare Technical Memorandum

The Consultant will prepare a draft technical memorandum that describes the methods and results of the recomputation of ambient water quality and the Interpretive Tools for the period of 1996 to 2015. The draft memorandum will be submitted in electronic format (PDF file) to the Task Force for review and comment. The draft results will be presented at a regular Task Force meeting.

The Task Force members will provide comments and suggested revisions to SAWPA within 14 days. The Consultant will address the comments and suggested revisions in a final technical memorandum, and will prepare an appendix to the report that describes the comments and responses to comments. The final technical memorandum will be delivered in hard copy format and as an electronic file to the Task Force.

Task 4 – Task Force Meetings

The Consultant will prepare for and attend eight (8) meetings with the Task Force to provide periodic progress updates and to present results. The Task Force meetings will be held at SAWPA headquarters, and SAWPA staff will perform meeting organization and facilitation, secretarial, clerical, and administrative services (*e.g.*, prepare meeting minutes, prepare agenda, provide refreshments, *etc.*). The Consultant will prepare for and present the work results at one SAWPA Commission meeting and one Santa Ana Regional Water Quality Control Board meeting at a mutually acceptable time and date to SAWPA staff and the Regional Board staff within six months after the final deliverable.

Optional Task 1 - Provide Technical Assistance

The Consultant may be asked to provide additional analysis or explanation of results to the Task Force or Regional Board as necessary for future Basin Plan Amendments or planning of future work. Consultant shall budget sixty (60) hours for this task.

Optional Task 2 – Improve the Spatial Distribution of Monitoring

There are areas in certain groundwater management zones (GMZs) that need additional ambient water quality (AWQ) point statistics to compute a more accurate estimate of current ambient TDS and nitrate-nitrogen concentrations. Additional data collection and/or groundwater monitoring at appropriate locations and/or depths within these areas will increase the number of wells with AWQ point statistics, better constrain TDS and nitrate-nitrogen contouring, and ultimately make the GMZs less susceptible to methodological factors that influence the computation of AWQ. The most important of these areas are as follows:

• The down-gradient portion of Riverside-A near the Riverside Narrows. There are few wells with data in this area. Riverside-A is an important GMZ that is receiving water for POTW discharge.

• The central and eastern portions of the Arlington GMZ. There are few wells with data in these areas of a GMZ that is considering recycled water reuse projects.

• The central and western portions of Riverside-B. There are very few wells with data in these areas that are representative of regional groundwater quality. Most wells in these areas are shallow monitoring wells associated with point-source releases.

The Consultant may be asked to conduct the following:

• Collect and compile all known well information in the three areas. Consultant will coordinate with the municipal water-supply agencies with wells in each area, and download all data and reports contained in online datasets (GeoTracker, EnviroStor, USGS, and Department of Public Health datasets). All collected data will be compiled and added to the AWQ database.

• Analyze the information, data, and reports and select a recommended set of wells for monitoring of groundwater levels and quality in 2016-17 and beyond.

• The recommendations will be documented in tables and figures in the report.

Optional Task 3 – Characterize the influence of sample size on the standard error and the AWQ point statistic

At many wells within the watershed, groundwater sampling and analysis occurs at a frequency of once every three years or less often. A low frequency of monitoring has the potential to increase the standard error associated with the computation of TDS and nitrate point statistics at wells, which can then increase the current ambient concentrations for TDS and nitrate in GMZs. In addition, a low frequency of monitoring may “miss” the short-term effects of hydrologic events on groundwater quality, such as the dilution effect of storm-water recharge on water quality at wells located near areas of storm-water recharge.

The Consultant may be asked to conduct an analysis of selected wells located in different GMZs that have robust data sets of TDS and nitrate concentrations. The data sets will be incrementally reduced and the AWQ statistics will be re-computed. The revised AWQ statistics will be compared to the actual AWQ statistics to characterize the influence of sample size on the standard error and the AWQ point statistic.

Final Deliverables

An electronic copy of the Final Technical Memorandum for the Recomputation of Ambient Water Quality and Interpretive Tools for the Period of 1996 to 2015 will be delivered to SAWPA by June 30, 2017.

A compact disc (CD) will accompany the final technical memorandum. This CD will contain a PDF of the final technical memorandum; an MS Access database of all well, water-quality,

and water-level data used in the recomputation; GIS shapefiles created and used specifically for the recomputation; PDFs of the water-quality contour maps; and PDFs of the water-quality and water-level time series charts of each well used in the recomputation.

Schedule

The project will start on July 1, 2016 and work will continue until the delivery date of the Final Technical Memorandum by no later than June 30, 2017. The schedule assumes that the review of draft documents will occur in a timely manner (*i.e.*, 14 days after a draft is submitted).

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 shall be prepared as concise as possible. The proposal shall 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 subcontractors 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 subcontractors 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 shall 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 shall be broken down by task and sub-task. All columns and rows shall have totals.

9. Hourly billing rates for personnel to be assigned to the project.

10. Project schedule.

11. Miscellaneous/Exceptions. Respondents shall thoroughly review the contents of this RFP and shall 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	April 20, 2016
Proposals Due	May 19, 2016 at 5pm
Recommendation of the Technical Advisory Committee	May 31, 2016
Task Force Meeting – Select Preferred Proposal/Consultant	June 13, 2016
SAWPA Commission Approves Task Order	June 21, 2016
Sign Contract and Begin Work	July 1, 2016

7. SUBMITTALS

Please submit six (6) hard copies of the proposal and one electronic copy (PDF file delivered via email) to Mark Norton, Water Resources & Planning Manager, at:

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

All proposals must be received by 5:00 p.m. on Thursday, May 19, 2016. Proposals received after the stated time will be returned unopened and will not be considered. Thereafter, a review panel, composed of members of the Task Force and SAWPA staff, will conduct question and answer interviews. 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 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 shall 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 shall 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 shall 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 shall not in any way be liable for any costs incurred in connection with the preparation of any proposal submitted in response to this RFP.