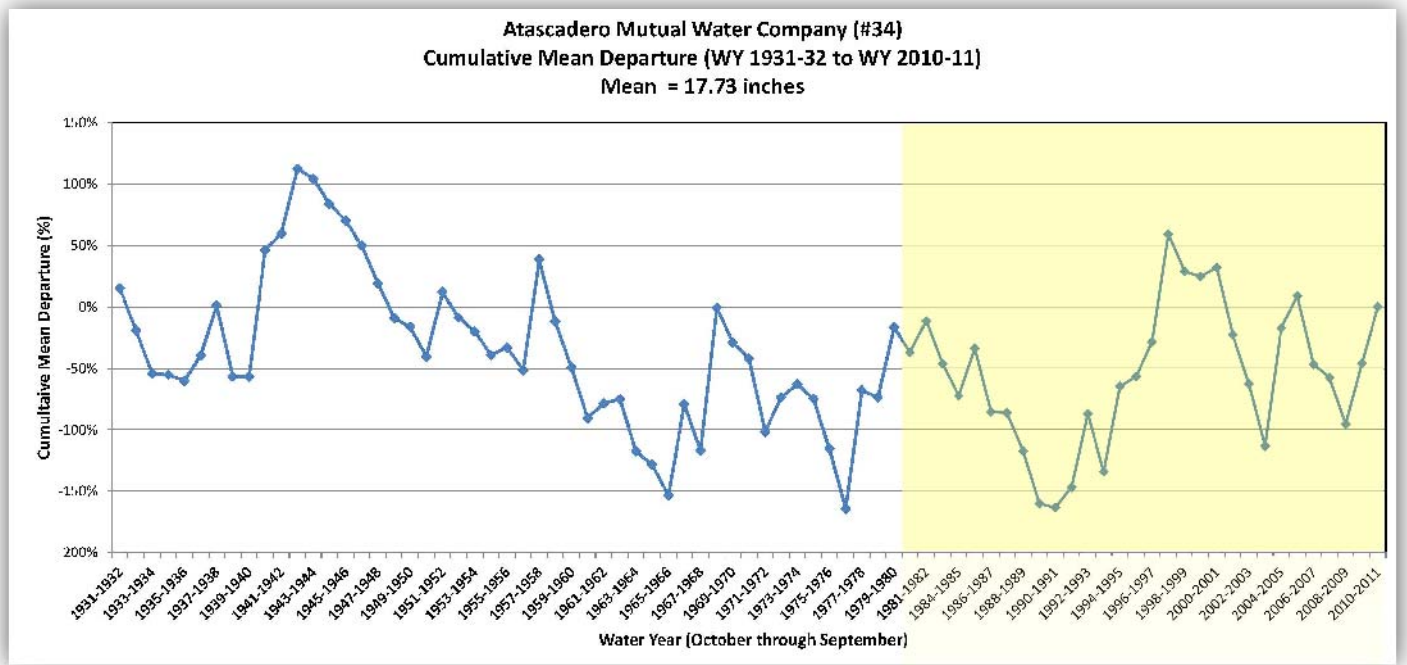
SECTION 5 – SCOPE OF SERVICES

A. DATA COLLECTION

The first step in a water balance analysis and model update is definition of the study period and the study area; these definitions guide the data collection. This task will provide the basic data to extend the original 1981-1997 model base period through the 2011 water year (ending September 30 2011). As illustrated below, the 1981-2011 study periods closely approximates long-term rainfall conditions and includes wet periods and drought. Annual data will be compiled on (or converted to) a water year basis (October 1 through September 30). The data collection task will focus on the groundwater basin (and Atascadero Subbasin and subareas), and will encompass the watershed to support the precipitation-runoff modeling system.



The following summarizes the data that will be compiled for input to the model, with notes on data to be provided by the San Luis Obispo County Flood Control and Water Conservation District (District), San Luis Obispo County (County) and other stakeholders.

A.1 Climatic Data

- Historical precipitation. As documented in the 2012 Master Water Plan (MWP) Appendix A, substantial rainfall data are available. For documentation of rainfall over time, we will use stations with long records (e.g., Atascadero MWC #34 and Paso Robles #10) that are also used in the Groundwater Management Plan and widely recognized among Basin stakeholders. We will request selected data from the District and/or download from online sources. For example, California Data Exchange Center (CDEC) provides hourly rainfall for eight stations in the watershed with records beginning as early as 1984. Hourly data are available from NOAA for four stations with records covering the study period. Hourly precipitation data also will be downloaded from CIMIS (California Irrigation Management Information Systems).
- Areal precipitation distribution. For the water balance analysis of the watershed, we recommend use of the PRISM (Parameter-elevation Regressions on Independent Slopes Model) mapping system. PRISM maps use point measurements of precipitation, temperature, and other climatic factors to account for rain shadows,

coastal effects, and temperature inversions. PRISM maps are recognized as the highest-quality spatial datasets currently available, used by the U.S. Department of Agriculture. The PRISM maps provide complete coverage of the geographic distribution of rainfall for the entire study period as gridded raster data. We can download the PRISM data, which are easily incorporated into the water balance analysis.

- Reference evapotranspiration from local CIMIS stations. We will download daily evapotranspiration data from the Atascadero CIMIS station from the beginning of its period of record, November 21, 2000 through September 30 2011. Data from nearby CIMIS stations (e.g., Blackwell's Corner and Belridge to the east) may be downloaded for comparison to aid in extension of Atascadero data to the east and backward through time. Pan evaporation and other climatic data may be downloaded to assist with evaluation of crop/vegetation water use factors.

A.2 Surface Water Data

- Topography and watershed maps. Our GIS libraries already include basic topographic and location information (USGS DEM, township and range, CALWATER watershed boundaries, city boundaries, etc.).
- Surface water flows. Stream flows are measured by USGS in the Salinas River at Paso Robles and Bradley; daily data are available for the entire study period for both stations. The Bradley station is particularly important given its location near the outlet of the groundwater basin; it will be a key calibration site. Instantaneous data are available from Bradley for a portion (1988-2008) of the study period. We will download needed data. Additional data are available from the District for other streams (e.g., Estrella River, Paso Robles Creek, Huer Huero Creek); we may request selected data to aid in water balance calibration.
- Reservoir releases and spills. Three major reservoirs exist in the watershed: San Antonio, Nacimiento, and Santa Margarita. The first two are operated by Monterey County Water Resources Agency and the last is operated by the District. We understand that daily release data are available for Santa Margarita Lake from 1970 to present in tabular or graphical plots, with monthly data from 1942 to 1971 and 1984 to 2002. In addition, daily or monthly operational records are on file with the respective operating agency. We will request and compile daily data on reservoir diversions, releases, and spills over the study period to account for water coming into the watershed/groundwater system from the respective watersheds above the reservoirs.

A.3 Hydrogeologic Data

- Historical groundwater levels. As of 2010, the groundwater monitoring program includes about 160 wells in the groundwater basin; the District manages the data in an Access database. We will request the most up-to-date version of that database. We understand that 21 new volunteers for groundwater level monitoring have stepped forward, with measurements taken with next October's monitoring. That represents a significant increase in data, sited in important data gaps. We understand that October 2012 is beyond the study period and that the data would not be available right away. Nonetheless, these new data points may be useful in calibrating the model; accordingly, we request expeditious entry of these data by the District and extension of the schedule to accommodate review.

- Water quality data. We recommend that collection of water quality data be considered as an optional, potential cost-savings task. We recognize that water quality data may be useful ancillary information for the aquifer system characterization, and specifically the consideration of the Atascadero Subbasin connection issue. The occurrence of geochemically distinct thermal water along the Rinconada Fault is known. However, the consideration should focus on groundwater levels as indicated in the RFP; groundwater levels and flow are the primary issue. Furthermore, compilation of groundwater quality data

has limited applicability to the water balance analysis that is the central focus of the model update. Lastly, we anticipate that the upcoming salt/nutrient study will include water quality data compilation; considering this task as optional will avoid duplication of effort.

- Soils. Application of the recommended precipitation-runoff modeling system requires soils data, including specific soil characteristics (e.g., soil moisture holding capacity) and maps of soils types. We already have this information in our in-office files.
- Well completion reports and boring logs. While we have GIS coverages of municipal, small water system, monitoring, and other key wells, we will request that the District provide the most current GIS coverages to ensure that we have current, important well locations. With regard to hydrogeologic information, as stated in the RFP, the model update will be focused on the water balance. The hydrogeologic conceptualization of the basin mostly will be retained, although the connection of the Atascadero Subbasin with the remainder of the basin will be re-considered. Accordingly, this data collection subtask will be conducted on an as-needed and issue-specific basis during the course of the model update to help resolve discrepancies. If needed, data collection will include specific requests to the District, Monterey County, or California DWR for local driller's logs and to the respective local agencies for information on recently completed wells or borings, pumping tests, etc.
- Hydrogeologic and water resource reports. Our team already has a substantial library of previous reports, maps, and planning documents (e.g., Urban Water Management Plans). Through the course of the study, we will compile a reference list of relevant documents and library of electronic copies, scanned if necessary. As additional relevant reports are identified, these will be added to the reference list and library.

A.4 Water Supply and Demand Data

- Monthly municipal pumping records. These records will be requested from the District, or from the specific purveyors. Consistent with the Phase I Study, these are Atascadero MWC, City of Paso Robles, Templeton CSD, and San Miguel CSD; Shandon is categorized as a small community system. If compiled on a fiscal year basis, we will convert to water year. Pumping records will be needed on a well/wellfield basis to allow allocation to subareas.
- Treated wastewater discharges. Records will be requested from City of Paso Robles, City of Atascadero, Atascadero State Hospital, Templeton CSD, and San Miguel CSD. Diversions to irrigation (e.g., golf course irrigation) will need to be distinguished. Data will be compiled on a monthly basis for the study period. We recognize historical changes in wastewater treatment and discharge practices, e.g., historical treatment by the Paso Robles of a portion of the Templeton CSD wastewater.
- Small community/commercial systems and rural land use data. As documented in the Pumping Update and MWP, numerous rural residents and small community/commercial water systems exist in the groundwater basin and watershed. We anticipate that the County will provide its Land Use ArcGIS layer and associated spreadsheets described in the MWP Appendix D. We will also request Land Use data from Monterey County. These will be the primary data source on geographic distribution and water demand of rural and small community/commercial land uses across the watershed and groundwater basin. We will also request names and addresses of small systems from both Counties, and any recent pumping data. Previous studies have categorized agricultural processing facilities, such as wineries, as small commercial for water accounting. For this study agricultural processing facilities will be categorized as an agricultural demand (Task A.5).

- Population data. Population data may be downloaded to estimate or verify small community and rural water use. We will download relevant 2000 and 2010 census data.

- Land use/cover maps. As summarized in the MWP, the County has compiled a substantial GIS library of land uses, including urban and community areas, and the Land Use layer, which includes land use and potential dwelling units (DUs) per acre for all unincorporated areas. GIS coverage of watershed areas is available from the California Department of Forestry and US Forest Service; we will download these data, for example, to update phreatophytes/riparian hardwood areas.

- Crop maps. The Phase I Study utilized DWR crop maps from 1984 and 1995 for San Luis Obispo County and 1989 and 1997 for Monterey County. The Todd Engineers' Pumping Update for 2006 used GIS data from the San Luis Obispo Agricultural Commissioner's Office (SLO ACO); we have those data and are familiar with data limitations (e.g., multi-cropping). As summarized in the MWP, San Luis Obispo County has developed an Agriculture/Crop GIS layer that is updated annually; we will request these for every year available from 2006 on. For Monterey County, the Pumping Update developed a crop acreage spreadsheet working with Monterey ACO. Since that time, Monterey County has progressed with its GIS parcel and Ranch Map Atlas system; we will work with Monterey ACO to access available crop map data.

- Aerial photos. We will contact the District and/or Counties of San Luis Obispo and Monterey for selected aerial photos since 1997 to corroborate land use changes, and to evaluate the landscaping extent around large rural ranchettes and other rural residential land uses with potential significant groundwater use.

A.5 Agricultural Water Demand Information

- The MWP Appendix D (regarding water demand analysis) contains fairly current information on agricultural water demand, including crop coefficients, frost protection, leaching requirements, and irrigation efficiencies across the entire County. We will contact the SLO and Monterey ACOs to discern local differences in cropping/irrigation across the basin. We will document seasonal crop growth information to support monthly water demands. As discussed in the *Approach*, the UC Cooperative Extension study of vineyard water demand should be released in early 2013 and we recommend extension of the Model Update to allow some consideration of its findings; if too late for incorporation in the water balance analysis, then perhaps in evaluation of sensitivity.

Deliverable

We recognize that the compiled data belong to the District/County and Basin stakeholders, and should be readily available for subsequent investigations (such as the SNMP) and model updates. We will compile data into standard and accessible formats (e.g., Access and GIS databases, and spreadsheets, etc.) that can be verified, updated regularly, accessed, and provided to local and state agencies for their use and respective databases. In addition, all data used for the model update will undergo a rigorous quality assurance / quality control (QA/QC) protocol. While this task is not in itself development of a comprehensive data management system (DMS), we recognize that the District is developing its DMS and will work with District staff toward smooth integration of data.

B. WATER BALANCE ESTIMATION

Our overall approach is to evaluate each component of the water balance equation independently by extending the water balance from the limits of the groundwater basin to the surrounding watershed. Watershed modeling will minimize uncertainties like those encountered in the previous calibration of the South Gabilan area (an important source of inflow to the stressed Estrella subarea). Most importantly, consideration of the entire watershed allows

checking and validation of the water balance against actual stream flow data at established gages (e.g., Salinas River at Bradley).

The water balance estimation will address each inflow and outflow component in terms of available data, previous estimates (e.g., Phase I and Phase II estimates), significance to the overall water balance, and our methodology and findings. The intent is to provide independent documentation of the water balance and to explain it clearly to the Basin stakeholders. The next task, Model Update, will involve revision of—and new insights into—water balance components, and these will be explained as part of the modeling tasks.

The Hydrologic Simulation Program – Fortran (HSPF) is a watershed model approach that has been developed and improved significantly in recent years, becoming the industry standard for watershed modeling. The HSPF is a comprehensive and physically based watershed model that can simulate the hydrology and water quality with a time step less than a day. The watershed modeling will improve not only the quantification of the recharge, but also the spatial and temporal distributions of the recharge as a result of changes in land uses. In addition, results of streambed percolation from the watershed model will provide great assistance in groundwater model calibration on the streambed conductance, particularly for the variations that occur during spring and fall, as well as wet and dry years. We propose to update the Paso Robles Groundwater Basin model recharge from direct precipitation, streambed percolation, local runoff generated from precipitation, return flow from applied irrigation, and mountain front runoff using results from the watershed model.

The following recharge components of the water balance will be updated using results from a watershed model (HSPF).

- Deep percolation of direct precipitation
- Deep percolation of streambed seepage
- Deep percolation of applied irrigation water
- Subsurface inflows from mountain front runoff

Deep percolation of discharged treated wastewater effluent will be based on reported data from the City of Atascadero, City of Paso Robles, Templeton Community Services District, and San Miguel Community Services District for the period WY 1981 through 2011. In the event of missing or erroneous discharge data, the recharge for that period will be estimated from linear regression analysis. The potential volume of recharge to the groundwater aquifer from seepage will be considered for all residential and commercial areas not connected to a sanitary sewer.

Our evaluation of recharge from urban water and sewer pipe leakage will include contacting the various water purveyors and wastewater agencies in the Basin. A reasonable estimation of water leakage could be developed by examining unaccounted water between production meters and the sum of connection meters. Unaccounted water is available in Urban Water Management Plans for the Cities of Atascadero and Paso Robles, which includes meter error (i.e., not real) and un-metered use (e.g., fire hydrant flushing), with the remainder as estimated leakage. Wastewater leakage can be assumed to be a small percentage (e.g., 2 percent) of the total flow.

Our specific approaches to evaluation of major groundwater discharge components are summarized below.

- Agricultural groundwater pumping. Agricultural groundwater pumping is the largest outflow, with significant trends over time, and considerable uncertainty. Our evaluation will evaluate applied water to specific crops using the historical DWR crops maps (used in the Phase 1 study) and the more recent County GIS Land Use layers. The 2012 MWP analysis included development of spreadsheets linked to the GIS

layers; these address evapotranspiration (ET) losses (with reference ET and crop coefficients), frost protection, leaching requirements, and irrigation efficiencies. We will use the GIS layers and the spreadsheets for our analysis, with re-evaluation of some factors. For example, previous estimates of *effective rainfall* have been subject to criticism; effective rainfall and irrigation demand for crops can be estimated effectively with the HSPF precipitation-runoff modeling system, which takes rainfall and simulates interception, soil moisture, evapotranspiration, groundwater recharge, and other processes.

- Municipal groundwater pumping. Evaluation of municipal groundwater pumping will be based on actual records of metered production from wells for Atascadero MWC, City of Paso Robles, Templeton CSD, and San Miguel CSD. Production will be allocated respectively to the subareas and Atascadero Subbasin.

- Private domestic well groundwater pumping. Rural water demand is a relatively small but increasing component. The Phase I Study estimated rural water demand as the product of County estimates of rural dwelling units (DU) and a water demand factor of 1.7 AFY per dwelling unit (DU). The Pumping Update for 2006 applied the same water factor to dwelling units, with geographic distribution provided by the County GIS. The 2012 MWP also used the County GIS to define the distribution and number of rural DUs and applied a 1.0 AFY/DU factor. Our approach will similarly use the County Land Use ArcGIS layer and associated spreadsheets to define the recent distribution and number of rural DUs. For annual values, this distribution and number will be interpolated with previous estimates, adjusted with review of population data. Monterey County rural water demand can be estimated from well permits and population data.

  Special focus will be placed on the water demand rate, which has been a significant source of uncertainty. A major factor affecting domestic use is the extent of irrigated landscaping. Recognizing that rural residences differ considerably in landscaping, we will conduct a systematic survey of rural residential landscaping extent using aerial photography. Working with the Modeling Subcommittee, we will define representative sample squares (e.g., in the Creston area or Whitley Gardens) and evaluate the extent of irrigated landscaping for selected years. The water demand of this landscaping will be computed. This will provide limited, but real data to evaluate the range of rural water demand and change over time.

- Small commercial pumping. Small rural commercial water demand is also small but increasing. The Phase I Study identified 20 small systems and estimated annual water demand using a mix of pumping data and estimates. The Pumping Update for 2006 identified 18 small systems and 64 wineries and used a mix of pumping data and estimates for type-specific water demand rates. The 2012 WMP used the County GIS to define the distribution and number of commercial systems and applied a factor of 1.5 AFY per DU. Our approach will use the regularly updated County Land Use ArcGIS layer and associated spreadsheets to define the recent distribution and number of rural DUs. For annual values, the distribution and number of commercial systems will be interpolated with previous estimates. The Land Use GIS identifies specific commercial types; for the groundwater basin area, we can apply specific water demand rates and cross-check with previous estimates.

- Small communities pumping. Small community water demand is also small but increasing. The Phase I Study identified 20 small systems and estimated annual water demand using a mix of pumping data and estimates. The Pumping Update for 2006 used a similar methodology, while the 2012 WMP apparently rolled the demand of small communities systems into rural water demand. Given that small community systems have a centralized system based on one or more wells (that should be recognized in the numerical

model), we will distinguish small systems, requesting names/addresses and pumping amounts from the County, and checking Geotracker. Monterey County communities (e.g., Bradley) will be included.

- Evapotranspiration (ET) by riparian vegetation. Phreatophyte ET is a relatively small and fluctuating component, estimated to average 3,800 AFY for the Paso Robles Basin in the Phase I Study and 7,700 AFY in the Phase II Study. The Phase I estimate was based on California Department of Forestry GIS coverage for 1991 and an estimated annual water demand, adjusted annually in response to rainfall. Our update will apply more recent GIS coverages of watershed vegetation types from the California Department of Forestry and US Forest Service, applied to define changes/trends in phreatophyte areal extent. Areal extent will be estimated annually based on trends. Riparian water demand will be estimated monthly for the period of record using the evapotranspiration (EVT) package in MODFLOW, which considers the effect of groundwater levels on phreatophyte water consumption.

- Subsurface outflow. Available information indicates that subsurface outflow occurs at the outlet of the basin near San Ardo. In the Phase I Study, outflow was estimated using Darcy's Law at 600 AFY and assumed constant, given the moderating effect of Nacimiento and San Antonio river flows and stability of local hydrographs. This is a reasonable evaluation given the general lack of local groundwater development and information. In the Phase II Study, subsurface outflow was simulated at a higher rate, averaging 1,600 AFY and ranging from 1,300 to 2,100 AFY. In both studies, subsurface outflow is indicated to be a very small portion of total outflow. We will inquire with Monterey County for significant new information (e.g., a nearby pumping test) to warrant independent re-evaluation; otherwise, the original estimate is adequate for the computed water balance. The updated model will provide additional insight into the variability of and key factors governing subsurface outflow over time.

Deliverable

The GEOSCIENCE/Todd Engineers Team will prepare a Technical Memorandum presenting the methodology and results of the updated water balance. This document will be thoroughly reviewed and vetted by senior project personnel prior to submittal. The Technical Memorandum will be submitted in electronic format (i.e., PDF) to the District for review prior to updating the groundwater model, and will be included in the full model update report.

C. AQUIFER SYSTEM CONCEPTUALIZATION

The conceptual model developed by the initial modelers includes hydrologic separation of the confined Paso Robles aquifer in the Atascadero area (i.e., sub-basin) from the confined aquifer in the rest of the Basin. Justification for this separation was supported through both varying water levels on either side of the Rinconada Fault and the juxtaposition of water-bearing with non water-bearing formations. We understand that the overall effect that the fault has on groundwater movement within the confined aquifer (from the Atascadero Sub-basin into the Paso Robles Basin) is subject for debate.

Our evaluation of the hydrologic connection between the Atascadero Sub-basin and Paso Robles Basin will focus on water level data and other geohydrologic data (e.g., driller's logs and pumping test results) collected since 1997. Water level data will be compiled based on spatial location and the elevation of the perforated interval in wells. Hydrographs will be plotted and evaluated, particularly for wells that are perforated only within the confined aquifer on either side of the Rinconada Fault. The hydrographs will also be used to identify water level responses to wet and dry climatic periods and local pumping. These types of water level changes will be considered during our evaluation of the hydraulic connection. Results from our analysis will be discussed with the District and Modeling Subcommittee.

D. MODEL UPDATE AND POST-AUDIT

D.1 Prepare Model Input Data

A MODFLOW model addressing the period 1981-1997 was based on the Paso Robles Groundwater Basin Study (Fugro et al., 2002) and completed in 2005 (Fugro, ETIC, and Cleath, 2005). The Paso Robles Groundwater Basin model currently utilizes the MODFLOW-2000 version of MODFLOW. The model update will include replacing this version with MODFLOW-2005. Like the previous version, MODFLOW-2005 has been developed to be readily understood and modified, is simple to use and maintain, and can be run using a variety of computer systems. The primary difference is that MODFLOW-2005 manages internal data in a more efficient manner.

The current model calibration covers the period from October 1981 through September 1997 (17 years) with semi-annual stress periods. However, basin conditions have changed significantly in the past 15 years and data availability has increased. Therefore, new hydrogeologic data collected for the period October 1997 through September 2011 and existing data (i.e., 1981-1997) will be formatted in a manner to allow for monthly stress periods.

D.2 Evaluate Model Output Files

Subsequent to calibration verification, GEOSCIENCE will run the model and use the output files to address the following goals of the model update:

1) Determine that the conversion from MODFLOW-2000 to MODFLOW-2005 was successful.
2) Estimated recharge and discharge inputs from the updated water balance are implemented correctly.

D.3 Model Post-Audit

A post-audit of the existing model will be performed by comparing the simulated groundwater levels from 1998 through 2011 against measured groundwater levels over the same period. Given that the water budget will be verified and updated (and possibly changed relative to the original model), measured and simulated groundwater elevations for the preceding historical model simulation period of 1981 to 1997 will also be evaluated in order to confirm calibration quality. The purpose of a post-audit is to evaluate calibration quality, i.e., how well the model is able to match groundwater levels. Significant groundwater elevation trends (declines) have been measured in certain subareas of the Paso Robles Basin. The updated model must accurately simulate these dynamic conditions in order to be confidently applied as a predictive tool. If the match between the simulated and measured groundwater levels from 1998 to 2011 is in relatively good agreement, then the existing calibrated model may be assumed a valid predictor of future groundwater levels and no additional modifications to the model structure or assigned model layer hydraulic parameters is considered necessary for the updated model. Conversely, if significant differences exist between simulated and measured groundwater levels from 1998 to 2011 either locally or throughout the Basin, then a re-calibration of the model will be necessary.

Calibration quality will be assessed through evaluation of hydraulic head residuals (the difference between observed and simulated elevations) in both space and time. Measured and simulated surface water flows in the Salinas River will also be compared. Hydrographs of measured and simulated heads, along with calibration statistics (mean errors and root mean squared errors) for each monitoring well identified as a representative calibration point will be calculated for each model period. Residuals for production well water levels will not be calculated because of the well losses and cell averaging associated with the finite-difference approximations. The mean and root mean squared error for selected observation wells over the transient simulation period (and sub-periods) will

be compared with the ASTM Guidelines for model calibration (mean residual and root mean squared residual or less that 5 and 10 percent, respectively), of the groundwater elevation range within the model area and period.

Deliverable

A post-audit Technical Memorandum will be prepared for review by the District and Modeling Subcommittee documenting the methodologies and analysis results prior to a final decision regarding the need for re-calibration. This document will be thoroughly reviewed and vetted by senior project personnel prior to submittal. The Technical Memorandum will be submitted in electronic format (i.e., PDF) to the District for review and used to determine if the updated model needs to be re-calibrated, and will be included in the full model update report.

E. MODEL RE-CALIBRATION

If it is determined that the updated model needs to be re-calibrated, GEOSCIENCE will prepare a flow model calibration plan for the District and Modeling Subcommittee to review. This plan will include the objective of the calibration, calibration approach, steady-state calibration period, transient calibration period, and selection of calibration targets. Quantitative techniques including calculating potentiometric head residuals (using residual statistics: maximum and minimum residual, residual mean, weighted residuals, and second order statistics), assessing correlation among head residuals (listings, scattergrams, spatial correlation plots, temporal correlation), and calculating flow residuals (water budget and mass balance, vertical gradients, and groundwater flow paths) will be used. Qualitative considerations during calibration will include assessment of general flow features, comparison with distinct and similar hydrologic conditions, and input hydraulic properties.

The flow model calibration plan will be prepared using the guidelines documented in "Standard Guide for Comparing Ground-Water Flow Model Simulations to Site-Specific Information (ASTM, 1993), "Standard Guide for Calibrating a Ground-Water Flow Model Application" (ASTM, 1996) and "Guidelines for Evaluating Ground-Water Flow Models" (USGS, 2004).

F. SENSITIVITY ANALYSIS AND SIMULATIONS

As part of the flow model re-calibration procedure, GEOSCIENCE will perform a sensitivity analysis of the flow model, which will identify the key flow model parameters that cause the most changes in the model results. In the sensitivity analysis, each of the input parameters will be iteratively altered by a factor to determine its effect on the model output. Model parameters that cause significant changes in model results will be investigated thoroughly to identify flow model uncertainty.

We understand that this task may also include developing future condition projections and running up to two scenarios for simulation with the calibrated model. In addition, at least one meeting will be required with the Modeling Subcommittee to discuss sensitivity analysis results and the approach for development model predictive scenarios.

Deliverable

A Technical Memorandum will be prepared to document the understanding amongst the District, Basin stakeholders, and the GEOSCIENCE/Todd Engineers Team for the sensitivity analysis and the approach that will be taken to develop the predictive simulations. This document will be thoroughly reviewed and vetted by senior project personnel prior to submittal. The Technical Memorandum will be submitted in electronic format (i.e., PDF) to the District prior to proceeding with the sensitivity analysis, and will be included in the full model update report.

G. REPORTING

The GEOSCIENCE/Todd Engineers Team will prepare a final report that summarizes each Technical Memorandum generated during the model update processes. It will also report the results of the sensitivity analysis and predictive simulations. The reporting will occur in three steps, which include:

- Administrative Draft (electronic format) for review and commenting
- Public Review Draft (three hard copies and electronic format)
- Final Report (three hard copies and electronic format) that addresses comments from Basin stakeholders

The model update report will include figures and tables that have undergone a thorough QA/QC process to ensure accuracy and consistent formatting. All figures will be generated using current industry-standard software that is capable of producing geospatial information in a manner that will be easily understood by the Basin stakeholders.

The GEOSCIENCE/Todd Engineers Team will provide a complete electronic copy of the watershed model and groundwater flow model calibration, flow model re-calibration (if performed), and predictive simulation (if generated) model files, including all HSPF and MODFLOW input and output files. In addition, the Team will provide any other electronic files used to develop the input data sets (e.g., Excel spreadsheets used to organize and populate pumping, injection, and boundary heads) and output results derived from post-processing of HSPF and MODFLOW output files. All of these files become the property of the District.

H. PROJECT MANAGEMENT AND MEETINGS

The GEOSCIENCE/Todd Engineers Team recognizes that the success of the model update will rely on effective project management and communication among the consultant, District staff, and members of the Modeling Subcommittee. Project management of all tasks required to update the model will be provided by the GEOSCIENCE / Todd Engineers team (which is included in the proposed cost for each task). Methods of communication will include meetings: face-to-face, conference calls, and video conferencing (e.g., GoToMeeting and Skype); interim progress reports; and, email correspondence. Meeting agendas will be prepared by the GEOSCIENCE/Todd Engineers Team for all project meetings. Meeting minutes and action items will be recorded and provided as necessary.

H.1 Project Kick-Off Meeting

The primary objective of the project kick-off meeting will be for the GEOSCIENCE/Todd Engineers Team members to meet face-to-face with key individuals from the District and Modeling Subcommittee and to ensure mutual understanding of the intent, objectives, tasks, budgets, schedules, milestones, and deliverables of the project. The kick-off meeting also identifies the individuals who are responsible for implementing each part of the work. Additionally, this meeting provides a forum for discussion of critical path tasks, and how those tasks can be efficiently expedited. Prior to the kick-off meeting, the GEOSCIENCE/Todd Engineers Team will prepare a detailed preliminary project schedule. For costing purposes, it is assumed that the kick-off meeting will take place at the County's administrative office in San Luis Obispo.

H.2 Water Balance Meeting

The GEOSCIENCE/Todd Engineers Team is prepared to attend one meeting with District staff and Modeling Subcommittee to discuss the approach to development of the updated water balance. It is assumed that the meeting will take place at the County's administrative office in San Luis Obispo.

H.3 Updated Water Balance and Modeling Subcommittee Meeting

The GEOSCIENCE/Todd Engineers Team is prepared to attend at least one meeting with the Modeling Subcommittee to present the updated water balance, findings of the model update, and post-audit review to determine the final decision regarding the need for model re-calibration. It is assumed that the meeting will take place at the County's administrative office in San Luis Obispo.

H.4 Progress Meetings

The GEOSCIENCE/Todd Engineers Team will coordinate progress meetings with the District that will occur at project milestones or as needed throughout the model update process. Progress meetings can occur effectively by means of telephone and/or video teleconferencing (GoToMeeting or Skype).

H.5 Meeting to Develop Future Scenarios for Modeling

The GEOSCIENCE/Todd Engineers Team will meet with the Modeling Subcommittee in order to discuss and plan future groundwater management scenarios to be simulated using the updated surface water/ groundwater model. We anticipate a fact-to-face meeting at the County's administrative office in San Luis Obispo in a project workshop format that will be facilitated by the project team.

H.6 Presentation of Public Draft Report

It is understood that key members of the GEOSCIENCE/Todd Engineers Team will be present during submittal of the Public Draft to the Steering Committee. It is assumed that the meeting will take place County's administrative office in San Luis Obispo or in the Paso Robles Basin (e.g., Templeton or Paso Robles).