ATTACHMENT 4 – PROJECT DESCRIPTION

Project Description

The Castaic Lake Water Agency (CLWA) was formed in 1962 as a State Water Project Contractor to provide wholesale water supply from the State Water Project (SWP) to retail water purveyors in the Upper Santa Clara River area, most notably to Newhall County Water District, Los Angeles County Waterworks District No. 36, CLWA's Santa Clarita Water Division and Valencia Water Company. In 2001, Assembly Bill 134 authorized CLWA to provide retail water service to individual municipal customers in addition to its ongoing wholesale water supply. The extent of the CLWA service area and the geographical locations of the individual water purveyors within the CLWA service area are illustrated in Figure 1.

The groundwater basin beneath the CLWA service area, identified in DWR Bulletin 118 as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin No. 4-4.07), consists of two water bearing units:

1. **Quaternary Alluvium** – Ranges in thickness from approximately 50 to 200 feet and consists of sand, gravel, and boulders within the active channel of the Santa Clara River, grading to finer flood plain deposits away from the river toward the margins of the valley.
2. **Saugus Formation** – Up to 5,500 feet thick (RCS, 1988) and consists of semi-consolidated sandstone, siltstone, and conglomerate. The Saugus Formation is a critically important source of water for the valley.

More than 50% of the municipal water supplied to customers in the Santa Clarita Valley by CLWA and the local retail water purveyors comes from groundwater pumped from the Saugus Formation. A former munitions testing and manufacturing site (the former Whittaker-Bermite site) in the valley has contamination issues, which include perchlorate and volatile organic compounds that are found in both soil and groundwater. This contamination has impacted drinking water, and several local water purveyor wells have been shut down due to the groundwater contamination. Numerous monitoring wells have been installed by the federal government (U.S. Army Corps of Engineers [USACE]) and the responsible party to monitor the migration of the contamination from this site. However, the horizontal and vertical extent of the groundwater impact is not fully understood. Therefore, CLWA proposes a new, permanent monitoring well to help determine the extent of the contamination within its service area, in order to assess how the contamination may impact CLWA's ability to provide groundwater from its deep Saugus Formation supply wells, and to assess groundwater treatment needs. This grant will help fund this proposed monitoring well and initial monitoring, thereby helping meet the goals of CLWA's Groundwater Management Plan (GWMP), which has been provided on CD with the hardcopy submittals.

The local water purveyors in the valley have wells that are impacted with perchlorate, and determining the extent of perchlorate migration in the valley is critical to CLWA's mission of providing safe drinking water to its customers. There is a large area near two Valencia Water Company production wells (VWC-201 and VWC-205) with no subsurface data (Figure 2). Perchlorate has been detected in the closest Saugus Formation monitoring well (MP-5) and other Valencia Water Company wells in the area (VWC-160, VWC-201, and VWC-205). In addition to documenting the extent of perchlorate migration, a multi-level monitoring well in this area will provide critical hydraulic monitoring points in the Saugus

Formation. These hydraulic data will be used to determine the hydraulic influence of pumping wells in the area, which will provide useful subsurface data that are needed to help the purveyors optimize the operation of their wells to minimize perchlorate migration to other drinking water wells.

The proposed project consists of planning, design, and construction of a deep monitoring well (described in more detail in Attachment 5). It includes borehole drilling, multi-level monitoring well installation, and groundwater monitoring at a location downgradient of areas of known perchlorate contamination in the basin's deep aquifer system (the Saugus Formation). The data provided by this project will be incorporated into ongoing technical analyses (including groundwater modeling) that CLWA is currently undertaking to evaluate how best to contain perchlorate and prevent its migration to other water supply wells farther downgradient (to the west and south). Specific activities to occur under the proposed project are:

- Project planning including final well siting, agency coordination, design of the new monitoring well and selection of a qualified drilling contractor.
- Drilling and geologic and geophysical logging to identify hydrostratigraphic units at the drilling location.
- Installing a permanent, multi-level monitoring well that can be used to monitor for perchlorate presence and/or changes in perchlorate concentrations through time.
- Initial groundwater monitoring including measuring water levels and specific field parameters and sampling for groundwater constituents of interest.
- Coordinating groundwater monitoring efforts and sharing monitoring results with state and federal agencies (DTSC, DWR, USACE) along with local stakeholders (water purveyors, staff/consultants associated with the former Whittaker-Bermite facility).

Project Goals

The Saugus Formation, a major source of drinking water in the Santa Clarita valley, is impacted by existing perchlorate contamination. Current efforts are ongoing to design a hydraulic containment system with the objective of containing the perchlorate plume while restoring groundwater production (with wellhead treatment) at the impacted production wells. The primary goal of the proposed project is to determine the horizontal and vertical extent of perchlorate migration in the northwestern portion of the Saugus Formation in order to inform ongoing monitoring efforts in other parts of the basin. The project will include a permanent, multi-level monitoring well and will provide geologic, hydraulic, and water quality data for an area downgradient of water supply wells that have been impacted by perchlorate (VWC-201 and VWC-205) (Figure 2). These wells are completed in the Saugus Formation, which is the deeper of two aquifers that are present in the Santa Clarita Valley. Currently, it is unknown whether perchlorate has migrated downgradient of the group of perchlorate-impacted Saugus Formation wells and to what extent, if any, the downgradient wells might be threatened with future contamination. This uncertainty is of heightened concern to the water purveyors in the valley because of the importance of the Saugus Formation aquifer for providing drought-year firming supplies for urban areas in the Santa Clarita Valley.

CLWA's groundwater management plan identified the need for continued monitoring of the Saugus Formation. Specifically, Primary Element 1 of the plan calls for continued monitoring of groundwater quality. Primary Element 8 of the plan specifically addresses contamination issues in the basin, indicating

that "data development and control and treatment of groundwater contamination in the Saugus Formation will be critical to accomplishing [the] water supply plan." Consequently, conducting the proposed project to meet the data needs and objectives specified above will also address and inform a larger CLWA objective of implementing its groundwater management plan and developing long-term solutions for managing the perchlorate plume that is present in the Saugus Formation. Specifically, conducting this project at a location north of VWC-201 and VWC-205 will inform groundwater modeling and other hydrogeologic and engineering analyses that are in progress by CLWA. These analyses are evaluating the likely ability of alternative pumping strategies to meet the CLWA's goals of creating a hydraulic containment zone in the Saugus Formation, protecting downgradient impacted wells, and (with wellhead treatment) restoring water supply production capacity at impacted Saugus Formation wells. In meeting this broader objective, the proposed project will further facilitate CLWA's ability to address concerns by state regulatory agencies with which it is working, such as the county Department of Public Health (DPH), which has regulatory authority for returning an impacted well to service for direct potable use; and the Department of Toxic Substances Control (DTSC), which is reviewing and overseeing the ongoing voluntary cleanup activities in the area.

Project Site Description

The proposed well location area lies at or near the suspected western (downgradient) portion of the aquifer where perchlorate has been identified as being present in the Saugus Formation and where no other Saugus Formation monitoring wells are currently located (Figure 3). Well installation is planned on one of two undeveloped land parcels owned by the City of Santa Clarita to monitor perchlorate in the northwest portion of the Saugus Formation. The facilities needed for the new well include a site for a permanent monitoring well, along with the material required to construct the new well, including steel and PVC casing, permanent pumps for each of the three nested wells at the monitoring well location (that is, "bladder" pumps for continued monitoring), and a well head to protect the new monitoring well from damage. One parcel is situated immediately northeast of well VWC-205 ("Option 1 Monitoring Well Site" on Figure 3). The other parcel lies approximately 800 feet east of well VWC-205 ("Option 2 Monitoring Well Site" on Figure 3). CLWA currently prefers to install the well at the Option 1 Monitoring Well Site because groundwater modeling analyses suggest that it is further downgradient of VWC-205 than is the Option 2 Monitoring Well Site, particularly when VWC-205 is not operating.

CLWA has also considered installing one or more multi-level monitoring wells at other locations farther to the north and northeast, outside the circled areas shown on Figure 3. Some locations are on public right-of-way; other locations are on private property where access agreements have not yet been secured. CLWA may consider installing the multi-level monitoring well at one of these parcels (rather than at the Option 1 or 2 Monitoring Well Sites) if access can be secured prior to drilling, as those sites lie farther from known impacted wells and thus may be farther downgradient of portions of the perchlorate plume than are the Option 1 and 2 Monitoring Well Sites. If access cannot be secured prior to drilling, then the multi-level well will be installed as planned on either the Option 1 or 2 Monitoring Well Site, and any future monitoring well installation on private properties will be conducted using other funding sources if available.

The area covered by this project is shown on Figure 3. As discussed above, all project activities will likely occur at the Option 1 or 2 Monitoring Well Sites. Consideration is also being given to well installation on

privately owned parcels farther to the north and northeast, but will only occur if access agreements can be secured prior to the beginning of the project.

Collaboration with Other Local Public Agencies

Water management activities within the Santa Clarita Valley are coordinated through an entity called the Santa Clarita Valley Water Committee. Work that will be completed as part of this project will be done collaboratively with the members of this Committee. This committee, sometimes referred to as the Upper Basin Water Purveyors, is made up of representatives from CLWA, the Valley's wholesaler of State Water Project Water, its four local retail water purveyors (CLWA's Santa Clarita Water Division, Los Angeles County Waterworks District 36, Newhall County Water District, and Valencia Water Company), and representatives from the City of Santa Clarita and the County of Los Angeles Department of Regional Planning. This committee coordinates the management of imported water with local groundwater and recycled water supplies to meet water requirements in the valley. Since 1999, the committee has funded the preparation of annual reports that discuss the water supplies and demands of a given calendar year, the outlook for water supplies during the following calendar year, and the water supply and groundwater resource management activities being conducted by the individual purveyors and the committee. With respect to groundwater management, the committee has conducted the following work over the years:

- Annual reports (1999 to Present)
- MOU (2001)
- Development and adoption of the GWMP (2003)
- Basin groundwater model development (2003)
- Perchlorate containment analysis (2004)
- Groundwater supply sustainability analysis (2005) and its incorporation into the 2005 UWMP
- Extension of the model to simulate observed conditions from 2004 through 2007
- Updated groundwater supply sustainability analysis (2008-2010) and its incorporation into the 2010 UWMP update
- Startup of the perchlorate containment system at Saugus1/Saugus2 (2010)
- Development of perchlorate containment analysis work plan for well VWC-201 (2012)
- Extension of the model (in progress) to simulate observed conditions from 2008 through 2011

The Santa Clarita Valley Water Committee and its individual members have a long history of internal cooperation and coordination on groundwater management, as evidenced by the prior section. With respect to the presence of perchlorate in groundwater, other stakeholders besides the committee members include the Whittaker Corporation, a local citizen's advisory group (CAG), and state regulatory agencies (primarily DPH and DTSC). A settlement agreement regarding perchlorate migrating from the Whittaker-Bermite site has been executed between the Whittaker Corporation and the water purveyors (Purveyors). DTSC and DPH serve as the agencies overseeing the implementation of the settlement agreement remedies, with DTSC focusing on remedial action planning onsite and offsite and DPH focusing on the process of returning water supply wells to service (with treatment) for potable use. The purveyors hold monthly technical meetings with Whittaker and the state agencies to discuss the progress and direction of studies, planning efforts, and remedy implementation activities. These entities also regularly inform and meet with the CAG, the City of Santa Clarita, and the County of Los Angeles Department of Regional Planning to update them on project progress and discuss their questions and concerns.

Groundwater characterization and monitoring activities and findings have been part of these discussions on a routine basis for the past several years. Consequently, the communication forums provided by these meetings are in place and will be used as the primary mechanisms for keeping stakeholders informed about the proposed monitoring well installation project. This activity has already begun through the preparation of this grant application, which was developed by CLWA in close consultation with the retail water providers and the Whittaker Corporation.

Coordination with State and Federal Agencies

As discussed previously, DPH and DTSC are integrated into the many activities that have been conducted since the early 2000s to address the presence of perchlorate on, and emanating from, the Whittaker-Bermite property. DPH and DTSC attend monthly meetings that the purveyors and the Whittaker Corporation hold under the settlement agreement, and these agencies also attend key meetings of public entities (meetings held by the CLWA Board, the citizen's advisory group, and the City of Santa Clarita). DPH and DTSC also provide regulatory oversight of activities occurring both onsite and offsite from the Whittaker-Bermite property. For example, under the work plan that is currently being implemented to restore groundwater quality at well VWC-201, the purveyors are conducting analyses designed to address requirements contained in DPH's 97-005 Policy Memorandum, which the agency uses to evaluate and approve or disapprove proposals for – and also establish appropriate permit conditions for – returning an impacted well to service for direct potable use. In addition to the DPH requirements, the purveyors' analyses under the VWC-201 work plan are also designed to update an Interim Remedial Action Plan (IRAP) that is administered by DTSC. The regular meetings described above will be the venue for continuing to coordinate with these agencies as part of this proposed project.

In addition to these two state agencies, the USACE also participates in many of these meetings and projects. Over the past several years, USACE has conducted field investigations and groundwater modeling to support the purveyors and the state under federal appropriations. The USACE is thus involved in many meetings as both an interested party and a provider of data and data analyses. Work that is done as part of this project will be closely coordinated with the USACE and its consultant to ensure that monitoring well sites are selected that maximize benefits to all parties working in the basin.

How the Project Supports the Goals and Objectives of the GWMP

In 2003, CLWA prepared and adopted the GWMP for the local groundwater basin (the East Subbasin of the DWR-designated Santa Clara River Valley Groundwater Basin). The GWMP includes four management objectives for the groundwater basin. Those four management objectives include:

- Development of local groundwater for water supply;
- Avoidance of overdraft and associated undesirable effects;
- Preservation of groundwater quality;
- Preservation of interrelated surface water resources.

The intent of the GWMP is to ensure that the purveyors' use of local groundwater continues to result in acceptable and sustainable aquifer conditions, specifically no degradation of water quality (Element 6 of the GWMP), avoidance of overdraft (Element 3 of the GWMP), and no adverse impacts to surface waters

(Element 2 of the GWMP). The GWMP identified these objectives and elements as being accomplished via continued conjunctive use operations that have been ongoing since the initial importation of supplemental surface water in 1980 (Element 5 of the GWMP) and via monitoring and interpretation of surface water and groundwater conditions on an ongoing basis (Elements 1 and 2 of the GWMP). Element 8 of the GWMP relates to contamination in the basin, and calls for continued groundwater monitoring, including monitoring associated with the perchlorate plume in the Saugus Formation. The objectives of the proposed project are aligned with the goals of the GWMP.

Returning perchlorate-impacted production wells to service (with treatment) has long been recognized by the purveyors and other stakeholders as a necessary step in preventing the further spread of perchlorate, therefore preserving groundwater quality of the basin to allow for continued use of local groundwater for water supply. However, the effectiveness of using existing wells to contain perchlorate cannot be ascertained without additional hydrogeologic characterization studies, monitoring wells, and groundwater modeling analyses that provide the basis for issuance of a permit by DPH to return an impacted well to service as a potable water supply. The containment system at the Saugus 1 and Saugus 2 wells began operating in May 2010, approximately six years after completion of the studies and modeling analyses and after construction of new facilities to treat the water pumped from these two wells. During the course of this planning effort, monitoring wells were installed in strategic locations near the Saugus1 and Saugus2 wells to provide details on the geographic and vertical distribution of perchlorate and spatial variations in aquifer properties. This information was directly used to locally refine the calibration of the purveyor's groundwater flow model, which then provided increased confidence in the model's ability to estimate the pumping rates at Saugus1 and Saugus2 that might be necessary for providing hydraulic containment of Saugus Formation groundwater over a sufficiently large area so as to prevent further plume migration.

In March 2012, the purveyors presented a work plan to DPH and DSTC for conducting additional hydrogeologic studies and modeling to review the effectiveness of the Saugus1 and Saugus2 containment system and to evaluate how best to contain perchlorate in the vicinity of VWC-201 and now VWC-205. Conducting the proposed project will: (1) significantly aid CLWA's efforts to protect regional groundwater quality (Element 6 of the GWMP) by providing groundwater quality and hydrogeologic data at multiple depths in the Saugus Formation beyond the currently known downgradient extent of the plume, thereby helping to determine the horizontal and vertical extent of perchlorate migration in the northwest portion of the Saugus Formation, and (2) provide CLWA with a monitoring well that can be integrated into the current long-term monitoring program to promote CLWA's GWMP and to evaluate the effectiveness of groundwater containment remedies.

Quality and Usefulness of Acquired Data

As discussed previously, the proposed project is just one of many activities that the purveyors are conducting to protect groundwater quality by addressing the known presence of perchlorate in groundwater. The proposed project will provide both groundwater quality data and hydrogeologic characterization data in a portion of the basin where no other Saugus Formation monitoring wells are currently located. This will provide CLWA with information that will be integrated into planning, implementation, and monitoring programs that are addressing the presence of perchlorate in water supply

wells and the aquifer from which they draw water, which is in alignment with CLWA's GWMP. Project data will be collected according to the QA/QC plan detailed in Attachment 8.

The multi-level monitoring well will complement existing and proposed monitoring activities performed by CLWA, USACE and by the Whittaker Corporation. Previous efforts to determine the horizontal and vertical extent of perchlorate contamination included the construction of Westbay® multi-port (MP) wells and multi-level (nested) PVC wells constructed in the same borehole. These monitoring wells have provided useful, vertically discretized perchlorate and aquifer head data in the Saugus Formation. The proposed multi-level monitoring well will be used to collect similar, vertically discretized data in an area of the Saugus Formation where no subsurface data exists. The proposed project is aligned with other planned monitoring of the Saugus Formation. CLWA proposes an additional monitoring well in the northwest portion of the Saugus Formation to support the regional goal of determining the horizontal and vertical extent of perchlorate, and is committed to coordinating and sharing data with the other stakeholders in the Valley that are interested in the results of the proposed monitoring well project.

Technical Methods and Data Analysis

The proposed multi-level monitoring well will provide critical information to help CLWA and the local water purveyors meet their responsibility of protecting drinking water supplies. To that end, the project will include data collection during borehole drilling (information on the lithology with depth) and following well construction (vertically discretized data, including discrete head values and water quality at various depths in the Saugus Formation).

As project success hinges on the collection of subsurface data throughout the duration of the project, CLWA is committed to providing the right technical and managerial staff for each project task. CLWA will assign an experienced project leader who will be responsible for the successful delivery of the project. CLWA will also ensure that those performing technical tasks have the training and experience necessary to collect accurate data during all phases of the project, which include:

1. **Technical Specifications** – The first step in a successful well drilling and construction project is the technical specifications. The specifications detail the materials and methods for completing the drilling and well construction project. These specifications will be prepared by a qualified geologist with experience on similar projects to ensure the goals of the project are met.
2. **Well Siting** – CLWA is committed to coordinating with state and federal agencies along with local stakeholders to gain endorsement of the monitoring well site location. To that end, CLWA will host a meeting for the agencies and other stakeholders to provide input into the site selection process.
3. **Field Data Collection** – A geologist will be on site during drilling activities to ensure that the contractor meets the intent of the technical drilling specifications. The geologist will monitor drilling activities, including the rate of drilling, the methods for obtaining drill cuttings, drilling fluid properties, borehole geophysical logging, well construction, well development, well capping, and will log the drill cuttings in the field. Following well construction and development, the field geologist will collect initial groundwater samples from each of the three nested PVC wells, which will provide data on the horizontal and vertical extent of perchlorate migration in the northwest portion of the Saugus Formation. These samples will be analyzed by a certified laboratory to measure the concentration of perchlorate, VOCs, SVOCs, and several explosives

(nitro aromatics and nitrosamines) associated with the site from where the perchlorate originated. These data will be reviewed by a senior geologist per the QA/QC plan detailed in Attachment 8. The field geologist will develop detailed daily logs, including photographs, to document project progress. These logs will be shared with the project team each day, including senior reviewers, ensuring the team has a proactive approach in managing any potential changes and documenting any potential data collection issues that may need to be corrected during the construction phase of the project.

4. **Data Interpretation and Analysis** – The data collected in the field will be compiled and detailed in the well installation report. The field geologist will develop a draft of the report after compiling all the field and laboratory data. The report will be prepared in cooperation with appropriate senior reviewers, and the draft and proposed final report will be reviewed by project stakeholders to ensure the data presented are aligned with the goals of the project.

Ongoing Use of Project Information and Work Products

Following well construction and initial well sampling, each of the three nested wells (in the single borehole) will be equipped with dedicated sampling equipment to be used for future groundwater monitoring. These data will also be made available to the California Department of Water Resources per the requirements of CQC 10795.19. QED® bladder pumps with low-flow sampling capability will be installed in each well. CLWA and the local water purveyors are dedicated to continued monitoring of the wells. CLWA will provide personnel and funding to perform field sampling and laboratory testing for groundwater monitoring into the future and no additional grant funding will be necessary for this future monitoring. The continued monitoring will include head (water level) measurements along with water quality samples to monitor changes in concentrations of perchlorate and other potential chemicals of concern identified in the initial groundwater sampling event. These data will be used to help CLWA and the project stakeholders plan for future pumping scenarios in order to avoid pumping contaminated water, and the data may help the stakeholders plan for perchlorate containment strategies into the future.