

ATTACHMENT 5 – WORK PLAN

Purpose and Objectives

The objective of the project is to collect subsurface data to define the horizontal and vertical extent of perchlorate contamination in the Saugus Formation in the eastern subbasin of the Santa Clara Valley. To that end, this project will provide a permanent, multi-level monitoring well. It is anticipated that the well will be installed to a total depth of approximately 1,200 feet below ground surface. Three PVC wells (each 3 inches in diameter) will be constructed inside a single borehole, each at a different elevation, to provide a single point where hydraulic and water quality data can be collected at multiple depths in the aquifer.

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 NCWD's mission of providing safe drinking water to its customers. There is an area between the contaminant source area (Whittaker-Bermite property) and several of NCWD's production wells located downgradient to the south along Railroad Avenue where there is no Saugus groundwater monitoring. . 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.

This project is aligned with the GWMP and will help accomplish the following objectives of the GWMP:

1. Preserve groundwater quality for beneficial use in the basin, and for beneficial use of surface water and groundwater discharges from the basin. Included in this management goal is the active characterization and solution of any groundwater contamination problems, through cooperation with responsible parties or through independent action.
2. Assess groundwater basin conditions to determine a range of operational yield values to avoid groundwater overdraft and the undesirable effects associated with it.
3. Formalize both a network of wells for groundwater monitoring and a program for water level measurements, water quality sampling, and other pertinent groundwater data collection (Primary GWMP Element 1).
4. Incorporate both short-term and long-term groundwater quality considerations in the management of the groundwater basin in order to formalize groundwater quality monitoring and assessment, to investigate and correct groundwater contamination problems, and to preserve or improve groundwater quality for ongoing water supply as well as for avoiding adverse water quality impacts on interconnected surface waters.

Scope of Work

Task 1 – Well Siting and Agency Coordination

There is a lack of subsurface data between the contaminant source area (Whittaker-Bermite property) and several of NCWD's production wells located downgradient to the south along Railroad Avenue (Figure

2). Therefore, to obtain critical information on the nature and extent of the perchlorate plume in this area, NCWD proposes to install a permanent multi-level monitoring well at the location shown in Figure 3. Because there are local, state, and federal agencies that are project stakeholders, NCWD proposes a coordination meeting as the first task of the project with the following stakeholders: DPH, DTSC, USACE, Santa Clarita Valley Water Committee and its individual members (CLWA's Santa Clarita Water Division, Los Angeles County Waterworks District 36, and Valencia Water Company, the City of Santa Clarita, and the County of Los Angeles Department of Regional Planning). The local water purveyors have had success in the past obtaining easements for similar projects, and they anticipate obtaining an easement from the City of Santa Clarita for a new monitoring well location will not be cumbersome. If public property is not available for the new monitoring well, NCWD will coordinate with private land owners to obtain legal access to a monitoring well site (as it has done previously without issue).

The agenda of the stakeholder coordination meeting will include a discussion of the pros and cons of potential well site locations, with a goal of coordinating with these stakeholders to accomplish project goals. NCWD will facilitate the meeting and will obtain endorsement of the monitoring well location from the project stakeholders.

In addition to the agency coordination meeting detailed above, NCWD proposes to survey the selected well site to confirm the site parcel details and to ensure the well is located in the selected parcel of land. NCWD will coordinate with Dig Alert to assess subsurface utility restrictions within the selected land parcel to be sure that a boring can be advanced on the land without issue.

Task 2 – Monitoring Well Design and Construction

A new, permanent, multi-level monitoring well will be designed and constructed to assess the horizontal and vertical extent of perchlorate migration in the Saugus Formation between the contaminant source area (Whittaker-Bermite property) and several of NCWD's production wells located downgradient to the south along Railroad Avenue. NCWD proposes to complete the following Subtasks associated with Task 2 (details of each Subtask are provided below):

- Specifications and public bid package
- Well drilling, construction, and development
- Initial groundwater monitoring
- Reporting
- Future groundwater monitoring
- Safety and quality assurance
- Stakeholder coordination and communication

Task 2.1 Specifications and Public Bid Package

NCWD will develop specifications for borehole drilling, well construction, well development, and well testing for inclusion in a public bid package that will be used to hire a contractor licensed in accordance with the provisions of the Contractor's License Law (Chapter 9, Division 3, of the Business and Professions Code) to perform the work. The specifications will incorporate California monitoring well design and borehole drilling standards. NCWD will also include contract documents (Division 0 and 1

documents) in the bid package. NCWD anticipates advancing a 14-inch diameter borehole to approximately 1,200 feet below ground surface (bgs) using the direct mud-rotary drilling method. Three separate 3-inch diameter steel or PVC monitoring wells will be constructed inside the 14-inch diameter borehole. The casing for each well will be centralized in order to maintain required annular space among the well casings and between the casings and the borehole wall. This design is consistent with previous wells that have been constructed in the valley by the USACE as part of subsurface investigations related to perchlorate contamination in the valley. Nested monitoring wells completed in the same borehole have been installed at a number of locations by the USGS and other agencies in Southern California. Key to the success of these installations are qualifications of the driller, maintaining borehole stability, selecting the appropriate sealing material and installation method for the seal between intervals, and selecting casing materials that will not deform during placement of the grout seal. Selection of the specific casing and sealing material and installation methods will be made during the design phase of the project. NCWD anticipates providing the following major specification sections in the technical section of the public bid package:

- Mobilization/demobilization (including temporary facilities, such as fencing and storage facilities) and final site cleanup
- Temporary containment and final disposal of investigation derived waste (IDW) including drill cuttings and development water
- Conductor borehole drilling, casing, and seal
- Drilling fluids program
- Borehole drilling
- Downhole geophysical surveys
- Well casing and well screen
- Filter pack
- Annular seal
- Well development
- Wellhead completion (including capping)
- Reporting (submitting a well completion log to DWR in accordance with the provisions of Sections 13750 through 13755 (Division 7, Chapter 10, Article 3) of the California Water Code.

NCWD will formally advertise the project through a public bidding process. NCWD will host a site walk with the potential contractors to ensure the contractors have an opportunity to assess the site for access and local conditions prior to completing their bids.

Task 2.2 Well Drilling, Construction, and Development

NCWD will hire a contractor to drill, construct, and develop the multi-level monitoring well. NCWD will provide a professional geologist to perform contractor oversight during monitoring well drilling, construction, and development. The geologist will oversee the contractor's work to ensure it complies with the intent of the specifications and associated California Well Construction Standards.

NCWD and its contractor or consultant will complete the following tasks:

1. **Permitting** – NCWD will obtain a monitoring well permit with the Los Angeles County Department of Public Health. NCWD will ensure the permit is obtained prior to contractor mobilization.
2. **Drilling Site Setup** – The drilling contractor will mobilize equipment to the site and maintain a safe and clean work site. The drilling site will be fenced to ensure unauthorized personnel do not enter the work site.
3. **Waste Management** – NCWD will ensure the contractor implements an investigation derived waste (IDW) management plan. The plan is anticipated to include the basic condition that the contractor removes all IDW (drill cuttings, drilling fluids, water developed from the well, etc.) from the site and dispose of the waste in compliance with state and/or federal regulations.
4. **Conductor Casing Drilling and Construction (optional task for the contractor)** – Should the contractor believe that a temporary or permanent conductor casing is required to maintain upper borehole stability, the contractor will have the option to install a temporary or permanent conductor casing. If the contractor chooses to install conductor casing, he shall follow the requirements of the technical specifications, which details state conductor casing drilling and sealing requirements.
5. **Drilling Fluid Program** – The drilling contractor shall be required to submit a detailed drilling fluids program developed by a drilling fluids (mud) specialist. The drilling fluid shall be NSF 61 certified and shall be comprised of a polymer-based “mud” or bentonite “gel”-based mud. The contractor will be required to maintain effective solids control through the course of drilling to minimize recirculation of drill cuttings and to facilitate the retrieval of representative cutting samples from the fluid at the surface.
6. **Borehole Drilling** – The contractor will drill a minimum 14-inch diameter borehole using the direct or dual-tube reverse mud rotary drilling method. The drilling specifications will require the drilling contractor to drill the borehole sufficiently straight and plumb to permit the installation of the well casing and screen (and to allow free passage of geophysical logging tools to the bottom of the borehole). NCWD will maintain a detailed description of the drilling fluid properties throughout the course of drilling, including fluid weight, fluid viscosity, water loss, any addition of water to the drilling fluid, sand content, and total solids content at a minimum of every 100 feet of drilled depth or every 8 hours when not drilling. NCWD’s consultant will collect and characterize soil cuttings at 10-foot intervals and at every change in lithology in accordance with the Unified Soil Classification System (USCS). The cuttings will be collected from the drilling fluid prior to the fluid moving through any solids control equipment (not off the shaker screen, for example) in order to log representative cuttings from the borehole. The contractor will be required to maintain drilling fluid circulation in the borehole until casing is set.
7. **Borehole Geophysical Surveys** – A suite of borehole geophysical logs will be collected in the borehole by a qualified service company. The borehole geophysical logging suite shall include: spontaneous potential, single-point resistivity, 16-inch normal, 64-inch normal, guard resistivity, and natural gamma ray. A caliper log will also be performed. Drilling fluid will be circulated in

the borehole for a minimum of one hour prior to borehole geophysical logging and the hole will be “conditioned” to its total depth. Drilling fluid circulation will not stop until the geophysical logging company is on site.

8. **Final Well Design** – Based on the results of the borehole geophysical logs and the detailed cuttings log maintained by NCWD’s geologist, the final design of the well will be developed. The final design will be based on the actual depths of potential water production zones interpreted from the borehole geophysical logs and the detailed drill cuttings log developed by NCWD’s geologist. The final design will specify the length of each well screen, the linear feet of filter pack surrounding each screen, and the linear feet of grout seal between each screened interval.
9. **Well Construction** – The multi-level monitoring well will be constructed using 3-inch diameter Schedule 80 PVC or steel. Selection of the casing and screen material will be made during the design phase of the project. Three separate steel or PVC wells will be constructed inside the 14-inch diameter borehole. Centralizers will be used to ensure there is a minimum of 2 inches surrounding each casing and between the outer casing and borehole wall (per state annual seal spacing requirements). The amount of slotted screen installed for each well will depend on the hydrostratigraphic unit that is targeted (based on drill cuttings and the borehole geophysical logs). Once all three nested wells are constructed and installed in the borehole, the annular space will be filled with filter pack material (surrounding the well screen) and grout above each filter pack and from the upper most filter pack to ground surface (that is, each screen will be isolated from the others using grout). The contractor will be required to use the tremie method to install annular materials. NCWD’s geologist will oversee the contractor’s work to ensure the well is constructed in accordance with the final well design.
10. **Well Development** – Each nested well will be developed mechanically (swabbing and bailing, followed by air-lifting). The anticipated static water level in the wells is approximately 100 to 150 feet below ground surface. The shallowest screen interval will likely be over 700 feet below ground surface. Therefore, there will be sufficient space above the screened interval for air lifting equipment to be installed and submerged to produce water from the well. This development method will require the contractor to manifold the well head (the top of each well) to allow the airlifting equipment to be installed in the well and to allow water to exit the well directly into a tank to contain the water. This development method will produce much more water than a submersible pump. However, a submersible pump could be used to perform final well development should there be an issue with air lifting. The air lift development will occur not less than 24 hours and no more than 48 hours after the grout seal is placed in the well. The contractor will continue surging and bailing material from the well until sand, silt, and clay have been washed through the well screen to the satisfaction of NCWD’s geologist. Development will continue until the water purged from each well is clear (free of silt, sand, and clay) and water quality parameters (pH, temperature, specific conductance, and oxidation-reduction potential) stabilize. The water discharged from the wells during development will be contained, removed from the site, and disposed of according to state and federal regulations.
11. **Daily Field Logs** – NCWD’s geologist will prepare daily field logs, including written and photo documentation of activities performed on site throughout the entire drilling, construction, and

testing process. These logs will be included in the final well installation report that will be prepared as part of the project (see Task 2.4).

Task 2.3 Initial Groundwater Monitoring

Following well development, NCWD's geologist will measure and record the static water level in each PVC monitoring well. Following the measurement of water levels, each well will be purged and field parameters, including temperature, pH, specific conductance, and oxidation-reduction potential will be measured (following the QA/QC guidelines in Attachment 8). Following purging, the wells will be sampled for the following:

- Major cations and anions
- VOCs and SVOCs
- Perchlorate and chlorate
- Explosive compounds (nitro aromatics and nitrosamines) and nitrosamines

The samples will be put on ice immediately following collection, and the samples will be delivered to a certified laboratory for analysis under chain-of-custody.

Following the initial round of sampling, the wells will be equipped with dedicated sampling equipment that will be used for future groundwater monitoring. QED[®] bladder pumps with low-flow sampling capability will be installed in each well for continued groundwater monitoring (funded by NCWD) for the purpose of improving NCWD's groundwater management to accomplish the goals of the basin's GWMP.

Task 2.4 Reporting

NCWD will provide quarterly progress reports on the status of the project. A final well completion report will be prepared and submitted to DWR within 60 days of the well completion. The report will go beyond the information required in the provisions of Sections 13750 through 13755 (Division 7, Chapter 10, Article 3) of the California Water Code (those provisions will be documented on the well driller's log that is submitted to the state in addition to the final well installation report described here). The well installation report will document the monitoring well design, construction, and testing process. The well installation report will include an as-built well construction drawing, lithologic and geophysical logs including a description of site stratigraphy, water quality test results including copies of laboratory data sheets from the first round of sampling following well completion, well development details, and details of the installation of permanent bladder pumps in each PVC well (for continued groundwater monitoring). The report will be signed and sealed by a California professional geologist.

Future Groundwater Monitoring (Funded by NCWD)

NCWD will provide personnel and funding to perform field sampling and laboratory testing for groundwater monitoring into the future (that is, no funds for monitoring into the future are requested as part of this grant application; NCWD is committed to fund future groundwater monitoring activities). NCWD will work with the other stakeholders to integrate this well into the overall monitoring program, including updating the annual budget for continued monitoring into the future.

Task 2.5 Safety and Quality Assurance

NCWD will provide a detailed health and safety plan for the monitoring well project to ensure the safety of all personnel working onsite and compliance with relevant regulations and standards. The plan will cover known field hazards associated with the tasks necessary to complete this project. Included in the plan will be NCWD's Standard Work Procedures (SWP), which outline and document all potential hazards associated with each task of the project. SWPs relevant for this project also will document all personal protective equipment (PPE) required for field staff working onsite. NCWD will also require that a project-specific health and safety plan be developed by the selected drilling contractor that is required to be submitted to NCWD for review before the commencement of any work.

NCWD will implement the quality assurance plan that is detailed in Attachment 8. The plan outlines NCWD's proposed QA/QC protocol for the work, including work plan review, well design review, sampling and analysis plan (for soil descriptions and water sampling protocols), laboratory quality control, field water quality instrument calibration, and professional qualification standards (for example, work is overseen by a professional geologist). Specific elements that will be implemented include:

1. **Kick-off (project chartering)** – This first task includes selection of the best members for the team and using team-chartering techniques to provide clarity of project purpose and direction. In this first task, the project leader assembles staff with applicable experience, technical expertise/application, and accessibility. NCWD will work closely in this phase to ensure all team members endorse the project goals and understand deliverables, deadlines, and general QA/QC expectations
2. **Project Planning** – Because the grant application includes a detailed work plan, this planning phase of the project delivery process is already in place. However, to effectively implement the plan, NCWD will meet with the project team members to make sure that they fully understand the project plan (scope of work). In this phase, project team members will gain an understanding of the specific project QA/QC measures by task, including a schedule of all deliverables, reviewers for each specific task, and specific protocol for logging and addressing QA/QC review comments. NCWD will assign a QA/QC manager to own and fully implement the QA/QC plan, which includes the following:
 - a. **Bid Package Review** – The bid package, including technical well drilling, construction, and development specifications, will be reviewed by a senior geologist with experience implementing similar projects. The reviewer will ensure state and federal regulations are met, and will ensure the project can be implemented in the field as specified.
 - b. **Monitoring Well Permit Review** – The project leader will ensure the monitoring well permit application to the Los Angeles Department of Public Health satisfies application requirements and contains appropriate and accurate project details.
 - c. **Drilling Contractor Submittal Review** – The senior project geologist will be responsible for ensuring the contractor submittals comply with the intent of the technical specifications. In this task, the contractor's proposed equipment list, drilling fluids program, drilling plan, IDW management plan, well casing and screen, geophysical surveying firm and plan all meet the intent of the technical specifications. A detailed

submittal log and any changes or corrections to the contractor's approach will be documented.

- d. **Initial Groundwater Monitoring** – The groundwater monitoring methods and data will be reviewed by a senior geologist. The senior reviewer will coordinate with field personnel throughout the field effort to ensure appropriate data collection procedures are followed. Following data collection, the senior review will have an opportunity to review all project data, including the laboratory results, and will ensure the data is presented in an effective manner to meet project goals.
 - e. **Data Review, Validation and Verification** – Data collected will be entered into a spreadsheet (Microsoft Excel® software). NCWD will perform the data entry. Upon data entry completion, the resulting spreadsheet will be double-checked for completeness and to confirm that parameter values are matched with the correct monitoring well. The project leader will be responsible for data summary, validation, and ensuring the data are reported accurately in the final well installation report.
 - f. **Final Well Installation Report Review** – The final well installation report will be reviewed by the senior project geologist.
3. **Performance** – The project leader will ensure the QA/QC plan is fully implemented, and will continuously status the project schedule and budget to ensure efficient project performance and quality deliverables.
4. **Managing Change** – Monthly status reports and prior notification of potential changes will ensure concurrence on the path forward, should major changes be warranted during the project delivery process.

Task 2.6 Stakeholder Coordination and Communication

NCWD has a history of collaborative multi-agency/jurisdictional efforts to disseminate information gained from mutual projects with the local purveyors, to resolve conflicts and reach common goals. The following examples typify the productive and cordial working relationships that exist between agencies/organizations, private industry, environmental groups, etc. in the Santa Clarita Valley which will be most useful in disseminating information received from this project.

In 2001, the United Water Conservation District (a public agency that manages surface and groundwater resources within seven groundwater basins in the Lower Santa Clara River Basin) and the Upper Santa Clara River Basin Water Purveyors (Castaic Lake Water Agency - wholesale; Santa Clarita Water Division - retail; Valencia Water Company - retail [private]; Newhall County Water District - retail; and LA County Waterworks District #36 - retail) signed a Memorandum of Understanding (MOU) that established a commitment by all parties to agree upon mutually beneficial water resources management techniques and the development of an informational database that would benefit both the upper and lower Santa Clara River Basins. This MOU provided for the protection and enhancement of the conjunctive uses of imported, ground and surface water resources within the region. As a result of the MOU, the cooperating agencies integrated their respective database management efforts and continued to monitor and report on the status of Basin conditions, as well as on geologic and hydrologic aspects of their respective parts of the overall stream-aquifer system. The results of those basin yield and contamination analyses, most recently updated in 2009 (Basin Yield Analysis, 2009), are bases for the amounts and allocations of groundwater supplies in the UWMP. In 2011, NCWD, along with and the other three retail

water purveyors and CLWA entered into a new MOU to establish a voluntary cooperative groundwater monitoring association. The existing groundwater monitoring program from the GWMP will be reflected in the groundwater reporting to DWR as part of SBX7-6 implementation through this MOU.

NCWD meets with the local purveyors and CLWA on a regular basis to discuss updates on the Eastern Santa Clara Basin Groundwater Study, for which is a cost-sharing sponsor with the U.S. Army Corps of Engineers (USACE). The main objective of this project has been to characterize the existing study area conditions in order to develop and evaluate long-term solutions and to address impacted groundwater in the basin, and the project was extended to update monitoring programs related to a perchlorate near the former Whittaker-Bermite Property in Santa Clarita. The program has generated abundant meaningful data that have benefitted the Valley's water purveyors.

NCWD also attends the monthly technical meetings with the partner water agencies and the responsible party to discuss and make decisions regarding operations, trouble shooting, expense reimbursement, and plume containment. As appropriate, special meetings or conference calls are held with just the water agencies to confer on those same issues without the responsible party present. NCWD plans to disseminate the results of planned study in the same manner.

Permitting

NCWD will obtain a monitoring well permit with the Los Angeles County Department of Public Health. NCWD will ensure the permit is obtained prior to contractor mobilization.

As with other similar projects in the area, NCWD believes the project will receive a Class 4 and Class 6 CEQA exemption (CEQA Guidelines Section 15304 (f) ad Section 15306) and will not require additional environmental review. The exemption guidelines are described as follows:

- Class 4 exemption (Section 15304), where Class 4 consists of minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of mature, scenic trees except for forestry and agricultural purposes. Examples include but are not limited to minor trenching and backfilling where the surface is restored;
- Class 6 exemption (Section 15306), where Class 6 consists of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource.