

## Project Assessment and Evaluation Plan (PAEP)

Los Angeles Forebay Perchlorate and Volatile Organic Compound (VOC) Cleanup Project  
Water Replenishment District of Southern California  
Proposition 1 Groundwater Grant Program  
Grant Agreement No. SWRCB000000000D181250600

Funding for this project has been provided in full or in part through an agreement with the State Water Resources Control Board (State Water Board). The contents of this document do not necessarily reflect the views and policies of the State Water Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

### I. Project Summary

#### A. Project Description

The Project will address a significant perchlorate plume and comingled volatile organic compounds (VOC's) in the Los Angeles Forebay by implementing Phase 1 of a contaminant removal action in the City of Vernon (Figure 1). A groundwater extraction and treatment system will be designed to immediately reduce contaminant mass and the potential migration of known perchlorate within the 'hot spot' as defined by the 1,000 micrograms per liter ( $\mu\text{g/L}$ ) contour interval. The currently available (and reported) monitoring data indicate the highest dissolved phase concentrations are up to 5,000 micrograms per liter ( $\mu\text{g/L}$ ) at groundwater monitoring well MW-03. This is nearly three orders of magnitude above the State's maximum contaminant level (MCL) of 6  $\mu\text{g/L}$ . The Water Replenishment District of Southern California (WRD) and the Department of Toxic Substances Control (DTSC) will work collaboratively to identify a yet to be determined Potentially Responsible Party (PRP). In addition to the groundwater treatment system, the project will include installation of extraction and monitoring wells, aquifer testing, conveyance piping, and a groundwater contaminant fate and transport model to optimize plume recovery and also help identify a PRP(s).

WRD has already conducted an extensive amount of work to identify and address the contamination issues in the Los Angeles Forebay. In 2015, WRD constructed three deep-nested groundwater monitoring wells to delineate the occurrence of perchlorate in the City of Vernon. In 2016, WRD analyzed perchlorate remedial technologies and prepared cost estimates with the assistance of their on-call environmental consultant WorleyParsons. WRD submitted a grant proposal for the project on November 18, 2016. A preliminary grant award was issued on March 30, 2017. The grant agreement was signed by the State Water Board on November 21, 2018.

#### B. Problem Statement

Perchlorate is a highly miscible constituent that can readily travel long distances and as a result has already spread to at least three drinking water supply wells in and around the City of Vernon. One municipal water supply well was destroyed due to elevated concentrations of perchlorate (20  $\mu\text{g/L}$  at Vernon 18). The two other municipal water supply wells currently have elevated concentrations of perchlorate that require treatment (34  $\mu\text{g/L}$  at Goodyear 4) and/or blending (11  $\mu\text{g/L}$  at Converse 1) by the well owner, Golden State Water Company (GSWC). In total, 13 municipal water supply wells could be at risk of being impacted by the perchlorate 'hot spot' including those owned / operated by GSWC (Converse 1, Converse 2, and Goodyear 4), City of Huntington Park (Well-15 and Well-17), Maywood Mutual Water Company No. 2 (MAYAV), and City of Vernon (Well-11, -12, -14, -15, -16, -17, and -19). The well locations are shown on Figure 1.

The scope for the groundwater remediation system is limited to the perchlorate 'hot spot' and recognizes that additional response actions may need to be evaluated at a future date pending available funds to address the broader comingled hazardous substance plumes (e.g., VOC plumes) that exists in the Los Angeles Forebay. The data obtained from additional monitoring wells installed for the project will be used to create a groundwater model to help identify areas of the basin that may have contributed to the impacted groundwater and possible identification of a PRP(s).

#### C. Baseline Groundwater Conditions

The aquifer systems within the investigation area are defined by the existing groundwater monitoring wells (MW-1 to MW-6) installed by AAD Distribution and Dry Cleaning (AAD) and three deep nested wells (Vernon 1 to Vernon 3) installed by WRD. Locally, the aquifer systems have been defined as the 220-foot Zone (Gage Aquifer) and the 310-foot Zone (Hollydale Aquifer). Perchlorate is the primary constituent of concern (COC). The wells closest to the perchlorate 'hot spot' are generally screened between 226 to 231 feet below ground surface (ft bgs) for the Gage Aquifer (MW-5) and between 311 to 321 ft bgs for the Hollydale Aquifer (MW-1). Local groundwater flow directions are complicated due to ancestral river channel deposits and local groundwater pumping within the Los Angeles Forebay. However, regionally groundwater flow directions within the production zone are generally

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toward the south-southwest (S-SW). The principle groundwater flow direction in Gage Aquifer is interpreted to be towards the east-northeast (E-NE) and east (E) and southeast (SE) for the deeper Hollydale Aquifer.

Groundwater elevations in the vicinity of the perchlorate 'hot spot' have only fluctuated a few feet since commencing environmental related investigations in early 2003. Similarly, the perchlorate concentrations (three sampling events) have remained elevated within the 'hot spot' with concentrations well above 1,000 µg/L and a maximum of 5,000 µg/L at MW-03. The proposed installation of 13 groundwater monitoring wells (three already installed by WRD [Vernon 1 to Vernon 3]) will help define the areal extent of the perchlorate and additional data will be used to define the second phase of work and possibly identify a PRP(s).

### D. Project Activities or Tasks

The project activities (or tasks) defined in the grant agreement are summarized as follows:

Item	Description of Activity	Key Elements
1.0	Project Management (PM)	Notifications, project schedule, site visits, photos, and overall PM.
2.0	General Compliance Requirements / Project Effectiveness and Performance	Location in global positioning system (GPS). Documents include PAEP, monitoring and reporting plan (MRP), and quality assurance project plan (QAPP).
3.0	Environmental Compliance, Permitting, and Easements	List of Approvals, Entitlements, Easements or Permits. Documents for compliance with California Environmental Quality Act (CEQA).
4.0	Technical Advisory Committee (TAC)	Document feedback to SWRCB. TAC members include Division of Drinking Water (DDW), Regional Water Quality Control Board (RWQCB), and SWRCB.
5.0	Stakeholder Advisory Group (SAG)	WRD will provide periodic updates to SAG.
6.0	Memorandum of Understanding (MOU)	A cooperation document signed between WRD, RWQCB, and SWRCB.
7.0	Engineering Evaluation / Cost Analysis and Approval Memorandum	Remedy evaluation for a non-time critical removal action (NTCRA). Document reviewed by TAC. Final regulatory approval by DTSC.
8.0	Remedial Investigation / Feasibility Study Workplan	Defines investigation work including Sampling Analysis Plan (SAP). Document reviewed by TAC. Final regulatory approval by DTSC.
9.0	Remedial Investigation Report Feasibility Study / Remedial Design Report	Documents summarizing investigation results and remedy design to address perchlorate "hot spot" and comingled VOC. Document reviewed by TAC. Final regulatory approval by DTSC.
10.0	Construction / Implementation	Construct system, install monitoring wells, and document results in a construction completion report (CCR) and preparing the operations and maintenance plan (O&MP).
11.0	Groundwater Model	Build a fate and transport model for optimizing the remedy and identifying a PRP(s). Document reviewed by TAC. Final regulatory approval by DTSC.
12.0	Search for PRP	WRD staff will work closely with regulatory staff at DTSC to identify PRP(s).
13.0	Remedial Evaluation Technical Memorandum	Describe the results of the project including potential system expansion and search for PRP(s). Document reviewed by TAC. Recommendations provided to SWRCB.
14.0	Public Outreach	Conduct at least one public workshop and review various outreach materials (flyers, posters, brochures, websites, etc.) with the SWRCB.

### E. Category of Project Activities or Tasks

Four categories were selected to evaluate the overall performance of the project. They include the following:

- Water that is prevented from becoming contaminated.
- Mass removal target.
- Number of contaminated or threatened municipal wells that will no longer be contaminated or threatened.
- Percent reduction in concentration of the contaminant.

## II. Project Goals & Desired Outcomes

The project goals, desired outcomes, and project lifetime are summarized as follows:

### **Performance Measure #1: Water That Is Prevented from Becoming Contaminated**

The goal is to reduce the overall area of the perchlorate 'hot spot' through the installation of a groundwater extraction and treatment system capable of reducing the overall area by 90% and prevent the migration of

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perchlorate to municipal supply wells and concurrently treat other regional constituents like VOCs. By reducing the area of perchlorate, less mass will be available for migration to municipal water supply wells in and around the City of Vernon.

### **Performance Measure #2: Mass Removal Target**

The goal is to remove an estimated one thousand (1,000) pounds of perchlorate mass from groundwater in the vicinity of the 'hot spot' at monitoring well MW-03. Samples will be collected from the groundwater treatment system to calculate mass removal for the Project. The removal of perchlorate mass from the aquifer system will have a beneficial effect and prevent 'hot spot' concentrations from migrating to municipal water supply wells in an around the City of Vernon.

### **Performance Measure #3: Number of Contaminated or Threatened Municipal Wells That Will No Longer Be Contaminated or Threatened**

The goal is to protect drinking water supplies and enhance local water supply reliability by remediating the perchlorate 'hot spot' in and around monitoring well MW-03. Our desired outcome is the protection of 13 municipal water supply wells located in an around the City of Vernon (defined above in Section I.B).

### **Performance Measure #4: Percent Reduction in Concentration of the Contaminant**

The goal is to significantly reduce perchlorate concentrations in the 'hot spot' which is defined by an area containing perchlorate concentrations exceeding 1,000 µg/L as defined in the grant submittal to the SWRCB with the highest perchlorate concentrations centering around groundwater monitoring well MW-03. It is estimated the groundwater extraction and treatment system can reduce the perchlorate concentration in this well by 98%.

### **III. Project Performance Measures Tables**

The project performance measures are summarized below in Table 1.

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**Table 1. Project Performance Measures**

Project Goals (What are you measuring?)		Measurement Tools and Methods (How are you measuring it?)	Targets
<b>Performance Measure #1: Water That Is Prevented from Becoming Contaminated</b>			
Reduce the overall area of the perchlorate 'hot spot' as defined in grant proposal using a contour interval of 1,000 µg/L (i.e., a baseline area of 277,000 ft <sup>2</sup> ).	Area will be measured using data from the same baseline monitoring network and analyzed using standard contouring software (i.e., Surfer®).	Reduce perchlorate 'hot spot' area by 90%.	
<b>Performance Measure #2: Mass Removal Target</b>			
Cleanup perchlorate contamination in groundwater that serves as drinking water source (source area removal) in the vicinity of the 'hot spot' well MW-03.	Calculations have been done for estimating quantity of contamination removed, and performance monitoring will be performed.	Remove a minimum of 1,000 pounds of perchlorate mass or operate the system until reaching asymptotic conditions as defined in the approved Remedial Design per item 9.1 in the Grant Agreement.	
<b>Performance Measure #3: Number of Contaminated or Threatened Municipal Wells That Will No Longer Be Contaminated or Threatened</b>			
Prevent the migration of perchlorate to protect drinking water supplies and enhance local water supply reliability by remediating the perchlorate 'hot spot' in and around monitoring well MW-03.	Analyze groundwater samples from monitoring wells installed for the Project. Evaluate through groundwater modeling, per item 11.1 of the Grant Agreement, if or the extent to which extraction wells (EW-01 to EW-03) are preventing the migration of perchlorate from the project area to drinking water supply wells identified above in section I.B.	Prevent the migration of perchlorate to protect 13 drinking water wells in close proximity to the project area from further degradation and protect water storage capacity in the Los Angeles Forebay.	
<b>Performance Measure #4: Percent Reduction in Concentration of the Contaminant</b>			
Significantly reduce perchlorate concentration in 'hot spot' groundwater monitoring well MW-03 (assuming a baseline perchlorate concentration of 5,000 µg/L).	Analyze and evaluate concentration reduction using groundwater sample results obtained from MW-03	98% reduction in perchlorate concentration in the currently defined 'hot spot' area at MW-03. The baseline perchlorate concentration in this well is 5,000 µg/L.	

**Figure 1**  
**Site Location Map**

