

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
MONITORING AND REPORTING PROGRAM NO. R5-2015-0012-069
FOR
IN-SITU GROUNDWATER REMEDIATION AND DISCHARGE OF TREATED GROUNDWATER
TO LAND
FORMER HUGGINS DRY CLEANERS
AND
FORMER PAUL'S CLEANERS
1347 FLORIN ROAD
SACRAMENTO, SACRAMENTO COUNTY

This Monitoring and Reporting Program (MRP) describes requirements for monitoring the progress of an in-situ chemical oxidation (ISCO) treatability pilot study using potassium permanganate as an oxidant to treat tetrachloroethylene pollution at the Former Huggins Dry Cleaner and Former Paul's Cleaners at 1347 Florin Road, Sacramento, CA. This MRP is issued pursuant to Water Code Section 13267. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. As appropriate, California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) staff shall approve specific sample station locations prior to implementation of sampling activities.

All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

GROUNDWATER MONITORING

The wells associated with the in-situ chemical oxidation (ISCO) pilot study at the site are shown on Figures 1,2 and 3. Proposed Well MW-11 is an upgradient well and will be used for monitoring background groundwater quality conditions and MW-8 is a downgradient monitoring well. Wells HSVE-1 and HSVE-2 are vadose zone injection wells. Groundwater monitoring wells MW-6 and MW-10 are treatment zone performance monitoring wells. Extraction wells EW-1, EW-2 and EW-3 will be used for mixing of groundwater and treatment water. These wells and any treatment system wells installed subsequent to the issuance of this MRP shall follow the schedule below. Sample collection and analysis shall follow standard EPA protocol and sample analyses shall be conducted by a California State certified laboratory.

The monitoring wells and injection wells shall be sampled according to the schedule in Table 1 and the samples analyzed by the methods in Table 2. Any sampling done more frequently than specified in Table 1 shall also be reported to Central Valley Water Board staff. Monitoring and reporting of constituents other than volatile organic compounds shall cease from all monitoring wells when impacts of the injection activities are no longer observed.

Table 1: Sampling Frequency and Constituent Suite

Well Number	Constituents	Frequency	Monitoring Objective
MW-3, MW-7	Suite A, B, C	Baseline (pre-injection), then Semi-annually after injection	Background
MW-1, MW-6, MW-10, MW-14, MW-15, EW-1, EW-2, EW-3	Suite A, B, C	Baseline (pre-injection)	Treatment Zone
	Suite D	1 Month after injection, then 3 months after injection	
	Suite A, C	1 Month after injection, then 3 months after injection, Semi-annually thereafter	
	Suite B	At the end of the Pilot Study	
MW-8 MW-11, MW-12, MW-13, MW-16	Suite A, B, C	Baseline (pre-injection), then 1 Month after injection, then 3 months after injection, Semi-annually thereafter	Compliance Zone

Table 2: Analytical Methods

Constituent	Method	Practical Quantitation Limit (ug/L)
Suite A		
Volatile Organic Compounds	EPA 8020 or 8260B	0.5
Metals, Total and Dissolved	EPA 200.7, 200.8	various
Suite B		
Hexavalent Chromium	EPA 7199	1
Suite C		
Sodium	EPA 200.7	100
Potassium	EPA 300	20
Total Organic Carbon	EPA 415	300
Chloride, Nitrate, and Sulfate	EPA 6500	300
Ferrous and Ferric Iron	EPA 200, 6020 or SM 3000	100
Phosphorus	EPA 200.7, 365	1,000
Suite D		
Potassium Permanganate	Visual	NA

1. Analytical method substitutions may be made, provided the method achieves the Maximum Practical Quantitation Limit.
2. Metals include aluminum, antimony, arsenic, barium, cadmium, calcium, total chromium, copper, iron, lead, manganese, magnesium, mercury, molybdenum, nickel, selenium, silver, vanadium, silica, and zinc.
3. All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as trace.
4. The presence of permanganate causes interference in the analysis of hexavalent chromium. Therefore, samples shall be analyzed for total chromium when permanganate is present. When permanganate is not present, samples shall be analyzed by EPA Method 7199 or an equivalent method.
5. If salts, total dissolved solids, metals, or electrical conductivity are more than 20% greater than their respective baseline concentrations at compliance zone wells, the Discharger shall implement one or more contingency measures presented in the *Workplan for In Situ Oxidation, Former Huggins Cleaners*, and the *Addendum to Workplan for In Situ Oxidation at the Former Huggins Cleaners*, and as deemed necessary by the Central Valley Water Board.

FIELD SAMPLING

In addition to the above sampling and laboratory analyses, field sampling and analysis shall be conducted each time a monitoring well or injection well is sampled. The sampling and analysis of field parameter shall be as specified in Table 3.

Table 3: Field Sampling Requirements

Parameters	Analytical Method	Units
Groundwater Elevation	Measurement	Feet, Mean Sea Level
Oxidation-Reduction Potential	Field Meter	Millivolts
Electrical Conductivity	Field Meter	µmhos/cm
Dissolved Oxygen	Field Meter	mg/L
pH	Field Meter	pH Units (to 0.1 units)
Temperature	Field Meter	°F/°C

All wells that are purged shall be purged until pH, temperature, conductivity, and dissolved oxygen are within 10% of the previous value.

Field test instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;

3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in item (b) of the "Reporting" section of this MRP.

IN-SITU DISCHARGE MONITORING

The Discharger shall monitor the discharge of water and amendments that are injected into the groundwater according to the requirements specified in Table 4. Each amendment addition shall be recorded individually, along with information regarding the time period over which the amendment was injected into the aquifer.

Table 4: Discharge Monitoring Requirements

Parameters	Units	Type of Sample
Injected Volume	gallons per day	Measured
Amendment(s) Added	pounds per day	Measured

AMENDMENT ANALYSIS

Prior to use, amendments shall be analyzed for the constituents listed in Table 5. The analysis should be done on a mixture of the amendment and deionized water at the estimated concentration that would be injected during the pilot project.

Table 5: Discharge Monitoring Requirements

Constituent	Method	Practical Quantitation Limit (ug/L)
Volatile Organic Compounds	EPA 8020 or 8260B	0.5
General Minerals	Various	Various
Metals, Total and Dissolved	EPA 200.7, 200.8	various
Total Dissolved Solids	EPA 160.1	10,000
pH	meter	NA
Electrical Conductivity	meter	NA

1. Analytical method substitutions may be made, provided the method achieves the Maximum Practical Quantitation Limit.
2. All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as trace.

3. Metals include arsenic, barium, cadmium, calcium, total chromium, copper, iron, lead, manganese, magnesium, mercury, molybdenum, nickel, selenium, and silica.
4. General minerals include alkalinity, bicarbonate, potassium, chloride, sulfate, total hardness, nitrate, nitrite, and ammonia.

ESTABLISHMENT OF BACKGROUND CONCENTRATION VALUES

The Discharger shall develop background values for concentrations of general minerals, dissolved metals, total dissolved solids, and electrical conductivity in groundwater following the procedures found in CCR Section 20415(e)(10). The Discharger shall complete a baseline monitoring event to establish background concentrations prior to implementation of the remediation event.

REPORTING

When reporting data, the Discharger shall arrange the information in tabular form so that the date, constituents, and concentrations are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this Order. In addition, the Discharger shall notify the Central Valley Water Board within 48 hours of any unscheduled shutdown of any soil vapor and/or groundwater extraction system. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall also be reported to the Central Valley Water Board.

As required by the California Business and Professions Code sections 6735, 7835, and 7835.1, all reports shall be prepared by a registered professional Civil Engineer or Geologist or their subordinate and shall be signed by the registered professional.

The Discharger shall submit semi-annual electronic data reports, which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30. The Semi-annual reports shall be submitted electronically over the internet to the Geotracker database system by **1 May and 1 November**, until such time as the Executive Officer determines that the reports are no longer necessary.

Each report shall include the following minimum information:

- (a) a description and discussion of the groundwater sampling event and results, including trends in the concentrations of pollutants and groundwater elevations in the wells, how and when samples were collected, and whether the pollutant plume(s) is delineated;
- (b) field logs that contain, at a minimum, water quality parameters measured before, during, and after purging, method of purging, depth of water, volume of water purged, etc;
- (c) groundwater contour maps for all groundwater zones, if applicable;
- (d) pollutant concentration maps for all groundwater zones, if applicable;
- (e) a table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation

of well bottom;

- (f) a table showing historical lateral and vertical (if applicable) flow directions and gradients;
- (g) cumulative data tables containing the water quality analytical results and depth to groundwater;
- (h) a copy of the laboratory analytical data report;
- (i) the status of any ongoing remediation, including an estimate of the cumulative mass of pollutant removed from the subsurface, system operating time, the effectiveness of the remediation system, and any field notes pertaining to the operation and maintenance of the system; and
- (j) if applicable, the reasons for and duration of all interruptions in the operation of any remediation system, and actions planned or taken to correct and prevent interruptions.

An Annual Report shall be submitted to the Central Valley Water Board by **1 November** of each year. This report shall contain an evaluation of the effectiveness and progress of the investigation and remediation. The Annual Report may be substituted for the second semi-annual monitoring report as long as it contains all of the information required for that report plus that required for the Annual Report. The Annual Report shall contain the following minimum information:

- (a) both tabular and graphical summaries of all data obtained during the year;
- (b) groundwater contour maps and pollutant concentration maps containing all data obtained during the previous year;
- (c) a discussion of the long-term trends in the concentrations of the pollutants in the groundwater monitoring wells;
- (d) an analysis of whether the pollutant plume is being effectively treated;
- (e) a description of all remedial activities conducted during the year, an analysis of their effectiveness in removing the pollutants, and plans to improve remediation system effectiveness;
- (f) an identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program; and
- (g) if desired, a proposal and rationale for any revisions to the groundwater sampling plan

A letter transmitting the monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the

Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by:



PATRICK PULUPA, Executive Officer

6/8/2021

(Date)

Figure 1 – Huggins ISCO Pilot Study Well Locations

(Source: Risk-Based Decisions, Inc., 2020 Revised Work Plan for In-Situ Oxidation)

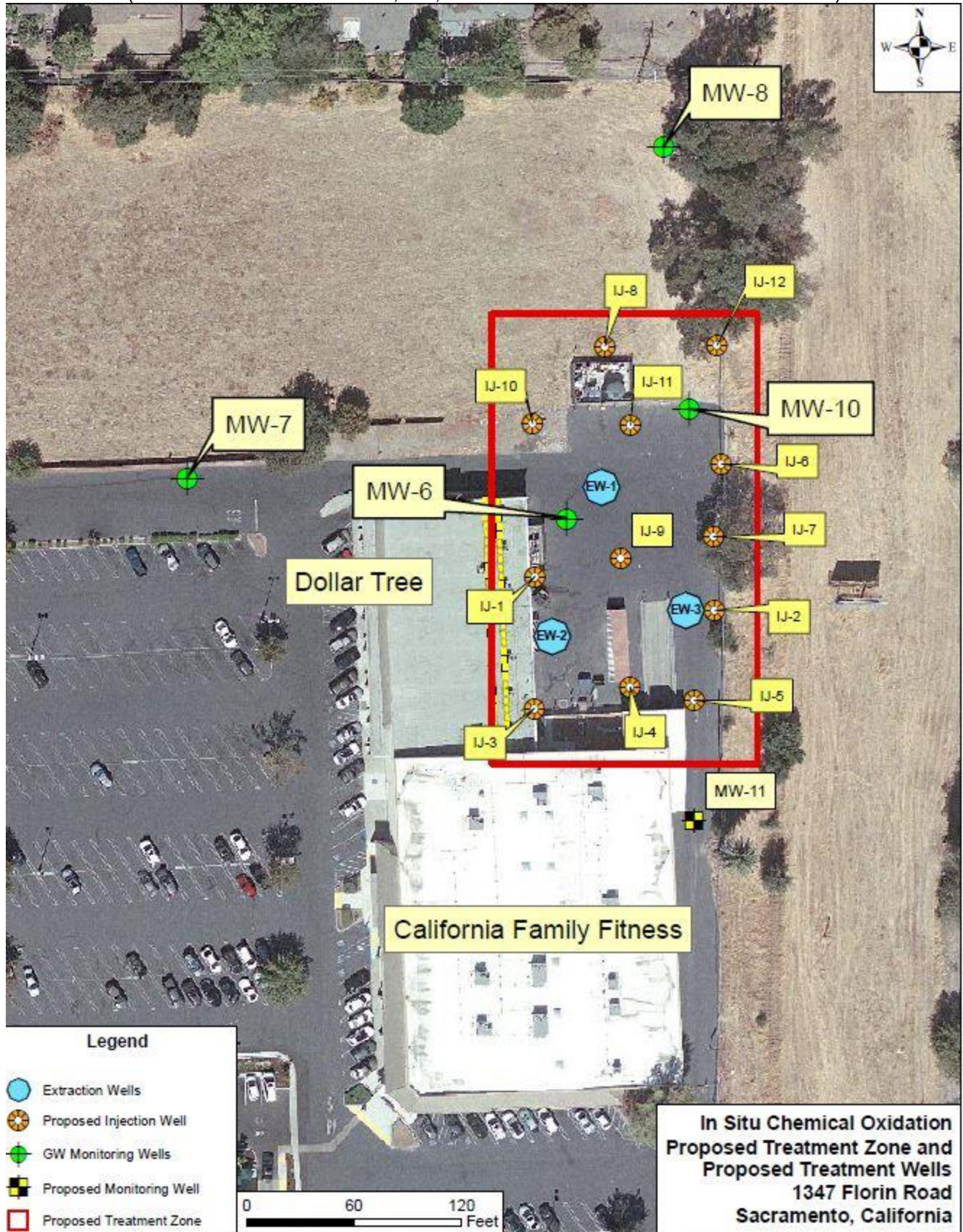


Figure 2 – Paul's ISCO Pilot Study Well Locations

(Source: Risk-Based Decisions, Inc., 2021 ISCO Work Plan Addendum)

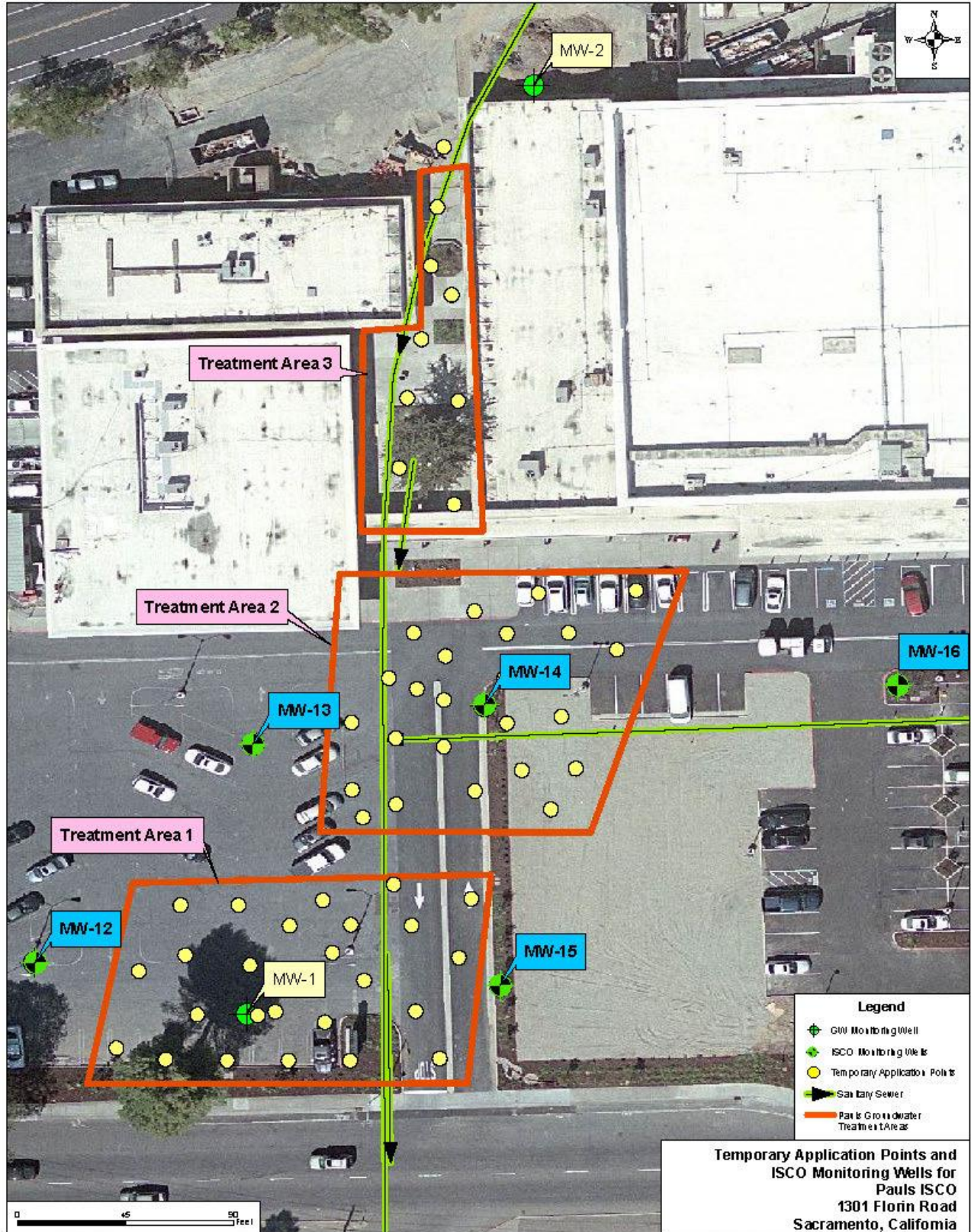


Figure 3 – Huggins and Paul's Monitoring Well Locations and Groundwater Contours

(Source: Risk-Based Decisions, Inc., 2021 Groundwater Monitoring Report)

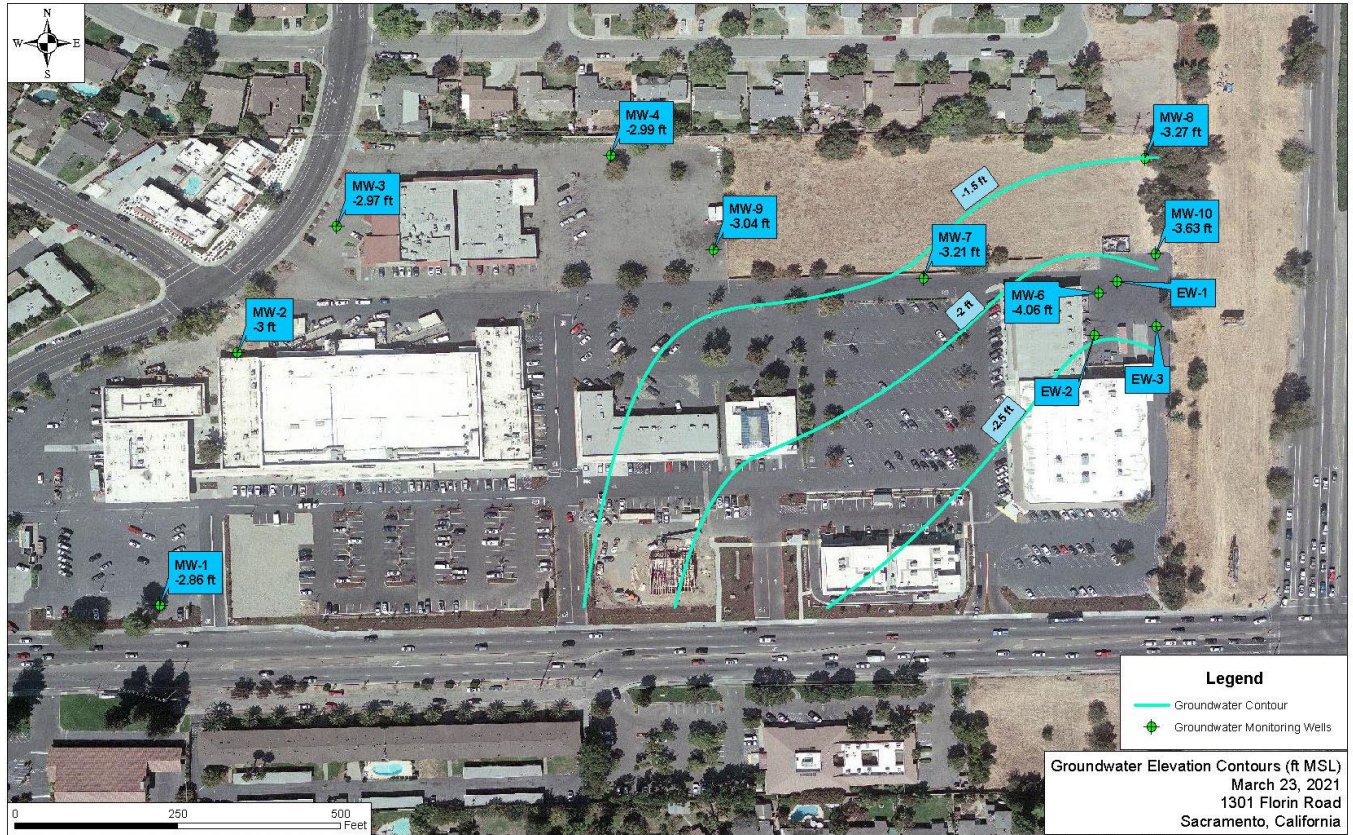


Figure 4-1