LAKEWOOD TOWNE CENTER GROUNDWATER TREATMENT AND MONITORING AMENDMENT 3

On August 29, 2025, Sara Abdelrahman of Kite Realty Group (KRG), authorized Herrera Environmental Consultants (Herrera) to prepare a scope of work and cost estimate for Amendment 3 to the Lakewood Towne Center Groundwater and Monitoring project at Lakewood Towne Center (Site) in Lakewood, Washington. The Site is located at 5731 Main Street Southwest in the northwest corner of the shopping center from 5815 to 6111 Lakewood Towne Center Boulevard Southwest.

Historical site investigations and groundwater monitoring have been completed within the northwest portion of the Site in the vicinity of the former Plaza Cleaners that operated from 1968 to 1987. Previous investigations and monitoring detected a dry cleaning solvent, perchloroethylene (PCE), and its breakdown products (aka daughter products), trichloroethylene (TCE), cis-1,2-dichloroethene (cDCE), and vinyl chloride (VC), as well as several related halogenated volatile organic compounds (HVOCs) in groundwater. Since groundwater monitoring at the Site was restarted in 2021, contaminant concentrations in monitoring wells have steadily decreased, but concentrations of VC are still being detected in groundwater at monitoring well MW-1S above the Model Toxics Control Act (MTCA) Method A Cleanup Levels (CULs).

In March 2023, the Site entered the Voluntary Cleanup Program (VCP) administered by the Washington Department of Ecology (Ecology), and in 2024, Herrera prepared a Work Plan that was approved by Ecology for additional aerobic groundwater treatment and several rounds of quarterly monitoring. The following is a timeline of key work elements completed per the Work Plan:

- June 2024 baseline groundwater monitoring prior to groundwater treatment.
- September 12 and 13, 2024, groundwater treatment at monitoring well MW-1S with stabilized hydrogen peroxide and nutrients to stimulate In Situ Chemical Oxidation (ISCO) to reduce residual concentrations of HVOCs including VC.
- Quarterly groundwater monitoring in October 2024, and January, April, and July 2025.

Herrera has prepared a draft 2025 Groundwater Treatment and Water Quality Status Report for KRG review that provides KRG and Ecology with updates on the work completed through July 2025 per the Work Plan, and provides recommendations for next steps. This scope of work includes a discussion of the activities, assumptions, deliverables, and a schedule associated with the following five tasks for Amendment 3 of this project:

Task 1.0 – Project Management and Coordination

Task 2.0 – Groundwater Treatment

Task 3.0 – Groundwater Monitoring

Task 4.0 – Reporting

Task 5.0 – Monitoring Well Decommissioning

Task 1.0 – Project Management and Contract Administration

Herrera will be responsible for contract administration of this project, including preparing invoices and progress reports; as well as coordination of work efforts with the designated client point of contact and others. Herrera's project manager George Iftner will have frequent phone and e-mail contact with KRG's project manager Sara Abdelrahman, subconsultants, and the analytical laboratory as needed. Herrera will also correspond with Ecology's VCP project manager Joe Hunt on an as needed basis to provide project updates and request feedback on technical issues if needed, as they arise.

Assumptions

- This task includes budget for project management and contract administration through December 31, 2027.
- As groundwater monitoring progresses in 2026 and 2027, Herrera will discuss the groundwater monitoring data results with Tersus, KRG, and the Ecology VCP project manager Joe Hunt to determine when to request an NFA Opinion for the Site from Ecology. Ecology typically requires a minimum of four consecutive monitoring events with concentrations of all COCs below MTCA CULs to qualify for NFA.
- Note that the overall project budget that accompanies this scope of work includes a 10 percent contingency to cover potential additional coordination with Ecology, an additional groundwater sampling event if required, or other project needs that may arise.

Deliverables

- Monthly invoices and progress reports.

Task 2.0 – Groundwater Treatment

As described in the October 2025 Groundwater Treatment and Water Quality Status Report, current Site conditions indicate that aerobic biodegradation or co-metabolism was not sustained following the June 2024 groundwater treatment, and aerobic biodegradation is not currently active in the vicinity of MW-1S at the Site. In contrast, the co-occurrence of methane, and methanogenic bacteria populations detected in groundwater at the Site suggests good potential for anaerobic VC degradation (also referred to as reductive dechlorination). Herrera and Tersus therefore recommend additional groundwater treatment at the site using an anaerobic

bioremediation strategy to elevate total organic carbon (TOC), drive the aquifer into a reducing state, deplete nitrate and sulfate, and promote stepwise dechlorination of chlorinated ethenes to ethene.

Assumptions

The anaerobic groundwater treatment approach will include the following:

- Drilling with a push probe drill rig (by Holocene Drilling) to inject the groundwater treatment products at five injection probes placed in two rows, approximately 10 feet on center, immediately upgradient (northeast) of the contaminant source area well MW-1S. One row of three probes will be aligned perpendicular to the direction of groundwater flow, and a second row of two more probes will be placed northeast of the first row. The probe locations will be adjusted in the field as needed to avoid underground utilities and prevent damage to trees. No soil samples will be collected from the injection probes.
- Co-injecting an organic carbon source (e.g., an emulsified vegetable oil based organic substrate such as Tersus EDS-ER™), with a bioaugmentation culture rich in *Dehalococcoides* mccartyi (DHC) and *Dehalobacter* (DHB) bacteria (such as KB-1® Plus Culture with KB-1® Primer to remove chlorine and oxygen from the injection water),
- Adding nutrients to stimulate the anaerobic bacteria (i.e., Nutrimens® Liquid),
- Adding an EtOH/MeOH alcohol blend consisting of ethanol, methanol, and n-propyl alcohol, to help spread the organic carbon source through soils for a wider radius of influence (ROI),
- And adding potassium hydroxide as a pH adjustment.

Underground Injection Control (UIC) permit:

- Herrera will apply for an Underground Injection Control (UIC) permit from the Ecology in advance of mobilizing to the Site.
- Approval of the UIC permit is anticipated to take approximately 2 months.
- After the UIC permit is approved by Ecology, Herrera staff will mobilize to the Site to oversee Holocene's work to inject the groundwater treatment components.
- There is an onsite spigot where tap water can be easily obtained.
- The treatment mixture will be pumped at a rate of approximately 1- to 2-gallons per minute and approximately 2 days will be needed to complete the treatment.

Deliverables

- See Task 4.0.

Task 3.0 –Groundwater Monitoring

Herrera will complete up to eight quarterly groundwater monitoring events through mid-2027 at nine onsite monitoring wells (MW-1S, MW-1M, MW-1D, MW-2D, MW-4, MW-4M, MW-5, MW-5M, and MW-8D, plus 1 duplicate sample).

Assumptions

- This scope and budget covers the planned October 2025 quarterly groundwater monitoring event.
- Groundwater treatment is anticipated to be scheduled in January 2026.
- Herrera will request approval from Ecology to suspend groundwater monitoring in 2026 and beyond at wells MW-7, MW-9 and MW-10 that are located upgradient and or cross-gradient of the MW-1S source area; no elevated concentrations of any contaminants of concern have been detected in those wells since they were installed in April 2024.
- The first quarterly groundwater monitoring event after groundwater treatment will occur in February 2026, and subsequent monitoring events will occur at 3-month intervals after that through mid-2027.
- Budget allows for up to a total of 8 quarterly monitoring events, but monitoring may be suspended sooner if concentrations of VC or other HVOCs drop and remain below MTCA CULs for a minimum of four consecutive quarters and if advised via consultation with Ecology.
- During each monitoring event, two Herrera staff will mobilize to the site for a 10-hour day to collect samples. Hours are included for travel, preparation, and coordination with the analytical laboratory.
- During each event, Herrera will:
  - Record static groundwater level measurements at all wells and create a groundwater contour map showing the direction of groundwater flow beneath the site.
  - Record field parameters with a field meter: dissolved oxygen (DO), oxygen reduction potential (ORP), conductivity, pH, and temperature.
  - Submit groundwater samples for laboratory analysis of HVOCs.
- For the three (3) monitoring events following the groundwater treatment, groundwater samples collected at well MW-1S will also be submitted for laboratory analysis of:
  - Geochemical parameters to assess the effectiveness of the treatment: Nitrate, Sulfate, Ethene/Ethane/Methane, Total phosphorous, Total Kjeldahl Nitrogen, and total and dissolved iron, manganese, and chloride.
  - Functional genes associated with anaerobic VC degradation (e.g., tceA, vcrA, bvcA, cerA), and
  - Conduct compound-specific isotope analysis (CSIA)(δ^{13}C-VC) and monitor ethene production as lines of evidence for VC degradation.

- Samples will be collected directly into bottles provided by the analytical laboratories, stored on ice, and delivered under chain-of-custody to OnSite Environmental, Inc. of Redmond, Washington, except for the functional gene and CSIA samples that will be shipped to SiREM laboratory in Knoxville, Tennessee for analysis.
- Wells will be purged and samples will be collected using a peristaltic pump, disposable polyethylene tubing, and the low-flow purge/sampling method.
- Herrera will coordinate with Lakewood Towne Center Security staff for temporary onsite storage of 55-gallon Department of Transportation-approved drums to contain the investigation-derived waste (purged groundwater) generated during sampling activities; we assume the drums will be kept in the storage room behind the former Old Country Buffet, or at another location selected by Lakewood Towne Center staff.
- Upon completion of the project, Herrera will arrange for proper offsite disposal and treatment of the drum and contents by a licensed waste hauler.

Task 4.0 – Reporting

Assumptions

- Herrera will provide the results of each monitoring event including field notes and summary data table of laboratory analytical results to Tersus to evaluate how well the treatment and monitoring are progressing.
- Herrera will provide a technical memo at the end of 2026 that summarizes the groundwater treatment methods and all groundwater monitoring results, for submittal to KRG and Ecology.
- Herrera will provide a second technical memo at the end of 2027 that summarizes the groundwater treatment methods and all groundwater monitoring results, for submittal to KRG and Ecology.
- Both technical memos will include a data quality assurance review of all analytical data, a table summarizing previous and recent groundwater data collected at the Site, groundwater contour maps for each event, Site figures depicting the contaminants detected, conclusions, and recommendations. The memos will include input from Tersus describing groundwater chemistry conditions and conclusions regarding the effectiveness of the monitoring.
- Herrera will assist KRG with submitting annual and biennial reports to Ecology via the RCRAInfo portal for hazardous wastes disposed in 2025, 2026, and 2027 (i.e., for 55-gallon drums of purge water from groundwater monitoring activities).
- The budget includes up to 20 hours to upload all groundwater data collected under this scope of work to Ecology's Environmental Information Management (EIM) system, and verifying that all groundwater data collected previously since 2021 has been uploaded.

Deliverables

- Draft 2026 Groundwater Treatment and Water Quality Status Report in electronic file format (Adobe PDF) for KRG review.

- Final 2026 Groundwater Treatment and Water Quality Status Report in electronic file format (Adobe PDF) for submittal to Ecology.
- Draft 2027 Groundwater Treatment and Water Quality Status Report in electronic file format (Adobe PDF) for KRG review.
- Final 2027 Groundwater Treatment and Water Quality Status Report in electronic file format (Adobe PDF) for submittal to Ecology.

Task 5.0 – Monitoring Well Decommissioning

Work under task 5 is contingent upon receiving Ecology's approval that groundwater remediation and monitoring activities at the Site have been satisfactorily completed, and the 12 existing groundwater monitoring wells may be decommissioned.

Assumptions

- Herrera will subcontract with Holocene Drilling to decommission all 12 groundwater monitoring wells onsite.
- A Herrera geologist licensed in Washington State will oversee the well decommissioning work.
- The existing groundwater monitoring wells will be decommissioned according to the requirements of WAC 173-160-460. The well casing will be perforated from top to bottom and then filled with hydrated bentonite chips to within 1 foot of the ground surface. The flush mount monument will be removed, concrete will be used to plug the top of the borehole and prevent bentonite from expanding.
- Herrera will document the work with a brief technical memorandum that includes a photographic log, field notes, and details of the work completed.

Deliverables

- Draft Groundwater Monitoring Well Decommissioning Report in electronic file format (Adobe PDF) for KRG review.
- Final Groundwater Monitoring Well Decommissioning Report in electronic file format (Adobe PDF) for submittal to Ecology.

Project Schedule

Following is a summary of the planned project schedule for work under Amendment 3:

Project Schedule for Lakewood Towne Center Groundwater Treatment and Monitoring Project – Amendment 3.

SCOPE OF WORK

Task	Task/Subtask Description	Planned Schedule
1.0 – Project Management and Coordination	Monthly Invoices and Progress Reports	October 2025 through December 2027
	Correspondence with Ecology	Ongoing as needed
	Request NFA From Ecology	October 2027
2.0 - Groundwater Treatment	Groundwater Treatment at Well MW-1S	January 2026
3.0 - Groundwater Monitoring (Quarterly Events)	2025 Monitoring	October 2025
	2026 Monitoring	February, May, August, November 2026
	2027 Monitoring	February, May, August 2027
4.0 - Reporting	Draft 2026 Groundwater Treatment and Water Quality Status Report	November 2026
	Final 2026 Groundwater Treatment and Water Quality Status Report	December 2026
	Draft 2027 Groundwater Treatment and Water Quality Status Report	September 2027
	Final 2027 Groundwater Treatment and Water Quality Status Report	September 2027
Task 5.0 – Monitoring Well Decommissioning	Well Decommissioning Field Work	November 2027
	Draft Groundwater Monitoring Well Decommissioning Report	November2027
	Final Groundwater Monitoring Well Decommissioning Report	December 2027