Everett Landfill/Tire Fire Site
Ground Water Sampling and Analysis Plan
One-Time Sampling - July 2020

Prepared for:

City of Everett

Prepared By:

HWA GEOSCIENCES INC.

June 30, 2020

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Table of Contents

List of Tables

List of Appendices

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) is for a one-time pre-development ground water sampling event at the Everett Landfill/Tire Fire Site (Site), to be conducted in July 2020. The Site has been, and will continue to be, in the ground water Performance Monitoring period, as outlined in the Compliance Monitoring and Contingency Plan (CMCP). The CMCP is an attachment to the Cleanup Action Plan (CAP), previously submitted to and approved by Washington State Department of Ecology (Ecology) in association with the Consent Decree that was entered into Snohomish County Superior Court on April 2, 2001. Ground water Performance Monitoring methods and procedures are outlined in the *Everett Landfill/Tire Fire Site Ground Water Sampling and Analysis Plan* dated March 22, 2005 and approved by Ecology on May 25, 2005.

This SAP:

1. Specifies procedures for field sampling activities in May or June 2020.
2. Identifies quality assurance (QA) procedures to be implemented during sampling activities and laboratory analyses.
3. Meets the requirements of WAC 173-340-820, and WAC 173-340-410(3)(a) of the Model Toxics Control Act (MTCA), for sampling and analysis plans.

Sampling and analysis will be conducted by HWA GeoSciences Inc. under the direction of the City of Everett Public Works Department (City). The City will report results to Ecology in a brief letter report.

1.1 PROJECT ORGANIZATION

Individuals responsible for ensuring the quality of the field operations and the collection of data are identified in this section. The City of Everett will provide oversight of all project activities and will be the point of contact with Ecology. Sampling activities, data evaluation, and reporting will be performed by HWA GeoSciences Inc. (HWA). Laboratory analysis will be done by Ecology-certified laboratories, and include the City of Everett Environmental Laboratory (for conventional and metals analyses) and by ALS Environmental Laboratory, Everett, Washington for organic parameters. Contacts for this project include:

Mark Sadler	City of Everett Site Manager (425) 257-8967
Arnie Sugar	HWA Project Manager (206) 774-0106
Chris Merwede	City of Everett Environmental Laboratory (425) 257 7865
Rick Bagan	ALS Laboratory Director (425) 356 2600

2.0 SAMPLING AND ANALYSIS

Wells to be sampled in July 2020 are:

- 3 deep point-of-compliance monitoring wells: MW-36, MW-38, and MW-39R
- MW-37, a deep monitoring well discontinued from 2006 to 2015 due to influence of saline water from the river, and resumed in 2015 at request of Ecology
- 5 deep aquifer network (not compliance) wells, MW-11R, MW-21R (upgradient), MW-29R, MW-30, MW-31
- Shallow wells MW-24 and MW-25
- Leachate from a leachate collector wet well or sampling port

The monitoring well locations are shown on Figure 1.

Analytes to be analyzed in July 2020 are:

- Dissolved Metals: nickel, zinc, iron, manganese, arsenic using EPA method 200.8/6020B
- Conventional Analytes: chloride using method SM4500-CL-E
- Volatile organic compounds (VOCs) using EPA method 8260C
- Semi-volatile organic compounds (SVOCs) using EPA method 8270D

HWA will send the samples to ALS Environmental Laboratory, Everett Washington, for organic analyses, and to the Everett Environmental Laboratory for inorganic analyses.

2.1 GROUND WATER SAMPLING

2.1.1 GROUND WATER MONITORING WELLS

Monitoring wells will be purged before sample collection to obtain ground water samples that are representative of the formation water rather than stagnant water from the well casing. Ground water that has occupied the well casing is often under oxidizing conditions, and thus may be chemically different from true formation water.

Monitoring wells will be purged and sampled using low-flow purging methods. Sampling staff will measure ground water levels to the nearest 0.01-foot using a decontaminated electronic well probe prior to collection of samples. Prior to collection of ground water samples, the wells will be purged by pumping a small volume of water to ensure sampled water represents aquifer conditions. The volume pumped will be determined in the field based on stabilization of field parameters: specific conductance, dissolved oxygen, and pH. Wells will be purged by very slowly lowering semi-rigid polyethylene tubing to a depth corresponding to roughly the midpoint of the screen, securing the tubing to prevent vertical movement, connecting it to a peristaltic pump, and then pumping at a rate not to exceed 0.5 liters/minute (0.132 gallons/minute). At a minimum, two pump and tubing volumes will be purged (1/4” I.D. tubing = 0.005 gallon/lineal

foot). Samples from all wells will be collected once the parameter values have stabilized over the course of three sets of measurements as follows:

specific conductance	10 uS
dissolved oxygen	2 mg/L
pH	0.1

If a well can be pumped dry prior to reaching the desired purge volume, it will be allowed to recover prior to sampling, using the minimum time between purging and sampling that would allow collection of sufficient sample volume. Samples will be pumped directly into the appropriate containers, as provided by the laboratory. A Field Data Sampling Sheet (provided in Appendix A) will be filled out for each well. New tubing will be used for each well. All purge water will be collected and discharged to one of the leachate wet wells.

Dissolved metals samples will be filtered through a disposable 0.45-micron filter at the time of sample collection. The filters will attach directly to the discharge tube of the sampling pump. Each in-line filter will be used only once.

After collection, all samples will be labeled, chilled in a cooler to 4°C, and shipped to the testing laboratories for analysis (CCI Analytical Laboratories, Inc. for organic analyses, and the Everett Environmental Laboratory for inorganic analyses). Full chain-of-custody and field documentation procedures will be employed, as described in Section 2.6. The laboratory will analyze the water samples for the constituents listed on Table 1. PQLs listed in Table 1 are equal to or less than those listed in the CMCP.

Table 1
Proposed Analytical Methods

Analyte	**Proposed Analytical Method**	**Method PQL µg/L**
Conventional Parameters		
Chloride	SM4500-CL-E	1200
Dissolved Metals		
Arsenic	200.8/6020B	2
Nickel	200.8/6020B	2
Zinc	200.8/6020B	20
Iron	200.8/6020B	80
Manganese	200.8/6020B	2
Organic Compounds		
VOCs	8260C	varies
SVOCs	8270D	varies

2.1.2 FIELD FILTERING

Samples collected for dissolved constituent analysis must be filtered through a 0.45-micron filter. The filters will attach directly to the discharge tube of the sampling pump. The filter must be changed between sample points, or more frequently if clogging occurs. Samples that have been field-filtered must be noted on the Chain-of-Custody forms in the comments section.

2.1.3 SAMPLE COLLECTION

When filling the sample bottles, the following procedures and precautions will be adhered to:

1. Sample bottles will be filled directly from the pump or filter apparatus, with minimal air contact.
2. Bottle caps will be removed carefully so that the inside of the cap is not touched. Caps must never be put on the ground. Caps for volatile organic compound (VOC) vials will contain a Teflon-lined septum. The Teflon side of the septum must be facing the sample to prevent contamination of the sample through the septum.
3. The sampling team will wear appropriate nonpowdered latex or nitrile gloves (PVC or vinyl gloves can leave trace levels of phthalate or vinyl chloride). Gloves will be changed between wells or more often.
4. Tubing or hoses from the sampling systems must not touch or be placed in the sample bottles.
5. Semivolatile organic compound (SVOC) bottles and VOC vials must be filled so that they are headspace-free. These sample bottles therefore need to be slightly overfilled (water tension will maintain a convex water surface in the bottle). The caps for these bottles will be replaced gently, to eliminate air bubbles in the sample. The bottles must then be checked by inverting them and tapping them sharply with a finger. If air bubbles appear, open the bottle, add more water, and repeat the process until all air bubbles are gone. Do not empty the bottle and refill it, as VOC bottles already contain preservatives.
6. Sample bottles, caps, or septums that fall on the ground before filling will be discarded.
7. Metals sampling will be conducted with “clean technique.” Bottles will be bagged in plastic and the cap placed in the bag during sampling.

Table 2 shows sample bottle requirements and preservatives. Samples will be collected in the reverse order shown on Table 2, in the event sample volume is limited. The analytical laboratory will provide the sample containers and necessary preservation.

Table 2
Sample Bottle Requirements

Analytical Parameter	Required Bottle*	Preservative
Chloride	250 ml poly	
Dissolved metals	500 ml poly	HNO_3 to pH<2
VOCs	(3) x 40 mL VOA	HCl to pH <2
SVOCs	1 L amber glass	

2.1.4 WATER LEVEL MONITORING

HWA will measure ground water levels at each of the monitoring wells at the start of each sampling round in order to monitor changes in seasonal or long-term water elevations and ground water flow directions.

2.2 EQUIPMENT DECONTAMINATION

In order to mitigate the potential for cross-contamination, all nondedicated, sample-contacting, and downhole equipment used in the collection and sampling processes will be decontaminated before sample collection. Included are ground water level measurement devices. A water level probe must be dedicated to ground water monitoring well use only. Under no circumstance shall this dedicated probe be used to measure other fluid levels (e.g., leachate).

The following steps will constitute the decontamination procedure:

1. Wash items in a solution of non-phosphate (e.g., Alconox) detergent and tap water
2. Rinse with tap water
3. Rinse with deionized water
4. Air dry in a clean environment

Decontaminated equipment will be stored and transported in clean containers or wrapping.

2.3 SAMPLE PRESERVATION, STORAGE, AND SHIPMENT

2.3.1 SAMPLE PRESERVATION

The sample containers (including preservative, if required) will be prepared and provided by the analytical laboratory. Samples will be preserved consistent with analytical laboratory recommendations. After each bottle is filled and capped, the sample container will be inverted to

ensure complete mixing of the sample with the preservative. The sample container should not be shaken.

2.3.2 TEMPERATURE CONTROL

The sample container and samples will be cooled to 4°C, from the time the sample is collected through analysis. Samples will be maintained in temperature-regulated refrigerators, in coolers, or in sample coolers containing double-bagged or commercially frozen icepacks. The icepacks will be frozen solid before use.

2.3.3 SAMPLE PACKING AND STORAGE

Before the sample bottles are packed into the shipment coolers, the sample designations will be recorded in the appropriate spaces on the Chain-of-Custody form. After the samples are collected and the preservatives are added (when applicable), the bottles will be capped and placed in the sample cooler. The frozen icepacks will be placed into the sample cooler such that they are not in direct contact with the sample bottles. Glass containers should not be packed in contact with each other. Bottle holders, cushions, or bubble wrap will be used for glass bottles to protect them from breakage.

Bottles will be wiped clean with paper towels before placement in the sample cooler. The sample cooler must be kept as clean as possible to minimize the potential for cross-contamination. Bottle caps will be checked to ensure they are tight and will not become loose when inserted in the cooler. Bottle caps will not be taped.

The Chain-of-Custody form will be placed in a plastic bag, sealed, and placed inside the sample cooler or taped to the inside lid of the cooler. A copy of the Chain-of-Custody form will be retained for verification.

Samples will be stored at 4°C, in an enclosed cooler or dedicated refrigerator where possible, before shipment to the laboratory. Samples will be shipped daily to the laboratory to ensure proper temperature control and that holding time requirements are met.

2.4 QUALITY ASSURANCE/QUALITY CONTROL

Samples will be collected and analyzed with sufficient quality assurance/quality control (QA/QC) to ensure representative and reliable results. The overall QA objective for this investigation is to ensure that all decisions based on laboratory and field data are technically sound, statistically valid, and properly documented. Specific QA protocols will be executed and are described for all activities related to the collection of samples, the analyses of these samples by the laboratory, and the handling of data generated during the investigation. There are two parts to the QA/QC program for this project: field and laboratory.

2.4.1 FIELD

Field QA/QC includes proper documentation of field activities and sampling/handling procedures, as described in Section 2.6. Field QA/QC samples will consist of the following:

- One duplicate per 12 samples

2.4.1.1 Duplicates Samples

Duplicates are used to confirm analytical results from a given sample point. Duplicate samples are collected in the field using a matching set of laboratory-supplied bottles and sampling from the selected well, as requested. Each duplicate should be sampled by alternating between the regular and the duplicate sample bottles, proceeding in the designated sampling order (VOCs first). The well where the duplicate is collected must be identified on the field sampling data sheet. All duplicates shall be blind-labeled (i.e., the well designation is not listed on the sample bottle or Chain-of-Custody form). Once a duplicate is collected, it is handled and shipped in the same manner as the rest of the samples. Duplicate results will be reported in the laboratory results as separate samples, using the designation DUP-(#).

2.4.1.2 Trip Blanks

Trip blanks are used to detect contamination that may be introduced in bottle preparation, in transit to or from the sampling site, or in the field. Trip blanks will be analyzed for VOCs.

2.4.2 LABORATORY

Method-specific QA/QC samples may include the following:

- Method blanks
- Duplicates
- Instrument calibration verification standards
- Laboratory control samples
- Surrogate spiked samples
- Performance evaluation QC check samples

2.4.3 DATA EVALUATION

Data evaluation will include checking holding times, method blank results, surrogate recovery results, field and laboratory duplicate results, completeness, detection limits, laboratory control sample results, and Chain-of-Custody forms. After the data has been checked, it will be entered into the project database with any assigned data qualifiers.

2.5 FIELD DOCUMENTATION AND CHAIN-OF-CUSTODY

The following sections describe the recording system for documenting all site field activities, and the sample chain-of-custody procedures.

2.5.1 FIELD DOCUMENTATION

An accurate chronological recording of all field activities is vital to the documentation of any environmental investigation. To accomplish this, field team members will maintain field log books and data sheets providing a daily record of significant events, observations, deviations from the sampling plan and measurements collected during the field activities.

2.5.1.1 Field Sampling Data Sheet

A field sampling data sheet (example in Appendix A) will be filled out for each sample point. This sheet contains information regarding site and well conditions, sampling and purging procedures, and field measurements. At a minimum, the following information must be documented:

1. **Purging Information**, including date, time, well number, casing volume, elapsed time, discharge color (if different than for sampling), water level before and after purging. Note if the well was dry, purged dry, or was otherwise impossible to sample.
2. **Purging and Sampling Equipment**, including pump type and tubing material.
3. **Field Measurements**, including fluid surface elevation (depth to ground water or to leachate), temperature, pH, dissolved oxygen, and specific conductance.
4. **Additional Field Measurements**, as necessary.

2.5.2 SAMPLE IDENTIFICATION

Following sample collection, field personnel will affix labels to each sample container. Samplers will use waterproof ink, plastic bags, or clear tape to ensure labels remain legible even when wet. A sample label form that may be copied on to adhesive label paper is provided in Appendix A. Samplers will record the following information on the labels:

- Project name and number
- Sample identification number
- Date and time of collection
- Required test methods
- Name of sample collector

Sample numbering will follow the following format:

MW-29-0720 = monitoring well MW-29 collected on July 2020

DUP 1, DUP 2, etc. = duplicate (do not indicate which well a duplicate is from)

TB 1, TB 2, etc. = trip blank (indicate matrix for all blanks, e.g., ground water, surface water)

2.5.3 CHAIN-OF-CUSTODY RECORD

The objective of the chain-of-custody procedures is to allow the tracking of possession and handling of individual samples from the time of field collection through laboratory analysis. Once a sample is collected, it becomes part of the chain-of-custody process. A sample is "in custody" when: (1) it is in someone's possession, (2) it is within visual proximity of that person, (3) it is in that person's possession, but locked up and sealed (e.g., during transport), or (4) it is in a designated secure sample storage area. Sampling staff will complete a Chain-of-Custody form, which will accompany each batch of samples. The record will contain the following information:

- Project name and number
- Names of sampling team members
- Requested testing program
- Required turnaround time
- Sample number
- Date and time collected
- Sample type
- Matrix
- Number of containers
- Special Instructions
- Signatures of persons involved in the chain of possession

When sample custody is transferred to another individual, the samples must be relinquished by the present custodian and received by the new custodian. This will be recorded at the bottom of the Chain-of-Custody form where the persons involved will sign, date and note the time of transfer. An HWA Chain-of-Custody form is provided in Appendix A.

Sampling team members will keep sample coolers in locked vehicles while not in active use or visual range. If couriers are used to transport samples, Chain-of-Custody seals will be affixed to sample coolers.

2.6 INVESTIGATION-DERIVED WASTE

Purge water from the wells will be collected and discharged to the leachate wet wells. Solid waste (e.g., disposable bailers, gloves, etc.) will be disposed of as ordinary municipal waste.

2.7 CALIBRATION AND USE OF METERS

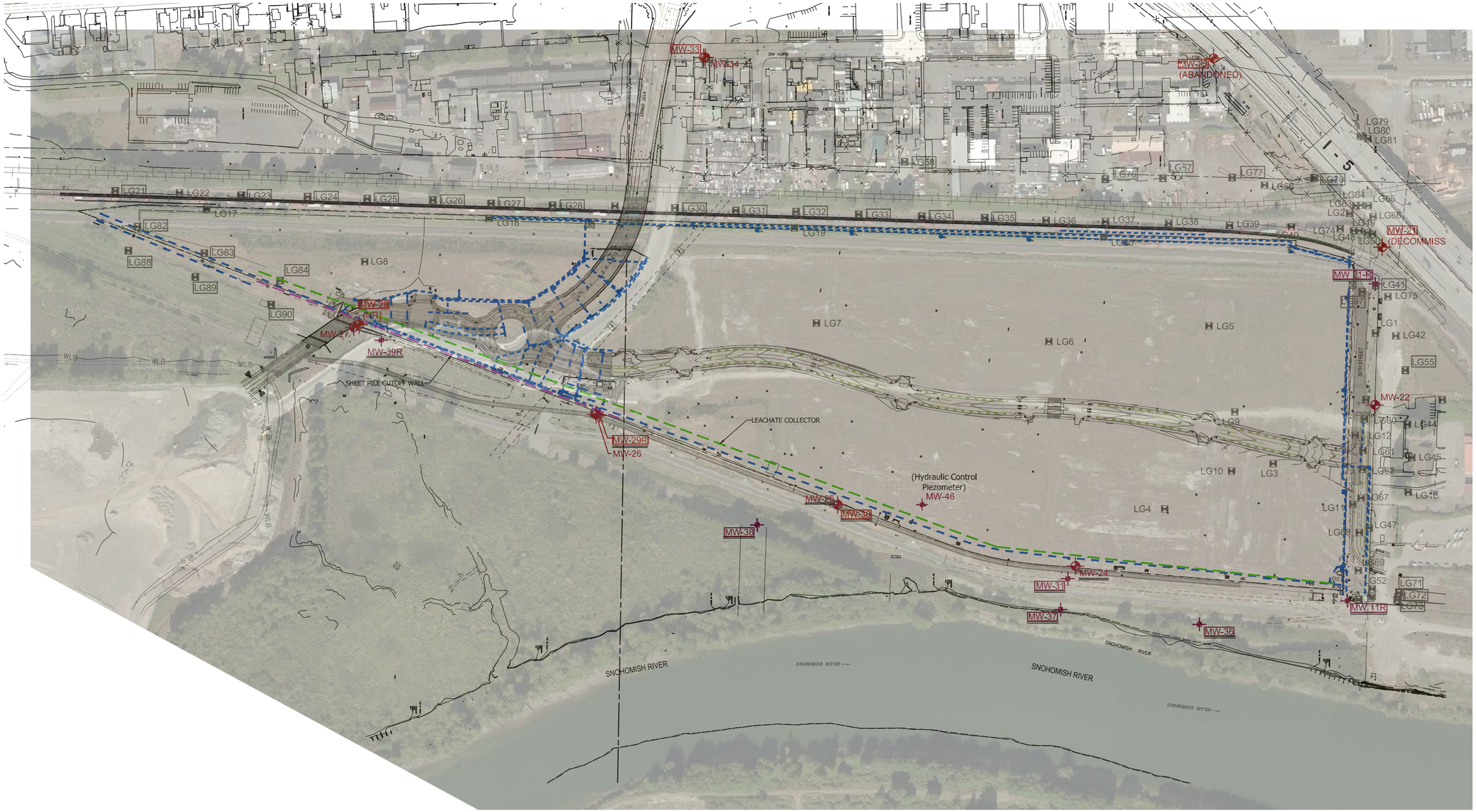
Before being taken to the field, equipment must be cleaned and checked for malfunctions. Meters must be calibrated each morning before they are used in the field, following manufacturers' procedures. Equipment will be calibrated at least daily. All field monitoring equipment will be calibrated consistent with manufacturers' procedures using instrument calibration standards prepared according to the manufacture's specifications. In all cases, proper documentation must be made of all calibration procedures for each sampling event, including calibration methodology (one- or two-point calibration, difference, standard concentration, and expiration date).

Logbooks should be maintained for all field meters. The logbooks must contain the same information as those for permanent laboratory instruments (serial number, name and model of meter, year purchased, etc.). The books also must contain quality control (QC) results, maintenance performed by the factory, and calibration notes for each day the equipment is used. Instruments used to measure pH and electrical conductivity should be calibrated at least once each day of sampling. Temperature-measuring devices should be calibrated against a standardized laboratory thermometer at a frequency recommended by the manufacturer. Additional data (e.g., turbidity, dissolved oxygen) should be calibrated in accordance with manufacturer recommendations and documented.

2.8 FIELD MEASUREMENTS

2.8.1 STATIC WATER LEVEL MEASUREMENTS

The depth-to-water should be recorded to the nearest hundredth of a foot (0.01 ft). Water levels should be measured before and after purging to assess drawdown effects at each well, and to produce a representative static ground water contour map. To alleviate potential errors, previous water level data should be used for comparison during field activities. Water levels are preferably measured before purging a well and as close in time as possible, to minimize interference from drawdown or barometric pressure effects.



EXPLORATION LEGEND

- MW-12 — SHALLOW MONITORING WELLS
- MW-12 — DEEP MONITORING WELLS
- MW-12 — WELLS TO BE MONITORED

0 150 300 450 600

SCALE: 1" = 300'

BASE MAP PROVIDED BY: BING AND SURVEYOR

H:\HWA GEOTECHNICAL\2016-061-21 EVERGREEN\HAZMAT\2015-061 EVERETT RIVERFRONT - HAZMAT 10.18.2019.DWG <2> Plotted: 10/21/2019 4:42 PM

HWA GEOSCIENCES INC. DBE/MWBE

EVERETT LANDFILL
EVERETT, WASHINGTON

GROUNDWATER MONITORING WELLS

DRAWN BY:	FIGURE NO.:
CF / BFM	1
CHECK BY:	PROJECT NO.:
AS	2015-061-21 TASK 600

APPENDIX A

SAMPLING DOCUMENTATION

Chain-of-Custody Form

Field Sampling Data Sheet

HWA GEOSCIENCES INC.

21312 30th Drive SE, Suite 110, Bothell, Washington 98021-7010
Tel 425.774.0106 Fax 425.774.2714 www.hwageo.com

Chain of Custody and Laboratory Anaylsis Request

DATE: _____

PAGE: ___ of ___

PROJECT NAME: _____ #: _____

SAMPLERS NAME: _____ PHONE: _____

SAMPLERS SIGNATURE: _____ DATE: _____

HWA CONTACT: _____ PHONE: _____

ANALYSIS REQUESTED

TURNAROUND TIME

☐ DAYS

☐ STANDARD

HWA SAMPLE ID	DATE	TIME	MATRIX	LAB ID	# OF BOTTLE	EDD	REMARKS

PRINT NAME	SIGNATURE	COMPANY	DATE	TIME	REMARKS
Relinquished by:					
Received by:					
Relinquished by:					
Received by:					

DISTRIBUTION: WHITE - Return to HWA GeoSciences; YELLOW - Retain by Lab; PINK - Retain by Sampler

HWA GEOSCIENCES INC.
21312 30th Drive SE, Suite 110, Bothell, WA 98021
Tel: 425-774-0106 / Fax: 425-774-2714

FIELD SAMPLING DATA SHEET

Project Name: _____ Well Number:_____

Project Number:_____ Sample Number:_____

Project Location:_____ Weather: _____

Client/Contact:_____ Date:_____

WELL MONITORING:

Time	Pump Depth	Depth to Water	Measuring Point (TOC?)	Measuring Point Elevation	Water Level Elevation	Gallons in Well (Case Volume)

(2" dia=0.163 gal/ft)
(4" dia=0.653 gal/ft)

WELL PURGING:

Time	Method	Gallons	Case Volume	pH	Conductivity	Temperature	Dissolved Oxygen		

WELL SAMPLING:

Time	Sampling Method	Sample Analysis	Container Number	Container Volume	Container Type	Field Filtered (Y/N)	Preservative	Iced (Y/N)

COMMENTS/NOTES: (Include equipment used: Bailers, Filters, Well Probe, pH/Conductivity, Meter, etc.)

Total # of Bottles:_____ Sampler**:**_____ Signature:_____