Compliance Monitoring Plan

Go East Corp Landfill Site
Everett, Washington

for

Washington State Department of Ecology
on Behalf of Century Communities

May 22, 2024

1101 South Fawcett Avenue, Suite 200
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Compliance Monitoring Plan

Go East Corp Landfill Site
Everett, Washington

File No. 26410-001-02
May 22, 2024

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1.0 Introduction

This Compliance Monitoring Plan (CMP) is for the former Go East Corp Landfill (Site) located near Everett, Washington. The general location of the Site is shown in Figure 1. The Site is listed by the Washington State Department of Ecology (Ecology) with cleanup site ID (CSID) 4294.

The Go East Landfill operated from 1972 to 1983 and contains wood waste and construction debris. The former owner, P&GE, LLC (P&GE), obtained land disturbing activity permits from Snohomish County Planning and Development Services and a limited purpose landfill permit from Snohomish County Health Department (formerly known as Snohomish Health District) for the redevelopment of the property and closure of the landfill. P&GE consolidated and closed the landfill from March 2021 to July 2022 in accordance with Washington Administrative Code (WAC) 173-350-400. Century Communities of Washington, LLC (Century Communities) purchased the property from P&GE, LLC on May 24, 2022 and developed Alpine Estates Plat Community. The Snohomish County Planning and Development Services approved the Alpine Estates, A Plat Community plat map on October 24, 2023. The landfill exists on Tracts 989, 992, 997, and 999. The Alpine Estates Owners Association is the current owner of the landfill, and Century Communities currently governs the Alpine Estates Owners Association. Snohomish County Health Department is issuing a limited purpose landfill permit to the Alpine Estates Owners Association for the post-closure care of the landfill in accordance with WAC 173-350-400.

Ecology determined that the former owners of the landfill, P&GE and Century Communities, are potentially liable persons (PLPs) under the state's cleanup law, the Model Toxics Control Act (MTCA). P&GE entered into Agreed Order No. DE 18121 with Ecology on January 29, 2021 and Century Communities signed as a party to the agreed order in January 10, 2022. The agreed order required that the PLPs implement an interim action during landfill consolidation and closure to ensure the residual soil beyond the landfill boundary met the soil cleanup standards. Ecology held a public comment period for the Agreed Order and Interim Action Work Plan from May 8 to June 7, 2020 and hosted an online public meeting on June 18, 2020. The agreed order also required that the PLPs prepare a Remedial Investigation and Feasibility Study (RI/FS) and preliminary draft Cleanup Action Plan (CAP). Ecology held a public comment period for the draft RI/FS and draft CAP from May 7 to April 7, 2024 and hosted an online public meeting on March 21, 2024. The RI/FS and CAP have been finalized following the public comment period.

The Site is currently in the compliance monitoring phase following closure of the landfill in 2022. Confirmational monitoring will be performed in monitoring wells and at one surface water location until residual hazardous substance concentrations no longer exceed the site cleanup levels established in the CAP for the Site (GeoEngineers 2024b). This CMP has been prepared in accordance with WAC 173-340-410(3) and includes a Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) that meets the requirements of WAC 173-340-820 and WAC 173-350-500(4).

2.0 Site History

Detailed descriptions of Site history are provided in historical documents including but not limited to the RI/FS (GeoEngineers 2024a) and CAP (GeoEngineers 2024b). The summary presented here is based on information provided in the CAP.

The Site includes a former ravine that was mined as a source of sand and gravel from 1969 until 1972. The ravine was then reclaimed with landfill material between 1972 to 1983. Interim actions were performed during landfill consolidation and closure to ensure that residual soil beyond the final landfill boundary met the soil cleanup standards. The interim action activities are documented in the Final Interim Action Completion Report (IACR) (GeoEngineers 2021), the Go East Landfill Northeast Slope Reconnaissance and Observations memorandum (GeoEngineers 2022a), and the Interim Action Completion Report Addendum – Cul-de-Sac Soil Sampling Results memorandum (GeoEngineers, 2022b). The landfill was closed in accordance with the requirements for limited purpose landfills (WAC 173-350-400) and a Landfill Closure Plan (LFCP; PACE 2018) between March 2021 and July 2022. A summary of pertinent landfill closure and site development activities are summarized below (see Figure 2):

- Excavation of landfill material from a “wedge area” and capping of the landfill material beneath an impermeable landfill cap.
- Construction of a surface water channel and an underlying groundwater interceptor trench at the toe of the western slope of the Alpine Estates subdivision that discharges surface water and groundwater toward Stream 2 and away from the landfill.
- Installation of an engineered cap over the final limits of the landfill, except where natural vegetation was preserved on the steep northeast landfill slope.
- Construction of a rock buttress and weir box at the toe of the northeast slope of the landfill. The weir box collects and discharges leachate to Stream 3.
- Construction of permanent stormwater facilities including detention ponds that discharge stormwater to Stream 2.

Site investigations from 1981 to 2021 are summarized in the RI/FS (GeoEngineers 2024a). Ten monitoring wells were installed between 2009 and 2022 to investigate groundwater conditions. Groundwater at the Site occurs near or below the bottom of the Landfill waste flowing northeast towards the weir box/Stream 3, as shown in Figure 2. A groundwater divide exists to the south and east of the landfill. Groundwater to the north of the groundwater divide flows beneath the landfill toward Stream 3, whereas groundwater to the south of the groundwater divide flows toward the south and east toward Stream 2.

Groundwater, surface water, and sediment samples were collected upgradient and downgradient of the landfill as part of the RI/FS. The primary chemicals of concern are manganese and iron in groundwater and surface water. Arsenic, lead, and nickel have been detected near the cleanup levels in one well (MW-7) completed beneath the wedge area. Polycyclic aromatic hydrocarbons (PAHs[1]) were inconsistently detected at concentrations slightly above the cleanup levels in two groundwater monitoring wells (MW-6 and MW-7) completed beneath the wedge area. Pesticides, presumably from urban stormwater drainage and not

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[1] The PAH that exceeded included the Total Toxic Equivalent Concentration for carcinogenic PAHs (i.e., cPAH TEQ); see the RI/FS.

related to the landfill, were detected in sediment upstream and downstream of the landfill. However, no pesticides were detected in groundwater or surface water.

The selected cleanup action described in the CAP includes closing the landfill per WAC 173-350-400 (completed in 2021-2022), monitored natural attenuation (MNA) for groundwater and surface water, and natural recovery for sediment. MNA for groundwater consists of continued monitoring of groundwater wells as required by long-term post-closure care. MNA for surface water consists of continued monitoring of surface water emanating from the weir box. Recovery for sediment was partially performed by a 2021 mudflow that covered pre-existing sediments. Natural recovery for sediment includes re-establishing wetland vegetation in and near Stream 3, improving surface water quality, and additional natural sedimentation to overlie historical contamination.

3.0 Compliance Monitoring

3.1 SAMPLING LOCATIONS

Monitoring well and surface water sampling location status including the monitoring wells and surface water sampling locations to be monitored as part of this CMP are summarized in Table 1. These sampling locations are shown in Figure 2.

MW-6, MW-7, MW-8, MW-10, and SWS-1 are considered “priority sampling locations” and will be monitored semi-annually to evaluate the natural attenuation of the chemicals of concern in groundwater and surface water.

Monitoring wells MW-2 and MW-3 are considered contingent wells to be monitored (along with MW-6, MW-7, and MW-8) annually for geochemical indicator parameters as long as methane concentrations exceed 5 percent in any of the 12 soil gas probes at the landfill boundary during the preceding 12 months. The Landfill Gas Monitoring Readiness Report (Herrera 2024) describes the methane concentrations in the 12 soil gas probes.

3.2 ANALYTES

The analytes to be monitored are based on the results of the extensive RI/FS sampling as well as the requirements of WAC 173-350-500. Iron and manganese are the primary chemicals of concern at the Site. Arsenic, lead, and nickel were detected near the cleanup levels in MW-7. The carcinogenic PAH toxic equivalency (cPAH TEQ) was exceeded one time each in wells MW-6 and MW-7. The leachate indicator ammonia will be monitored, as well as selected geochemical indicators in WAC 173-350-500 including alkalinity and bicarbonate. Analysis of other leachate and/or geochemical indicators will not be needed due to the extensive sampling and site characterization performed during the RI/FS[2]. Two pesticides (cis-Chlordane and heptachlor) were sporadically detected in sediment samples during the RI. However, these pesticides were not detected in the groundwater or surface water samples during the RI. Furthermore, these pesticides were detected in sediment both upstream and downstream of the landfill suggesting a potential upgradient source. No further sampling of pesticides is warranted.

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[2] Several of the indicators do not exceed background, while other indicators overlap with proposed analytes in this CMP.

The proposed initial (2024) monitoring program is shown in Table 2. Analytes will be monitored until statistical compliance is achieved. The geochemical indicator parameters listed in Table 2 are alkalinity, bicarbonate, total and dissolved iron, and total and dissolved manganese (WAC 173-350-500(4)(h)(ii)). MW-2, MW-3, MW-6, MW-7, and MW-8 will be monitored annually for the geochemical indicator parameters whenever methane is detected at a concentration above 5% in any of the 12 soil gas probes at the landfill boundary during the preceding 12 months.

3.3 FIELD PARAMETERS

The field parameters pH, dissolved oxygen, oxidation-reduction potential, specific conductance, and temperature will be recorded at each monitoring location per WAC 173-350-500. Depth to water will be recorded at each monitoring well. See Appendix A.

3.4 SAMPLING FREQUENCY

Initially, the locations will be sampled semiannually as allowed by WAC 173-350-500. Sampling for an analyte may be ceased at a monitoring point when statistical compliance is demonstrated for the analyte per WAC 173-340-720(9)(d). MW-2, MW-3, MW-6, MW-7, and MW-8 will be sampled for the geochemical indicator parameters during the spring sampling event whenever methane is detected at a concentration above 5% in any of the 12 soil gas probes at the landfill boundary during the preceding 12 months.

3.5 QUALITY ASSURANCE/QUALITY CONTROL

Sampling quality assurance and quality control (QA/QC) procedures are identified in the SAP (Appendix A) and QAPP (Appendix B).

3.6 SCHEDULE

Sampling is initially planned to be conducted in August and February each year. These dates provide a ‘dry season’ and ‘wet season’ analysis and will provide time for annual reporting which is due each April. When applicable, groundwater samples from MW-2 and MW-3 are planned in February.

3.7 REPORTING

An annual report will be submitted to the SCHD and Ecology by April 1 each year containing the required information in WAC 173-350-500(5)(c).

4.0 References

GeoEngineers, 2021. Final Interim Action Completion Report – Go East Landfill Corp Site. November 23, 2021.

GeoEngineers, 2022a. Go East Landfill Northeast Slope Reconnaissance and Observations. April 7, 2022.

GeoEngineers, 2022b. Interim Action Completion Report Addendum – Cul-de-Sac Soil Sampling Results. December 20, 2022.

GeoEngineers, 2024a. Remedial Investigation/Feasibility Study, Go East Corp Landfill Site, Everett, Washington. Ecology Agreed Order No. DE 18121. May 17, 2024.

GeoEngineers, 2024b. Cleanup Action Plan, Go East Corp Landfill Site, Everett, Washington. Ecology Agreed Order No. DE 18121. May 17, 2024.

Herrera, 2024. Landfill Gas Monitoring Readiness Report, Go East Landfill/Alpine Estates Development. February 16, 2024.

PACE Engineers, Inc. (PACE), 2018. Go East Landfill Closure Plan, Revised January 2018 with updates.

Tables

Table 1

Monitoring Well and Surface Water Location Summary

Go East Corp Landfill Site
Everett, Washington

Location Identification	Well Monument	Depth to Base of Well (feet bgs)[1]	Well Screen Interval Depth (feet bgs)[1]	Status/Sampling Location
MW-1	Flush	75	65 to 75	To be decommissioned
MW-2	Stickup	60	50 to 60	Contingent sampling location[2]
MW-3	Stickup	83	73 to 83	Contingent sampling location[2]
MW-4	NA	NA	NA	Decommissioned
MW-5	Flush	80	70 to 80	To be decommissioned
MW-6	Stickup	55	45 to 55	Priority sampling location
MW-7	Stickup	60	45 to 60	Priority sampling location
MW-8	Stickup	55.5	45.5 to 55.5	Priority sampling location
MW-9	Stickup	10	5 to 10	To be decommissioned
MW-10	Stickup	10	5 to 10	Priority sampling location
SWS-1	NA	NA	NA	Priority sampling location

Notes:

[1] Depths and elevations rounded to the nearest foot.

[2] Well to be sampled in the spring for geochemical indicators based on methane results; see report text.

bgs = below ground surface

NA = Not applicable

Table 2

Analytical Program

Go East Corp Landfill Site

Everett, Washington

Location Identification	**Analyte List[1]**								
	Field Parameters[2]	**Iron**	**Manganese**	**As**	**Pb**	**Ni**	**Ammonia**	**Alkalinity and Bicarbonate**	**cPAHs**
MW-2 (Contingent[3])	Yes	Yes (T/D)	Yes (T/D)	--	--	--	--	Yes	--
MW-3 (Contingent[3])	Yes	Yes (T/D)	Yes (T/D)	--	--	--	--	Yes	--
MW-6	Yes	Yes (T/D)	Yes (T/D)	Yes (T)	--	--	Yes	Yes	Yes
MW-7	Yes	Yes (T/D)	Yes (T/D)	Yes (T)	Yes (T)	Yes (T)	Yes	Yes	Yes
MW-8	Yes	Yes (T/D)	Yes (T/D)	--	--	--	Yes	Yes	--
MW-10	Yes	Yes (T/D)	Yes (T/D)	--	Yes (T)	--	Yes	Yes	--
SWS-1	Yes	Yes (T)	Yes (T)	--	Yes (T)	--	Yes	Yes	--

Notes:

[1] See Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) for analytical methods and further details.

[2] Field parameters include pH, specific conductivity, temperature, dissolved oxygen and oxidation-reduction potential at a minimum.

[3] Well to be sampled in the spring for geochemical indicators based on methane results; see report text.

As = Arsenic

cPAHs = carcinogenic polycyclic aromatic hydrocarbons listed in Table 708-2 of the Model Toxics Control Act (MTCA), to calculate Total cPAH TEQ

Ni = Nickel

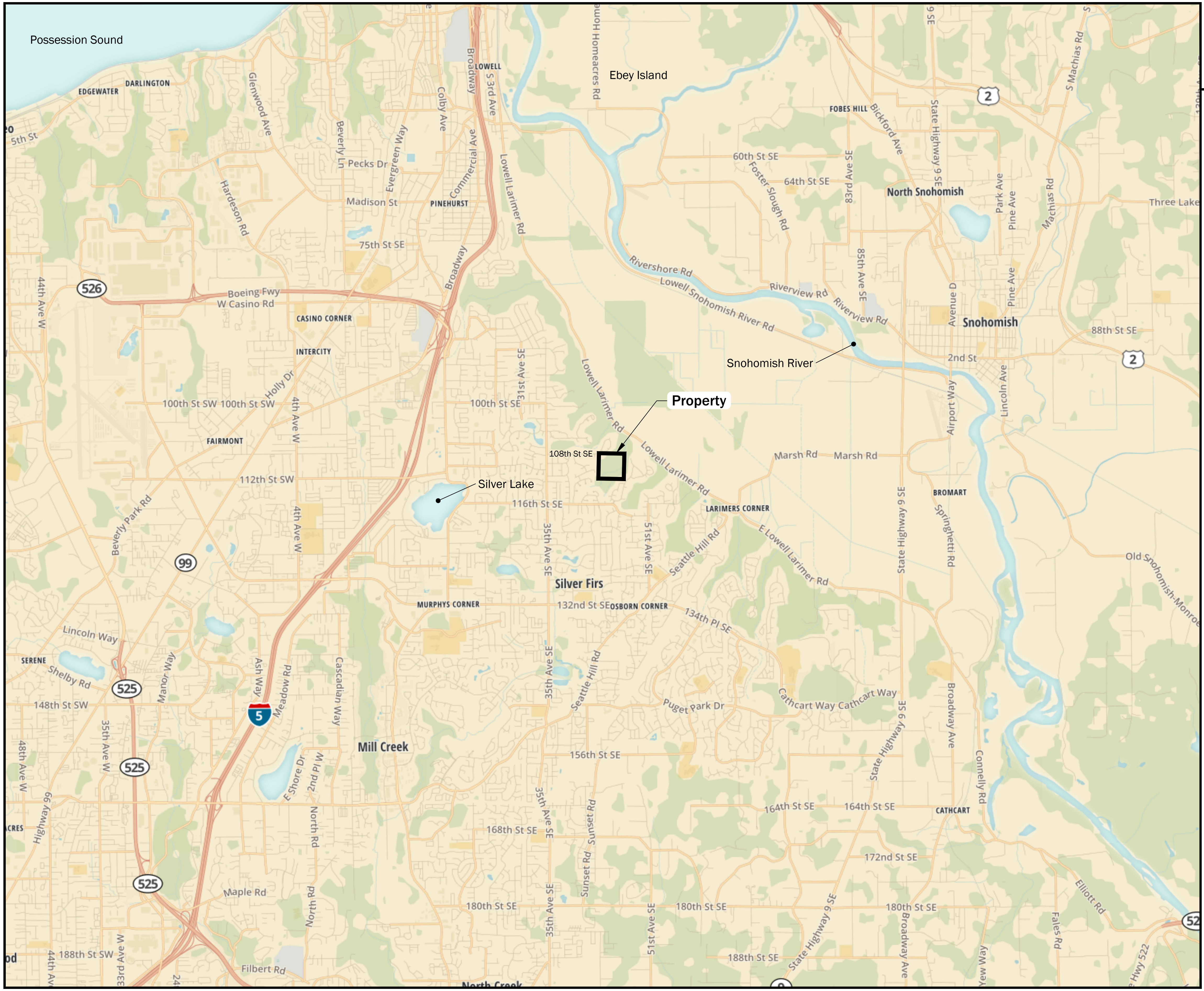
Pb = Lead

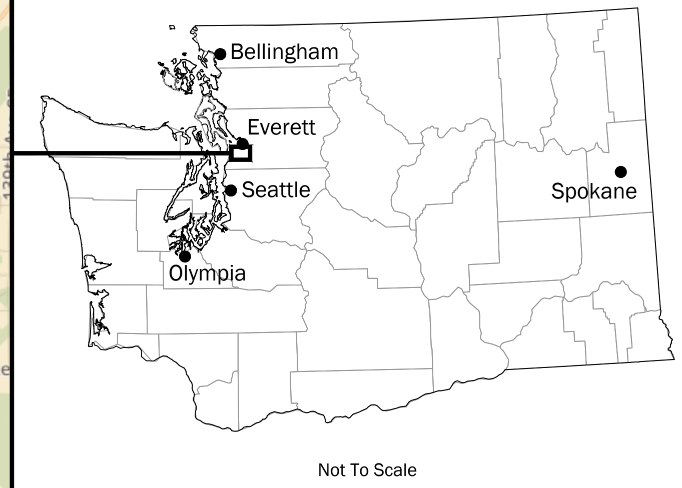
T/D = Total and dissolved metals

T = Total metals

TEQ = Toxic equivalency

Figures



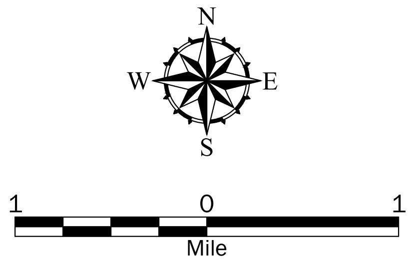


Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2016.

Projection: NAD 1983 UTM Zone 10N



Vicinity Map

Go East Corp Landfill Site
Everett, Washington

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Figure 1

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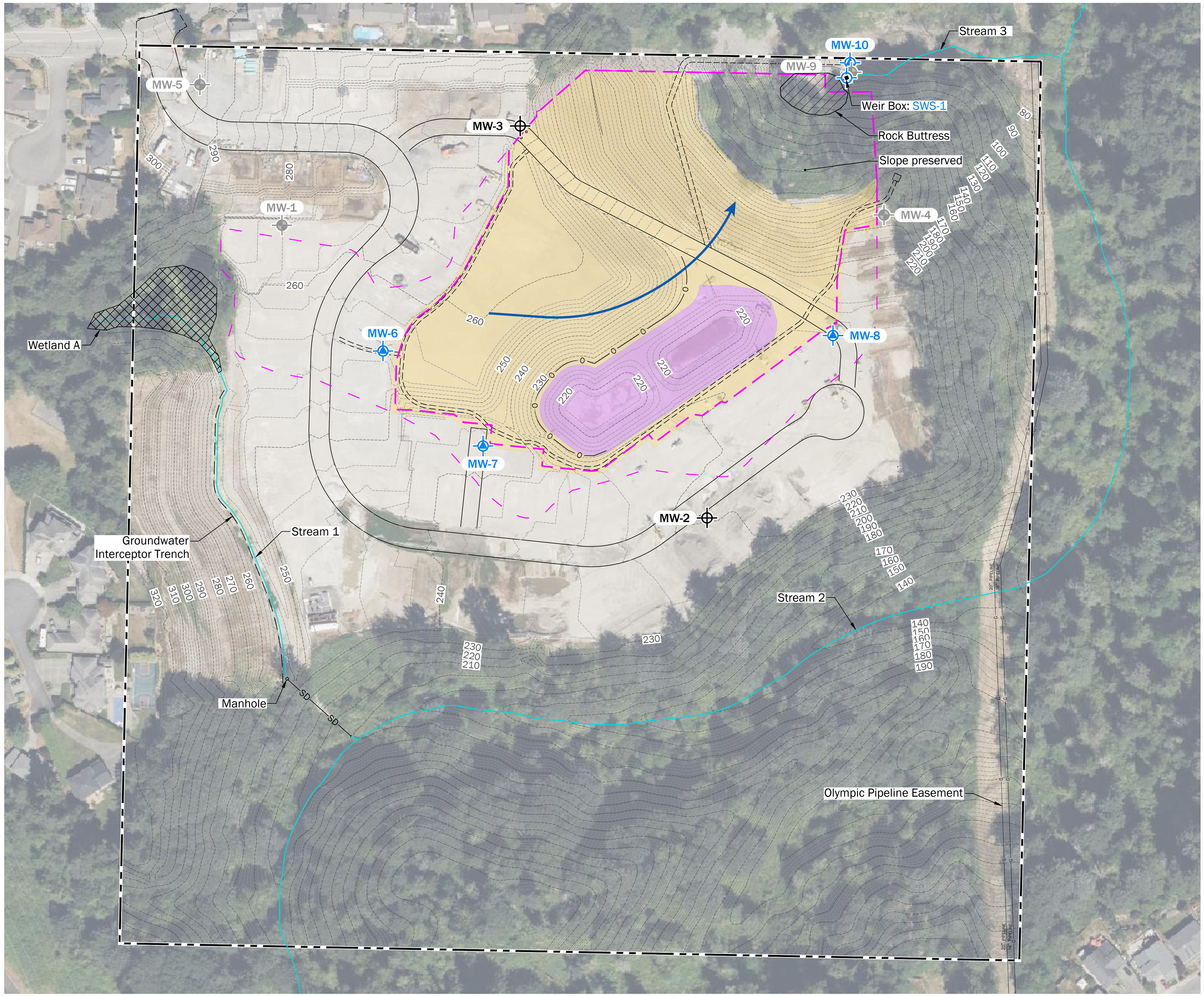

Legend

- Property Boundary
- Final Landfill Limit
- Former Extent of Wedge Area
- Engineered Cap
- Double-lined stormwater pond
- 280 Topographic Contour (NAVD88)
- Priority Sampling Location
- Monitoring Well Contingent Sampling Location
- Monitoring Well Decommissioned/ To be Decommissioned
- SD—SD Storm Drain
- Inferred Groundwater Flow Direction

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Background CAD files from MG Land Surveyors downloaded 2/17/2023.
Aerial from Microsoft Bing Images.

Projection: WA State Plane, North Zone, NAD83, US Foot

N
W E
S

150 0 150
Feet

Site Plan

Go East Corp Landfill Site
Everett, Washington

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Figure 2

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Appendices

Appendix A

Sampling and Analysis Plan (SAP)

Sampling and Analysis Plan

Go East Corp Landfill Site
Everett, Washington

for
Washington State Department of Ecology
on Behalf of Century Communities

May 22, 2024

1101 South Fawcett Avenue, Suite 200
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Table of Contents

1.0 Introduction

This Sampling and Analysis Plan (SAP) has been prepared in accordance with requirements of Washington Administrative Code (WAC) 173-340-820 of the Model Toxics Control Act (MTCA) Cleanup Regulations and WAC 173-350-500(4) of the Solid Waste management Handling Standards. The SAP is developed based on the findings of the Remedial Investigation/Feasibility Study (RI/FS) (GeoEngineers 2024a), Cleanup Action Plan (GeoEngineers 2024b), and Landfill Gas Monitoring Readiness Report (Herrera 2024). The purpose of this SAP is to describe the planned sampling and analytical testing of groundwater and surface water during post-closure care of the Go East Corp Landfill Site (Site). A Quality Assurance Project Plan (QAPP) is included as Appendix B of the Compliance Monitoring Plan (CMP).

1.1 PROJECT ORGANIZATION AND RESPONSIBILITIES

Key personnel and responsibilities for the sampling are identified below. These personnel are responsible for ensuring that the sampling activities are conducted in accordance with the SAP and CMP.

1.1.1 Principal-in-Charge

The Principal-in-Charge has overall responsibility for ensuring that the sampling is performed in accordance with this SAP and the CMP.

1.1.2 Project Manager

The Project Manager will assign field sampler(s), coordinate and schedule field and laboratory testing activities, coordinate subcontractors, and track the project schedule. The Project Manager will also verify that SAP and QAPP objectives are achieved and that any deviations from the SAP or QAPP are documented. Additionally, the Project Manager will provide technical oversight and coordinate production and review of project deliverables.

1.1.3 Field Sampler(s)

The Field Sampler(s) is responsible for the daily management of field activities. Specific responsibilities include:

- Implement and oversee field sampling in accordance with the CMP including this SAP and the QAPP.
- Coordinate work with the analytical laboratory.
- Schedule sample shipments/delivery with the analytical laboratory.
- Monitor that appropriate sampling, testing, and measurement procedures are followed.
- Coordinate the transfer of field records (field forms and reports, etc.) to the Project Manager.
- Identify whether deviations from the SAP and QAPP procedures are necessary and appropriate to achieve the project goals and discuss deviations with the Project Manager.

1.1.4 Quality Assurance Leader

The Quality Assurance (QA) Leader is responsible for overseeing quality assurance/quality control for laboratory testing of field samples. Specific responsibilities of the QA Leader include the following:

- Serve as the point of contact for laboratory QA questions and concerns.
- Confirm acceptability of the Laboratory QA Plan.
- Respond to laboratory data QA needs, answer laboratory requests for guidance and assistance, and resolve issues.
- Monitor laboratory compliance with data quality requirements outlined in the QAPP.
- Confirm that appropriate sampling and analysis procedures are followed including implementation of proper quality control (QC) checks.
- Coordinate the implementation of the QAPP and review the quality of the analytical data generated.
- Implement or direct corrective actions if necessary.
- Review project policies, procedures, and guidelines and review the project activities to verify that the QA program is being properly implemented.
- Provide oversight of the data development and review process and of subcontracted laboratories.
- Develop work scopes for subcontracted laboratories that incorporate QAPP requirements.
- Enter data into the Washington State Department of Ecology's (Ecology) Environmental Information Management (EIM) system.

1.1.5 Laboratory Management

Subcontracted laboratories conducting analytical testing for this project are required to confirm with the QA Leader that laboratory procedures are consistent with the project QA objectives outlined in the QAPP.

The Laboratory QA Coordinator for each subcontracted laboratory administers the Laboratory QA Plan and is responsible for QC. Specific responsibilities of the Laboratory QA Coordinator include:

- Verify implementation of the Laboratory QA Plan.
- Serve as the laboratory point of contact.
- Implement corrective action as necessary when analytical QC limits are exceeded.
- Issue the final laboratory analytical report and QC data.
- Comply with the QAPP and contractual requirements for laboratory services.
- Participate in QA audits and compliance inspections as directed by the QA Leader, if needed.

OnSite Environmental, Inc. (OnSite) of Redmond, Washington, a Washington State accredited laboratory, is anticipated to be the primary subcontracted analytical laboratory starting in 2024. Alternative laboratories may be considered provided they are accredited by Ecology to perform the required analyses and otherwise meet the requirements of the SAP and QAPP.

2.0 Environmental Media Sampling and Analytical Testing

The planned sampling and analytical testing activities are described below. Details regarding sample containers, sample preservation, and sample holding times are provided in the QAPP (Appendix B of the CMP).

2.1 GROUNDWATER

Groundwater monitoring wells to be sampled include MW-2, MW-3, MW-6, MW-7, MW-8, and MW-10 as shown in Figure 2 of the CMP. Depth to groundwater will be measured using an electronic water level indicator prior to sampling groundwater. The wells should all be opened and allowed to equilibrate prior to collecting a round of water levels in a short period of time. Samples will be collected using low-flow purging and sampling methods following collection of groundwater level measurements. At least one well volume will be removed from wells prior to sampling.

Deeper wells MW-2, MW-3, MW-6, MW-7, and MW-8 are anticipated to be sampled using pump bladder technology or other similar method. MW-10 is a shallow well and groundwater can be obtained using a peristaltic pump (preferred), or bladder pump technology or bailer. The field water quality parameters pH, dissolved oxygen, oxidation-reduction potential, specific conductance, and temperature will be recorded at a minimum[1] using a portable calibrated multi-probe water quality meter. Depth to water will be monitored during purging to ensure that wells do not draw down more than 10% of the height of the water column.

At least one well volume will be purged prior to sample collection. Groundwater parameters are required to be stabilized prior to sample collection; stabilization generally means two consecutive readings within 10% for all water quality parameters. Once these conditions are met, samples will be collected in laboratory-supplied sample containers and placed in a cooler containing ice for delivery to the analytical laboratory Both unfiltered and field-filtered samples will be collected for total and dissolved metals analysis, respectively. Field-filtered samples will be filtered using disposable 0.45-micron filter cartridges. All analytes will have laboratory method detection limits that are equal or below the applicable water quality standards.

The groundwater samples will be analyzed for the following analytes shown in Table 2 of the CMP[2]:

- Metals (iron, manganese, arsenic, lead, and nickel) by United States Environmental Protection Agency (EPA) Methods 200.7, 200.8, 6010, or 6020.
- Ammonia by SM 4500-NH3.
- Alkalinity and bicarbonate by SM 2320B.
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs) by EPA 8270 (SIM only if needed to achieve the target reporting limit of 0.010 micrograms per liter [µg/L]).

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[1] These parameters are required; other parameters are encouraged to be collected including turbidity, dissolved oxygen (DO), and oxidation-reduction potential (ORP).

[2] Sampling may cease for individual analytes at individual locations when statistical compliance is achieved as described in the CMP.

2.2 SURFACE WATER

Surface water sampling will occur at the outlet of the weir structure at the toe of the northeast slope at SWS-1. The surface water sample collected will be unfiltered and will be obtained directly into lab containers from the weir, or, if flow is insufficient samples will be collected using a disposable Teflon bailer, a peristaltic pump and disposable polyethylene tubing, or a stainless steel or polyethylene cup or ladle. Field water quality parameters will be collected as described in Section 2.1. Samples will be analyzed as shown in Table 2 of the CMP by the methods indicated below:

- Metals (iron, manganese, and lead) by EPA Methods 200.7, 200.8, 6010, or 6020.
- Ammonia by SM 4500-NH3.
- Alkalinity and bicarbonate by SM 2320B.

2.3 SAMPLE IDENTIFICATION

The groundwater and surface water samples will be assigned unique sample identification numbers. Examples are provided below.

- Groundwater samples: MW-1-240815, where “MW-1” indicates the sample was collected from monitoring well MW-1 and “240815” (YYMMDD) indicates the sample was collected on August 15, 2024.
- Weir box surface water sample: SWS1-240815, where “SWS1” indicates a surface water sample collected at station SWS-1 and “240815” (YYMMDD) indicates the sample was collected on August 15, 2024.

The sample identification numbers will be written on the sample containers and chain-of-custody forms. Sample locations will be recorded in field notes, boring logs, and/or field sampling forms.

2.4 SAMPLE HANDLING

2.4.1 Sample Containers and Preservation

Requirements for sample containers, sample preservation, and sample holding times are provided in the QAPP contained in Appendix B.

2.4.2 Sample Packaging and Delivery to Analytical Laboratory

Samples will be packaged in a cooler containing ice for delivery to the analytical laboratory. The samples will be delivered to the laboratory under chain of custody by field personnel, courier, or commercial carrier.

Upon receipt of the sample coolers at the laboratory, the condition and temperature of the samples will be recorded, and the chain-of-custody forms will be signed to document transfer of sample custody. The chain-of-custody forms will be used internally by the laboratory to track sample handling and final disposition.

3.0 Equipment Decontamination

Most equipment is anticipated to be single-use disposable and not requiring decontamination. If any equipment is reused between sampling locations the equipment will be decontaminated between locations by washing in a solution of potable water and Alconox or Liquinox and rinsing in distilled or deionized water.

Decontamination and/or well purge water will be disposed of in accordance with all required laws and regulations.

4.0 Field Documentation

Field documentation will consist of sample collection forms and a field report for each sampling event. Photographs may be recorded if unusual conditions are observed. Field reports will include dates and times, summaries of field activities, names of field personnel and site visitors, weather conditions, field measurements, and other pertinent data.

Sample data recorded on field forms will include the sample date, time, location, sample identification number, sample matrix (e.g., soil, groundwater, etc.), sample collection method, field screening results, any associated QC samples collected, and the sampler's name.

The original field records will be kept in the project file following review by the Project Manager.

4.1 SAMPLE LABELS

Sample containers will be clearly labeled with indelible ink at the time of sampling. Sample labels will include the following information:

- Project name and/or number.
- Sampling date and time.
- Sample identification.

The same information entered on the sample label will be recorded on the chain-of-custody form.

4.2 CHAIN OF CUSTODY

Samples will be retained in the custody of field personnel until the samples are delivered (or released for delivery) to the analytical laboratory. The samples will be maintained using chain-of-custody procedures following sample collection and labeling. These procedures document the transfer of sample custody from the field to the laboratory. Each sample sent to the laboratory for analysis will be recorded on a chain-of-custody form.

The chain-of-custody form documents the sample identification number, sample matrix, sample collection date and time, and requested analyses for each sample, as well as all transfers of sample custody from the field to the analytical laboratory. The chain-of-custody form will be completed using indelible ink. Any corrections will be made by drawing a line through the information being corrected, entering the correct information, and initialing and dating the change.

The individuals relinquishing and receiving samples will sign, date, and note the time on the chain-of-custody form when transferring custody of samples. If sample coolers are shipped by commercial carrier, the chain-of-custody form will be enclosed in a resealable plastic bag and placed in the sample cooler prior to sealing the cooler for shipping. The commercial carrier will not sign the chain-of-custody forms as a receiver; instead, the laboratory will sign as a receiver when the samples are received. Internal laboratory records will document custody of the samples from the time they are received through final disposition.

5.0 Determination of Sampling Locations

The sampling locations have been surveyed. However, if any new locations are sampled the location will be recorded using GPS or survey.

6.0 Quality Assurance and Quality Control Requirements

The QAPP contained in Appendix B of the CMP discusses QA/QC requirements for the RI field sampling activities.

Appendix B

Quality Assurance Project Plan (QAPP)

Quality Assurance Project Plan

Go East Corp Landfill Site
Everett, Washington

for

Washington State Department of Ecology
on Behalf of Century Communities

May 22, 2024

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1.0 Introduction

This Quality Assurance Project Plan (QAPP) has been prepared for compliance monitoring at the closed Go East Corp Landfill Site (Site) as an appendix to the Compliance Monitoring Plan (CMP). The QAPP presents the quality objectives for environmental measurement data that will be generated during compliance monitoring and the quality assurance/quality control (QA/QC) procedures for achieving the quality objectives. The QAPP was developed based on guidelines contained in the Washington State Model Toxics Control Act (MTCA) Cleanup Regulation (Washington Administrative Code [WAC] Chapter 173-340) and Washington State Department of Ecology (Ecology) guidance contained in Ecology Publication No. 04-03-030, *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* (Ecology 2016). Ecology's guidance is generally consistent with United States Environmental Protection Agency (EPA) guidance contained in EPA Document QA/G-5, *Guidance for Quality Assurance Project Plans*, EPA Publication No. EPA/240/R-02/009 (EPA 2002).

Environmental measurements will be performed to produce data that are scientifically valid, of known and acceptable quality, and meet established objectives. QA/QC procedures will be implemented so that the precision, accuracy, representativeness, completeness, and comparability of the data generated meet the measurement quality objectives to the maximum extent possible.

2.0 Sample Collection, Handling, and Custody

The sample collection, handling, and custody procedures are described in the Sampling and Analysis Plan (SAP) included as Appendix A of the CMP.

3.0 Chemical Analyses/Methods

Groundwater and surface water samples will be collected as described in the SAP. The samples will be analyzed for one or more of the following constituents:

- Metals by EPA Methods 200.7/200.8/6010/6020.
- Ammonia by SM4500-NH3.
- Alkalinity and bicarbonate by SM 2320B.
- cPAHs by EPA 8270.

Samples will be containerized and preserved in the field according to the guidelines summarized in Table B-1. The samples will remain in a refrigerated state at the laboratory until analyzed. Sample holding times are defined as the method-specific recommended time between sample collection and extraction, sample collection and analysis, or sample extraction and analysis. Recommended holding times are presented in Table B-1.

4.0 Measurement Quality Objectives

The quality objectives for measurement data are to collect environmental sampling data of known, acceptable, and documentable quality. The specific quality objectives established for the project are as follows:

- Implement the procedures outlined herein for field sampling, sample custody, equipment operation and calibration, laboratory analysis, and data reporting to ensure consistency and thoroughness of data generated.
- Achieve the level of QA/QC required to produce scientifically valid analytical data of known and documented quality. This will be accomplished by establishing acceptance and performance criteria for analytical data precision, accuracy, representativeness, completeness, and comparability, and by evaluating project data against these criteria.

The sampling design, field procedures, laboratory procedures, and quality control (QC) procedures established for this project were developed to provide defensible data. Specific analytical data quality factors that may affect data usability include quantitative factors (analytical sensitivity, precision, accuracy, bias, and completeness) and qualitative factors such as representativeness and comparability. These data quality factors and associated acceptance and performance criteria are discussed below. Method-specific acceptance and performance criteria (QC limits) for samples are presented in Table B-2.

4.1 ANALYTICAL SENSITIVITY

Analytical methods have qualitative limitations regarding the level at which an analyte can be theoretically detected with a given statistical level of confidence that are often expressed as the method detection limit (MDL). These same methods also have quantitative thresholds at which an analyte can be quantified that are typically represented by the lowest point on a 5- to 7-point calibration curve (linear, response factors, weighted, etc.) generated prior to project sample analysis. In all cases, these latter real-world measurements are always greater (typically 3 to 5 times greater) than the MDL and are often expressed as the method reporting limit (MRL).

The detected concentration is identified as an estimate (i.e., “J” flagged) when an analyte is positively identified (i.e., detected) at a concentration greater than the MDL but less than the MRL. The analytical laboratory will provide numerical results for each analyte that is positively identified and report them as detected above the MRL or detected below the MRL but above the MDL.

Intended uses of project data such as risk assessment or comparison to numerical criteria typically dictate specific laboratory target MRLs necessary to fulfill stated objectives. The laboratory target MRLs for the project are presented in Table B-2. (Laboratory target MRLs are also known as practical quantitation limits.) It may be possible to achieve MRLs less than the target MRLs under ideal conditions. However, the target MRLs presented in Table B-2 are considered targets because several factors may influence final MRLs. First, MRLs can be affected by the physical conditions of samples. Second, analytical procedures may require sample dilutions or other practices to accurately quantify a particular analyte at concentrations above the range of the instrument. The effect of this is that other analytes could be reported as not detected but at a laboratory-adjusted, final MRL that is higher than a specified target MRL. Data users must be aware that elevated MRLs can bias statistical data summaries, and careful interpretation is required when using data sets with MRLs that exceed targets.

4.2 PRECISION

The precision of analytical data is a measure of the reproducibility among duplicate measurements of an analyte in a sample and applies to duplicate samples and duplicate spiked samples (matrix spikes/matrix spike duplicates [MS/MSDs]). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usability. Precision is expressed as the relative percent difference (RPD) of duplicate sample or duplicate spiked sample results. The RPD is calculated as:

$$RPD\,(\%) = \frac{|D_1 - D_2|}{(D_1 + D_2)/2}\ X\ 100,$$

Where:

D_1 = Reported concentration of analyte in primary sample/aliquot.

D_2 = Reported concentration of analyte in duplicate or duplicate spiked sample/aliquot.

The RPD will be calculated for laboratory duplicate measurements and compared to the project RPD QC limits. Examples of duplicate measurements for which RPD may be calculated include laboratory duplicates, and laboratory control samples/laboratory control sample duplicates (LCS/LCSDs), and MS/MSDs.

4.3 ACCURACY AND BIAS

Accuracy is a measure of bias in the analytical process. The closer the measurement value is to the true value, the greater the accuracy. Accuracy is typically evaluated by adding a known concentration (a “spike”) of a target or surrogate compound to a sample prior to analysis. The detected concentration or percent recovery (%R) of the spiked compound reported in the sample provides a quantitative measure of analytical accuracy. Since most environmental data collected represent single points spatially and temporally rather than an average, accuracy is generally more important than precision in assessing the data. In general, if %R values are low, non-detect results may be reported for analytes of interest when in fact these analytes are present in the sample (i.e., false negative results), and results for detected analytes may be biased low. The reverse is true when %R values are high. In this case, non-detect results are considered accurate, whereas detected values may be higher than true values.

For this project, accuracy will be expressed as the %R of a known surrogate spike, matrix spike, or laboratory control sample (blank spike) concentration:

$$Recovery\,(\%R) = \frac{Spiked\ Result - Unspiked\ Result}{Known\ Spike\ Concentration}\ X\ 100$$

Accuracy (%R) criteria are presented in Table B-2.

4.4 COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY

Completeness establishes whether enough valid measurements were obtained to meet project objectives. The number of samples and results expected establishes the comparative basis for completeness. The completeness goal is 90 percent useable data for the samples/analyses planned. If the completeness goal is not achieved, an evaluation will be performed to determine if the data are adequate to meet study objectives. The following equation is used to calculate percent completeness:

% Completeness = Number of valid results x 100/Number of possible results

Representativeness refers to the degree to which data accurately and precisely represent actual site conditions. Representativeness of the data will be evaluated by:

- Comparing actual field sampling procedures, including QC sampling activities, to those specified in the SAP and QAPP.
- Reviewing the RPD values for laboratory sample pairs to evaluate the precision of analytical results.
- Reviewing the data and identifying data that should be qualified as estimated, qualitative in nature, or rejected as not usable.

Only representative data will be used in subsequent data reduction, validation, and reporting activities.

Comparability refers to the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, the following items are evaluated when assessing data comparability:

- Whether each data set contains the same defining parameters.
- Whether the units used for each data set are convertible to a common metric scale.
- Whether similar analytical and quality assurance procedures were used to generate the data contained in each data set.
- Whether the analytical instruments used for each data set have similar detection levels.
- Whether the samples in each data set were selected and collected in a similar manner.

The overall usability of data sets generated during the project will be assessed based on the evaluation of the data quality factors discussed above and other QA/QC criteria described herein.

5.0 Quality Control Samples and Procedures

QC samples will be analyzed to ensure the precision, accuracy, representativeness, comparability, and completeness of the data as discussed below.

5.1 FIELD QUALITY CONTROL SAMPLES

Field QC samples serve as a control and check mechanism to monitor the consistency of sampling methods and potential influence of off-site factors on environmental samples. Examples of potential off-site factors include airborne VOCs and potable water used in drilling activities. QC samples often include field duplicates, equipment rinsate blanks, and trip blanks.

5.1.1 Field Duplicates

Field duplicates serve as measures for precision. They are created by placing aliquots of an environmental sample in separate containers and identifying one of the aliquots as the primary sample and the other as the duplicate sample. Field duplicates measure the precision and consistency of laboratory analytical procedures and methods, as well as the consistency of the sample processing techniques used by field personnel and/or the relative homogeneity of sample matrices. The duplicate sample is submitted to gain precision information on sample homogeneity, handling, shipping, storage and preparation, and analysis. Many field duplicates were analyzed during the RI, and no data qualifications were necessary. Given that there are only 5 samples collected twice per year, field duplicates are not being proposed for the sampling. This can be reevaluated by the project team including the entity performing the sampling and/or Ecology.

5.1.2 Rinsate Blanks

Equipment rinsate blanks are often collected when reusable sampling equipment is used. Since no reusable equipment is planned to be used, no rinsate blanks are proposed.

5.1.3 Trip Blanks

Laboratory-provided trip blanks will accompany samples collected for VOC analysis during field sampling and delivery to the laboratory. Trip blanks can assist in determining if contamination or cross contamination from airborne VOCs is occurring. Since VOCs are not being analyzed trip blanks are not proposed.

5.1.4 Other Field QC Samples

According to the *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017a), "The purpose of laboratory (or field) blank analysis is to assess the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples…" Field blanks will be used at the discretion of the QA Leader if there is a reason to suspect contamination introduced by ambient conditions in the field. Field blanks consist of samples of distilled or deionized water poured directly into sample containers in the field. Field blanks are analyzed for the same parameters as the associated project samples.

5.2 CHEMICAL LABORATORY QUALITY CONTROL

The analytical laboratory will follow standard analytical method procedures that include specified QC monitoring requirements. These requirements will vary by method, but generally include:

- Method blanks.
- Internal standards.
- Instrument calibrations.
- MS/MSDs.
- LCS/LCSDs.
- Laboratory replicates or duplicates.
- Surrogate spikes.
- Initial and continuing instrument calibrations.

5.2.1 Method Blanks

Laboratory procedures employ the use of several types of blanks but the most commonly used blanks for QA/QC assessments are method blanks. Method blanks are laboratory QC samples that consist of either a soil-like material that has undergone a contaminant destruction process, or a sample of reagent water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis.

Method blanks are particularly useful during volatiles analysis since VOCs can be transported in the laboratory through the vapor phase. If a substance is found in the method blank, it indicates that one (or more) of the following occurred:

- Measurement apparatus or containers were not properly cleaned and contained contaminants.
- Reagents used in the analytical process were contaminated with a substance(s) of interest.
- Contaminated analytical equipment was not properly cleaned.
- Volatile substances in the air with high solubility or affinities for the sample matrix contaminated the samples during preparation or analysis.

If method blank contamination occurs, it can be difficult to determine which of the above scenarios caused the contamination. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. Validation guidelines assist in determining which substances detected in associated project samples are likely present in the samples and which substances are likely attributable to the analytical process.

5.2.2 Matrix Spikes/Matrix Spike Duplicates

MS/MSDs are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH can affect the results of SVOC analyses. Additionally, the presence of a particular analyte in a sample may interfere with accurate quantitation of another analyte. MS/MSD data are reviewed in combination with other QC monitoring data to evaluate matrix effects. In some cases, matrix effects cannot be determined due to dilution and/or high levels of related substances in the sample.

An MS is created by spiking a known amount of one or more of the target analytes into a project sample, ideally at a concentration at least 5 to 10 times greater than the concentration in the unspiked sample. The %R is calculated by subtracting the unspiked sample result from the spiked sample result, dividing by the spike amount, and multiplying by 100.

The samples designated for MS/MSD analysis should be obtained from a sampling location that is suspected to not be highly contaminated, which is the case for all monitoring points for this project. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to assess possible matrix interferences, which can best be achieved with low levels of contaminants. MS/MSD analysis may not necessarily be performed on project samples given the low number of samples per event. However, MS/MSD data will be provided by the laboratory as applicable.

5.2.3 Laboratory Control Spikes/Laboratory Control Spike Duplicates

LCS/LCSDs (also known as blank spikes) are similar to MS/MSD samples in that a known amount of one or more of the target analytes is spiked into a prepared medium and the %R is calculated for the spiked substance(s). The primary difference between an MS and LCS is that the LCS spike medium is considered “clean” or contaminant-free. For example, reagent water is typically used for LCS water analyses. The purpose of an LCS is to help assess the overall accuracy and precision of the analytical process including sample preparation, instrument performance, and analyst performance. LCS data must be reviewed in context with other laboratory QC data to determine if corrective action is necessary for laboratory control limit exceedances.

5.2.4 Laboratory Duplicates

Laboratories often use MS/MSDs, LCS/LCSDs, and/or laboratory duplicates to assess precision. Laboratory duplicates are a second analysis of a field-collected environmental sample to assess internal laboratory precision.

5.2.5 Surrogate Spikes

Surrogate spikes are used to verify the accuracy of the analytical instrument and extraction procedures used for organic analysis methods. Surrogates are substances similar to the target analytes. A known concentration of surrogate is added to each project sample and passed through the instrument, noting the surrogate recovery. Each surrogate used has an acceptable range of %R. If a surrogate recovery is low, sample results may be biased low, and depending on the %R, a possibility of false negatives may exist. Conversely, a possibility of false positives exists when surrogate recoveries are biased high although non-detected results are considered accurate.

5.3 CALIBRATION PROCEDURES

5.3.1 Field Instrumentation

Field instrument calibration and calibration checks facilitate accurate and reliable field measurements. The calibration of the instruments will be checked and adjusted as necessary in general accordance with manufacturers' recommendations. Methods and frequency of calibration checks and instrument maintenance will be based on the type of instrument, stability characteristics, required accuracy, intended use, and environmental conditions.

5.3.2 Laboratory Instrumentation

The laboratory will be responsible for developing and implementing instrument calibration procedures. Several types of instrument calibrations are used, depending on the method, to determine whether the methodology is 'in control' by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements. This is done by verifying that the relative standard deviations (%RSD), the percent difference (%D), or the correlation coefficients are within the control limits specified in the validation documents. The main calibrations used are initial calibrations and continuing calibrations.

Calibration procedures and their appropriate chemical standards for chemical analytical testing are to comply with the specific methods in EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, 3rd Edition*, December 1996 and the laboratory's Standard Operating Procedures. Calibration documentation will be retained at the laboratory for a minimum of 6 months.

6.0 Laboratory Data Reporting and Deliverables

Laboratories will report data in formatted hardcopy and electronic form to the Project Manager and QA Leader. The laboratory will prepare electronic deliverables for data packages upon completion of analyses in accordance with project requirements. The laboratory will generally provide electronic data deliverable (EDD) files within 5 business days after delivering Portable Data Format (PDF) analytical results, including the appropriate QC documentation. Analytical laboratory measurements will be recorded in standard formats that display, at a minimum, the client/field sample identification, the laboratory sample identification, reporting units, analytical methods, analytes tested, analytical results, extraction and analysis dates, quantitation limits, and data qualifiers. Each sample delivery group will be accompanied by sample receipt forms and a case narrative identifying data quality issues.

7.0 Data Reduction and Assessment Procedures

This section describes data reduction and assessment procedures for field and laboratory analytical data.

7.1 DATA REDUCTION

Data reduction involves the conversion or transcription of field and analytical data to a useable format. The field and laboratory personnel will reduce their data for review by the QA Leader. For the laboratory, this will involve generating both PDF forms and EDDs. The QA Leader will review both data formats to verify that the data are consistent between formats.

7.2 REVIEW OF FIELD DOCUMENTATION AND LABORATORY RECEIPT INFORMATION

Documentation of field sampling data will be reviewed promptly after each sampling event for conformance with project QC requirements described in this QAPP. Field documentation will be checked for proper documentation of the following:

- Sample collection information (date, time, location, matrices, etc.).
- Field instruments used and calibration check data.
- Sample collection procedures.
- Sample containers, preservation, and volume.
- Field QC samples collected at the specified frequency.
- Chain-of-custody procedures.
- Sample delivery information.

Sample receipt forms provided by the laboratory will be reviewed for QC exceptions. The final laboratory data packages will describe (in the case narrative) the effects that any identified QC exceptions have on data quality. The laboratory will review transcribed sample collection and receipt information for correctness prior to delivering the final data packages.

7.3 CHEMICAL DATA VALIDATION

Project decisions, conclusions, and recommendations will be based on validated data. The purpose of data validation is to ensure that data used for evaluations and calculations are scientifically valid, of known and documented quality, and defensible. Laboratory data validation will be used to identify data that should be rejected based on QA/QC deficiencies.

The QA Leader will validate data collected during the project to ensure that the data are valid and usable for their intended purpose. Data will be validated in general conformance with EPA functional guidelines for data validation (EPA 2020a, 2020b). At a minimum, the following items will be reviewed to validate the data as applicable:

- Documentation that a final review of the data was completed by the Laboratory QA Coordinator.
- Documentation of analytical and QC methodology.
- Documentation of sample preservation and transport.
- Sample receipt forms and case narratives.
- The following QC parameters:
    - Holding times and sample preservation.
    - Method blanks.
    - MS/MSDs.
    - LCS/LCSDs.
    - Surrogate spikes.
    - Duplicates.
    - Initial Calibrations.
    - Continuing Calibrations.
    - Internal Standards.

The accuracy and precision achieved will be compared to the laboratory's analytical QC limits. QC limits are presented in Table B-2. Additional specifications and professional judgment by the QA Leader may be incorporated when appropriate data from specific matrices and project samples are not available.

A data validation memorandum will be prepared to document the overall quality of the validated data relative to the measurement quality objectives. The data validation memorandum will include the following components:

- **Data Validation Summary.** Summarizes the data validation results for all sample delivery groups by analytical method. The summary identifies any systematic problems, data generation trends, general conditions of the data, and reasons for any data qualification.
- **QC Sample Evaluation.** Evaluates the results of QC sample analyses, and presents conclusions based on these results regarding the validity of the project data.
- **Assessment of measurement quality objectives.** An assessment of the quality of data measured and generated in terms of accuracy, precision, and completeness relative to objectives established for the project.
- **Summary of Data Usability.** Summarizes the usability of data based on the results of the data validation process.

The data validation will help to achieve an acceptable level of confidence in the decisions that are to be made based upon the project data.

The project analytical data will be submitted to Ecology's Environmental Information Management system after the data validation is completed.

8.0 References

GeoEngineers, Inc. (GeoEngineers), 2021. Remedial Investigation Work Plan, Go East Corp Landfill Site, Everett, Washington. April 16, 2021.

EPA, 2002. Document QA/G-5, Guidance for Quality Assurance Project Plans, EPA/240/R-02/009. December 2002.

EPA, 2020a. National Functional Guidelines for Organic Superfund Methods Data Review, EPA-540-R-2017-002. November 2020.

EPA, 2020b. National Functional Guidelines for Inorganic Superfund Methods Data Review, EPA-540-R-2017-001. November 2020.

Washington State Department of Ecology (Ecology), 2016. Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies, Publication No. 04-03-030. July 2004, revised December 2016.

Table B-1

Groundwater and Surface Water Analytical Methods, Sample Containers, Preservation, and Holding Times

Go East Corp Landfill Site

Everett, Washington

Analysis	Method	Type/Number of Sample Containers	Sample Preservation	Recommended Sample Holding Times[1]
Metals	EPA 200.7/200.8	500 mL HDPE bottle (1)	HNO3 pH <2, cool to ≤6°C	6 months to analysis
Alkalinity, Bicarbonate	SM 2320B	500 mL HDPE bottle (2)	Cool to ≤6°C	14 days to analysis
Ammonia	SM 4500-NH3	250 mL HDPE bottle (1)	H2SO4 pH <2, cool to ≤6°C	28 days to analysis
PAHs	EPA 8270E/Selective Ion Monitoring	1 L amber glass bottle (1)	Cool to ≤6°C	7 days to laboratory extraction; 40 days to analysis after extraction

Notes:

[1] Recommended holding times are based on elapsed time from date of sample collection unless otherwise noted.

°C = Degrees Celsius

EPA = United States Environmental Protection Agency

HDPE = High-density polyethylene

HNO3 = Nitric acid

L = Liter

mL = Milliliter

PAH = Polycyclic aromatic hydrocarbons

Table B-2

Laboratory Target Method Reporting Limits and Quality Control Limits for Groundwater and Surface Water Samples

Go East Corp Landfill Site

Everett, Washington

Analyte	Laboratory Target Method Reporting Limit (PQL)[1]	Quality Control Limits	
		RPD[2]	%R
Metals - EPA Methods 200.7/200.8/6010/6020 (µg/L)			
Arsenic	3.3	20	80-120 (LCS) 75-125 (MS)
Iron	20.0	20	80-120 (LCS) 75-125 (MS)
Lead	1.1	20	80-120 (LCS) 75-125 (MS)
Manganese	11	20	80-120 (LCS) 75-125 (MS)
Nickel	22	20	80-120 (LCS) 75-125 (MS)
General Chemistry Parameters (mg/L)			
Alkalinity SM 2320B	15	10	89-110 (LCS)
Bicarbonate SM 2320B	15	10	89-110 (LCS)
Ammonia SM 4500-NH3	0.050	19	88-110 (LCS) 80-113 (MS)
Semivolatile Organic Compounds (SVOCs) - EPA Method 8270E/Selective Ion Monitoring (µg/L)			
Benzo(a)anthracene	0.010	NA	NA
Benzo(a)pyrene	0.010	NA	NA
Benzo(b)fluoranthene	0.010	NA	NA
Benzo(j)fluoranthene	0.010	NA	NA
Chrysene	0.010	NA	NA
Dibenz(a,h)anthracene	0.010	NA	NA
Indeno(1,2,3-cd)pyrene	0.010	NA	NA

Notes:

[1] MRL for project samples may vary depending on the matrix characteristics of the samples.

[2] Listed RPD limits are for LCS/MS duplicates or laboratory duplicates; RPD goal for groundwater field duplicates is 30%.

EPA = United States Environmental Protection Agency
LCS = Laboratory Control Sample
µg/L = Microgram per liter
MRL = Method Reporting Limits
MS = Matrix spike
NA = Not applicable
%R = Percent recovery
PQL = Practical Quantitation Limit
RPD = Relative Percent Difference