Interim Action Work Plan

Go East Corp Landfill Site
Everett, Washington
Ecology Agreed Order No. DE 18121

for
Washington State Department of Ecology on Behalf of P&GE, LLC

August 10, 2020

GeoEngineers
Earth Science + Technology

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File No. 6694-002-03

August 10, 2020

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1.0 INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) has prepared this Interim Action Work Plan (IAWP) on behalf of P&GE, LLC (P&GE) to describe the interim action activities that will be conducted at the Go East Corp Landfill Site in Everett, Washington (Site) (Figure 1). This IAWP was prepared in accordance with applicable requirements of Section 173-340-430(7) of the Washington State Model Toxics Control Act (MTCA) Cleanup Regulation, Washington Administrative Code (WAC) Chapter 173-340. It was revised based on comments received during the public comment period from May 8 to June 28, 2020.

The Go East Corp Landfill (Landfill) is a 9.6-acre, inactive, limited purpose landfill as defined in WAC 173-350-400. The Landfill and the 40.9-acre property on which it is located (Property) are owned by P&GE.

The interim action will be completed as a part of the Landfill closure activities described in the *Go East Landfill Closure Plan* (LFCP) (PACE 2012), which was last revised in January 2018. The Landfill closure will reduce the Landfill area from the current 9.6 acres to a final area of approximately 6.8 acres. This interim action applies primarily to the 2.8 acres of the Landfill that will be removed as part of the Landfill closure. This area is referred to herein as the interim action excavation area (the LFCP refers to this area as the "wedge area"). The area immediately outside the future Landfill limit to the west, south, and east, including the interim action excavation area, will be developed for residential use as part of the Bakerview Plat Subdivision (97 residential lots) following closure of the Landfill. The LFCP describes the planned development of the Bakerview Plat Subdivision. The Snohomish Health District (SHD) and the Washington State Department of Ecology (Ecology) approved the LFCP as part of SHD Solid Waste Facility Permit No. SW-027 (the Permit), subject to the development and written approval of final design drawings, construction specifications, and a Construction Quality Assurance Plan (CQAP) pursuant to WAC 173-350-400(5). The final design drawings and construction specifications are provided in the Land Disturbing Activity No. 1 plans (Landfill closure construction plans), which have been reviewed by Ecology and approved by the Snohomish County Planning and Development Services (PDS) and SHD.

The interim action will be performed under an Agreed Order with Ecology. The Agreed Order identifies remedial actions that P&GE must conduct at the Site to comply with MTCA. The Agreed Order requires P&GE to implement this IAWP during Landfill closure and to prepare a remedial investigation (RI) work plan, an RI and feasibility study (RI/FS) report, and a preliminary draft cleanup action plan in accordance with the MTCA Cleanup Regulation and the Washington State Solid Waste Handling Standards (WAC 173-350). This IAWP is a fully integrated part of the Agreed Order and is included as Exhibit D of the Agreed Order.

1.1 Interim Action Objective and Scope

The interim action will protect human health and the environment by removing landfill material from beyond the future Landfill limit during implementation of the LFCP. The current Landfill limit depicted in the figures contained in this IAWP is approximate; previous field surveys and investigations have not defined its exact location. Consequently, it is possible that landfill material exists beyond the approximate current Landfill limit depicted in the IAWP figures. For the purposes of the interim action, landfill material includes solid waste and intermixed soil within the approximate current Landfill limit depicted in the IAWP figures and any solid waste and intermixed soil that may be present beyond the current Landfill limit depicted in the IAWP figures but within the historical Landfill area. Approximately 50,000 to 60,000 cubic yards of landfill material will be excavated from the periphery of the Landfill and relocated beneath an engineered capping system to be installed during Landfill closure, thereby reducing the footprint of the Landfill from 9.6 acres to approximately 6.8 acres.

The interim action also includes the removal of potential contaminated soil that may be encountered beneath or beyond landfill material during excavation. The Permit allows landfill material to be disposed of in the Landfill but prohibits contaminated soil from being disposed of in the Landfill. For this interim action, contaminated soil is defined as soil that is beneath or beyond landfill material, that has become contaminated by a release and contains hazardous substances at concentrations that exceed applicable MTCA cleanup levels (WAC 173-350-100).

After the interim action excavation is completed and confirmation soil sampling indicates that soil remaining beyond the future Landfill limit does not contain hazardous substances at concentrations exceeding Site-specific interim action levels (IALs) developed by Ecology, the interim action excavation area will be backfilled with clean fill obtained from areas of the Property outside the current Landfill limit. Development of the Bakerview Plat Subdivision will not begin until the Landfill closure work and interim action are completed as described in the LFCP, the approved Landfill closure construction plans (i.e., the design drawings, construction specifications, and CQAP), and this IAWP.

1.2 Property Description

1.2.1 Location and Setting

The Landfill and Property (Snohomish County Parcel Number 280521-004-002-00) are situated in the northwest quarter of the southeast quarter of Section 21, Township 28 North, Range 5 East, Willamette Meridian in Snohomish County (Figure 1). The Property address is 4330 108th Street Southeast, Everett, Washington, 98208. The Property is located approximately 1.4 miles east-northeast of Silver Lake and is generally situated on a northeastward-facing bluff that overlooks the Snohomish River Valley, with the Snohomish River located approximately 1.8 miles north-northeast of the Property. The location of the Property in relation to regional physiographic features is shown in Figure 2.

The Landfill is situated within a former eastward-sloping ravine that historically existed in the northern portion of the Property. This former ravine was entirely filled by the historical landfilling activities. A map depicting the topography of the former ravine beneath the Landfill and the major geologic units that constitute the landforms and native soils on the Property is shown in Figure 3. Local geology is discussed in Section 1.2.3.

The present-day topography of the Property is depicted in Figure 4. Two steep-sided, eastward-sloping drainage ravines are present in the southern portion of the Property south of the Landfill. These ravines turn northward just east of the eastern Property boundary and extend beyond the northeastern corner of the Property to the Snohomish River Valley, which is approximately at sea level. The western and southwestern approximately two-thirds of the Landfill surface generally slopes gently to the east (Figure 4). The northeastern approximately one-third of the Landfill surface consists of a steep, heavily vegetated slope. Elevations of the Landfill surface range from approximately 260 feet above the North American Vertical Datum of 1988 (NAVD88) in the westernmost portion of the Landfill, to 225 feet NAVD88 at the top of the steep northeastern slope, to 110 feet NAVD88 at the base of the northeastern slope.

The deepest portion of the Landfill occurs near its center at the top of the northeastern slope. The estimated maximum depth of the Landfill in this area is approximately 50 feet below ground surface (bgs) based on test pit explorations completed in the Landfill (see Section 2.1) and a comparison of present-day ground surface elevations in the Landfill area to estimated historical ground surface elevations in the former ravine beneath the Landfill. Figure 5 shows two generalized cross sections through the Landfill, one parallel and one perpendicular to the axis of the former ravine. The locations of the cross-section lines are shown in Figure 4. The cross sections shown in Figure 5 were developed based on limited observations and data from field reconnaissance and subsurface explorations in the Landfill area (Geolabs – Washington, Inc. 1970, Associated Earth Sciences, Inc. [AESI] 2009b), as well as topographic and geologic information obtained from land surveying and geologic mapping studies in western Snohomish County (Newcomb 1952, Smith 1976, United States Geological Survey [USGS] 1985). The groundwater levels and subdrain depicted on the cross sections are discussed below. Subsurface conditions at the Site will be further investigated during the RI.

1.2.2 Vegetation and Structures

Vegetation across most of the area disturbed by landfilling activity consists of a sparse canopy of red alder and Black cottonwood, with Himalayan blackberry in the understory. Portions of the Property in the west and in the ravine areas are less disturbed and contain red alder, big leaf maple, Western hemlock, salmonberry, sword fern, filaree, and piggy-back plant (Wetland Resources, Inc. 2010). Several trails are present on the Property including trails around and across portions of the Landfill. Four groundwater monitoring wells (wells MW-1 through MW-4) were installed around the Landfill perimeter in 2009 (Figure 4). The measured depth to groundwater in three of these monitoring wells in 2009 and 2011 was approximately 30 to 50 feet bgs. Groundwater was not present in the other monitoring well (see Section 2.2).

The only existing building on the Property is a small wooden storage shed located approximately 200 feet south of the northwestern corner of the Property (Figure 4). This shed belongs to the owner of the west-adjacent residential property.

An abandoned storage tank appeared on the Property approximately 40 feet east of the wooden storage shed sometime after the cessation of Landfill operations in 1983 and before 2010. The cylindrical tank was resting on its side directly on the ground surface and was not connected to any piping, equipment, or other structures. It appeared to be a former steel underground storage tank with a capacity of approximately 500 gallons. According to P&GE, the tank was empty (P&GE 2020). The origin and past use of this abandoned tank is unknown. It was never used by the then owner of the Landfill, the Go East Corporation (Go East), nor by the present owner, P&GE. It is presumed to have been a residential heating oil tank that was disposed of on the Property by a trespasser (P&GE 2020). A previous owner of the west-adjacent residential property asked P&GE in approximately 2017 if P&GE would be willing to remove the tank, as the property owner considered the tank an eyesore. P&GE agreed to remove the tank during Landfill closure construction that was anticipated to begin in 2019. The residential property owner expressed displeasure at having to wait until 2019 for the tank to be removed. P&GE noticed that the storage tank was gone during a Property visit in September 2018. The tank was not seen during subsequent Property visits in 2019 and 2020 and was presumed to have been removed by a trespasser (P&GE 2020).

1.2.3 Local Geology

Three geologic units have been mapped on the Property (Figure 3). These units consist of approximately 10 to 60 feet of Vashon glacial till (Qvt) (a mixture of sand, silt, pebbles, cobbles, and boulders), underlain by approximately 80 to 130 feet of Vashon glacial advance outwash (Qva) (primarily sand with some gravel), underlain by pre-Vashon glacial lacustrine silt deposits. Within the Property boundaries, the glacial lacustrine silt deposits constitute the upper portion of the transitional beds stratigraphic sequence (Qtb) that has been identified throughout the Snohomish River Valley and adjacent plateau areas. The glacial till (Qvt) mantles the plateau areas in the western and northwestern portions of the Property at elevations greater than approximately 260 to 320 feet NAVD88. Directly beneath the glacial till, the advance outwash sand (Qva) deposits comprise the ridges, walls, and floors of the ravines at elevations between approximately 260 to 320 feet NAVD88 and 180 feet NAVD88. The lacustrine silt deposits (Qtb) comprise the walls and floors of the ravines at elevations below approximately 180 feet NAVD88.

The *Geologic Map of the Everett 7.5-Minute Quadrangle, Snohomish County, Washington* (USGS 1985) indicates that the transitional beds comprising the lacustrine silt unit and other pre-Vashon deposits are laterally continuous across a broad area of the bluff bounding the western margin of the Snohomish River Valley including the areas north, northeast, and east of the Property. This suggests the lacustrine silts are present below the advance outwash sands throughout the Property. The lacustrine silt unit was encountered below the advance outwash sand unit in borings drilled for four groundwater monitoring wells installed on the Property in 2009 (see below), providing further evidence that the lacustrine silts are present below the advance outwash sands throughout the Property.

The former ravine beneath the Landfill was originally operated as an excavation borrow source for sand from 1969 until the early to mid-1970s. The advance outwash sand deposits were mined from the walls of the ravine. The sand mining activities widened the ravine before landfilling activities began in the early 1970s. Portions of the steep bank below the plateau areas in the western and northwestern portions of the Property likely represent relic cut faces from the mining operations. The approximate shape of the widened ravine created by the mining activities has been estimated by others (AESI 2009b) and is depicted in Figure 3. The widened ravine was subsequently filled with landfill wastes to form the Landfill. The lateral and vertical limits of the Landfill correspond to the approximate lateral and vertical limits of the historical sand mining activities.

1.2.4 Regional and Local Surface Water Hydrology

The Property is situated in the Marshland Tributaries drainage basin within the City of Everett Snohomish River watershed (City of Everett 2017). The Marshland Tributaries basin constitutes 3.5 square miles of the City's 11.6 square mile Snohomish River watershed. Most of this basin lies southeast of the Everett city limits but within the City's Urban Growth Area. The headwaters of the basin's tributaries are in the upland bluffs bordering the western edge of the Snohomish River Valley. The upland bluffs are heavily urbanized with a significant amount of residential land use and some commercial land use. The tributaries receive surface water drainage from the bluff areas and flow through steep ravines in an easterly to northeasterly direction before discharging to a series of agricultural drainage channels in the Snohomish River floodplain. The floodplain drainage channels discharge to the Snohomish River (City of Everett 2017).

The historical development in the residential and commercial areas of the Marshland Tributaries basin has resulted in degraded water quality conditions. The significant urban footprint of the upland bluff areas produces surface water runoff with a variety of pollutants including metals, fertilizers, pesticides, nutrients, and fecal coliform bacteria. In the Snohomish River Valley directly east of the basin, commercial agriculture and pasture lands dominate. These land use practices likely contribute sediment, nutrient, and bacterial contamination to receiving waters through disturbed soils, livestock grazing, and application of fertilizers (City of Everett 2017).

Surface water quality in the Marshland Tributaries basin is generally poor based on 2002 data. Elevated concentrations of fecal coliform, copper, and lead have been reported (City of Everett 2017). Pet wastes and failing septic systems are likely sources of fecal coliform. The elevated copper and lead concentrations are likely a result of untreated stormwater from roads and parking lots. High sediment loads have been reported and are likely due to erosion from the steep streams on the bluffs. Elevated nutrient concentrations also have been reported and are likely a result of fertilizer use in upland residential areas (City of Everett 2017).

There are three streams (Streams 1 through 3) on the Property in the vicinity of the Landfill (Figure 4). Stream 1 enters the Property from the west and flows southeast across the graded area south-adjacent to the Landfill before descending into the drainage ravine south of the Landfill, where it joins Stream 2. Stream 1 previously flowed along the bottom of the former ravine beneath the Landfill. At the direction of SHD and PDS, Go East diverted Stream 1 to the south after it acquired the Property in 1979 (P&GE 2020).

Stream 2 flows east in the drainage ravine south of the Landfill and then off the Property where it turns towards the north. Stream 2 ultimately drains to the Snohomish River Valley.

Stream 3 originates from one or more groundwater seeps or "springs" at the base of the Landfill's northeastern slope and flows east off the Property, where it joins Stream 2. At the direction of SHD and PDS, Rekoway, Inc. (Rekoway), the operator of the Landfill prior to Go East's acquisition of the Property, installed a subdrain on the bottom of the former ravine beneath the Landfill before landfilling activities began (P&GE 2020). The subdrain consists of a perforated pipe embedded in gravel. This subdrain likely drains groundwater beneath the Landfill and discharges groundwater towards the base of the northeastern slope. The local geology and measured groundwater levels in the monitoring wells surrounding the Landfill suggest that the groundwater source of Stream 3 is perched on top of the low-permeability lacustrine silts and that groundwater flows to the northeast in the advance outwash sands beneath the Landfill. This conceptual model of groundwater occurrence and flow is depicted in the cross sections shown in Figure 5. The engineered capping system described in the LFCP will reduce infiltration and percolation of stormwater through the Landfill.

Snohomish County critical area maps and resources available from the Washington State Department of Fish and Wildlife and the Washington State Department of Natural Resources (DNR) indicate that fish do not use the streams on the Property or the agricultural drainage channels in the Snohomish River floodplain. Fish are deterred from accessing the streams and the floodplain drainage channels by a pump station adjacent to the Snohomish River and by poor water quality in the drainage channels (Wetland Resources, Inc. 2010, PDS 2020). Streams 1 and 2 have been classified as Type Np streams according to the DNR forest practices water typing classification system, and Stream 3 has been classified as a Type Ns stream (Wetland Resources, Inc. 2010). Type Np streams are non-fish supporting, perennial streams that may have spatially intermittent dry reaches. Type Ns streams are non-fish supporting, seasonal streams. Neither Type Np nor Type Ns streams meet the physical criteria to be potentially used by fish (DNR 2020).

1.3 Landfill Operational History and Regulatory Background

Detailed descriptions of the Landfill operational history are provided in the Agreed Order, the LFCP, and the document *Amended Decision of the Snohomish County Hearing Examiner: Amended Decision Affirming SEPA Threshold Determination, Approving Rezone, and Approving Preliminary Subdivision with Conditions* (Amended Decision) (Snohomish County 2018). The Agreed Order and the Amended Decision also provide detailed summaries of the Landfill regulatory background. The summary presented below is based on information contained in the Agreed Order.

The former ravine beneath the Landfill was used as an excavation borrow source beginning in 1969 when a permit was issued for excavation and sand reclamation for a two-year period. Sand was mined from the walls of the ravine for several years before landfilling activities began.

Rekoway purchased the Property in February 1972 and received a conditional use (CU) permit in March 1972 to perform sand and gravel excavation and operate a solid waste landfill accepting wood, mineral, and concrete solid materials, but not garbage or putrescibles (i.e., solid waste containing organic material that is liable to decompose). In 1974 or 1975, Rekoway sought authorization to accept tires and bulk packaging such as cardboard, pallets, large parcel wrappings, shredded paper, and warehousing waste materials. In September 1975, Snohomish County issued a CU permit allowing additional types of waste.

In August 1974, Rekoway accepted approximately 200 cubic yards of baghouse dust containing magnesium, phosphate, and aluminum dusts from Northwest Wire and Rope in Seattle (Ecology & Environment, Inc. 1987). The initial intermixing of these waste materials caused fires when the materials were first deposited in the Landfill. The fire hazard was eliminated when the different types of wastes were separated using a front-end loader. The fires caused by the metal dusts soon burned out and the remaining waste materials were covered with soil (Ecology & Environment, Inc. 1987). Rekoway also accepted partially burned trees and stumps that may have contributed to ongoing smoldering through 1977, when SHD and Snohomish County suspended Rekoway's CU permit.

Go East conditionally purchased the Property from Rekoway in 1979 and applied to Snohomish County to reinstate the CU permit and approve its transfer to Go East. Go East applied for a new woodwaste landfill permit following Snohomish County's conditional approval of these requests. Both the CU permit and the woodwaste landfill permit were conditioned on extinguishing existing fire(s) left by Rekoway. From November 1979 through early 1980, Go East excavated smoldering woodwaste debris (primarily large tree stumps) from Rekoway's previous operations and extinguished the smoldering fires. Full Landfill operations commenced in early 1980 after the Snohomish County Fire Marshal formally verified that Go East had successfully extinguished the fires. Thereafter, the CU permit and the woodwaste landfill permit were renewed until 1982, when the CU permit expired. SHD renewed the woodwaste landfill permit into 1983. Throughout Go East's operation of the Landfill, SHD frequently oversaw and inspected the operations and the imported waste materials without finding problems under its regulations. SHD issued a stop work order in 1983 and Go East stopped accepting waste in the summer of 1983.

An additional fire began on the surface of the Landfill's northeastern slope in October 1983. The soil cover in the area where the fire started was washed away when the local fire district sprayed water on the slope in an effort to extinguish the fire. This caused the fire to spread across the top surface of the Landfill without penetrating to the lower disposal cells. The fire burned out by January 1986. There have been no other fires at the Landfill since January 1986.

SHD prepared a Site Hazard Assessment (SHA) under MTCA in May 2004. Based on the SHA findings, SHD recommended that future residential development of the Property include and implement a landfill closure plan. SHD further recommended No Further Action (NFA) at the Site under MTCA. SHD subsequently issued an NFA letter in June 2004 that stated Ecology had made an NFA determination for the Site based on the SHA.

P&GE acquired the Property from Go East in May 2009 and subsequently developed plans to close the Landfill as part of Property redevelopment. SHD issued Solid Waste Facility Permit No. SW-027 to P&GE on May 11, 2018. The Permit authorized a limited purpose landfill subject to WAC 173-350-400 and required P&GE to close the Landfill in accordance with the approved LFCP. Ecology's Solid Waste Management Program has provided technical support to SHD for the authorization and oversight of the Permit.

The Kings Ridge Homeowners Association and the 108th Street Point Homeowners Association (collectively, the HOAs) appealed SHD's issuance of the Permit to the Washington State Pollution Control Hearings Board (PCHB). Following an adjudicative hearing on the appeal, the PCHB found that the HOAs had not met their burden to prove either that the LFCP or the Permit violated applicable landfill closure regulations. The PCHB determined that the LFCP met the closure requirements specified in WAC 173-350-400(8) and that additional design evaluation and components could be added to the Permit-required design drawings, construction specifications, and CQAP if necessary and appropriate.

Based on information contained in the report *Go East Landfill – Information for MTCA Assessment* (Practical Environmental Solutions [PES] 2019) that was submitted to Ecology in March 2019 on behalf of the HOAs, Ecology prepared an Initial Investigation Field Report for the Site in June 2019. The Initial Investigation Field Report stated that concentrations of total and dissolved arsenic and total chromium, iron, lead, and/or manganese reported in groundwater samples collected from three groundwater monitoring wells in 2009 exceeded MTCA default cleanup levels, and recommended that the Site be listed on Ecology's Confirmed and Suspected Contaminated Sites List.

Ecology rescinded its 2004 NFA determination on June 18, 2019 and added the Site to Ecology's Confirmed and Suspected Contaminated Sites List. The Cleanup Site Identification Number is 4294 and the Facility/Site Identification Number is 2708.

1.4 Future Land Use

After the Landfill is capped and closed pursuant to the LFCP and the Landfill closure construction plans, the Landfill area will be developed with a grass cover, stormwater control facilities, and playfields. An environmental covenant will be recorded for the Property to ensure the engineered capping system remains protective of human health and the environment.

As described in the LFCP, the area adjacent to the west, south, and east sides of the future Landfill limit will be developed for residential use within the Bakerview Plat Subdivision. The planned lot layout of the subdivision is shown in Figure 4.

2.0 EXISTING CONDITIONS AND PREVIOUS INVESTIGATIONS

The area that will be excavated and developed for future residential use is located on the western, southern, and eastern periphery of the Landfill (Figure 4). The northeastern portion of the Landfill consists of a steep, heavily vegetated slope. After historical landfilling activities ceased in the summer of 1983, the surface of the Landfill was covered with 1 to 2 feet of sandy soil obtained from the on-site advance outwash deposits. The northeastern slope area will not be excavated as part of the interim action. However, this area will be inspected during the interim action excavation activities as discussed in Section 4.0. If landfill debris is observed on or near the ground surface in the northeastern slope area, it will be removed and disposed of in accordance with the approved Landfill closure construction plans.

The ground surface in the interim action excavation area is generally rugged. Thick shrub vegetation including blackberry brambles is present in some areas, while other areas have relatively little vegetation. Landfill material such as concrete and asphalt rubble, glass and wood debris, carpet, and scraps of metal are visible on the ground surface in unvegetated portions of the interim action excavation area. Groundwater occurs at depths of approximately 30 to 50 feet bgs based on groundwater levels measured in monitoring wells installed around the perimeter of the Landfill in 2009 (see Section 2.2).

Previous subsurface explorations and sampling in and adjacent to the interim action excavation area have included test pit explorations, landfill gas probes, and groundwater monitoring well installation and sampling. Observations and/or sampling of soil and landfill materials in the test pit explorations and monitoring well borings are relevant to the interim action and are discussed below. Previous landfill gas and groundwater sampling will be described in a forthcoming RI work plan.

2.1 Test Pit Explorations

A total of 130 test pits have been completed on the Property (Figure 4) to assess the types of materials contained in the Landfill, the depth and lateral limits of the Landfill, concentrations of hazardous substances potentially present in the landfill material, and/or geotechnical properties of the landfill material and native soil. The test pits allowed for visual observation of subsurface conditions and were completed to variable depths ranging from a few feet to 38 feet bgs. The test pits completed on the Property are identified in the following list by the company that performed the work, the number of test pits completed, and the year the work was performed.

- Hong West Associates completed 47 test pits in 2002.
- AESI completed 17 test pits in 2009.
- Terra Associates completed 15 test pits in January 2019 and 25 test pits in June 2019.
- Hos Brothers Construction completed 26 test pits in July 2019.

Approximately 91 of the 130 test pits were excavated within the interim action excavation area or immediately adjacent to the interim action excavation area within the Landfill, including the 25 test pits completed in June 2019. Soil samples were collected for chemical analysis from the 25 test pits completed in June 2019; soil samples were not collected from the other test pits. Exploration logs for all but the 26 test pits completed in July 2019 (for which test pit logs were not prepared) are contained in Appendix A. The scope and purpose of the test pit investigations are summarized below.

Forty-seven test pits were completed in 2002 by Hong West Associates and 17 test pits were completed in 2009 by AESI. These test pits were excavated within and just outside the Landfill limit to assess the types of materials contained in the Landfill, the depth and lateral limits of the Landfill, and/or geotechnical properties of the landfill material.

Fifteen test pits were completed by Terra Associates in January 2019 to assess geotechnical properties of the advance outwash sand deposits that will be used as a source of structural fill during the Landfill closure construction activities. Fourteen of these test pits were excavated outside the Landfill limit; one test pit (TP-15) was excavated inside the eastern edge of the Landfill (Figure 4). The scope and results of the January 2019 geotechnical investigation are presented in *Geotechnical Report, Bakerview, 4330 – 708th Street SE, Everett, Washington* (Terra Associates 2019), contained in Appendix B.

Fifty-one test pits were completed by Terra Associates and Hos Brothers Construction in June and July 2019. These test pits were excavated within and adjacent to the interim action excavation area to assess the depth and lateral limits of the Landfill, and to characterize hazardous substance concentrations potentially present in the landfill material as required by Section 3.6.2 of the LFCP ("Preventive Measures during Relocation"). Test pits TP-1 through TP-25 excavated in June 2019 were completed for the primary purpose of assessing hazardous substance concentrations in the landfill material to be excavated. Exploration logs for these 25 test pits are included in Appendix A and the sampling conducted at these locations is described below. An additional 26 reconnaissance test pits were excavated in July 2019 to further assess the depth and lateral limits of the Landfill. Seven of the reconnaissance test pits were named (test pits TP-1-A, TP-1-B, TP-2-A, TP-3-A, TP-5-A, TP-8-A, and TP-9-A) (Figure 4); the other 19 reconnaissance test pits were not named. Exploration logs for the reconnaissance test pits were not prepared and samples were not collected from them.

Landfill materials encountered in the test pits (including in the interim action excavation area) consisted of assorted construction debris including gravel, concrete, wire, woody debris, tires, brick, asphalt, plastic pipe, dimensional lumber, burned wood, metal, broken glass, and carpet. These materials were encountered at depths ranging from 1 foot to 38 feet bgs. Landfill materials also included soil used as cover material during Landfill operations. This soil was obtained from borrow sources on the Property and consisted of loose silty sand with gravel. Native soil encountered beneath the landfill materials generally consisted of gray or tan to brown, fine to medium-grained sand interpreted as Vashon glacial advance outwash (AESI 2009a). No apparent hazardous materials such as asbestos or lead-based paint were observed in the test pits.

The lateral limits of the Landfill have been delineated and surveyed based on the previous test pit explorations, Go East's knowledge of the Landfill limits at the time landfilling activities ceased in 1983 (as documented in a survey drawing prepared in 1984 by Chenoweth & Associates, Inc.), and the estimated limits of the historical sand mining activities (Figure 3). Figure 6 shows the test pit locations where landfill material was observed.

As required by Section 3.6.2 of the LFCP ("Preventive Measures during Relocation"), soil samples were collected from test pits TP-1 through TP-25 completed in June 2019 to assess concentrations of hazardous substances potentially present in the landfill material to be relocated beneath the engineered capping system. Five soil samples were collected from the sidewalls of test pit TP-1 at depths ranging from 4 to 20 feet bgs. One soil sample was collected from the temporary stockpile of landfill material excavated at each of the other test pits (TP-2 through TP-25). The soil samples were submitted for laboratory analysis of the following parameters:

- Gasoline range organics (GRO) and benzene, toluene, ethylbenzene, and xylenes (BTEX) by Method NWTPH-Gx and United States Environmental Protection Agency (EPA) Method 8021B, respectively.
- Diesel range organics (DRO) and heavy oil range organics (ORO) by Method NWTPH-Dx.
- Low-level polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270D/Selective Ion Monitoring (SIM).
- Arsenic, cadmium, chromium, lead, mercury, nickel, and zinc by EPA Methods 6010D/7471B.
- pH by EPA Method 9045D.

In addition to the above analyses, seven soil samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) lead by EPA Methods 1311/6010D.

Analytical testing results for the soil samples collected in June 2019 are summarized in Table 1. Laboratory analytical reports for the samples are contained in Appendix C.

All the June 2019 soil analytical results except TCLP lead were screened against numerical "suggested maximum values" (SMVs) presented in LFCP Table G.4 – Recommended Parameters and Suggested Values for Determining Reuse and Disposal Options. The analytical results for TCLP lead were screened against the Washington State toxicity characteristic dangerous waste threshold for lead (WAC 173-303-090[8][c]). The June 2019 soil analytical results also were compared to soil IALs developed for the interim action by Ecology. The soil IALs are conservative, risk-based numerical criteria that must be met in soil outside the future Landfill limit after landfill material in the interim action excavation area has been removed and relocated beneath the engineered capping system.[1] The June 2019 soil analytical results were compared to the soil IALs to select supplemental landfill material sampling locations as described in Section 4.1.3. Exceedances of the IALs in the June 2019 soil samples do not preclude the relocation of landfill materials from the interim action excavation area to the interior portion of the Landfill for containment beneath the engineered capping system as described in the LFCP.

The reported concentrations of the following constituents exceeded respective SMVs in one or more of the soil samples collected in June 2019 (Table 1): DRO, ORO, carcinogenic PAHs (cPAHs), cadmium, chromium, lead, mercury, and zinc. None of the TCLP lead results exceeded the toxicity characteristic dangerous waste threshold for lead. Supplemental sampling and analysis of landfill material is required by Section 3.6.2 of the LFCP because constituents were detected in soil at concentrations exceeding SMVs. The supplemental sampling is described in Section 4.1.3.

2.2 Groundwater Monitoring Wells

AESI installed four groundwater monitoring wells (wells MW-1 through MW-4) around the perimeter of the Landfill in August 2009 to measure groundwater levels and assess groundwater quality. The monitoring well locations are shown in Figure 4. Details of the monitoring well installation and sampling are provided in the report *Revised Hydrogeology, Ground Water, and Surface Water Quality Report, Former Go East Landfill, Snohomish County, Washington* (AESI 2009b), included as Appendix B of the LFCP. Boring logs for the monitoring wells are contained in Appendix A of this IAWP. The discussion below focuses on the soil types encountered in the monitoring well borings and the measured depths to groundwater in the wells. Previous sampling and chemical analysis of groundwater will be described in a forthcoming RI work plan.

Native soil encountered from the ground surface to depths ranging from approximately 28 to 73 feet bgs in the monitoring well borings consisted of gray or tan to brown, fine to medium-grained sand with

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[1] The soil IALs and the risk-based regulatory criteria Ecology used to derive them are provided in Appendix D. The risk-based criteria apply to various potential routes of human and ecological exposure to hazardous substances under Ecology default assumptions regarding the highest beneficial use of a particular environmental medium (i.e., soil, groundwater, surface water, sediment, or indoor air) and the maximum exposure expected to occur under current and potential future Site use conditions (e.g., residential land use; land use as habitat for plants, soil biota, and wildlife; groundwater use as drinking water; surface water use as drinking water and fish habitat; surface water use for fishing). For most constituents, the most stringent risk-based criterion was selected as the IAL. However, if the most stringent criterion was less than the Puget Sound or statewide natural background concentration or the practical quantitation limit of the associated laboratory analytical method, the higher of natural background or the practical quantitation limit was selected as the IAL in accordance with WAC 173-340-740(5)(c).

occasional gravel and silt lenses. AESI interpreted this soil as Vashon glacial advance outwash. Soil encountered directly below the advance outwash deposits consisted of very stiff to hard, bluish gray silt interpreted as pre-Vashon glacial lacustrine deposits (AESI 2009a, 2009b). The base of the lacustrine silt deposits has not been identified in the subsurface explorations completed on the Property. However, the fine-grained Admiralty clay geologic unit, a member of the transitional beds that includes the lacustrine silt deposits, has been described as being hundreds of feet thick beneath Snohomish County's main river troughs (e.g., the Snohomish River Valley) (Newcomb 1952).

The groundwater monitoring wells range in depth from 31 feet bgs (well MW-4) to 75 feet bgs (well MW-1) and extend into the upper 2 to 3 feet of the lacustrine silt deposits. The wells are constructed of 2-inch diameter polyvinyl chloride (PVC) casing with 10-foot screens installed at the bottom of the wells. The well screens extend approximately 8 feet into the advance outwash sands above the lacustrine silts. The wells are completed at the ground surface with a concrete surface seal, an aboveground protective steel casing, and bollards.

Groundwater levels in the monitoring wells were measured in August 2009, February 2011, and April 2011. The depths to groundwater in wells MW-1 through MW-3 during these gauging events ranged from approximately 30 to 50 feet bgs (AESI 2009b). Well MW-4 was dry (i.e., it did not contain groundwater) during each gauging event. Groundwater occurs in the advance outwash sands above the lacustrine silt unit (AESI 2009b). Wells MW-1 and MW-3 are hydraulically upgradient of the Landfill and well MW-2 is crossgradient of the Landfill based on the measured groundwater levels. Groundwater is inferred to generally flow to the east toward the Snohomish River Valley, with a component of southerly flow in the northern portion of the Property (AESI 2009b).

Available information suggests that in general, the groundwater table beneath the Property occurs at or below the bottom of the Landfill. This is based on several lines of evidence including the measured groundwater levels in monitoring wells MW-1 through MW-3, the elevation of the bottom of the Landfill as estimated from the historical topography of the former ravine beneath the Landfill, and the reported presence of a subdrain beneath the Landfill (described in Section 1.2.4). Groundwater occurrence relative to the bottom of the Landfill is depicted conceptually in Figure 5.

3.0 REGULATORY REQUIREMENTS

The environmental impacts of the planned Landfill closure (including the excavation, relocation, and capping of landfill material described in this IAWP) were evaluated by PDS pursuant to the State Environmental Policy Act (SEPA) (Revised Code of Washington [RCW] Chapter 43.21C) beginning in 2014. The history of the SEPA process for the Landfill closure is detailed in the Agreed Order. PDS issued a mitigated determination of nonsignificance decision (MDNS) on May 7, 2017. The MDNS was appealed by the HOAs. The Snohomish County Hearing Examiner affirmed the MDNS in the Amended Decision. The Amended Decision stated that SHD relies heavily on Ecology's review of landfill closure applications, and that SHD would not issue a landfill closure permit unless and until Ecology concurs with the proposed Landfill closure plan. The Amended Decision also stated that the Landfill closure work requires a land disturbing activity permit from PDS (per the Land Disturbing Activity code, Snohomish County Code Chapter 30.63B), and that a Hydraulic Project Approval permit is required (per the Hydraulic Code Rules, WAC 220-660) to relocate the stream on the west side of the Property (Stream 1) as described in the LFCP.

PDS authorized a land disturbing activity permit for the Landfill closure to P&GE on May 11, 2019. The Washington State Department of Fish and Wildlife issued a Hydraulic Project Approval permit for the stream relocation to P&GE on October 16, 2018. Ecology authorized permit coverage under Ecology's Construction Stormwater General Permit dated November 18, 2015 to P&GE on September 18, 2018 (per the Washington State Water Pollution Control Act, RCW 90.48, and the Federal Water Pollution Control Act, Title 33 United States Code, Section 1251 et seq.).

The Landfill closure work will be performed in accordance with the Solid Waste Management Act (RCW 70.95) and Solid Waste Handling Standards (WAC 173-350) pursuant to the Permit. The Permit requires P&GE to close the Landfill in accordance with the approved LFCP and submit and obtain SHD's written approval of the final design drawings, construction specifications, and a CQAP prior to beginning construction. The required design drawings, specifications, and CQAP were reviewed by Ecology and approved by SHD. The applicable requirements for the Landfill closure are identified in Sections 2.1, 5.3, and 9.2.6 of the LFCP.

The interim action will be performed pursuant to MTCA (RCW 70.105D) and the requirements of the Agreed Order. Accordingly, the interim action is exempt from the procedural requirements of certain state laws and any laws requiring or authorizing local government permits or approvals for the action per WAC 173-340-710(9)(b). The interim action still must comply with the substantive requirements of applicable laws.

Other laws and regulations with substantive requirements (in addition to MTCA and its implementing regulations) anticipated to be applicable to the interim action described in this IAWP and that are known at this time include the following:

- Hazardous Waste Management Act (RCW 70.105) and Dangerous Waste Regulations (WAC 173-303).
- Washington Industrial Safety and Health Act (RCW 49.17) and applicable parts of Safety Standards for Construction Work (WAC 296-155).
- Occupational Safety and Health Act of 1970 (Title 29 United States Code, Chapter 15) and the Hazardous Waste Operations and Emergency Response standard for construction (Title 29 Code of Federal Regulations [CFR], Section 1926.65).

The Safety Standards for Construction Work (WAC 296-155) and the Hazardous Waste Operations and Emergency Response standard for construction (29 CFR 1926.65) include requirements that workers are to be protected from exposure to contaminants. A Health and Safety Plan describing actions that will be taken to protect the health and safety of environmental field representatives will be prepared before interim action construction activities begin. The construction contractor will be required to prepare and submit a separate Health and Safety Plan for use by contractor personnel. Personnel engaged in work that involves hazardous material excavation and handling will comply with MTCA worker safety and health provisions in WAC 173-340-810.

4.0 INTERIM ACTION DESCRIPTION

This section describes the interim action including the interim action components, compliance with MTCA interim action criteria, and alternative actions considered.

4.1 Interim Action Components

The interim action consists of the following components, listed in the general sequential order in which they will be completed:

- On-site fill source sampling.
- Former storage tank area sampling.
- Supplemental landfill material sampling.
- Excavation of landfill material and reconnaissance of northeastern slope.
- Confirmation soil sampling in interim action excavation area.
- Lot exploration outside current Landfill limit.

Three of the interim action components – supplemental landfill material sampling, excavation of landfill material and reconnaissance of the northeastern slope, and elements of the lot exploration outside the current Landfill limit – are required elements of the approved LFCP and Landfill closure construction plans, and are being performed pursuant to the Permit. The IAWP provides additional sampling plans for these Permit-required tasks. The other interim action components – on-site fill source sampling, former storage tank area sampling, confirmation soil sampling in the interim action excavation area, and sampling elements of lot exploration – are being performed pursuant to the Agreed Order. The interim action components are described below.

On-site fill source sampling (Section 4.1.1), former storage tank area sampling (Section 4.1.2), and supplemental landfill material sampling (Section 4.1.3) were completed prior to finalization of this IAWP, as requested by Ecology based on public comments. The IAWP, which was updated after P&GE's submission of these sampling results to Ecology on July 30, 2020, does not reconcile the Ecology-approved modifications to the work plan based on field conditions.

4.1.1 On-Site Fill Source Sampling

Following the excavation and relocation of landfill material (described in Section 4.1.4), the interim action excavation area will be backfilled with structural fill consisting of the on-site native sandy soil (advance outwash sand) present in areas outside the current Landfill limit. This on-site source of structural fill will be sampled at ten locations to evaluate background concentrations of metals, polychlorinated biphenyls (PCBs), and PAHs in the native soil and to verify that other hazardous substances are not present at concentrations exceeding IALs. The approximate proposed sampling locations are shown in Figure 7. Samples will be collected from shallow test pits excavated to a depth of 1 to 3 feet bgs using hand tools or a backhoe or excavator.

Soil in each test pit will be field screened for the potential presence of hazardous substances. Field screening will consist of visual observation for soil staining, soil headspace vapor screening using a photoionization detector, and water sheen testing. If field screening evidence of contamination is not observed, the on-site fill source samples will be collected from the temporary stockpile of excavated soil at each test pit location. If field screening evidence of contamination is observed, the samples will be collected from soil considered most likely to be contaminated based on the field screening results. Each test pit will be backfilled with the excavated soil following sampling. Details regarding sampling procedures, analytical testing, and quality assurance/quality control (QA/QC) guidelines and procedures are provided in the

Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) contained in Appendices E and F, respectively.

The on-site fill source soil samples will be submitted to OnSite Environmental, Inc. in Redmond, Washington (OnSite), a Washington State accredited laboratory, and analyzed for the following parameters to evaluate background concentrations:

- Low-level PAHs by EPA Method 8270E/SIM.
- PCBs as Aroclors by EPA Method 8082A.
- Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc by EPA Methods 6010D/6020B/7471B.

Three of the samples also will be analyzed for the following parameters to verify that other hazardous substances are not present at concentrations exceeding IALs:

- GRO by Method NWTPH-Gx.
- DRO and ORO by Method NWTPH-Dx without acid/silica gel cleanup. If DRO or ORO are detected, follow-up analysis with acid/silica gel cleanup will be performed to assess potential analytical interference by biogenic organics (e.g., tannins and lignins from woody debris).
- Volatile organic compounds (VOCs) by EPA Methods 5035A (unpreserved sample collection and preparation) and 8260D (analysis).
- Semivolatile organic compounds (SVOCs) with low-level PAHs by EPA Method 8270E/SIM.
- Organochlorine pesticides by EPA Method 8081B.
- Chlorinated acid herbicides by EPA Method 8151A.

It is anticipated that there is enough clean native sandy soil available on the Property to meet the structural fill needs of the Landfill closure project. Should it become necessary to use imported structural fill, a sample of the import fill material will be obtained from the fill supplier and analyzed before the material is used on-site. The import fill sample will be analyzed for the parameters listed above to verify that the material does not contain concentrations of hazardous substances exceeding IALs.

4.1.2 Former Storage Tank Area Sampling

Soil at the location of the former storage tank approximately 40 feet east of the existing wooden shed will be sampled to assess whether soil at this location is contaminated. The approximate proposed sampling location is shown in Figure 7. One shallow soil sample will be collected from the upper 1 foot of soil using hand tools. The sample will be collected during the same field mobilization as the on-site fill source sampling described in Section 4.1.1.

Soil in the former storage tank area will be field screened for the potential presence of hazardous substances as described in Section 4.1.1. If field screening evidence of contamination is not observed, the soil sample will be collected from shallow soil at the center of the estimated former storage tank location. If field screening evidence of contamination is observed, the sample will be collected from soil considered most likely to be contaminated based on the field screening results. Details regarding sampling procedures, analytical testing, and QA/QC guidelines and procedures are provided in the SAP and QAPP contained in Appendices E and F.

The former storage tank area soil sample will be analyzed by OnSite for the following parameters:

- GRO and BTEX by Method NWTPH-Gx and EPA Method 8021B.
- DRO and ORO by Method NWTPH-Dx without acid/silica gel cleanup. If DRO or ORO are detected above the IAL, follow-up analysis with acid/silica gel cleanup will be performed to assess potential analytical interference by biogenic organics.

The former storage tank area soil sample will be archived at the laboratory. If GRO, BTEX, DRO, or ORO are detected in the sample at concentrations exceeding IALs, additional constituents will be analyzed in accordance with MTCA Table 830-1, "Required Testing for Petroleum Releases" (WAC 173-340-900). If soil contamination exceeding IALs or other applicable MTCA criteria is confirmed, the contaminated soil will be excavated and disposed of off site as appropriate based on the analytical results. If contaminated soil is removed from the former storage tank area, confirmation soil samples will be collected at the excavation limits to confirm that contamination exceeding IALs or other applicable MTCA criteria has been removed. The confirmation soil sampling in the former storage tank area will be performed consistent with applicable guidelines in Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016).

4.1.3 Supplemental Landfill Material Sampling

Section 3.6.2 of the LFCP includes a sampling plan to pre-characterize landfill material, including sampling frequency, analytical parameters, and unspecified supplemental sampling contingent on results of the initial pre-characterization sampling. This IAWP describes the supplemental sampling locations and analytical parameters for the landfill material. Pre-characterization samples are collected and analyzed to identify potential dangerous waste and potential PCB waste in the Landfill. As described in the LFCP, the pre-characterization sample results also are compared to SMVs, which are based on MTCA cleanup levels, to allow the contractor to evaluate worker protection requirements. The pre-characterization samples are predictive in nature. Section 4.1.4 describes plans for additional observation, field screening, and contingent sampling and analysis during excavation of the heterogeneous landfill material.

Supplemental sampling of landfill material in the interim action excavation area will be conducted to further characterize the landfill material prior to excavating and relocating it beneath the engineered capping system. As discussed in Section 2.1, 29 soil samples were collected from 25 test pits excavated in or adjacent to the interim action excavation area in June 2019. These soil samples were collected and analyzed as required by Section 3.6.2 of the LFCP to characterize concentrations of hazardous substances potentially present in the landfill material that will be relocated beneath the engineered capping system, and to evaluate whether landfill materials requiring off-site disposal as a Washington State dangerous waste may be present. The June 2019 soil samples were analyzed for GRO, DRO, ORO, BTEX, PAHs, selected metals, TCLP lead, and pH.

The supplemental soil samples will be collected during the same field mobilization as the on-site fill source sampling described in Section 4.1.1. The samples will be collected from 12 test pits in the interim action excavation area (Figure 7). The proposed supplemental soil sampling locations are adjacent to the June 2019 test pit locations where the highest concentrations of hazardous substances were detected relative to the IALs, as these are the locations considered most likely to contain elevated concentrations of other hazardous substances, if present.

The test pits will be excavated using a backhoe or excavator and will be observed and logged by an environmental representative. The test pits will be excavated to a depth of 15 feet bgs or to native soil beneath the landfill material if native soil is encountered first. Soil in the test pits will be field screened for the potential presence of hazardous substances as described in Section 4.1.1.

One soil sample will be collected from each test pit for chemical analysis. The sample will be collected from soil considered most likely to be contaminated based on field screening results. If field screening evidence of contamination is not observed, the soil sample will be collected from the temporary stockpile of excavated landfill material at each test pit location. Each test pit will be backfilled with the excavated material following sampling. Details regarding sampling procedures, analytical testing, and QA/QC guidelines and procedures are provided in the SAP and QAPP contained in Appendices E and F.

The supplemental soil samples will be analyzed by OnSite for the following parameters:

- GRO by Method NWTPH-Gx.
- DRO and ORO by Method NWTPH-Dx without acid/silica gel cleanup. If DRO or ORO are detected above the IAL, follow-up analysis with acid/silica gel cleanup will be performed to assess potential analytical interference by biogenic organics.
- VOCs by EPA Methods 5035A and 8260D.
- SVOCs with low-level PAHs by EPA Method 8270E/SIM.
- PCBs as Aroclors by EPA Method 8082A.
- Organochlorine pesticides by EPA Method 8081B.
- Chlorinated acid herbicides by EPA Method 8151A.
- Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc by EPA Methods 6010D/6020B/7471B.

Follow-up TCLP analysis will be performed if any constituents are detected in a soil sample at concentrations (in milligrams per kilogram) greater than 20 times the respective Washington State toxicity characteristic dangerous waste thresholds specified in WAC 173-303-090(8)(c) (in milligrams per liter). The TCLP analysis will be performed to evaluate whether the constituent concentrations in the sample leachate exceed the respective toxicity characteristic criteria. Any landfill material found to exceed toxicity characteristic dangerous waste thresholds will be disposed of at an off-site facility permitted to receive Washington State dangerous wastes. Additionally, any landfill material found to contain total PCB concentrations (sum of Aroclors) greater than or equal to 1 milligram per kilogram will be disposed of in accordance with the Federal Toxic Substances Control Act requirements for PCB remediation waste (40 CFR 761.50[b][3] and 761.61).

4.1.4 Excavation of Landfill Material and Reconnaissance of Northeastern Slope

Landfill material will be excavated from the interim action excavation area and relocated beneath the engineered capping system as required by the LFCP. Details regarding the planned execution of this work are contained in the LFCP. The landfill material will be excavated, hauled, and graded using conventional construction equipment (e.g., excavators, trucks, dozers, etc.). Qualified personnel including a certified asbestos professional will be present on site during the excavation work to observe the excavated material and the soil exposed in the excavation. If anomalous soil staining, odors, or unexpected wastes such as drums are observed, associated soil will be field screened for VOCs or other contaminants using a photoionization detector and water sheen testing as described in Section 4.1.1. If this field screening indicates potential soil contamination, one or more soil samples will be collected and analyzed for GRO, DRO, ORO, VOCs, SVOCs, PCBs, pesticides, herbicides, metals, and/or relevant TCLP constituents depending on observed conditions and suspected contaminants. The LFCP, Landfill closure construction plans, and Permit specify waste handling and disposal requirements for various landfill materials that may be encountered.

As landfill material is removed from the interim action excavation area, native soil beneath the landfill material will be field screened as described in Section 4.1.1. An assessment of whether all landfill material has been removed from a particular area will be made based on visual observation of native soil on the bottom and/or sidewalls of the excavation as described in the LFCP, and on Landfill depth data derived from previous subsurface explorations. If field screening indicates that native soil at any location on the bottom and/or sidewalls of the excavation may be contaminated, the suspect contaminated soil will be excavated, temporarily stockpiled on site, and covered with plastic sheeting. Suspect contaminated native soil stockpiles will be characterized for disposal in accordance with applicable guidelines in Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016). If contamination exceeding IALs is confirmed in stockpiled native soil, the contaminated soil will be disposed of off site at a permitted facility. Confirmation soil samples will be collected from the excavation limits in a particular area as described in Section 4.1.5 when all landfill material and suspect contaminated native soil has been removed from the area. An environmental representative will document field activities, observations, and field screening results in field reports and photographs.

The report *Go East Landfill – Information for MTCA Assessment* (PES 2019) states that representatives of Landau Associates, Inc. observed partially exposed drums and metal debris near the base of the Landfill's steep northeastern slope in January 2019. The approximate location where the drums and metal debris were reportedly observed is shown in Figure 4.

A reconnaissance inspection of the entire northeastern slope of the Landfill will be conducted and if landfill material (e.g., drums or other debris) is found in the existing landfill cover, it will be removed and disposed of in accordance with the LFCP, Landfill closure construction plans, and Permit. If field screening indicates potential contamination of the landfill cover, soil samples will be collected and analyzed for GRO, DRO, ORO, VOCs, SVOCs, PCBs, pesticides, herbicides, metals, and/or relevant TCLP constituents depending on the waste types observed and suspected contaminants. If concentrations of hazardous substances exceeding IALs are detected, the affected landfill cover material will be excavated and placed beneath the engineered capping system or disposed of off site as appropriate based on the analytical results. Confirmation soil samples will be collected at the excavation limits and analyzed to confirm the soil removal meets regulatory requirements. The confirmation soil sampling will be performed consistent with applicable guidelines in Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016).

4.1.5 Confirmation Soil Sampling

Confirmation soil sampling will be conducted in the interim action excavation area following removal of landfill material and any suspect contaminated native soil. The confirmation soil samples will be submitted for laboratory analysis to confirm that hazardous substances are not present in native soil beyond the future Landfill limit at concentrations exceeding IALs.

The approximate proposed confirmation soil sampling locations are shown in Figure 8. The confirmation soil samples will be collected from the bottom and/or sidewalls of the excavation area as the excavation work progresses using an excavator or hand tools. The sampling locations may be adjusted based on the size and shape of the excavation area, access constraints, or other field conditions. The final sampling locations will be evaluated and selected based on field conditions and field screening results. Details regarding sampling procedures, analytical testing, and QA/QC guidelines and procedures are provided in the SAP and QAPP contained in Appendices E and F. An environmental representative will document the confirmation soil sampling activities in field reports and photographs.

The confirmation soil samples will be submitted to OnSite and analyzed for the following parameters:

- GRO by Method NWTPH-Gx.
- DRO and ORO by Method NWTPH-Dx without acid/silica gel cleanup. If DRO or ORO are detected above the IAL, follow-up analysis with acid/silica gel cleanup will be performed to assess potential analytical interference by biogenic organics.
- VOCs by EPA Methods 5035A and 8260D.
- SVOCs with low-level PAHs by EPA Method 8270E/SIM.
- PCBs as Aroclors by EPA Method 8082A.
- Organochlorine pesticides by EPA Method 8081B.
- Chlorinated acid herbicides by EPA Method 8151A.
- Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc by EPA Methods 6010D/6020B/7471B.

If contamination exceeding IALs is detected in native soil, the contaminated soil will be excavated, potentially staged on site, and disposed of at an off-site, permitted facility, and follow-up confirmation soil sampling will be conducted to confirm that no contaminated soil remains. The interim action excavation area will not be backfilled until results of the confirmation soil sampling indicate that hazardous substances are not present in soil beyond the future Landfill limit at concentrations exceeding IALs.

4.1.6 Lot Exploration Outside Current Landfill Limit

Excavation activities conducted in areas of the future Bakerview Plat Subdivision outside the current Landfill limit (to obtain borrow material for structural fill, for example) will be observed by a qualified professional as detailed in the lot exploration plan contained in the Landfill closure construction plans. Additionally, areas outside the current Landfill limit that are to be filled or left ungraded will be scarified to a depth of 1 foot to verify that no landfill wastes are present before filling or recompacting these areas. Test pit explorations also will be performed as determined necessary to verify that no landfill wastes are present in areas outside the current Landfill limit.

Solid waste found outside the historical Landfill area (if any) will be removed and disposed of off site in accordance with the LFCP, Landfill closure construction plans, and Permit. If field screening indicates native soil in the area may be contaminated, soil samples will be collected and analyzed for GRO, DRO, ORO, VOCs, SVOCs, PCBs, pesticides, herbicides, metals, and/or relevant TCLP constituents depending on the waste types observed and suspected contaminants. If contamination exceeding IALs is detected in native soil, the contaminated soil will be excavated, potentially staged on site, and disposed of at an off-site, permitted facility. Confirmation soil samples will be collected at the excavation limits and analyzed to confirm that contamination exceeding IALs has been removed. The confirmation soil sampling will be performed consistent with applicable guidelines in Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016).

4.2 Compliance with MTCA Interim Action Criteria

The interim action meets the MTCA criteria for interim actions identified in subsections (1), (2), and (3) of WAC 173-340-430, as follows:

- The interim action will eliminate or substantially reduce one or more pathways for exposure to hazardous substances at the Site (i.e., the direct contact and leaching to groundwater exposure pathways) (WAC 173-340-430[1][a]).
- The interim action will provide for completion of an RI/FS (WAC 173-340-430[1][c]).
- The interim action will achieve soil cleanup standards for a portion of the Site (i.e., the interim action excavation area) (WAC 173-340-430[2][a]).
- The interim action will not foreclose reasonable alternatives for the final cleanup action if a final cleanup action is determined to be necessary based on the results of the RI (WAC 173-340-430[3][b]).

4.3 Alternative Actions Considered

During the early stages of Landfill closure planning, consideration was given to transporting the landfill material excavated from the interim action excavation area to an off-site, permitted facility for disposal. The proposed alternative of consolidating the excavated material under the engineered capping system within the future Landfill limit was selected because this approach minimizes worker safety hazards by minimizing handling of the excavated landfill material. Consolidating and capping the excavated material within the future Landfill limit also reduces community traffic impacts and potential safety risks associated with hauling an estimated 50,000 to 60,000 in-place cubic yards (i.e., 2,500+ truck and trailer loads) of landfill material to an off-site disposal facility.

5.0 REPORTING

Upon completion of the interim action, an interim action completion report will be submitted to Ecology as required by the Agreed Order.

6.0 SCHEDULE

The on-site fill source sampling, former storage tank area sampling, and supplemental landfill material sampling were performed on June 29 and June 30, 2020. Ecology authorized P&GE to perform clearing and grubbing of trees and other vegetation in the construction area before the Agreed Order is finalized. Landfill excavation and closure construction work is scheduled to begin after the Agreed Order is finalized.

7.0 REFERENCES

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Table 1

Analytical Results for Soil Samples Collected June 2019

Go East Corp Landfill Site

Everett, Washington

Sample Identification	TP-1-4'	TP-1-8'	TP-1-12'	TP-1-16'	TP-1-20'	TP-2	TP-3	TP-4	TP-5	TP-6	TP-7	TP-8	TP-9	TP-10	TP-11	LFCP Table G.4 SMV (a)	Interim Action Level (b)	Toxicity Characteristic Criterion (c)
Sample Date	6/14/2019	6/14/2019	6/14/2019	6/14/2019	6/14/2019	6/14/2019	6/14/2019	6/14/2019	6/14/2019	6/14/2019	6/12/2019	6/17/2019	6/14/2019	6/17/2019	6/17/2019			
Approximate Sample Depth	4-5 ft bgs	8-9 ft bgs	12-13 ft bgs	16-17 ft bgs	20-21 ft bgs	Stockpile	Stockpile	Stockpile	Stockpile	Stockpile	Stockpile	Stockpile	Stockpile	Stockpile	Stockpile			
Total Petroleum Hydrocarbons by Ecology Methods NWTPH-Gx/NWTPH-Dx (mg/kg)																		
Gasoline Range Organics (GRO)	7.2 U	**6.9**	8.1 U	8.0 U	**11**	8.3 U	6.9 U	7.4 U	7.8 U	7.1 U	**32**	8.6 U	11 U	7.0 U	9.5 U	100	30/100	--
Diesel Range Organics (DRO)	30 U	650 U	340 U	320 U	1,600 U	340 U	300 U	170 U	**230**	150 U	**90**	370 U	190 U	300 U	370 U	200 - 460	260 (d)	--
Heavy Oil Range Organics (ORO)	**330**	**11,000**	**3,600**	**2,800**	**28,000**	**5,000**	**4,100**	**2,000**	**1,400**	**910**	**660**	**3,100**	**1,300**	**1,400**	**5,200**	200 - 460	260 (d)	--
Aromatic Volatile Organic Compounds by EPA Method 8021B (mg/kg)																		
Benzene	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.023 U	0.020 U	0.020 U	0.03	0.0024	--
Toluene	0.072 U	0.064 U	0.081 U	0.080 U	0.073 U	0.083 U	0.069 U	0.074 U	0.078 U	0.071 U	0.077 U	0.086 U	0.11 U	0.070 U	0.095 U	7	0.40	--
Ethylbenzene	0.072 U	0.064 U	0.081 U	0.080 U	0.073 U	0.083 U	0.069 U	0.074 U	0.078 U	0.071 U	0.077 U	0.086 U	0.11 U	0.070 U	0.095 U	6	0.24	--
Xylene, m-,p-	0.072 U	0.064 U	0.081 U	0.080 U	0.073 U	0.083 U	0.069 U	0.074 U	0.078 U	0.071 U	0.077 U	0.086 U	0.11 U	0.070 U	0.095 U	9 (e)	14 (e)	--
Xylene, o-	0.072 U	0.064 U	0.081 U	0.080 U	0.073 U	0.083 U	0.069 U	0.074 U	0.078 U	0.071 U	0.077 U	0.086 U	0.11 U	0.070 U	0.095 U	9 (e)	14 (e)	--
Polycyclic Aromatic Hydrocarbons by EPA Method 8270D/Selective Ion Monitoring (mg/kg)																		
1-Methylnaphthalene	0.016 U	0.12 U	0.13 U	0.025 U	0.13 U	0.14 U	**0.13**	0.089 U	0.081 U	0.082 U	**0.017**	**0.016**	**0.12**	**0.70**	0.075 U	NE	34	--
2-Methylnaphthalene	0.016 U	0.12 U	0.13 U	**0.027**	**0.14**	0.14 U	**0.18**	0.089 U	0.081 U	0.082 U	**0.024**	**0.023**	**0.11**	**1.2**	0.075 U	NE	320	--
Acenaphthene	0.016 U	0.12 U	0.13 U	0.025 U	**0.19**	0.14 U	**0.29**	**0.16**	**0.20**	**0.36**	**0.022**	**0.038**	**0.44**	**2.0**	0.075 U	NE	3.1	--
Acenaphthylene	**0.028**	0.12 U	0.13 U	0.025 U	0.13 U	0.14 U	0.12 U	0.089 U	0.081 U	0.082 U	0.0085 U	**0.048**	**0.20**	**0.46**	0.075 U	NE	NE	--
Anthracene	**0.040**	0.12 U	0.13 U	**0.027**	**0.19**	0.14 U	**0.15**	0.089 U	0.081 U	**0.26**	**0.011**	**0.044**	**0.22**	**2.2**	0.075 U	NE	47	--
Benzo(g,h,i)perylene	**0.20**	**0.23**	**0.24**	**0.074**	**0.41**	**0.17**	**0.31**	**0.49**	**0.12**	**0.093**	**0.024**	**0.13**	**0.66**	**0.37**	**0.16**	NE	NE	--
Fluoranthene	**0.25**	**0.26**	**0.37**	**0.14**	**1.1**	**0.34**	**0.88**	**0.40**	**0.28**	**0.52**	**0.060**	**0.15**	**0.89**	**12**	**0.10**	NE	0.020	--
Fluorene	0.016 U	0.12 U	0.13 U	0.025 U	**0.20**	0.14 U	**0.33**	**0.12**	**0.22**	**0.46**	**0.015**	**0.039**	**0.28**	**2.5**	0.075 U	NE	1.6	--
Naphthalene	0.016 U	0.12 U	**0.14**	**0.036**	**0.30**	0.14 U	**0.39**	**0.24**	**0.18**	0.082 U	**0.022**	**0.073**	**0.34**	**1.1**	0.075 U	NE	4.5	--
Phenanthrene	**0.084**	**0.34**	**0.45**	**0.074**	**1.2**	**0.27**	**0.69**	**0.31**	**0.34**	**0.85**	**0.071**	**0.11**	**0.36**	**11**	0.075 U	NE	NE	--
Pyrene	**0.43**	**0.33**	**0.45**	**0.19**	**1.3**	**0.42**	**0.76**	**0.53**	**0.26**	**0.39**	**0.068**	**0.20**	**1.4**	**9.0**	**0.18**	NE	0.020	--
Benzo(a)anthracene	**0.22**	**0.16**	**0.19**	**0.089**	**0.54**	**0.15**	**0.39**	**0.27**	0.081 U	0.082 U	**0.020**	**0.087**	**0.80**	**3.0**	0.075 U	See cPAHs	See cPAHs	--
Benzo(a)pyrene	**0.20**	**0.19**	**0.22**	**0.085**	**0.44**	**0.16**	**0.29**	**0.53**	**0.098**	0.082 U	**0.027**	**0.14**	**0.95**	**0.99**	**0.12**	See cPAHs	See cPAHs	--
Benzo(b)fluoranthene	**0.26**	**0.24**	**0.22**	**0.11**	**0.53**	**0.20**	**0.45**	**0.59**	**0.14**	**0.091**	**0.033**	**0.18**	**1.3**	**1.7**	**0.13**	See cPAHs	See cPAHs	--
Benzo(j,k)fluoranthene	**0.044**	0.12 U	0.13 U	**0.027**	**0.14**	0.14 U	**0.14**	**0.17**	0.081 U	0.082 U	**0.0094**	**0.041**	**0.46**	**0.59**	0.075 U	See cPAHs	See cPAHs	--
Chrysene	**0.30**	**0.40**	**0.36**	**0.16**	**0.98**	**0.26**	**0.57**	**0.39**	**0.099**	**0.15**	**0.026**	**0.11**	**0.91**	**2.5**	**0.11**	See cPAHs	See cPAHs	--
Dibenz(a,h)anthracene	**0.042**	0.12 U	0.13 U	0.025 U	0.13 U	0.14 U	0.12 U	0.089 U	0.081 U	0.082 U	0.0085 U	**0.025**	**0.15**	**0.11**	0.075 U	See cPAHs	See cPAHs	--
Indeno(1,2,3-c,d)pyrene	**0.14**	**0.17**	**0.16**	**0.059**	**0.30**	**0.14**	**0.30**	**0.47**	**0.10**	0.082 U	**0.022**	**0.13**	**0.68**	**0.45**	**0.096**	See cPAHs	See cPAHs	--
cPAHs (TTEC)	**0.27**	**0.26**	**0.29**	**0.12**	**0.61**	**0.23**	**0.43**	**0.69**	**0.14**	**0.068**	**0.036**	**0.19**	**1.3**	**1.6**	**0.15**	0.1 - 2.0	0.084	--
Metals by EPA Methods 6010D/7471B (mg/kg)																		
Arsenic	12 U	12 U	13 U	13 U	13 U	14 U	12 U	13 U	12 U	12 U	13 U	15 U	15 U	12 U	15 U	20	20	--
Cadmium	0.59 U	**0.90**	**1.0**	**1.5**	**0.99**	0.69 U	**1.0**	**0.81**	**0.78**	0.61 U	**1.5**	**1.2**	**5.3**	0.59 U	**0.99**	2.0	0.80	--
Chromium	**33**	**32**	**28**	**26**	**24**	**31**	**31**	**32**	**46**	**29**	**30**	**40**	**66**	**39**	**37**	42	48	--
Lead	**49**	**99**	**270**	**260**	**180**	**140**	**170**	**120**	**160**	**83**	**95**	**310**	**560**	**98**	**620**	250	50	--
Mercury	0.30 U	0.30 U	**0.39**	0.32 U	0.32 U	0.34 U	**0.43**	0.33 U	0.30 U	0.31 U	0.32 U	0.37 U	0.38 U	0.30 U	**0.48**	2.0	0.070	--
Nickel	**47**	**42**	**31**	**29**	**33**	**39**	**32**	**34**	**41**	**43**	**29**	**35**	**57**	**44**	**37**	100	48	--
Zinc	**120**	**810**	**300**	**340**	**390**	**290**	**300**	**400**	**410**	**130**	**3,000**	**330**	**1,800**	**150**	**640**	270	86	--
TCLP Metals by EPA Methods 1311/6010D (mg/L in TCLP extract)																		
TCLP Lead	--	--	0.20 U	0.20 U	--	--	--	--	--	--	--	--	--	--	**1.3**	5.0	--	5.0
General Chemistry Parameters by EPA Method 9045D																		
pH (SU)	6.8	6.2	7.0	7.3	7.2	6.4	7.3	7.1	7.4	7.1	6.9	7.4	7.4	5.5	7.5	6.5 - 8.5	NE	--

Table 1

Analytical Results for Soil Samples Collected June 2019

Go East Corp Landfill Site

Everett, Washington

Sample Identification Sample Date Approximate Sample Depth	TP-12 6/17/2019 Stockpile	TP-13 6/12/2019 Stockpile	TP-14 6/12/2019 Stockpile	TP-15 6/17/2019 Stockpile	TP-16 6/17/2019 Stockpile	TP-17 6/12/2019 Stockpile	TP-18 6/12/2019 Stockpile	TP-19 6/12/2019 Stockpile	TP-20 6/12/2019 Stockpile	TP-21 6/12/2019 Stockpile	TP-22 6/17/2019 Stockpile	TP-23 6/12/2019 Stockpile	TP-24 6/12/2019 Stockpile	TP-25 6/12/2019 Stockpile	LFCP Table G.4 SMV (a)	Interim Action Level (b)	Toxicity Characteristic Criterion (c)
Total Petroleum Hydrocarbons by Ecology Methods NWTPH-Gx/NWTPH-Dx (mg/kg)																	
Gasoline Range Organics (GRO)	6.1 U	9.7 U	6.9	11 U	9.3 U	8.1 U	6.6 U	6.3 U	26 U	8.6 U	7.9 U	13	8.0 U	7.5 U	100	30/100	–
Diesel Range Organics (DRO)	30 U	190 U	310 U	39 U	37 U	34 U	30 U	28 U	100	340 U	660 U	330 U	320 U	37 U	200 - 460	260 (d)	–
Heavy Oil Range Organics (ORO)	98	1,200	2,200	300	230	280	59 U	150	440	2,400	9,800	2,600	5,500	410	200 - 460	260 (d)	–
Aromatic Volatile Organic Compounds by EPA Method 8021B (mg/kg)																	
Benzene	0.020 U	0.020 U	0.020 U	0.022 U	0.020 U	0.020 U	0.020 U	0.020 U	0.051 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.03	0.0024	–
Toluene	0.061 U	0.097 U	0.056 U	0.11 U	0.093 U	0.081 U	0.066 U	0.063 U	0.26 U	0.086 U	0.079 U	0.078 U	0.080 U	0.075 U	7	0.40	–
Ethylbenzene	0.061 U	0.097 U	0.056 U	0.11 U	0.093 U	0.081 U	0.066 U	0.063 U	0.26 U	0.086 U	0.079 U	0.078 U	0.080 U	0.075 U	6	0.24	–
Xylene, m-,p-	0.061 U	0.097 U	0.056 U	0.11 U	0.093 U	0.081 U	0.066 U	0.063 U	0.26 U	0.086 U	0.079 U	0.078 U	0.080 U	0.075 U	9 (e)	14 (e)	–
Xylene, o-	0.061 U	0.097 U	0.056 U	0.11 U	0.093 U	0.081 U	0.066 U	0.063 U	0.26 U	0.086 U	0.079 U	0.078 U	0.080 U	0.075 U	9 (e)	14 (e)	–
Polycyclic Aromatic Hydrocarbons by EPA Method 8270D/Selective Ion Monitoring (mg/kg)																	
1-Methylnaphthalene	0.0081 U	0.10 U	0.082 U	0.010 U	0.074 U	0.0092 U	0.0079 U	0.0074 U	0.021 U	0.090 U	0.066 U	0.41	0.084 U	0.0089	NE	34	–
2-Methylnaphthalene	0.0081 U	0.10 U	0.082 U	0.010 U	0.074 U	0.0092 U	0.0079 U	0.0074 U	0.021 U	0.090 U	0.066 U	0.60	0.084 U	0.016	NE	320	–
Acenaphthene	0.0099	0.10 U	0.082 U	0.010 U	0.074 U	0.0092 U	0.0079 U	0.0074 U	0.021 U	0.090 U	0.066 U	1.9	0.084 U	0.0086 U	NE	3.1	–
Acenaphthylene	0.0081 U	0.10 U	0.082 U	0.010 U	0.074 U	0.0092 U	0.0079 U	0.0074 U	0.021 U	0.090 U	0.066 U	1.0	0.084 U	0.072	NE	NE	–
Anthracene	0.021	0.10 U	0.082 U	0.010 U	0.074 U	0.0092 U	0.0079 U	0.0095	0.021 U	0.090 U	0.066 U	2.6	0.084 U	0.060	NE	47	–
Benzo(g,h,i)perylene	0.029	0.16	0.11	0.022	0.074 U	0.0092 U	0.0079 U	0.014	0.021 U	0.24	0.092	0.93	0.084 U	0.28	NE	NE	–
Fluoranthene	0.084	0.14	0.18	0.038	0.074 U	0.0092 U	0.0079 U	0.049	0.021 U	0.090 U	0.11	8.7	0.084 U	0.44	NE	0.020	–
Fluorene	0.0090	0.10 U	0.082 U	0.010 U	0.074 U	0.0092 U	0.0079 U	0.0074 U	0.021 U	0.090 U	0.066 U	1.9	0.084 U	0.0086 U	NE	1.6	–
Naphthalene	0.0081 U	0.10 U	0.082 U	0.027	0.074 U	0.0092 U	0.0079 U	0.0074 U	0.021 U	0.090 U	0.066 U	0.48	0.084 U	0.085	NE	4.5	–
Phenanthrene	0.080	0.10 U	0.099	0.028	0.074 U	0.0092 U	0.0079 U	0.040	0.021 U	0.090 U	0.066 U	6.6	0.084 U	0.14	NE	NE	–
Pyrene	0.097	0.16	0.23	0.048	0.074 U	0.0092 U	0.0079 U	0.052	0.021 U	0.090 U	0.14	6.4	0.091	0.42	NE	0.020	–
Benzo(a)anthracene	0.047	0.10	0.12	0.018	0.074 U	0.0092 U	0.0079 U	0.022	0.021 U	0.090 U	0.076	2.2	0.084 U	0.35	See cPAHs	See cPAHs	–
Benzo(a)pyrene	0.045	0.15	0.13	0.020	0.074 U	0.0092 U	0.0079 U	0.022	0.021 U	0.090 U	0.096	1.4	0.084 U	0.39	See cPAHs	See cPAHs	–
Benzo(b)fluoranthene	0.047	0.24	0.16	0.030	0.074 U	0.0092 U	0.0079 U	0.022	0.021 U	0.090 U	0.11	2.2	0.084 U	0.45	See cPAHs	See cPAHs	–
Benzo(j,k)fluoranthene	0.018	0.10 U	0.082 U	0.010 U	0.074 U	0.0092 U	0.0079 U	0.0083	0.021 U	0.090 U	0.066 U	0.48	0.084 U	0.14	See cPAHs	See cPAHs	–
Chrysene	0.049	0.14	0.16	0.025	0.074 U	0.0099	0.0079 U	0.024	0.021 U	0.090 U	0.079	2.2	0.12	0.32	See cPAHs	See cPAHs	–
Dibenz(a,h)anthracene	0.0081 U	0.10 U	0.082 U	0.010 U	0.074 U	0.0092 U	0.0079 U	0.0074 U	0.021 U	0.090 U	0.066 U	0.23	0.084 U	0.049	See cPAHs	See cPAHs	–
Indeno(1,2,3-c,d)pyrene	0.031	0.16	0.091	0.019	0.074 U	0.0092 U	0.0079 U	0.013	0.021 U	0.090 U	0.080	1.0	0.084 U	0.28	See cPAHs	See cPAHs	–
cPAHs (TTEC)	0.060	0.21	0.18	0.028	0.056 U	0.0070	0.0060 U	0.029	0.016 U	0.068 U	0.13	2.0	0.064	0.52	0.1 - 2.0	0.084	–
Metals by EPA Methods 6010D/7471B (mg/kg)																	
Arsenic	12 U	15 U	12 U	16 U	15 U	14 U	12 U	11 U	17	13 U	13 U	17	13 U	13 U	20	20	–
Cadmium	0.61 U	0.94	0.61 U	0.78 U	0.74 U	0.69 U	0.59 U	0.56 U	1.6 U	0.82	1.1	0.66 U	1.0	0.65 U	2.0	0.80	–
Chromium	49	45	27	37	33	39	32	33	37	31	39	28	31	32	42	48	–
Lead	29	1,200	87	77	110	46	5.9 U	21	26	300	300	100	46	62	250	50	–
Mercury	0.30 U	5.4	0.31 U	0.39 U	0.37 U	0.34 U	0.29 U	0.28 U	0.78 U	1.0	0.33 U	0.33 U	0.32 U	0.32 U	2.0	0.070	–
Nickel	36	34	35	31	32	50	44	44	45	32	41	32	40	42	100	48	–
Zinc	80	480	160	100	150	130	27	71	82	360	460	180	110	78	270	86	–
TCLP Metals by EPA Methods 1311/6010D (mg/L)																	
TCLP Lead	–	0.78	–	–	–	–	–	–	–	0.39	0.20 U	0.20 U	–	–	5.0	–	5.0
General Chemistry Parameters by EPA Method 9045D																	
pH (SU)	7.0	6.2	7.7	6.5	6.9	6.2	7.1	6.7	6.1	7.3	7.0	6.9	6.7	5.9	6.5 - 8.5	NE	–

Notes:

(a) Suggested maximum value (SMV) from Landfill Closure Plan (LFCP) Table G.4 - Recommended Parameters and Suggested Values for Determining Reuse and Disposal Options

(b) Risk-based interim action levels (IALs) were derived by Ecology. Ecology-derived IALs were adjusted to the laboratory analytical method practical quantitation limit (PQL) if the Ecology-derived IAL was less than the PQL, per WAC 173-340-740(5)(c). See Appendix D. For GRO, the 100 mg/kg value applies to gasoline mixtures without benzene and the total of toluene, ethylbenzene, and xylene is less than 1% of the gasoline mixture; the 30 mg/kg value applies to all other gasoline mixtures.

(c) Source: WAC 173-303-090(8)(c)

(d) Value for total diesel and heavy oil range organics (DRO+ORO)

(e) Value for total xylenes

-- = Not analyzed or not applicable

cPAHs = Carcinogenic polycyclic aromatic hydrocarbons

ft bgs = Feet below ground surface

LFCP = Landfill Closure Plan

mg/kg = Milligrams per kilogram

mg/L = Milligrams per liter

NE = Not established

SMV = Suggested maximum value

SU = pH Standard Units

TCLP = Toxicity Characteristic Leaching Procedure

TTEC = Total toxic equivalent concentration of benzo(a)pyrene calculated per WAC 173-340-708(8)(e)(iii)(A) and using one-half the laboratory reporting limit for non-detected cPAHs.

U = The analyte was not detected; the reported numerical value represents the laboratory reporting limit.

Bold typeface indicates the constituent was detected at the reported concentration.

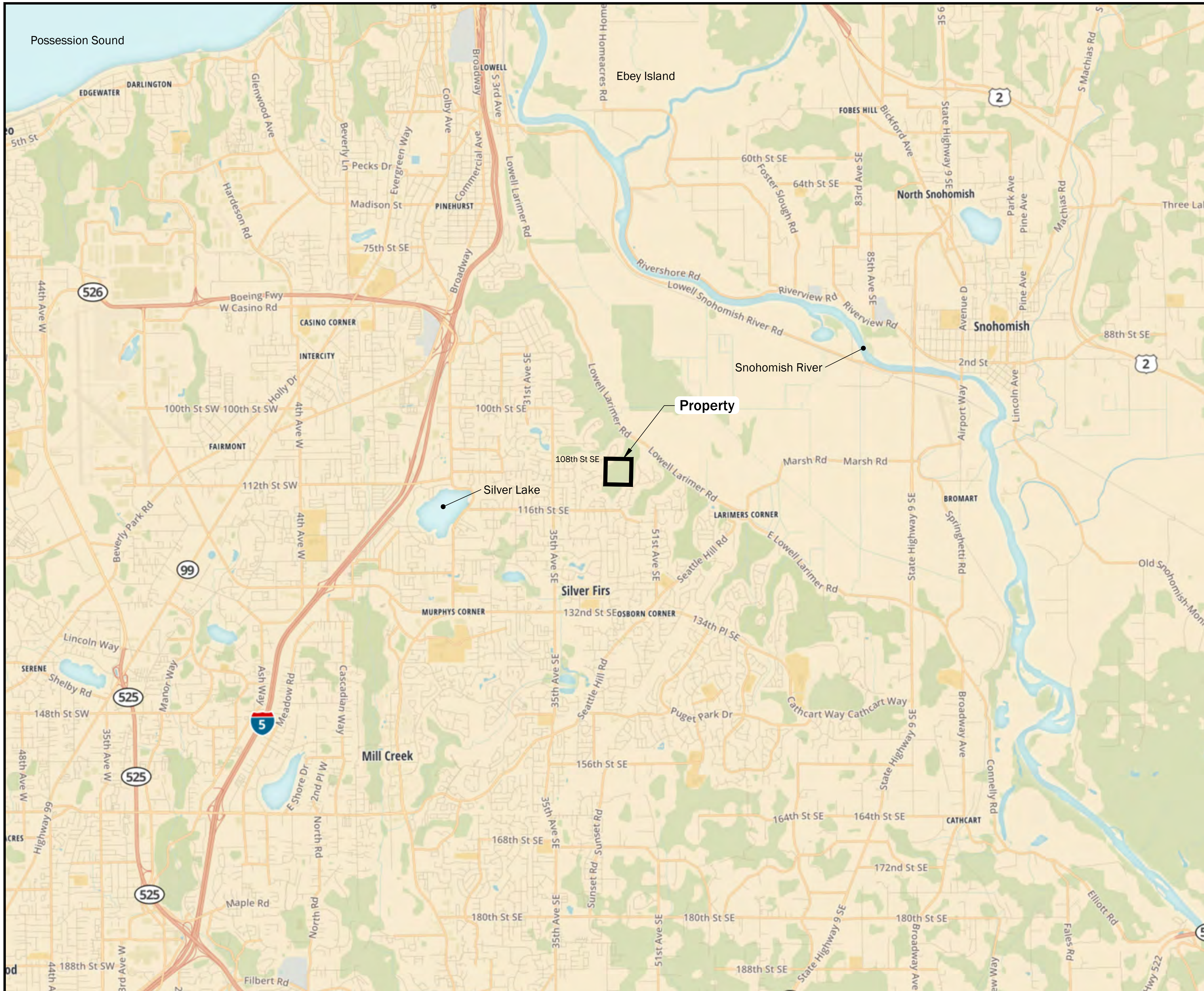
Pink highlighting indicates the reported concentration exceeds the LFCP Table G.4 SMV and the interim action level.

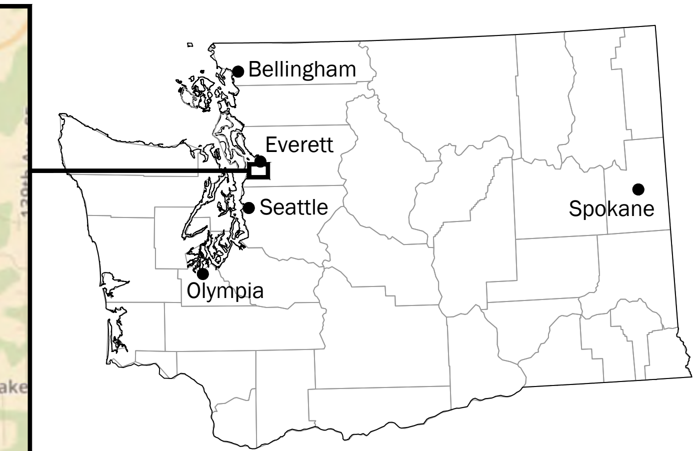
Orange highlighting indicates the reported concentration exceeds the LFCP Table G.4 SMV but not the interim action level.

Yellow highlighting indicates the reported concentration exceeds the interim action level but not the LFCP Table G.4 SMV.

Blue highlighting indicates the laboratory reporting limit exceeds the interim action level but not the LFCP Table G.4 SMV.

Violet highlighting indicates the laboratory reporting limit exceeds the interim action level and the LFCP Table G.4 SMV.





Not To Scale

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

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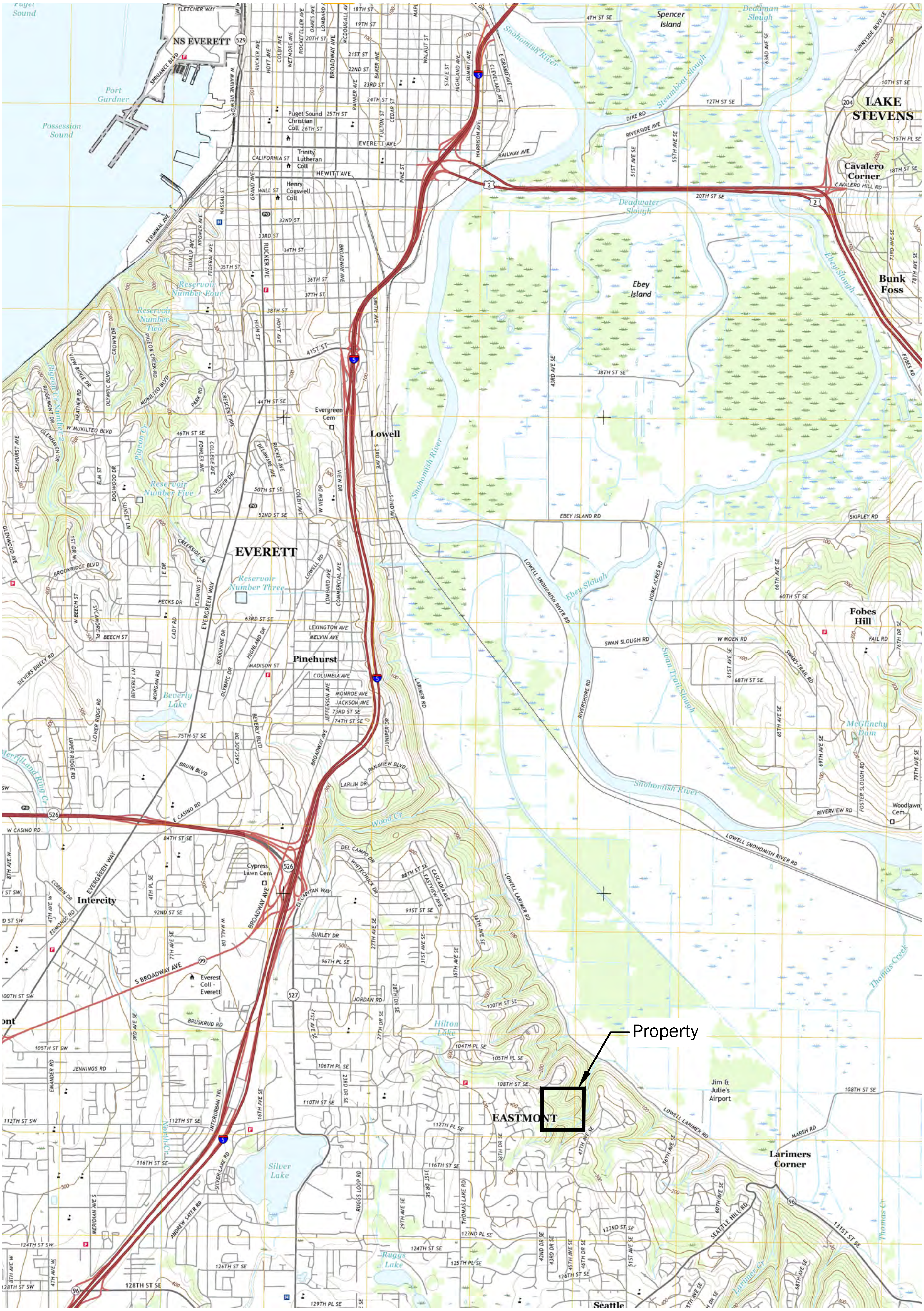
Vicinity Map

Go East Corp Landfill Site
Everett, Washington

GEOENGINEERS

Figure 1

\\geoengineers.com\WAN\Projects\6\6694002\CAD\03\Geotech\669400203_F01_Vicinity Map.dwg TAB:F01 Date Exported: 01/31/20 - 11:52 by mwoods



N
W E
S

3,000 0 3,000
Feet

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: Map from USGS dated 2017.

Property Location in Relation to Physiographic Features

Go East Corp Landfill Site
Everett, Washington

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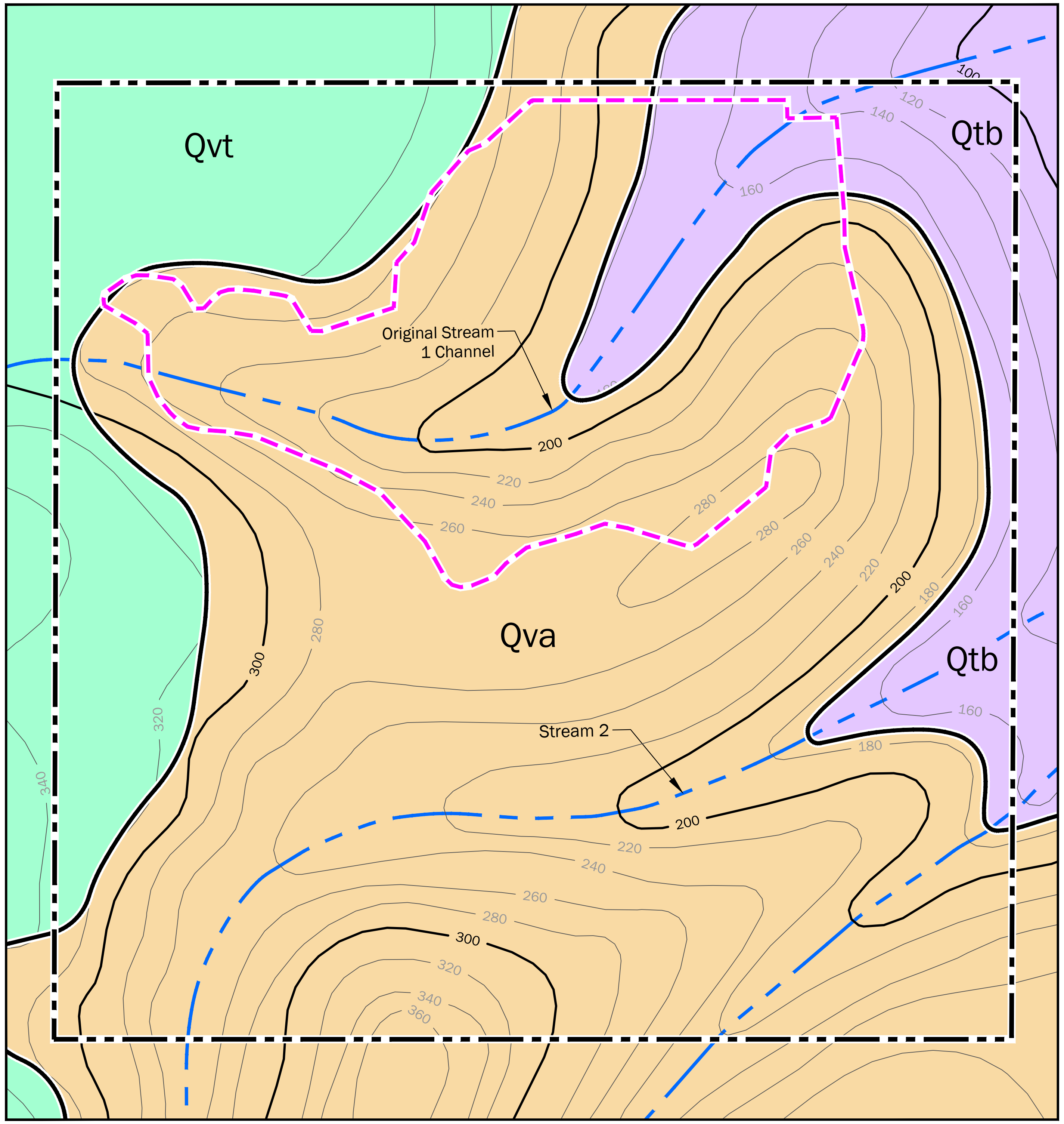
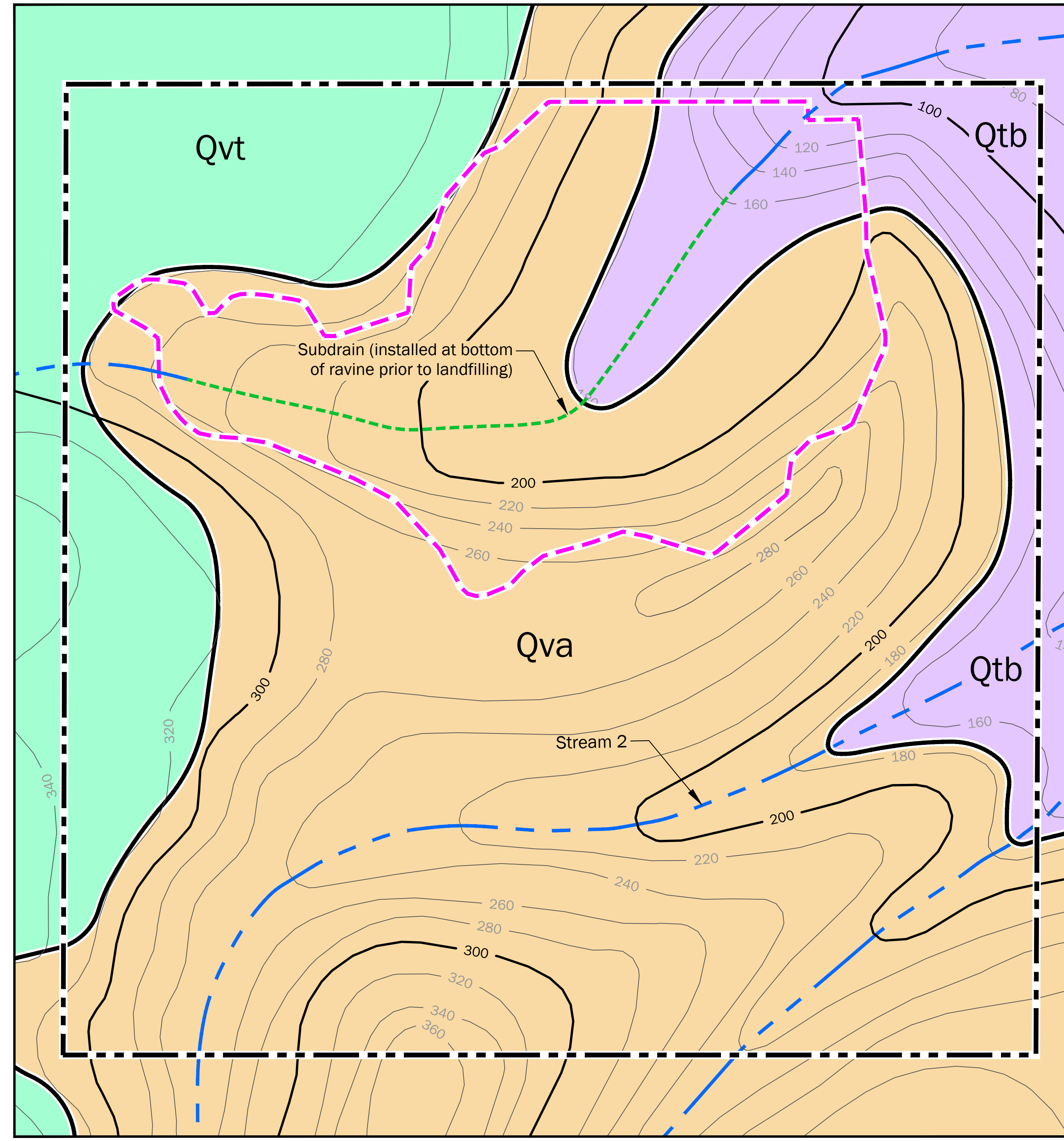
Figure 2



Approximate Pre-Sand Mining Condition



Approximate Post-Sand Mining Condition (prior to landfilling)

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 for pre-sand mining contours and map unit descriptions: USGS 1985.
Data sources for geologic contacts: AESI 2009b; USGS 1985; Smith 1976; Geolabs - Washington, Inc. 1970; Newcomb 1952.

Projection: HPGN (HARN) Washington State Planes, North Zone, US Foot

Datum: NAVD88

Legend

- Property Boundary
- Approximate Current Landfill Limit
- Geologic Contact (Location Approximate)

Map Unit Descriptions

Qvt	Vashion Glacial Till - These deposits mantle hills, ridges, and slopes and consist of a nonsorted mixture of mud, sand, pebbles, cobbles and boulders resembling concrete mix.
Qva	Vashion Glacial Advance Outwash - These deposits underlie the till and consist of clean, mostly gray, well stratified, unconsolidated sand with pebbles and some cobbles. The sand is locally silty and oxidized to shades of brown.
Qtb	Transitional Beds (includes pre-Vashon glacial lacustrine silt) - These deposits underlie the advance outwash and consist of clay, silt, and very fine to fine sand. The sediments were mostly deposited in still to slowly moving water (e.g., lakes and slowly flowing rivers/streams).

N
W E
S

200 0 200
Feet

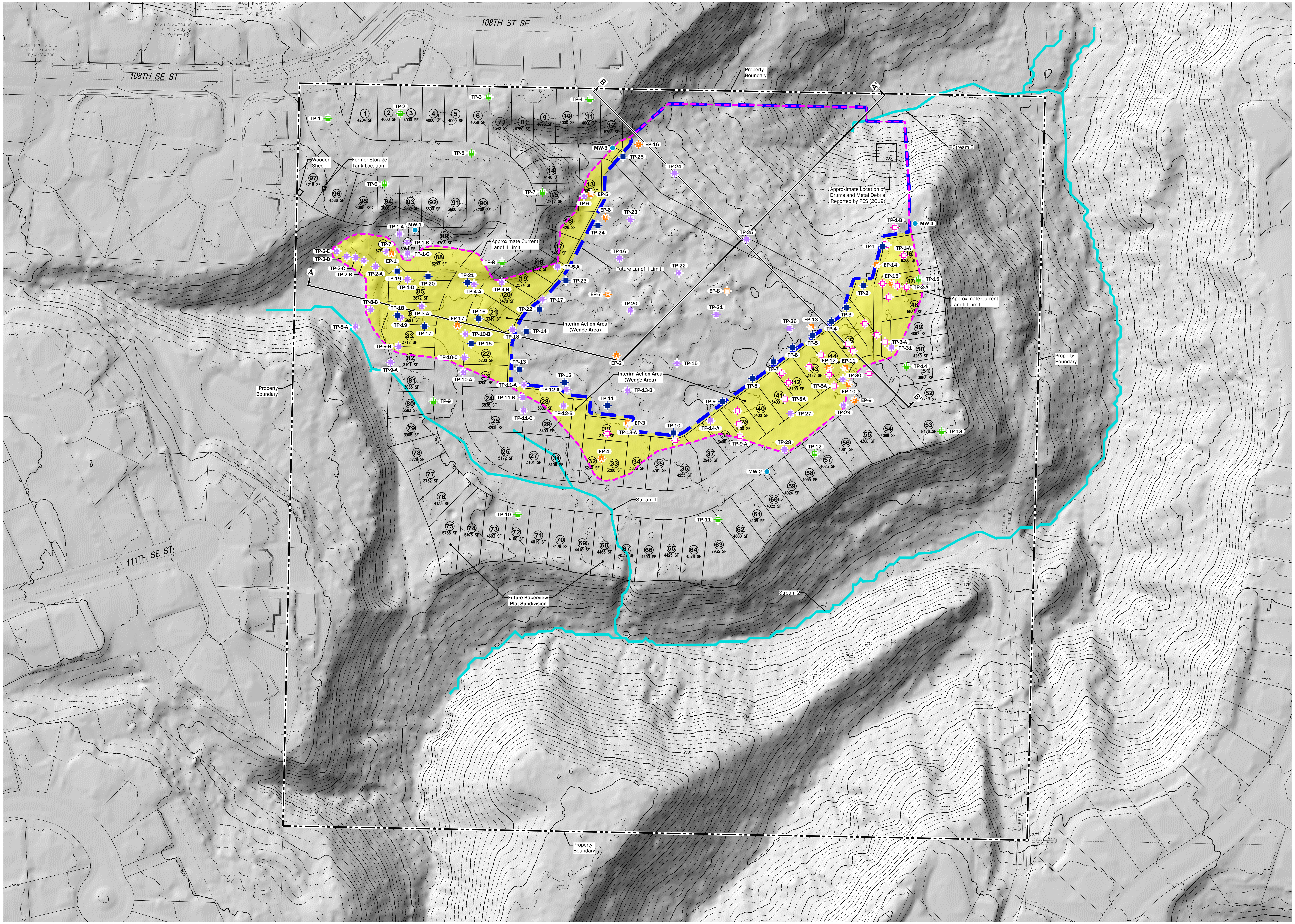
Historical Topography and Surface Geology

Go East Corp Landfill Site
Everett, Washington

GeoEngineers

Figure 3

\\geoengineers.com\WAN\Projects\6\6694002\CAD\03\Interim Action Work Plan\669400203_F03_Historical Topography and Surface Geology.dwg TAB:F03 Date Exported: 03/25/20 - 8:42 by mwoods



Legend

- Property Boundary
- Interim Action Area (Wedge Area)
- Approximate Current Landfill Limit
- Future Landfill Limit
- A — A' Cross Section Location
- TP-1 Test Pit - Soil Sample(s) Collected (Terra Associates, June 2019)
- Reconnaissance Test Pit (Hos Brothers, July 2019)
- TP-1 Test Pit (Terra Associates, January 2019)
- Test Pit (AESI, 2009)
- Test Pit (Hong West Associates, 2002)
- MW-1 Groundwater Monitoring Well (AESI, 2009)

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: Property boundary survey from PACE Engineers, dated 1/27/2020. Lidar image and elevation contours from Puget Sound Lidar Consortium dated 2013.

Projection: HPGN (HARN) Washington State Planes, North Zone, US Foot

N W E S

80 0 80

Feet

Present-Day Topography and Previous Subsurface Exploration Locations

Go East Corp Landfill Site
Everett, Washington

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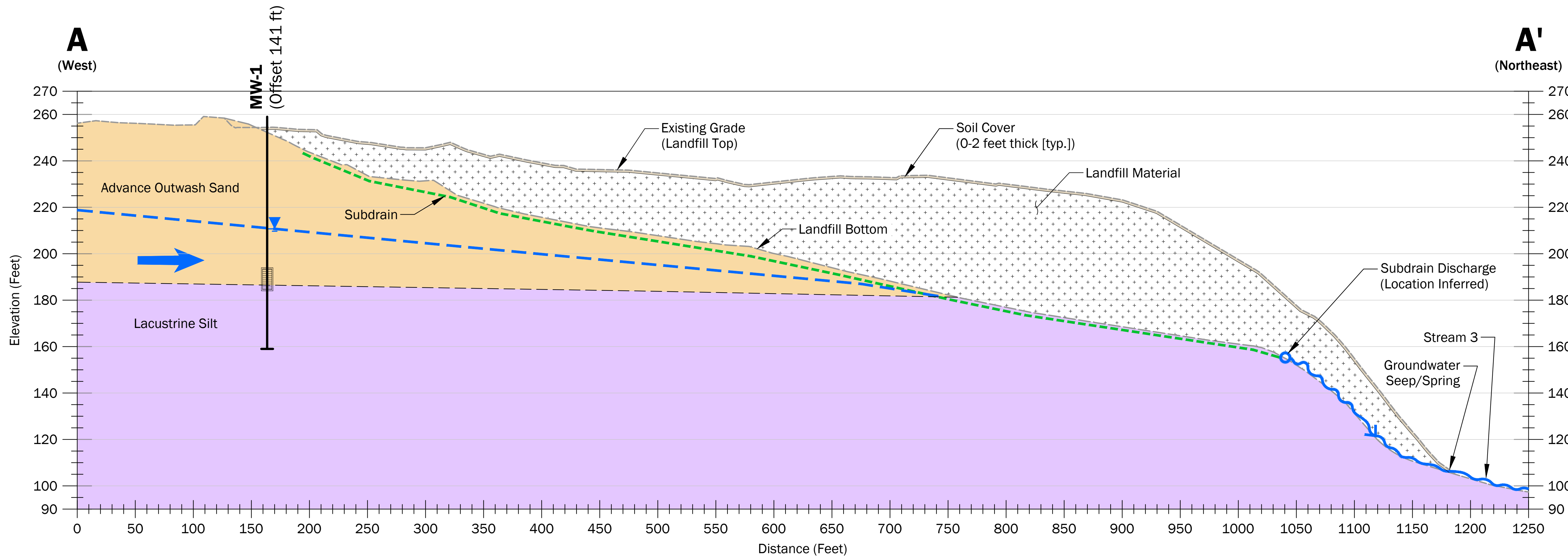
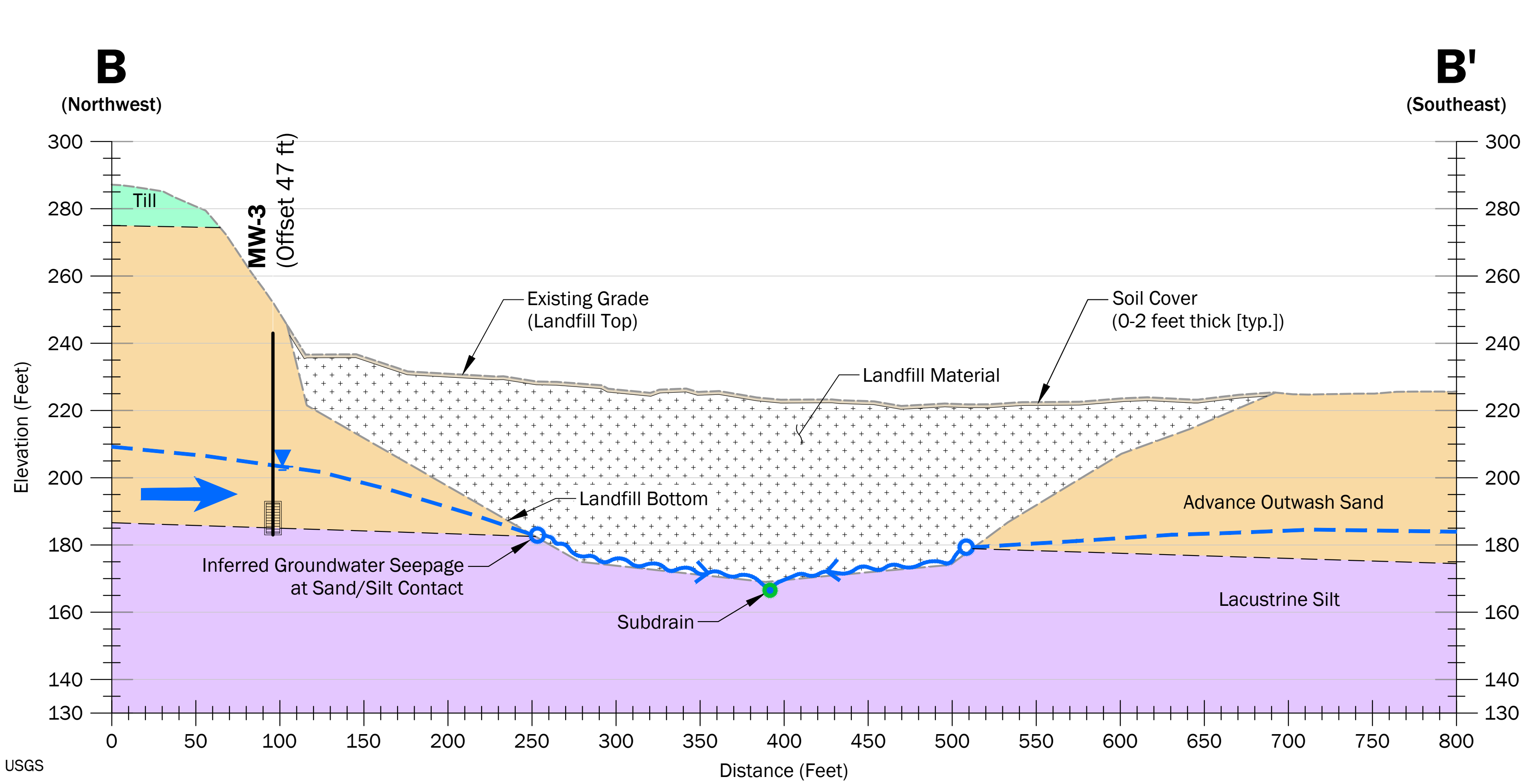
Figure 4





Legend

MW-1 (Offset) Monitoring Well

Inferred Geologic Contact

Well Screen

Inferred Groundwater Table (Triangle Indicates Measured Groundwater Level in Well)

Inferred Groundwater Flow Direction

Soil Cover

Advance Outwash Sand

Lacustrine Silt

Glacial Till

100 0 100
Horizontal Scale in Feet

50 0 50
Vertical Scale in Feet
Vertical Exaggeration: 2X

Notes:

1. The subsurface conditions shown are inferred from the data sources cited below, and should be considered approximate; actual subsurface conditions may vary from those shown.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

Data source for existing grade and landfill bottom: PACE Engineers

Data sources for geologic contacts and groundwater table: AESI 2009b; USGS 1985; Smith 1976; Geolabs - Washington, Inc. 1970; Newcomb 1952.

Datum: NAVD88

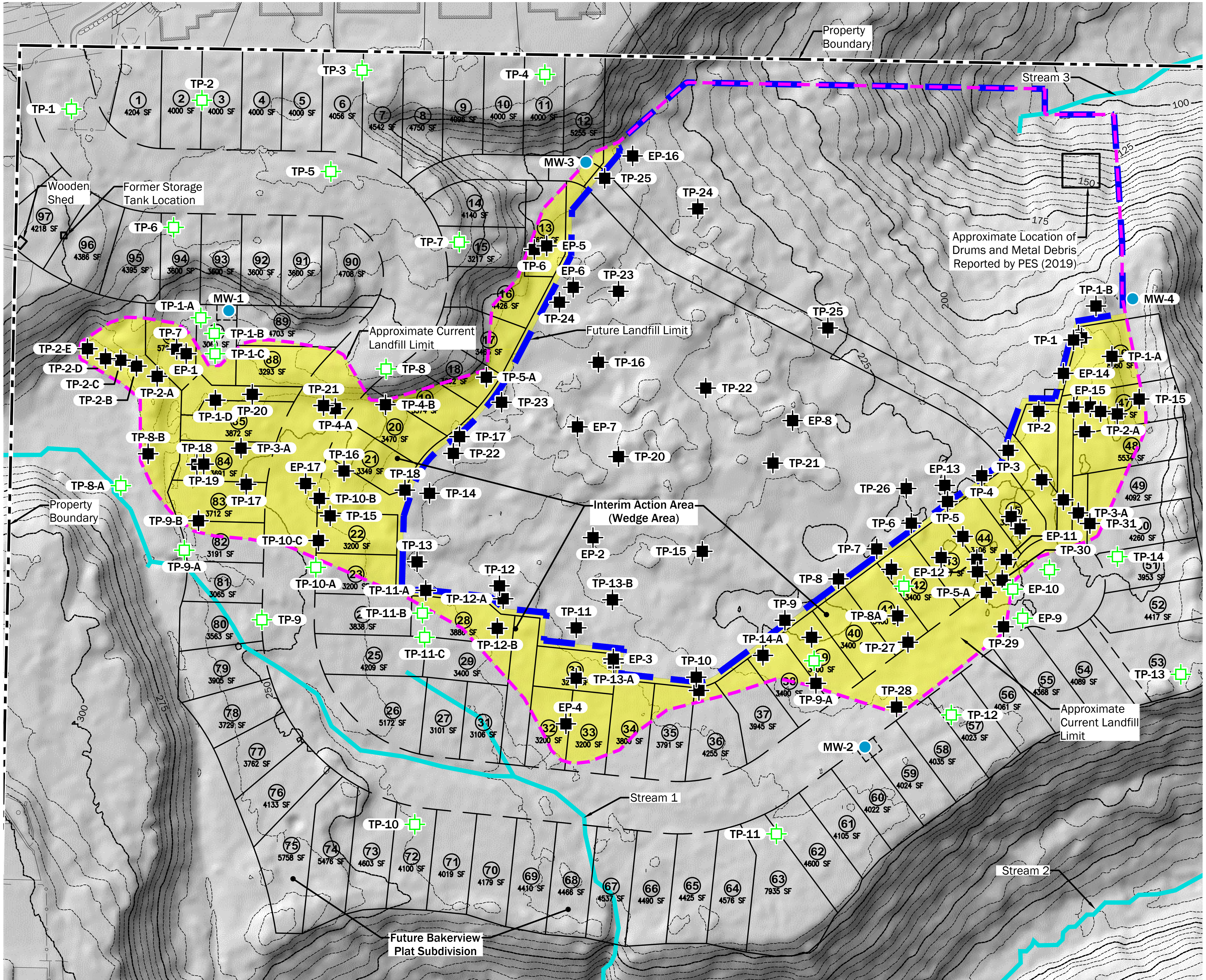
Generalized Cross Sections Through Landfill

Go East Corp Landfill Site
Everett, Washington

GeoEngineers

Figure 5

P:\6\6694002\CAD\03\Interim Action Work Plan\669400203_F05_Schematic Cross Sections Through Landfill.dwg TAB:F05 Date Exported: 04/16/20 - 16:15 by mwoods



\\geoengineers.com\WAN\Projects\6\6694002\CAD\03\Interim Action Work Plan\669400203_F06_TP Locations with Observed Landfill Debris.dwg TAB:F06 Date Exported: 03/10/20 - 11:58 by mwoods

Legend

- Property Boundary
- Interim Action Area (Wedge Area)
- Approximate Current Landfill Limit
- Future Landfill Limit
- Test Pits with Observed Landfill Material
- Test Pits with No Observed Landfill Material
- MW-1 Groundwater Monitoring Well (AESI, 2009)

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: Property boundary survey from PACE Engineers, dated 1/27/2020. Lidar image and elevation contours from Puget Sound Lidar Consortium dated 2013.

Projection: HPGN (HARN) Washington State Planes, North Zone, US Foot

N W E S

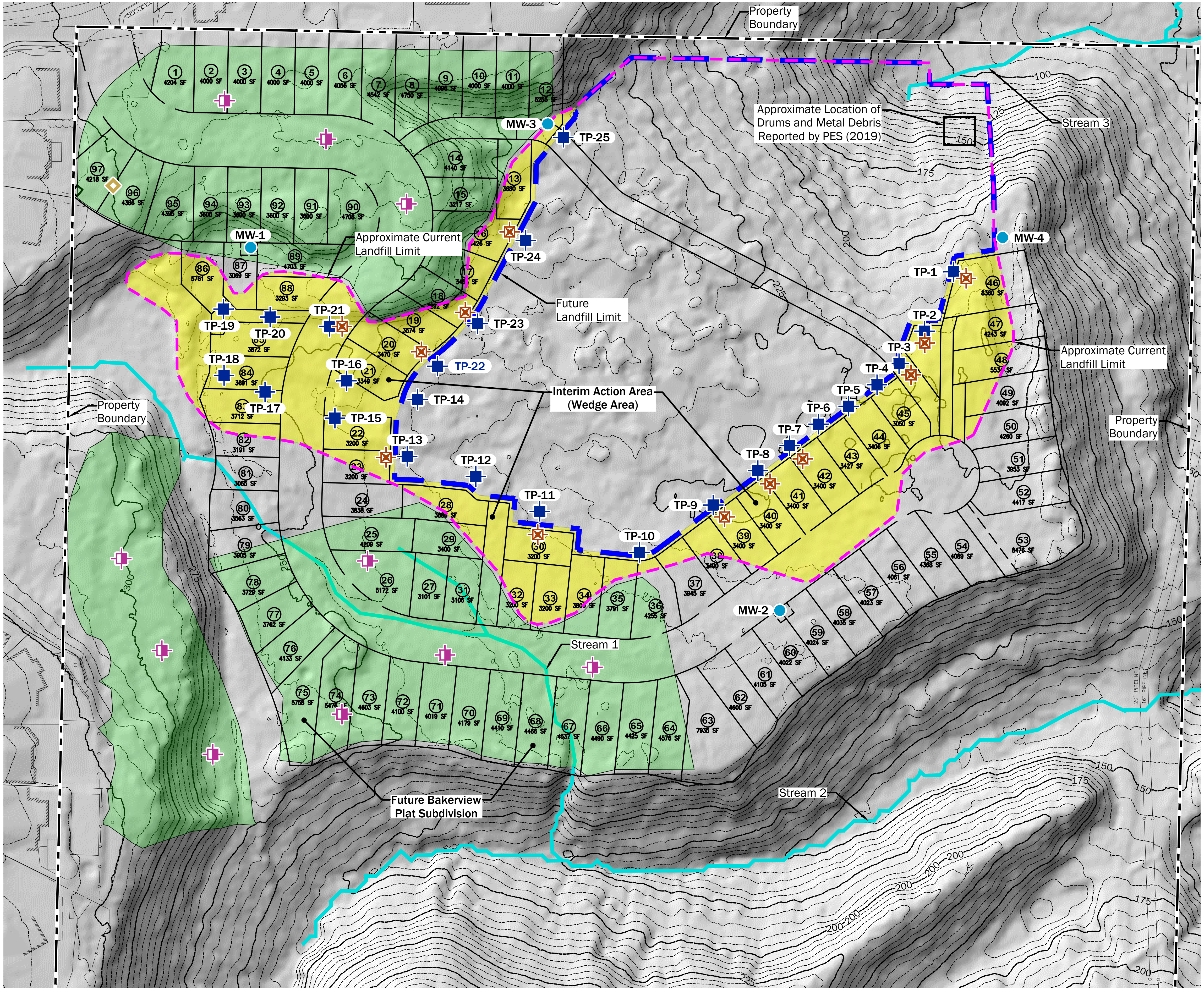
100 0 100
Feet

Test Pit Locations with Observed Landfill Material

Go East Corp Landfill Site
Everett, Washington

GeoEngineers

Figure 6



Legend

- Property Boundary
- Interim Action Area (Wedge Area)
- Approximate Current Landfill Limit
- Future Landfill Limit
- TP-1 Test Pit - Soil Sample(s) Collected (Terra Associates, June 2019)
- Test Pit - Proposed Supplemental Landfill Material Sampling Location
- Test Pit - Proposed On-Site Fill Source Sampling Location
- Proposed Former Storage Tank Area Soil Sample
- MW-1 Groundwater Monitoring Well (AESI, 2009)
- On-Site Source Area for Structural Fill

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: Property boundary survey from PACE Engineers, dated 1/27/2020. Lidar image and elevation contours from Puget Sound Lidar Consortium dated 2013.

Projection: HPGN (HARN) Washington State Planes, North Zone, US Foot

N W E S

120 0 120
Feet

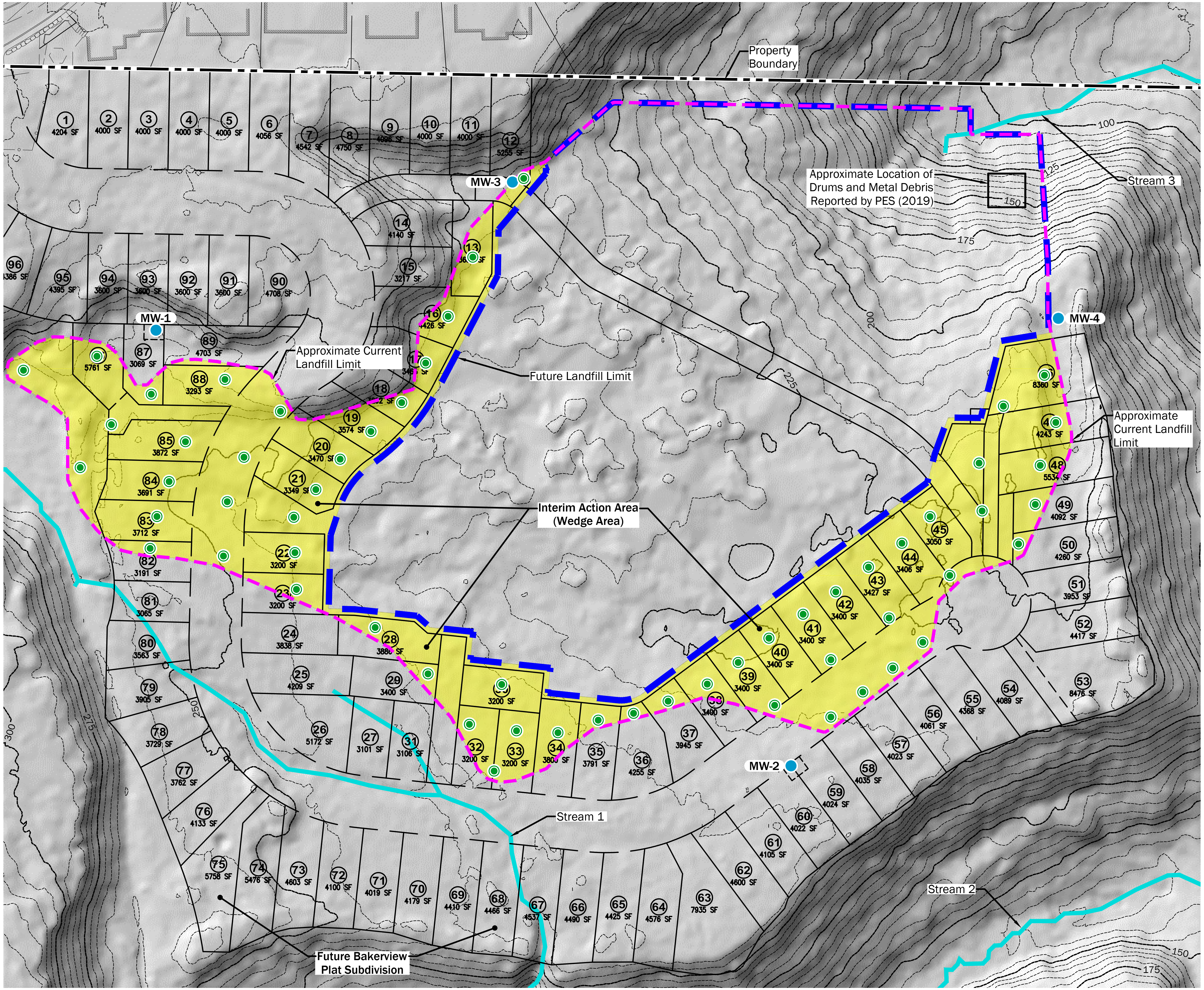
Proposed Soil Sampling Locations - On-Site Fill Source, Former Storage Tank Area, and Supplemental Landfill Material Samples

Go East Corp Landfill Site
Everett, Washington

GeoEngineers

Figure 7

P:\6\6694002\CAD\03\Interim Action Work Plan\669400203_F04-F08_Site Plan.dwg TAB:F07 Date Exported: 04/13/20 - 12:12 by mwoods



Legend

- Property Boundary
- Interim Action Area (Wedge Area)
- Approximate Current Landfill Limit
- Future Landfill Limit
- Proposed Confirmation Soil Sampling Location
- MW-1 Groundwater Monitoring Well (AESI, 2009)

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: Property boundary survey from PACE Engineers, dated 1/27/2020. Lidar image and elevation contours from Puget Sound Lidar Consortium dated 2013.

Projection: HPGN (HARN) Washington State Planes, North Zone, US Foot

N W E S

100 0 100
Feet

Proposed Soil Sampling Locations - Confirmation Soil Samples

Go East Corp Landfill Site
Everett, Washington

GEOENGINEERS

Figure 8

\\geoengineers.com\WAN\Projects\6\6694002\CAD\03\Interim Action Work Plan\669400203_F04-F08_Site Plan.dwg TAB:F08 Date Exported: 03/10/20 - 11:44 by mwoods

APPENDIX A
Test Pit Logs and Monitoring Well Boring Logs

June 2019 Test Pit Logs (Terra Associates)

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS — More than 50% material larger than No. 200 sieve size	**GRAVELS** More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.
		Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
			SP	Poorly-graded sands, sands with gravel, little or no fines.
		Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS — More than 50% material smaller than No. 200 sieve size	**SILTS AND CLAYS** Liquid Limit is less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity. (Lean clay)
			OL	Organic silts and organic clays of low plasticity.
	SILTS AND CLAYS Liquid Limit is greater than 50%		MH	Inorganic silts, elastic.
			CH	Inorganic clays of high plasticity. (Fat clay)
			OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

Symbol	Definition
I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
II	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

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UNIFIED SOIL CLASSIFICATION SYSTEM
BAKERVIEW
EVERETT, WASHINGTON

Proj.No.T-8096-1	Date: MAR 2019	Figure A-1

LOG OF TEST PIT NO. TP-1

FIGURE 1

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 14, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** 8 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Brown silty SAND with gravel and debris, medium grained, moist, debris consisted of glass, metal, wire, fibrous roof tar, and occasional plastic.	Loose	
4	1			
5		-Lots of roof tar and wood from 4 to 7 feet.		
8	2			
10		-Large concrete rubble and stumps below 10 feet.		
12	3			
16	4			
17		-Increase in wood debris below 17 feet		
20	5			
23		*Sulfer/organic odor when material disturbed entire depth of pit.		
29–30		Gray SAND at 29 feet, medium grained, moist. (SP)		
31		Test pit terminated at approximately 30 feet. No groundwater seepage observed. Caving at 8 feet.		
35				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-2

FIGURE 2

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 14, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** 8 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Brown silty SAND with gravel and debris consisting of wood, metal, concrete, moist.		
2				
3				
4				
5				
6		-Charred asphaltic material from 5 to 8 feet.		
7				
8				
9				
10				
11				
12				
13				
14				
15			Loose	
16		-Mostly glass from 15 to 18 feet.		
17				
18		-Large stumps below 18 feet.		
19				
20				
21				
22				
23				
24				
25				
26		*Sulfer/organic odor when material disturbed entire depth of pit.		
27				
28				
29				
30		Gray SAND, fine to medium grained, moist. (SP)		
31		Test pit terminated at approximately 30 feet.		
32		No groundwater seepage observed.		
33		Caving at 8 feet.		
34				
35				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-3

FIGURE 3

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 14, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** 8 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–27		FILL: Brown silty SAND with gravel and debris consisting of wood, concrete, metal, and occasional plastic, moist. -Charred asphaltic layer from 5 to 7 feet. -Large concrete debris below 10 feet. -Lots of stumps and wood debris below 10 feet. *Sulfer/organic odor when material disturbed.	Loose	
27–29		Gray SAND, fine to medium grained, moist, trace silt. (SP-SM)		
29		Test pit terminated at approximately 29 feet. No groundwater seepage observed. Moderate to heavy caving below 8 feet.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-4

FIGURE 4

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 14, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Brown silty SAND with gravel and debris consisting of wood, metal, bricks, glass.		
8–9		-Lots of stumps below 8 feet.		
12		-Asphalt shingles at 12 feet.	Loose	
18		-Mostly glass from 18 to 20 feet.		
22		*Sulfer/organic odor when material disturbed.		
23–26		Gray SAND, fine to medium grained, moist. (SP)		
26–30		Test pit terminated at approximately 26 feet. No groundwater seepage observed. Moderate caving from surface down.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-5

FIGURE 5

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 14, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Brown silty SAND with gravel and debris consisting of wood, concrete, and occasional plastic, moist.		
6		-Charred asphaltic from 6 to 7 feet.		
12		-Lots of wood debris consisting of stumps and dimensional lumber below 12 feet.		
14			Loose	
15		-Gray SAND layer with minor to moderate wood debris from 15 to 18 feet.		
18		-Brown from 18 to 21 feet.		
21		-Gray SAND with large stumps from 21 to 28 feet.		
25		*No petroleum sheens or odors noted.		
28		Test pit terminated at approximately 28 feet in fill. No groundwater seepage observed. Moderate caving from surface down.		
35				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-6

FIGURE 6

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 14, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Brown silty SAND with gravel, fine grained, moist, occasional rubble in upper 5 feet.		
5		-Large stumps and concrete rubble from 5 to 12 feet.		
13		-Becomes gray SAND with minor to moderate wood rubble from 12 to 18 feet.	Loose	
18		-Becomes brown with lots of wood, metal, and concrete debris.		
27		*No petroleum sheens or odors noted.		
29		Test pit terminated at approximately 29 feet in fill. No groundwater seepage observed. Minor to moderate caving from surface down.		
35				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-7

FIGURE 7

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 14, 2019 **DEPTH TO GROUNDWATER:** 21 Feet **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1–27		FILL: Dark brown silty SAND with gravel and debris consisting of large concrete rubble, glass, metal, bricks, and occasional plastic and trees, occasional creosote treated wood.	Loose	
12		-Becomes gray with stumps at 12 to 13 feet.		
16		-Lots of wood below 16 feet.		
21		-Seepage.		
27		*No petroleum sheens or odors noted.		
28–35		Test pit terminated at approximately 28 feet in fill. Moderate to heavy seepage from 21 to 22 feet. Minor to moderate caving from surface down.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-8

FIGURE 8

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 14, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–1		FILL: Dark brown silty SAND with gravel and debris consisting of wood, concrete, metal, and occasional plastic, moist, wet below 16 feet.		
16		-Large stumps/logs below 16 feet.		
19			Loose	
34		*No petroleum sheens or odors noted.		
38–39		Test pit terminated at approximately 38 feet in fill. No groundwater seepage observed. Moderate caving from surface down.		

Depth scale: 0 to 45 ft.

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-9

FIGURE 9

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 14, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Brown silty SAND with gravel and lots of wood debris from surface to 8 inches, occasional metal and brick debris.		
2				
3				
4				
5				
6				
7				
8				
9		-Gray and brown SAND with minor silt from 8 to 10 feet.		
10				
11				
12				
13				
14		-Below 10 feet mostly wood debris with concrete chunks and some soil.		
15				
16				
17		-Becomes wet below 14 feet.		
18			Loose	
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29		*No petroleum sheens or odors noted.		
30				
31				
32				
33				
34				
35				
36				
37				
38		Test pit terminated at approximately 37 feet in fill. No groundwater seepage observed. Minor to moderate caving observed from surface down.		
39				
40				
41				
42				
43				
44				
45				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-10

FIGURE 10

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 17, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–4		FILL: Gray and brown SAND and silty SAND, fine to medium grained, occasional logs and stumps, concrete blocks.	Loose	
4–10.5		Tan SAND starting at 4 feet on south side of pit and 10 feet on north side of pit, medium grained, moist. (SP) (Outwash) *No petroleum sheens or odors noted.	Medium Dense	
10.5–15		Test pit terminated at approximately 10.5 feet. No groundwater seepage observed. No caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-11

FIGURE 11

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 17, 2019 **DEPTH TO GROUNDWATER:** 30 Feet **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Tan and brown SAND and silty SAND with debris consisting of wood, occasional wire, large concrete chunks, and metal, occasional tires.		
2				
3				
4				
5				
6				
7				
8				
9				
10		-Becomes dark brown and gray below 10 feet.		
11				
12				
13				
14				
15		-Becomes moist to wet below 15 feet. -Mostly wood debris below 15 feet.	Loose	
16				
17				
18				
19		*No petroleum sheens or odors noted.		
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
▼30				
31		Test pit terminated at 31 feet in fill. Light groundwater seepage at 30 feet. Light to moderate caving entire depth.		
32				
33				
34				
35				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-12

FIGURE 12

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 17, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–1.5		FILL: Tan SAND with trace organics, medium grained, moist.		
1.5–11		FILL Brown silty SAND with gravel and debris consisting of wood, metal, and bricks		
11–27		Gray SAND, fine to medium grained, moist. (SP) (Outwash) *Native outwash encountered at 13.5 feet at south end of pit. The fill sloped down to a depth of 26 feet at the north end of the pit and consisted of dark brown silty SAND with gravel and debris consisting of wood, large stumps, metal, and concrete. *No petroleum sheens or odors noted.	Loose	
27–30		Test pit terminated at 27 feet in outwash. No groundwater seepage observed. Minor to moderate caving from surface down.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-13

FIGURE 13

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Brown silty SAND with gravel and debris consisting of concrete, carpet, large stumps, and occasional metal, fine to medium grained, moist to wet.		
2				
3				
4				
5				
6				
7				
8		-Becomes dark brown at 8 feet.	Loose	
9				
10				
11				
12				
13				
14				
15				
16		Tan silty SAND with gravel, fine grained, moist to wet. (SM) (Outwash)		
17			Medium Dense	
18		Test pit terminated at 18 feet in outwash. No groundwater seepage observed. Caving at surface.		
19				
20				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-14

FIGURE 14

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** 12 Feet **DEPTH TO CAVING:** 4 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–4		FILL: Gray silty SAND with gravel, fine grained, moist.	Loose	
4–27		FILL: Brown and light brown silty SAND with gravel and occasional debris consisting of wood, stumps, metal, concrete and plastic.		
12		-Becomes dark gray and wet with primarily wood debris below 12 feet.		
26		*No petroleum sheens or odors noted.		
27–30		Test pit terminated at 27 feet in fill. Groundwater seepage observed at 12 feet. Caving at 4 feet.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-15

FIGURE 15

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Trees and Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 17, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–15		FILL: Brown silty SAND with debris consisting of glass, metal, and concrete from 0 to 4 feet. Increasing wood content below 7 feet. *No petroleum sheens or odors noted.	Loose	
15–20		Gray SAND, medium grained, wet to saturated. (SP) (Outwash)	Medium Dense	
20–25		Terminated at approximately 20 feet in native outwash. No groundwater seepage observed. Caving at surface.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-16

FIGURE 16

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 17, 2019 **DEPTH TO GROUNDWATER:** 20 Feet **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Gray silty SAND with gravel, fine grained, moist, trace rubble from 0 to 8 feet.		
8		Becomes brown with moderate amounts of rubble consisting of bricks glass, plastic, and concrete chunks from 8 to 16 feet.		
16		-Gray SAND and silty SAND from 16 to 17 feet.	Loose	
17		-Below 17 feet gray SAND and silty SAND with lots of wood debris.		
20		-Light seepage at 20 feet.		
33		Terminated at approximately 32 to 33 in fill. Groundwater seepage observed at 20 feet. Caving at surface.		
40				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-17

FIGURE 17

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–11		FILL: Gray and brown silty SAND with gravel and debris consisting of glass, wood, bricks, plastic bags, stumps, and metal, moist. *No petroleum odors or sheens noted.	Loose	
11–13		Tan SAND and silty SAND, fine to medium grained, moist. (SP-SM) (Outwash)	Medium Dense	
13–15		Test pit terminated at 13 feet in outwash. No groundwater seepage observed. No caving.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-18

FIGURE 18

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass/Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–6		FILL: Brown silty SAND with gravel and rootlets, moist. -6 inches asphalt debris larger from 18 inches to 2 feet. -Below 2 feet gray SAND, fine to medium grained, moist with wet lenses.	Loose	
6–10		Tan SAND, fine to medium grained, moist to wet. (SP) (Outwash)	Medium Dense	
10–15		Test pit terminated at 10 feet in native outwash. No groundwater seepage observed. Caving at surface.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-19

FIGURE 19

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** 7 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
0–13.5		FILL: Light brown silty SAND with gravel, fine grained, moist. -Asphalt debris layer from 2 to 3 feet. -Below 3 feet becomes gray with debris consisting of wood, metal, brick, and occasional concrete. -Mostly wood debris from 6 to 9 feet.	Loose	
13.5–14.5		Tan/brown SAND and silty SAND, fine grained, moist. (SP-SM) (Outwash)	Medium Dense	
		Test pit terminated at 14.5 feet in native outwash. Light groundwater seepage observed at 3 feet. Light to moderate caving below 7 feet.		
20				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-20

FIGURE 20

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** 17 Feet **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Brown silty SAND with gravel and debris consisting of asphalt, concrete, wires, glass, and wood.		
2				
3				
4				
5				
6				
7				
8				
9				
10			Loose	
11				
12		-Becomes gray at 12 feet.		
13				
14				
15				
16				
17		-Pile of stumps at 17 feet.		
18				
19		-Decaying organic odor to total depth.		
20				
21		Test pit terminated at 20 feet in fill. Light groundwater seepage observed at 17 feet. Light caving at surface.		
22				
23				
24				
25				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-21

FIGURE 21

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass/Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–11		FILL: Brown silty SAND with gravel, fine grained, moist to wet, moderate amounts of asphalt, brick, concrete, wood, metal, and plastic debris. *No petroleum sheens or odors noted.	Loose	
11–13		Tan and gray SAND, fine to medium grained, moist. (SP-SM) (Outwash)	Medium Dense	
13–20		Test pit terminated at 13 feet in native outwash. No groundwater seepage observed. No caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-22

FIGURE 22

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** 4 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–18		FILL: Gray and brown silty SAND with occasional small brick and concrete from 0 to 4 feet. -Below 4 feet becomes gray with moderate wood and stump debris and a large piece of fiber glass. *No petroleum sheens or odors noted.	Loose	
18–21		Tan/mottled silty SAND, fine grained, moist. (SP-SM) (Outwash)	Medium Dense	
21		Test pit terminated at 21 feet in native outwash. No groundwater seepage observed. Caving observed at 4 feet.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-23

FIGURE 23

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–4.5		FILL: Dark brown silty SAND with gravel and debris consisting of wood, wires, plastic, creosote treated wood and metal.	Loose	
4.5–7		Brown SAND, fine to medium grained, moist. (SP) (Outwash)	Medium Dense	
7–10		Test pit terminated at 7 feet in native outwash. No groundwater seepage observed. No caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-24

FIGURE 24

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Cleared Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		FILL: Dark gray and brown silty SAND with gravel and debris consisting of glass, foam, plastic, shingles, roof tar, and metal.	Loose	
6		-3-foot thick layer of asphaltic tar from 6 to 9 feet.		
9		Brown becoming gray silty SAND, fine grained, wet. (SM) (Outwash)	Medium Dense	
12		Test pit terminated at 12 feet in native outwash. No groundwater seepage observed. Light caving in fill.		
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-25

FIGURE 25

PROJECT NAME: Baker View **PROJ. NO:** T-8096 **LOGGED BY:** NRH

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass/Brush **APPROX. ELEV:** N/A

DATE LOGGED: June 12, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** Surface

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–3		FILL: Dark brown silty SAND with gravel and occasional brick and metal fragments, moist.	Loose	
3–10.5		Tan SAND, fine to medium grained, moist. (SP) (Outwash)	Loose to Medium Dense	
10.5–15		Test pit terminated at 10.5 feet in native outwash. No groundwater seepage observed. Caving at surface.		

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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January 2019 Test Pit Logs (Terra Associates)

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS More than 50% material larger than No. 200 sieve size	**GRAVELS** More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.
		Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
			SP	Poorly-graded sands, sands with gravel, little or no fines.
		Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS More than 50% material smaller than No. 200 sieve size	**SILTS AND CLAYS** Liquid Limit is less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity. (Lean clay)
			OL	Organic silts and organic clays of low plasticity.
	SILTS AND CLAYS Liquid Limit is greater than 50%		MH	Inorganic silts, elastic.
			CH	Inorganic clays of high plasticity. (Fat clay)
			OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

Symbol	Definition
I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
I	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

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UNIFIED SOIL CLASSIFICATION SYSTEM
BAKERVIEW
EVERETT, WASHINGTON

Proj.No.T-8096-1 | Date: MAR 2019 | Figure A-1

LOG OF TEST PIT NO. TP-1

FIGURE A-2

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
2	1	FILL: Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist, some cobbles. (SM)		7.4
3			Medium Dense to Dense	
4				
5	2	Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, moist, trace cobbles. (SP-SM/SM)		5.9
6				
7				
8				
9			Very Dense	
10				
11				
12	3			13.6
13		Test pit terminated at approximately 13 feet. No groundwater or caving observed.		
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-2

FIGURE A-3

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–1		Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
1–3.5	1	FILL: Brown silty SAND with gravel, fine to medium sand, fine gravel, moist, scattered organics, trace cobbles. (SM)	Medium Dense	11.8
3.5–10	2	Tan to gray SAND with silt and gravel interbedded with silty SAND with gravel, fine to coarse sand, fine gravel, trace cobbles. (SP-SM/SM) *Boulder size rock observed at approximately 8 feet.	Dense to Very Dense	4.4
10–12.5	3	Gray SAND with silt and some gravel, fine to medium sand, fine gravel, moist. (SP-SM)	Dense to Very Dense	10.6
12.5–15		Test pit terminated at approximately 12.5 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-3

FIGURE A-4

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1	1	(9 inches of TOPSOIL) FILL: Brown silty SAND with gravel, fine to medium sand, fine gravel, moist, scattered organics, trace cobbles. (SM)	Medium Dense	19.6
2–12	2 3	Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, trace cobbles. (SP-SM/SM)	Dense to Very Dense	7.4 15.5
12–15		Test pit terminated at approximately 12 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-4

FIGURE A-5

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–2		Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
2	1	Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, moist, trace cobbles. (SP-SM/SM)	Medium Dense to Dense	13.9
4	2			14.8
11	3			9.6
12		Test pit terminated at approximately 12 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-5

FIGURE A-6

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–4.5	1	(11 inches of TOPSOIL) Tan to brown silty SAND with gravel, fine to coarse sand, fine gravel, moist, scattered organics, trace cobbles. (SM)	Medium Dense to Dense	16.8
4.5–12.5	2 3	Tan to gray silty SAND to SAND with silt, fine to medium sand, fine gravel, moist, trace cobbles. (SM/SP-SM)	Very Dense	18.3 8.7
12.5–15		Test pit terminated at approximately 12.5 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-6

FIGURE A-7

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		(15 inches of TOPSOIL) Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)		
2	1	Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to coarse sand, fine gravel, dry to moist, trace cobbles. (SP-SM/SM)		11.6
3				
4				
5				
6	2		Medium Dense to Dense	7.6
7				
8				
9				
10				
11	3			8.1
12		Test pit terminated at approximately 12 feet. No groundwater or caving observed.		
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-7

FIGURE A-8

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0 – 1		(12 inches of TOPSOIL) Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
1 – 13		Tan to gray SAND with silt and gravel interbeded with tan silty SAND with gravel, fine to coarse sand, fine gravel, moist, scattered organics, trace cobbles. (SP-SM/SM)	Medium Dense to Dense	
~2.5	1			10.9
~5.5	2			9.5
~12.5	3			9.4
13 – 15		Test pit terminated at approximately 13 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-8

FIGURE A-9

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
0–1		Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
1–14		Tan to gray SAND with silt, fine to coarse sand, moist. (SP-SM)	Medium Dense to Dense	
2	1			15.1
5	2			7.3
13	3			5.9
14		Test pit terminated at approximately 14 feet. No groundwater or caving observed.		
20				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-9

FIGURE A-10

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 4.5 Feet **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		(6 inches of TOPSOIL) Tan to gray silty SAND with gravel to sandy SILT with gravel, fine to medium sand, fine gravel, wet, trace cobbles. (SM/ML)		
2	1			13.7
3				
4				
5	2			24.6
6			Medium Dense to Dense	
7				
8				
9				
10	3			25.7
11				
12		Test pit terminated at approximately 12 feet. Groundwater seepage observed at 4.5 feet. No caving observed.		
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-10

FIGURE A-11

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 4 Feet **DEPTH TO CAVING:** 0 to 12.5 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(9 inches of TOPSOIL)		
1		Tan to gray silty SAND with gravel to sandy SILT with gravel, fine to coarse sand, fine gravel, wet. (SM/ML)		
	1			21.0
2				
3				
▼ 4				
5				
6			Medium Dense	
7				
8				22.4
	2			
9				
10				
11				
12				22.0
	3			
13		Test pit terminated at approximately 12.5 feet. Moderate groundwater seepage observed at 4 feet. Caves easily the entire depth.		
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-11

FIGURE A-12

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 6 Feet **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		(3 inches of TOPSOIL) Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, moist, trace cobbles. (SP-SM/SM)		
2	1			9.9
3			Medium Dense to Dense	
4	2	Brown to gray silty SAND with some gravel to sandy SILT with gravel, fine sand, fine gravel, moist to wet, strongly cemented. (SM/ML)		22.8
5				
6 ▼				
7	3			23.3
8				
9			Very Dense	
10	4			20.8
11				
12		Test pit terminated at approximately 12 feet. Minor groundwater seepage observed at 6 feet. No caving observed.		
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-12

FIGURE A-13

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 4 Feet **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
0–4	1	(4 inches of TOPSOIL) Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, moist. (SP-SM/SM)	Medium Dense	17.5
4 (groundwater)				32.3
4–8	2	Tan to gray silty SAND with gravel to sandy SILT with gravel, fine sand, fine gravel, moist to wet, strongly cemented. (SM/ML)	Dense to Very Dense	
8–12	3	Gray SAND wiith silt and gravel, fine to medium sand, fine gravel, moist to wet. (SP-SM)		9.4
12–15		Test pit terminated at approximately 12 feet. Minor groundwater seepage observed at 4 feet. No caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-13

FIGURE A-14

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		(6 inches of TOPSOIL) Tan to gray SAND with silt and gravel, fine to medium sand, fine gravel, moist, trace cobbles. (SP-SM)	Medium Dense to Dense	
2	1			8.1
3				
4		Tan to gray sandy SILT, fine sand, moist. (ML)	Dense to Very Dense	24.2
5	2			
6				
7		Tan to gray silty SAND, fine to medium sand, fine gravel, moist. (SM)		
8				
9				
10				6.7
11	3			
12				
13	4			7.6
14		Test pit terminated at approximately 13 feet. No groundwater or caving observed.		
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-14

FIGURE A-15

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 5.5 Feet **DEPTH TO CAVING:** 0 to 12 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(5 inches of TOPSOIL)		
1		Tan to gray silty SAND with gravel to sandy SILT with gravel, fine to medium sand, fine gravel, wet, trace cobbles. (SM/ML)		
2				7.8
	1			
3				
4				
5				22.2
▼	2			
6			Medium Dense	
7				
	3			26.5
8				
9				
10				
11				
	4			22.3
12		Test pit terminated at approximately 12 feet. Moderate groundwater seepage observed at 5.5 feet. Caving easily the entire depth.		
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-15

FIGURE A-16

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–5.5	1	(5 inches of TOPSOIL) FILL: Gray SAND with silt and gravel to silty SAND with gravel, fine sand, fine gravel, moist, wood and glass debris, tree roots. (SP-SM/SM)	Medium Dense	13.2
5.5–7.5	2	FILL: Tan to brown sandy SILT, fine sand, moist, wood debris. (ML)	Medium Dense	24.1
7.5–12		Tan to gray SAND with silt and gravel, fine sand, fine gravel, moist. (SP-SM)	Dense	
12	3	Test pit terminated at approximately 12 feet. No groundwater or caving observed.		4.9

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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2009 Test Pit Logs (AESI)

				Symbol	Description
Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines[5]		GW	Well-graded gravel and gravel with sand, little to no fines
				GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥15% Fines[5]		GM	Silty gravel and silty gravel with sand
				GC	Clayey gravel and clayey gravel with sand
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines[5]		SW	Well-graded sand and sand with gravel, little to no fines
				SP	Poorly-graded sand and sand with gravel, little to no fines
		≥15% Fines[5]		SM	Silty sand and silty sand with gravel
				SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50			ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
				CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
				OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More			MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
				CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
				OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils				PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

	Density	SPT[2] blows/foot
Coarse-Grained Soils	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50

	Consistency	SPT[2] blows/foot
Fine-Grained Soils	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

[3] Estimated Percentage

Component	Percentage by Weight
Trace	<5
Few	5 to 10
Little	15 to 25
With	- Non-primary coarse constituents: ≥ 15% - Fines content between 5% and 15%

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols

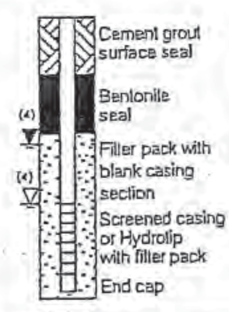
Sampler Type

Blows/6" or portion of 6"

2.0" OD Split-Spoon Sampler (SPT)

Sampler Type Description

3.0" OD Split-Spoon Sampler
3.25" OD Split-Spoon Ring Sampler
Bulk sample
3.0" OD Thin-Wall Tube Sampler (including Shelby tube)
Grab Sample
Portion not recovered



(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of ground water
ATD = At time of drilling
Static water level (date)
(5) Combined USCS symbols used for fines between 5% and 15%

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

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EXPLORATION LOG KEY

blockslog_key.dwg LAYOUT: Layout2

LOG OF EXPLORATION PIT NO. EP-1

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered. **DESCRIPTION**
	Fill
1	Loose, moist, brownish gray, silty SAND, with gravel, roots, woody debris, plastic, brick.
2	
3	
4	Loose, moist, bluish gray, silty fine to medium SAND, with organics and woody debris, and dimensional lumber.
5	
6	
7	
8	
9	
10	**Vashon Advance Outwash**
11	Loose to medium dense, moist to wet, rust-stained brown to brownish gray, silty fine to medium SAND, with trace organics.
12	
13	
14	Bottom of exploration pit at 13 feet. Slight seepage at 11'. Caving from 7' to 12'.
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

KCTP3 090231A.GPJ September 10, 2009

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Snohomish County, WA

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8/5/09

LOG OF EXPLORATION PIT NO. EP-2

Depth (ft)	DESCRIPTION
	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered.
	Fill
1	Loose, moist, brownish gray, silty SAND, with gravel, woody debris, plastic, and oxide fragment glass brick.
2	
3	
4	
5	Loose, moist, dark brown to brown, silty SAND, with organic, woody debris, wire, burned wood fragments, brick, metal fragments and pipe, cloth (some wood with creosote odor), concrete, carpet.
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	Bottom of exploration pit at 19 feet. No seepage or caving.
21	
22	
23	
24	
25	

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LOG OF EXPLORATION PIT NO. EP-3

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered.

Depth (ft)	DESCRIPTION
	Fill
1	Loose, moist, brownish gray, silty SAND, with gravel, concrete, wire, and woody debris.
2	
3	Loose, moist, dark brown to brown, silty SAND, with organics and assorted debris (woody, metal, plastic, concrete, tire, railroad tie (dimensional wood), fabric, brick.
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	**Vashon Advance Outwash (Qva)**
17	Medium dense, moist to wet, rust-stained brownish gray, fine to medium SAND, with silty zones and trace gravel.
18	Bottom of exploration pit at 16.5 feet. Slight seepage at 5' in south extension. No caving. 15-foot depth stake located adjacent to north end of exploration pit. Contact between fill and Qva slopes upward (approximately 2H:1V [Horizontal:Vertical]) toward the south.
19	
20	

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LOG OF EXPLORATION PIT NO. EP-4

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered. **DESCRIPTION**
	Fill
1	Loose, moist, brownish gray, silty SAND, with gravel, roots, and a brick fragment.
2	
3	**Vashon Advance Outwash (Qva)**
4	Medium dense to dense, moist, slightly rust-stained brownish gray, fine to medium SAND, with trace gravel.
5	
6	
7	
8	Bottom of exploration pit at 7 feet. Seepage at 5'. Caving 2' to 7'.
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

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LOG OF EXPLORATION PIT NO. EP-5

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered. **DESCRIPTION**
	Fill
1	Loose, moist, dark brown to brownish gray, silty SAND, with roots, gravel, organics, concrete, woody debris, and brick fragments.
2	
3	**Vashon Advance Outwash (Qva)**
4	Medium dense, moist, reddish brown to brownish gray, fine to medium SAND, with roots and trace gravel.
5	
6	
7	
8	
9	Bottom of exploration pit at 8 feet. No seepage or caving. Base of slope located at west end of exploration pit. Contact between fill and Qva slopes downward (approximately 2 1/2H:1V) toward the east.
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

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LOG OF EXPLORATION PIT NO. EP-6

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

Depth (ft)	DESCRIPTION
	Fill
1	Brown, silty SAND, with gravel, roots, and assorted debris (wood, metal, glass, plastic, fabric, brick, tire, stumps), more "general refuse" - not as much woody debris percentage as other pits.
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	Dense, moist, slightly rust-stained bluish gray, silty fine to medium SAND, with gravel, asphalt, and plastic pipe (bricks and woody debris below 18').
14	
15	
16	
17	
18	
19	
20	
21	
22	Bottom of exploration pit at 21 feet. No seepage. Caving 3' to 10'.
23	
24	
25	

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LOG OF EXPLORATION PIT NO. EP-7

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

Depth (ft)	DESCRIPTION
	Fill
1	Loose, moist, dark brown to brown, silty SAND, with gravel, organics, and associated debris (woody debris, dimensional lumber, brick, glass, plastic, stumps, burned wood,, asphalt, concrete, metal,
2	burn ash [orange and white], carpet.
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	**Vashon Advance Outwash (Qva)**
15	Medium dense to dense, moist, rust-stained brownish gray, fine to medium SAND, with lenses of bluish gray to gray, SILT (lenses between 14" and 15").
16	
17	
18	
19	
20	
21	Bottom of exploration pit at 20 feet. No seepage or caving.
22	
23	
24	
25	

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LOG OF EXPLORATION PIT NO. EP-8

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Fill
1	Dark brown to brown, silty SAND, with gravel, organics and assorted debris (woody debris, metal, concrete, asphalt, plastic, burned wood, brownish ash, wire, brick, stumps, dimensional lumber, cinder blocks).
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	Bottom of exploration pit at 19 feet. No seepage. Cave below 15'.
21	
22	
23	
24	
25	

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LOG OF EXPLORATION PIT NO. EP-9

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. DESCRIPTION
	Vashon Advance Outwash (Qva)
1	Hard, moist, bluish gray, bedded SILT.
2	
3	Dense, moist, brownish gray, fine to medium SAND.
4	
5	
6	Bottom of exploration pit at 5.5 feet.
7	No seepage or caving.
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

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LOG OF EXPLORATION PIT NO. EP-10

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Vashon Advance Outwash (Qva)
1	Loose, moist, brownish gray, silty SAND, with gravel and roots.
2	Hard, moist, rust-stained tan to bluish gray, SILT.
3	Dense, moist, brownish gray, fine to medium SAND, with trace gravel.
4	
5	
6	Bottom of exploration pit at 5.5 feet. No seepage or caving.
7	
8	
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Go East Landfill Development
Snohomish County, WA

Associated Earth Sciences, Inc.

Logged by: JPL

Approved by:

Project No. KE090231A

8/5/09

LOG OF EXPLORATION PIT NO. EP-11

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered. **DESCRIPTION**
	Fill
1	Loose, moist, dark brown to brown, silty SAND, with gravel, organics and assorted debris (similar).
	Vashon Advance Outwash (Qva)
2	Dense, moist, brownish gray, fine to medium SAND, slight rust staining.
3	
4	Bottom of exploration pit at 3 feet. No seepage or caving.
5	
6	
7	
8	
9	
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Go East Landfill Development
Snohomish County, WA

Associated Earth Sciences, Inc.

Logged by: JPL

Approved by:

Project No. KE090231A

8/5/09

LOG OF EXPLORATION PIT NO. EP-12

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered.

Depth (ft)	DESCRIPTION
	Fill
1	Loose, moist, dark brown to brown, silty SAND, with gravel, organics, and assorted debris (similar).
2	
3	
4	
5	Loose, moist, bluish gray, silty SAND, with gravel.
6	Loose, moist, dark brown to brown, silty SAND, with gravel, organics, and assorted debris (similar).
7	
8	
9	
10	
11	
	Vashon Advance Outwash (Qva)
12	Dense, moist, brownish gray, fine to medium SAND.
13	
14	
15	
16	
17	Bottom of exploration pit at 16 feet. No seepage or caving.
18	
19	
20	
21	
22	
23	
24	
25	

Go East Landfill Development
Snohomish County, WA

Associated Earth Sciences, Inc.

Logged by: JPL
Approved by:

Project No. KE090231A

8/5/09

LOG OF EXPLORATION PIT NO. EP-13

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered. **DESCRIPTION**
	Fill
1	Loose, moist, dark brown to brown, silty SAND, with gravel, organics, and assorted debris (similar).
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	Bottom of exploration pit at 17 feet. Refusal on debris. No seepage or caving.
19	
20	
21	
22	
23	
24	
25	

Go East Landfill Development
Snohomish County, WA

Associated Earth Sciences, Inc.

Project No. KE090231A

Logged by: JPL

Approved by:

8/5/09

LOG OF EXPLORATION PIT NO. EP-14

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered.

Depth (ft)	DESCRIPTION
0–18	**Fill** Loose, moist, dark brown to brown, silty SAND, with gravel, organics, and assorted debris, abundant burned woody debris.
18	Bottom of exploration pit at 18 feet. No seepage or caving. Hard digging through layers of burned wood.

Go East Landfill Development
Snohomish County, WA

Associated Earth Sciences, Inc.

Logged by: JPL

Approved by:

Project No. KE090231A

8/5/09

LOG OF EXPLORATION PIT NO. EP-15

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered.

Depth (ft)	DESCRIPTION
	Fill
1	Loose, moist, dark brown to brown, silty sAND, with gravel, organics, and assorted debris
2	
3	
4	
5	
6	
7	
8	
9	**Vashon Advance Outwash**
10	Dense, moist, slightly rust-stained brownish gray, fine to medium SAND.
11	
12	
13	Bottom of exploration pit at 12.5 feet. No seepage or caving.
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

Go East Landfill Development
Snohomish County, WA

Associated Earth Sciences, Inc.

Logged by: JPL
Approved by:

Project No. KE090231A
8/5/09

LOG OF EXPLORATION PIT NO. EP-16

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Fill
1	Loose, moist, brownish gray, silty SAND, with gravel, trace organics and woody debris.
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	Loose, moist, bluish gray, silty SAND, with gravel, woody debris, asphalt.
13	
14	
15	
16	
17	
18	**Vashon Advance Outwash (Qva)**
19	Medium dense to dense, moist, bluish gray to brownish gray (slightly rust-stained) fine to medium SAND.
20	
21	Bottom of exploration pit at 20 feet. No seepage or caving. Much less debris than other pits. More like typical fill with some debris.
22	
23	
24	
25	

Go East Landfill Development
Snohomish County, WA

Associated Earth Sciences, Inc.

Logged by: JPL

Approved by:

Project No. KE090231A

8/5/09

LOG OF EXPLORATION PIT NO. EP-17

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplfication of actual conditions encountered. **DESCRIPTION**
1	**Fill** Loose, moist, dark brown to brown, silty SAND, with gravel, organics, and assorted debris, abundant glass shards.
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	Bottom of exploration pit at 19.5 feet. No seepage or caving.
22	
23	
24	
25	

KCTP3 090231A.GPJ September 10, 2009

Go East Landfill Development
Snohomish County, WA

Associated Earth Sciences, Inc.

Logged by: JPL
Approved by:

Project No. KE090231A

8/5/09

2002 Test Pit Logs (Hong West Associates)

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP SM	Light brown, poorly graded SAND with some silt, loose, dry, (Earthen Fill)					
		SW	Yellowish brown, well graded SAND with some gravel, medium dense, dry to moist, fine to coarse sand, (Glacial Outwash) 1" horizon of black organic soil at 3.5'					
		SP	Light gray brown poorly graded GRAVELLY SAND, dense, moist, fine sand, (Glacial Outwash)					

SKETCH OF East SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 2, 4, 6, 8, 10

DEPTH (feet): 0, 2, 4, 6, 8, 10

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-1-A

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0–2		SP	Yellowish brown, poorly graded SAND, medium dense, dry (Glacial Outwash)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-1-B

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

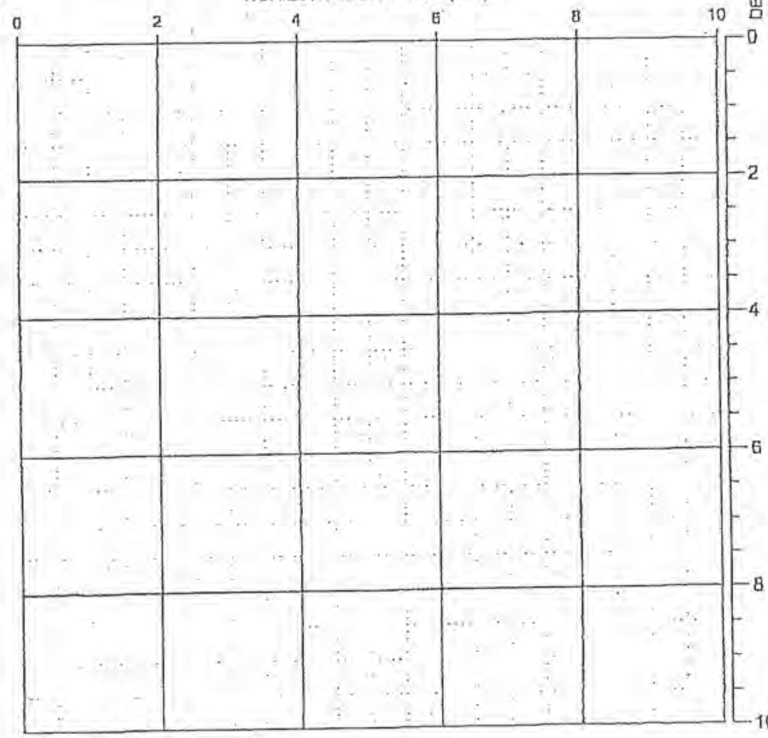
EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0–2		SP	Yellowish brown, poorly graded SAND, medium dense, dry. (Glacial Outwash)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-1-C

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT10 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Light brown, GRAVELLY SAND, medium dense, dry (Earthen Fill)					
		SP	Olive gray, poorly graded SAND, loose, moist, fine sand, intermixed bricks and dimensional timber, (Demolition waste)					
2		SP	Olive gray, poorly graded SAND, loose, moist, fine sand, intermixed tree limbs (Earthen Fill)					
6		SP	Olive gray, poorly graded SAND, moist to wet, fine to medium grained, with trace roots (Glacial Outwash)					
10								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 2, 4, 6, 8, 10

DEPTH (feet): 0, 2, 4, 6, 8, 10

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-1-D

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT10 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Gray brown, poorly graded SAND, loose, fine sand, some roots (Earthen Fill)					
		SP	Brown, poorly graded SAND, loose, fine sand (Earthen Fill)					
5		SP	Gray, poorly graded SAND, loose, fine sand, some wood and plastic (Earthen Fill)					
10								
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 5, 10, 15, 20

DEPTH (feet): 0, 5, 10, 15, 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

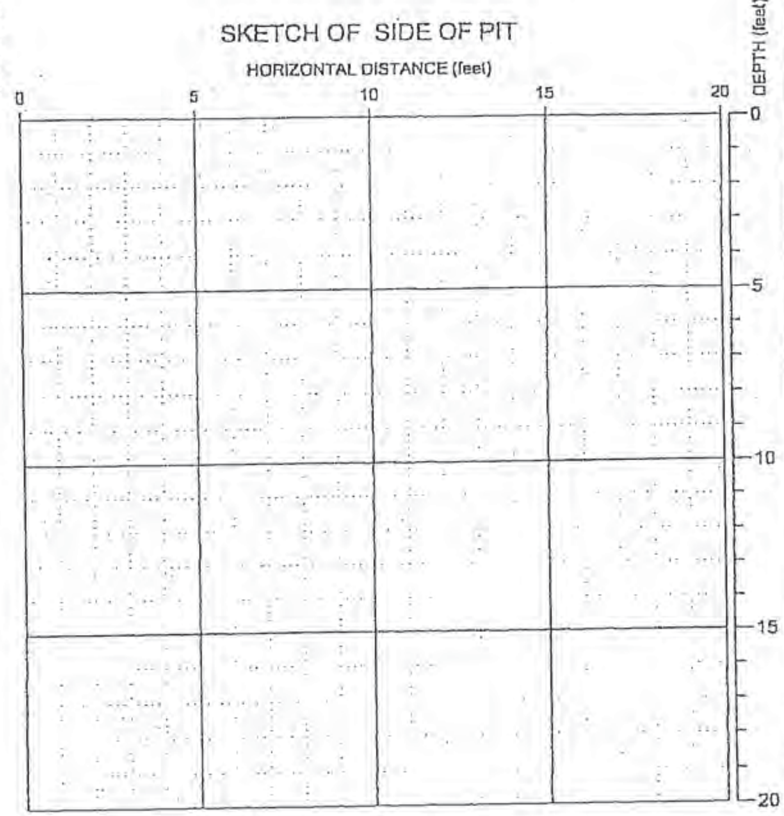
LOG OF TEST PIT
TP-2-A

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, SAND with some gravel, fine sand (Earthen Fill)					
		SP SM	Gray, poorly graded SAND, with silt and gravel, moist, loose, with intermixed tree branches (Earthen Fill)					
		SP	Yellowish brown, poorly graded SAND, trace gravel, very moist, medium dense (Glacial Outwash)					



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-2-B
PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

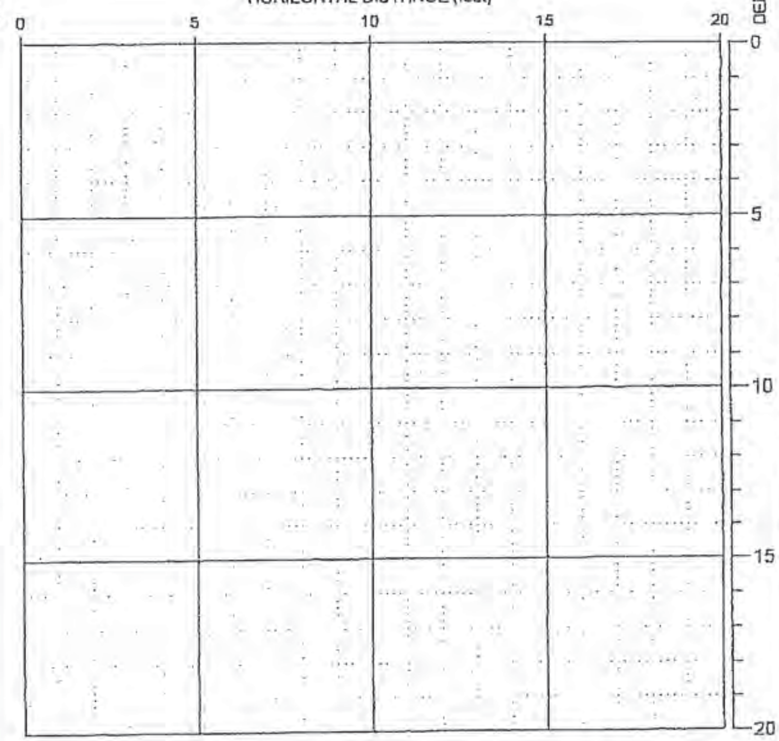
EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, SAND, trace plastic, bricks and tree branches (Earthen Fill)					
		SP	Gray, poorly graded SAND, loose, moist, fine sand, with intermixed tree branches (Earthen Fill)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-2-C

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded SAND, moist, fine sand, some roots (Earthen Fill)					
		SP	Gray, poorly graded SAND, moist to wet, loose, fine sand, intermixed wood and branches (Earthen Fill) Wet below 5' Strong seepage at 9'					
10		SP	Yellowish brown, SAND, wet					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 5, 10, 15, 20

DEPTH (feet): 0, 5, 10, 15, 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-2-D

PROJECT NO.: 2002071 FIGURE:

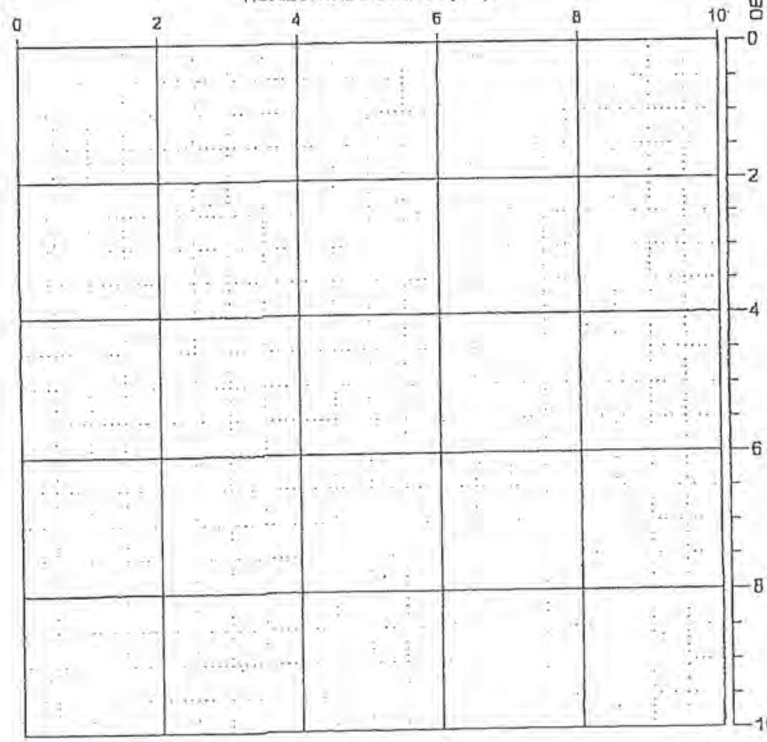
EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 8/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, SAND, moist to wet, some roots (Earthen Fill - Topsoil)					
1		SP	Gray, poorly graded SAND, wet, loose, fine sand, intermixed tree branches (Earthen Fill) Seepage at 3'					
4		SP	Yellowish bown, poorly graded SAND, wet, fine to medium sand (Glacial Outwash)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-2-E

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, medium dense, fine to medium sand (Earthen Fill)					
			Black/brown, GRAVELLY SAND with glass, aphalt and bricks, dry, loose (Demolition Waste)					
5			Gray, SAND, dry to moist, loose, fine to medium sand, intermixed wood, boulders, concrete pipe (Demolition Waste)					
10								
			Increasing amounts of plastic and concrete at 12'					
15			Becoming moist below 16'					
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 5, 10, 15, 20

DEPTH (feet): 0, 5, 10, 15, 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-3-A

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Dark brown, SILTY SAND with some gravel, medium dense, fine sand (Earthen Fill)					
			Brown, SAND, dry, loose, intermixed steel pipes, plastic and concrete (Demolition Waste)					
5								
10								
		SP	Yellowish brown, poorly graded SAND, moist, dense, fine sand, with gray SILT laminations (Glacial Outwash)					
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

DEPTH (feet)	0	5	10	15	20
0					
5					
10					
15					
20					

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-4-A

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Dark brown, SILTY SAND with some gravel, medium dense, fine sand (Earthen Fill)					
			Gray, SAND, dry to moist, loose, fine to medium sand, intermixed wood, steel, concrete pipe (Demolition Waste)					
		SP	Yellowish bown, poorly graded SAND, medium dense, fine to medium sand, (Glacial Outwash)					
5								
10								
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet)

0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-4-B

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 8/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, SAND, loose, fine sand, some roots (Earthen Fill - Topsoil)					
			Dark brown, SILTY SAND, intermixed wood and glass, (Demolition Waste)					
2		SP	Yellowish bown, poorly graded SAND, fine to medium sand. (Glacial Outwash)					
4								
6								
8								
10								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 2, 4, 6, 8, 10

DEPTH (feet): 0, 2, 4, 6, 8, 10

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-5-A

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT10 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Grayish light brown, GRAVELLY SAND, loose, fine to coarse sand (Earthen Fill)					
			Dark brown/black, SAND, organic, with dimensional timber (Demolition Waste)					
4		SP	Yellowish bown, poorly graded SAND, fine to medium sand, (Glacial Outwash)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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HWAGEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-6

PROJECT NO.: 2002071 FIGURE:

TPIT10 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, SAND, loose, dry to moist, medium sand (Earthen Fill)					
2		SP	Dark brown, SAND with some gravel, medium dense with trace wood (Earthen Fill)					
		SP	Gray, SAND, loose, slightly moist, with intermixed wood (Earthen Fill)					
4		SP	Yellowish bown, poorly graded SAND, fine to medium sand, (Glacial Outwash)					
6								
8								
10								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

DEPTH (feet)	0	2	4	6	8	10
0						
2						
4						
6						
8						
10						

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-7

PAGE: 1 of 1

PROJECT NO.: 2002071

FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, SAND, loose, dry to moist, medium sand (Earthen Fill)					
		SP	Yellowish brown, poorly graded SAND, bedded with gray poorly graded SAND, moist to wet (Glacial Outwash) Strong seepage at 3'					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 2, 4, 6, 8, 10

DEPTH (feet): 0, 2, 4, 6, 8, 10

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-8-A

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT10 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, SAND, loose, dry to moist, medium sand (Earthen Fill)					
		SP	Gray, SAND, loose, slightly moist, fine to medium sand with intermixed wood (Earthen Fill)					
		SP	Yellowish brown, poorly graded SAND, bedded with gray poorly graded SAND, loose, moist to wet (Glacial Outwash) Wet below 8' Strong seepage at 10'					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet)

0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-8-B

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Dark brown, poorly graded SAND, fine sand (Topsoil - Fill)					
		SP	Yellowish bown, poorly graded SAND, fine sand, (Glacial Outwash)					
		SP	Gray brown, poorly graded SAND, wet, fine to medium grained (Glacial Outwash) Strong seepage at 5'					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 5, 10, 15, 20

DEPTH (feet): 0, 5, 10, 15, 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-9-A

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, fine to medium sand, dry to moist (Earthen Fill)					
			Dark brown, GRAVELLY SAND, with intermixed glass, bricks and some steel (Demolition Waste)					
		SP	Gray, SAND, loose, slightly moist, fine to medium sand with intermixed wood (Earthen Fill)					
5		SP	Yellowish bown, poorly graded SAND, fine sand (Glacial Outwash)					
10								
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet)

0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-9-B

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Dark brown, poorly graded SILTY SAND, loose, moist, fine sand, organic (Topsoil - Fill)					
		SP	Yellowish brown, poorly graded SAND with trace gravel, loose, moist, fine sand (Glacial Outwash)					
3		SP	Gray brown, poorly graded SAND, moist, fine sand (Glacial Outwash)					
5								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 2, 4, 6, 8, 10

DEPTH (feet): 0, 2, 4, 6, 8, 10

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-10-A

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT10 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		ML	Gray, GRAVELLY SILT, medium dense, moist (Fill)					
			Brown, poorly graded SILTY SAND, loose, moist with intermixed glass, dimensional timber, steel and some plastic (Demolition Waste)					
~14		SP	Yellowish brown/gray, poorly graded SAND, wet, fine sand, bedded (Glacial Outwash)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet) 0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-10-B

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

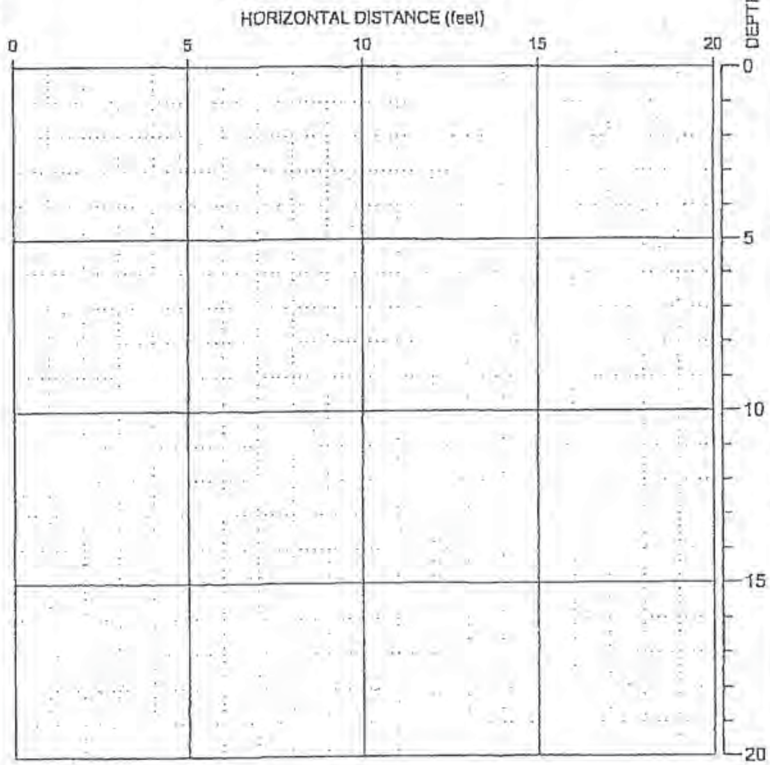
TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP SM	Brown, poorly graded GRAVELLY SAND with some silt, medium dense, dry (Fill)					
			Brown, poorly graded SILTY SAND, dry, loose, fine sand with intermixed dimensional timber (Demolition Waste)					
5								
10		SP	Yellowish brown/gray, poorly graded SAND, moist, fine sand (Glacial Outwash)					
15								
20								

SKETCH OF SIDE OF PIT



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-10-C

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Dark brown, poorly graded SAND, moist, fine sand, organic, (Topsoil - Fill)					
		SP	Brown, poorly graded SAND, dry, loose, fine sand, some intermixed wood (Earthen Fill)					
		SP	Gray, poorly graded SAND, moist, fine sand, intermixed wood (Earthen Fill)					
5		SP	Yellowish brown, poorly graded SAND, loose, fine sand (Glacial Outwash)					
		ML	Gray, SILT, dry, medium plasticity, dense					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-11-A

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Brown, SAND, loose, moist, organic, (Topsoil - Fill)					
		SP	Gray brown, poorly graded SAND, moist, loose, fine sand (Glacial Outwash)					
2		SP	Gray/yellowish brown, poorly graded SAND, moist to wet, fine sand, bedded, (Glacial Outwash) Seepage at 3.5'					∇

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-11-B

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, dry to moist, loose, fine sand, some roots (Fill)					
		SP	Yellowish brown/gray, poorly graded SAND, moist, medium dense, fine sand (Glacial Outwash)					
2								
4								
6								
8								
10								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 2 4 6 8 10

DEPTH (feet)

0 2 4 6 8 10

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-11-C

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT10 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, dry to moist, loose, fine sand, some roots (Fill)					
			Charcoal and partially burnt wood					
5			Brown, poorly graded SAND, dry, loose, intermixed bricks, (Demolition waste)					
10			Gray brown, poorly graded SAND, moist, loose, fine to medium sand, intermixed wood and steel, with some hoses (Demolition Waste)					
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

DEPTH (feet)	0–5	5–10	10–15	15–20
0–5				
5–10				
10–15				
15–20				

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-12-A

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, moist to dry, loose, fine to medium sand (Fill)					
			Gray brown, poorly graded SAND, moist, loose, fine to medium sand, intermixed with wood (Demolition waste)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet) 0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-12-B

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/3/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, moist to dry, loose, fine to medium sand (Fill)					
			Gray brown, poorly graded SAND, dry, loose, fine sand, intermixed wood, tires, metal, carpet, steel pipes (Refuse)					
5								
10								
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 5, 10, 15, 20

DEPTH (feet): 0, 5, 10, 15, 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-13-A

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/4/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, moist to dry, loose, fine to medium sand (Fill)					
			Dark gray brown, poorly graded SAND, dry to moist, loose, intermixed dimensional timber, bricks, steel pipes (Demolition Waste)					
5								
10								
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet) 0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-13-B

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/4/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Gray, poorly graded GRAVELLY SAND, dry, fine sand (Fill)					
			Gray brown, poorly graded SAND, dry to moist, loose, fine to medium sand, intermixed dimensional lumber (Demolition Waste)					
5								
10								
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet)

0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-14-A

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/4/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, dry, medium dense, fine sand, with some steel and pockets of crushed glass (Fill)					
4–20			Dark gray brown, poorly graded SAND, moist, loose, fine sand, intermixed dimensional timber (Fill)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet) 0 5 10 15 20

DEPTH (feet) 0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-15

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/4/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
20								
25								
30								
35								
40								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet)

20 25 30 35 40

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-15

PAGE: 2 of 2

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 8/4/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, moist to dry, loose, fine to medium sand with some wood (Earthen Fill)					
5			Dark brown, poorly graded SAND, dry to moist, fine sand, with intermixed wood and plastic (Demolition Waste)					
			Pocket of pink packing foam and plastic at 8 feet					
10			Pocket of crushed glass at 10 feet					
			No plastic in demolition waste below 13 feet					
15								
		SP	Gray, poorly graded SAND, moist, fine sand, (Glacial Outwash - Fill)					
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet) 0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-16

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/4/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Gray brown, SILTY SAND with some gravel, fine sand, with intermixed wood, some steel and plastic (Demolition Waste)					
			Brown, poorly graded GRAVELLY SAND, with intermixed wood, bricks, steel and cardboard (Demolition Waste)					
5			Crushed glass					
		SP	Yellowish brown, poorly graded SAND, dry, loose, fine to medium sand (Earthen Fill)					
10			Dark brown, SILTY SAND, moist, loose, fine sand, intermixed wood (Demolition Waste)					
15								
		SM	Gray/yellow, SANDY SILT, moist, medium plasticity, medium stiff, dark brown concretions					
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet) 0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-17

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 5900 Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/4/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		ML	Gray, SANDY SILT with some gravel, dry, medium plasticity, (Earthen Fill)					
4–20			Brown, poorly graded SILTY SAND, moist, loose, fine to medium sand, intermixed with tires, bricks, plastic and large pieces of wood (Demolition Waste) Intermixed with wood only below 8'					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 5, 10, 15, 20

DEPTH (feet): 0, 5, 10, 15, 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-18

PAGE: 1 of 2

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 5900 Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 8/4/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
20								
25								
30								
35								
40								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet)

20 25 30 35 40

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-18

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 8/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded GRAVELLY SAND, dry, medium dense, (Earthen Fill)					
			Black/brown, GRAVELLY SAND with glass, aphalt and bricks, dry, loose (Fill)					
			Crushed glass (Fill)					
			Gray, poorly graded SAND, dry, loose, fine sand, with intermixed plastic and PVC pipes (Demolition Waste)					
5			Dark brown, poorly graded SAND, dry to moist, loose, intermixed plywood, PVC pipes and some steel (Demolition Waste					
10								
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet) 0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-19

PAGE: 1 of 1

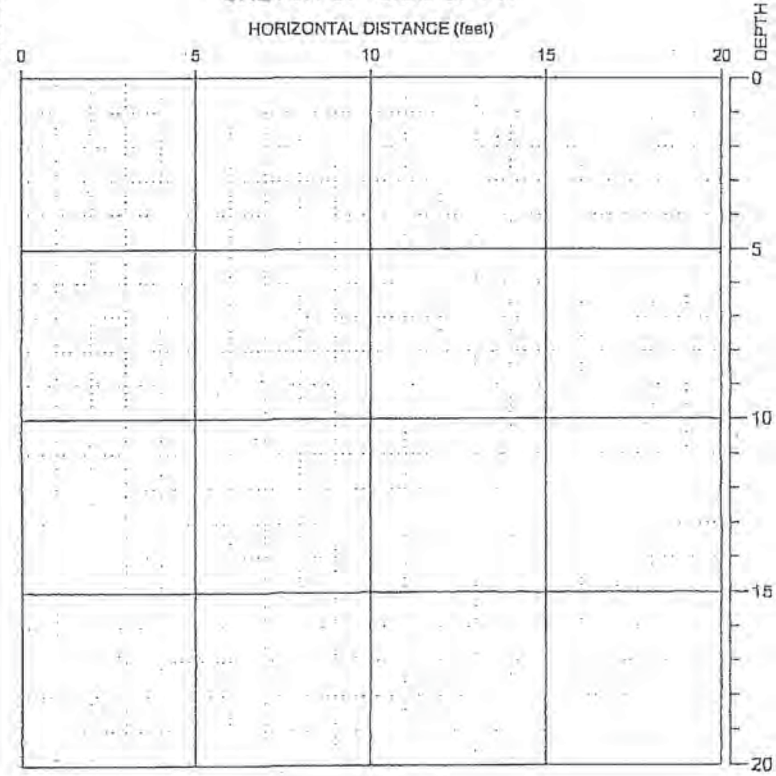
PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Dark brown, SILTY SAND with some gravel, moist (Earthen Fill)					
		SM	Brown, SILTY SAND, dry to moist, loose, fine to medium sand, intermixed plywood, bricks, plastic sheeling, steel and occasional tire (Demolition Waste)					
5								
		SP	Olive grey, poorly graded SAND, loose, moist, fine to medium sand					
10								
15								
20								

SKETCH OF SIDE OF PIT



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP20

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Dark brown, SILTY SAND with some gravel, moist (Earthen Fill)					
		SM	Brown, SILTY SAND, moist, loose, fine to medium sand (Demolition Waste) Some plastic at 3' Burnt wood at 4' Tyres and PVC piping at 6' to 8'					
		SP	Dark brown, SAND, moist, loose, with intermixed plywood and dimensional timber (Demolition waste)					
		ML	Blue gray, SANDY SILT, moist, with intermixed plywood, tires and concrete (Demolition waste)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet)

0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP21

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		ML	Dark brown, SANDY SILT, low plasticity, moist (Earthen Fill)					
		SM	Orange brown, SILTY SAND, dry, loose, with intermixed glass and steel (Demolition waste)					
			Charcoal and partially burnt wood					
		SM	Dark brown, SILTY SAND, dry to moist, loose, intermixed concrete and dimensional timber, with some carpet (Demolition Waste)					
5								
10								
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet) 0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP22

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Brown, SILTY SAND with gravel (Earthen Fill					
			Brown, SILTY SAND, loose, with intermixed plastic sheeting, plywood, foam rubber insulation, glass (Demolition Waste)					
5			Burnt wood and charcoal					
			Branches and pine needles (Wood waste)					
10			Dark brown, SILTY SAND, with intermixed dimensional timber and concrete (Demolition Waste)					
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 5, 10, 15, 20

DEPTH (feet): 0, 5, 10, 15, 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP23

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Brown, poorly graded SAND with some gravel					
			Dark brown, SILTY SAND, dry to moist, with intermixed bricks, linoleum, insulation and some steel and wire (Demolition Waste)					
			Crushed glass					
5			Dark brown, SILTY SAND, dry to moist, with intermixed bricks, insulation and some steel and wire (Demolition Waste)					
10								
15								
20								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet) 0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-24

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Dark brown, SILTY SAND					
		SM	Orange, poorly graded SILTY SAND, dry, fine to medium sand, some steel and bricks (Demolition Waste)					
			Burnt wood/charcoal					
5			Brown, SILTY SAND, dry to moist, with intermixed dimensional timber, steel, concrete, carpet and some plastic (Demolition Waste) Pocket of crushed glass at 7' Large stumps from 8' to 12'					
10–15								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet): 0, 5, 10, 15, 20

DEPTH (feet): 0, 5, 10, 15, 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-25

PAGE: 1 of 1

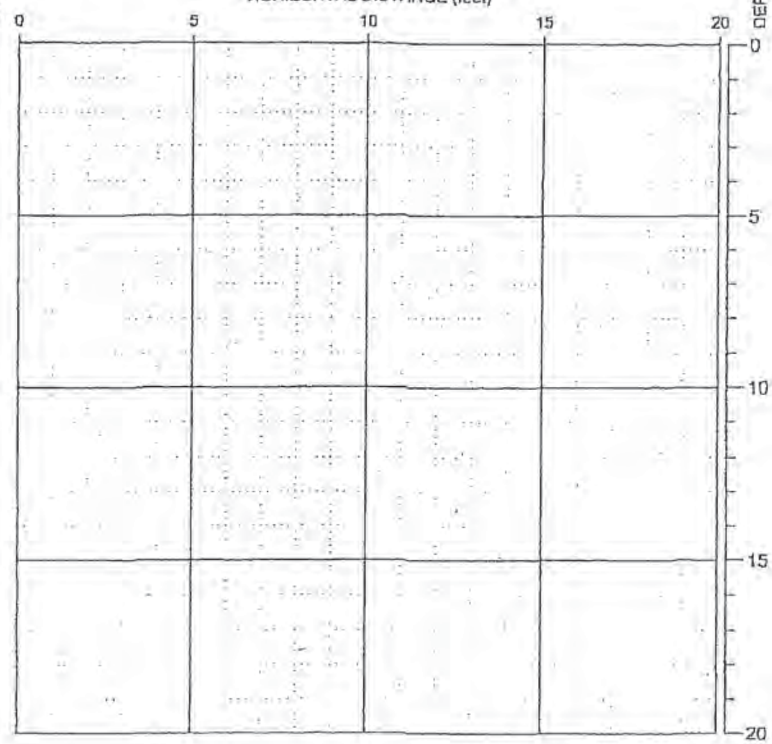
PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Brown, SILTY SAND with gravel (Earthen Fill)					
			Dark gray, GRAVELLY SAND with silt, some steel and plastic (Demolition Waste)					
			Charcoal					
5			Dark gray, SILTY SAND, with intermixed plywood, dimensional timber, trace concrete (Demolition Waste) Large pieces of dimensional timber at 8'					
10								
15								
20								

SKETCH OF SIDE OF PIT



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-26
PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0–3.5			Dark brown, SILTY SAND with some gravel, fine sand, with intermixed bricks, glass, plywood and steel (Demolition Waste)					
3.5–4.5		SM	Gray, SILTY SAND, moist to dry, some wood, (Earthen Fill)					
4.5–6		SP SM	Light brown, poorly graded SAND with some silt, fine sand, (Glacial Outwash)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-27

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT10 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Dark brown, SILTY SAND, moist, with some wood and glass, occasional concrete (Topsoil - Demolition Waste)					
		SM	Light brown, SAND, moist, fine sand, with veins of gray SILTY SAND					
2								
4								
6								
8								
10								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 2 4 6 8 10

DEPTH (feet) 0 2 4 6 8 10

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-28

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Dark brown, SILTY SAND, moist, with some wood and glass, occasional concrete (Topsoil - Demolition Waste)					
		SM	Light brown, SAND, moist, fine sand, with veins of gray SILTY SAND					
2								
4								
6								
8								
10								

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 2 4 6 8 10

DEPTH (feet)

0 2 4 6 8 10

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-29

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT10 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0–6			Dark brown, SILTY SAND, loose, intermixed wood, steel, bricks concrete and plastic (Demolition Waste)					
6–10		SM	Light brown, SILTY SAND, dry to moist, fine sand (Glacial Outwash)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

0 5 10 15 20

DEPTH (feet)

0 5 10 15 20

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-30

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

TPIT20 2002071.GPJ 6/25/02

EXCAVATION COMPANY: Best Way Excavation, Inc.
EXCAVATING EQUIPMENT: 590D Track Hoe
SURFACE ELEVATION: ± Feet

LOCATION: Go East Landfill, Everett Washington
DATE COMPLETED: 6/5/02
LOGGED BY: B. Robinson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0–6			Brown, SILTY SAND with some gravel, loose, fine sand, intermixed bricks, concrete, logs and some carpet (Demolition Waste)					

SKETCH OF SIDE OF PIT

HORIZONTAL DISTANCE (feet)

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

GO EAST LANDFILL
EVERETT, WASHINGTON

LOG OF TEST PIT
TP-31

PAGE: 1 of 1

PROJECT NO.: 2002071 FIGURE:

2009 Monitoring Well Boring Logs (AESI)

Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines[5]	GW	Well-graded gravel and gravel with sand, little to no fines
			GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥15% Fines[5]	GM	Silty gravel and silty gravel with sand
			GC	Clayey gravel and clayey gravel with sand
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines[5]	SW	Well-graded sand and sand with gravel, little to no fines
			SP	Poorly-graded sand and sand with gravel, little to no fines
		≥15% Fines[5]	SM	Silty sand and silty sand with gravel
			SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50		ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
			CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
			CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

	Density	SPT[2] blows/foot
Coarse-Grained Soils	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50

	Consistency	SPT[2] blows/foot
Fine-Grained Soils	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

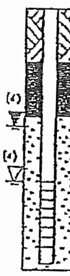
(3) Estimated Percentage

Component	Percentage by Weight
Trace	<5
Few	5 to 10
Little	15 to 25
With	- Non-primary coarse constituents: ≥ 15% - Fines content between 5% and 15%

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols



(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of ground water
ATD = At time of drilling
Static water level (date)
(5) Combined USCS symbols used for fines between 5% and 15%

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

/T: Layout2

blocks\log_key.dwg

Associated Earth Sciences, Inc.

EXPLORATION LOG KEY

Associated Earth Sciences, Inc.	Geologic & Monitoring Well Construction Log		
	Project Number	Well Number	Sheet
	KE090231A	MW-1	1 of 3

Project Name	Go East Landfill	Location	Snohomish County, WA
Elevation (Top of Well Casing)	~262'	Surface Elevation (ft)	~259'
Water Level Elevation	~211'	Date Start/Finish	8/11/09 8/12/09
Drilling/Equipment	Cascade CME 75	Hole Diameter (in)	6 1/4" I.D.
Hammer Weight/Drop	140# / 30"		

Depth (ft)	Water Level	WELL CONSTRUCTION	S T	Blows/ 6"	Graphic Symbol	DESCRIPTION
		Well monument (aboveground) Concrete				**Vashon Advance Outwash**
5		Bentonite chips		8 12 28		Moist, slightly rust-stained brownish gray, fine to medium SAND, with trace gravel.
10				14 28 40		Moist, brownish gray, fine to medium SAND, with silty zones and coarse sand beds.
15				10 15 25		Wet, slightly rust-stained brownish gray, fine to medium SAND, with trace gravel.
20		Bentonite grout		8 18 21		Moist, bluish gray, SILT.
25				50/6"		Moist, brownish gray, fine to medium SAND.
30				25 50/5"		Moist, slightly rust-stained brownish gray, fine to medium SAND, with a silt lens containing trace charcoal.
35				18 33 34		Moist, brownish gray, fine to medium SAND, with siltier zones.

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

Water Level (8/19/09)

Water Level at time of drilling (ATD)

Logged by: JPL

Approved by:

Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
KE090231A	MW-1	2 of 3

Project Name: Go East Landfill
Elevation (Top of Well Casing): ~262'
Water Level Elevation: ~211'
Drilling/Equipment: Cascade CME 75
Hammer Weight/Drop: 140# / 30"

Location: Snohomish County, WA
Surface Elevation (ft): ~259'
Date Start/Finish: 8/11/09 8/12/09
Hole Diameter (in): 6 1/4" I.D.

Depth (ft)	Water Level	WELL CONSTRUCTION	S T	Blows/ 6"	Graphic Symbol	DESCRIPTION
				36 50/5"		Moist, bluish gray, fine to medium SAND, with siltier zones.
						Driller reports significant water.
45				50/6"		Above bottom 6": Same as above (filled sampler [heave?]). Bottom 6": Moist, bluish gray, SILT, with a few light gray, very fine sand partings.
	∇					
50				24 27 41		Moist, bluish gray, silty very fine SAND interbedded with sandy SILT.
55				14 17 32		Moist, bluish gray, SILT.
60		Bentonite chips		10 23 26		Moist to wet, bluish gray, fine SAND.
		Silica sand 2/12				
65				18 28 39		Wet, same.
70		2" I.D. Schedule 40 PVC machine slotted well screen with 0.010" slots (65' to 75')		16 24 36		Wet, bluish gray, silty very fine SAND interbedded with SILT, with fine sand.
						Pre-Vashon Glacial Lacustrine
75		Threaded end cap		10 22 27		Wet, bluish gray, SILT, with very fine sand, a few very fine sand partings and beds of fine to medium sand.

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
∇ Water Level (8/19/09)
▼ Water Level at time of drilling (ATD)

Logged by: JPL
Approved by:

Associated Earth Sciences, Inc.

Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
KE090231A	MW-1	3 of 3

Project Name: Go East Landfill
Elevation (Top of Well Casing): ~262'
Water Level Elevation: ~211'
Drilling/Equipment: Cascade CME 75
Hammer Weight/Drop: 140# / 30"

Location: Snohomish County, WA
Surface Elevation (ft): ~259'
Date Start/Finish: 8/11/09 8/12/09
Hole Diameter (in): 6 1/4" I.D.

Depth (ft)	Water Level	WELL CONSTRUCTION	ST	Blows/ 6"	Graphic Symbol	DESCRIPTION
				14 22 28		Moist, bluish gray, SILT, with scattered white sand-sized grains.
85				18 23 24		Moist, bluish gray, SILT, with a few very fine sand partings.
90				15 21 25		Moist, bluish gray, SILT.
95				9 17 30		Moist, bluish gray, SILT, with a few very fine sand partings and a fine sand bed.
100				12 19 26		Moist, bluish gray, SILT, with a few very fine sand partings.
						Boring terminated at 101.5 feet on 8/12/09
105						
110						
115						

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
Water Level (8/19/09)
Water Level at time of drilling (ATD)

Logged by: JPL
Approved by:

Associated Earth Sciences, Inc.

Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
KE090231A	MW-2	1 of 2

Project Name: Go East Landfill
Elevation (Top of Well Casing): ~234'
Water Level Elevation: ~183'
Drilling/Equipment: Cascade CME 75
Hammer Weight/Drop: 140# / 30"

Location: Snohomish County, WA
Surface Elevation (ft): ~232'
Date Start/Finish: 8/12/09 8/12/09
Hole Diameter (in): 6 1/4" I.D.

Depth (ft)	Water Level	WELL CONSTRUCTION	S T	Blows/ 6"	Graphic Symbol	DESCRIPTION
		Well monument (aboveground) Concrete				Vashon Advance Outwash
5		Bentonite chips		10 12 14		~4" moist, rust-stained brownish gray, fine to medium SAND over moist, brownish gray to bluish gray (with depth), SILT.
10				11 11 13		Moist, brownish gray, fine SAND.
15				9 19 29		Moist, brownish gray, fine SAND interbedded with brownish gray, SILT, rust staining at contacts.
20		Bentonite grout		8 12 17		Moist to wet, brownish gray, silty fine SAND, with a medium sand bed, interbedded with brownish gray, SILT.
25				5 14 22		Moist, brownish gray, fine SAND.
30				13 21 33		Wet, same, with slight rust staining.
35				21 26 33		Wet, same with siltier zones.

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
Water Level (8/19/09)
Water Level at time of drilling (ATD)

Logged by: JPL
Approved by:

NWWELL 090231A.GPJ BORING.GDT 9/10/09

Geologic & Monitoring Well Construction Log

Associated Earth Sciences, Inc.

Project Number	Well Number	Sheet
KE090231A	MW-2	2 of 2

Project Name: Go East Landfill
Elevation (Top of Well Casing): ~234'
Water Level Elevation: ~183'
Drilling/Equipment: Cascade CME 75
Hammer Weight/Drop: 140# / 30"

Location: Snohomish County, WA
Surface Elevation (ft): ~232'
Date Start/Finish: 8/12/09 8/12/09
Hole Diameter (in): 6 1/4" I.D.

Depth (ft)	Water Level	WELL CONSTRUCTION	ST	Blows/ 6"	Graphic Symbol	DESCRIPTION
				11 21 21		Moist to wet, brownish gray, SILT, with fine sand beds.
45		Bentonite chips		12 26 37		Moist to wet, brownish gray to bluish gray, silty very fine SAND interbedded with SILT, with fine sand.
	▽	Silica sand 2/12				
50		2" I.D. Schedule 40 PVC machine slotted well screen with 0.010" slots (50' to 60')		11 19 22		Wet, bluish gray, fine SAND, medium sand laminae with organics at 50.5'.
55				12 20 24		Wet, bluish gray, silty very fine SAND.
						Pre-Vashon Glacial Lacustrine
60		Threaded end cap		7 19 22		Moist, bluish gray, SILT.
						Boring terminated at 61.5 feet on 8/12/09
65						
70						
75						

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
▽ Water Level (8/19/09)
▼ Water Level at time of drilling (ATD)

Logged by: JPL
Approved by:

NWWELL 090231A.GPJ BORING.GDT 9/10/09

48.4

Associated Earth Sciences, Inc.	Geologic & Monitoring Well Construction Log		
	Project Number: KE090231A	Well Number: MW-3	Sheet: 1 of 2

Project Name	Go East Landfill	Location	Snohomish County, WA
Elevation (Top of Well Casing)	~245'	Surface Elevation (ft)	~243'
Water Level Elevation	~214'	Date Start/Finish	8/13/09 8/13/09
Drilling/Equipment	Cascade CME 75	Hole Diameter (in)	6 1/4" I.D.
Hammer Weight/Drop	140# / 30"		

Depth (ft)	Water Level	WELL CONSTRUCTION	S T	Blows/ 6"	Graphic Symbol	DESCRIPTION
		Well monument (aboveground) Concrete				**Vashon Advance Outwash**
5		Bentonite chips		2 4 6		Wet, slightly rust-stained brownish gray, fine to medium SAND.
10				6 11 13		Moist, rust-stained bluish gray, bedded SILT. Bottom 3": Moist, brownish gray, fine to medium SAND, with trace gravel.
15				10 16 21		Moist, brownish gray, fine to medium SAND, with trace gravel.
20		Bentonite grout		8 13 13		Moist, brownish gray, fine to medium SAND.
25				10 13 16		Moist, same.
	∇					
30				20 29 22		Wet, brownish gray, fine SAND, with siltier zones.
35				11 18 29		Top 4": Wet, rust-stained brownish gray, fine to medium SAND, with silt. Wet, bluish gray, silty very fine SAND interbedded with SILT, with fine sand.

Sampler Type (ST):

2" OD Split Spoon Sampler (SPT)	No Recovery	M - Moisture
3" OD Split Spoon Sampler (D & M)	Ring Sample	∇ Water Level (8/19/09)
Grab Sample	Shelby Tube Sample	▼ Water Level at time of drilling (ATD)

Logged by: JPL

Approved by:

Associated Earth Sciences, Inc.	Geologic & Monitoring Well Construction Log		
	Project Number	Well Number	Sheet
	KE090231A	MW-3	2 of 2

Project Name	Go East Landfill	Location	Snohomish County, WA
Elevation (Top of Well Casing)	~245'	Surface Elevation (ft)	~243'
Water Level Elevation	~214'	Date Start/Finish	8/13/09,8/13/09
Drilling/Equipment	Cascade CME 75	Hole Diameter (in)	6 1/4" I.D.
Hammer Weight/Drop	140# / 30"		

Depth (ft)	Water Level	WELL CONSTRUCTION	S T	Blows/ 6"	Graphic Symbol	DESCRIPTION
				12 20 26		Moist, bluish gray, SILT.
45		Bentonite chips		12 21 29		Wet, bluish gray, fine SAND, with silt.
		Silica sand 2/12				
50		2" I.D. Schedule 40 PVC machine slotted well screen with 0.010" slots (50' to 60')		14 18 21		Wet, same.
55				12 24 30		Moist to wet, bluish gray, laminated SILT, with very fine sand.
						Pre-Vashon Glacial Lacustrine
60		Threaded end cap		14 24 28		Moist, bluish gray, SILT, with a few very fine sand partings and a bed of fine sand.
						Boring terminated at 61.5 feet on 8/13/09
65						
70						
75						

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

Water Level (8/19/09)

Water Level at time of drilling (ATD)

Logged by: JPL

Approved by:

Associated Earth Sciences, Inc.

Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
KE090231A	MW-4	1 of 2

Project Name: Go East Landfill
Elevation (Top of Well Casing):
Water Level Elevation: No water (8/19/09)
Drilling/Equipment: Cascade CME 75
Hammer Weight/Drop: 140# / 30"

Location: Snohomish County, WA
Surface Elevation (ft): ~206'
Date Start/Finish: 8/14/09 8/14/09
Hole Diameter (in): 6 1/4" I.D.

Depth (ft)	Water Level	WELL CONSTRUCTION	S T	Blows/ 6"	Graphic Symbol	DESCRIPTION
		Locking cap				**Vashon Advance Outwash**
		Concrete				
		Bentonite chips				
5		Bentonite grout		6 8 10		Moist, grayish brown, fine SAND, little silt (SM).
10		2" I.D. Schedule 40 PVC blank		7 9 10		Moist, grayish brown, fine SAND, few silt (SP).
15				7 11 12		Becomes slightly more gray, trace silt, trace rust mottling.
		Bentonite chips				
		#2/12 silica sand				Moist to very moist, grayish tan, silty fine SAND (SM).
20				9 15 18		
		2" I.D. Schedule 40 PVC machine slotted well screen with 0.010" slots (20' to 30')				
25				6 14 19		
						Pre-Vashon Glacial Lacustrine
30		Threaded end cap		6 8 16		Wet, grayish tan, SILT (ML); non-plastic, contains dilatant zones.
35		Bentonite chips		5 9 11		Becomes blue-gray and very moist to wet.

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: TJP
Approved by:

Associated Earth Sciences, Inc.

Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
KE090231A	MW-4	2 of 2

Project Name: Go East Landfill
Elevation (Top of Well Casing):
Water Level Elevation: No water (8/19/09)
Drilling/Equipment: Cascade CME 75
Hammer Weight/Drop: 140# / 30"

Location: Snohomish County, WA
Surface Elevation (ft): ~206'
Date Start/Finish: 8/14/09 8/14/09
Hole Diameter (in): 6 1/4" I.D.

Depth (ft)	Water Level	WELL CONSTRUCTION	S T	Blows/ 6"	Graphic Symbol	DESCRIPTION
				11 13 17		
45				9 12 18		Boring terminated at 46.5 feet on 8/14/09
50						
55						
60						
65						
70						
75						

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
Water Level ()
Water Level at time of drilling (ATD)

Logged by: TJP
Approved by:

NWWELL 090231A.GPJ BORING.GDT 9/10/09

APPENDIX B
Geotechnical Report (Terra Associates 2019)

GEOTECHNICAL REPORT

Bakerview
4330 – 108th Street SE
Everett, Washington

Project No. T-8096-1

Terra Associates, Inc.

Prepared for:

Pulte Homes of Washington, Inc.
Bellevue, Washington

March 13, 2019

TERRA ASSOCIATES, Inc.

Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

March 13, 2019
Project No. T-8096-1

Mr. Jim Sprott
Pulte Homes of Washington, Inc.
3535 Factoria Blvd., Suite 600
Bellevue, Washington 98006

Subject: Geotechnical Report
Bakerview
4330 – 108th Street SE
Everett, Washington

Dear Mr. Sprott:

As requested, we have conducted a geotechnical engineering study for the subject project. The attached report presents our findings and recommendations for the geotechnical aspects of project design and construction.

Our field exploration indicates the site is generally underlain by 5 to 18 inches of organics overlying native soils consisting of various layers of sand with silt, silty sand, and sandy silt to the termination of the test pits. There were two exceptions to this general condition. The first was observed in Test Pits TP-1, TP-2, and TP-3 where we observed approximately two to three feet of medium dense, inorganic fill material overlying the native soils. The second was observed in Test Pit TP-15 where we observed approximately seven and one-half feet of loose, organic fill material overlying the native soils. We observed minor perched groundwater seepage at five tests pits between depths of four and six feet below current site grades.

In our opinion, the native soils on the site will be suitable for support of the proposed development, provided the recommendations presented in this report are incorporated into project design and construction.

We trust the information presented in this report is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

3-13-19

Carolyn S. Decker, P.E.
Project Engineer

12220 113th Avenue NE, Ste. 130, Kirkland, Washington 98034
Phone (425) 821-7777 • Fax (425) 821-4334

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Geotechnical Report
Bakerview
4330 – 108th Street SE
Everett, Washington

1.0 PROJECT DESCRIPTION

The project consists of developing a single tax parcel totaling approximately 40.64 acres with 96 single-family residential building lots, stormwater facilities, and associated access and utilities. The project site is located around a landfill that is in the process of being closed. Based on the preliminary grading plans prepared by Pace Engineers, dated October 23, 2018 for the landfill closure, grading to achieve building lot and roadway elevations will consist of cuts and fills from 1 to 16 feet. Site stormwater will be collected and directed to a stormwater pond in the approximate center of the landfill. Vertical grade transitions throughout the site will be supported by retaining walls and slopes.

We expect that the residential buildings on the lots will be two- to three-story wood-framed single-family residences constructed over a crawl space with an attached garage constructed at grade. Structural loading for these buildings is expected to be generally light; with bearing walls carrying loads of one to three kips per foot and isolated columns carrying maximum loads of 30 to 40 kips.

The recommendations contained in the following sections of this report are based on our understanding of the above design features. If actual features vary or changes are made, we should review them in order to modify our recommendations, as required. We should review final design drawings and specifications to verify that our recommendations have been properly interpreted and incorporated into project design.

2.0 SCOPE OF WORK

Our work was completed in accordance with our authorized proposal, dated December 20, 2018. Accordingly, on January 31, 2019, we observed soil conditions at 15 test pits excavated to depths of about 12 to 14 feet below existing site grades. Using the information obtained from the subsurface exploration and laboratory testing, we performed analyses to develop geotechnical recommendations for project design and construction. Specifically, this report addresses the following:

- Soil and groundwater conditions
- Geologic hazards per the City of Everett Municipal Code
- Seismic design parameters per 2015 International Building Code (IBC)
- Site preparation and grading
- Excavations
- Foundations
- Floor slabs
- Drainage
- Utilities
- Pavements

It should be noted that recommendations outlined in this report regarding drainage are associated with soil strength, design earth pressures, erosion, and stability. Design and performance issues with respect to moisture as it relates to the structure environment are beyond Terra Associates' purview. A building envelope specialist or contractor should be consulted to address these issues, as needed.

3.0 SITE CONDITIONS

3.1 Surface

The project site consists of a single tax parcel totaling approximately 40.64 acres located at 4330 – 108th Street SE in Everett, Washington. The approximate site location is shown on Figure 1.

The site is currently occupied by a landfill that is in the process of being closed. The landfill occupies the center of the project site and extends partially to the west. The landfill closure plans include overexcavation and removal of the soils associated with the landfill within the proposed project footprint. The site is currently covered with tall grass, weeds, and areas of clustered mature trees. Site topography consists of a slope that descends from the northwest to the southeast. The slope transitions across the site and has various gradients from relatively flat to steep.

3.2 Subsurface

In general, the soil conditions observed in the test pits consisted of 5 to 18 inches of organics overlying native soils consisting of various layers of sand with silt, silty sand, and sandy silt to the termination of the test pits. There were two exceptions to this general condition. The first was observed in Test Pits TP-1, TP-2, and TP-3 where we observed approximately two to three feet of medium dense, inorganic fill material overlying the native soils. The second was observed in Test Pit TP-15 where we observed approximately seven and one-half feet of loose, organic fill material overlying the native soils.

The *Geologic Map of the Everett 7.5 Minute Quadrangle, Snohomish County, Washington* by J.P. Minard (1985) indicates the site is underlain by advance outwash (Qva), Vashon till (Qvt), and transitional bed materials (Qtb). The soils observed in our test pits are consistent with these mapped descriptions.

The preceding discussion is intended to be a general review of the soil conditions encountered. For more detailed descriptions, please refer to the Test Pit in Appendix A.

3.3 Groundwater

We observed minor to moderate, perched groundwater seepage in Test Pits TP-9, TP-10, TP-11, TP-12, and TP-14 between four to six feet below current site grades, respectively. The groundwater was noted to flow generally from sandier layers within the glacial till or transitional bed material. This groundwater seepage would not be significantly affected by seasonal weather variations and would likely be present during the drier summer and fall months. However, once exposed by excavation, we would anticipate the rate and volume of flow will diminish as storage from the isolated sandier zones is depleted.

3.4 Geologic Hazards

We evaluated site conditions for the presence of geologic hazards as designated in Chapter 19.37.080 "Geologically Hazardous Areas" of the City of Everett Municipal Code (EMC).

3.4.1 Erosion Hazard Areas

Section 19.37.080 (3) of the Everett Municipal Code (EMC) defines an erosion hazard as:

"a. Those areas defined as high and very high/severe risk of erosion in the Dames and Moore Methodology for the Inventory, Classification and Designation of Geologically Hazardous Areas, City of Everett, Washington: July 1, 1991:

> i. High erosion hazard areas include slopes of 25 to 40 percent in Qva and Qal geologic units; and slopes of greater than forty percent in other (not Qva or Qal) geologic units.
>
> ii. Very high/severe erosion hazard areas include slopes of greater than 40 percent in Qva and Qal geologic units.

b. Those areas defined as medium risk of erosion in the Dames and Moore Methodology for the Inventory, Classification and Designation of Geologically Hazardous Areas, City of Everett, Washington: July 1, 1991, when they contain debris and mud flows, gullying or rifling, immature vegetation, or no vegetation:

> i. Slopes of 25 to 40 percent in other (not Qva or Qal) geologic units."

The soils encountered on-site are classified as Alderwood gravelly sandy loam, 0 to 8 percent slopes and Alderwood-Everett gravelly sandy loams, 25 to 70 percent slopes by the United States Department of Agriculture Natural Resources Conservation Service (NRCS). These soil types are rated as having a slight to severe potential for erosion when exposed. Therefore, according to the EMC, the site would be considered an erosion hazard area.

Implementation of temporary and permanent Best Management Practices (BMPs) for preventing and controlling erosion will be required and will mitigate the erosion hazard. As a minimum, we recommend implementing the following erosion and sediment control BMPs prior to, during, and immediately following construction activities at the site.

Prevention

- Limit site clearing and grading activities to the relatively dry months (typically May through September).
- Limit disturbance to areas where construction is imminent.
- Locate temporary stockpiles of excavated soils no closer than ten feet from the crest of the slope.
- Provide temporary cover for cut slopes and soil stockpiles during periods of inactivity. Temporary cover may consist of durable plastic sheeting that is securely anchored to the ground surface or straw mulch.
- Establish permanent cover over exposed areas that will not be disturbed for a period of 30 days or more by seeding, in conjunction with a mulch cover or appropriate hydroseeding.

Containment

- Install a silt fence along site margins and downslope of areas that will be disturbed. The silt fence should be in place before clearing and grading is initiated.
- Intercept surface water flow and route the flow away from the slope to a stabilized discharge point. Surface water must not discharge at the top or onto the face of the steep slope.
- Provide on-site sediment retention for collected runoff.

The contractor should perform daily review and maintenance of all erosion and sedimentation control measures at the site.

3.4.2 Landslide Hazard Areas

Section 19.37.080 (1) of the EMC defines a landslide hazard area as

"a. Those areas defined as high and very high/severe risk of landslide hazard in the Dames and Moore Methodology for the Inventory, Classification and Designation of Geologically Hazardous Areas, City of Everett, Washington: July 1, 1991:

i. Very high/severe: slopes greater than 15 percent in the Qtb, Qw, and Qls geologic units; and slopes greater than 15 percent with uncontrolled fill.

ii. High: slopes greater than 40 percent in all other geologic units (not Qtb, Qw, and Qls or uncontrolled fill).

b. Those areas defined as medium risk of landslide hazard in the Dames and Moore Methodology for Inventory, Classification and Designation of Geologically Hazardous Areas, City of Everett, Washington: July 1, 1991, when combined with springs or seeps, immature vegetation, and/or no vegetation:

i. Slopes less than 15 percent for Qtb, Qw, and Qls geologic units and uncontrolled fill.

ii. Slopes of 25 percent to 40 percent in all other geologic units.

c. Any area with all three of the following characteristics:

i. Slopes greater than 15 percent.

ii. Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock.

iii. Springs, groundwater seepage, or saturated soils.

d. Any area which has shown movement during the Holocene epoch (from 10,000 years ago to the present) or which is underlain or covered by mass wastage debris of that epoch.

e. Any area potentially unstable as a result of rapid stream incision, stream bank erosion, or undercutting by wave action.

f. Areas of historic failures, including areas of unstable, old and recent landslides or landslide debris within a head scarp, and areas exhibiting geomorphological features indicative of past slope failure, such as hummocky ground, slumps, earthflows, mudflows, etc.

g. Any area with a slope of 40 percent or steeper and with a vertical relief of fifteen or more feet, except those manmade slopes created under the design and inspection of a geotechnical professional, or slopes composed of consolidated rock.

h. Areas that are at risk of landslide due to high seismic hazard.

i. Areas that are at risk of landslides or mass movement due to severe erosion hazards."

There are portions of the site that meet the definitions of a and b outlined above. However, during the closure process of the landfill and during the grading process for the site the majority of the manmade landslide hazards that are currently present will be removed and the result of the grading will create a more stable project site.

The exception to this is the slope along the eastern side of the project the descends from the site to a ravine to the east. Any structure located along this slope should maintain a minimum buffer of 25 feet with a 15-foot building setback for a total of 40 feet from the crest of the slope. Alternatively, the building foundations can be lowered to create a 40-foot horizontal separation from the outside edge of the building foundation and the face of the steep slope.

3.4.3 Seismic Hazard Areas

Section 19.37.080 (2) of the EMC defines a seismic hazard as

"a. Those areas mapped as seismic/liquefaction hazards per the Dames and Moore Methodology for the Inventory, Classification and Designation of Geologically Hazardous Areas, City of Everett, Washington: July 1, 1991.

b. Those areas mapped as high and moderate to high liquefaction susceptibility on the Liquefaction Susceptibility Map of Snohomish County, Washington, Washington State Department of Natural Resources, Palmer, Stephen, et al., September 2004."

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations. Liquefaction mainly affects geologically recent deposits of fine grained sand that are below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction; thus, eliminating the soil's strength.

The glacial sediments observed at the site were observed to be in a medium dense to very dense state and would typically exhibit moderate to high shear strengths capable of offsetting the liquefaction inducing stresses caused by a design level earthquake. Therefore, it is our opinion that the hazard for soil liquefaction during an earthquake and the associated risk or impact is negligible. Therefore, the site would not be meet the seismic hazard area criteria as described above.

Based on soil conditions observed in the test pits and our knowledge of the area geology, per Chapter 16 of the 2015 International Building Code (IBC), site class "D" should be used in structural design. Based on this site class, in accordance with the 2015 IBC, the following parameters should be used in computing seismic forces:

Seismic Design Parameters (IBC 2015)

Spectral response acceleration (Short Period), S_{Ms}	1.386g
Spectral response acceleration (1 – Second Period), S_{M1}	0.794g
Five percent damped .2 second period, S_{Ds}	0.924g
Five percent damped 1.0 second period, S_{D1}	0.529g

These values were determined using the latitude and longitude coordinates of 47.89783°N and 122.171849°W and the OSHPD Seismic Design Maps, accessed on March 12, 2019 at the web site https://seismicmaps.org/.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 General

Based on our study, there are no geotechnical considerations that would preclude development of the site, as currently planned. The residential building can be supported on conventional spread footings bearing on competent inorganic native soil, competent existing fill, or on structural fill placed and compacted above the competent soils. Pavement and floor slabs can be similarly supported.

The approximately seven and one-half feet of loose, organic fill material that was observed in Test Pit TP-15 would not be suitable for support of building foundations, pavements, or other site improvements. We recommend this material be removed from below all building elements and replaced with new structural fill placed and compacted as recommended below. We would note that this test pit was excavated near edge of the landfill closure area.

The native and existing fill soils encountered at the site contain a significant amount of soil fines that will make compaction as structural fill difficult when too wet. The ability to use the soil from site excavations as structural fill will depend on its moisture content and the prevailing weather conditions at the time of construction. If grading activities will take place during the wet winter months, the owner should be prepared to import clean granular material for use as structural fill and backfill.

The following sections provide detailed recommendations regarding the preceding issues and other geotechnical design considerations. These recommendations should be incorporated into the final design drawings and construction specifications.

4.2 Site Preparation and Grading

To prepare the site for construction, all vegetation, organic surface soils, and other deleterious material should be stripped and removed from below building and pavement areas. Stripping depths of 5 to 18 inches should be expected to remove the upper layer of organic material. Soil containing organic material will not be suitable for use as structural fill but may be used for limited depths in nonstructural areas.

As mentioned above, the seven and one-half feet of loose, organic fill material observed in Test Pit TP-15 will not be suitable for support of building foundations and pavements in its current condition. We recommend that this material be removed and replaced with structural fill placed and compacted as outlined below. The lateral extent of the removal will need to be determined in the field during grading.

The closure of the landfill will include over excavation and removal of unsuitable soils located along the perimeter of the landfill and extend into the proposed development area. We recommend the material that is used to restore grades be a structural fill material that is placed and compacted as outlined below.

Once clearing and excavation operations are complete, cut and fill operations can be initiated to establish desired grades. Prior to placing fill, all exposed bearing surfaces should be observed by a representative of Terra Associates, Inc. to verify soil conditions are as expected and suitable for support of new fill. Our representative may request a proofroll using heavy rubber-tired equipment to determine if any isolated soft and yielding areas are present. If excessively yielding areas are observed, and they cannot be stabilized in place by compaction, the affected soils should be excavated and removed to firm bearing and grade restored with new structural fill. Beneath embankment fills or roadway subgrade if the depth of excavation to remove unstable soils is excessive, the use of geotextile fabrics, such as Mirafi 500X, or an equivalent fabric, can be used in conjunction with clean granular structural fill. Our experience has shown that, in general, a minimum of 18 inches of a clean, granular structural fill placed and compacted over the geotextile fabric should establish a stable bearing surface.

The native and existing fill soils encountered at the site contain a sufficient amount of soil fines that will make them difficult to compact as structural fill when too wet or too dry. The ability to use soils from site excavations as structural fill will depend on its moisture content and the prevailing weather conditions at the time of construction. If wet soils are encountered, the contractor will need to dry the soils by aeration during dry weather conditions. Alternatively, the use of an additive such as Portland cement or lime to stabilize the soil moisture can be considered. If the soil is amended, additional Best Management Practices (BMPs) addressing the potential for elevated pH levels will need to be included in the Storm Water Pollution Prevention Program (SWPPP) prepared with the Temporary Erosion and Sedimentation Control (TESC) plan.

If grading activities are planned during the wet winter months, or if they are initiated during the summer and extend into fall and winter, the owner should be prepared to import wet weather structural fill. For this purpose, we recommend importing a granular soil that meets the following grading requirements:

U.S. Sieve Size	Percent Passing
6 inches	100
No. 4	75 maximum
No. 200	5 maximum*

* Based on the 3/4-inch fraction.

Prior to use, Terra Associates, Inc. should examine and test all materials imported to the site for use as structural fill.

Structural fill should be placed in uniform loose layers not exceeding 12 inches and compacted to a minimum of 95 percent of the soil's maximum dry density, as determined by American Society for Testing and Materials (ASTM) Test Designation D-698 (Standard Proctor). The moisture content of the soil at the time of compaction should be within minus one to plus three percent of its optimum, as determined by this ASTM standard. In nonstructural areas, the degree of compaction can be reduced to 90 percent.

4.3 Excavation

All excavations at the site associated with confined spaces, such as utility trenches, must be completed in accordance with local, state, and federal requirements. Based on regulations outlined in the Washington Industrial Safety and Health Act (WISHA), the existing fill and medium dense soils observed at the site would be classified as Type C soils. The dense to very dense native soils would be classified as Type B soil.

Accordingly, temporary excavations in Type C soils should have their slopes laid back at an inclination of 1.5:1 (Horizontal:Vertical) or flatter, from the toe to the crest of the slope. Side slopes in Type B soils can be laid back at a slope inclination of 1:1 or flatter. All exposed temporary slope faces that will remain open for an extended period of time should be covered with a durable reinforced plastic membrane during construction to prevent slope raveling and rutting during periods of precipitation.

Perched groundwater seepage may be encountered at shallow depths within excavations in the native soils. In our opinion, the volume of water and rate of flow into the excavation should be relatively minor and would not be expected to impact the stability of the excavations when completed as described above. Conventional sump pumping procedures along with a system of collection trenches, if necessary, should be capable of maintaining a relatively dry excavation for construction purposes.

The above information is provided solely for the benefit of the owner and other design consultants, and should not be construed to imply that Terra Associates, Inc. assumes responsibility for job site safety. It is understood that job site safety is the sole responsibility of the project general contractor.

4.4 Foundation Support

The buildings can be supported on conventional spread footing foundations bearing on competent native soils, competent existing fill soils, or on structural fills placed above competent soils. As noted above, the existing loose fill material observed in Test Pit TP-15 would not be suitable for support of building foundations in its current condition. Foundation subgrade should be prepared as recommended in Section 4.2 of this report. Perimeter foundations exposed to the weather should bear a minimum depth of 1.5 feet below final exterior grades for frost protection. Interior foundations can be constructed at any convenient depth below the floor slab.

Foundations obtaining support on competent existing fill, native soils or on new structural fill can be dimensioned for a net allowable bearing capacity of 2,500 pounds per square foot (psf). For short-term loads, such as wind and seismic, a one-third increase in this allowable capacity can be used. With structural loading as anticipated and this bearing stress applied, estimated total and differential settlements are expected to be less than one-half inch.

For designing foundations to resist lateral loads, a base friction coefficient of 0.35 can be used. Passive earth pressures acting on the side of the footing can also be considered. We recommend calculating this lateral resistance using an equivalent fluid weight of 350 pcf. We recommend not including the upper 12 inches of soil in this computation because they can be affected by weather or disturbed by future grading activity. This value assumes the foundation will be constructed neat against competent native soil or backfilled with structural fill as described in Section 4.2 of this report. The values recommended include a safety factor of 1.5.

4.5 Floor Slab-on-Grade

Slab-on-grade floors may be supported on subgrade prepared as recommended in Section 4.2 of this report. Immediately below the floor slab, we recommend placing a four-inch thick capillary break layer composed of clean, coarse sand or fine gravel that has less than three percent passing the No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab.

The capillary break layer will not prevent moisture intrusion through the slab caused by water vapor transmission. Where moisture by vapor transmission is undesirable, such as covered floor areas, a common practice is to place a durable plastic membrane on the capillary break layer and then cover the membrane with a layer of clean sand or fine gravel to protect it from damage during construction, and to aid in uniform curing of the concrete slab. It should be noted that if the sand or gravel layer overlying the membrane is saturated prior to pouring the slab, it will not be effective in assisting uniform curing of the slab and can actually serve as a water supply for moisture bleeding through the slab, potentially affecting floor coverings. Therefore, in our opinion, covering the membrane with a layer of sand or gravel should be avoided if floor slab construction occurs during the wet winter months and the layer cannot be effectively drained. We recommend floor designers and contractors refer to the current American Concrete Institute (ACI) Manual of Concrete Practice for further information regarding vapor barrier installation below slab-on-grade floors.

4.6 Drainage

Surface

Final exterior grades should promote free and positive drainage away from the site at all times. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building areas. We recommend providing a positive drainage gradient away from the building perimeters. If this gradient cannot be provided, surface water should be collected adjacent to the structures and disposed to appropriate storm facilities.

Surface water must not be allowed to flow uncontrolled over the crest of the site slopes and embankments. Surface water should be directed away from the slope crests to a point of collection and controlled discharge. If site grades do not allow for directing surface water away from slopes, then water should be collected and tightlined down the slope face in a controlled manner.

Subsurface

We recommend installing perimeter foundation drains adjacent to shallow foundations. The drains can be laid to grade at an invert elevation equivalent to the bottom of footing grade. The drains can consist of four-inch diameter perforated PVC pipe that is enveloped in washed pea gravel-sized drainage aggregate. The aggregate should extend six inches above and to the sides of the pipe. Roof and foundation drains should be tightlined separately to the storm drains. All drains should be provided with cleanouts at easily accessible locations.

4.7 Utilities

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) or the local jurisdiction specifications. As a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 4.2 of this report. As noted, depending on the soil moisture when excavated most inorganic native soils on the site should be suitable for use as backfill material during dry weather conditions. However, if utility construction takes place during the wet winter months, it will likely be necessary to import suitable wet weather fill for utility trench backfilling.

4.8 Pavement

Pavement subgrade should be prepared as described in the Section 4.2 of this report. Regardless of the degree of relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. The subgrade should be proofrolled with heavy rubber-tire construction equipment such as a loaded 10-yard dump truck to verify this condition.

The pavement design section is dependent upon the supporting capability of the subgrade soils and the traffic conditions to which it will be subjected. For the plat access, with traffic consisting mainly of light passenger vehicles with only occasional heavy traffic, and with a stable subgrade prepared as recommended, we recommend the following pavement sections:

- Two inches of hot mix asphalt (HMA) over six inches of crushed rock base (CRB)
- Four inches full depth HMA

The paving materials used should conform to the Washington State Department of Transportation (WSDOT) specifications for ½-inch class HMA and CRB.

Long-term pavement performance will depend on surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils and reducing their supporting capability. For optimum pavement performance, we recommend surface drainage gradients of at least two percent. Some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

5.0 ADDITIONAL SERVICES

Terra Associates, Inc. should review the final design drawings and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and implemented in project design. We should also provide geotechnical service during construction to observe compliance with our design concepts, specifications, and recommendations. This will allow for design changes if subsurface conditions differ from those anticipated prior to the start of construction.

6.0 LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Terra Associates, Inc. and is intended for specific application to the Bakerview project in Everett, Washington. This report is for the exclusive use of Pulte Homes of Washington, Inc. and its authorized representatives.

The analyses and recommendations present in this report are based on data obtained from the subsurface exploration conducted on-site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, Terra Associates, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.

REFERENCE: https://www.bing.com/maps

ACCESSED 3/12/19

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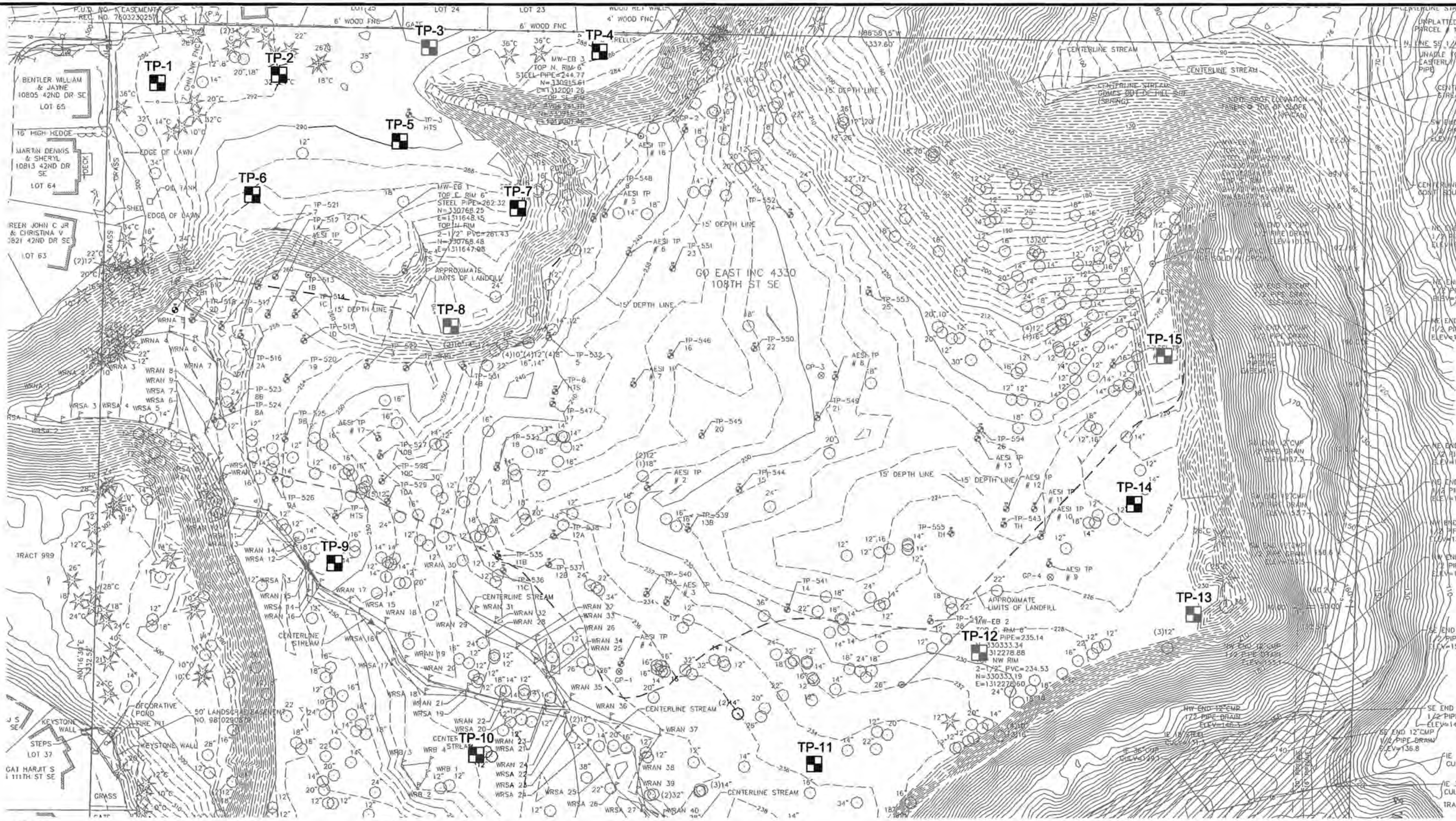
Environmental Earth Sciences

VICINITY MAP
BAKERVIEW
EVERETT, WASHINGTON

Proj.No.T-8096-1	Date: MAR 2019	Figure 1



NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE: SITE PLAN PROVIDED BY PACE.

LEGEND:

APPROXIMATE TEST PIT LOCATION

0 100 200

APPROXIMATE SCALE IN FEET

N

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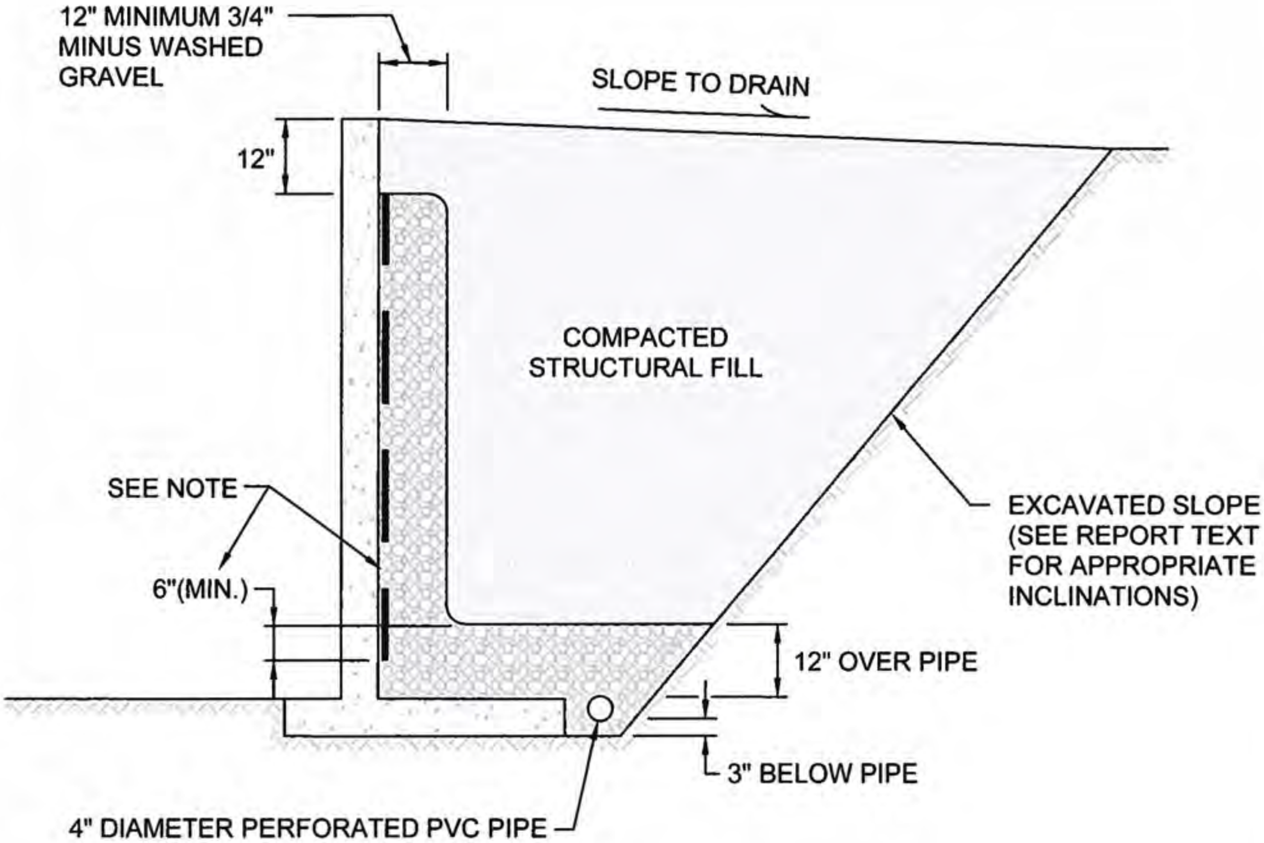
EXPLORATION LOCATION PLAN BAKERVIEW EVERETT, WASHINGTON		
Proj.No.T-8096-1	Date: MAR 2019	Figure 2



NOT TO SCALE

NOTE:

MIRADRAIN G100N PREFABRICATED DRAINAGE PANELS OR SIMILAR PRODUCT CAN BE SUBSTITUTED FOR THE 12-INCH WIDE GRAVEL DRAIN BEHIND WALL. DRAINAGE PANELS SHOULD EXTEND A MINIMUM OF SIX INCHES INTO 12-INCH THICK DRAINAGE GRAVEL LAYER OVER PERFORATED DRAIN PIPE.

Terra Associates, Inc. Consultants in Geotechnical Engineering Geology and Environmental Earth Sciences	TYPICAL WALL DRAINAGE DETAIL BAKERVIEW EVERETT, WASHINGTON		
	Proj.No.T-8096-1	Date: MAR 2019	Figure 3

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

Bakerview
Everett, Washington

On January 31, 2019, we investigated subsurface conditions at the site by excavating 15 test pits to a maximum depth of approximately 14 feet below existing surface grades using a track-mounted excavator. The test pit locations were approximately determined by measurements from existing site features and using GPS coordinates from Google Earth. The approximate test pit locations are shown on Figure 2. The Test Pit Logs are presented on Figures A-2 through A-16.

A geotechnical engineer from our office conducted the field exploration. Our representative classified the soil conditions encountered, maintained a log of each test pit, obtained representative soil samples, and recorded water levels observed during excavation. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described on Figure A-1.

Representative soil samples obtained from the test pits were placed in closed containers and taken to our laboratory for further examination and testing. The moisture content of each sample was measured and is reported on the individual Test Pit Logs. Grain size analyses were performed on selected samples. The results are shown on Figures A-17 and A-18.

MAJOR DIVISIONS				LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	More than 50% material larger than No. 200 sieve size	**GRAVELS** More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
				GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.
			Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
				GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
		SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
				SP	Poorly-graded sands, sands with gravel, little or no fines.
			Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines.
				SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS	More than 50% material smaller than No. 200 sieve size	**SILTS AND CLAYS** Liquid Limit is less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
				CL	Inorganic clays of low to medium plasticity. (Lean clay)
				OL	Organic silts and organic clays of low plasticity.
		SILTS AND CLAYS Liquid Limit is greater than 50%		MH	Inorganic silts, elastic.
				CH	Inorganic clays of high plasticity. (Fat clay)
				OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS				PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

Symbol	Definition
I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
II	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

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UNIFIED SOIL CLASSIFICATION SYSTEM
BAKERVIEW
EVERETT, WASHINGTON

Proj.No.T-8096-1	Date: MAR 2019	Figure A-1

LOG OF TEST PIT NO. TP-1

FIGURE A-2

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–1		Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
1.5–4.5	1	FILL: Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist, some cobbles. (SM)	Medium Dense to Dense	7.4
4.5–13	2, 3	Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, moist, trace cobbles. (SP-SM/SM)	Very Dense	5.9, 13.6
13–15		Test pit terminated at approximately 13 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-2

FIGURE A-3

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–1	1	Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
1–3.5	1	FILL: Brown silty SAND with gravel, fine to medium sand, fine gravel, moist, scattered organics, trace cobbles. (SM)	Medium Dense	11.8
3.5–10	2	Tan to gray SAND with silt and gravel interbedded with silty SAND with gravel, fine to coarse sand, fine gravel, trace cobbles. (SP-SM/SM) *Boulder size rock observed at approximately 8 feet.	Dense to Very Dense	4.4
10–12.5	3	Gray SAND with silt and some gravel, fine to medium sand, fine gravel, moist. (SP-SM)		10.6
12.5–15		Test pit terminated at approximately 12.5 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-3

FIGURE A-4

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
0–2	1	(9 inches of TOPSOIL) FILL: Brown silty SAND with gravel, fine to medium sand, fine gravel, moist, scattered organics, trace cobbles. (SM)	Medium Dense	19.6
2–12	2, 3	Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, trace cobbles. (SP-SM/SM)	Dense to Very Dense	7.4 (at ~4 ft); 15.5 (at ~10 ft)
12–15		Test pit terminated at approximately 12 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-4

FIGURE A-5

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–1		Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
2	1	Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, moist, trace cobbles. (SP-SM/SM)	Medium Dense to Dense	13.9
4	2			14.8
11	3			9.6
12		Test pit terminated at approximately 12 feet. No groundwater or caving observed.		
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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Environmental Earth Sciences

LOG OF TEST PIT NO. TP-5

FIGURE A-6

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
0–4.5	1	(11 inches of TOPSOIL) Tan to brown silty SAND with gravel, fine to coarse sand, fine gravel, moist, scattered organics, trace cobbles. (SM)	Medium Dense to Dense	16.8
4.5–12.5	2	Tan to gray silty SAND to SAND with silt, fine to medium sand, fine gravel, moist, trace cobbles. (SM/SP-SM)	Very Dense	18.3
	3			8.7
12.5–15		Test pit terminated at approximately 12.5 feet. No groundwater or caving observed.		
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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Environmental Earth Sciences

LOG OF TEST PIT NO. TP-6

FIGURE A-7

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(15 inches of TOPSOIL) Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)		
1		Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to coarse sand, fine gravel, dry to moist, trace cobbles. (SP-SM/SM)		
2				11.6
	1			
3				
4				
5				
6			Medium Dense to Dense	7.6
	2			
7				
8				
9				
10				
11				
	3			8.1
12		Test pit terminated at approximately 12 feet. No groundwater or caving observed.		
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-7

FIGURE A-8

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–1		(12 inches of TOPSOIL) Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
1–13		Tan to gray SAND with silt and gravel interbeded with tan silty SAND with gravel, fine to coarse sand, fine gravel, moist, scattered organics, trace cobbles. (SP-SM/SM)	Medium Dense to Dense	
2	1			10.9
5.5	2			9.5
12	3			9.4
13		Test pit terminated at approximately 13 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-8

FIGURE A-9

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–1		Black silty SAND, fine sand, moist, heavy organic inclusions. (SM) (Topsoil)	Loose	
1–14	1 (≈2.5 ft)	Tan to gray SAND with silt, fine to coarse sand, moist. (SP-SM)	Medium Dense to Dense	15.1 (≈2 ft)
	2 (≈5.5 ft)			7.3 (≈5 ft)
	3 (≈13.5 ft)			5.9 (≈13 ft)
14		Test pit terminated at approximately 14 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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Environmental Earth Sciences

LOG OF TEST PIT NO. TP-9

FIGURE A-10

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 4.5 Feet **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(6 inches of TOPSOIL)		
1		Tan to gray silty SAND with gravel to sandy SILT with gravel, fine to medium sand, fine gravel, wet, trace cobbles. (SM/ML)		
2				13.7
	1			
3				
4				
5				
	2			24.6
6			Medium Dense to Dense	
7				
8				
9				
10				25.7
	3			
11				
12				
		Test pit terminated at approximately 12 feet. Groundwater seepage observed at 4.5 feet. No caving observed.		
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-10

FIGURE A-11

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 4 Feet **DEPTH TO CAVING:** 0 to 12.5 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(9 inches of TOPSOIL)		
1		Tan to gray silty SAND with gravel to sandy SILT with gravel, fine to coarse sand, fine gravel, wet. (SM/ML)		
	1			21.0
2				
3				
▼ 4				
5				
6			Medium Dense	
7				
8				22.4
	2			
9				
10				
11				
12				22.0
	3			
13		Test pit terminated at approximately 12.5 feet. Moderate groundwater seepage observed at 4 feet. Caves easily the entire depth.		
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-11

FIGURE A-12

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 6 Feet **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(3 inches of TOPSOIL)		
1		Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, moist, trace cobbles. (SP-SM/SM)		
2				9.9
3	1		Medium Dense to Dense	
4	2	Brown to gray silty SAND with some gravel to sandy SILT with gravel, fine sand, fine gravel, moist to wet, strongly cemented. (SM/ML)		22.8
5				
6				
7	3			23.3
8				
9			Very Dense	
10				20.8
11	4			
12		Test pit terminated at approximately 12 feet. Minor groundwater seepage observed at 6 feet. No caving observed.		
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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Geology and
Environmental Earth Sciences

LOG OF TEST PIT NO. TP-12

FIGURE A-13

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 4 Feet **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–4	1	(4 inches of TOPSOIL) Tan to gray SAND with silt and gravel to silty SAND with gravel, fine to medium sand, fine gravel, moist. (SP-SM/SM)	Medium Dense	17.5
4–8 (groundwater at 4)	2	Tan to gray silty SAND with gravel to sandy SILT with gravel, fine sand, fine gravel, moist to wet, strongly cemented. (SM/ML)	Dense to Very Dense	32.3
8–12	3	Gray SAND wiith silt and gravel, fine to medium sand, fine gravel, moist to wet. (SP-SM)		9.4
12–15		Test pit terminated at approximately 12 feet. Minor groundwater seepage observed at 4 feet. No caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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Geology and
Environmental Earth Sciences

LOG OF TEST PIT NO. TP-13

FIGURE A-14

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–3.5	1 (at ~2 ft)	(6 inches of TOPSOIL) Tan to gray SAND with silt and gravel, fine to medium sand, fine gravel, moist, trace cobbles. (SP-SM)	Medium Dense to Dense	8.1
3.5–6	2 (at ~4.5 ft)	Tan to gray sandy SILT, fine sand, moist. (ML)	Dense to Very Dense	24.2
6–13	3 (at ~10.5 ft) 4 (at ~12.5 ft)	Tan to gray silty SAND, fine to medium sand, fine gravel, moist. (SM)		6.7 7.6
13–15		Test pit terminated at approximately 13 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-14

FIGURE A-15

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** 5.5 Feet **DEPTH TO CAVING:** 0 to 12 Feet

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(5 inches of TOPSOIL)		
1		Tan to gray silty SAND with gravel to sandy SILT with gravel, fine to medium sand, fine gravel, wet, trace cobbles. (SM/ML)		
2				7.8
	1			
3				
4				
5				22.2
	2			
6			Medium Dense	
7				
	3			26.5
8				
9				
10				
11				
	4			22.3
12		Test pit terminated at approximately 12 feet. Moderate groundwater seepage observed at 5.5 feet. Caving easily the entire depth.		
13				
14				
15				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

LOG OF TEST PIT NO. TP-15

FIGURE A-16

PROJECT NAME: Bakerview **PROJ. NO:** T-8096-1 **LOGGED BY:** HM

LOCATION: Everett, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N/A

DATE LOGGED: January 31, 2019 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–1		(5 inches of TOPSOIL)		
1–5.5	1	FILL: Gray SAND with silt and gravel to silty SAND with gravel, fine sand, fine gravel, moist, wood and glass debris, tree roots. (SP-SM/SM)	Medium Dense	13.2
5.5–7.5	2	FILL: Tan to brown sandy SILT, fine sand, moist, wood debris. (ML)	Medium Dense	24.1
7.5–12	3	Tan to gray SAND with silt and gravel, fine sand, fine gravel, moist. (SP-SM)	Dense	4.9
12		Test pit terminated at approximately 12 feet. No groundwater or caving observed.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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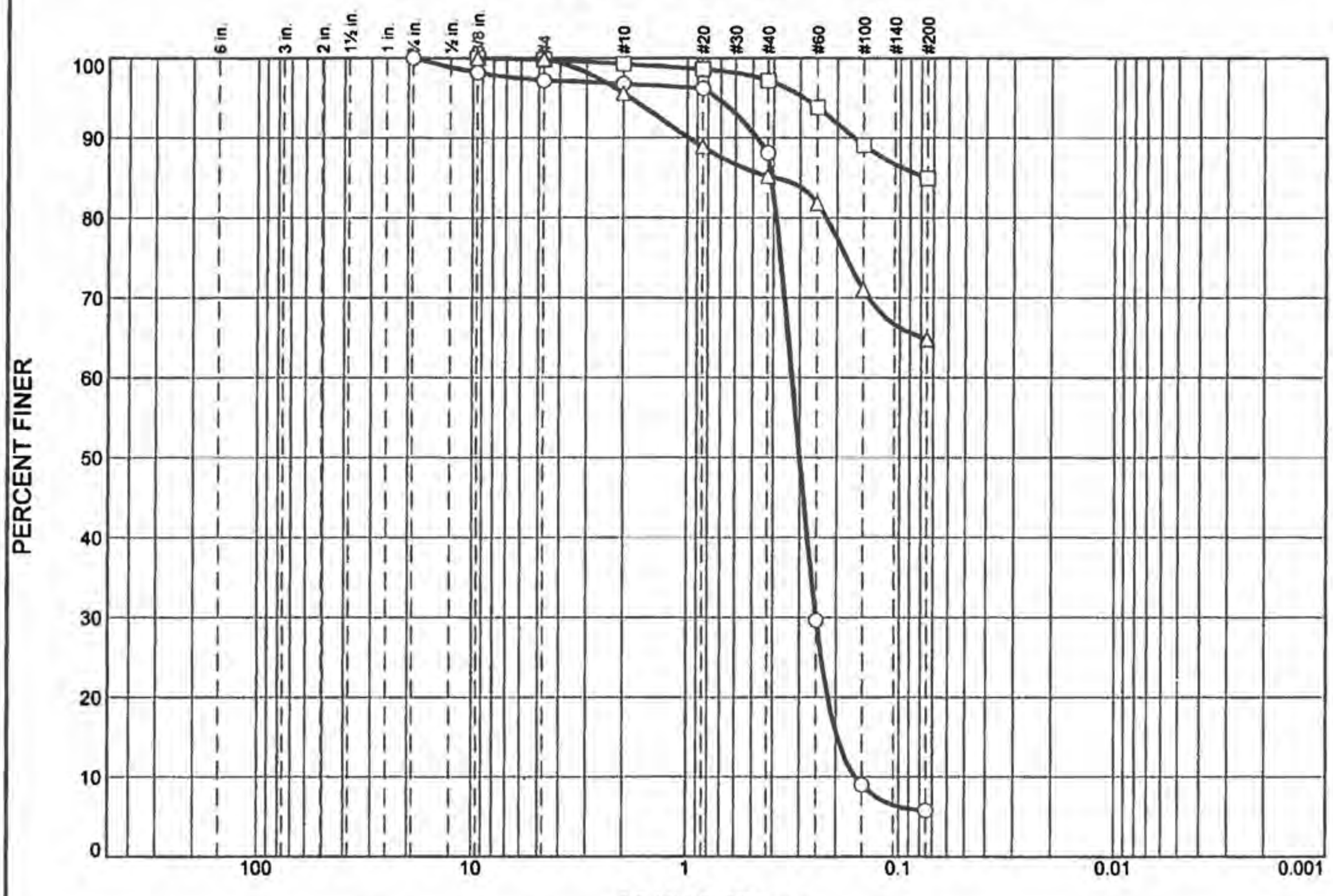
Particle Size Distribution Report



	% +3"	% Gravel Coarse	% Gravel Fine	% Sand Coarse	% Sand Medium	% Sand Fine	% Fines Silt	% Fines Clay
○	0.0	0.0	2.8	0.4	8.7	82.3	5.8	
□	0.0	0.0	0.2	0.5	2.1	12.3	84.9	
△	0.0	0.0	0.1	4.3	10.4	20.4	64.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.4096	0.3271	0.3015	0.2511	0.1973	0.1617	1.19	2.02
□			0.0765							
△			0.3957							

Material Description	USCS	AASHTO
○ Poorly graded SAND with silt	SP-SM	
□ Sandy SILT	ML	
△ Sandy SILT	ML	

Project No. T-8096-1 **Client:** Pulte Homes of Washington, Inc.

Project: Bakerview

Everett, Washington

○ **Location:** Test Pit TP-5 **Depth:** -2 feet **Sample Number:** 1

□ **Location:** Test Pit TP-10 **Depth:** -6 feet **Sample Number:** 2

△ **Location:** Test Pit TP-13 **Depth:** -4 feet **Sample Number:** 2

Remarks:

○Tested on February 1, 2019

□Tested on February 1, 2019

△Tested on February 1, 2019

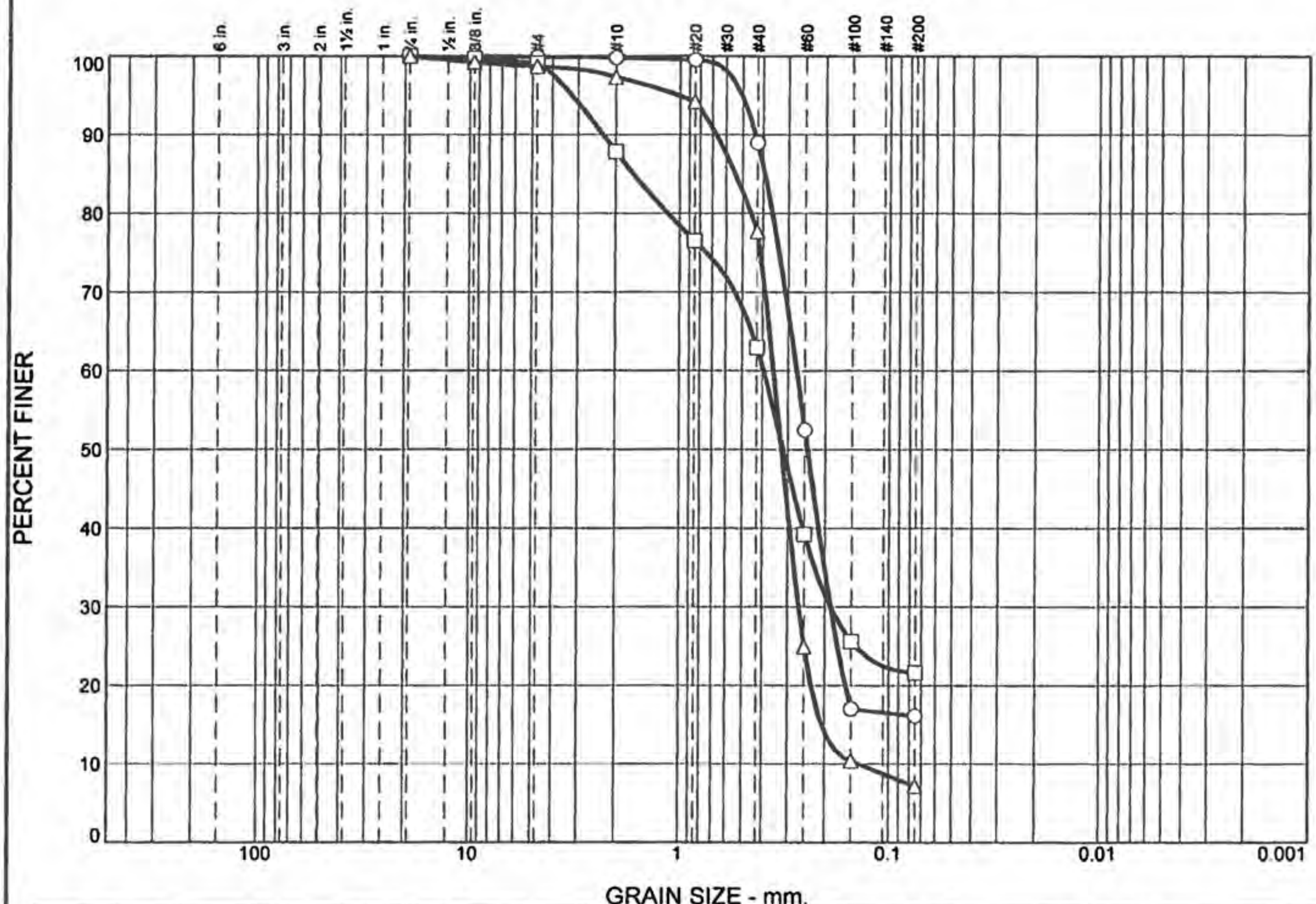
Terra Associates, Inc.

Kirkland, WA

Figure A-17

Tested By: FQ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.1	0.1	10.8	72.9	16.1	
□	0.0	0.0	0.9	11.3	24.8	41.4	21.6	
△	0.0	0.0	1.3	1.4	19.6	70.5	7.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.3922	0.2741	0.2425	0.1880				
□			1.6545	0.3939	0.3169	0.1880				
△			0.5438	0.3538	0.3231	0.2661	0.2065	0.1387	1.44	2.55

Material Description	USCS	AASHTO
○ Silty SAND	SM	
□ Silty SAND	SM	
△ Poorly graded SAND with silt	SP-SM	

Project No. T-8096-1 **Client:** Pulte Homes of Washington, Inc.

Project: Bakerview

Everett, Washington

○ **Location:** Test Pit TP-13 **Depth:** -12.5 feet **Sample Number:** 4

□ **Location:** Test Pit TP-14 **Depth:** -2 feet **Sample Number:** 1

△ **Location:** Test Pit TP-14 **Depth:** -10 feet **Sample Number:** 3

Remarks:

○Tested on February 1, 2019

□Tested on February 1, 2019

△Tested on February 1, 2019

Terra Associates, Inc.

Kirkland, WA

Figure A-18

Tested By: FQ

APPENDIX C
Laboratory Analytical Reports for June 2019 Soil Samples

OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

June 24, 2019

Chuck Lie
Terra Associates, Inc.
12220 113th Avenue NE, Suite 130
Kirkland, WA 98034

Re: Analytical Data for Project 8096
Laboratory Reference No. 1906-121

Dear Chuck:

Enclosed are the analytical results and associated quality control data for samples submitted on June 12, 2019.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

Case Narrative

Samples were collected on June 12, 2019 and received by the laboratory on June 12, 2019. They were maintained at the laboratory at a temperature of $2^{o}C$ to $6^{o}C$.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-19**					
Laboratory ID:	06-121-01					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.063	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.063	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.063	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.063	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	6.3	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*100*	*58-129*				
Client ID:	**TP-18**					
Laboratory ID:	06-121-02					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.066	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.066	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.066	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.066	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	6.6	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*98*	*58-129*				
Client ID:	**TP-17**					
Laboratory ID:	06-121-03					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.081	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.081	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.081	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.081	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	8.1	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*107*	*58-129*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-20**					
Laboratory ID:	06-121-04					
Benzene	**ND**	0.051	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.26	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.26	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.26	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.26	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	26	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*106*	*58-129*				
Client ID:	**TP-21**					
Laboratory ID:	06-121-05					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.086	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.086	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.086	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.086	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	8.6	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*102*	*58-129*				
Client ID:	**TP-25**					
Laboratory ID:	06-121-06					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.075	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.075	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.075	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.075	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	7.5	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*94*	*58-129*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-24**					
Laboratory ID:	06-121-07					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.080	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.080	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.080	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.080	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	8.0	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*98*	*58-129*				
Client ID:	**TP-23**					
Laboratory ID:	06-121-08					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.078	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.078	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.078	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.078	EPA 8021B	6-17-19	6-17-19	
Gasoline	**13**	7.8	NWTPH-Gx	6-17-19	6-17-19	O
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*104*	*58-129*				
Client ID:	**TP-7**					
Laboratory ID:	06-121-09					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.077	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.077	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.077	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.077	EPA 8021B	6-17-19	6-17-19	
Gasoline	**32**	7.7	NWTPH-Gx	6-17-19	6-17-19	O
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*58-129*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-14**					
Laboratory ID:	06-121-10					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.056	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.056	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.056	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.056	EPA 8021B	6-17-19	6-17-19	
Gasoline	**6.9**	5.6	NWTPH-Gx	6-17-19	6-17-19	O
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*107*	*58-129*				
Client ID:	**TP-13**					
Laboratory ID:	06-121-11					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.097	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.097	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.097	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.097	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	9.7	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*58-129*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B
METHOD BLANK QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0617S1					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	5.0	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*58-129*				
Laboratory ID:	MB0617S2					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	5.0	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*98*	*58-129*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B
QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-121-01										
	ORIG	DUP									
Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Toluene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Ethyl Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
m,p-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
o-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*100*	*96*	*58-129*			
Laboratory ID:	06-121-02										
	ORIG	DUP									
Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Toluene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Ethyl Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
m,p-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
o-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*98*	*95*	*58-129*			
SPIKE BLANKS											
Laboratory ID:	SB0617S1										
	SB	SBD	SB	SBD		SB	SBD				
Benzene	**0.910**	**0.921**	1.00	1.00		**91**	**92**	69-109	1	10	
Toluene	**1.05**	**1.07**	1.00	1.00		**105**	**107**	67-112	2	10	
Ethyl Benzene	**1.06**	**1.08**	1.00	1.00		**106**	**108**	67-113	2	10	
m,p-Xylene	**1.08**	**1.09**	1.00	1.00		**108**	**109**	66-114	1	11	
o-Xylene	**1.04**	**1.08**	1.00	1.00		**104**	**108**	68-112	4	11	
Surrogate:											
Fluorobenzene						*100*	*100*	*58-129*			

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-19**					
Laboratory ID:	06-121-01					
Diesel Range Organics	**ND**	28	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil Range Organics	**150**	56	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*93*	*50-150*				
Client ID:	**TP-18**					
Laboratory ID:	06-121-02					
Diesel Range Organics	**ND**	30	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil Range Organics	**ND**	59	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*91*	*50-150*				
Client ID:	**TP-17**					
Laboratory ID:	06-121-03					
Diesel Range Organics	**ND**	34	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil	**280**	69	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*83*	*50-150*				
Client ID:	**TP-20**					
Laboratory ID:	06-121-04					
Diesel Range Organics	**100**	78	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil Range Organics	**440**	160	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*82*	*50-150*				
Client ID:	**TP-21**					
Laboratory ID:	06-121-05					
Diesel Range Organics	**ND**	340	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil	**2400**	670	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*---*	*50-150*				S
Client ID:	**TP-25**					
Laboratory ID:	06-121-06					
Diesel Range Organics	**ND**	37	NWTPH-Dx	6-13-19	6-14-19	U1
Lube Oil	**410**	65	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*96*	*50-150*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-24**					
Laboratory ID:	06-121-07					
Diesel Range Organics	**ND**	320	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil	**5500**	630	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	---	*50-150*				S
Client ID:	**TP-23**					
Laboratory ID:	06-121-08					
Diesel Range Organics	**ND**	330	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil	**2600**	660	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	---	*50-150*				S
Client ID:	**TP-7**					
Laboratory ID:	06-121-09					
Diesel Range Organics	**90**	63	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil	**660**	130	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*87*	*50-150*				
Client ID:	**TP-14**					
Laboratory ID:	06-121-10					
Diesel Range Organics	**ND**	310	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil	**2200**	610	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	---	*50-150*				S
Client ID:	**TP-13**					
Laboratory ID:	06-121-11					
Diesel Range Organics	**ND**	190	NWTPH-Dx	6-13-19	6-14-19	
Lube Oil	**1200**	380	NWTPH-Dx	6-13-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*100*	*50-150*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0613S2					
Diesel Range Organics	**ND**	25	NWTPH-Dx	6-13-19	6-13-19	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	6-13-19	6-13-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*126*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-111-03										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*116*	*119*	*50-150*			
Laboratory ID:	06-128-02										
	ORIG	DUP									
Diesel Range Organics	**1940**	**1870**	NA	NA		NA		NA	4	NA	
Lube Oil Range Organics	**812**	**829**	NA	NA		NA		NA	2	NA	
Surrogate:											
o-Terphenyl						*109*	*118*	*50-150*			

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-19**					
Laboratory ID:	06-121-01					
Naphthalene	**ND**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**ND**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**ND**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**0.040**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**0.0095**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**0.049**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**0.052**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**0.022**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**0.024**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**0.022**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**0.0083**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**0.022**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**0.013**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**0.014**	0.0074	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*86*	*40 - 111*				
Pyrene-d10	*86*	*40 - 110*				
Terphenyl-d14	*86*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-18**					
Laboratory ID:	06-121-02					
Naphthalene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**ND**	0.0079	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*89*	*40 - 111*				
Pyrene-d10	*83*	*40 - 110*				
Terphenyl-d14	*90*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-17**					
Laboratory ID:	06-121-03					
Naphthalene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**0.0099**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**ND**	0.0092	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*75*	*40 - 111*				
Pyrene-d10	*80*	*40 - 110*				
Terphenyl-d14	*70*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-20**					
Laboratory ID:	06-121-04					
Naphthalene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**ND**	0.021	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*70*	*40 - 111*				
Pyrene-d10	*72*	*40 - 110*				
Terphenyl-d14	*79*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
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Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-21**					
Laboratory ID:	06-121-05					
Naphthalene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**0.24**	0.090	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*85*	*40 - 111*				
Pyrene-d10	*88*	*40 - 110*				
Terphenyl-d14	*80*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-25**					
Laboratory ID:	06-121-06					
Naphthalene	**0.085**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**0.016**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**0.0089**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**0.072**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**0.14**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**0.060**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**0.44**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**0.42**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**0.35**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**0.32**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**0.45**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**0.14**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**0.39**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**0.28**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**0.049**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**0.28**	0.0086	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*85*	*40 - 111*				
Pyrene-d10	*85*	*40 - 110*				
Terphenyl-d14	*79*	*45 - 122*				

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Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-24**					
Laboratory ID:	06-121-07					
Naphthalene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**0.091**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**0.12**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**ND**	0.084	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*84*	*40 - 111*				
Pyrene-d10	*89*	*40 - 110*				
Terphenyl-d14	*83*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-23**					
Laboratory ID:	06-121-08					
Naphthalene	**0.48**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**0.60**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**0.41**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**1.0**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**1.9**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**1.9**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**6.6**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**2.6**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**8.7**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**6.4**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**2.2**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**2.2**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**2.2**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**0.48**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**1.4**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**1.0**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**0.23**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**0.93**	0.18	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*72*	*40 - 111*				
Pyrene-d10	*74*	*40 - 110*				
Terphenyl-d14	*78*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-7**					
Laboratory ID:	06-121-09					
Naphthalene	**0.022**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**0.024**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**0.017**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**0.022**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**0.015**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**0.071**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**0.011**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**0.060**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**0.068**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**0.020**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**0.026**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**0.033**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**0.0094**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**0.027**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**0.022**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**0.024**	0.0085	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*81*	*40 - 111*				
Pyrene-d10	*88*	*40 - 110*				
Terphenyl-d14	*82*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-14**					
Laboratory ID:	06-121-10					
Naphthalene	**ND**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**ND**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**ND**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**0.099**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**ND**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**0.18**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**0.23**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**0.12**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**0.16**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**0.16**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**ND**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**0.13**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**0.091**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**0.11**	0.082	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*83*	*40 - 111*				
Pyrene-d10	*88*	*40 - 110*				
Terphenyl-d14	*81*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-13**					
Laboratory ID:	06-121-11					
Naphthalene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**0.14**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**0.16**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**0.10**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**0.14**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**0.24**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**0.15**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**0.16**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**0.16**	0.10	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*81*	*40 - 111*				
Pyrene-d10	*84*	*40 - 110*				
Terphenyl-d14	*80*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0614S1					
Naphthalene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
2-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
1-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthylene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Acenaphthene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Fluorene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Phenanthrene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Anthracene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Pyrene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Chrysene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[b]fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo(j,k)fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[a]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Dibenz[a,h]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Benzo[g,h,i]perylene	**ND**	0.0067	EPA 8270D/SIM	6-14-19	6-14-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*91*	*40 - 111*				
Pyrene-d10	*88*	*40 - 110*				
Terphenyl-d14	*91*	*45 - 122*				

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

PAHs EPA 8270D/SIM
MS/MSD QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	06-121-01										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.0816**	**0.0808**	0.0833	0.0833	ND	98	97	44 - 111	1	21	
Acenaphthylene	**0.0952**	**0.0946**	0.0833	0.0833	ND	114	114	47 - 122	1	24	
Acenaphthene	**0.0974**	**0.0950**	0.0833	0.0833	ND	117	114	46 - 122	2	24	
Fluorene	**0.0894**	**0.0899**	0.0833	0.0833	ND	107	108	53 - 118	1	23	
Phenanthrene	**0.0881**	**0.0893**	0.0833	0.0833	0.0361	62	64	41 - 124	1	24	
Anthracene	**0.0900**	**0.0909**	0.0833	0.0833	0.00849	98	99	53 - 119	1	21	
Fluoranthene	**0.0921**	**0.0913**	0.0833	0.0833	0.0441	58	57	39 - 135	1	32	
Pyrene	**0.0905**	**0.0918**	0.0833	0.0833	0.0470	52	54	39 - 134	1	34	
Benzo[a]anthracene	**0.0971**	**0.0951**	0.0833	0.0833	0.0197	93	91	53 - 131	2	23	
Chrysene	**0.0881**	**0.0867**	0.0833	0.0833	0.0218	80	78	46 - 126	2	24	
Benzo[b]fluoranthene	**0.0919**	**0.0896**	0.0833	0.0833	0.0194	87	84	45 - 127	3	25	
Benzo(j,k)fluoranthene	**0.0873**	**0.0875**	0.0833	0.0833	0.00739	96	96	52 - 122	0	21	
Benzo[a]pyrene	**0.0913**	**0.0903**	0.0833	0.0833	0.0195	86	85	51 - 126	1	24	
Indeno(1,2,3-c,d)pyrene	**0.0912**	**0.0887**	0.0833	0.0833	0.0116	96	93	48 - 127	3	23	
Dibenz[a,h]anthracene	**0.0869**	**0.0862**	0.0833	0.0833	ND	104	103	51 - 124	1	22	
Benzo[g,h,i]perylene	**0.0858**	**0.0857**	0.0833	0.0833	0.0125	88	88	50 - 120	0	22	
Surrogate:											
2-Fluorobiphenyl						*93*	*91*	*40 - 111*			
Pyrene-d10						*89*	*91*	*40 - 110*			
Terphenyl-d14						*89*	*89*	*45 - 122*			

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-19**					
Laboratory ID:	06-121-01					
Arsenic	**ND**	11	EPA 6010D	6-17-19	6-17-19	
Cadmium	**ND**	0.56	EPA 6010D	6-17-19	6-17-19	
Chromium	**33**	0.56	EPA 6010D	6-17-19	6-17-19	
Lead	**21**	5.6	EPA 6010D	6-17-19	6-17-19	
Mercury	**ND**	0.28	EPA 7471B	6-17-19	6-17-19	
Nickel	**44**	2.8	EPA 6010D	6-17-19	6-17-19	
Zinc	**71**	2.8	EPA 6010D	6-17-19	6-17-19	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-18**					
Laboratory ID:	06-121-02					
Arsenic	**ND**	12	EPA 6010D	6-17-19	6-17-19	
Cadmium	**ND**	0.59	EPA 6010D	6-17-19	6-17-19	
Chromium	**32**	0.59	EPA 6010D	6-17-19	6-17-19	
Lead	**ND**	5.9	EPA 6010D	6-17-19	6-17-19	
Mercury	**ND**	0.29	EPA 7471B	6-17-19	6-17-19	
Nickel	**44**	2.9	EPA 6010D	6-17-19	6-17-19	
Zinc	**27**	2.9	EPA 6010D	6-17-19	6-17-19	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-17**					
Laboratory ID:	06-121-03					
Arsenic	**ND**	14	EPA 6010D	6-17-19	6-17-19	
Cadmium	**ND**	0.69	EPA 6010D	6-17-19	6-17-19	
Chromium	**39**	0.69	EPA 6010D	6-17-19	6-17-19	
Lead	**46**	6.9	EPA 6010D	6-17-19	6-17-19	
Mercury	**ND**	0.34	EPA 7471B	6-17-19	6-17-19	
Nickel	**50**	3.4	EPA 6010D	6-17-19	6-17-19	
Zinc	**130**	3.4	EPA 6010D	6-17-19	6-17-19	

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-20**					
Laboratory ID:	06-121-04					
Arsenic	**17**	16	EPA 6010D	6-17-19	6-17-19	
Cadmium	**ND**	1.6	EPA 6010D	6-17-19	6-17-19	
Chromium	**37**	1.6	EPA 6010D	6-17-19	6-17-19	
Lead	**26**	16	EPA 6010D	6-17-19	6-17-19	
Mercury	**ND**	0.78	EPA 7471B	6-17-19	6-17-19	
Nickel	**45**	7.8	EPA 6010D	6-17-19	6-17-19	
Zinc	**82**	7.8	EPA 6010D	6-17-19	6-17-19	
Client ID:	**TP-21**					
Laboratory ID:	06-121-05					
Arsenic	**ND**	13	EPA 6010D	6-17-19	6-17-19	
Cadmium	**0.82**	0.67	EPA 6010D	6-17-19	6-17-19	
Chromium	**31**	0.67	EPA 6010D	6-17-19	6-17-19	
Lead	**300**	6.7	EPA 6010D	6-17-19	6-17-19	
Mercury	**1.0**	0.34	EPA 7471B	6-17-19	6-17-19	
Nickel	**32**	3.4	EPA 6010D	6-17-19	6-17-19	
Zinc	**360**	3.4	EPA 6010D	6-17-19	6-17-19	
Client ID:	**TP-25**					
Laboratory ID:	06-121-06					
Arsenic	**ND**	13	EPA 6010D	6-17-19	6-17-19	
Cadmium	**ND**	0.65	EPA 6010D	6-17-19	6-17-19	
Chromium	**32**	0.65	EPA 6010D	6-17-19	6-17-19	
Lead	**62**	6.5	EPA 6010D	6-17-19	6-17-19	
Mercury	**ND**	0.32	EPA 7471B	6-17-19	6-17-19	
Nickel	**42**	3.2	EPA 6010D	6-17-19	6-17-19	
Zinc	**78**	3.2	EPA 6010D	6-17-19	6-17-19	

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-24**					
Laboratory ID:	06-121-07					
Arsenic	**ND**	13	EPA 6010D	6-17-19	6-17-19	
Cadmium	**1.0**	0.63	EPA 6010D	6-17-19	6-17-19	
Chromium	**31**	0.63	EPA 6010D	6-17-19	6-17-19	
Lead	**46**	6.3	EPA 6010D	6-17-19	6-17-19	
Mercury	**ND**	0.32	EPA 7471B	6-17-19	6-17-19	
Nickel	**40**	3.2	EPA 6010D	6-17-19	6-17-19	
Zinc	**110**	3.2	EPA 6010D	6-17-19	6-17-19	

Client ID:	**TP-23**					
Laboratory ID:	06-121-08					
Arsenic	**17**	13	EPA 6010D	6-17-19	6-17-19	
Cadmium	**ND**	0.66	EPA 6010D	6-17-19	6-17-19	
Chromium	**28**	0.66	EPA 6010D	6-17-19	6-17-19	
Lead	**100**	6.6	EPA 6010D	6-17-19	6-17-19	
Mercury	**ND**	0.33	EPA 7471B	6-17-19	6-17-19	
Nickel	**32**	3.3	EPA 6010D	6-17-19	6-17-19	
Zinc	**180**	3.3	EPA 6010D	6-17-19	6-17-19	

Client ID:	**TP-7**					
Laboratory ID:	06-121-09					
Arsenic	**ND**	13	EPA 6010D	6-17-19	6-17-19	
Cadmium	**1.5**	0.63	EPA 6010D	6-17-19	6-17-19	
Chromium	**30**	0.63	EPA 6010D	6-17-19	6-17-19	
Lead	**95**	6.3	EPA 6010D	6-17-19	6-17-19	
Mercury	**ND**	0.32	EPA 7471B	6-17-19	6-17-19	
Nickel	**29**	3.2	EPA 6010D	6-17-19	6-17-19	
Zinc	**3000**	32	EPA 6010D	6-17-19	6-19-18	

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-14**					
Laboratory ID:	06-121-10					
Arsenic	**ND**	12	EPA 6010D	6-17-19	6-17-19	
Cadmium	**ND**	0.61	EPA 6010D	6-17-19	6-17-19	
Chromium	**27**	0.61	EPA 6010D	6-17-19	6-17-19	
Lead	**87**	6.1	EPA 6010D	6-17-19	6-17-19	
Mercury	**ND**	0.31	EPA 7471B	6-17-19	6-17-19	
Nickel	**35**	3.1	EPA 6010D	6-17-19	6-17-19	
Zinc	**160**	3.1	EPA 6010D	6-17-19	6-17-19	

Client ID:	**TP-13**					
Laboratory ID:	06-121-11					
Arsenic	**ND**	15	EPA 6010D	6-17-19	6-17-19	
Cadmium	**0.94**	0.76	EPA 6010D	6-17-19	6-17-19	
Chromium	**45**	0.76	EPA 6010D	6-17-19	6-17-19	
Lead	**1200**	7.6	EPA 6010D	6-17-19	6-17-19	
Mercury	**5.4**	3.8	EPA 7471B	6-17-19	6-17-19	
Nickel	**34**	3.8	EPA 6010D	6-17-19	6-17-19	
Zinc	**480**	3.8	EPA 6010D	6-17-19	6-17-19	

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

TOTAL METALS
EPA 6010D/7471B
METHOD BLANK QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0617SM2					
Arsenic	**ND**	5.0	EPA 6010D	6-17-19	6-17-19	
Cadmium	**ND**	0.50	EPA 6010D	6-17-19	6-17-19	
Chromium	**ND**	0.50	EPA 6010D	6-17-19	6-17-19	
Lead	**ND**	5.0	EPA 6010D	6-17-19	6-17-19	
Nickel	**ND**	2.5	EPA 6010D	6-17-19	6-17-19	
Zinc	**ND**	2.5	EPA 6010D	6-17-19	6-17-19	
Laboratory ID:	MB0617S1					
Mercury	**ND**	0.25	EPA 7471B	6-17-19	6-17-19	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-076-13										
	ORIG	DUP									
Arsenic	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**6.95**	**8.35**	NA	NA		NA		NA	18	20	
Lead	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Nickel	**5.80**	**6.30**	NA	NA		NA		NA	8	20	
Zinc	**15.7**	**16.6**	NA	NA		NA		NA	6	20	
Laboratory ID:	06-076-13										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	06-076-13										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**102**	**101**	100	100	ND	**102**	**101**	75-125	1	20	
Cadmium	**46.1**	**45.0**	50.0	50.0	ND	**92**	**90**	75-125	2	20	
Chromium	**110**	**103**	100	100	6.95	**103**	**96**	75-125	7	20	
Lead	**232**	**229**	250	250	ND	**93**	**91**	75-125	1	20	
Nickel	**104**	**102**	100	100	5.80	**98**	**96**	75-125	2	20	
Zinc	**117**	**113**	100	100	15.7	**101**	**97**	75-125	4	20	
Laboratory ID:	06-076-13										
Mercury	**0.523**	**0.544**	0.500	0.500	0.0190	**101**	**105**	80-120	4	20	

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

pH
EPA 9045D

Matrix: Soil
Units: pH (@ 25ºC)

Analyte	Result	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-19**				
Laboratory ID:	06-121-01				
pH	**6.7**	EPA 9045D	6-13-19	6-13-19	
Client ID:	**TP-18**				
Laboratory ID:	06-121-02				
pH	**7.1**	EPA 9045D	6-13-19	6-13-19	
Client ID:	**TP-17**				
Laboratory ID:	06-121-03				
pH	**6.2**	EPA 9045D	6-13-19	6-13-19	
Client ID:	**TP-20**				
Laboratory ID:	06-121-04				
pH	**6.1**	EPA 9045D	6-13-19	6-13-19	
Client ID:	**TP-21**				
Laboratory ID:	06-121-05				
pH	**7.3**	EPA 9045D	6-13-19	6-13-19	
Client ID:	**TP-25**				
Laboratory ID:	06-121-06				
pH	**5.9**	EPA 9045D	6-13-19	6-13-19	
Client ID:	**TP-24**				
Laboratory ID:	06-121-07				
pH	**6.7**	EPA 9045D	6-13-19	6-13-19	

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

pH
EPA 9045D

Matrix: Soil
Units: pH (@ 25ºC)

Analyte	Result	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-23**				
Laboratory ID:	06-121-08				
pH	**6.9**	EPA 9045D	6-13-19	6-13-19	
Client ID:	**TP-7**				
Laboratory ID:	06-121-09				
pH	**6.9**	EPA 9045D	6-13-19	6-13-19	
Client ID:	**TP-14**				
Laboratory ID:	06-121-10				
pH	**7.7**	EPA 9045D	6-13-19	6-13-19	
Client ID:	**TP-13**				
Laboratory ID:	06-121-11				
pH	**6.2**	EPA 9045D	6-13-19	6-13-19	

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

TCLP LEAD
EPA 1311/6010D

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-21**					
Laboratory ID:	06-121-05					
Lead	**0.39**	0.20	EPA 6010D	6-24-19	6-24-19	
Client ID:	**TP-23**					
Laboratory ID:	06-121-08					
Lead	**ND**	0.20	EPA 6010D	6-24-19	6-24-19	
Client ID:	**TP-13**					
Laboratory ID:	06-121-11					
Lead	**0.78**	0.20	EPA 6010D	6-24-19	6-24-19	

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

TCLP LEAD
EPA 1311/6010D
QUALITY CONTROL

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0624TM1					
Lead	**ND**	0.20	EPA 6010D	6-24-19	6-24-19	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-155-03										
	ORIG	DUP									
Lead	**1.32**	**1.37**	NA	NA		NA		NA	4	20	
MATRIX SPIKES											
Laboratory ID:	06-155-03										
	MS	MSD	MS	MSD		MS	MSD				
Lead	**10.2**	**10.3**	10.0	10.0	1.32	**88**	**90**	75-125	1	20	

Date of Report: June 24, 2019
Samples Submitted: June 12, 2019
Laboratory Reference: 1906-121
Project: 8096

% MOISTURE

Client ID	Lab ID	% Moisture	Date Analyzed
TP-19	06-121-01	**10**	6-13-19
TP-18	06-121-02	**15**	6-13-19
TP-17	06-121-03	**27**	6-13-19
TP-20	06-121-04	**68**	6-13-19
TP-21	06-121-05	**26**	6-13-19
TP-25	06-121-06	**23**	6-13-19
TP-24	06-121-07	**21**	6-13-19
TP-23	06-121-08	**24**	6-13-19
TP-7	06-121-09	**21**	6-13-19
TP-14	06-121-10	**18**	6-13-19
TP-13	06-121-11	**35**	6-13-19

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 06-121

Company: Terra Associates Inc
Project Number: 8096
Project Name:
Project Manager: Chuck Lie
Sampled by: Nicolas R. Hoffman

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
~~☒ Standard (7 Days)~~
(TPH analysis 5 Days)
☒ 4 DAY TAT
(other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals + Ni, Zn	TCLP Metals LEAD ONLY	HEM (oil and grease) 1664A		pH				% Moisture
1	TP-19	6/12/19	8:30	Soil	2		X		X				X						X				X				X
2	TP-18		8:50				X		X				X						X				X				X
3	TP-17		9:10				X		X				X						X				X				X
4	TP-20		9:35				X		X				X						X				X				X
5	TP-21		10:05				X		X				X						X	X			X				X
6	TP-25		10:30				X		X				X						X				X				X
7	TP-24		10:45				X		X				X						X				X				X
8	TP-23		11:05				X		X				X						X	X			X				X
9	TP-7		11:55				X		X				X						X				X				X
10	TP-14		14:30				X		X				X						X				X				X

	Signature	Company	Date	Time
Relinquished	[signature]	TAI	6/12/19	17:30
Received	[signature]	OSE	6/12/19	1730
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
~~X Hold for analysis Request X~~
X - Added 6/13/19. DB (4 day
X Added 6/19/19. DB (4DAY TAT) TAT

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐

OnSite Environmental Inc.

Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 06-121

Company: Terra Associates Inc
Project Number: 8096
Project Name:
Project Manager: Chuck Liu
Sampled by: Nicolas R. Hoffman

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☒ ~~Standard (7 Days) (TPH analysis 5 Days)~~
- ☒ 4 DAY TAT (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals + Ni, Zn	TCLP Metals LEAD ONLY	HEM (oil and grease) 1664A		pH				% Moisture
1	TP-13	6/12/19	15:00	Soil	2		X		X				X						X	X			X				X

	Signature	Company	Date	Time
Relinquished	[signature]	TAI	6/12/19	17:30
Received	[signature]	OSE	6/12/19	1730
Relinquished				
Received				
Relinquished				
Received				

Reviewed/Date

Reviewed/Date

Comments/Special Instructions

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

June 19, 2019

Chuck Lie
Terra Associates, Inc.
12220 113th Avenue NE, Suite 130
Kirkland, WA 98034

Re: Analytical Data for Project 8096
Laboratory Reference No. 1906-146

Dear Chuck:

Enclosed are the analytical results and associated quality control data for samples submitted on June 15, 2019.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

Case Narrative

Samples were collected on June 14, 2019 and received by the laboratory on June 15, 2019. They were maintained at the laboratory at a temperature of $2^{o}C$ to $6^{o}C$.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

<u>Total Metals EPA 6010D/7471B Analysis:</u>

The Matrix Spike/ Matrix Spike Duplicate recoveries for Zinc are outside control limits due to matrix inhomogeneity . The samples were re-extracted and re-analyzed with similar results. The Spike Blank recovery was 96%.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-4'**					
Laboratory ID:	06-146-01					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.072	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.072	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.072	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.072	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	7.2	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***101***	***58-129***				
Client ID:	**TP-1-8'**					
Laboratory ID:	06-146-02					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.064	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.064	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.064	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.064	EPA 8021B	6-17-19	6-17-19	
Gasoline	**6.9**	6.4	NWTPH-Gx	6-17-19	6-17-19	O
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***93***	***58-129***				
Client ID:	**TP-1-12'**					
Laboratory ID:	06-146-03					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.081	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.081	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.081	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.081	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	8.1	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***96***	***58-129***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-16'**					
Laboratory ID:	06-146-04					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.080	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.080	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.080	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.080	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	8.0	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***102***	***58-129***				
Client ID:	**TP-1-20'**					
Laboratory ID:	06-146-05					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.073	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.073	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.073	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.073	EPA 8021B	6-17-19	6-17-19	
Gasoline	**11**	7.3	NWTPH-Gx	6-17-19	6-17-19	O
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***96***	***58-129***				
Client ID:	**TP-2**					
Laboratory ID:	06-146-06					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.083	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.083	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.083	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.083	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	8.3	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***94***	***58-129***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-3**					
Laboratory ID:	06-146-07					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.069	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.069	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.069	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.069	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	6.9	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***103***	***58-129***				
Client ID:	**TP-4**					
Laboratory ID:	06-146-08					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.074	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.074	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.074	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.074	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	7.4	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***101***	***58-129***				
Client ID:	**TP-5**					
Laboratory ID:	06-146-09					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.078	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.078	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.078	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.078	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	7.8	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***97***	***58-129***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-6**					
Laboratory ID:	06-146-10					
Benzene	**ND**	0.020	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.071	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.071	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.071	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.071	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	7.1	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***100***	***58-129***				
Client ID:	**TP-9**					
Laboratory ID:	06-146-11					
Benzene	**ND**	0.023	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.11	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.11	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.11	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.11	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	11	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***93***	***58-129***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B
METHOD BLANK QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0617S2					
Benzene	**ND**	0.020	EPA 8021B	6-17-19	6-17-19	
Toluene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
Ethyl Benzene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
m,p-Xylene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
o-Xylene	**ND**	0.050	EPA 8021B	6-17-19	6-17-19	
Gasoline	**ND**	5.0	NWTPH-Gx	6-17-19	6-17-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***98***	***58-129***				
Laboratory ID:	MB0618S1					
Benzene	**ND**	0.020	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.050	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.050	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.050	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.050	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	5.0	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***95***	***58-129***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B
QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-121-02										
	ORIG	DUP									
Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Toluene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Ethyl Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
m,p-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
o-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						***98***	***95***	***58-129***			
Laboratory ID:	06-146-10										
	ORIG	DUP									
Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Toluene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Ethyl Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
m,p-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
o-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						***100***	***93***	***58-129***			
SPIKE BLANKS											
Laboratory ID:	SB0617S1										
	SB	SBD	SB	SBD		SB	SBD				
Benzene	**0.910**	**0.921**	1.00	1.00		**91**	**92**	69-109	1	10	
Toluene	**1.05**	**1.07**	1.00	1.00		**105**	**107**	67-112	2	10	
Ethyl Benzene	**1.06**	**1.08**	1.00	1.00		**106**	**108**	67-113	2	10	
m,p-Xylene	**1.08**	**1.09**	1.00	1.00		**108**	**109**	66-114	1	11	
o-Xylene	**1.04**	**1.08**	1.00	1.00		**104**	**108**	68-112	4	11	
Surrogate:											
Fluorobenzene						***100***	***100***	***58-129***			
Laboratory ID:	SB0618S2										
	SB	SBD	SB	SBD		SB	SBD				
Benzene	**0.882**	**0.900**	1.00	1.00		**88**	**90**	69-109	2	10	
Toluene	**0.896**	**0.909**	1.00	1.00		**90**	**91**	67-112	1	10	
Ethyl Benzene	**0.871**	**0.883**	1.00	1.00		**87**	**88**	67-113	1	10	
m,p-Xylene	**0.863**	**0.875**	1.00	1.00		**86**	**88**	66-114	1	11	
o-Xylene	**0.877**	**0.889**	1.00	1.00		**88**	**89**	68-112	1	11	
Surrogate:											
Fluorobenzene						***81***	***81***	***58-129***			

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-4'**					
Laboratory ID:	06-146-01					
Diesel Range Organics	**ND**	30	NWTPH-Dx	6-17-19	6-18-19	
Lube Oil	**330**	59	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***91***	***50-150***				
Client ID:	**TP-1-8'**					
Laboratory ID:	06-146-02					
Diesel Range Organics	**ND**	650	NWTPH-Dx	6-17-19	6-18-19	U1
Lube Oil	**11000**	1200	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***---***	***50-150***				S
Client ID:	**TP-1-12'**					
Laboratory ID:	06-146-03					
Diesel Range Organics	**ND**	340	NWTPH-Dx	6-17-19	6-18-19	
Lube Oil	**3600**	670	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***---***	***50-150***				S
Client ID:	**TP-1-16'**					
Laboratory ID:	06-146-04					
Diesel Range Organics	**ND**	320	NWTPH-Dx	6-17-19	6-18-19	
Lube Oil	**2800**	630	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***---***	***50-150***				S
Client ID:	**TP-1-20'**					
Laboratory ID:	06-146-05					
Diesel Range Organics	**ND**	1600	NWTPH-Dx	6-17-19	6-18-19	U1
Lube Oil	**28000**	2600	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***---***	***50-150***				S
Client ID:	**TP-2**					
Laboratory ID:	06-146-06					
Diesel Range Organics	**ND**	340	NWTPH-Dx	6-17-19	6-18-19	
Lube Oil	**5000**	690	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***---***	***50-150***				S

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-3**					
Laboratory ID:	06-146-07					
Diesel Range Organics	**ND**	300	NWTPH-Dx	6-17-19	6-18-19	
Lube Oil	**4100**	600	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***---***	***50-150***				S
Client ID:	**TP-4**					
Laboratory ID:	06-146-08					
Diesel Range Organics	**ND**	170	NWTPH-Dx	6-17-19	6-18-19	
Lube Oil	**2000**	340	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***84***	***50-150***				
Client ID:	**TP-5**					
Laboratory ID:	06-146-09					
Diesel Range Organics	**230**	150	NWTPH-Dx	6-17-19	6-18-19	N
Lube Oil Range Organics	**1400**	300	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***92***	***50-150***				
Client ID:	**TP-6**					
Laboratory ID:	06-146-10					
Diesel Range Organics	**ND**	150	NWTPH-Dx	6-17-19	6-18-19	
Lube Oil	**910**	310	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***88***	***50-150***				
Client ID:	**TP-9**					
Laboratory ID:	06-146-11					
Diesel Range Organics	**ND**	190	NWTPH-Dx	6-17-19	6-18-19	
Lube Oil	**1300**	380	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***80***	***50-150***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
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Project: 8096

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0617S3					
Diesel Range Organics	**ND**	25	NWTPH-Dx	6-17-19	6-18-19	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	6-17-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***89***	***50-150***				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-146-01										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil	**276**	**236**	NA	NA		NA		NA	16	NA	
Surrogate:											
o-Terphenyl						***91***	***93***	***50-150***			
Laboratory ID:	06-146-11										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil	**840**	**781**	NA	NA		NA		NA	7	NA	
Surrogate:											
o-Terphenyl						***80***	***85***	***50-150***			

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Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-4'**					
Laboratory ID:	06-146-01					
Naphthalene	**ND**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**0.028**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**ND**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**ND**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.084**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**0.040**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.25**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.43**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.22**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.30**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.26**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**0.044**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.20**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.14**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**0.042**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.20**	0.016	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***91***	***40 - 111***				
Pyrene-d10	***89***	***40 - 110***				
Terphenyl-d14	***86***	***45 - 122***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-8'**					
Laboratory ID:	06-146-02					
Naphthalene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.34**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.26**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.33**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.16**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.40**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.24**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.19**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.17**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.23**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***85***	***40 - 111***				
Pyrene-d10	***102***	***40 - 110***				
Terphenyl-d14	***81***	***45 - 122***				

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Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-12'**					
Laboratory ID:	06-146-03					
Naphthalene	**0.14**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.45**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.37**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.45**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.19**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.36**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.22**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.22**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.16**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.24**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***77***	***40 - 111***				
Pyrene-d10	***81***	***40 - 110***				
Terphenyl-d14	***78***	***45 - 122***				

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Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-16'**					
Laboratory ID:	06-146-04					
Naphthalene	**0.036**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**0.027**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**ND**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**ND**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.074**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**0.027**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.14**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.19**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.089**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.16**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.11**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**0.027**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.085**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.059**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.074**	0.025	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***90***	***40 - 111***				
Pyrene-d10	***89***	***40 - 110***				
Terphenyl-d14	***87***	***45 - 122***				

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PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-20'**					
Laboratory ID:	06-146-05					
Naphthalene	**0.30**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**0.14**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**0.19**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**0.20**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**1.2**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**0.19**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**1.1**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**1.3**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.54**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.98**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.53**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**0.14**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.44**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.30**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.41**	0.13	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***76***	***40 - 111***				
Pyrene-d10	***80***	***40 - 110***				
Terphenyl-d14	***78***	***45 - 122***				

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Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-2**					
Laboratory ID:	06-146-06					
Naphthalene	**ND**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**ND**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**ND**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.27**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**ND**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.34**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.42**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.15**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.26**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.20**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**ND**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.16**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.14**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.17**	0.14	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***86***	***40 - 111***				
Pyrene-d10	***90***	***40 - 110***				
Terphenyl-d14	***89***	***45 - 122***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-3**					
Laboratory ID:	06-146-07					
Naphthalene	**0.39**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**0.18**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**0.13**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**0.29**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**0.33**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.69**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**0.15**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.88**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.76**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.39**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.57**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.45**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**0.14**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.29**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.30**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.31**	0.12	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***72***	***40 - 111***				
Pyrene-d10	***85***	***40 - 110***				
Terphenyl-d14	***74***	***45 - 122***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-4**					
Laboratory ID:	06-146-08					
Naphthalene	**0.24**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**0.16**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**0.12**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.31**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**ND**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.40**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.53**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.27**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.39**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.59**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**0.17**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.53**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.47**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.49**	0.089	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***85***	***40 - 111***				
Pyrene-d10	***85***	***40 - 110***				
Terphenyl-d14	***91***	***45 - 122***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-5**					
Laboratory ID:	06-146-09					
Naphthalene	**0.18**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**0.20**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**0.22**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.34**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**ND**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.28**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.26**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**ND**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.099**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.14**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**ND**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.098**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.10**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.12**	0.081	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***86***	***40 - 111***				
Pyrene-d10	***85***	***40 - 110***				
Terphenyl-d14	***84***	***45 - 122***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-6**					
Laboratory ID:	06-146-10					
Naphthalene	**ND**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**0.36**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**0.46**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.85**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**0.26**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.52**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.39**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**ND**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.15**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.091**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**ND**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**ND**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.093**	0.082	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***79***	***40 - 111***				
Pyrene-d10	***80***	***40 - 110***				
Terphenyl-d14	***81***	***45 - 122***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-9**					
Laboratory ID:	06-146-11					
Naphthalene	**0.34**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**0.11**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**0.12**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**0.20**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**0.44**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**0.28**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.36**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**0.22**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.89**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**1.4**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.80**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.91**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**1.3**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**0.46**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.95**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.68**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**0.15**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.66**	0.10	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***86***	***40 - 111***				
Pyrene-d10	***85***	***40 - 110***				
Terphenyl-d14	***86***	***45 - 122***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

PAHs EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0618S1					
Naphthalene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
2-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
1-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Acenaphthylene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Acenaphthene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Fluorene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Phenanthrene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Anthracene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Pyrene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo[a]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Chrysene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo[b]fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo(j,k)fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo[a]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Dibenz[a,h]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo[g,h,i]perylene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***94***	***40 - 111***				
Pyrene-d10	***91***	***40 - 110***				
Terphenyl-d14	***95***	***45 - 122***				

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

PAHs EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0618S1									
	SB	SBD	SB	SBD	SB	SBD				
Naphthalene	**0.0829**	**0.0798**	0.0833	0.0833	100	96	57 - 109	4	15	
Acenaphthylene	**0.0904**	**0.0893**	0.0833	0.0833	109	107	60 - 121	1	15	
Acenaphthene	**0.0889**	**0.0868**	0.0833	0.0833	107	104	59 - 121	2	15	
Fluorene	**0.0945**	**0.0957**	0.0833	0.0833	113	115	63 - 119	1	15	
Phenanthrene	**0.0926**	**0.0942**	0.0833	0.0833	111	113	59 - 114	2	15	
Anthracene	**0.0931**	**0.0943**	0.0833	0.0833	112	113	63 - 119	1	15	
Fluoranthene	**0.0955**	**0.0968**	0.0833	0.0833	115	116	63 - 120	1	15	
Pyrene	**0.0915**	**0.0935**	0.0833	0.0833	110	112	62 - 119	2	15	
Benzo[a]anthracene	**0.101**	**0.103**	0.0833	0.0833	121	124	64 - 127	2	15	
Chrysene	**0.0921**	**0.0934**	0.0833	0.0833	111	112	63 - 121	1	15	
Benzo[b]fluoranthene	**0.0942**	**0.0962**	0.0833	0.0833	113	115	61 - 122	2	15	
Benzo(j,k)fluoranthene	**0.0967**	**0.0964**	0.0833	0.0833	116	116	64 - 123	0	15	
Benzo[a]pyrene	**0.0957**	**0.0972**	0.0833	0.0833	115	117	62 - 122	2	15	
Indeno(1,2,3-c,d)pyrene	**0.0971**	**0.0979**	0.0833	0.0833	117	118	59 - 124	1	15	
Dibenz[a,h]anthracene	**0.0963**	**0.0961**	0.0833	0.0833	116	115	61 - 123	0	15	
Benzo[g,h,i]perylene	**0.0961**	**0.0959**	0.0833	0.0833	115	115	61 - 119	0	15	
Surrogate:										
2-Fluorobiphenyl					***98***	***91***	***40 - 111***			
Pyrene-d10					***93***	***91***	***40 - 110***			
Terphenyl-d14					***97***	***96***	***45 - 122***			

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-4'**					
Laboratory ID:	06-146-01					
Arsenic	**ND**	12	EPA 6010D	6-18-19	6-18-19	
Cadmium	**ND**	0.59	EPA 6010D	6-18-19	6-18-19	
Chromium	**33**	0.59	EPA 6010D	6-18-19	6-18-19	
Lead	**49**	5.9	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.30	EPA 7471B	6-18-19	6-18-19	
Nickel	**47**	3.0	EPA 6010D	6-18-19	6-18-19	
Zinc	**120**	3.0	EPA 6010D	6-18-19	6-18-19	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-8'**					
Laboratory ID:	06-146-02					
Arsenic	**ND**	12	EPA 6010D	6-18-19	6-18-19	
Cadmium	**0.90**	0.59	EPA 6010D	6-18-19	6-18-19	
Chromium	**32**	0.59	EPA 6010D	6-18-19	6-18-19	
Lead	**99**	5.9	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.30	EPA 7471B	6-18-19	6-18-19	
Nickel	**42**	3.0	EPA 6010D	6-18-19	6-18-19	
Zinc	**810**	15	EPA 6010D	6-18-19	6-18-19	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-12'**					
Laboratory ID:	06-146-03					
Arsenic	**ND**	13	EPA 6010D	6-18-19	6-18-19	
Cadmium	**1.0**	0.67	EPA 6010D	6-18-19	6-18-19	
Chromium	**28**	0.67	EPA 6010D	6-18-19	6-18-19	
Lead	**270**	6.7	EPA 6010D	6-18-19	6-18-19	
Mercury	**0.39**	0.33	EPA 7471B	6-18-19	6-18-19	
Nickel	**31**	3.3	EPA 6010D	6-18-19	6-18-19	
Zinc	**300**	3.3	EPA 6010D	6-18-19	6-18-19	

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-16'**					
Laboratory ID:	06-146-04					
Arsenic	**ND**	13	EPA 6010D	6-18-19	6-18-19	
Cadmium	**1.5**	0.63	EPA 6010D	6-18-19	6-18-19	
Chromium	**26**	0.63	EPA 6010D	6-18-19	6-18-19	
Lead	**260**	6.3	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.32	EPA 7471B	6-18-19	6-18-19	
Nickel	**29**	3.2	EPA 6010D	6-18-19	6-18-19	
Zinc	**340**	3.2	EPA 6010D	6-18-19	6-18-19	
Client ID:	**TP-1-20'**					
Laboratory ID:	06-146-05					
Arsenic	**ND**	13	EPA 6010D	6-18-19	6-18-19	
Cadmium	**0.99**	0.65	EPA 6010D	6-18-19	6-18-19	
Chromium	**24**	0.65	EPA 6010D	6-18-19	6-18-19	
Lead	**180**	6.5	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.32	EPA 7471B	6-18-19	6-18-19	
Nickel	**33**	3.2	EPA 6010D	6-18-19	6-18-19	
Zinc	**390**	3.2	EPA 6010D	6-18-19	6-18-19	
Client ID:	**TP-2**					
Laboratory ID:	06-146-06					
Arsenic	**ND**	14	EPA 6010D	6-18-19	6-18-19	
Cadmium	**ND**	0.69	EPA 6010D	6-18-19	6-18-19	
Chromium	**31**	0.69	EPA 6010D	6-18-19	6-18-19	
Lead	**140**	6.9	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.34	EPA 7471B	6-18-19	6-18-19	
Nickel	**39**	3.4	EPA 6010D	6-18-19	6-18-19	
Zinc	**290**	3.4	EPA 6010D	6-18-19	6-18-19	

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-3**					
Laboratory ID:	06-146-07					
Arsenic	**ND**	12	EPA 6010D	6-18-19	6-18-19	
Cadmium	**1.0**	0.60	EPA 6010D	6-18-19	6-18-19	
Chromium	**31**	0.60	EPA 6010D	6-18-19	6-18-19	
Lead	**170**	6.0	EPA 6010D	6-18-19	6-18-19	
Mercury	**0.43**	0.30	EPA 7471B	6-18-19	6-18-19	
Nickel	**32**	3.0	EPA 6010D	6-18-19	6-18-19	
Zinc	**300**	3.0	EPA 6010D	6-18-19	6-18-19	

Client ID:	**TP-4**					
Laboratory ID:	06-146-08					
Arsenic	**ND**	13	EPA 6010D	6-18-19	6-18-19	
Cadmium	**0.81**	0.67	EPA 6010D	6-18-19	6-18-19	
Chromium	**32**	0.67	EPA 6010D	6-18-19	6-18-19	
Lead	**120**	6.7	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.33	EPA 7471B	6-18-19	6-18-19	
Nickel	**34**	3.3	EPA 6010D	6-18-19	6-18-19	
Zinc	**400**	3.3	EPA 6010D	6-18-19	6-18-19	

Client ID:	**TP-5**					
Laboratory ID:	06-146-09					
Arsenic	**ND**	12	EPA 6010D	6-18-19	6-18-19	
Cadmium	**0.78**	0.61	EPA 6010D	6-18-19	6-18-19	
Chromium	**46**	0.61	EPA 6010D	6-18-19	6-18-19	
Lead	**160**	6.1	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.30	EPA 7471B	6-18-19	6-18-19	
Nickel	**41**	3.0	EPA 6010D	6-18-19	6-18-19	
Zinc	**410**	3.0	EPA 6010D	6-18-19	6-18-19	

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-6**					
Laboratory ID:	06-146-10					
Arsenic	**ND**	12	EPA 6010D	6-18-19	6-18-19	
Cadmium	**ND**	0.61	EPA 6010D	6-18-19	6-18-19	
Chromium	**29**	0.61	EPA 6010D	6-18-19	6-18-19	
Lead	**83**	6.1	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.31	EPA 7471B	6-18-19	6-18-19	
Nickel	**43**	3.1	EPA 6010D	6-18-19	6-18-19	
Zinc	**130**	3.1	EPA 6010D	6-18-19	6-18-19	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-9**					
Laboratory ID:	06-146-11					
Arsenic	**ND**	15	EPA 6010D	6-18-19	6-18-19	
Cadmium	**5.3**	0.77	EPA 6010D	6-18-19	6-18-19	
Chromium	**66**	0.77	EPA 6010D	6-18-19	6-18-19	
Lead	**560**	7.7	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.38	EPA 7471B	6-18-19	6-18-19	
Nickel	**57**	3.8	EPA 6010D	6-18-19	6-18-19	
Zinc	**1800**	38	EPA 6010D	6-18-19	6-18-19	

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

TOTAL METALS
EPA 6010D/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0618SM2					
Arsenic	**ND**	10	EPA 6010D	6-18-19	6-18-19	
Cadmium	**ND**	0.50	EPA 6010D	6-18-19	6-18-19	
Chromium	**ND**	0.50	EPA 6010D	6-18-19	6-18-19	
Lead	**ND**	5.0	EPA 6010D	6-18-19	6-18-19	
Nickel	**ND**	2.5	EPA 6010D	6-18-19	6-18-19	
Zinc	**ND**	2.5	EPA 6010D	6-18-19	6-18-19	
Laboratory ID:	MB0618S1					
Mercury	**ND**	0.25	EPA 7471B	6-18-19	6-18-19	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-146-01										
	ORIG	DUP									
Arsenic	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**27.7**	**27.7**	NA	NA		NA		NA	0	20	
Lead	**41.8**	**36.8**	NA	NA		NA		NA	13	20	
Nickel	**39.6**	**37.3**	NA	NA		NA		NA	6	20	
Zinc	**103**	**126**	NA	NA		NA		NA	20	20	
Laboratory ID:	06-155-02										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	06-146-01										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**98.6**	**98.4**	100	100	ND	**99**	**98**	75-125	0	20	
Cadmium	**45.5**	**45.5**	50.0	50.0	ND	**91**	**91**	75-125	0	20	
Chromium	**119**	**114**	100	100	27.7	**92**	**87**	75-125	4	20	
Lead	**264**	**263**	250	250	41.8	**89**	**88**	75-125	1	20	
Nickel	**132**	**132**	100	100	39.6	**92**	**93**	75-125	0	20	
Zinc	**201**	**230**	100	100	103	**98**	**126**	75-125	13	20	
Laboratory ID:	06-155-02										
Mercury	**0.630**	**0.640**	0.500	0.500	0.170	**92**	**94**	80-120	2	20	

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

pH
EPA 9045D

Matrix: Soil
Units: pH (@ 25ºC)

Analyte	Result	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-4'**				
Laboratory ID:	06-146-01				
pH	**6.8**	EPA 9045D	6-17-19	6-17-19	
Client ID:	**TP-1-8'**				
Laboratory ID:	06-146-02				
pH	**6.2**	EPA 9045D	6-17-19	6-17-19	
Client ID:	**TP-1-12'**				
Laboratory ID:	06-146-03				
pH	**7.0**	EPA 9045D	6-17-19	6-17-19	
Client ID:	**TP-1-16'**				
Laboratory ID:	06-146-04				
pH	**7.3**	EPA 9045D	6-17-19	6-17-19	
Client ID:	**TP-1-20'**				
Laboratory ID:	06-146-05				
pH	**7.2**	EPA 9045D	6-17-19	6-17-19	
Client ID:	**TP-2**				
Laboratory ID:	06-146-06				
pH	**6.4**	EPA 9045D	6-17-19	6-17-19	
Client ID:	**TP-3**				
Laboratory ID:	06-146-07				
pH	**7.3**	EPA 9045D	6-17-19	6-17-19	

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

pH
EPA 9045D

Matrix: Soil
Units: pH (@ 25ºC)

Analyte	Result	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-4**				
Laboratory ID:	06-146-08				
pH	**7.1**	EPA 9045D	6-17-19	6-17-19	
Client ID:	**TP-5**				
Laboratory ID:	06-146-09				
pH	**7.4**	EPA 9045D	6-17-19	6-17-19	
Client ID:	**TP-6**				
Laboratory ID:	06-146-10				
pH	**7.1**	EPA 9045D	6-17-19	6-17-19	
Client ID:	**TP-9**				
Laboratory ID:	06-146-11				
pH	**7.4**	EPA 9045D	6-17-19	6-17-19	

Date of Report: June 19, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146
Project: 8096

% MOISTURE

Client ID	Lab ID	% Moisture	Date Analyzed
TP-1-4'	06-146-01	**15**	6-17-19
TP-1-8'	06-146-02	**15**	6-17-19
TP-1-12'	06-146-03	**25**	6-17-19
TP-1-16'	06-146-04	**21**	6-17-19
TP-1-20'	06-146-05	**23**	6-17-19
TP-2	06-146-06	**27**	6-17-19
TP-3	06-146-07	**16**	6-17-19
TP-4	06-146-08	**25**	6-17-19
TP-5	06-146-09	**17**	6-17-19
TP-6	06-146-10	**19**	6-17-19
TP-9	06-146-11	**35**	6-17-19

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
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Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 06-146

Company: Terra Associates Inc
Project Number: 8096
Project Name:
Project Manager: Chuck Lio
Sampled by: Nicolas R. Hoffman

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☒ 2 Days ☐ 3 Days
☐ Standard (7 Days) (TPH analysis 5 Days)
☒ ~~5 day~~ (other) PJ

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	pH	Nickel & Zinc				% Moisture
1	TP-1 -4'	6/14/19	7:40	Soil	2		X		X				X						X			X	X				X
2	TP-1 -8'		7:50				X		X				X						X			X	X				
3	TP-1 -12'		8:00				X		X				X						X			X	X				
4	TP-1 -16'		8:05				X		X				X						X			X	X				
5	TP-1 -20'		8:15				X		X				X						X			X	X				
6	TP-2		11:00				X		X				X						X			X	X				
7	TP-3		1010				X		X				X						X			X	X				
8	TP-4		12:00				X		X				X						X			X	X				
9	TP-5		13:15				X		X				X						X			X	X				
10	TP-6		12:50				X		X				X						X			X	X				

	Signature	Company	Date	Time
Relinquished	[signature]	TAI	6/13/19	900
Received	[signature]	OnSite Env	6/15/19	900
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions:

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

OnSite Environmental Inc.

Analytical Laboratory Testing Services
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Chain of Custody

Laboratory Number: 06-146

Company: Terra Associates Inc
Project Number: 8096
Project Name:
Project Manager: Chuck Liu
Sampled by: Nicolas R. Hoffman

Turnaround Request (in working days)
(Check One)
- ☐ Same Day
- ☐ 1 Day
- ☒ 2 Days
- ☐ 3 Days
- ☐ Standard (7 Days) (TPH analysis 5 Days)
- ☒ ~~5 day~~ 2D (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	pH	Nickel & Zinc				% Moisture
11	TP-9	6/14/19	14:40	Soil	2		X		X				X						X			X	X				X

	Signature	Company	Date	Time
Relinquished	[signature]	TAI	6/15/19	900
Received	[signature]	OnSite Env	6/15/19	900
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

June 24, 2019

Chuck Lie
Terra Associates, Inc.
12220 113th Avenue NE, Suite 130
Kirkland, WA 98034

Re: Analytical Data for Project 8096
Laboratory Reference No. 1906-146B

Dear Chuck:

Enclosed are the analytical results and associated quality control data for samples submitted on June 15, 2019.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: June 24, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146B
Project: 8096

Case Narrative

Samples were collected on June 14, 2019 and received by the laboratory on June 15, 2019. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: June 24, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146B
Project: 8096

TCLP LEAD
EPA 1311/6010D

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-12'**					
Laboratory ID:	06-146-03					
Lead	**ND**	0.20	EPA 6010D	6-24-19	6-24-19	
Client ID:	**TP-1-16'**					
Laboratory ID:	06-146-04					
Lead	**ND**	0.20	EPA 6010D	6-24-19	6-24-19	

Date of Report: June 24, 2019
Samples Submitted: June 15, 2019
Laboratory Reference: 1906-146B
Project: 8096

TCLP LEAD
EPA 1311/6010D
QUALITY CONTROL

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0624TM1					
Lead	**ND**	0.20	EPA 6010D	6-24-19	6-24-19	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-155-03										
	ORIG	DUP									
Lead	**1.32**	**1.37**	NA	NA		NA		NA	4	20	
MATRIX SPIKES											
Laboratory ID:	06-155-03										
	MS	MSD	MS	MSD		MS	MSD				
Lead	**10.2**	**10.3**	10.0	10.0	1.32	**88**	**90**	75-125	1	20	

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L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

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X - Sample extract treated with a mercury cleanup procedure.

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RPD - Relative Percent Difference

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Chain of Custody

Laboratory Number: 06-146

Company: Terra Associates Inc
Project Number: 8096
Project Name:
Project Manager: Chuck Lio
Sampled by: Nicolas R. Hoffman

Turnaround Request (in working days)
(Check One)
- ☐ Same Day ☐ 1 Day
- ☒ 2 Days ☐ 3 Days
- ☐ Standard (7 Days) (TPH analysis 5 Days)
- ☒ ~~5 day~~ PJ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals LEAD ONLY	HEM (oil and grease) 1664A	pH	Nickel & Zinc				% Moisture
1	TP-1 -4'	6/14/19	7:40	Soil	2		X		X				X						X			X	X				X
2	TP-1 -8'		7:50				X		X				X						X			X	X				
3	TP-1 -12'		8:00				X		X				X						X	X		X	X				
4	TP-1 -16'		8:05				X		X				X						X	X		X	X				
5	TP-1 -20'		8:15				X		X				X						X			X	X				
6	TP-2		11:00				X		X				X						X			X	X				
7	TP-3		1010				X		X				X						X			X	X				
8	TP-4		12:00				X		X				X						X			X	X				
9	TP-5		13:15				X		X				X						X			X	X				
10	TP-6		12:50				X		X				X						X			X	X				

	Signature	Company	Date	Time
Relinquished	[signature]	TAI	6/13/19	900
Received	[signature]	OnSite E	6/15/19	900
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
X Added 6/21/19. DB (1 day TAT)

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Laboratory Number: 06-146

Company: Terra Associates Inc
Project Number: 8096
Project Name:
Project Manager: Chuck Lie
Sampled by: Nicolas R. Hoffman

Turnaround Request (in working days)

(Check One)

- [ ] Same Day
- [ ] 1 Day
- [x] 2 Days
- [ ] 3 Days
- [ ] Standard (7 Days) (TPH analysis 5 Days)
- [x] ~~5 day~~ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	pH	Nickel & Zinc				% Moisture
11	TP-9	6/14/19	14:40	Soil	2		X		X				X						X			X	X				X

	Signature	Company	Date	Time
Relinquished	[signature]	TAI	6/15/19	900
Received	[signature]	OnSite Env	6/15/19	900
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

June 19, 2019

Chuck Lie
Terra Associates, Inc.
12220 113th Avenue NE, Suite 130
Kirkland, WA 98034

Re: Analytical Data for Project 8096
Laboratory Reference No. 1906-155

Dear Chuck:

Enclosed are the analytical results and associated quality control data for samples submitted on June 17, 2019.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

Case Narrative

Samples were collected on June 17, 2019 and received by the laboratory on June 17, 2019. They were maintained at the laboratory at a temperature of $2^{o}C$ to $6^{o}C$.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-8**					
Laboratory ID:	06-155-01					
Benzene	**ND**	0.020	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.086	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.086	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.086	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.086	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	8.6	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*86*	*58-129*				
Client ID:	**TP-10**					
Laboratory ID:	06-155-02					
Benzene	**ND**	0.020	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.070	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.070	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.070	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.070	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	7.0	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*87*	*58-129*				
Client ID:	**TP-11**					
Laboratory ID:	06-155-03					
Benzene	**ND**	0.020	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.095	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.095	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.095	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.095	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	9.5	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*95*	*58-129*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-12**					
Laboratory ID:	06-155-04					
Benzene	**ND**	0.020	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.061	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.061	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.061	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.061	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	6.1	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*90*	*58-129*				
Client ID:	**TP-22**					
Laboratory ID:	06-155-05					
Benzene	**ND**	0.020	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.079	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.079	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.079	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.079	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	7.9	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*87*	*58-129*				
Client ID:	**TP-16**					
Laboratory ID:	06-155-06					
Benzene	**ND**	0.020	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.093	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.093	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.093	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.093	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	9.3	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*89*	*58-129*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-15**					
Laboratory ID:	06-155-07					
Benzene	**ND**	0.022	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.11	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.11	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.11	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.11	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	11	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*78*	*58-129*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

GASOLINE RANGE ORGANICS/BTEX
NWTPH-Gx/EPA 8021B
QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	**Result**	**PQL**	**Method**	**Date Prepared**	**Date Analyzed**	**Flags**
METHOD BLANK						
Laboratory ID:	MB0618S1					
Benzene	**ND**	0.020	EPA 8021B	6-18-19	6-18-19	
Toluene	**ND**	0.050	EPA 8021B	6-18-19	6-18-19	
Ethyl Benzene	**ND**	0.050	EPA 8021B	6-18-19	6-18-19	
m,p-Xylene	**ND**	0.050	EPA 8021B	6-18-19	6-18-19	
o-Xylene	**ND**	0.050	EPA 8021B	6-18-19	6-18-19	
Gasoline	**ND**	5.0	NWTPH-Gx	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*95*	*58-129*				

Analyte	**Result**		**Spike Level**		**Source Result**	**Percent Recovery**		**Recovery Limits**	**RPD**	**RPD Limit**	**Flags**
DUPLICATE											
Laboratory ID:	06-146-10										
	ORIG	DUP									
Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Toluene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Ethyl Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
m,p-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
o-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*100*	*93*	*58-129*			
SPIKE BLANKS											
Laboratory ID:	SB0618S2										
	SB	SBD	SB	SBD		SB	SBD				
Benzene	**0.882**	**0.900**	1.00	1.00		**88**	**90**	69-109	2	10	
Toluene	**0.896**	**0.909**	1.00	1.00		**90**	**91**	67-112	1	10	
Ethyl Benzene	**0.871**	**0.883**	1.00	1.00		**87**	**88**	67-113	1	10	
m,p-Xylene	**0.863**	**0.875**	1.00	1.00		**86**	**88**	66-114	1	11	
o-Xylene	**0.877**	**0.889**	1.00	1.00		**88**	**89**	68-112	1	11	
Surrogate:											
Fluorobenzene						*81*	*81*	*58-129*			

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-8**					
Laboratory ID:	06-155-01					
Diesel Range Organics	**ND**	370	NWTPH-Dx	6-18-19	6-19-19	
Lube Oil	**3100**	730	NWTPH-Dx	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	---	*50-150*				S
Client ID:	**TP-10**					
Laboratory ID:	06-155-02					
Diesel Range Organics	**ND**	300	NWTPH-Dx	6-18-19	6-19-19	
Lube Oil	**1400**	590	NWTPH-Dx	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	---	*50-150*				S
Client ID:	**TP-11**					
Laboratory ID:	06-155-03					
Diesel Range Organics	**ND**	370	NWTPH-Dx	6-18-19	6-19-19	
Lube Oil	**5200**	750	NWTPH-Dx	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	---	*50-150*				S
Client ID:	**TP-12**					
Laboratory ID:	06-155-04					
Diesel Range Organics	**ND**	30	NWTPH-Dx	6-18-19	6-19-19	
Lube Oil	**98**	61	NWTPH-Dx	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*82*	*50-150*				
Client ID:	**TP-22**					
Laboratory ID:	06-155-05					
Diesel Range Organics	**ND**	660	NWTPH-Dx	6-18-19	6-19-19	
Lube Oil	**9800**	1300	NWTPH-Dx	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	---	*50-150*				S
Client ID:	**TP-16**					
Laboratory ID:	06-155-06					
Diesel Range Organics	**ND**	37	NWTPH-Dx	6-18-19	6-19-19	
Lube Oil	**230**	74	NWTPH-Dx	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*76*	*50-150*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-15**					
Laboratory ID:	06-155-07					
Diesel Range Organics	**ND**	39	NWTPH-Dx	6-18-19	6-19-19	
Lube Oil	**300**	78	NWTPH-Dx	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*83*	*50-150*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0618S1					
Diesel Range Organics	**ND**	25	NWTPH-Dx	6-18-19	6-18-19	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*94*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-155-01										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil	**2110**	**1680**	NA	NA		NA		NA	23	NA	
Surrogate:											
o-Terphenyl						---	---	*50-150*			S,S

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-8**					
Laboratory ID:	06-155-01					
Naphthalene	**0.073**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**0.023**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**0.016**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**0.048**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**0.038**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**0.039**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.11**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**0.044**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.15**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.20**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.087**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.11**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.18**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**0.041**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.14**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.13**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**0.025**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.13**	0.0097	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*88*	*40 - 111*				
Pyrene-d10	*94*	*40 - 110*				
Terphenyl-d14	*89*	*45 - 122*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-10**					
Laboratory ID:	06-155-02					
Naphthalene	**1.1**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**1.2**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**0.70**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**0.46**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**2.0**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**2.5**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**11**	0.24	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**2.2**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**12**	0.24	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**9.0**	0.24	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**3.0**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**2.5**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**1.7**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**0.59**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.99**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.45**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**0.11**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.37**	0.059	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*79*	*40 - 111*				
Pyrene-d10	*89*	*40 - 110*				
Terphenyl-d14	*90*	*45 - 122*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-11**					
Laboratory ID:	06-155-03					
Naphthalene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.10**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.18**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.11**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.13**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.12**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.096**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.16**	0.075	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*70*	*40 - 111*				
Pyrene-d10	*75*	*40 - 110*				
Terphenyl-d14	*75*	*45 - 122*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-12**					
Laboratory ID:	06-155-04					
Naphthalene	**ND**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**0.0099**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**0.0090**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.080**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**0.021**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.084**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.097**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.047**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.049**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.047**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**0.018**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.045**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.031**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.029**	0.0081	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*78*	*40 - 111*				
Pyrene-d10	*81*	*40 - 110*				
Terphenyl-d14	*79*	*45 - 122*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-22**					
Laboratory ID:	06-155-05					
Naphthalene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.11**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.14**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.076**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.079**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.11**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.096**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.080**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.092**	0.066	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*83*	*40 - 111*				
Pyrene-d10	*81*	*40 - 110*				
Terphenyl-d14	*81*	*45 - 122*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-16**					
Laboratory ID:	06-155-06					
Naphthalene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**ND**	0.074	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*83*	*40 - 111*				
Pyrene-d10	*84*	*40 - 110*				
Terphenyl-d14	*91*	*45 - 122*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

PAHs EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-15**					
Laboratory ID:	06-155-07					
Naphthalene	**0.027**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
2-Methylnaphthalene	**ND**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
1-Methylnaphthalene	**ND**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthylene	**ND**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Acenaphthene	**ND**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Fluorene	**ND**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Phenanthrene	**0.028**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Anthracene	**ND**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Fluoranthene	**0.038**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Pyrene	**0.048**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]anthracene	**0.018**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Chrysene	**0.025**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[b]fluoranthene	**0.030**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[a]pyrene	**0.020**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Indeno(1,2,3-c,d)pyrene	**0.019**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Benzo[g,h,i]perylene	**0.022**	0.010	EPA 8270D/SIM	6-18-19	6-19-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*83*	*40 - 111*				
Pyrene-d10	*81*	*40 - 110*				
Terphenyl-d14	*85*	*45 - 122*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

PAHs EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0618S1					
Naphthalene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
2-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
1-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Acenaphthylene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Acenaphthene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Fluorene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Phenanthrene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Anthracene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Pyrene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo[a]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Chrysene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo[b]fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo(j,k)fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo[a]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Dibenz[a,h]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Benzo[g,h,i]perylene	**ND**	0.0067	EPA 8270D/SIM	6-18-19	6-18-19	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*94*	*40 - 111*				
Pyrene-d10	*91*	*40 - 110*				
Terphenyl-d14	*95*	*45 - 122*				

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

PAHs EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0618S1									
	SB	SBD	SB	SBD	SB	SBD				
Naphthalene	**0.0829**	**0.0798**	0.0833	0.0833	100	96	57 - 109	4	15	
Acenaphthylene	**0.0904**	**0.0893**	0.0833	0.0833	109	107	60 - 121	1	15	
Acenaphthene	**0.0889**	**0.0868**	0.0833	0.0833	107	104	59 - 121	2	15	
Fluorene	**0.0945**	**0.0957**	0.0833	0.0833	113	115	63 - 119	1	15	
Phenanthrene	**0.0926**	**0.0942**	0.0833	0.0833	111	113	59 - 114	2	15	
Anthracene	**0.0931**	**0.0943**	0.0833	0.0833	112	113	63 - 119	1	15	
Fluoranthene	**0.0955**	**0.0968**	0.0833	0.0833	115	116	63 - 120	1	15	
Pyrene	**0.0915**	**0.0935**	0.0833	0.0833	110	112	62 - 119	2	15	
Benzo[a]anthracene	**0.101**	**0.103**	0.0833	0.0833	121	124	64 - 127	2	15	
Chrysene	**0.0921**	**0.0934**	0.0833	0.0833	111	112	63 - 121	1	15	
Benzo[b]fluoranthene	**0.0942**	**0.0962**	0.0833	0.0833	113	115	61 - 122	2	15	
Benzo(j,k)fluoranthene	**0.0967**	**0.0964**	0.0833	0.0833	116	116	64 - 123	0	15	
Benzo[a]pyrene	**0.0957**	**0.0972**	0.0833	0.0833	115	117	62 - 122	2	15	
Indeno(1,2,3-c,d)pyrene	**0.0971**	**0.0979**	0.0833	0.0833	117	118	59 - 124	1	15	
Dibenz[a,h]anthracene	**0.0963**	**0.0961**	0.0833	0.0833	116	115	61 - 123	0	15	
Benzo[g,h,i]perylene	**0.0961**	**0.0959**	0.0833	0.0833	115	115	61 - 119	0	15	
Surrogate:										
2-Fluorobiphenyl					*98*	*91*	*40 - 111*			
Pyrene-d10					*93*	*91*	*40 - 110*			
Terphenyl-d14					*97*	*96*	*45 - 122*			

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-8**					
Laboratory ID:	06-155-01					
Arsenic	**ND**	15	EPA 6010D	6-18-19	6-18-19	
Cadmium	**1.2**	0.73	EPA 6010D	6-18-19	6-18-19	
Chromium	**40**	0.73	EPA 6010D	6-18-19	6-18-19	
Lead	**310**	7.3	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.37	EPA 7471B	6-18-19	6-18-19	
Nickel	**35**	3.7	EPA 6010D	6-18-19	6-18-19	
Zinc	**330**	3.7	EPA 6010D	6-18-19	6-18-19	
Client ID:	**TP-10**					
Laboratory ID:	06-155-02					
Arsenic	**ND**	12	EPA 6010D	6-18-19	6-18-19	
Cadmium	**ND**	0.59	EPA 6010D	6-18-19	6-18-19	
Chromium	**39**	0.59	EPA 6010D	6-18-19	6-18-19	
Lead	**98**	5.9	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.30	EPA 7471B	6-18-19	6-18-19	
Nickel	**44**	3.0	EPA 6010D	6-18-19	6-18-19	
Zinc	**150**	3.0	EPA 6010D	6-18-19	6-18-19	
Client ID:	**TP-11**					
Laboratory ID:	06-155-03					
Arsenic	**ND**	15	EPA 6010D	6-18-19	6-18-19	
Cadmium	**0.99**	0.75	EPA 6010D	6-18-19	6-18-19	
Chromium	**37**	0.75	EPA 6010D	6-18-19	6-18-19	
Lead	**620**	7.5	EPA 6010D	6-18-19	6-18-19	
Mercury	**0.48**	0.37	EPA 7471B	6-18-19	6-18-19	
Nickel	**37**	3.7	EPA 6010D	6-18-19	6-18-19	
Zinc	**640**	3.7	EPA 6010D	6-18-19	6-18-19	

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-12**					
Laboratory ID:	06-155-04					
Arsenic	**ND**	12	EPA 6010D	6-18-19	6-18-19	
Cadmium	**ND**	0.61	EPA 6010D	6-18-19	6-18-19	
Chromium	**49**	0.61	EPA 6010D	6-18-19	6-18-19	
Lead	**29**	6.1	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.30	EPA 7471B	6-18-19	6-18-19	
Nickel	**36**	3.0	EPA 6010D	6-18-19	6-18-19	
Zinc	**80**	3.0	EPA 6010D	6-18-19	6-18-19	

Client ID:	**TP-22**					
Laboratory ID:	06-155-05					
Arsenic	**ND**	13	EPA 6010D	6-18-19	6-18-19	
Cadmium	**1.1**	0.66	EPA 6010D	6-18-19	6-18-19	
Chromium	**39**	0.66	EPA 6010D	6-18-19	6-18-19	
Lead	**300**	6.6	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.33	EPA 7471B	6-18-19	6-18-19	
Nickel	**41**	3.3	EPA 6010D	6-18-19	6-18-19	
Zinc	**460**	3.3	EPA 6010D	6-18-19	6-18-19	

Client ID:	**TP-16**					
Laboratory ID:	06-155-06					
Arsenic	**ND**	15	EPA 6010D	6-18-19	6-18-19	
Cadmium	**ND**	0.74	EPA 6010D	6-18-19	6-18-19	
Chromium	**33**	0.74	EPA 6010D	6-18-19	6-18-19	
Lead	**110**	7.4	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.37	EPA 7471B	6-18-19	6-18-19	
Nickel	**32**	3.7	EPA 6010D	6-18-19	6-18-19	
Zinc	**150**	3.7	EPA 6010D	6-18-19	6-18-19	

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

TOTAL METALS
EPA 6010D/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-15**					
Laboratory ID:	06-155-07					
Arsenic	**ND**	16	EPA 6010D	6-18-19	6-18-19	
Cadmium	**ND**	0.78	EPA 6010D	6-18-19	6-18-19	
Chromium	**37**	0.78	EPA 6010D	6-18-19	6-18-19	
Lead	**77**	7.8	EPA 6010D	6-18-19	6-18-19	
Mercury	**ND**	0.39	EPA 7471B	6-18-19	6-18-19	
Nickel	**31**	3.9	EPA 6010D	6-18-19	6-18-19	
Zinc	**100**	3.9	EPA 6010D	6-18-19	6-18-19	

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

TOTAL METALS
EPA 6010D/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0618SM3					
Arsenic	**ND**	10	EPA 6010D	6-18-19	6-18-19	
Cadmium	**ND**	0.50	EPA 6010D	6-18-19	6-18-19	
Chromium	**ND**	0.50	EPA 6010D	6-18-19	6-18-19	
Lead	**ND**	5.0	EPA 6010D	6-18-19	6-18-19	
Nickel	**ND**	2.5	EPA 6010D	6-18-19	6-18-19	
Zinc	**ND**	2.5	EPA 6010D	6-18-19	6-18-19	
Laboratory ID:	MB0618S1					
Mercury	**ND**	0.25	EPA 7471B	6-18-19	6-18-19	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-155-02										
	ORIG	DUP									
Arsenic	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**33.0**	**29.3**	NA	NA		NA		NA	12	20	
Lead	**82.9**	**91.2**	NA	NA		NA		NA	10	20	
Nickel	**37.1**	**33.6**	NA	NA		NA		NA	10	20	
Zinc	**123**	**125**	NA	NA		NA		NA	2	20	
Laboratory ID:	06-155-02										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	06-155-02										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**102**	**101**	100	100	ND	**102**	**101**	75-125	1	20	
Cadmium	**47.0**	**46.7**	50.0	50.0	ND	**94**	**93**	75-125	1	20	
Chromium	**126**	**126**	100	100	33.0	**93**	**93**	75-125	0	20	
Lead	**318**	**312**	250	250	82.9	**94**	**92**	75-125	2	20	
Nickel	**133**	**134**	100	100	37.1	**96**	**97**	75-125	1	20	
Zinc	**231**	**232**	100	100	123	**108**	**109**	75-125	1	20	
Laboratory ID:	06-155-02										
Mercury	**0.630**	**0.640**	0.500	0.500	0.170	**92**	**94**	80-120	2	20	

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

pH
EPA 9045D

Matrix: Soil
Units: pH (@ 25ºC)

Analyte	Result	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-8**				
Laboratory ID:	06-155-01				
pH	**7.4**	EPA 9045D	6-18-19	6-18-19	
Client ID:	**TP-10**				
Laboratory ID:	06-155-02				
pH	**5.5**	EPA 9045D	6-18-19	6-18-19	
Client ID:	**TP-11**				
Laboratory ID:	06-155-03				
pH	**7.5**	EPA 9045D	6-18-19	6-18-19	
Client ID:	**TP-12**				
Laboratory ID:	06-155-04				
pH	**7.0**	EPA 9045D	6-18-19	6-18-19	
Client ID:	**TP-22**				
Laboratory ID:	06-155-05				
pH	**7.0**	EPA 9045D	6-18-19	6-18-19	
Client ID:	**TP-16**				
Laboratory ID:	06-155-06				
pH	**6.9**	EPA 9045D	6-18-19	6-18-19	
Client ID:	**TP-15**				
Laboratory ID:	06-155-07				
pH	**6.5**	EPA 9045D	6-18-19	6-18-19	

Date of Report: June 19, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155
Project: 8096

% MOISTURE

Client ID	Lab ID	% Moisture	Date Analyzed
TP-8	06-155-01	**32**	6-18-19
TP-10	06-155-02	**15**	6-18-19
TP-11	06-155-03	**33**	6-18-19
TP-12	06-155-04	**18**	6-18-19
TP-22	06-155-05	**24**	6-18-19
TP-16	06-155-06	**32**	6-18-19
TP-15	06-155-07	**36**	6-18-19

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 06-155

Company: TAI
Project Number: 8096
Project Name:
Project Manager: Chuck Lio
Sampled by: Nicolas R. Hoffman

Turnaround Request (in working days)
(Check One)
- ☐ Same Day
- ☐ 1 Day
- ☒ 2 Days
- ~~☒ 3 Days~~
- ☐ Standard (7 Days)
- ☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	pH	Nickel + Zinc			% Moisture
1	TP-8	6/17/19	8:20	Soil	2		X		X					X						X			X	X			X
2	TP-10	↓	9:45	↓	↓		X		X					X						X			X	X			↓
3	TP-11	↓	10:30	↓	↓		X		X					X						X			X	X			↓
4	TP-12	↓	11:30	↓	↓		X		X					X						X			X	X			↓
5	TP-22	↓	12:00	↓	↓		X		X					X						X			X	X			↓
6	TP-16	↓	13:00	↓	↓		X		X					X						X			X	X			↓
7	TP-15	↓	13:30	↓	↓		X		X					X						X			X	X			↓

	Signature	Company	Date	Time
Relinquished	[signature]	TAI	6/17/19	16:00
Received	[signature]	OSE	6/17/19	1600
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

June 24, 2019

Chuck Lie
Terra Associates, Inc.
12220 113th Avenue NE, Suite 130
Kirkland, WA 98034

Re: Analytical Data for Project 8096
Laboratory Reference No. 1906-155B

Dear Chuck:

Enclosed are the analytical results and associated quality control data for samples submitted on June 17, 2019.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: June 24, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155B
Project: 8096

Case Narrative

Samples were collected on June 17, 2019 and received by the laboratory on June 17, 2019. They were maintained at the laboratory at a temperature of $2^{o}C$ to $6^{o}C$.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: June 24, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155B
Project: 8096

TCLP LEAD
EPA 1311/6010D

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-11**					
Laboratory ID:	06-155-03					
Lead	**1.3**	0.20	EPA 6010D	6-24-19	6-24-19	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-22**					
Laboratory ID:	06-155-05					
Lead	**ND**	0.20	EPA 6010D	6-24-19	6-24-19	

Date of Report: June 24, 2019
Samples Submitted: June 17, 2019
Laboratory Reference: 1906-155B
Project: 8096

TCLP LEAD
EPA 1311/6010D
QUALITY CONTROL

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0624TM1					
Lead	**ND**	0.20	EPA 6010D	6-24-19	6-24-19	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-155-03										
	ORIG	DUP									
Lead	**1.32**	**1.37**	NA	NA		NA		NA	4	20	
MATRIX SPIKES											
Laboratory ID:	06-155-03										
	MS	MSD	MS	MSD		MS	MSD				
Lead	**10.2**	**10.3**	10.0	10.0	1.32	**88**	**90**	75-125	1	20	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

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Chain of Custody

Laboratory Number: 06-155

Company: TAI
Project Number: 8096
Project Name:
Project Manager: Chuck Lio
Sampled by: Nicolas R. Hoffman

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☒ 2 Days ~~☒ 3 Days~~
☐ Standard (7 Days)
☐ ________ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals LEAD	HEM (oil and grease) 1664A	pH	Nickel, Zinc			% Moisture
1	TP-8	6/17/19	8:20	Soil	2		X		X					X						X			X	X			X
2	TP-10		9:45				X		X					X						X			X	X			
3	TP-11		10:30				X		X					X						X	X		X	X			
4	TP-12		11:30				X		X					X						X			X	X			
5	TP-22		12:00				X		X					X						X	X		X	X			
6	TP-16		13:00				X		X					X						X			X	X			
7	TP-15		13:30				X		X					X						X			X	X			

	Signature	Company	Date	Time
Relinquished	[signature]	TAI	6/17/19	16:00
Received	[signature]	OSE	6/17/19	1600
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
X Added 6/21/19 - PB (1 day TAT)

Data Package: Standard ☐ Level III ☐ Level IV ☐
Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

APPENDIX D
Ecology-Derived Soil Interim Action Levels

Chemical (all concentrations are in mg/kg for vadose zone soil)	Selected Interim Action Level	Basis is Protection of…	Direct Contact	Protect Potable Groundwater	Protect Surface Water via Groundwater	Protect Sediment via Groundwater	Site-Specific TEE	Puget Sound Natural Background (a)	PQL (b)
Metals									
Arsenic	20	surface water adjusted to background	6.7E-01	3.4E-01	1.1E-02	2.0E+02	7.0E+00	20 (c)	10
Cadmium	0.80	sediment adjusted to background	8.0E+01	6.9E-01	9.9E-02	2.6E-02	4.0E+00	8.0E-01	0.50
Chromium, total	48	TER adjusted to background	na	na	na	na	4.2E+01	4.8E+01	0.50
Copper	36	sediment adjusted to background	3.2E+03	2.8E+02	5.0E+00	7.0E-01	5.0E+01	3.6E+01	1.0
Lead	50	TER	2.5E+02	3.0E+03	5.0E+02	1.8E+02	5.0E+01	2.4E+01	5.0
Mercury, inorganic	0.070	surface water adjusted to background	2.4E+01	2.1E+00	1.3E-02	1.0E+00	1.0E-01	7.0E-02	0.025
Nickel	48	TER adjusted to background	1.6E+03	1.3E+02	6.8E+01	3.4E+01	3.0E+01	4.8E+01	2.5
Selenium	0.80	TER adjusted to PQL	4.0E+02	5.2E+00	5.2E-01	3.7E+00	3.0E-01	7.8E-01 (d)	0.80
Zinc	86	TER	2.4E+04	6.0E+03	1.3E+02	2.2E+02	8.6E+01	8.5E+01	2.5
TPH									
Gasoline range hydrocarbons	30/100	groundwater (Method A with/without benzene present)	1.5E+03	30/100	na	na	1.2E+02	na	5.0
Total diesel & oil range hydrocarbons	260	TER	na	2.0E+03	na	na	2.6E+02	na	50
PCBs									
Total PCB Aroclors	0.050	surface water adjusted to PQL	1.0E+00	2.7E+00	4.3E-05	4.8E-02	6.5E-01	na	0.050

Notes:

(a) Source: *Natural Background Soil Metals Concentrations in Washington State* (Ecology Publication #94-115, October 1994)

(b) Listed values are from OnSite Environmental, Inc., Redmond, Washington, and are for analytical results reported on a wet-weight basis. Method reporting limits for project samples may vary depending on the moisture content and matrix characteristics of the samples.

(c) Statewide regulatory background value for arsenic per MTCA Table 740-1, Footnote b (WAC 173-340-900).

(d) Statewide background value; a Puget Sound background value has not been established.

mg/kg = Milligrams per kilogram

na = Not available

PCBs = Polychlorinated biphenyls

PQL = Laboratory analytical method practical quantitation limit

TEE = Terrestrial ecological evaluation

TER = Terrestrial ecological receptors (plants, soil biota, and wildlife)

TPH = Total petroleum hydrocarbons

Chemical	protective sediment concentration (mg/kg dw)	sediment basis	groundwater - protect sediment (ug/L)	groundwater - protect surface water (ug/L)	GW-SW basis	protect potable groundwater (ug/L)	potable groundwater basis
Metals							
Arsenic	1.1E+01	natural background	3.5E+02	1.8E-02	NTR/NRWQC human health	5.8E-01	MCL adj. to 1E-5 risk
Cadmium	8.0E-01	natural background	1.9E-01	7.2E-01	NRWQC aquatic life	5.0E+00	WA/federal MCL
Chromium, total	6.2E+01	natural background	na	na		1.0E+02	WA/federal MCL
Copper	4.5E+01	natural background	1.6E+00	1.1E+01	WA aquatic life	6.4E+02	noncancer risk
Lead	2.1E+01	natural background	9.0E-01	2.5E+00	WA/NRWQC aquatic life	1.5E+01	federal MCL
Mercury, inorganic	2.0E-01	natural background	1.0E+00	1.2E-02	WA aquatic life	2.9E-01	protect indoor air
Nickel	5.0E+01	natural background	2.6E+01	5.2E+01	NRWQC aquatic life	1.0E+02	state MCL
Selenium	1.0E-01	natural background	3.6E+01	5.0E+00	WA aquatic life	5.0E+01	WA/federal MCL
Zinc	9.3E+01	natural background	1.8E+02	1.0E+02	WA aquatic life	4.8E+03	noncancer risk
TPH							
Gasoline range hydrocarbons	na			1.0E+03	aquatic life (Implementation Memo 23)	8.0E+02	Method A
Total diesel & oil range hydrocarbons	na (values are established for -D and -O separately)			3.0E+03	aquatic life (Implementation Memo 23)	5.0E+02	Method A
PCBs							
Total PCB Aroclors	1.2E-02	PQL	7.8E-03	7.0E-06	NTR human health	4.4E-01	MCL adj. to 1E-5 risk

Chemical (all concentrations are in mg/kg for vadose zone soil)	Selected Interim Action Level	Basis is Protection of…	Direct Contact	Protect Potable Groundwater	Protect Surface Water via Groundwater	Protect Sediment via Groundwater	Site-Specific TEE	PQL (a)
Pesticides								
4,4'-DDD	0.010	surface water adjusted to PQL	2.4E+00	3.4E-01	7.3E-06	1.4E+01	7.5E-01	0.010
4,4'-DDE	0.010	surface water adjusted to PQL	2.9E+00	4.5E-01	1.5E-06	1.0E+01	7.5E-01	0.010
4,4'-DDT	0.010	surface water adjusted to PQL	2.9E+00	3.5E+00	1.6E-05	4.0E-04	7.5E-01	0.010
Aldrin	0.0050	surface water adjusted to PQL	5.9E-02	2.5E-03	4.0E-08	4.0E-04	1.0E-01	0.0050
alpha-BHC	0.0050	surface water adjusted to PQL	1.6E-01	5.4E-04	1.9E-06	5.6E-01	6.0E+00	0.0050
beta-BHC	0.0050	surface water adjusted to PQL	5.6E-01	2.3E-03	6.1E-05	3.0E-02	6.0E+00	0.0050
cis-Chlordane	0.010	sediment adjusted to PQL	2.9E+00	2.6E-01	3.7E-04	1.1E-04	1.0E+00	0.010
delta-BHC	6.0	TER	na	na	na	na	6.0E+00	0.0050
Dieldrin	0.010	surface water adjusted to PQL	6.3E-02	2.8E-03	3.6E-08	4.0E-04	7.0E-02	0.010
Endosulfan I	0.0050	surface water adjusted to PQL	4.8E+02	4.3E+00	2.5E-03	na	na	0.0050
Endosulfan II	0.010	surface water adjusted to PQL	4.8E+02	4.3E+00	2.5E-03	na	na	0.010
Endosulfan sulfate	480	direct contact	4.8E+02	na	na	na	na	0.010
Endrin	0.0050	surface water adjusted to PQL	2.4E+01	4.4E-01	4.4E-04	na	2.0E-01	0.0050
Endrin aldehyde	no value		na	na	na	na	na	0.010
Endrin ketone	no value		na	na	na	na	na	0.010
gamma-BHC	0.0050	surface water adjusted to PQL	9.1E-01	6.2E-03	2.5E-03	3.3E+00	6.0E+00	0.0050
Heptachlor	0.0050	surface water adjusted to PQL	2.2E-01	3.8E-02	6.6E-08	4.0E-04	4.0E-01	0.0050
Heptachlor epoxide	0.0050	surface water adjusted to PQL	1.1E-01	8.0E-02	4.0E-06	na	4.0E-01	0.0050
Methoxychlor	0.032	surface water	4.0E+02	6.4E+01	3.2E-02	3.4E+03	na	0.010
Toxaphene	0.050	surface water adjusted to PQL	9.1E-01	1.5E+00	6.1E-05	na	na	0.050
trans-Chlordane	0.0050	sediment adjusted to PQL	2.9E+00	2.6E-01	3.7E-04	1.1E-04	1.0E+00	0.0050

Notes:

(a) Listed values are from OnSite Environmental, Inc., Redmond, Washington, and are for analytical results reported on a wet-weight basis. Method reporting limits for project samples may vary depending on the moisture content and matrix characteristics of the samples.

mg/kg = Milligrams per kilogram

na = Not available

PQL = Laboratory analytical method practical quantitation limit

TEE = Terrestrial ecological evaluation

TER = Terrestrial ecological receptors (plants, soil biota, and wildlife)

Chemical	protective sediment concentration (mg/kg dw)	sediment basis	groundwater - protect sediment (ug/L)	groundwater - protect surface water (ug/L)	GW-SW basis	protect potable groundwater (ug/L)	potable groundwater basis
Pesticides							
4,4'-DDD	3.6E+00	cancer risk	1.5E+01	7.9E-06	NTR human health	3.6E-01	cancer risk
4,4'-DDE	2.5E+00	cancer risk	5.8E+00	8.8E-07	NTR human health	2.6E-01	cancer risk
4,4'-DDT	1.0E-04	PQL	2.9E-05	1.2E-06	NTR human health	2.6E-01	cancer risk
Aldrin	1.0E-04	PQL	4.1E-04	4.1E-08	NTR human health	2.6E-03	cancer risk
alpha-BHC	1.4E-01	cancer risk	1.4E+01	4.8E-05	NTR human health	1.4E-02	cancer risk
beta-BHC	7.2E-03	LAET	6.4E-01	1.3E-03	NTR human health	4.9E-02	cancer risk
cis-Chlordane	1.0E-04	PQL	1.0E-04	3.6E-04	cancer risk	2.5E-01	cancer risk
delta-BHC	na		na	na		na	
Dieldrin	1.0E-04	PQL	7.8E-04	7.0E-08	NTR human health	5.5E-03	cancer risk
Endosulfan I	PQL		TBD	5.6E-02	WA/NRWQC aquatic life	9.6E+01	noncancer risk
Endosulfan II	PQL		TBD	5.6E-02	WA/NRWQC aquatic life	9.6E+01	noncancer risk
Endosulfan sulfate	1.0E+03	noncancer risk	na	9.0E+00	NTR human health	9.6E+01	noncancer risk
Endrin	PQL		TBD	2.0E-03	NTR human health	2.0E+00	WA/federal MCL
Endrin aldehyde	na		na	3.4E-02	WA human health	na	
Endrin ketone	8.5E-03	LAET	na	na		na	
gamma-BHC	7.8E-01	cancer risk	1.1E+02	8.0E-02	WA aquatic life	2.0E-01	WA/federal MCL
Heptachlor	1.0E-04	PQL	2.1E-03	3.4E-07	NTR human health	1.9E-01	MCL adj. to 1e-5 risk
Heptachlor epoxide	PQL		TBD	2.4E-06	NTR human health	4.8E-02	MCL adj. to 1e-5 risk
Methoxychlor	8.4E+02	noncancer risk	2.1E+03	2.0E-02	NRWQC human health	4.0E+01	WA/federal MCL
Toxaphene	PQL		TBD	3.2E-05	WA human health	8.0E-01	MCL adj. to 1e-5 risk
trans-Chlordane	1.0E-04	PQL	1.0E-04	3.6E-04	cancer risk	2.5E-01	cancer risk

Chemical (all concentrations are in mg/kg for vadose zone soil)	Selected Interim Action Level	Basis is Protection of…	Direct Contact	Protect Potable Groundwater	Protect Surface Water via Groundwater	Protect Sediment via Groundwater	Site-Specific TEE	PQL (a)
Herbicides								
2,4,5-T	800	direct contact	8.0E+02	na	na	na	na	0.0095
2,4,5-TP	640	direct contact	6.4E+02	na	na	na	na	0.0095
2,4-D	800	direct contact	8.0E+02	na	na	na	na	0.0094
2,4-DB	2,400	direct contact	2.4E+03	na	na	na	na	0.0095
Dalapon	2,400	direct contact	2.4E+03	na	na	na	na	0.18
Dicamba	2,400	direct contact	2.4E+03	na	na	na	na	0.0094
Dichlorprop	no value		na	na	na	na	na	0.071
Dinoseb	80	direct contact	8.0E+01	na	na	na	na	0.0095
MCPA	40	direct contact	4.0E+01	na	na	na	na	2.3
MCPP	80	direct contact	8.0E+01	na	na	na	na	0.94

Notes:

(a) Listed values are from OnSite Environmental, Inc., Redmond, Washington, and are for analytical results reported on a wet-weight basis. Method reporting limits for project samples may vary depending on the moisture content and matrix characteristics of the samples.

mg/kg = Milligrams per kilogram

na = Not available

PQL = Laboratory analytical method practical quantitation limit

TEE = Terrestrial ecological evaluation

Chemical	protective sediment concentration (mg/kg dw)	sediment basis	groundwater - protect sediment (ug/L)	groundwater - protect surface water (ug/L)	GW-SW basis	protect potable groundwater (ug/L)	potable groundwater basis
Herbicides							
2,4,5-T	1.7E+03	noncancer risk	na	na		1.6E+02	noncancer risk
2,4,5-TP	1.4E+03	noncancer risk	na	1.0E+02	NRWQC human health	5.0E+01	WA/federal MCL
2,4-D	1.7E+03	noncancer risk	na	1.3E+03	NRWQC human health	7.0E+01	WA/federal MCL
2,4-DB	5.1E+03	noncancer risk	na	na		4.8E+02	noncancer risk
Dalapon	5.1E+03	noncancer risk	na	na		2.0E+02	WA/federal MCL
Dicamba	5.1E+03	noncancer risk	na	na		4.8E+02	noncancer risk
Dichlorprop	na			na		na	
Dinoseb	1.7E+02	noncancer risk	na	na		7.0E+00	WA/federal MCL
MCPA	8.4E+01	noncancer risk	na	na		8.0E+00	noncancer risk
MCPP	1.7E+02	noncancer risk	na	na		1.6E+01	noncancer risk

Chemical (all concentrations are in mg/kg for vadose zone soil)	Selected Interim Action Level	Basis is Protection of…	Direct Contact	Protect Potable Groundwater	Protect Surface Water via Groundwater	Protect Sediment via Groundwater	Site-Specific TEE	PQL (a)
PAHs								
1-Methylnaphthalene	34	direct contact	3.4E+01	na	na	na	na	0.0067
2-Methylnaphthalene	320	direct contact	3.2E+02	na	na	na	na	0.0067
Acenaphthene	3.1	surface water	4.8E+03	9.8E+01	3.1E+00	4.1E+04	2.0E+01	0.0067
Acenaphthylene	no value		na	na	na	na	na	0.0067
Anthracene	47	surface water	2.4E+04	2.3E+03	4.7E+01	2.0E+05	na	0.0067
Benzo(g,h,i)perylene	no value		na	na	na	na	na	0.0067
Fluoranthene	0.020	sediment	3.2E+03	6.3E+02	5.9E+00	2.0E-02	na	0.0067
Fluorene	1.6	surface water	3.2E+03	1.0E+02	1.6E+00	2.7E+04	3.0E+01	0.0067
Naphthalene	4.5	drinking water	1.6E+03	4.5E+00	3.8E+01	1.4E+04	na	0.0067
Phenanthrene	no value		na	na	na	na	na	0.0067
Pyrene	0.020	sediment	2.4E+03	6.5E+02	1.1E+01	2.0E-02	na	0.0067
cPAHs (TTEC) (b)	0.084	sediment	1.9E-01	3.9E+00	2.3E-01	8.4E-02	na	0.0051

Notes:

(a) Listed values are from OnSite Environmental, Inc., Redmond, Washington, and are for analytical results reported on a wet-weight basis. Method reporting limits for project samples may vary depending on the moisture content and matrix characteristics of the samples.

(b) Includes benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

cPAHs = Carcinogenic polycyclic aromatic hydrocarbons

mg/kg = Milligrams per kilogram

na = Not available

PAHs = Polycyclic aromatic hydrocarbons

PQL = Laboratory analytical method practical quantitation limit

TEE = Terrestrial ecological evaluation

TTEC = Total toxic equivalent concentration of benzo(a)pyrene calculated per WAC 173-340-708(8)(e)(iii)(A) and using one-half the analytical method reporting limit for non-detected cPAHs.

Chemical	protective sediment concentration (mg/kg dw)	sediment basis	groundwater - protect sediment (ug/L)	groundwater - protect surface water (ug/L)	GW-SW basis	protect potable groundwater (ug/L)	potable groundwater basis
PAHs							
1-Methylnaphthalene	2.9E+01	cancer risk	na	na		1.5E+00	cancer risk
2-Methylnaphthalene	6.8E+02	noncancer risk	na	na		3.2E+01	noncancer risk
Acenaphthene	1.0E+04	noncancer risk	4.0E+05	3.0E+01	NTR human health	9.6E+02	noncancer risk
Acenaphthylene	na		na	na		na	
Anthracene	5.1E+04	noncancerl risk	4.3E+05	1.0E+02	NTR human health	4.8E+03	noncancer risk
Benzo(g,h,i)perylene	5.0E-03	PQL	na	na		na	
Fluoranthene	5.0E-03	PQL	2.0E-02	6.0E+00	NTR human health	6.4E+02	noncancer risk
Fluorene	6.8E+03	noncancer risk	1.7E+05	1.0E+01	NTR human health	6.4E+02	noncancer risk
Naphthalene	3.4E+03	noncancer risk	5.2E+05	1.4E+03	noncancer risk	8.9E+00	protect indoor air
Phenanthrene	na		na	na		na	
Pyrene	5.0E-03	PQL	1.5E-02	8.0E+00	NTR human health	4.8E+02	noncancer risk
cPAHs (TTEC) (a)	2.1E-02	natural background	4.3E-03	1.2E-02	cancer risk	na	

Notes:

(a) Includes benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
These individual PAHs may have applicable water quality criteria that should be considered if setting interim action levels for media other than soil.

Chemical (all concentrations are in mg/kg for vadose zone soil)	Selected Interim Action Level	Basis is Protection of...	Direct Contact	Protect Potable Groundwater	Protect Surface Water via Groundwater	Protect Sediment via Groundwater	Site-Specific TEE	PQL (a)
SVOCs								
1,2,4-Trichlorobenzene	0.033	surface water adjusted to PQL	3.4E+01	5.6E-01	1.3E-03	1.2E+02	2.0E+01	0.033
1,2-Dichlorobenzene	7.0	drinking water	7.2E+03	7.0E+00	8.1E+00	2.3E+04	na	0.033
1,2-Dinitrobenzene	8.0	direct contact	8.0E+00	na	na	na	na	0.033
1,2-Diphenylhydrazine	1.3	direct contact	1.3E+00	na	na	na	na	0.033
1,3-Dichlorobenzene	no value		na	na	na	na	na	0.033
1,3-Dinitrobenzene	8.0	direct contact	8.0E+00	na	na	na	na	0.033
1,4-Dichlorobenzene	0.98	surface water	1.9E+02	1.2E+00	9.8E-01	2.1E+02	2.0E+01	0.033
1,4-Dinitrobenzene	8.0	direct contact	8.0E+00	na	na	na	na	0.033
1,4-Dioxane	10	direct contact	1.0E+01	na	na	na	na	0.0067
2,3,4,6-Tetrachlorophenol	2,400	direct contact	2.4E+03	na	na	na	na	0.033
2,3,5,6-Tetrachlorophenol	no value		na	na	na	na	na	0.033
2,4,5-Trichlorophenol	4.0	TER	8.0E+03	2.9E+01	1.1E+01	2.0E+03	4.0E+00	0.033
2,4,6-Trichlorophenol	0.033	surface water adjusted to PQL	8.0E+01	4.6E-02	2.9E-03	6.9E+00	1.0E+01	0.033
2,4-Dichlorophenol	0.069	surface water	2.4E+02	1.7E-01	6.9E-02	4.8E+01	na	0.033
2,4-Dimethylphenol	0.70	surface water	1.6E+03	1.3E+00	7.0E-01	1.7E+04	na	0.033
2,4-Dinitrophenol	0.17	surface water adjusted to PQL	1.6E+02	1.3E-01	4.0E-02	2.2E+03	2.0E+01	0.17
2,4-Dinitrotoluene	0.033	surface water adjusted to PQL	3.2E+00	1.7E-03	2.3E-04	1.5E+01	na	0.033
2,6-Dinitrotoluene	0.033	drinking water adjusted to PQL	6.7E-01	3.1E-04	na	3.2E+00	na	0.033
2-Chloronaphthalene	6,400	direct contact	6.4E+03	na	na	na	na	0.033
2-Chlorophenol	0.18	surface water	4.0E+02	4.7E-01	1.8E-01	3.5E+01	na	0.033
2-Methylphenol	2.3	drinking water	4.0E+03	2.3E+00	na	4.6E+04	na	0.033
2-Nitroaniline	800	direct contact	8.0E+02	na	na	na	na	0.033
2-Nitrophenol	no value		na	na	na	na	na	0.033
3,3'-Dichlorobenzidine	0.17	surface water adjusted to PQL	2.2E+00	3.6E-03	5.7E-05	2.4E+00	na	0.17
3+4-Methylphenol	4,000 (b)	direct contact	4.0E+03 (b)	na	na	na	na	0.033
3-Nitroaniline	no value		na	na	na	na	na	0.033
4,6-Dinitro-2-methylphenol	no value		na	na	na	na	na	0.17
4-Bromophenyl phenyl ether	no value		na	na	na	na	na	0.033
4-Chloro-3-methylphenol	no value		na	na	na	na	na	0.033
4-Chloroaniline	0.17	drinking water adjusted to PQL	5.0E+00	1.2E-03	na	2.4E+01	na	0.17
4-Chlorophenyl phenyl ether	no value		na	na	na	na	na	0.033
4-Nitroaniline	320	direct contact	3.2E+02	na	na	na	na	0.033
4-Nitrophenol	7.0	TER	na	na	na	na	7.0E+00	0.033
Aniline	180	direct contact	1.8E+02	na	na	na	na	0.17
Benzoic acid	11	sediment	3.2E+05	2.6E+02	na	1.1E+01	na	0.17
Benzyl alcohol	8,000	direct contact	8.0E+03	na	na	na	na	0.17
Bis(2-chloroethoxy)methane	no value		na	na	na	na	na	0.033
Bis(2-chloroethyl)ether	0.033	surface water adjusted to PQL	9.1E-01	2.2E-04	1.1E-04	4.4E+00	na	0.033
Bis(2-ethylhexyl) phthalate	0.17	surface water adjusted to PQL	7.1E+01	1.3E+01	1.0E-01	2.0E+00	na	0.17
Butyl benzyl phthalate	0.17	surface water adjusted to PQL	5.3E+02	1.3E+01	3.6E-03	1.8E+03	na	0.17

Chemical (all concentrations are in mg/kg for vadose zone soil)	Selected Interim Action Level	Basis is Protection of...	Direct Contact	Protect Potable Groundwater	Protect Surface Water via Groundwater	Protect Sediment via Groundwater	Site-Specific TEE	PQL (a)
SVOCs								
Carbazole	3.7	sediment	na	na	na	3.7E+00	na	0.033
Dibutyl phthalate	0.28	surface water	8.0E+03	5.7E+01	2.8E-01	4.4E-01	2.0E+02	0.17
Diethyl phthalate	1.1	surface water	6.4E+04	7.2E+01	1.1E+00	7.5E+05	1.0E+02	0.17
Dimethyl phthalate	200	TER	na	na	na	na	2.0E+02	0.033
Di-n-octyl phthalate	0.17	sediment adjusted to PQL	8.0E+02	2.7E+05	na	1.6E-01	na	0.17
Hexachlorobenzene	0.033	surface water adjusted to PQL	6.3E-01	8.8E-01	8.0E-06	4.0E-03	1.7E+01	0.033
Hexachlorobutadiene	0.033	sediment adjusted to PQL	1.3E+01	6.0E-01	1.1E-02	1.2E-03	na	0.033
Hexachlorocyclopentadiene	4.0	surface water	4.8E+02	1.9E+02	4.0E+00	4.1E+03	1.0E+01	0.033
Hexachloroethane	0.033	surface water adjusted to PQL	2.5E+01	4.3E-02	7.9E-04	8.9E+01	na	0.033
Isophorone	0.13	drinking water	1.1E+03	2.3E-01	1.3E-01	5.3E+03	na	0.033
Nitrobenzene	0.064	surface water	1.6E+02	1.0E-01	6.4E-02	1.8E+03	4.0E+01	0.033
n-Nitrosodimethylamine	0.033	direct contact adjusted to PQL	2.0E-02	na	na	na	na	0.033
n-Nitrosodi-n-propylamine	0.033	surface water adjusted to PQL	1.4E-01	5.6E-05	2.0E-05	7.6E-01	na	0.033
n-Nitrosodiphenylamine	0.033	surface water adjusted to PQL	2.0E+02	5.3E-01	1.8E-02	7.4E+02	2.0E+01	0.033
Pentachlorophenol	0.17	surface water adjusted to PQL	2.5E+00	1.6E-02	3.2E-05	1.4E-02	3.0E+00	0.17
Phenol	0.74	sediment	2.4E+04	1.1E+01	1.8E+01	7.4E-01	3.0E+01	0.033
Pyridine	80	direct contact	8.0E+01	na	na	na	na	0.33

Notes:

(a) Listed values are from OnSite Environmental, Inc., Redmond, Washington, and are for analytical results reported on a wet-weight basis. Method reporting limits for project samples may vary depending on the moisture content and matrix characteristics of the samples.

(b) Value for 3-methylphenol; the value for 4-methylphenol is 8,000 mg/kg.

mg/kg = Milligrams per kilogram

na = Not available

PQL = Laboratory analytical method practical quantitation limit

SVOCs = Semivolatile organic compounds

TEE = Terrestrial ecological evaluation

TER = Terrestrial ecological receptors (plants, soil biota, and wildlife)

Chemical	protective sediment concentration (mg/kg dw)	sediment basis	groundwater - protect sediment (ug/L)	groundwater - protect surface water (ug/L)	GW-SW basis	protect potable groundwater (ug/L)	potable groundwater basis
SVOCs							
1,2,4-Trichlorobenzene	2.9E+01	cancer risk	3.3E+03	3.6E-02	NTR human health	1.5E+01	MCL adj to 1e-5 risk
1,2-Dichlorobenzene	1.5E+04	noncancer risk	1.9E+06	7.0E+02	NTR human health	6.0E+02	WA/federal MCL
1,2-Dinitrobenzene	1.7E+01	noncancer risk	na	na		1.6E+00	noncancer risk
1,2-Diphenylhydrazine	1.1E+00	cancer risk	na	1.0E-02	NTR human health	1.1E-01	cancer risk
1,3-Dichlorobenzene	na		na	2.0E+00	NTR human health	na	
1,3-Dinitrobenzene	1.7E+01	noncancer risk	na	na		1.6E+00	noncancer risk
1,4-Dichlorobenzene	1.6E+02	cancer risk	1.3E+04	6.0E+01	WQC adj. to risk of 1e-5	4.9E+00	protect indoor air
1,4-Dinitrobenzene	1.7E+01	noncancer risk	na	na		1.6E+00	noncancer risk
1,4-Dioxane	8.5E+00	cancer risk	na	na		4.4E-01	cancer risk
2,3,4,6-Tetrachlorophenol	5.1E+03	noncancer risk	na	na		4.8E+02	noncancer risk
2,3,5,6-Tetrachlorophenol	na		na	na		na	
2,4,5-Trichlorophenol	1.7E+04	noncancer risk	5.7E+04	3.0E+02	NRWQC human health	8.0E+02	noncancer risk
2,4,6-Trichlorophenol	7.8E+01	cancer risk	5.9E+02	2.5E-01	WA human health	4.0E+00	cancer risk
2,4-Dichlorophenol	5.1E+02	noncancer risk	7.0E+03	1.0E+01	NTR/NRWQC human health	2.4E+01	noncancer risk
2,4-Dimethylphenol	3.4E+03	noncancer risk	2.1E+06	8.5E+01	WA human health	1.6E+02	noncancer risk
2,4-Dinitrophenol	3.4E+02	noncancer risk	5.5E+05	1.0E+01	NRWQC human health	3.2E+01	noncancer risk
2,4-Dinitrotoluene	2.8E+00	cancer risk	2.5E+03	3.9E-02	WA human health	2.8E-01	cancer risk
2,6-Dinitrotoluene	5.7E-01	cancer risk	6.0E+02	na		5.8E-02	cancer risk
2-Chloronaphthalene	1.4E+04	noncancer risk	na	1.0E+02	NTR human health	6.4E+02	noncancer risk
2-Chlorophenol	8.4E+02	noncancer risk	2.9E+03	1.5E+01	WA human health	4.0E+01	noncancer risk
2-Methylphenol	8.4E+03	noncancer risk	8.0E+06	na		4.0E+02	noncancer risk
2-Nitroaniline	1.7E+03	noncancer risk	na	na		1.6E+02	noncancer risk
2-Nitrophenol	na		na	na		na	
3,3'-Dichlorobenzidine	1.9E+00	cancer risk	1.3E+02	3.1E-03	WA human health	1.9E-01	cancer risk
3-Methylphenol	8.4E+03	noncancer risk	na	na		4.0E+02	noncancer risk
3-Nitroaniline	na		na	na		na	
4,6-Dinitro-2-methylphenol	na		na	2.0E+00	NRWQC human health	na	
4-Bromophenyl phenyl ether	na		na	na		na	
4-Chloro-3-methylphenol	na		na	3.6E+01	WA human health	na	
4-Chloroaniline	4.3E+00	cancer risk	4.6E+03	na		2.2E-01	cancer risk
4-Chlorophenyl phenyl ether	na		na	na		na	
4-Methylphenol	2.6E-01	LAET	na	na		8.0E+02	noncancer risk
4-Nitroaniline	6.8E+02	noncancer risk	na	na		6.4E+01	noncancer risk
4-Nitrophenol	na		na	na		na	
Aniline	1.5E+02	cancer risk	na	na		7.7E+00	cancer risk

Chemical	protective sediment concentration (mg/kg dw)	sediment basis	groundwater - protect sediment (ug/L)	groundwater - protect surface water (ug/L)	GW-SW basis	protect potable groundwater (ug/L)	potable groundwater basis
SVOCs							
Benzoic acid	2.9E+00	LAET	2.6E+03	na		6.4E+04	noncancer risk
Benzyl alcohol	1.7E+04	noncancer risk	na	na		8.0E+02	noncancer risk
Bis(2-chloroethoxy)methane	na		na	na		na	
Bis(2-chloroethyl)ether	7.8E-01	cancer risk	7.9E+02	2.0E-02	WA human health	4.0E-02	cancer risk
Bis(2-ethylhexyl) phthalate	5.0E-01	LAET	9.0E-01	4.5E-02	NTR human health	6.0E+00	WA/federal MCL
Butyl benzyl phthalate	4.5E+02	cancer risk	6.5E+03	1.3E-02	NTR human health	4.6E+01	cancer risk
Carbazole	9.0E-01	LAET	5.1E+01	na		na	
Dibutyl phthalate	3.8E-01	LAET	1.2E+01	8.0E+00	NTR human health	1.6E+03	noncancer risk
Diethyl phthalate	1.4E+05	noncancer risk	1.3E+08	2.0E+02	NTR human health	1.3E+04	noncancer risk
Dimethyl phthalate	na		na	6.0E+02	NTR human health	na	
Di-n-octyl phthalate	3.9E-02	LAET	9.4E-05	na		1.6E+02	noncancer risk
Hexachlorobenzene	1.0E-03	PQL	2.5E-03	5.0E-06	NTR human health	5.5E-01	MCL adj to 1e-5 risk
Hexachlorobutadiene	3.0E-04	PQL	1.1E-03	1.0E-02	NTR/NRWQC human health	5.6E-01	cancer risk
Hexachlorocyclopentadiene	1.0E+03	noncancer risk	1.0E+03	1.0E+00	NTR human health	4.8E+01	noncancer risk
Hexachloroethane	2.1E+01	cancer risk	2.2E+03	2.0E-02	NTR human health	1.1E+00	cancer risk
Isophorone	9.0E+02	cancer risk	1.1E+06	2.7E+01	WA human health	4.6E+01	cancer risk
Nitrobenzene	3.4E+02	noncancer risk	2.8E+05	1.0E+01	NRWQC human health	1.6E+01	noncancer risk
n-Nitrosodimethylamine	1.7E-02	cancer risk	na	6.5E-04	WA human health	8.6E-04	cancer risk
n-Nitrosodi-n-propylamine	1.2E-01	cancer risk	1.7E+02	4.4E-03	WA human health	1.3E-02	cancer risk
n-Nitrosodiphenylamine	1.7E+02	cancer risk	2.5E+04	6.2E-01	WA human health	1.8E+01	cancer risk
Pentachlorophenol	3.6E-01	PQL	8.6E-01	2.0E-03	NTR human health	1.0E+00	WA/federal MCL
Phenol	1.2E-01	LAET	1.6E+02	4.0E+03	NRWQC human health	2.4E+03	noncancer risk
Pyridine	1.7E+02	noncancer risk	na	na		8.0E+00	noncancer risk

Chemical (all concentrations are in mg/kg for vadose zone soil)	Selected Interim Action Level	Basis is Protection of…	Direct Contact	Protect Potable Groundwater	Protect Surface Water via Groundwater	Protect Sediment via Groundwater	Site-Specific TEE	PQL (a)
VOCs								
1,1,1,2-Tetrachloroethane	38	direct contact	3.8E+01	na	na	na	na	0.0010
1,1,1-Trichloroethane	1.5	drinking water	1.6E+05	1.5E+00	7.4E+01	na	na	0.0010
1,1,2,2-Tetrachloroethane	0.0010	surface water adjusted to PQL	5.0E+00	1.2E-03	5.6E-04	na	na	0.0010
1,1,2-Trichloroethane	0.0019	surface water	1.8E+01	1.7E-02	1.9E-03	na	na	0.0010
1,1-Dichloroethane	0.041	drinking water	1.8E+02	4.1E-02	na	na	na	0.0010
1,1-Dichloroethylene	0.044	drinking water	4.0E+03	4.4E-02	1.9E+00	na	na	0.0010
1,1-Dichloropropene	no value		na	na	na	na	na	0.0010
1,2,3-Trichlorobenzene	20	TER	na	na	na	na	2.0E+01	0.0010
1,2,3-Trichloropropane	0.033	direct contact	3.3E-02	na	na	na	na	0.0010
1,2,4-Trimethylbenzene	800	direct contact	8.0E+02	na	na	na	na	0.0010
1,2-Dibromo-3-chloropropane	1.3	direct contact	1.3E+00	na	na	na	na	0.0050
1,2-Dichloroethane	0.023	drinking water	1.1E+01	2.3E-02	4.3E-02	na	na	0.0010
1,2-Dichloroethylene (mixed isomers)	720	direct contact	7.2E+02	na	na	na	na	0.0010
1,2-Dichloropropane	0.0036	surface water	2.7E+01	2.5E-02	3.6E-03	na	7.0E+02	0.0010
1,3,5-Trimethylbenzene	800	direct contact	8.0E+02	na	na	na	na	0.0010
1,3-Dichloropropane	no value		na	na	na	na	na	0.0010
2,2-Dichloropropane	no value		na	na	na	na	na	0.0010
2-Chloroethyl vinyl ether	no value		na	na	na	na	na	0.0050
2-Chlorotoluene	1,600	direct contact	1.6E+03	na	na	na	na	0.0010
2-Hexanone	400	direct contact	4.0E+02	na	na	na	na	0.0050
4-Chlorotoluene	no value		na	na	na	na	na	0.0010
4-Isopropyltoluene	no value		na	na	na	na	na	0.0010
Acetone	29	drinking water	7.2E+04	2.9E+01	na	na	na	0.0050
Benzene	0.0024	surface water	1.8E+01	2.7E-02	2.4E-03	na	na	0.0010
Bromobenzene	0.56	drinking water	6.4E+02	5.6E-01	na	na	na	0.0010
Bromochloromethane	no value		na	na	na	na	na	0.0010
Bromoform	0.030	surface water	1.3E+02	3.6E-01	3.0E-02	na	na	0.0050
Bromomethane	0.050	drinking water	1.1E+02	5.0E-02	4.5E-01	na	na	0.0010
Carbon disulfide	5.0	drinking water	8.0E+03	5.0E+00	na	na	na	0.0010
Carbon tetrachloride	0.0017	surface water	1.4E+01	4.2E-02	1.7E-03	na	na	0.0010
Chlorobenzene	0.17	surface water	1.6E+03	8.6E-01	1.7E-01	na	4.0E+01	0.0010
Chloroethane	no value		na	na	na	na	na	0.0050
Chloroform	0.074	drinking water	3.2E+01	7.4E-02	3.1E-01	na	na	0.0010
Chloromethane	no value		na	na	na	na	na	0.0050
cis-1,2-Dichloroethylene	0.078	drinking water	1.6E+02	7.8E-02	na	na	na	0.0010
cis-1,3-Dichloropropene	0.0011	surface water	1.0E+01	2.3E-03	1.1E-03	na	na	0.0010
Dibromochloromethane	0.0032	surface water	1.2E+01	2.8E-02	3.2E-03	na	na	0.0010
Dibromomethane	800	direct contact	8.0E+02	na	na	na	na	0.0010
Dichlorobromomethane	0.0038	surface water	1.6E+01	3.6E-02	3.8E-03	na	na	0.0010

Chemical (all concentrations are in mg/kg for vadose zone soil)	Selected Interim Action Level	Basis is Protection of…	Direct Contact	Protect Potable Groundwater	Protect Surface Water via Groundwater	Protect Sediment via Groundwater	Site-Specific TEE	PQL (a)
VOCs								
Dichlorodifluoromethane	16,000	direct contact	1.6E+04	na	na	na	na	0.0010
Ethylbenzene	0.24	surface water	8.0E+03	5.9E+00	2.4E-01	na	na	0.0010
Ethylene dibromide	0.0010	drinking water adjusted to PQL	5.0E-01	2.7E-04	na	na	na	0.0010
Isopropylbenzene	8,000	direct contact	8.0E+03	na	na	na	na	0.0010
Methyl ethyl ketone (MEK)	48,000	direct contact	4.8E+04	na	na	na	na	0.0050
Methyl iodide	no value		na	na	na	na	na	0.0050
Methyl isobutyl ketone	6,400	direct contact	6.4E+03	na	na	na	na	0.0050
Methyl tert-butyl ether	0.10	drinking water	5.6E+02	1.0E-01	na	na	na	0.0010
Methylene chloride	0.021	surface water	4.8E+02	2.1E-02	4.3E-02	na	na	0.0050
n-Butylbenzene	4,000	direct contact	4.0E+03	na	na	na	na	0.0010
n-Propylbenzene	8,000	direct contact	8.0E+03	na	na	na	na	0.0010
sec-Butylbenzene	8,000	direct contact	8.0E+03	na	na	na	na	0.0010
Styrene	2.2	drinking water	1.6E+04	2.2E+00	na	na	3.0E+02	0.0010
tert-Butylbenzene	8,000	direct contact	8.0E+03	na	na	na	na	0.0010
Tetrachloroethylene	0.024	surface waer	4.8E+02	5.0E-02	2.4E-02	na	na	0.0010
Toluene	0.40	surface water	6.4E+03	4.5E+00	4.0E-01	na	2.0E+02	0.0050
Total xylenes	14	drinking water	1.6E+04	1.4E+01	na	na	na	0.0020
trans-1,2-Dichloroethylene	0.52	drinking water/surface water	1.6E+03	5.2E-01	5.2E-01	na	na	0.0010
trans-1,3-Dichloropropene	0.0011	surface water	1.0E+01	2.3E-03	1.1E-03	na	na	0.0010
Trichloroethylene	0.0019	surface water	1.2E+01	2.5E-02	1.9E-03	na	na	0.0010
Trichlorofluoromethane	24,000	direct contact	2.4E+04	na	na	na	na	0.0010
Vinyl acetate	33	drinking water	8.0E+04	3.3E+01	na	na	na	0.0050
Vinyl chloride	0.0010	surface water adjusted to PQL	6.7E-01	1.7E-03	1.2E-04	na	na	0.0010

Notes:

(a) Listed values are from OnSite Environmental, Inc., Redmond, Washington, and are for analytical results reported on a wet-weight basis. Method reporting limits for project samples may vary depending on the moisture content and matrix characteristics of the samples.

mg/kg = Milligrams per kilogram

na = Not available

PQL = Laboratory analytical method practical quantitation limit

TEE = Terrestrial ecological evaluation

TER = Terrestrial ecological receptors (plants, soil biota, and wildlife)

VOCs = Volatile organic compounds

Chemical	protective sediment concentration (mg/kg dw)	sediment basis	groundwater - protect sediment (ug/L)	groundwater - protect surface water (ug/L)	GW-SW basis	protect potable groundwater (ug/L)	potable groundwater basis
VOCs							
1,1,1,2-Tetrachloroethane	na			na		1.7E+00	cancer risk
1,1,1-Trichloroethane	na			1.0E+04	NRWQC human health	2.0E+02	WA/federal MCL
1,1,2,2-Tetrachloroethane	na			1.0E-01	NTR human health	2.2E-01	cancer risk
1,1,2-Trichloroethane	na			3.5E-01	NTR human health	3.0E+00	federal MCLG
1,1-Dichloroethane	na			na		7.7E+00	cancer risk
1,1-Dichloroethylene	na			3.0E+02	NRWQC human health	7.0E+00	WA/federal MCL
1,1-Dichloropropene	na			na		na	
1,2,3-Trichlorobenzene	na			na		na	
1,2,3-Trichloropropane	na			na		1.5E-03	cancer risk
1,2,4-Trimethylbenzene	na			na		8.0E+01	noncancer risk
1,2-Dibromo-3-chloropropane	na			na		2.0E-01	WA/federal MCL
1,2-Dichloroethane	na			8.9E+00	NTR human health	4.2E+00	protect indoor air
1,2-Dichloroethylene (mixed isomers)	na			na		7.2E+01	noncancer risk
1,2-Dichloropropane	na			7.1E-01	WA human health	5.0E+00	WA/federal MCL
1,3,5-Trimethylbenzene	na			na		8.0E+01	noncancer risk
1,3-Dichloropropane	na			na		na	
2,2-Dichloropropane	na			na		na	
2-Chloroethyl vinyl ether	na			na		na	
2-Chlorotoluene	na			na		1.6E+02	noncancer risk
2-Hexanone	na			na		4.0E+01	noncancer risk
4-Chlorotoluene	na			na		na	
4-Isopropyltoluene	na			na		na	
Acetone	na			na		7.2E+03	noncancer risk
Benzene	na			4.4E-01	WA human health	2.4E+00	protect indoor air
Bromobenzene	na			na		6.4E+01	noncancer risk
Bromochloromethane	na			na		na	
Bromoform	na			4.6E+00	NTR human health	5.5E+01	MCL adj. to 1e-5 risk
Bromomethane	na			1.0E+02	NRWQC human health	1.1E+01	noncancer risk
Carbon disulfide	na			na		4.0E+02	protect indoor air
Carbon tetrachloride	na			2.0E-01	WA human health	5.6E-01	protect indoor air
Chlorobenzene	na			2.0E+01	NRWQC human health	1.0E+02	WA/federal MCL
Chloroethane	na			na		1.9E+04	protect indoor air
Chloroform	na			6.0E+01	NRWQC human health	1.2E+00	protect indoor air
Chloromethane	na			na		1.5E+02	protect indoor air
cis-1,2-Dichloroethylene	na			na		1.6E+01	noncancer risk

Chemical	protective sediment concentration (mg/kg dw)	sediment basis	groundwater - protect sediment (ug/L)	groundwater - protect surface water (ug/L)	GW-SW basis	protect potable groundwater (ug/L)	potable groundwater basis
VOCs							
cis-1,3-Dichloropropene	na			2.2E-01	NTR human health	4.4E-01	cancer risk
Dibromochloromethane	na			6.0E-01	NTR human health	5.2E+00	MCL adj. to 1e-5 risk
Dibromomethane	na			na		8.0E+01	noncancer risk
Dichlorobromomethane	na			7.3E-01	NTR human health	1.8E+00	protect indoor air
Dichlorodifluoromethane	na			na		5.6E+00	protect indoor air
Ethylbenzene	na			2.9E+01	NTR human health	7.0E+02	WA/federal MCL
Ethylene dibromide	na			na		5.0E-02	WA/federal MCL
Isopropylbenzene	na			na		8.0E+02	noncancer risk
Methyl ethyl ketone (MEK)	na			na		4.8E+03	noncancer risk
Methyl iodide	na			na		na	
Methyl isobutyl ketone	na			na		6.4E+02	noncancer risk
Methyl tert-butyl ether	na			na		2.4E+01	cancer risk
Methylene chloride	na			1.0E+01	NTR human health	5.0E+00	WA/federal MCL
n-Butylbenzene	na			na		4.0E+02	noncancer risk
n-Propylbenzene	na			na		8.0E+02	noncancer risk
sec-Butylbenzene	na			na		8.0E+02	noncancer risk
Styrene	na			na		1.0E+02	WA/federal MCL
tert-Butylbenzene	na			na		8.0E+02	noncancer risk
Tetrachloroethylene	na			2.4E+00	NTR human health	5.0E+00	WA/federal MCL
Toluene	na			5.7E+01	NRWQC human health	6.4E+02	noncaner eqn
Total xylenes	na			na		3.3E+02	protect indoor air
trans-1,2-Dichloroethylene	na			1.0E+02	NRWQC human health	1.0E+02	WA/federal MCL
trans-1,3-Dichloropropene	na			2.2E-01	NTR human health	4.4E-01	cancer risk
Trichloroethylene	na			3.0E-01	NTR human health	1.5E+00	protect indoor air
Trichlorofluoromethane	na			na		1.2E+02	protect indoor air
Vinyl acetate	na			na		7.8E+03	protect indoor air
Vinyl chloride	na			2.0E-02	WA human health	2.9E-01	MCL adj to risk of 1e-5

Equations

Blue highlighting indicates parameter values that are site-specific (many, especially for sediment, default to Lower Duwamish Waterway values in the absence of site-specific data)

MTCA Equation 720-1 (Method B groundwater cleanup level, noncancer, potable water)

$$CUL{-}GW{-}N = \frac{RfDo\ x\ ABW\ x\ UCF\ x\ HQ\ x\ AT}{DWIR\ x\ INH\ x\ DWF\ x\ ED}$$

IDWIFn = ABW x UCF x HQ x AT / (DWIR x DWF x ED)
CUL-GW-NC = IDWIFn x RfDo / INH

CUL-GW-N	Groundwater cleanup level, noncancer	ug/L	Calculated
RfDo	Oral reference dose	mg/kg-day	from CLARC
ABW	Average body weight over exposure duration, default	kg	16
UCF	Unit conversion factor, default	ug/mg	1E+03
HQ	Acceptable hazard quotient, default	unitless	1
AT	Averaging time, default	years	6
DWIR	Drinking water ingestion rate, default	L/day	1
INH	Inhalation correction factor	unitless	from CLARC
DWF	Drinking water fraction, default	unitless	1
ED	Exposure duration, default	years	6
IDWIFn	Intermediate drinking water intake factor, noncancer	kg-ug-day/mg-L	1.60E+04

MTCA Equation 720-2 (Method B groundwater cleanup level, cancer, potable water)

$$CUL{-}GW{-}C = \frac{Risk\ x\ ABW\ x\ UCF\ x\ AT}{CPFo\ x\ DWIR\ x\ INH\ x\ DWF\ x\ ED}$$

IDWIFc = Risk x ABW x UCF x AT / (DWIR x DWF x ED)
CUL-GW-C = IDWIFc / (CPFo x INH)

CUL-GW-C	Groundwater cleanup level, cancer	ug/L	Calculated
Risk	Acceptable cancer risk level, default	unitless	1E-06
ABW	Average body weight over exposure duration, default	kg	70
UCF	Unit conversion factor, default	ug/mg	1E+03
AT	Averaging time, default	years	75
CPFo	Oral cancer potency factor	kg-day/mg	from CLARC
DWIR	Drinking water ingestion rate, default	L/day	2
INH	Inhalation correction factor	unitless	from CLARC
DWF	Drinking water fraction, default	unitless	1
ED	Exposure duration, default	years	30
IDWIFc	Intermediate drinking water intake factor, cancer	kg-ug-day/mg-L	8.75E-02

Equations

MTCA Equation 730-1 (Method B surface water cleanup level, noncancer)

$$CUL{-}SW{-}N = \frac{RfDo\ x\ ABW\ x\ UCF1\ x\ UCF2\ x\ HQ\ x\ AT}{BCF\ x\ FCR\ x\ FDF\ x\ ED}$$

ISWIFn = ABW x UCF1 x UCF2 x HQ x AT / (FCR x FDF x ED)
CUL-SW-NC = RfDo x ISWIFn / BCF

CUL-SW-N	Surface water cleanup level, noncancer	ug/L	Calculated
RfD	Oral reference dose	mg/kg-day	from CLARC
ABW	Average body weight, default	kg	70
UCF1	Unit conversion factor 1, default	ug/mg	1E+03
UCF2	Unit conversion factor 2, default	g/kg	1E+03
HQ	Acceptable hazard quotient, default	unitless	1
AT	Averaging time, default	years	30
BCF	Bioconcentration factor	L/kg	from CLARC
FCR	Fish consumption rate, LDW	g/day	97.5
FDF	Fish diet fraction, LDW	unitless	1
ED	Exposure duration, default	years	30
ISWIFn	Intermediate surface water intake factor, noncancer	ug-day/mg	7.18E+05

MTCA Equation 730-2 (Method B surface water cleanup level, cancer)

$$CUL{-}SW{-}C = \frac{Risk\ x\ ABW\ x\ UCF1\ x\ UCF2\ x\ AT}{CPFo\ x\ BCF\ x\ FCR\ x\ FDF\ x\ ED}$$

ISWIFc = Risk x ABW x UCF1 x UCF2 x AT / (FCR x FDF x ED)
CUL-SW-C = ISWIFc / (CPFo x BCF)

CUL-SW-C	Surface water cleanup level, cancer	ug/L	Calculated
Risk	Acceptable cancer risk level, default	unitless	1.00E-06
ABW	Average body weight, default	kg	70
UCF1	Unit conversion factor 1, default	ug/mg	1E+03
UCF2	Unit conversion factor 2, default	g/kg	1E+03
AT	Averaging time, default	years	75
CPF	Cancer potency factor	kg-day/mg	from CLARC
BCF	Bioconcentration factor	L/kg	from CLARC
FCR	Fish consumption rate, LDW	g/day	97.5
FDF	Fish diet fraction, LDW	unitless	1
ED	Exposure duration, default	years	30
ISWIFc	Intermediate surface water intake factor, cancer	ug-day/mg	1.79E+00

Equations

MTCA Equation 740-1 (Method B soil cleanup level, noncancer)

$$CUL\text{−}S\text{−}RN = \frac{RfDo\ x\ ABW\ x\ UCF\ x\ HQ\ x\ AT}{SIR\ x\ AB1\ x\ EF\ x\ ED}$$

ISIFrn = ABW x UCF x HQ x AT / (SIR x EF x ED)
CUL-S-RNC = ISIFrn x RfDo / AB1

CUL-S-N	Soil cleanup level, noncancer	mg/kg	Calculated
RfDo	Oral reference dose	mg/kg-day	from CLARC
ABW	Average body weight over exposure duration, default	kg	16
UCF	Unit conversion factor, default	mg/kg	1E+06
HQ	Hazard quotient, default	unitless	1
AT	Averaging time, default	years	6
SIR	Soil ingestion rate, default	mg/day	200
AB1	Gastrointestinal absorption fraction, default	unitless	Chemical-specific
EF	Exposure frequency, default	unitless	1
ED	Exposure duration, default	years	6
ISIFrn	Intermediate soil intake factor, residential noncancer	1/day	8.00E+04

MTCA Equation 740-2 (Method B soil cleanup level, cancer)

$$CUL\text{−}S\text{−}\mathrm{RC} = \frac{Risk\ x\ ABW\ x\ UCF\ x\ AT}{CPFo\ x\ SIR\ x\ AB1\ x\ EF\ x\ ED}$$

ISIFrc = Risk x ABW x UCF x AT / (SIR x EF x ED)
CUL-S-RC = ISIFrc / (CPFo x AB1)

CUL-S-C	Soil cleanup level, cancer	mg/kg	Calculated
Risk	Acceptable cancer risk level, default	unitless	1E-06
ABW	Average body weight over exposure duration, default	kg	16
AT	Averaging time, default	years	75
UCF	Unit conversion factor, default	mg/kg	1E+06
CPFo	Oral cancer potency factor	kg-day/mg	from CLARC
SIR	Soil ingestion rate, default	mg/day	200
AB1	Gastrointestinal absorption fraction, default	unitless	Chemical-specific
EF	Exposure frequency, default	unitless	1
ED	Exposure duration, default	years	6
ISIFrc	Intermediate soil intake factor, residential cancer	1/day	1.00E+00

Equations

MTCA Equation 747-1 (Soil cleanup level for groundwater protection)

$$CUL{-}S{-}GW \; = CUL{-}GW \; x \; UCF \; x \; DF \; x \; \left[K_d + \frac{\theta_w + \theta_a H_{cc}}{\rho_b}\right]$$

ILF1 = UCF x DF
ILF2 = θw / ρb
ILF3 = θa / ρb
CUL-S-FW = GUL-GW x ILF1 (Kd + ILF2 + ILF3 x Hcc)

CUL-S-GW	Soil cleanup level, groundwater protection	mg/kg	Calculated
CUL-GW	Selected groundwater CUL	ug/L	Calculated
UCF	Unit conversion factor, default	mg/ug	1E-03
DF	Dilution factor, default		
	Vadose	unitless	20
	Saturated	unitless	1
K_d	Distribution coefficient	L/kg	calculated with MTCA eqn. 747-2; also see Tables 747-2 and 747-3
θ_w	Water-filled soil porosity, default		
	Vadose	ml water/ml soil	0.3
	Saturated	ml water/ml soil	0.43
θ_a	Air-filled soil porosity, default		
	Vadose	ml air/ml soil	0.13
	Saturated	ml air/ml soil	0
H_{cc}	Henry's law constant at 13 degrees C	unitless	from CLARC
ρ_b	Dry soil bulk density, default	kg/L	1.5
ILF1v	Intermediate leaching factor 1, vadose zone	mg/ug	2.00E-02
ILF2v	Intermediate leaching factor 2, vadose zone	L/kg	2.00E-01
ILF3v	Intermediate leaching factor 3, vadose zone	L/kg	8.67E-02
ILF1s	Intermediate leaching factor 1, saturated zone	mg/ug	1.00E-03
ILF2s	Intermediate leaching factor 2, saturated zone	L/kg	2.87E-01
	There is no ILF3 for the saturated zone		

MTCA Equation 747-2 (Kd, distribution coefficient) (not used for metals)

$$K_d = Koc \; x \; Foc$$

K_d	Distribution coefficient	L/kg	calculated; also see MTCA Tables 747-2 and 747-3
K_{oc}	Soil organic carbon-water partitioning coefficient	ml/g	from CLARC
F_{oc}	Organic carbon fraction		
	Soil	g/g	0.001
	Sediment	g/g	0.005

Equations

Modified MTCA Equation 747-1 (GW concentration for protection of sediment; from Ecology [2016], Appendix A)

$$CUL-GW-SED = \frac{RBC-SED}{UCF\ x\ DF\ x\ \left[K_d + \frac{\theta_w}{\rho_b}\right]}$$

IPF1 = UCF x DF
IPF2 = θw / ρb
CUL-GW-SED = RBC-SED / [IPF1 (Kd + IPF2)]

CUL-GW-SED	Groundwater cleanup level, sediment protection	ug/L	Calculated
RBC-SED	Sediment risk-based concentration (Lower Tier Sediment PCUL)	mg/kg	Calculated
UCF	Unit conversion factor, default	mg/ug	1E-03
DF	Dilution factor, default (saturated)	unitless	1
K_d	Distribution coefficient in sediment	L/kg	calculated with MTCA eqn. 747-2; also see Tables 747-2 and 747-3
θ_w	Water-filled soil porosity, LDW average	ml water/ml soil	0.615
ρ_b	Dry soil bulk density, from Ecology (2016)	kg/L	1.02
IPF1	Intermediate partitioning factor 1	mg/ug	1.00E-03
IPF2	Intermediate partitioning factor 2	L/kg	6.03E-01

Equations

MTCA Equation 750-1 (Method B air cleanup level, noncancer)

$$CUL\text{−A−}RN = \frac{RfD_i\ x\ ABW\ x\ UCF\ x\ HQ\ x\ AT}{BR\ x\ ABS\ x\ EF\ x\ ED}$$

IAIFrn = ABW x UCF x HQ x AT / (BR x EF x ED)
CUL-A-RN = RfDi x IAIFrn / ABS

CUL-A-RN	Air cleanup level, noncancer	ug/m3	Calculated
RfDi	Inhalation reference dose	mg/kg-day	from CLARC
ABW	Average body weight over exposure duration, default	kg	16
UCF	Unit conversion factor, default	ug/mg	1E+03
HQ	Hazard quotient, default	unitless	1
AT	Averaging time, default	years	6
BR	Breathing rate	m3/day	10
ABS	Inhalation absorption fraction, default	unitless	1
EF	Exposure frequency, default	unitless	1
ED	Exposure duration	years	6
IAIFrn	Intermediate air intake factor, noncancer	kg-ug-day/mg-m3	1.60E+03

MTCA Equation 750-2 (Method B air cleanup level, cancer)

$$CUL\text{−A−RC} = \frac{Risk\ x\ ABW\ x\ UCF\ x\ AT}{CPF_i\ x\ BR\ x\ ABS\ x\ EF\ x\ ED}$$

IAIFrc = Risk x ABW x UCF x AT / (BR x EF x ED)
CUL-A-RC = IAIFrc / (CPFi x ABS)

CUL-S-RC	Air cleanup level, cancer	ug/m3	Calculated
Risk	Acceptable cancer risk level, default	unitless	1E-06
ABW	Average body weight over exposure duration, default	kg	70
AT	Averaging time, default	years	75
UCF	Unit conversion factor, default	ug/mg	1E+03
CPFi	Inhalation cancer potency factor	kg-day/mg	from CLARC
BR	Breathing rate	m3/day	20
ABS	Inhalation absorption fraction, default	unitless	1
EF	Exposure frequency, default	unitless	1
ED	Exposure duration, default	years	30
IAIFrc	Intermediate air intake factor, cancer	kg-ug-day/mg-m3	8.75E-03

Equations

Equation 1 (Vapor Intrusion Guidance 2009, rev. Feb 2016, page 3-6)

$$SL{-}GW{-}VI = \frac{SL_{IA}}{VAF \ x \ UCF \ x \ Hcc}$$

SL-GW-VI	Screening level in groundwater protective of indoor air	ug/L	Calculated
SL_{IA}	Indoor air screening level	ug/m3	Calculated
VAF	Vapor attenuation factor; default	unitless	1E-03
Hcc	Henry's Law Constant at 13 degrees C	unitless	from CLARC
UCF	Unit conversion factor	L/m3	1E+03
IVEF	Intermediate vapor exposure factor	m3/L	1

Equation 2 (Vapor Intrusion Guidance 2009, rev. Feb 2016, page 3-10)

$$SL{-}SG = \frac{SL_{IA}}{VAF}$$

SL-SG	Screening level in soil gas protective of indoor air	ug/m3	Calculated
VAF	Vapor attenuation factor		
	Shallow soil gas/sub-slab	unitless	0.03
	Deep soil gas	unitless	0.01

Equations

SMS SCUM II, Equation 9-1 (sediment ingestion / direct contact, cancer)

$$RBC{-}SED{-}C = \frac{ACR\ x\ BW\ x\ ATc}{EF\ x\ ED\ x\ \left[\left(\frac{IR\ x\ AB\ x\ CPFo}{UCF}\right) + \left(\frac{SA\ x\ AF\ x\ ABS\ x\ CPFd}{UCF}\right)\right]}$$

ISDIF1c = BW x ATc x UCF / (EF x ED)
ISDIF2 = SA x AF
RBC-SED-C = ACR x ISDIF1c / (IR x AB x CPFo + ISDIF2 x ABS x CPFd)

General Parameters			
RBC-SED-C	Risk-based concentration, sediment, cancer	mg/kg	Calculated
ACR	Acceptable cancer risk level	unitless	1E-06 (Lower Tier SCO) 1E-05 (Upper Tier CSL)
AB	Gastrointestinal absorption fraction	unitless	Chemical-specific
CPFo	Oral cancer potency factor	$(mg/kg\text{-}day)^{-1}$	from CLARC
UCF	Unit conversion factor	mg/kg	1E+06
ABS	Dermal absorption factor	unitless	From SCUM II Appendix E
CPFd	Dermal cancer potency factor	$(mg/kg\text{-}day)^{-1}$	Calculated; see Equation 9-3 below

Scenario-Specific Parameters (from LDW ROD)			Beach Play (Child)	Subsistence Clam Digging (Adult)	Subsistence Net Fishing (Adult)
BW	Average body weight over exposure duration	kg	16	81.8	81.8
ATc	Averaging time (cancer)	days	27,375	27,375	27,375
EF	Exposure frequency	days/year	120	120	119
ED	Exposure duration	years	6	64	44
IR	Sediment ingestion rate	mg/day	200	100	50
SA	Skin surface area	cm^2/day	2,200	6,040	3,600
AF	Sediment-to-skin adherence factor	$mg/cm^2\text{-}day$	0.2	0.2	0.2

Intermediate Calculations			Beach Play (Child)	Subsistence Clam Digging (Adult)	Subsistence Net Fishing (Adult)
ISDIF1c	Intermediate sediment intake factor 1, cancer	mg	6.08E+08	2.92E+08	4.28E+08
ISDIF2	Intermediate sediment intake factor 2	mg/day	4.40E+02	1.21E+03	7.20E+02

Equations

SMS SCUM II, Equation 9-2 (sediment ingestion / direct contact, noncancer)

$$RBC{-}SED{-}N = \frac{HQ\ x\ BW\ x\ ATn}{EF\ x\ ED\ x\ \left[\left(\frac{IR\ x\ AB}{RfDo\ x\ UCF}\right) + \left(\frac{SA\ x\ AF\ x\ ABS}{RfDd\ x\ UCF}\right)\right]}$$

ISDIF1n = HQ x BW x ATn x UCF / (EF x ED)
ISDIF2 = SA x AF
RBC-SED-N = ISDIF1n / (IR x AB/RfDo + ISDIF2 x ABS/RfDd)

General Parameters					
RBC-SED-N	Risk-based concentration, sediment, noncancer	mg/kg	Calculated		
HQ	Hazard quotient	unitless	1		
AB	Gastrointestinal absorption fraction	unitless	Chemical-specific		
RfDo	Oral reference dose	mg/kg-day	from CLARC		
UCF	Unit conversion factor	mg/kg	1E+06		
ABS	Dermal absorption factor	unitless	From SCUM II Appendix E		
RfDd	Dermal reference dose	mg/kg-day	Calculated; see Equation 9-4 below		
Scenario-Specific Parameters (from LDW ROD)			Beach Play (Child)	Subsistence Clam Digging (Adult)	Subsistence Net Fishing (Adult)
BW	Average body weight over exposure duration	kg	16	81.8	81.8
ATn	Averaging time (noncancer)	days	2,190	23,360	16,060
EF	Exposure frequency	days/year	120	120	119
ED	Exposure duration	years	6	64	44
IR	Sediment ingestion rate	mg/day	200	100	50
SA	Skin surface area	cm^2/day	2,200	6,040	3,600
AF	Sediment-to-skin adherence factor	mg/cm^2-day	0.2	0.2	0.2
Intermediate Calculations			Beach Play (Child)	Subsistence Clam Digging (Adult)	Subsistence Net Fishing (Adult)
ISDIF1n	Intermediate sediment intake factor 1, noncancer	mg	4.87E+07	2.49E+08	2.51E+08
ISDIF2	Intermediate sediment intake factor 2	mg/day	4.40E+02	1.21E+03	7.20E+02

SMS SCUM II, Equation 9-3 (CPFd)

$$CPFd = \frac{CPFo}{GI}$$

CPFd	Cancer potency factor, dermal	$(mg/kg\text{-}day)^{-1}$	Calculated
CPFo	Cancer potency factor, oral	$(mg/kg\text{-}day)^{-1}$	From CLARC
GI	Gastrointestinal absorption conversion factor	unitless	Chemical-specific

SMS SCUM II, Equation 9-4 (RFDd)

$$RfDd = RfDo\ x\ GI$$

RfDd	Reference dose, dermal	(mg/kg-day)	Calculated
RfDo	Reference dose, oral	(mg/kg-day)	From CLARC
GI	Gastrointestinal absorption conversion factor	unitless	Chemical-specific

Values considered and notes for each route. Risk based values were based on unrestricted land use.

Sediment:

- Lowest adverse effects threshold (LAET; for freshwater sediment, this is the CSO from SCUM Table 8-1)
- PQL for bioaccumulatives – programmatic PQLs in SCUM Table 11-1; bioaccumulative if on PBT list in WAC 173-333 or on list 1 or 2 in DMMP guidance; if programmatic PQL is not established, sediment value will say "PQL" and groundwater protective of sediment will say "TBD"
- Natural background – for metals and cPAH TEQ; based on marine sediment background concentrations
- Risk-based values calculated using SCUM equations 9-1 and 9-2
- Chemicals with sediment values but an "na" for corresponding groundwater concentration do not have a K_d to be used in the calculation

Surface water:

- WA state water quality criteria (WQC) – protection of aquatic life (freshwater, chronic; WAC 173-201A-240)
- National recommended water quality criteria (NRWQC) – protection of aquatic life (freshwater, chronic; Clean Water Act section 304)
- WA state WQC – protection of human health (consumption of organisms + water; WAC 173-201A-240)
- National Toxics Rule promulgated human health criteria (consumption of organisms + water; 40 CFR 131.45)
- NRWQC – protection of human health (consumption of organisms + water; Clean Water Act section 304) – if multiple criteria had the same value, all are included in the table
- Risk-based values calculated using MTCA equations 730-1 and 730-2

Potable groundwater:

- Federal maximum contaminant level (MCL; 40 CFR 141)
- Federal MCL goal (MCLG; 40 CFR 141)
- WA state MCL (WAC 246-290) – in many cases, values for the state MCL and federal MCL and/or MCLG are the same; these are noted in the table as WA/federal MCL
- If an ARAR was used as the basis but was not sufficiently protective and required adjusting, it is noted as "MCL adj. to 1e-5 risk" in the table
- Vapor intrusion screening levels
- Risk-based values calculated using MTCA equations 720-1 and 720-2

Vadose zone soil concentrations considered for the final selection of interim action levels included:

- soil protective of human health – direct contact (calculated using MTCA equations 740-1 and 740-2)
- soil protective of environmental health – site-specific TEE
- natural background (when available)
- soil protective of leaching to potable groundwater
- soil protective of groundwater that is transported to surface water
- soil protective of groundwater that partitions to sediment

APPENDIX E
Sampling and Analysis Plan

Sampling and Analysis Plan

Go East Corp Landfill Site
Everett, Washington

for
Washington State Department of Ecology
on Behalf of P&GE, LLC

August 10, 2020

GeoEngineers

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1.0 INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) has prepared this Sampling and Analysis Plan (SAP) for the Go East Corp Landfill Site (Site) as an appendix to the *Interim Action Work Plan, Go East Corp Landfill Site, Everett, Washington* (GeoEngineers 2020) (IAWP). The objective and scope of the interim action are presented in the IAWP. The SAP describes field sampling procedures and laboratory analyses to be performed in support of the interim action. Field sampling activities described in this SAP include:

- Sampling of the on-site source of structural fill that will be used to backfill the interim action excavation area.
- Sampling of soil in the area where an abandoned storage tank previously was observed on the ground surface beyond the current limit of the Go East Corp Landfill (Landfill).
- Supplemental sampling of landfill material to be excavated from the interim action excavation area during closure of the Landfill.
- Confirmation soil sampling at the limits of the interim action excavation area.
- Sampling of soil in any areas where unexpected wastes such as drums are found (if any) or where landfill materials are found outside the current Landfill limit (if any).

As described in the IAWP, the landfill material excavated from the interim action excavation area will be consolidated in the interior portion of the Landfill and covered with an engineered capping system.

This SAP has been prepared in general accordance with requirements of the Washington State Model Toxics Control Act (MTCA) Cleanup Regulation (Washington Administrative Code [WAC] Chapter 173-340). A Quality Assurance Project Plan (QAPP) is included in Appendix F of the IAWP.

1.1 Purpose

This SAP describes planned field methods, sample collection and handling, and analytical testing for soil samples[1] to be collected during the interim action.

1.2 Project Organization and Responsibilities

GeoEngineers key personnel and responsibilities for the interim action project are identified below. These personnel are responsible for ensuring that the project, including the sampling and analysis activities described herein, is conducted in accordance with the IAWP.

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[1] Per the IAWP, landfill material in the interim action excavation area consists of solid waste debris (e.g., concrete/asphalt rubble, glass and wood debris, tires, carpet, metal) and admixed on-site borrow soil that was historically used as Landfill cover material. The admixed soil will be sampled as described in the IAWP to provide supplemental information regarding chemical concentrations in the landfill material.

1.2.1 Principal-in-Charge

Mr. Terry McPhetridge is the Principal-in-Charge and has overall responsibility for ensuring that the project is implemented in accordance with the IAWP.

1.2.2 Project Manager

Mr. Robert Leet is the Project Manager and will assign project team members, coordinate and schedule field and laboratory testing activities, coordinate subcontractors, and track the project schedule. Mr. Leet will also verify that SAP and QAPP objectives are achieved and that deviations from the IAWP, SAP, or QAPP are documented, if deviations are necessary based on conditions at the time of the work. Additionally, Mr. Leet will provide technical oversight and coordinate production and review of project deliverables.

1.2.3 Field Coordinator

The Field Coordinator will be identified before field work begins. The Field Coordinator is responsible for the daily management of activities in the field. Specific responsibilities include:

- Supervise and provide technical direction to GeoEngineers field personnel and subcontractors (e.g., a certified asbestos professional) as needed under the supervision of the Project Manager.
- Develop schedules and allocate resources for field tasks.
- Coordinate data collection and field documentation activities.
- Supervise the compilation of field data and laboratory analytical results.
- Review data for correct and complete reporting.
- Implement and oversee field sampling in accordance with the IAWP including this SAP and related documents.
- Coordinate work with on-site subcontractors.
- Schedule sample shipments/delivery with the analytical laboratory.
- Monitor that appropriate sampling, testing, and measurement procedures are followed.
- Coordinate the transfer of field records (data, sample tracking forms, field 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.

1.2.4 Quality Assurance Leader

Mr. Mark Lybeer is the Quality Assurance (QA) Leader 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 GeoEngineers 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 QC checks.
- Coordinate the implementation of the QAPP and review the overall 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.
- Conduct or delegate data review activities.
- Enter data into the Washington State Department of Ecology's (Ecology) Environmental Information Management system.

1.2.5 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, will be the subcontracted analytical laboratory for the project. Mr. David Baumeister or designee will be OnSite's Laboratory QA Coordinator.

2.0 SAMPLING ACTIVITIES AND SAMPLE DESIGNATION

The interim action sampling activities identified in Section 1.0 are described below.

2.1 On-Site Fill Source Sampling

Following the excavation and relocation of landfill material, the interim action excavation area will be backfilled with structural fill consisting of the on-site native sandy soil (advance outwash sand) present in areas outside the current Landfill limit. This on-site source of structural fill will be sampled at ten locations to evaluate background concentrations of metals, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs) in the native soil and to verify that other hazardous substances are not present at concentrations exceeding the interim action levels (IALs) presented in Appendix D of the IAWP. The approximate proposed sampling locations are shown in Figure E-1. Samples will be collected from shallow test pits excavated to a depth of 1 to 3 feet below ground surface (bgs) using hand tools or a backhoe or excavator.

Soil in each test pit will be field screened for the potential presence of hazardous substances. Field screening will consist of visual observation for soil staining, soil headspace vapor screening using a photoionization detector (PID), and water sheen testing. Field screening procedures are discussed in Section 3.2. If field screening evidence of contamination is not observed, the on-site fill source samples will be collected from the temporary stockpile of excavated soil at each test pit location. If field screening evidence of contamination is observed, the samples will be collected from soil considered most likely to be contaminated based on the field screening results. Each test pit will be backfilled with the excavated soil following sampling.

The on-site fill source soil samples will be submitted to OnSite and analyzed for the following parameters to evaluate background concentrations:

- Low-level PAHs by EPA Method 8270E/SIM.
- PCBs as Aroclors by EPA Method 8082A.
- Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc by EPA Methods 6010D/6020B/7471B.

Three of the samples also will be analyzed for the following parameters to verify that other hazardous substances are not present at concentrations exceeding IALs:

- Gasoline range organics (GRO) by Method NWTPH-Gx.
- Diesel range organics (DRO) and heavy oil range organics (ORO) by Method NWTPH-Dx without acid/silica gel cleanup. If DRO or ORO are detected, follow-up analysis with acid/silica gel cleanup will be performed to assess potential analytical interference by biogenic organics (e.g., tannins and lignins from woody debris).
- Volatile organic compounds (VOCs) by United States Environmental Protection Agency (EPA) Methods 5035A (unpreserved sample collection and preparation) and 8260D (analysis).
- Semivolatile organic compounds (SVOCs) with low-level PAHs by EPA Method 8270E/SIM.
- Organochlorine pesticides by EPA Method 8081B.
- Chlorinated acid herbicides by EPA Method 8151A.

It is anticipated that there is enough clean native sandy soil available on the Property to meet the structural fill needs of the Landfill closure project. Should it become necessary to use imported structural fill, a sample of the import fill material will be obtained from the fill supplier and analyzed before the material is used on site. The import fill sample will be analyzed for the parameters listed above to verify that the material does not contain concentrations of hazardous substances exceeding IALs.

2.2 Former Storage Tank Area Sampling

Soil at the location of the former storage tank approximately 40 feet east of the existing wooden shed will be sampled to assess whether soil at this location is contaminated. The approximate proposed sampling location is shown in Figure E-1. One shallow soil sample will be collected from the upper 1 foot of soil using hand tools. The sample will be collected during the same field mobilization as the on-site fill source sampling described in Section 2.1.

Soil in the former storage tank area will be field screened for the potential presence of hazardous substances as described in Section 3.2. If field screening evidence of contamination is not observed, the soil sample will be collected from shallow soil at the center of the estimated former storage tank location. If field screening evidence of contamination is observed, the sample will be collected from soil considered most likely to be contaminated based on the field screening results.

The former storage tank area soil sample will be analyzed by OnSite for the following parameters:

- GRO and benzene, toluene, ethylbenzene, and xylenes (BTEX) by Method NWTPH-Gx and EPA Method 8021B.
- DRO and ORO by Method NWTPH-Dx without acid/silica gel cleanup. If DRO or ORO are detected above the IAL, follow-up analysis with acid/silica gel cleanup will be performed to assess potential analytical interference by biogenic organics.

The former storage tank area soil sample will be archived at the laboratory. If GRO, BTEX, DRO, or ORO are detected in the sample at concentrations exceeding IALs, additional constituents will be analyzed in accordance with MTCA Table 830-1, “Required Testing for Petroleum Releases” (WAC 173-340-900). If soil contamination exceeding IALs or other applicable MTCA criteria is confirmed, the contaminated soil will be excavated and disposed of off site as appropriate based on the analytical results. If contaminated soil is removed from the former storage tank area, confirmation soil samples will be collected at the excavation limits to confirm that contamination exceeding IALs or other applicable MTCA criteria has been removed. The confirmation soil sampling in the former storage tank area will be performed consistent with applicable guidelines in Ecology’s *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016).

2.3 Supplemental Landfill Material Sampling

Supplemental sampling of landfill material in the interim action excavation area will be conducted as required by Section 3.6.2 of the *Go East Landfill Closure Plan* (PACE 2012) (LFCP) to further characterize the landfill material prior to excavating and relocating it beneath the engineered capping system. As discussed in Section 2.1 of the IAWP, 29 soil samples were collected from 25 test pits excavated in or adjacent to the interim action excavation area in June 2019. These soil samples were collected and analyzed as required by Section 3.6.2 of the LFCP to characterize concentrations of hazardous substances potentially present in the landfill material that will be relocated beneath the engineered capping system, and to evaluate whether landfill materials requiring off-site disposal as a Washington State dangerous waste may be present. The June 2019 soil samples were analyzed for GRO, DRO, ORO, BTEX, PAHs, selected metals, Toxicity Characteristic Leaching Procedure (TCLP) lead, and pH.

The supplemental soil samples will be collected during the same field mobilization as the on-site fill source sampling described in Section 2.1. The samples will be collected from 12 test pits in the interim action excavation area (Figure E-1). The proposed supplemental soil sampling locations are adjacent to the June 2019 test pit locations where the highest concentrations of hazardous substances were detected relative to the IALs, as these are the locations considered most likely to contain elevated concentrations of other hazardous substances, if present.

The test pits will be excavated using a backhoe or excavator and will be observed and logged by a GeoEngineers representative. The test pits will be excavated to a depth of 15 feet bgs or to native soil beneath the landfill material if native soil is encountered first. Soil in the test pits will be field screened for the potential presence of hazardous substances as described in Section 3.2.

One soil sample will be collected from each test pit for chemical analysis. The sample will be collected from soil considered most likely to be contaminated based on field screening results. If field screening evidence of contamination is not observed, the soil sample will be collected from the temporary stockpile of excavated landfill material at each test pit location. Each test pit will be backfilled with the excavated material following sampling.

The supplemental soil samples will be analyzed by OnSite for the following parameters:

- GRO by Method NWTPH-Gx.
- DRO and ORO by Method NWTPH-Dx without acid/silica gel cleanup. If DRO or ORO are detected above the IAL, follow-up analysis with acid/silica gel cleanup will be performed to assess potential analytical interference by biogenic organics.
- VOCs by EPA Methods 5035A and 8260D.
- SVOCs with low-level PAHs by EPA Method 8270E/SIM.
- PCBs as Aroclors by EPA Method 8082A.
- Organochlorine pesticides by EPA Method 8081B.
- Chlorinated acid herbicides by EPA Method 8151A.
- Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc by EPA Methods 6010D/6020B/7471B.

Follow-up TCLP analysis will be performed if any constituents are detected in a soil sample at concentrations (in milligrams per kilogram) greater than 20 times the respective Washington State toxicity characteristic dangerous waste criteria specified in WAC 173-303-090(8)(c) (in milligrams per liter). The TCLP analysis will be performed to evaluate whether the constituent concentrations in the sample leachate exceed the respective toxicity characteristic criteria. Any landfill material found to exceed toxicity characteristic dangerous waste criteria will be disposed of at an off-site facility permitted to receive Washington State dangerous wastes. Additionally, any landfill material found to contain total PCB concentrations (sum of Aroclors) greater than or equal to 1 milligram per kilogram will be disposed of in accordance with the Federal Toxic Substances Control Act requirements for PCB remediation waste.

2.4 Confirmation Soil Sampling

Confirmation soil sampling will be conducted in the interim action excavation area following removal of landfill material and prior to backfilling the area with clean fill. The confirmation soil samples will be submitted for laboratory analysis to confirm that hazardous substances are not present in native soil beyond the future Landfill limit at concentrations exceeding IALs.

The approximate proposed confirmation soil sampling locations are shown in Figure E-2. The confirmation soil samples will be collected from the bottom and/or sidewalls of the excavation area as the excavation work progresses using an excavator or hand tools. The sampling locations may be adjusted based on the size and shape of the excavation area, access constraints, or other field conditions. The final sampling locations will be evaluated and selected by the Project Manager and Field Coordinator based on field conditions and field screening results. A GeoEngineers representative will document the confirmation soil sampling activities in field reports and photographs.

The confirmation soil samples will be submitted to OnSite and analyzed for the following parameters:

- GRO by Method NWTPH-Gx.
- DRO and ORO by Method NWTPH-Dx without acid/silica gel cleanup. If DRO or ORO are detected above the IAL, follow-up analysis with acid/silica gel cleanup will be performed to assess potential analytical interference by biogenic organics.
- VOCs by EPA Methods 5035A and 8260D.
- SVOCs with low-level PAHs by EPA Method 8270E/SIM.
- PCBs as Aroclors by EPA Method 8082A.
- Organochlorine pesticides by EPA Method 8081B.
- Chlorinated acid herbicides by EPA Method 8151A.
- Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc by EPA Methods 6010D/6020B/7471B.

The interim action excavation area will not be backfilled until the results of confirmation soil sampling indicate that concentrations of hazardous substances in soil beyond the future Landfill limit do not exceed IALs.

2.5 Other Soil Sampling

2.5.1 Interim Action Excavation Area

Qualified personnel including a certified asbestos professional will be present on site during the excavation work in the interim action excavation area to observe the excavated material and the soil exposed in the excavation. If anomalous soil staining, odors, or unexpected wastes such as drums are observed, associated soil will be field screened for VOCs or other contaminants using a PID and water sheen testing as described in Section 3.2. If this field screening indicates potential soil contamination, one or more soil samples will be collected and analyzed for GRO, DRO, ORO, VOCs, SVOCs, PCBs, pesticides, herbicides, metals, and/or relevant TCLP constituents depending on observed conditions and suspected contaminants. The LFCP, Landfill closure construction plans, and existing Landfill permit (Snohomish Health District Solid Waste Facility Permit No. SW-027 [Permit]) specify waste handling and disposal requirements for various landfill materials that may be encountered.

2.5.2 Northeastern Slope Area

A reconnaissance inspection of the entire northeastern slope of the Landfill will be conducted and if landfill material (e.g., drums or other debris) is found in the existing landfill cover, it will be removed and disposed of in accordance with the LFCP, Landfill closure construction plans, and Permit. If field screening indicates potential contamination of the landfill cover, soil samples will be collected and analyzed for GRO, DRO, ORO, VOCs, SVOCs, PCBs, pesticides, herbicides, metals, and/or relevant TCLP constituents depending on the waste types observed and suspected contaminants. If concentrations of hazardous substances exceeding IALs are detected, the affected landfill cover material will be excavated and placed beneath the engineered capping system or disposed of off site as appropriate based on the analytical results. Confirmation soil samples will be collected at the excavation limits and analyzed to confirm the soil removal meets regulatory requirements. The confirmation soil sampling will be performed consistent with applicable guidelines in Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016).

2.5.3 Areas Outside Current Landfill Limit

Excavation activities conducted in areas of the future Bakerview Plat Subdivision outside the current Landfill limit will be observed by a qualified professional as detailed in the lot exploration plan contained in the Landfill closure construction plans. Additionally, areas outside the current Landfill limit that are to be filled or left ungraded will be scarified to a depth of 1 foot to verify that no landfill wastes are present before filling or recompacting these areas. Test pit explorations also will be performed as determined necessary to verify that no landfill wastes are present in areas outside the current Landfill limit.

Solid waste found outside the historical Landfill area (if any) will be removed and disposed of off site in accordance with the LFCP, Landfill closure construction plans, and Permit. If field screening indicates native soil in the area may be contaminated, soil samples will be collected and analyzed for GRO, DRO, ORO, VOCs, SVOCs, PCBs, pesticides, herbicides, metals, and/or relevant TCLP constituents depending on the waste types observed and suspected contaminants. If contamination exceeding IALs is detected in native soil, the contaminated soil will be excavated, potentially staged on site, and disposed of at an off-site, permitted facility. Confirmation soil samples will be collected at the excavation limits and analyzed to confirm that contamination exceeding IALs has been removed. The confirmation soil sampling will be performed consistent with applicable guidelines in Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016).

2.6 Sample Designation

The soil samples will be assigned unique sample identification numbers. Examples are provided below.

- On-site fill source samples: Fill-01-3, where "Fill-01" indicates fill sample Fill-01 and "3" indicates the sample was obtained from a depth of approximately 3 feet bgs.
- Former storage tank area soil sample: FST-01-0.5, where "FST-01" indicates former storage tank area sample FST-01 and "0.5" indicates the sample was obtained from a depth of approximately 0.5 feet bgs.
- Supplemental landfill material samples (if field screening indicates potential contamination at a discrete depth): STP-01-12, where "STP-01" indicates supplemental test pit STP-01 and "12" indicates the sample was obtained from a depth of approximately 12 feet bgs.

- Supplemental landfill material samples (if field screening indicates no evidence of potential contamination): STP-01-SP, where “STP-01” indicates supplemental test pit STP-01 and “SP” indicates the sample was obtained from the temporary stockpile of material excavated from the test pit.
- Confirmation soil samples: IAEX-01-6, where “IAEX-01” indicates interim action excavation area sample IAEX-01 and “6” indicates the sample was obtained from a depth of approximately 6 feet bgs.

The sample locations will be recorded in the field and sample identification numbers will be written on the sample containers and chain-of-custody forms.

3.0 SAMPLING EQUIPMENT AND PROCEDURES

This section summarizes the sample collection procedures for soil.

3.1 Field Logging

Materials encountered in test pit explorations will be logged by field personnel on test pit logs, and the sidewalls of each test pit will be photographed. Information on the test pit logs will include the test pit identification number, excavation equipment used, material encountered, and sampling information such as sampling depths and field screening results. Soil will generally be described in accordance with ASTM D 2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) and classified according to the Unified Soil Classification System. Landfill solid waste debris will generally be described consistent with the descriptions used in previous Site investigations (e.g., brick, plastic, asphalt, glass, carpet). Descriptions of wood encountered will include additional detail to the extent discernable by field personnel (e.g., woody debris, dimensional lumber, stumps).

Although they are not anticipated, if drums, tanks, or apparent hazardous materials such as asbestos, lead-based paint, petroleum fuels, oily liquids, or solvents are encountered in the interim action excavation area during excavation activities, the locations, nature, condition, and disposition of the materials will be documented in field reports.

3.2 Field Screening

Soil in areas to be sampled will be field screened for evidence of potential contamination. Field screening results will be recorded on test pit logs, sample collection forms, and/or other field forms. Soil field screening methods will include visual screening, water sheen screening, and headspace vapor screening.

3.2.1 Visual Screening

Soil will be observed for possible staining that may be indicative of contamination.

3.2.2 Water Sheen Screening

This is a qualitative field screening method that can help identify the presence or absence of petroleum hydrocarbons. A portion of a soil sample will be placed in a pan containing distilled water. The water surface will be observed for signs of sheen. The following sheen classifications will be used:

Classification	Description
No Sheen (NS)	No visible sheen on the water surface
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly
Moderate Sheen (MS)	Moderate sheen; may have color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface; sheen does not dissipate rapidly
Heavy Sheen (HS)	Heavy sheen with strong color/iridescence; spread is rapid; entire water surface may be covered with sheen; sheen does not dissipate

3.2.3 Headspace Vapor Screening

This is a semi-quantitative field screening method that can help identify the presence or absence of volatile chemicals. As soon as possible after collecting a soil sample, a portion of the sample is placed in a resealable plastic bag and ambient air is captured in the bag. The bag is sealed to form a "headspace" of trapped air above the soil and the soil is gently agitated to expose the trapped air to the soil. If the ambient air temperature is low (e.g., below 45 degrees Fahrenheit), the sealed bag may be heated to accelerate partitioning of soil vapors into the headspace. Concentrations of VOCs present in the headspace (if any) are then measured by inserting the probe of a PID through a small opening in the bag. A PID measures the concentration of organic vapors ionizable by a 10.6 electron volt lamp (standard) in parts per million (ppm) and quantifies organic vapor concentrations in the range between 0.1 ppm and 2,000 ppm (isobutylene-equivalent) with an accuracy of 1 ppm between 0 ppm and 100 ppm. The maximum vapor concentration reading on the PID will be recorded on the sample collection form for each sample.

The PID will be calibrated to 100 ppm isobutylene. The PID calibration will be checked at the start of each day and at other times as necessary if anomalous or erratic instrument response is observed and a problem with the instrument is suspected.

3.3 Soil Sampling

Soil samples will be collected from the sidewalls or bottom of test pits or excavations, from temporary stockpiles of excavated material, and from in-place soil in the former storage tank area. Depending on the depth and width of test pits and excavations, soil samples will be collected either directly from the test pit/excavation sidewalls or bottom using hand tools, or from the bucket of the excavation equipment (backhoe or excavator). Field personnel will not collect a sample that has contacted the bucket of the excavation equipment. The former storage tank area soil sample will be collected using hand tools.

Samples will be placed into laboratory-supplied containers, capped with a plastic lid, and placed in a cooler containing ice pending delivery to the analytical laboratory. VOC containers will be filled first to minimize loss of volatiles. Applicable sampling procedures of EPA Method 5035A will be followed for samples to be analyzed for VOCs, including the use of EasyDraw syringes or similar equipment. The sand-sized and finer fractions of the soil will be targeted for collection. Foreign material including Landfill solid waste debris will not be sampled.

3.4 Equipment Decontamination

Hand tools used to collect soil samples (e.g., spade, trowel, stainless steel spoon) will be decontaminated using an Alconox/potable water wash and a distilled water rinse after each use. Excavation equipment will be decontaminated on site as necessary using an Alconox/potable water wash (or other effective method) if unanticipated material such as oily liquid is encountered during excavation. Decontamination water (if generated during the interim action) will be contained and stored on site in marked drums pending characterization and off-site disposal.

3.5 Field Documentation

Field documentation will consist of test pit logs, sample collection forms, field notes, field reports, and georeferenced photographs. Field notes will be recorded in field notebooks and/or on maps. Field reports will include the date, time, description of field activities performed, names of personnel and site visitors, weather conditions, field measurements, calibration checks of field instruments (e.g., PID), 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), sample collection method, field screening results, any associated quality control samples collected, and the sampler's name.

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

3.5.1 Sample Labels

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

- Project name and/or number.
- Sampling date.
- Sampling time.
- Sample identification number.
- Sample preservative used, if any.
- Initials of sampler.

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

3.5.2 Chain-of-Custody

Samples will be retained in the custody of field personnel until the samples are delivered 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 the analyses to be performed 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 waterproof 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. Sample coolers shipped by common carrier will have the chain-of-custody form enclosed in a resealable plastic bag and placed in the sample cooler prior to sealing the cooler for shipping. Custody seals will be used on sample coolers that are shipped by common carrier or delivered by courier to the laboratory. The common carrier shipping company (if applicable) 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.

3.6 Determination of Sampling Locations

3.6.1 Determination by Field Personnel

Horizontal and vertical sampling locations (e.g., test pit locations) will be estimated using a measuring tape and/or portable device equipped with a Global Positioning System receiver. A measuring tape will be used to estimate horizontal sampling locations only if measurements can be made accurately from a surveyed location or a relatively permanent structure, improvement, or other distinct site feature that will continue to exist after project construction activities are completed. Geolocation data recorded in the field using a Global Positioning System receiver will be processed in the office using measurements from the nearest reference station to each sample location.

3.6.2 Surveying by Professional Land Surveyor

Sampling locations will be surveyed by a professional land surveyor to the extent possible based on access constraints and other considerations.

3.7 Investigation Derived Waste

Material removed from test pits will be returned to the test pits following sample collection. Equipment decontamination water (if generated) will be contained and stored on site in marked drums pending characterization and off-site disposal. Gloves and other incidental waste will be disposed of in off-site waste receptacles.

4.0 SAMPLE HANDLING

4.1 Sample Containers and Preservation

Requirements for sample containers, sample preservation, and sample holding times for the planned laboratory analyses are discussed in the QAPP (Appendix F of the IAWP).

4.2 Sample Packaging and Shipping

Samples will be stored in a cooler containing ice for delivery to the analytical laboratory. The samples will be either hand-delivered to the laboratory by field personnel or courier or shipped via a commercial carrier. Custody seals will be used on sample coolers that are not hand-delivered by field personnel.

Upon receipt of the sample coolers at the laboratory, the custody seals (if present) will be broken, 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 in the laboratory to track sample handling and final disposition.

5.0 LABORATORY ANALYTICAL METHODS

The laboratory analytical methods to be used are specified in Section 2.0. Details regarding sample containers, sample preservation, and sample holding times are discussed in the QAPP.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS

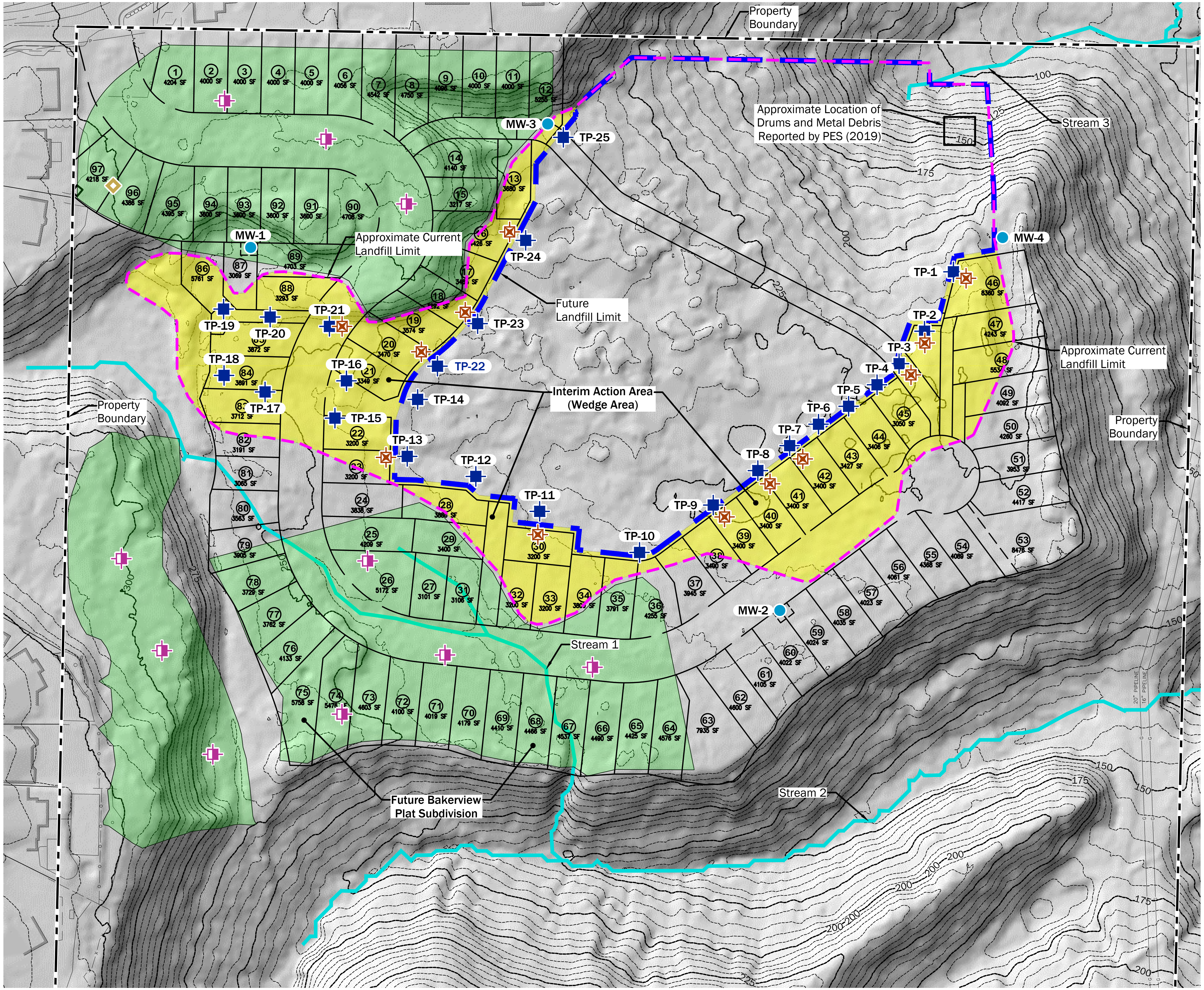
The QAPP contained in Appendix F of the IAWP discusses quality assurance/quality control requirements in detail.

7.0 REFERENCES

PACE Engineers, Inc. (PACE), 2012. Go East Landfill Closure Plan, Go East Landfill, 4330 108th Street SE, Everett, Washington, 98208. February 8, 2012, revised January 2018.

Practical Environmental Solutions, 2019. Go East Landfill – Information for MTCA Assessment. March 31, 2019.

Washington State Department of Ecology (Ecology), 2016. Guidance for Remediation of Petroleum Contaminated Sites. Toxics Cleanup Program Publication No. 10-09-057. Revised June 2016.



Legend

Property Boundary

Interim Action Area (Wedge Area)

Approximate Current Landfill Limit

Future Landfill Limit

TP-1 Test Pit - Soil Sample(s) Collected (Terra Associates, June 2019)

Test Pit - Proposed Supplemental Landfill Material Sampling Location

Test Pit - Proposed On-Site Fill Source Sampling Location

Proposed Former Storage Tank Area Soil Sample

MW-1 Groundwater Monitoring Well (AESI, 2009)

On-Site Source Area for Structural Fill

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: Property boundary survey from PACE Engineers, dated 1/27/2020. Lidar image and elevation contours from Puget Sound Lidar Consortium dated 2013.

Projection: HPGN (HARN) Washington State Planes, North Zone, US Foot

N S E W

120 0 120

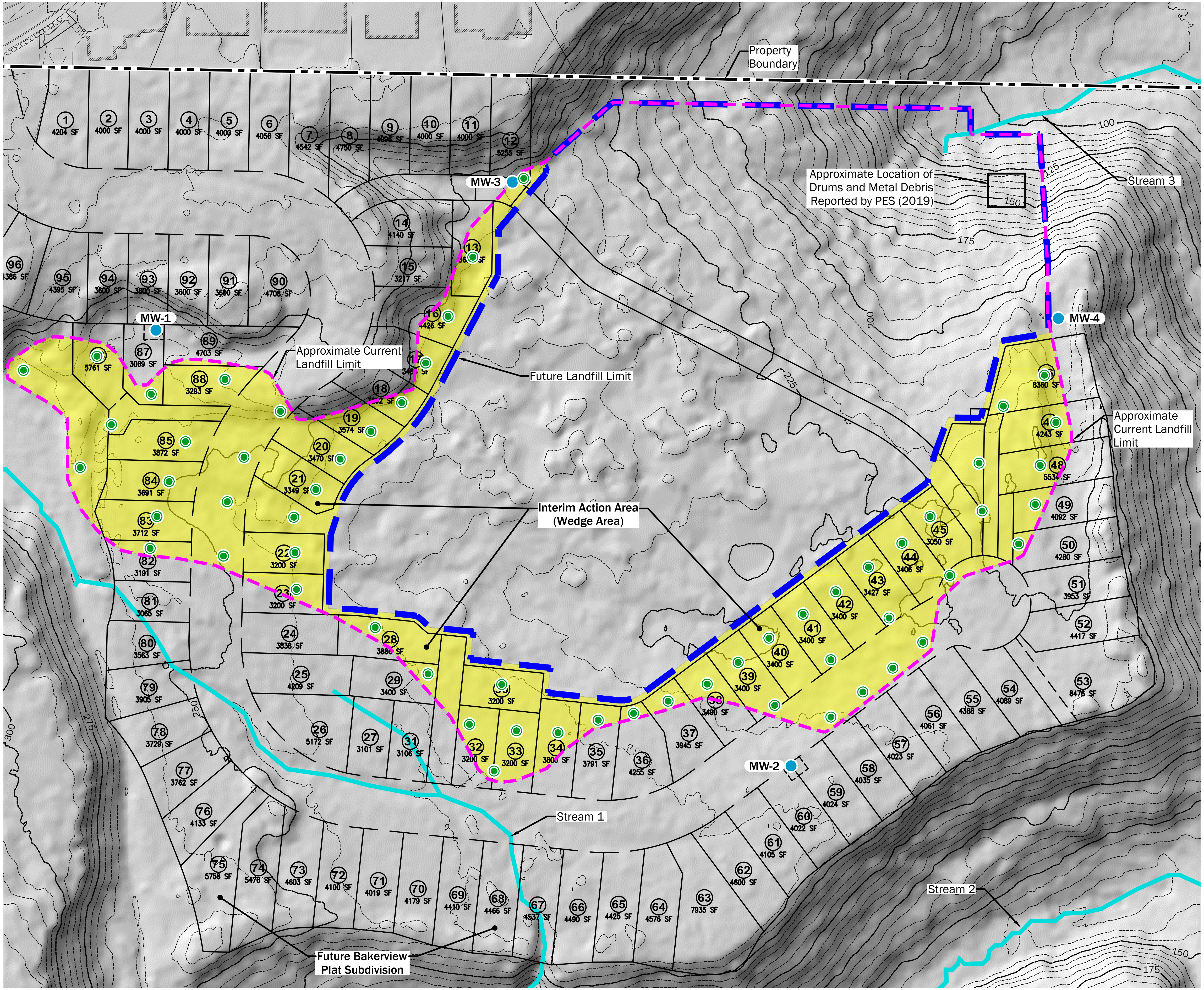
Feet

Proposed Soil Sampling Locations - On-Site Fill Source, Former Storage Tank Area, and Supplemental Landfill Material Samples

Go East Corp Landfill Site
Everett, Washington

GeoEngineers

Figure E-1



Legend

- Property Boundary
- Interim Action Area (Wedge Area)
- Approximate Current Landfill Limit
- Future Landfill Limit
- Proposed Confirmation Soil Sampling Location
- MW-1 Groundwater Monitoring Well (AESI, 2009)

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: Property boundary survey from PACE Engineers, dated 1/27/2020. Lidar image and elevation contours from Puget Sound Lidar Consortium dated 2013.

Projection: HPGN (HARN) Washington State Planes, North Zone, US Foot

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100 0 100
Feet

Proposed Soil Sampling Locations - Confirmation Soil Samples

Go East Corp Landfill Site
Everett, Washington

GeoEngineers

Figure E-2

APPENDIX F
Quality Assurance Project Plan

Quality Assurance Project Plan

Go East Corp Landfill Site
Everett, Washington

for
Washington State Department of Ecology
on Behalf of P&GE, LLC

August 10, 2020

GeoEngineers

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Table of Contents

LIST OF TABLES

1.0 INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) has prepared this Quality Assurance Project Plan (QAPP) for the Go East Corp Landfill Site (Site) as an appendix to the *Interim Action Work Plan, Go East Corp Landfill Site, Everett, Washington* (GeoEngineers 2020) (IAWP). The objective and scope of the interim action are presented in the IAWP. The QAPP presents the quality objectives for environmental measurement data that will be generated during the interim action activities 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 throughout the project 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) contained in Appendix E of the IAWP. The anticipated chemical analytical laboratory to be subcontracted for this project will be OnSite Environmental, Inc. (OnSite) in Redmond, Washington.

3.0 CHEMICAL ANALYSES/METHODS

Soil samples will be collected during field activities as described in the SAP. The samples will be analyzed for one or more of the following constituents:

- Volatile organic compounds (VOCs) by EPA Methods 5035A (unpreserved sample collection and preparation) and 8260D (analysis).
- Petroleum hydrocarbons – gasoline range organics by Method NWTPH-Gx and diesel range organics and heavy oil range organics by Method NWTPH-Dx (potentially both with and without silica gel cleanup).
- Benzene, toluene, ethylbenzene, and xylenes by EPA Method 8021B.
- Carcinogenic polycyclic aromatic hydrocarbons by EPA Method 8270D/Selective Ion Monitoring.
- Polychlorinated biphenyls as Aroclors by EPA Method 8082A.
- Organochlorine pesticides by EPA Method 8081B.
- Arsenic, cadmium, chromium, copper, lead, mercury, selenium, and/or zinc by EPA Method 6010D/7471B.

3.1 Sample Containers, Preservation, and Holding Times

Samples subject to chemical laboratory analyses will be containerized and preserved in the field according to the guidelines summarized in Table F-1. Samples will be kept on ice in coolers while at the Site. The samples generally will be hand-delivered to the laboratory by the field representative or a courier service. The samples will be kept on ice in coolers until the next day in cases where hand-delivery is not possible (inclement weather, after-hours sampling, etc.). 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. The analytical results may be biased low if a sample exceeds a recommended holding time. For example, if the extraction holding time for volatile analysis of soil samples is exceeded, then the possibility exists that some of the organic constituents may have volatilized from the sample or degraded. Results for that analysis would be qualified as estimated to indicate that the reported results may be lower than actual site conditions. Recommended holding times are presented in Table F-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 chemical analysis of soil samples are presented in Table F-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 project laboratory target MRLs for the project are presented in Table F-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 F-2 are considered targets because several factors may influence final MRLs. First, the moisture content and other physical conditions of samples can affect MRLs. 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 duplicate measurements and compared to the project RPD QC limits. Examples of duplicate measurements for which RPD may be calculated include laboratory duplicates, field duplicates, laboratory control samples/laboratory control sample duplicates (LCS/LCSDs), and MS/MSDs. The RPD QC limit goals for field duplicate sample pairs (50% for soil) are only applicable if the primary and duplicate sample concentrations are greater than 5 times the MRL. For results less than 5 times the MRL, the difference between the primary and duplicate samples should be less than 2 times the MRL for soil samples and less than 1 times the MRL for water samples.

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 F-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 field primary/duplicate 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. Table F-3 summarizes the types and frequency of QC samples to be analyzed during the project, including field QC samples and laboratory QC samples.

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. As shown in Table F-3, field QC samples will generally consist of field duplicates.

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. Field duplicates will be analyzed for the same parameters as the associated primary samples.

One field duplicate will be collected for approximately every 20 primary samples (i.e., a frequency of 5 percent).

5.1.2. 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 water poured directly into sample containers in the field. Field blanks are analyzed for the same parameters as the associated project samples.

Analytical results for QC blanks, including field blanks, will be interpreted in general accordance with EPA's *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017a) and *National Functional Guidelines for Inorganic Superfund Methods Data Review* (EPA 2017b) and professional judgment.

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. Laboratory 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 semivolatile organic compound 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. 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. Additional sample volume generally will be collected for MS/MSD analysis for every 20 primary soil samples for this project.

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 within 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.

GeoEngineers will establish EDD requirements with the analytical laboratories as part of subcontracting.

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 laboratory personnel will reduce the analytical data for review by the QA Leader. 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 periodically 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 2017a, 2017b). 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 F-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

United States Environmental Protection Agency (EPA), 2002. Document QA/G-5, Guidance for Quality Assurance Project Plans, EPA/240/R-02/009. December 2002.

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

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

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 F-1

Soil Analytical Methods, Sample Containers, Preservation, and Holding Times

Go East Corp Landfill Site

Everett, Washington

Analysis	Method	Minimum Sample Size	Sample Containers	Sample Preservation	Recommended Sample Holding Times[1]
		Soil	Soil	Soil	Soil
Volatile Organic Compounds (VOCs)	EPA 5035A/8260D	5 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	Samples without chemical preservative to be delivered to laboratory within 48 hours of collection; 14 days to analysis
Gasoline Range Organics	NWTPH-Gx	15 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	Samples without chemical preservative to be delivered to laboratory within 48 hours of collection; 14 days to analysis
Diesel & Heavy Oil Range Organics	NWTPH-Dx	15 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	14 days to laboratory extraction; 40 days to analysis after extraction
Benzene, Toluene, Ethylbenzene, and Xylenes	EPA 8021B	5 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	Samples without chemical preservative to be delivered to laboratory within 48 hours of collection; 14 days to analysis
Semivolatile Organic Compounds (SVOCs)	EPA 8270E/Selective Ion Monitoring	200 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	14 days to laboratory extraction; 40 days to analysis after extraction
Polychlorinated Biphenyls as Aroclors (PCBs)	EPA 8082A	12.5 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	None
Organochlorine Pesticides	EPA 8081B	50 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	14 days to laboratory extraction; 40 days to analysis after extraction
Chlorinated Acid Herbicides	EPA 8151A	50 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	14 days to laboratory extraction; 40 days to analysis after extraction
Mercury	EPA 7471B	100 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	28 days to analysis (Typically digestion & analysis occur on the same day)
Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, and Zinc	EPA 6010D/6020B	100 grams	4 oz glass clear widemouth jar	Cool to ≤6°C	6 months to analysis (Typically digestion & analysis occur on the same day)

Notes:

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

°C = degrees Celsius

oz = ounce

Table F-2

Laboratory Target Method Reporting Limits and Quality Control Limits for Soil Samples

Go East Corp Landfill Site

Everett, Washington

Analyte	Laboratory Target Method Reporting Limit (PQL)*	Quality Control Limits	
		RPD**	%R
Volatile Organic Compounds (VOCs) - EPA Method 8260D (µg/kg)			
1,1,1,2-Tetrachloroethane	1.0	NA	NA
1,1,1-Trichloroethane	1.0	NA	NA
1,1,2,2-Tetrachloroethane	1.0	NA	NA
1,1,2-Trichloroethane	1.0	NA	NA
1,1-Dichloroethane	1.0	NA	NA
1,1-Dichloroethene	1.0	17 (LCS); 25 (MS)	65-130 (LCS)
1,1-Dichloropropene	1.0	NA	NA
1,2,3-Trichlorobenzene	1.0	NA	NA
1,2,3-Trichloropropane	1.0	NA	NA
1,2,4-Trichlorobenzene	1.0	NA	NA
1,2,4-Trimethylbenzene	1.0	NA	NA
1,2-Dibromo-3-chloropropane	5.0	NA	NA
1,2-Dibromoethane	1.0	NA	NA
1,2-Dichlorobenzene	1.0	NA	NA
1,2-Dichloroethane	1.0	NA	NA
1,2-Dichloropropane	1.0	NA	NA
1,3,5-Trimethylbenzene	1.0	NA	NA
1,3-Dichlorobenzene	1.0	NA	NA
1,3-Dichloropropane	1.0	NA	NA
1,4-Dichlorobenzene	1.0	NA	NA
2,2-Dichloropropane	1.0	NA	NA
2-Butanone (Methyl ethyl ketone [MEK])	5.0	NA	NA

Analyte	Laboratory Target Method Reporting Limit (PQL)*	Quality Control Limits	
		RPD**	%R
2-Chloroethyl Vinyl Ether	5.0	NA	NA
2-Chlorotoluene	1.0	NA	NA
2-Hexanone	5.0	NA	NA
4-Chlorotoluene	1.0	NA	NA
4-Isopropyltoluene (p-Isopropyltoluene)	1.0	NA	NA
Acetone	5.0	NA	NA
Benzene	1.0	16 (LCS); 28 (MS)	65-121 (LCS)
Bromobenzene	1.0	NA	NA
Bromochloromethane	1.0	NA	NA
Bromodichloromethane (Dichlorobromomethane)	1.0	NA	NA
Bromoform	5.0	NA	NA
Bromomethane	1.0	NA	NA
Carbon Disulfide	1.0	NA	NA
Carbon Tetrachloride	1.0	NA	NA
Chlorobenzene	1.0	15 (LCS); 31 (MS)	72-123 (LCS)
Chloroethane	5.0	NA	NA
Chloroform	1.0	NA	NA
Chloromethane	5.0	NA	NA
cis-1,2-Dichloroethene	1.0	NA	NA
cis-1,3-Dichloropropene	1.0	NA	NA
Dibromochloromethane	1.0	NA	NA
Dibromomethane	1.0	NA	NA
Dichlorobromomethane	1.0	NA	NA
Dichlorodifluoromethane (CFC-12)	1.0	NA	NA
Ethylbenzene	1.0	NA	NA
Ethylene dibromide (EDB) (1,2-Dibromoethane)	1.0	NA	NA

Analyte	Laboratory Target Method Reporting Limit (PQL)*	Quality Control Limits	
		RPD**	%R
Hexachlorobutadiene	5.0	NA	NA
Iodomethane	5.0	NA	NA
Isopropylbenzene	1.0	NA	NA
m,p-Xylene	2.0	NA	NA
Methyl Iodide (Iodomethane)	5.0	NA	NA
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	5.0	NA	NA
Methyl t-Butyl Ether	1.0	NA	NA
Methylene Chloride	5.0	NA	NA
Naphthalene	1.0	NA	NA
n-Butylbenzene	1.0	NA	NA
n-Propylbenzene	1.0	NA	NA
o-Xylene	1.0	NA	NA
p-Isopropyltoluene	1.0	NA	NA
sec-Butylbenzene	1.0	NA	NA
Styrene	1.0	NA	NA
tert-Butylbenzene	1.0	NA	NA
Tetrachloroethene	1.0	NA	NA
Toluene	5.0	16 (LCS); 26 (MS)	71-121 (LCS)
trans-1,2-Dichloroethene	1.0	NA	NA
trans-1,3-Dichloropropene	1.0	NA	NA
trans-1,4-Dichloro-2-butene	NA	NA	NA
Trichloroethene	1.0	16 (LCS); 24 (MS)	74-126 (LCS)
Trichlorofluoromethane	1.0	NA	NA
Vinyl Acetate	5.0	NA	NA
Vinyl Chloride	1.0	NA	NA

Analyte	Laboratory Target Method Reporting Limit (PQL)*	Quality Control Limits	
		RPD**	%R
Total Petroleum Hydrocarbons - Methods NWTPH-Gx and NWTPH-Dx (mg/kg)			
Gasoline Range Organics (NWTPH-Gx)	5.0	30	NA
Diesel Range Organics (NWTPH-Dx)	25	30	59-129 (LCS)
Heavy Oil Range Organics (NWTPH-Dx)	50	30	59-129 (LCS)
Aromatic Volatile Organic Compounds - EPA Method 8021B (mg/kg)			
Benzene	0.020	30	68-112 (LCS)
Toluene	0.050	30	70-114 (LCS)
Ethylbenzene	0.050	30	70-115 (LCS)
m,p-Xylene	0.050	30	69-117 (LCS)
o-Xylene	0.050	30	71-115 (LCS)
Semivolatile Organic Compounds (SVOCs) - EPA Method 8270E/Selective Ion Monitoring (µg/kg)			
(3+4)-Methylphenol (m,p-Cresol)	33	NA	NA
1,2,4-Trichlorobenzene	33	32 (LCS); 38 (MS)	42 - 111 (LCS) 34 - 115 (MS)
1,2-Dichlorobenzene	33	NA	NA
1,2-Dinitrobenzene	33	NA	NA
1,2-Diphenylhydrazine	33	NA	NA
1,3-Dichlorobenzene	33	NA	NA
1,3-Dinitrobenzene	33	NA	NA
1,4-Dichlorobenzene	33	32 (LCS); 35 (MS)	41- 105 (LCS) 24-116 (MS)
1,4-Dinitrobenzene	33	NA	NA
1,4-Dioxane	6.7	NA	NA
1-Methylnaphthalene	6.7	NA	NA
2,3,4,6-Tetrachlorophenol	33	NA	NA
2,3,5,6-Tetrachlorophenol	33	NA	NA
2,3-Dichloroaniline	33	NA	NA
2,4,5-Trichlorophenol	33	NA	NA

Analyte	Laboratory Target Method Reporting Limit (PQL)*	Quality Control Limits	
		RPD**	%R
2,4,6-Trichlorophenol	33	NA	NA
2,4-Dichlorophenol	33	NA	NA
2,4-Dimethylphenol	33	NA	NA
2,4-Dinitrophenol	170	NA	NA
2,4-Dinitrotoluene	33	22 (LCS); 30 (MS)	57 - 107 (LCS) 32 - 114 (MS)
2,6-Dinitrotoluene	33	NA	NA
2-Chloronaphthalene	33	NA	NA
2-Chlorophenol	33	31 (LCS); 39 (MS)	45 - 108 (LCS) 30-113 (MS)
2-Methylnaphthalene	6.7	NA	NA
2-Methylphenol (o-Cresol)	33	NA	NA
2-Nitroaniline	33	NA	NA
2-Nitrophenol	33	NA	NA
3,3'-Dichlorobenzidine	170	NA	NA
3-Nitroaniline	33	NA	NA
4,6-Dinitro-2-methylphenol	170	NA	NA
4-Bromophenyl-phenylether	33	NA	NA
4-Chloro-3-methylphenol	33	25 (LCS); 26 (MS)	61 - 108 (LCS) 41 - 117 (MS)
4-Chloroaniline	170	NA	NA
4-Chlorophenyl-phenylether	33	NA	NA
4-Nitroaniline	33	NA	NA
4-Nitrophenol	33	24 (LCS); 32 (MS)	53 - 122 (LCS) 30 - 127 (MS)
Acenaphthene	6.7	23 (LCS); 21 (MS)	54 - 102 (LCS) 41 - 111 (MS)
Acenaphthylene	6.7	NA	NA
Aniline	170	NA	NA
Anthracene	6.7	NA	NA
Benzo(g,h,i)perylene	6.7	NA	NA

Analyte	Laboratory Target Method Reporting Limit (PQL)*	Quality Control Limits	
		RPD**	%R
Benzoic acid	170	NA	NA
Benzyl alcohol	170	NA	NA
bis(2-Chloroethoxy)methane	33	NA	NA
bis(2-Chloroethyl)ether	33	NA	NA
bis(2-Chloroisopropyl)ether	33	NA	NA
bis(2-Ethylhexyl)phthalate	170	NA	NA
bis-2-Ethylhexyladipate	33	NA	NA
Butylbenzylphthalate	170	NA	NA
Carbazole	33	NA	NA
Dibenzofuran	33	NA	NA
Dibutylphthalate	170	NA	NA
Diethylphthalate	170	NA	NA
Dimethylphthalate	33	NA	NA
Di-n-butylphthalate	33	NA	NA
Di-n-octylphthalate	170	NA	NA
Fluoranthene	6.7	NA	NA
Fluorene	6.7	NA	NA
Hexachlorobenzene	33	NA	NA
Hexachlorobutadiene	33	NA	NA
Hexachlorocyclopentadiene	33	NA	NA
Hexachloroethane	33	NA	NA
Isophorone	33	NA	NA
Naphthalene	6.7	NA	NA
n-Decane	330	NA	NA
Nitrobenzene	33	NA	NA
n-Nitrosodimethylamine	33	NA	NA

Analyte	Laboratory Target Method Reporting Limit (PQL)*	Quality Control Limits	
		RPD**	%R
n-Nitroso-di-n-propylamine	33	28 (LCS); 34 (MS)	47 - 103 (LCS) 34-112 (MS)
n-Nitrosodiphenylamine	33	NA	NA
n-Octadecane	33	NA	NA
Pentachlorophenol	170	23 (LCS); 37 (MS)	44 - 132 (LCS) 36 - 147 (MS)
Phenanthrene	6.7	NA	NA
Phenol	33	30 (LCS); 37 (MS)	47 - 104 (LCS) 30-108 (MS)
Pyrene	6.7	21 (LCS); 33 (MS)	58 - 111 (LCS) 33 - 127 (MS)
Pyridine	330	NA	NA
Benzo(a)anthracene	6.7	NA	NA
Benzo(a)pyrene	6.7	NA	NA
Benzo(b)fluoranthene	6.7	NA	NA
Benzo(j,k)fluoranthene	6.7	NA	NA
Chrysene	6.7	NA	NA
Dibenz(a,h)anthracene	6.7	NA	NA
Indeno(1,2,3-cd)pyrene	6.7	NA	NA
Polychlorinated Biphenyls as Aroclors (PCBs) - EPA Method 8082A (µg/kg)			
Aroclor 1016	50	NA	NA
Aroclor 1221	50	NA	NA
Aroclor 1232	50	NA	NA
Aroclor 1242	50	NA	NA
Aroclor 1248	50	NA	NA
Aroclor 1254	50	NA	NA
Aroclor 1260	50	18 (LCS); 15 (MS)	50-134 (LCS)
Aroclor 1262	50	NA	NA
Aroclor 1268	50	NA	NA
Total Aroclors	50	NA	NA

Analyte	Laboratory Target Method Reporting Limit (PQL)*	Quality Control Limits	
		RPD**	%R
Organochlorine Pesticides - EPA Method 8081B (µg/kg)			
4,4'-DDD	10	15 (LCS); 21 (MS)	50 - 120 (LCS)
4,4'-DDE	10	15 (LCS); 22 (MS)	57-119 (LCS)
4,4'-DDT	10	15 (LCS); 32 (MS)	47-128 (LCS)
Aldrin	5	15 (LCS); 22 (MS)	55-110 (LCS)
alpha-BHC	5	15 (LCS); 21 (MS)	48-117 (LCS)
beta-BHC	5	15 (LCS); 21 (MS)	48-116 (LCS)
cis-Chlordane (alpha-Chlordane)	10	15 (LCS); 23 (MS)	53-110 (LCS)
delta-BHC	5	15 (LCS); 23 (MS)	40-118 (LCS)
Dieldrin	10	15 (LCS); 23 (MS)	53-110 (LCS)
Endosulfan I	5	15 (LCS); 25 (MS)	49-114 (LCS)
Endosulfan II	10	15 (LCS); 22 (MS)	50-110 (LCS)
Endosulfan sulfate	10	15 (LCS); 21 (MS)	50-110 (LCS)
Endrin	5	15 (LCS); 28 (MS)	51-114 (LCS)
Endrin aldehyde	10	15 (LCS); 22 (MS)	42-110 (LCS)
Endrin ketone	10	15 (LCS); 22 (MS)	47-114 (LCS)
gamma-BHC (Lindane)	5	15 (LCS); 21 (MS)	48-118 (LCS)
Heptachlor	5	15 (LCS); 24 (MS)	40-114 (LCS)
Heptachlor epoxide	5	15 (LCS); 22 (MS)	49 - 110 (LCS)
Methoxychlor	10	15 (LCS); 22 (MS)	46-124 (LCS)
Toxaphene	50	NA	NA
trans-Chlordane (beta- or gamma-Chlordane)	5	15 (LCS); 23 (MS)	54 - 110 (LCS)
Chlorinated Acid Herbicides - EPA Method 8151A (µg/kg)			
2,4,5-T	9.5	19 (LCS); 24 (MS)	24-144 (LCS)
2,4,5-TP	9.5	18 (LCS); 23 (MS)	38-127 (LCS)
2,4,6-Trichlorophenol	4.7	NA	NA

Analyte	Laboratory Target Method Reporting Limit (PQL)*	Quality Control Limits	
		RPD**	%R
2,4-D	9.4	24 (LCS); 29 (MS)	10-131 (LCS)
2,4-DB	9.5	22 (LCS); 28 (MS)	17-154 (LCS)
Dalapon	180	37 (LCS); 30 (MS)	10 - 105 (LCS)
Dicamba	9.4	20 (LCS); 23 (MS)	32-106 (LCS)
Dichlorprop	71	20 (LCS); 27 (MS)	19-123 (LCS)
Dinoseb	9.5	32 (LCS); 23 (MS)	10-124 (LCS)
MCPA	2,300	25 (LCS); 35 (MS)	17-128 (LCS)
MCPP	940	23 (LCS); 32 (MS)	19-143 (LCS)
Pentachlorophenol	4.8	21 (LCS); 30 (MS)	10-119 (LCS)
Metals - EPA Methods 6010D/6020B/7471B (mg/kg)			
Arsenic	10	20	80-120 (LCS)
Cadmium	0.50	20	80-120 (LCS)
Chromium	0.50	20	80-120 (LCS)
Copper	1.0	20	80-120 (LCS)
Lead	5.0	20	80-120 (LCS)
Mercury	0.025	20	80-120 (LCS)
Nickel	2.5	20	80-120 (LCS)
Selenium	0.80	20	80-120 (LCS)
Zinc	2.5	20	80-120 (LCS)

Notes:

kg = Kilogram

LCS = Laboratory control sample

MS = Matrix spike

µg = Microgram

mg = Milligram

NA = Not applicable

%R = Percent recovery

PQL = Practical quantitation limit

RPD = Relative percent difference

*Listed values are for analytical results reported on a wet-weight basis. Method reporting limits for project samples may vary depending on the moisture content and matrix characteristics of the samples.

**Listed RPD limits are for LCS/MS duplicates or laboratory duplicates; RPD goal for soil field duplicates is 50.

Table F-3

Quality Control Sample Types and Frequency

Go East Corp Landfill Site

Everett, Washington

Parameter	Field QC Samples	Laboratory QC Samples			
	Field Duplicates	Method Blanks	LCS	MS/MSD	Laboratory Duplicates
VOCs	1 per 20 primary soil samples	1 per batch*	1 per batch*	1 per batch*	NA
Total Petroleum Hydrocarbons as Gasoline Range Organics		1 per batch*	NA	NA	1 per batch*
Total Petroleum Hydrocarbons as Diesel Range Organics and Heavy Oil Range Organics		1 per batch*	1 per batch*	NA	1 per batch*
Benzene, Toluene, Ethylbenzene, and Xylenes		1 per batch*	1 per batch*	1 per batch*	1 per batch*
SVOCs		1 per batch*	1 per batch*	1 per batch*	NA
PCBs		1 per batch*	1 per batch*	1 per batch*	NA
Organochlorine Pesticides		1 per batch*	1 per batch*	1 per batch*	NA
Chlorinated Acid Herbicides		1 per batch*	1 per batch*	1 per batch*	NA
Metals		1 per batch*	1 per batch*	1 per batch*	1 per batch*

Notes:

*An analytical batch is defined as a group of samples taken through a preparation procedure and sharing a method blank, LCS, and MS/MSD (or MS and laboratory duplicate). No more than 20 samples are contained in one batch.

LCS = Laboratory control sample

MS = Matrix spike

MSD = Matrix spike duplicate

NA = Not applicable

PCBs = Polychlorinated biphenyls as Aroclors

QC = Quality control

SVOCs = Semivolatile organic compounds

VOCs = Volatile organic compounds