Remedial Investigation Work Plan

Sound Transit Former Key Bank Site
1000 NE 45th Street
Seattle, Washington
Grant Number TCPAHP-2325-Snd Trs-00005

for

Washington State Department of Ecology
on behalf of Sound Transit

October 28, 2024

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GeoEngineers

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File No. 4082-073-00
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List of Acronyms and Abbreviations

ACRONYM/ ABBREVIATION	DESCRIPTION
AHP Grant	Affordable Housing Planning Grant
ASTM	ASTM International
BTEX	benzene, toluene, ethylbenzene and xylenes
bgs	below ground surface
CAP	cleanup action plan
CID	Contained-In Determination
City	City of Seattle
COC	chain-of-custody
CSM	conceptual site model
CUL	cleanup level
CVOC	chlorinated volatile organic compound
DNAPL	dense nonaqueous phase liquid
DO	dissolved oxygen
Ecology	Washington State Department of Ecology
EDD	electronic data deliverable
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
GeoEngineers	GeoEngineers, Inc.
HASP	Health and Safety Plan
HPLC	high performance liquid chromatography
HSA	hollow-stem auger
HVOC	halogenated volatile organic compound
IDL	instrument detection limit
IDP	Inadvertent Discovery Plan
IDW	investigation-derived waste
LCS/LCSD	laboratory control spikes/laboratory control spike duplicate
LNAPL	light nonaqueous phase liquid
MDL	method detection limit
mg/kg	milligram per kilogram

µg/L	microgram per liter
mm	millimeter
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicates
MTCA	Model Toxics Control Act
NAVD88	North American Vertical Datum of 1988
NTU	nephelometric turbidity units
ORP	oxidation-reduction potential
PARCC	precision, accuracy, representativeness, completeness and comparability
PCE	perchloroethylene
PID	photoionization detector
ppm	parts per million
PQL	practical quantitation limit
QA/QC	quality assurance/quality control
RI/FS	remedial investigation/feasibility study
ROW	right-of-way
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SOP	standard operating procedure
SVOC	semivolatile organic compounds
TEE	terrestrial ecological evaluation
TOC	total organic carbon
TPH-G	total petroleum hydrocarbons- diesel
TPH-D	total petroleum hydrocarbons- gasoline
TPH-O	total petroleum hydrocarbons- oil-range
TRL	target reporting limits
USCS	Unified Soil Classification System
UST	underground storage tank
VCP	voluntary cleanup program
VOC	volatile organic compound
WAC	Washington Administrative Code

1.0 Introduction

This Remedial Investigation (RI) Work Plan (Work Plan) has been prepared for the Sound Transit Former Key Bank Site, also referred to as the Sound Transit 45th Street Site in Washington Department of Ecology (Ecology) records. Sound Transit (ST) has owned the property located at 1000 NE 45th Street in Seattle, Washington (Property) since 2001. Prior uses at the Property included a gas/service station and a dry cleaner, both of which had contaminant releases to soil and groundwater on the Property. Several subsurface investigations and two interim cleanup actions were previously completed on the Property between 2000 and 2020.

Ecology awarded an Affordable Housing Planning Grant to Sound Transit in October 2023 to complete a Remedial Investigation and Feasibility Study (RI/FS) for the Site. The RI is intended to assess the extent of contamination in soil and groundwater at locations off-Property and hydraulically downgradient of the former source areas. The grant was executed by Ecology on March 14, 2024.

1.1 REMEDIAL INVESTIGATION PURPOSE

Pursuant to the Washington State Model Toxics Control Act (MTCA) Cleanup Regulation (Chapter 173-340 Washington Administrative Code [WAC]), the purpose the RI is to collect sufficient data and information to define the extent of contamination, characterize the Site, and evaluate cleanup action alternatives in the FS.

1.2 WORK PLAN ORGANIZATION

The remaining sections of this Work Plan are organized as follows:

- **Section 2.0 – Background.** Describes the Site setting and history, current and future land use, regulatory framework, and previous remedial actions and regulatory actions.
- **Section 3.0 – Existing Site Conditions.** Describes the Site geology and hydrogeology, surface water and ecological habitat in the Site vicinity, and the nature and extent of contamination at the Site based on currently available data.
- **Section 4.0 – Preliminary Conceptual Site Model (CSM).** Describes the preliminary conceptual model for the Site.
- **Section 5.0 – Identification of Data Gaps.** Describes the known Site characterization data gaps.
- **Section 6.0 – Remedial Investigation Field Program.** Describes the investigations that will be conducted to complete the next phase of RI.
- **Section 7.0 – Data Evaluation and RI Reporting.** Describes generally how the data collected during the RI field activities will be evaluated and how the RI activities and results will be reported.
- **Section 8.0 – Schedule.** Provides the schedule for the RI field activities and reporting.
- **Section 9.0 – References.** Lists references cited in this Work Plan.

2.0 Background

This section summarizes background information for the Site.

2.1 SITE SETTING

The Property is in the City of Seattle University District and identified as King County Tax Parcel No. 773360-0155. The parcel comprises approximately 18,034 square feet and is separated into two areas by a 10-foot-wide alley that is oriented north-to-south through approximately the center of the parcel. Utilities operated by Puget Sound Energy, Seattle City Light, Seattle Public Utilities and telecommunication companies are situated within the alley. Vacation of the alley to support future redevelopment was approved by the Seattle Department of Transportation in 2023. The areas east and west of the alley are referred to herein as the Western and Eastern Site areas. (see Site Plan and Inferred Extent of Contamination, Figure 2).

The Property and surrounding area are primarily developed with commercial and residential buildings, associated paved parking, roads, and landscaping. The Key Bank Property is paved with asphalt and is currently leased to the City of Seattle and occupied by Rosie's Place Tiny House Village. The Village homes are temporary structures slightly elevated from the asphalt by wood "pallets." The tiny house village is surrounded by chain link fencing at the property exterior.

The parcel sits at an elevation of approximately 180 feet (North American Vertical Datum of 1988[1] [NAVD88]) within the Puget Sound Lowland. The Property is situated in a north-south trending shallow topographic depression sloping gently downward to the south that was interpreted during previous investigations to be associated with a former glacial meltwater stream (Shannon & Wilson 2021).

2.2 UTILITY INFRASTRUCTURE

Underground utilities located on or in the vicinity of the parcel include water, electric, storm sewer, sanitary or combined sewer, natural gas, and fiber optics (Utility Infrastructure – City of Seattle ArcGIS Online, Figure 3). The rights-of-way of Roosevelt Way NE, 11th Avenue NE and NE 45th Street serve as major utility corridors for surrounding developments. Utilities located in inferred hydraulically downgradient locations from the parcel are situated below NE 45th Street and primarily oriented in an east-west alignment. Utilities located on and hydraulically downgradient of the parcel are potential pathways for migration of contaminants originating from the parcel, as discussed in Section 4.2.

2.3 SITE HISTORY

GeoEngineers reviewed available information regarding the history of the Property, and surrounding area, and the results of previous investigations from reports provided to us by Sound Transit. Pertinent figures from prior site investigation reports that show the configurations of historical structures are presented in Appendix A. Based on the available information, the Western Site area was occupied by a gasoline service station from approximately 1938 through 1953 and a used car lot from approximately 1953 through 1961 (White Shield 2000). The service station utilized two underground storage tanks (USTs) that were located north of the building. In 1971, the former service station building was demolished, and in 1972 a drive-

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[1] NAVD88 is the reference elevation used throughout this Work Plan unless noted otherwise.

thru bank building (former Key Bank) was constructed (White Shield 2000; Shannon & Wilson 2020). The bank building was demolished in February 2000. The Eastern Site area was first developed with a building in 1926 that was occupied by retail businesses and a laundromat by 1943. The building included a dry cleaner business (Shannon & Wilson 2012). The building on the Eastern Site area was demolished in 1963.

Sound Transit purchased the Property in 2001. The Property has been the subject of several environmental investigations since 2000. Prior investigations performed on behalf of Sound Transit have identified petroleum-related constituents including gasoline-, diesel- and oil-range total petroleum hydrocarbons (TPH-G, TPH-D and TPH-O), benzene, and halogenated volatile organic compounds (HVOCs) in soil and groundwater beneath the Property at concentrations greater than the MTCA Method A cleanup levels (CULs). A release of contamination at the Property was reported to Ecology following completion of a Phase II Environmental Site Assessment (ESA) in 2012 (Shannon & Wilson 2012). Ecology listed the Property as the Sound Transit NE 45th St Site (FSID 8342; Cleanup Site 12019) and the Property was enrolled in the Ecology Voluntary Cleanup Program (VCP; No. NW2704) in 2013.

Past site investigations and interim actions are discussed further in Section 2.5.

2.4 CURRENT AND FUTURE LAND USE

The Key Bank parcel is owned by Sound Transit and leased by the City of Seattle. The parcel is occupied by a tiny house village. The lease extends through September 2024. Sound Transit recently selected a non-profit developer for the parcel and intends to transfer ownership of the parcel to the developer. The future development project is anticipated to be affordable housing.

Surrounding land use in the immediate vicinity is generally mixed commercial and residential comprising retail, restaurants, office buildings and high density residential buildings.

2.5 REGULATORY FRAMEWORK

As noted previously, Ecology lists the Property as the Sound Transit NE 45th St Site (FSID 8342; Cleanup Site 12019). The Property was enrolled in Ecology's Voluntary Cleanup Program (VCP; No. NW2704) in 2013. In 2016 Ecology terminated the VCP agreement citing lack of updates on remedial progress since 2014 (Ecology 2016).

2.6 PREVIOUS REMEDIAL ACTIONS AND REGULATORY ACTIONS

This section summarizes previous investigations and remedial actions completed at the Site between 2011 and 2020, and related regulatory actions. Environmental investigations completed at the Property include soil and groundwater sampling, a geophysical survey, UST removals and partial remedial excavations (Shannon & Wilson 2021). The following sections summarize the environmental subsurface investigations and remedial actions that inform the nature and extent of contamination at the Property. Exploration locations, cross sections and sample analytical data are shown in the report excerpts provided in Appendix A.

2.6.1 Phase I ESA (2000)

A Phase I ESA conducted in 2000 identified the first site development in 1922 with a building located in the southwest portion of the Property (White Shield 2000). The building housed three stores, including a barber shop and two retail businesses based on 1926 historical documents. A service station occupied the

Western Site area from approximately 1938 to 1953, followed by a used car lot from 1953 to 1961 and a drive-in restaurant from 1961 to 1971. The Western Site building was demolished in approximately 1971 and a one-story bank building was constructed near the former footprint of the service station building. Various banks operated in the building on the Western Site area from 1972 through approximately 2000.

A building was constructed in the southeast corner of the Eastern Site area in 1926, and a laundromat and café operated in this building starting in 1943. The Eastern Site area building was demolished in 1963.

Numerous potential off-Property sources of environmental concern were noted and evaluated in the Phase I ESA. Off-property sources of contamination are identified as a data gap, as discussed in Section 5.9.

2.6.2 Phase II ESA and Remedial Cost Estimate (2000-2001)

A Phase II ESA completed in 2000 identified a possible abandoned UST west of the bank building (removed in 2016), as well as gasoline and related volatile organic compounds (VOCs) in samples collected from explorations conducted on the west side of the Property. A copy of the Phase II report was not located in ST files.

2.6.3 Phase II ESA (2012)

A Phase II ESA was conducted by Sound Transit to evaluate if the Property had been impacted by historic off-Property and on-Property uses (Shannon & Wilson 2012). The 2012 Phase II ESA included the collection of soil and groundwater samples and completion of a geophysical survey to locate evidence of potential USTs. Two potential USTs were identified in the Western Site area. Petroleum hydrocarbons and petroleum-related VOCs (including benzene) were identified in soil and groundwater on the Western Site area and perchloroethylene (PCE) and related HVOCs were identified in soil and groundwater on the Eastern Site area.

2.6.4 Interim Action, Permeable Treatment Barrier (2014)

In 2014, Sound Transit completed an interim action to mitigate potential off-Property migration of contaminated groundwater during construction dewatering activities for the nearby University District light rail station. The interim action consisted of injecting 12,800 pounds (18,450 gallons) of a liquid activated carbon product below the groundwater table to treat HVOCs in groundwater. Additional products consisting of a mixture of naturally occurring microbes were injected to enhance anaerobic biodegradation of HVOCs (Shannon & Wilson 2020). The interim action included baseline groundwater monitoring, drilling and construction of 12 injection wells, slug testing and a pilot-scale injection prior to injection of the treatment barrier.

2.6.5 Interim Action, Remedial Excavation (2016)

In 2016, Sound Transit completed remedial excavation activities in the Western and Eastern Site areas (see Figure 2) in advance of a potential sale of the Property (Shannon & Wilson 2020). Remedial excavation activities included decommissioning of injection wells, removal of two apparent gasoline USTs (3,000-gallon and 500-gallon capacities) from the Western Site area, excavation backfilling, grading and paving (Shannon & Wilson 2020). Six sidewall and two base confirmatory soil samples were collected from the western excavation, and 17 sidewall and three base confirmatory soil samples were collected from the eastern excavation. A summary of observations and confirmatory soil sample analytical results from the two remedial excavation areas is described below.

2.6.5.1 WESTERN EXCAVATION

The western remedial excavation measured approximately 66 feet by 36 feet in plan dimensions and 20 feet deep. TPH-G was detected at concentrations greater than the MTCA CUL in soil samples collected from the northern and southern sidewalls of the western excavation. PCE was also detected at a concentration greater than the MTCA CUL in one confirmatory soil sample collected from the northern sidewall of the western excavation. Following remedial excavation activities, approximately 1,000 pounds of an oxygen release compound was placed across the base of the western remedial excavation before backfilling.

2.6.5.2 EASTERN EXCAVATION

The eastern remedial excavation measured approximately 36 feet by 35 feet by 15 to 20 feet deep. PCE was detected in all 17 soil sidewall confirmation samples and in the three base confirmation samples at concentrations greater than the MTCA CULs. The highest PCE concentration (6.44 milligrams per kilogram [mg/kg]) was detected in a base sample collected from a depth of 16.5 feet below ground surface (bgs) in the southwest quadrant (Shannon & Wilson 2020). In general, the highest detected PCE concentrations were in samples collected from depths between 11 and 18.5 feet bgs along the eastern sidewall of the excavation. Following remedial excavation activities, approximately 1,000 pounds of an anaerobic bioremediation product was placed across the base of the eastern remedial excavation before backfilling. Based on the detected PCE concentrations in soil within and surrounding the eastern excavation, 480 tons of the removed soil was disposed as dangerous waste and 990 tons of soil was disposed as non-hazardous waste under a Contained-In Determination (CID) from Ecology.

2.6.6 Supplemental Investigation and Groundwater Monitoring (2021 and 2022)

Supplemental investigation activities completed by Sound Transit in 2021 included seven direct-push borings, 10 hollow-stem auger borings, and monitoring well installation in the Western and Eastern Site areas (Shannon & Wilson 2021). The extent of TPH contamination in soil and groundwater on the Western Site area was documented by perimeter borings, although the results of the investigation indicated that TPH-contaminated groundwater appeared to be moving off-Property to the southwest (Shannon & Wilson 2021).

The extent of HVOC contamination in soil on the Eastern Site area was not delineated by the 2021 investigation, although HVOC-contaminated soil at concentrations greater than MTCA CULs was not present in soil samples collected below the groundwater table. The 2021 results also indicated that HVOC-contaminated groundwater appeared to be moving off-Property to the southeast (Shannon & Wilson 2021). Groundwater monitoring conducted between 2021 and 2022 confirmed the presence of TPH in groundwater on the Western Site area and HVOCs in groundwater on the Eastern Site area at concentrations greater than the MTCA CULs (Shannon & Wilson 2022).

2.7 CULTURAL RESOURCES

Ecology is performing a cultural resources consultation with tribal contacts and requested a project-specific Inadvertent Discovery Plan (IDP) be prepared for the project to support their determination of low potential to impact cultural resources. The IDP is presented in Appendix B.

3.0 Existing Site Conditions

The existing site conditions are described previously in Section 2.1. The remainder of this section describes the Site geology and hydrogeology, surface water and ecological habitat in the Site vicinity, and the nature and extent of contamination at the Site.

3.1 SOIL CONDITIONS

Soil conditions encountered at the Property generally consist of a fill layer overlying glacial channel deposits and glacial till-like deposits (Shannon & Wilson 2021). Fill soils are comprised of fine to medium sand with gravel and extend to depths between 4.5 and 14 feet bgs. The underlying channel deposits are comprised of a heterogeneous mixture of silty sand with gravel interbedded with silt and clay extending to depths of 25 to 35 feet bgs. Soils in the Western Site Area consist of sandy clay and appear to perch shallow groundwater seasonally. Discontinuous clay interbeds are also present in the Western Site area near the locations of the removed USTs, and across much of the Eastern Site area, although the clay interbeds are generally absent on the southern portion of both areas. Dense till-like deposits comprised of silty sand with gravel underly the channel deposits and extend to the total depths explored. The dense till-like deposits are generally similar in texture but are distinguishable from the overlying channel deposits by changes in soil density (Shannon & Wilson 2021).

3.2 GROUNDWATER CONDITIONS

Groundwater at the Property generally occurs in two zones based on the results of prior investigations and remedial activities. Shallow perched groundwater occurs on the western end of the Western Site area at depths between 14 and 22 feet bgs. The perched groundwater only appears to occur within silty sands at the southern and western edges of the Western Site area, with an inferred flow direction to the east-northeast (Shannon & Wilson 2022; see Figure 1). However, the shallow groundwater flow may occasionally be to the southwest based on contamination observed in the area west of the former USTs (Shannon & Wilson 2021). Perched groundwater has not been verified on the Eastern Site area where shallow groundwater would be expected to seasonally perch above clay layers present in that area. The presence of perched groundwater only at the margins of the Western Site area, where several large trees are present, may be related to groundwater input from irrigation at those locations.

Deeper groundwater occurs on both the Western and Eastern Site areas at depths between approximately 36 and 41 feet bgs and appears to perch on top of the dense till-like deposits. Prior reports from 2020 and 2021 infer variable groundwater flow directions (to the southwest and southeast); however, the 2022 groundwater monitoring report (Shannon & Wilson 2022) shows a southeasterly groundwater flow direction for deeper groundwater in the Eastern Site area. Based on our review of the available information, the deeper groundwater flow zone likely represents the local water table aquifer and the shallow groundwater zones are locally perched, discontinuous across the Property, and likely seasonally intermittent.

3.3 SURFACE WATER AND TERRESTRIAL HABITAT

The Site is located approximately 0.6 mile north of Lake Union, 1.1 miles northwest of Union Bay in Lake Washington, and 1.2 mile southeast of Green Lake. Lake Union and Lake Washington are inferred to be hydraulically downgradient of the Site and Green Lake is inferred to be hydraulically upgradient of the Site based on the inferred southwesterly to southeasterly groundwater flow direction at the Site. Shallow perched groundwater observed at the Western Site Area is unlikely to affect surface water in Green Lake,

Lake Washington or Lake Union because it discontinuous across the Site with an inferred groundwater flow direction toward the northeast (Shannon & Wilson 2022).

There are no areas of contiguous, undeveloped land larger than 1.5 acres on or within 500 feet of the Site that could provide habitat for terrestrial wildlife. A Terrestrial Ecological Evaluation (TEE) form is presented in Appendix C.

3.4 NATURE AND EXTENT OF CONTAMINATION

The results of environmental sampling conducted at the Property during the period from 2017 through 2023 indicate the presence of TPH, PCE and other chlorinated solvents in Property soil and/or groundwater at concentrations greater than the MTCA CULs. The nature and extent of soil and groundwater contamination for each Property area is summarized below.

3.4.1 Western Site Area

3.4.1.1 SOIL

Confirmatory soil sampling conducted during the 2016 remedial excavation activities indicates that TPH and PCE contamination was present in two sidewall excavation samples at concentrations greater than MTCA CULs (see Appendix A). TPH-G was detected in confirmatory soil samples collected from the north and south excavation sidewalls at depths of 7.5 and 10 feet, respectively. PCE was detected in a soil sample collected from the north sidewall at a depth of 5 feet bgs. TPH-G and PCE were not detected at concentrations greater than the laboratory reporting limits in soil samples collected at the base of the excavation. The sidewall locations where contaminants were detected in soil at concentrations greater than the MTCA CULs were not over-excavated, and the contaminant-containing soil is assumed to remain in-place. The areas estimated to have remaining soil contamination that require cleanup are shown in Figure 2. The remaining soil contamination in this area of the Site appears to be situated above the water table.

3.4.1.2 GROUNDWATER

Based on the results of the March through October 2022 groundwater monitoring events, TPH-G was present at concentrations greater than the MTCA CUL in groundwater sampled from wells W-Well-3 and W-Well-4, located near the southwest corner of the Property, and TPH-D and TPH-O were present at concentrations greater than the MTCA CULs in groundwater sampled from wells W-Well-2, W-Well-3 and W-Well-4, located near the western and southwestern property boundaries (see Appendix A). It is unknown if TPH-contaminated groundwater on the Western Site area has migrated off the Property.

3.4.2 Eastern Site Area

3.4.2.1 SOIL

HVOC contamination remains across a broad portion of the Eastern Site area at depths ranging from 2.5 to 25.5 feet bgs based on the results of soil sampling conducted during drilling and during the 2016 remedial excavation (see Appendix A). HVOC concentrations generally increase with depth, and the deepest detected concentration of PCE greater than the CUL is from a depth of 25.5 feet bgs in boring E-Well-3, located on the southern and downgradient end of the Property.

3.4.2.2 GROUNDWATER

HVOC contamination is present in groundwater along the eastern and southern margins of the Property. The highest PCE concentrations during the March through October 2022 groundwater monitoring events were in the samples collected from monitoring wells E-Well-2 (130 micrograms per liter [µg/L]) and E-Well-4 (120 µg/L), located at the eastern edge of the Property (see Appendix A). HVOCs in soil remain below the remedial excavation area and likely continue to contribute to groundwater contamination in this area. HVOC contaminated groundwater is likely migrating off- the Property to the east and southeast based on the results of prior investigations and our review of the available information.

4.0 Preliminary Conceptual Site Model

This section presents the preliminary conceptual site model (CSM) based on the investigations and interim cleanup actions completed to date.

4.1 SOURCES OF CONTAMINATION

4.1.1 Western Site Area (Former Fueling and Service Station)

Source areas in the Western Site Area where a service station operated previously include:

- **Former UST Nest.** TPH-G was detected in soil collected from within the UST excavation area footprint at concentrations greater than the MTCA CUL. The highest detected TPH-G concentrations were in soil samples collected closest to the former UST sidewalls (see Appendix A). Petroleum hydrocarbons (TPH-G, TPH-D and TPH-O) are present in groundwater to the south and west of the former USTs at concentrations greater than the MTCA CULs.
- **Surface Spills/Releases.** The TPH-G and PCE detected in soil in the southern portion of the Western Site Area at a depth of 5 feet bgs, and situated above the water table, suggests a surface spill/release source (see Appendix A). Historic automotive maintenance activities conducted on this area of the Property likely used degreasing solvents such as PCE, and surface spills or leaks from a waste oil UST are likely the source of the isolated PCE detections in soil in this area.
- **Preferential Migration through Utility Corridors.** Underground utilities situated near historical petroleum sources may represent preferential pathways for contaminant migration to locations off the property.

4.1.2 Eastern Site Area (Former Cleaners)

- **Releases/Spills Inside the Former Cleaners Building.** PCE was detected at concentrations greater than the laboratory reporting limits in all 20 soil samples collected within the former cleaners building footprint during the 2016 remedial excavation (17 sidewall and three excavation base samples), in all 10 soil samples collected from boring E-Well-2, and in eight of 10 soil samples collected from boring E-Well-3 (see Appendix A). The soil samples were collected from depths between 3 and 45.5 feet bgs. PCE was detected in soil samples collected from depths above the water table, indicating a localized source of PCE. Releases likely occurred inside the building to drains or cracks in the building slab and/or leaked from sub-grade building plumbing to sub-slab soil and groundwater. Isolated surface spills may also have occurred in the area surrounding the former building. These releases/potential spills have also impacted groundwater. Detections of PCE above the MTCA cleanup level have occurred in wells on the parcel southeast perimeter. The extent of off-Property contamination is not known.

- **Preferential Migration through Utility Corridors.** The presence of nearby utilities to PCE release locations may have resulted in preferential pathways for contaminant migration to locations off the property.

4.2 CONTAMINANT FATE AND TRANSPORT

The available information indicates that petroleum hydrocarbons and benzene released from the former USTs on the Western Site area migrated downward and laterally through dispersion along silt interbeds to the west and south, and down to the groundwater table and generally to the south through advective flow. The highest TPH-G concentrations observed during the 2022 groundwater monitoring event (between 840 and 1,100 µg/L) were observed in well W-Well-4, located south and downgradient of the former USTs near the southern Property boundary. Isolated releases of PCE in the Western Site area have migrated into the soil and to groundwater based on the sample results of two Western Site area monitoring wells (W-Well-2 and W-Well-3), though the detected concentrations of PCE were less than the MTCA CUL.

HVOCs released from the former cleaners on the Eastern Site area migrated downward and laterally along clay interbeds, as evidenced by relatively higher PCE concentrations in soil samples collected just above clay interbeds as compared to concentrations in soil samples collected above or below these locations. HVOCs migrated downward through gaps in the clay interbeds to the water table and flowed through advection to the south and southeast. Soil samples collected near the top of the dense till-like deposits also had higher relative concentrations of PCE as compared to soil samples collected from other depths.

Underground utilities located on- and off-Property may act as preferential pathways for contaminant migration. The potential for underground utilities to affect contaminant migration at the Site will be evaluated during the RI.

Although no Site soil vapor data are available, potential contaminant volatilization from soil and groundwater to soil vapor is recognized as a fate and transport mechanism associated with the Site.

4.3 CONTAMINATED MEDIA

Based on the results of previous environmental studies, soil and groundwater beneath the property are contaminated from historical operations. Soil vapor has not been evaluated to date and will be evaluated during the Site RI.

4.4 POTENTIAL EXPOSURE PATHWAYS AND RECEPTORS

The following potential exposure pathways and receptors have been identified based on the current and anticipated future land use at the Property:

- **Direct Contact.** Contaminated soil is located beneath paved and/or improved surfaces; therefore, the direct contact pathway is not complete. Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities that disturb the overlying improved/paved surfaces.
- **Groundwater Beneficial Use as Drinking Water.** Groundwater beneath the Property is not considered to be a current source of drinking water. Drinking water is supplied by municipal water supplies. However, groundwater beneficial use is still considered a potential exposure pathway as required by MTCA.
- **Surface Water.** Surface water is not a potential receptor because the Site ground surface is mostly capped with improved/paved hardscapes and surface water is not present at the Property.

- **Indoor Air.** Soil vapor to indoor air is considered a potential exposure pathway based on the detected contaminants of concern concentrations in soil and groundwater beneath the Property.

Ecological receptors such as aquatic organisms, terrestrial wildlife, plants and soil biota are unlikely to be exposed to Site contaminants due to the depth of the soil and groundwater contamination (i.e., greater than 15 feet bgs) and the lack of surface water and contiguous, undeveloped land on the Site or within 500 feet of the Site.

5.0 Identification of Data Gaps

This section identifies the Site characterization data gaps. Addressing these data gaps is the basis for the remedial investigation (RI) field program described in Section 6.0.

5.1 LATERAL AND VERTICAL EXTENT OF CONTAMINATION - WESTERN SITE AREA

In 2016, TPH-G was detected in confirmatory soil samples collected from the north and south excavation sidewalls at depths of 7.5 and 10 feet, respectively. PCE was detected in a soil sample collected from the north sidewall at a depth of 5 feet bgs. TPH and PCE soil contamination was not overexcavated from sidewalls of the remedial excavation in 2016. The remaining soil contamination appears to be situated above the shallow perched groundwater table (generally above 22 feet bgs) observed in the Western Site Area. The source of PCE at the Western Site area has not been confirmed and may relate to a waste oil release associated with the former service station. The lateral and vertical extent of PCE contamination in soil in the Western Site Area has not been evaluated and will be assessed during a future RI phase as the scope of RI presented in this Work Plan does not include soil sampling on the Property. The future soil investigation should include sampling for waste oil constituents (PAHs, PCBs, metals, etc.) according to WAC 173-340-900, Table 830-1.

The extent of TPH contamination in soil and groundwater on the Western Site area was documented by perimeter borings, although the results of past investigations indicated that TPH-contaminated groundwater appeared to be moving off-Property to the southwest. Therefore, the downgradient extent of TPH-contaminated groundwater has not been identified. Monitoring wells planned to be installed downgradient of the Property during this phase of RI are intended to address this data gap.

5.2 LATERAL AND VERTICAL EXTENT OF CONTAMINATION – EASTERN SITE AREA

HVOCs at concentrations greater than CULs remain in soil across a broad portion of the Eastern Site area at depths ranging from 2.5 to 25.5 feet bgs based on the results of soil sampling conducted during drilling and during the 2016 remedial excavation. HVOC concentrations generally increase with depth, and the deepest detected concentration of PCE greater than the CUL is from a depth of 25.5 feet bgs in boring W-Well-3, located on the southern and downgradient end of the Property. HVOCs in soil remain below the remedial excavation area and likely continue to contribute to groundwater contamination in this area. This soil characterization data gap will be assessed during a future RI phase as the scope of RI presented in this Work Plan does not include soil sampling on the Property.

HVOC contamination is present in groundwater (36 to 41 feet bgs) along the eastern and southern margins of the Property. The highest PCE concentrations during the 2022 groundwater monitoring event were in the sample collected from monitoring well E-Well-2 (120 µg/L), located at the eastern edge of the Property (see

Appendix A). HVOC-contaminated groundwater is likely migrating off-Property to the east and southeast based on the results of prior investigations and review of currently available information. Monitoring wells planned to be installed downgradient of the Property during this phase of RI are intended to address this data gap.

5.3 SHALLOW GROUNDWATER PRESENCE AND GRADIENT

Perched groundwater has been consistently found on top of dense till in the Western Site Area generally at depths of 14 to 22 feet bgs. Groundwater flow directions measured during prior investigations range from south to east; however, based on the distribution of contaminants in areas that are southwest of the former UST nest in the Western Site Area, a southwesterly groundwater flow direction is also interpreted to be likely. Deeper groundwater in the Western Site Area is inferred to flow from north to south, as is the case in the Eastern Site Area.

Perched groundwater has not been documented in the Eastern Site Area, although only one existing well (E-Well-5A) is screened to monitor for the presence of perched groundwater. Additional groundwater monitoring data are needed to further evaluate perched and shallow groundwater, seasonal groundwater fluctuations, groundwater gradients and flow direction at the Site. Monitoring wells are not planned to be installed on the Property during the next RI phase; however, monitoring wells planned to be installed downgradient of the Property will provide information to address this data gap. If additional monitoring wells are needed to characterize groundwater occurrence, gradients and flow direction, that may occur during a later phase of the RI.

5.4 SOIL PHYSIOCHEMICAL PROPERTIES

Physiochemical properties of Site soil including grain size distribution, pH, soil bulk density, and total organic carbon content (TOC) have not been evaluated. These properties can influence the implementability and performance of remediation technologies that may be applicable to the Site. Consequently, the collection and evaluation of soil physiochemical data can inform the evaluation of cleanup action alternatives in the FS. This data gap may be partially addressed by the RI activities proposed herein but may also require additional assessment during a subsequent RI phase.

5.5 SEASONAL VARIABILITY AND TEMPORAL TRENDS OF VOC CONCENTRATIONS IN GROUNDWATER

Previous investigations did not fully characterize the seasonal variability and temporal trends of dissolved VOC concentrations in groundwater. The collection and evaluation of these groundwater quality data can inform the evaluation of cleanup action alternatives in the FS.

5.6 GROUNDWATER GEOCHEMICAL CONDITIONS

Past studies have included testing of Site groundwater geochemical conditions to evaluate natural attenuation, including testing for ferrous iron, nitrate, nitrite, sulfate and sulfite, chloride, dissolved manganese and dissolved methane, ethane and ethene. Because groundwater geochemical conditions can influence the performance of remediation technologies that may be applicable to the Site, the collection and evaluation of geochemical indicator data can inform the evaluation of cleanup action alternatives in the FS. This data gap may be partially addressed by the RI activities proposed herein but may also require additional assessment during a subsequent phase of RI.

5.7 PREFERENTIAL PATHWAYS FOR CONTAMINATION

There have been no studies to date to assess whether underground utilities on the parcel and in adjacent City of Seattle rights-of-way are preferential pathways for contaminant migration. This data gap may be partially addressed by the RI activities proposed herein but may also require additional assessment during a subsequent phase of RI.

5.8 SOIL VAPOR/INDOOR AIR PATHWAY

Prior studies completed on the parcel did not include soil vapor sampling and the potential for vapor intrusion has not been evaluated on the parcel or at locations downgradient that have potentially been affected by the groundwater contaminant plume. The RI field program will include soil vapor sampling at select locations on- and off-Property to evaluate the potential for vapor intrusion at locations near and downgradient of the source areas.

5.9 POTENTIAL OFF-PROPERTY SOURCES

The ONP Body & Paint Shop was identified in the 2000 Phase I ESA (White Shields 2000) as an auto body shop that operated as early as 1930 that was previously located north-adjacent to the Western Site area (see Figure 2). The potential for this auto body shop to be a source of contamination migration to the subject property is a data gap that may be partially addressed by the RI activities proposed herein but may also require additional assessment during a subsequent phase of RI.

6.0 Remedial Investigation Field Program

The RI field program is designed to address the majority of the data gaps identified in Section 5.0. If needed in the future, subsequent phases of RI will be performed to address remaining data gaps. The planned exploration locations are shown on Remedial Investigation Target Exploration Areas, Figure 4.

The main elements of the RI field program include the following:

- Obtaining permits from City of Seattle to complete the field investigation, including a right-of-way permit for planned explorations in the streets surrounding the parcel. Review available information on underground utilities to determine depth and orientation to inform planning for the RI.
- Drilling up to six off-Property borings (KB-MW1 through KB-MW6; see Figure 4) to further assess the extent of petroleum- and chlorinated volatile organic compound- (CVOC)- contaminated soil and groundwater. Borings will be completed as permanent groundwater monitoring wells in City of Seattle right-of-way (ROW). The monitoring well depths will range between 15 and 45 feet bgs.
- Submitting soil samples collected from select borings for laboratory analysis of petroleum and CVOCs.
- Assessing the condition of 10 existing monitoring wells located on the Property.
- Completing an elevation survey of the new and existing monitoring wells relative to NAVD88 datum.
- Monitoring seasonal groundwater levels, hydraulic gradients, and dissolved petroleum and CVOC concentrations quarterly for 12 months (four quarters) at new and existing monitoring well locations. Groundwater samples collected during the quarterly monitoring events will be submitted for laboratory analysis of petroleum and/or VOCs.

- Completing a vapor intrusion evaluation in accordance with Ecology "Guidance for Evaluating Vapor Intrusion in Washington State" dated March 2022. The vapor intrusion evaluation will include soil vapor sampling at select on- and off-Property locations, as shown on Figure 4.

The elements of the RI field program are described further below. Details regarding field sampling procedures are provided in the Sampling and Analysis Plan (SAP, Appendix D). Quality control procedures for field activities and laboratory analyses are described in the Quality Assurance Project Plan (QAPP, Appendix E). The investigation to evaluate the extent of contaminated soil and groundwater is described in the sections below.

6.1 DRILLING AND SOIL SAMPLING

Six borings (KB-MW1 through KB-MW6) will be drilled at the approximate locations shown in Figure 4 using hollow-stem auger (HSA) drilling methods. The actual boring locations will be determined based on City of Seattle ROW Permit conditions. An environmental representative will be present during drilling to log and field screen soils and to collect soil samples for possible laboratory analysis. Drill cuttings will be segregated by boring and depth intervals and stored in labeled drums within the fenced areas on the Sound Transit parcel, pending waste characterization and appropriate disposal.

Soil samples will be collected at approximate 5-foot depth intervals during drilling of the borings. Soil types will be identified using the Unified Soil Classification System (USCS). In addition, soil will be field screened for evidence of potential contamination using visual screening (e.g., observations of soil staining), water sheen screening, and headspace vapor screening with a photoionization detector (PID). Soil field screening and sampling methods are described in the SAP (Appendix D).

Select soil samples will be submitted for laboratory chemical analysis based on field observations, sample depth in relation to depth to groundwater and the RI objectives. Up to three soil samples per boring will be collected and submitted for laboratory chemical analysis for the following analytes:

- TPH-G by NWTPH-Gx Method;
- TPH-D and TPH-O by NWTPH-Dx Method; and
- VOCs by United States Environmental Protection Agency (EPA) Method 8260D.

Following completion of drilling and soil sampling, the investigation-derived waste (IDW) contained in drums will be sampled and submitted for laboratory chemical analysis for the following:

- Resource Conservation and Recovery Act (RCRA) 8 metals by EPA Method 6000/7000 series.

6.2 GROUNDWATER MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING

A 2-inch-diameter groundwater monitoring well will be installed in each boring. The wells will be constructed in accordance with Washington State well construction standards (WAC 173-160); resource protection well notification and construction documents will be submitted to Ecology. The well casing will consist of Schedule 40 polyvinyl chloride (PVC) blank casing and machine-slotted screens with 0.010-inch slot width.

Groundwater conditions in the Western Site area of the Property have been described as perched groundwater at depths ranging from 14 to 22 feet bgs. Perched groundwater has not been observed in past explorations completed in the Eastern Site area of the Property and groundwater depths have been measured at 36 to 41 feet bgs. The depth and screen intervals for RI monitoring wells are anticipated to be consistent with monitoring wells previously completed on the parcel to inform the nature and extent of contamination documented in Site soil and groundwater. However, the planned depth and screen intervals for the RI wells maybe adjusted based on observations during drilling.

The annular space between the well screen and the borehole wall will be filled with a clean sand filter pack to approximately 2 feet above the top of the well screen. The annular space above the filter pack will be filled with hydrated bentonite. Each well will be fitted with a locking well cap and completed at the surface with a flush steel monument set in a concrete surface seal.

After all monitoring wells are installed, the wells will be developed as described in the SAP to stabilize the sand filter pack and formation materials surrounding the well screen and to establish a hydraulic connection between the well screen and the surrounding soil. Monitoring well casing rim and monument elevations will be surveyed relative to NAVD88.

RI groundwater monitoring will be conducted on a quarterly basis for 12 months and will include all new wells installed during the RI and up to six existing wells located on the Property. During each monitoring event, groundwater levels will be measured in the monitoring wells and groundwater samples will be collected for analysis from each well as described in the SAP. The groundwater samples will be submitted for laboratory chemical analysis for the following analytes:

- TPH-G by NWTPH-Gx Method;
- TPH-D and TPH-O by NWTPH-Dx Method; and
- VOCs by EPA Method 8260D.

6.3 SOIL VAPOR PROBE SAMPLING

On- and off-Property soil vapor samples will be collected from within the current anticipated extent of the CVOC plume to evaluate the potential for vapor intrusion (VI). Soil vapor samples will be conducted from temporary soil vapor probes installed to depths of approximately 5 to 6 feet bgs. Four soil vapor samples (KB-SV1 through KB-SV4) will be collected near the Western and Eastern site area source areas (see Figure 4). Two additional soil vapor samples (KB-SV-5 and KB-SV6) will be collected from select locations off-Property in the inferred downgradient direction. Soil vapor sampling procedures are summarized in the SAP (Appendix D).

Soil vapor samples will be sent to an approved chemical analytical laboratory for chemical analysis of the following:

- Air phase petroleum compounds (C5-C8 aliphatics, C9-C12 aliphatics and C9-C10 aromatics) by Massachusetts Department of Environmental Protection (MA DEP) Method;
- VOCs, including benzene, toluene, ethylbenzene and total xylenes (BTEX) by EPA Method TO-15;

- PCE, trichloroethene (TCE), cis- and trans-1,2-DCE, 1,1-DCE, and vinyl chloride by EPA Method TO-15; and
- Helium by ASTM International (ASTM) D 1946.

6.4 INVESTIGATION-DERIVED WASTE MANAGEMENT

Investigation-derived waste (IDW) will include drill cuttings, well development water, sampling equipment decontamination water, pre-sampling purge water from monitoring wells, and incidental waste such as disposable gloves, paper towels, plastic bags, etc.

Drill cuttings, well development water and pre-sampling purge water will be segregated by boring or monitoring well and stored on site in labeled drums pending waste classification and subsequent disposal. Solids (i.e., drill cuttings) and liquids (i.e., well development water and pre-sampling purge water) will be stored in separate drums. Well development water and pre-sampling purge water from the same monitoring well can be combined in the same drum. Decontamination water will be stored on site in labeled drums separate from other IDW. Between 10 and 20 drums are anticipated to be generated during RI drilling and sampling activities. Incidental waste (disposable gloves, etc.) will be disposed of in a trash receptacle.

Drill cuttings and decontamination water will be characterized for disposal by submitting a representative sample of the drill cuttings from each soil boring and a representative sample of the decontamination water for analysis of petroleum and related compounds, and PCE, TCE, cis- and trans-1,2-DCE, 1,1-DCE, and vinyl chloride. Well development water and pre-sampling purge water will be characterized for disposal based on the groundwater analytical results from the quarterly groundwater monitoring events.

If PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, and/or vinyl chloride are detected in any IDW samples, the associated IDW will be designated as an F002-listed waste under the State dangerous waste regulations (WAC 173-303) and disposed of off-site at a facility permitted to receive hazardous waste. Hazardous waste manifests will be prepared for IDW designated as dangerous waste, and the IDW will be transported to the permitted disposal facility by a licensed hazardous waste hauler.

IDW samples that are non-detect for PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, or vinyl chloride will be disposed of off-Property at a permitted facility.

7.0 Data Evaluation and RI Reporting

The results of soil, groundwater and soil vapor sampling will be used to delineate the vertical extent of contamination exceeding screening levels at the Site. Soil and groundwater screening levels will be the MTCA Method A cleanup levels. Soil vapor screening levels will be the MTCA Method B soil gas screening levels based on residential exposure. Cleanup standards will be presented in the FS and Cleanup Action Plan (CAP).

Quarterly groundwater monitoring data will be used to further evaluate groundwater gradient and flow direction and evaluate the seasonal variability of dissolved petroleum and VOC concentrations. The RI activities and results will be documented in an RI report prepared in accordance with applicable MTCA requirements and associated regulatory guidance. The preliminary CSM presented in this Work Plan will be refined as necessary based on the results of the RI, and an updated CSM will be presented in the RI report.

An evaluation of remedial alternatives for the Property will be presented in the FS. The selected remedial alternative will be consistent with MTCA requirements and compatible with future proposed Property development and uses of adjacent ROW that may be affected by the Site.

8.0 Schedule

The RI drilling, soil sampling, groundwater monitoring well construction, and soil vapor sampling activities described in this Work Plan are anticipated to be completed in September and October 2024, following completion of ROW permitting with the City of Seattle. Quarterly groundwater monitoring events are anticipated to occur in October 2024, January 2025, April 2025 and July 2025. The draft RI/FS report and remedial cost estimate are anticipated to be provided to Ecology for review in August 2025.

9.0 References

Shannon & Wilson, Inc., 2012. Phase II Environmental Site Assessment, Former Key Bank Property, 1000 NE 45th Street, Seattle, Washington. Prepared for Sound Transit. January 9, 2012.

Shannon & Wilson, Inc., 2020. Summary Report, Former Key Bank Property, 1000 NE 45th Street, Seattle, Washington. Prepared for Sound Transit. December 22, 2020.

Shannon & Wilson, Inc., 2021. Supplemental Environmental Data Report, Former Key Bank Site, 1000 NE 45th Street, Seattle, Washington. Prepared for Sound Transit. April 29, 2021.

Shannon & Wilson, Inc., 2022. Groundwater Monitoring Data Report (3rd Quarter 2022), Former Key Bank Site, 1000 NE 45th Street, Seattle, Washington. Prepared for Sound Transit. December 21, 2022.

Veris Law Group, 2015. Update to Notice of Remedial Action (ERTS 635313) 4550 11th Avenue Northeast, Seattle, Washington. Letter to Donna Musa, Department of Ecology Northwest Regional Office.

Washington State Department of Ecology (Ecology), 2016. Termination of VCP Agreement for the following Site: Sound Transit NE 45th Street, 1000 NE 45th Street, Seattle, WA. Cleanup Site ID: 12019, Facility/Site ID: 8342. August 18, 2016.

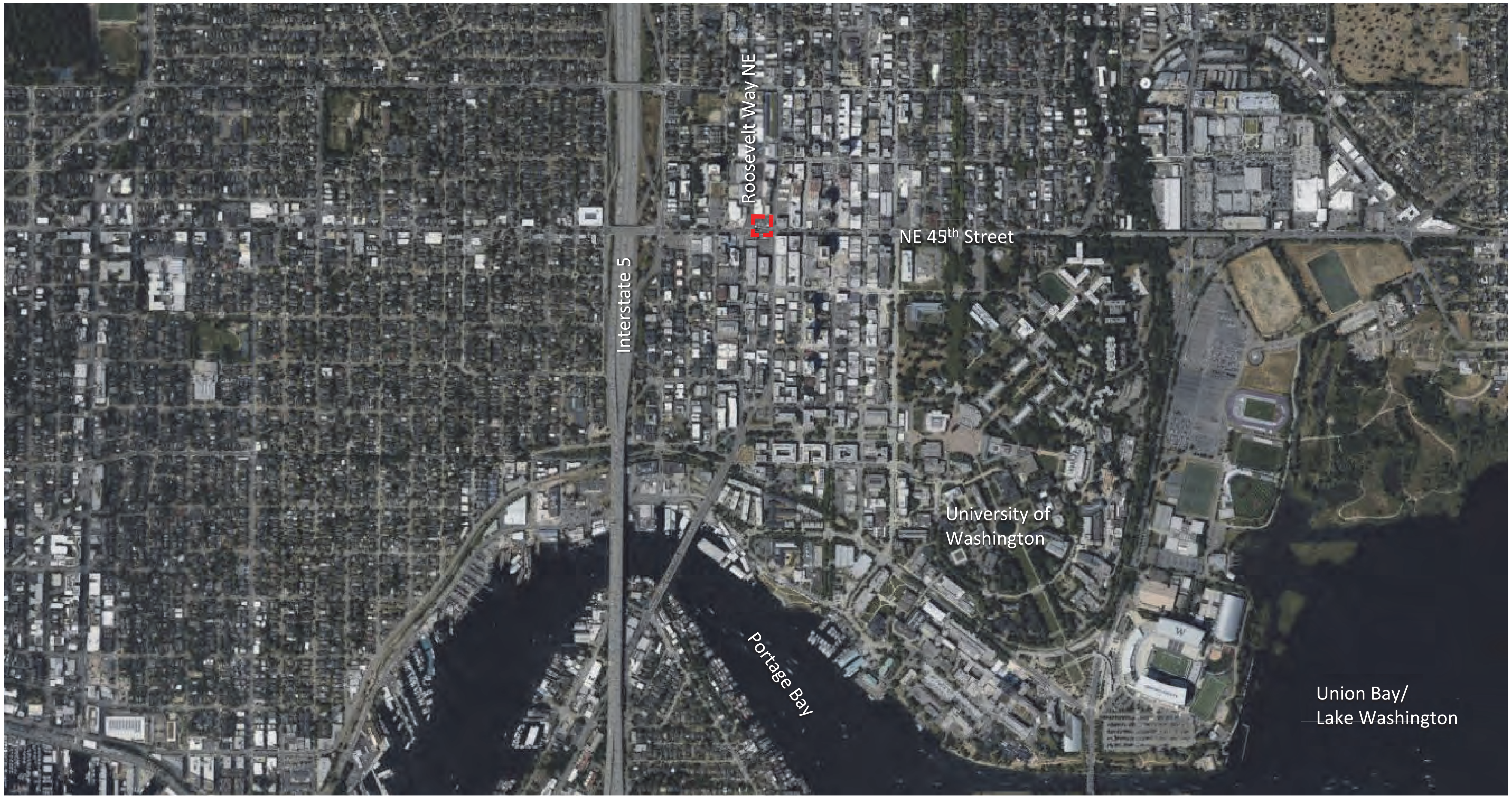
Washington State Department of Ecology (Ecology), 2022. Guidance for Evaluating Vapor Intrusion in Washington State, Investigation and Remedial Action. Toxics Cleanup Program Publication No. 09-09-047. Dated March 2022.

White Shield, Inc., 2000. Phase I Environmental Site Assessment, Key Bank, 1000 NE 45th Street, Seattle, Washington. September 22, 2000.

10.0 Limitations

We have prepared this Work Plan for use by Sound Transit and the Washington State Department of Ecology for remedial investigation to be performed at 1000 NE 45th Street in Seattle, Washington. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this Work Plan was prepared. No warranty or other conditions, express or implied, should be understood. This document (email, text, table and/or figure) and any attachments are only a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

Figures



Legend

Approximate Parcel Boundary

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: Google Earth 2023

N

1000 ft

Scale is Approximate

Vicinity Map

Sound Transit Former Key Bank
Seattle, Washington

GeoEngineers

Figure 1

4082-073-00 Date Exported: 05/23/24

Legend

Approximate Parcel Boundary

Approximate 2016 Remedial Excavation Areas

Western Portion of Site - Inferred Area of Soil Contamination

Eastern Portion of Site - Inferred Area of Soil Contamination

Inferred Deep Groundwater Flow Direction (Shannon & Wilson 2021)

Inferred Perched Groundwater Flow Direction (Shannon & Wilson 2021)

Interred Area of Groundwater Contamination – Off-Property Extents Unknown

N

50 ft

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: Google Earth 2023

Site Plan and Inferred Extent of Contamination

Sound Transit Former Key Bank
Seattle, Washington

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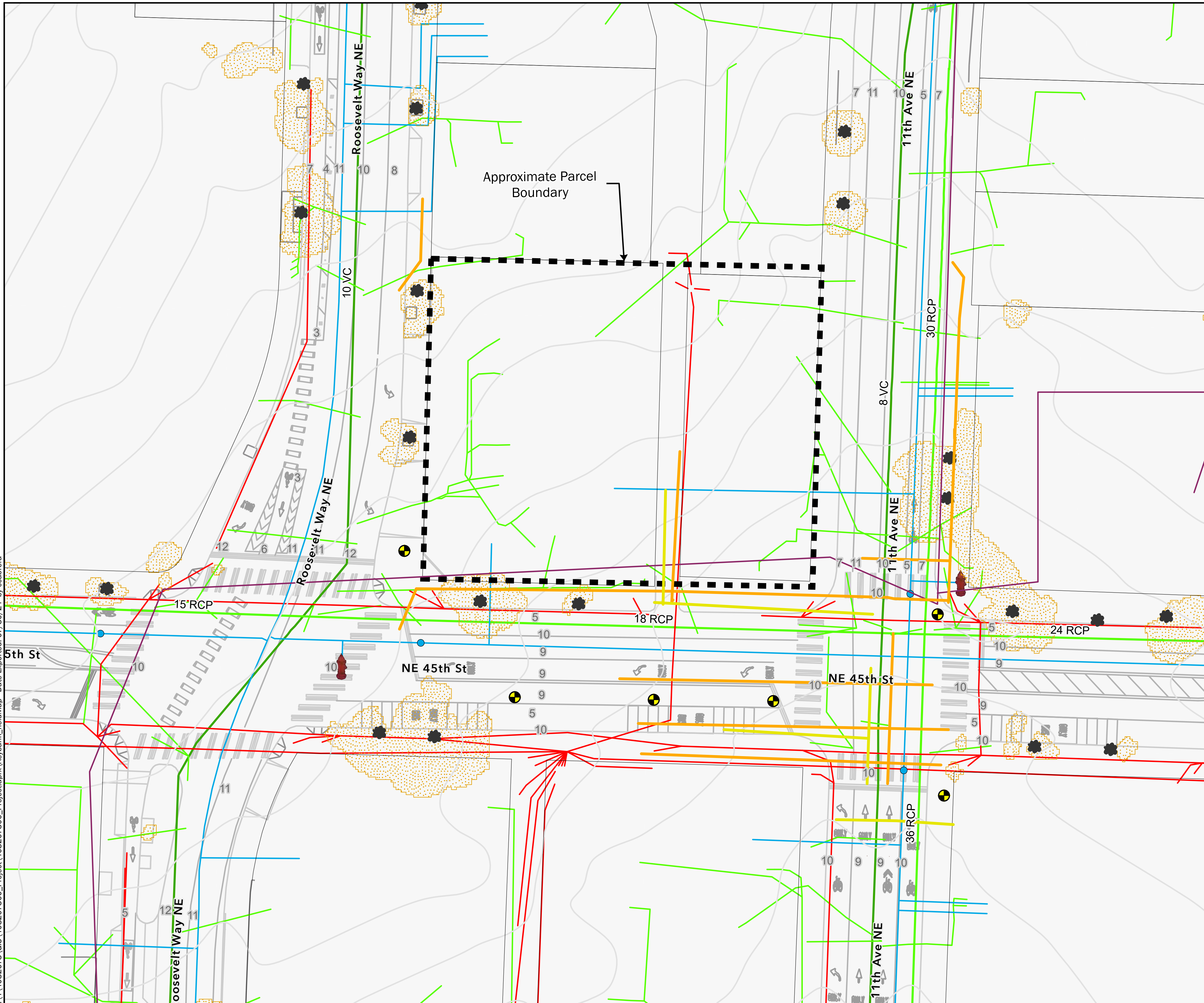
Figure 2

4082-071-00 Date Exported: 07/09/23



Legend

- King County Parcel
- Existing Tree
- Contours-2ft
- Tree Canopy
- Hydrants
- Proposed Subsurface Exploration Location
- Fiber Route
- Water Utility
- Electric Utility
- Storm Drainage Utility
- Sanitary Sewer or Combined Utility
- Roadway Features and Channelization
- Telecommunications Utility
- Natural Gas Utility

Notes:
1. Natural gas utilities are not available on the City GIS system and are therefore not shown.

Source(s):
- City of Seattle ArcGIS Online

Coordinate System: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Disclaimer: This figure was created for a specific purpose and project. Any use of this figure for any other project or purpose shall be at the user's sole risk and without liability to GeoEngineers. The locations of features shown may be approximate. GeoEngineers makes no warranty or representation as to the accuracy, completeness, or suitability of the figure, or data contained therein. The file containing this figure is a copy of a master document, the original of which is retained by GeoEngineers and is the official document of record.

N

0 40
Feet

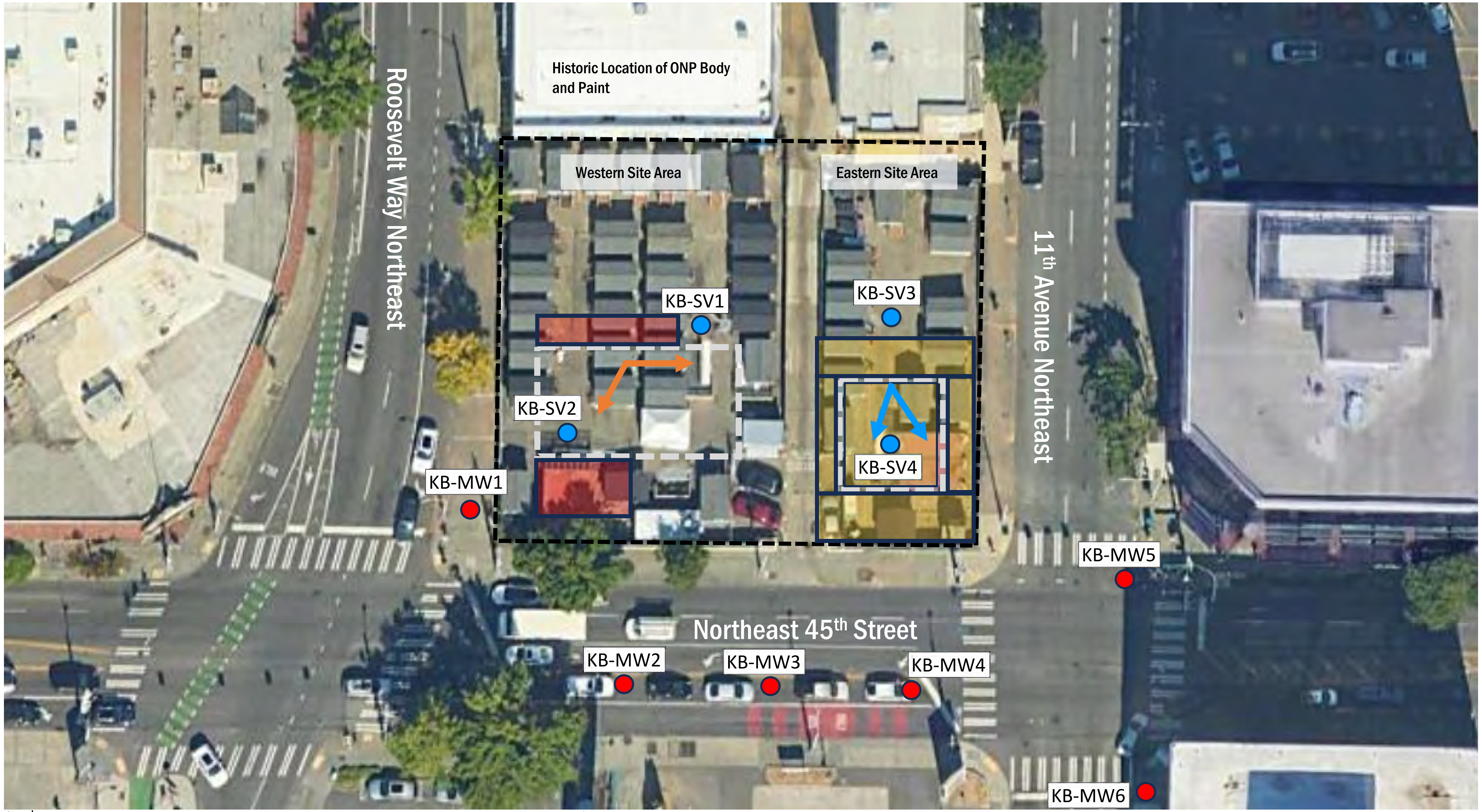
Utility Infrastructure - City of Seattle ArcGIS Online

Sound Transit Former Key Bank
Seattle, Washington

GEOENGINEERS

Figure 3

P:\4\4082073\GIS\408207300_Project\408207300_Project.aprx\Keybank_fieldMap Date Exported: 07/30/24 by ccabrera



Legend

- Approximate Parcel Boundary
- Approximate 2016 Remedial Excavation Areas
- Western Portion of Site - Inferred Area of Soil Contamination
- Eastern Portion of Site - Inferred Area of Soil Contamination
- Inferred Deep Groundwater Flow Direction (Shannon & Wilson 2021)
- Inferred Perched Groundwater Flow Direction (Shannon & Wilson 2021)
- Proposed RI Monitoring Well Location
- Proposed RI Soil Vapor Sample Location

Notes:
1. The locations of all features shown are approximate.
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Data Source: Google Earth 2023

N

50 ft

Remedial Investigation
Proposed Exploration Locations

Sound Transit Former Key Bank
Seattle, Washington

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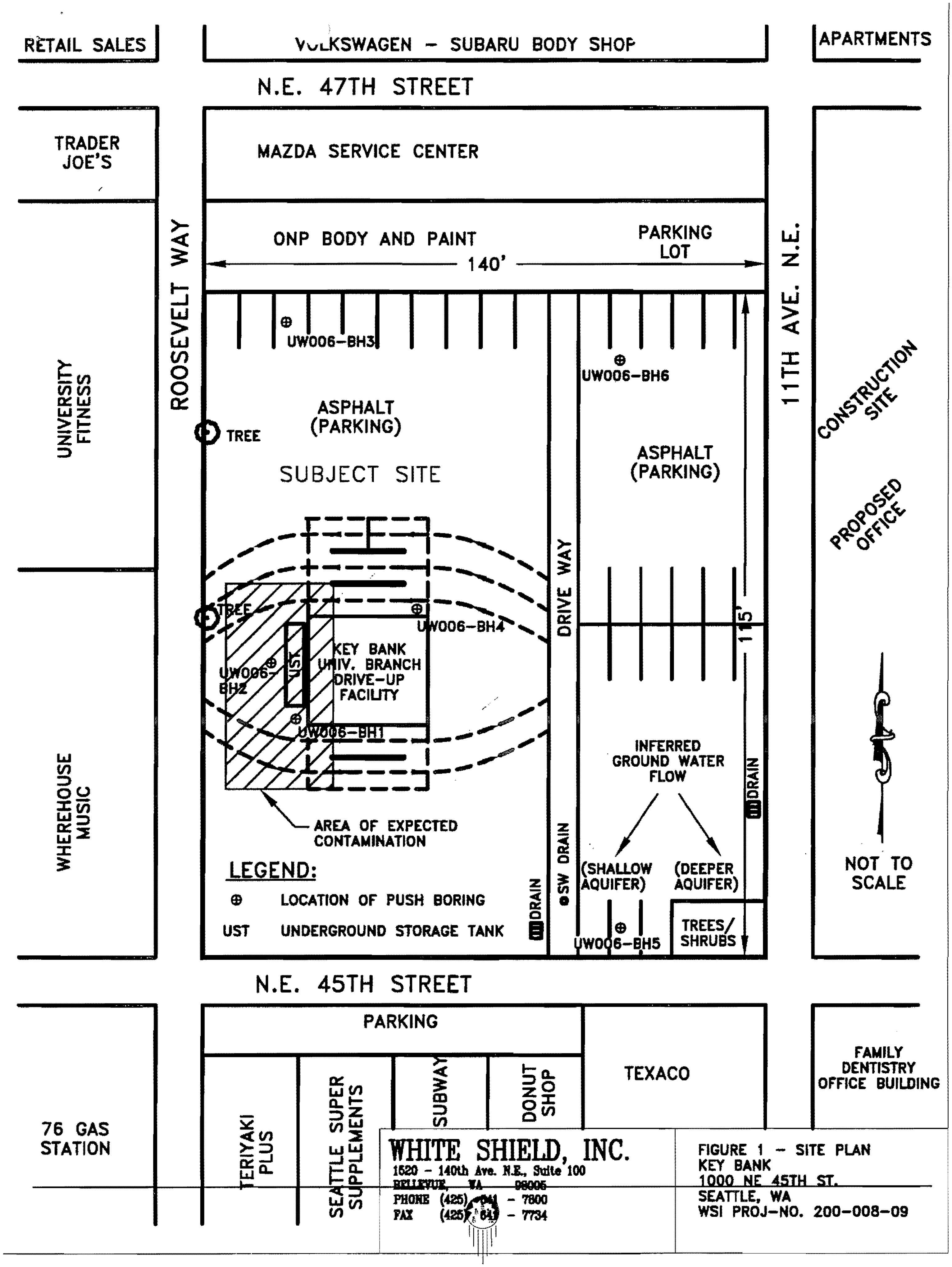
Figure 4

4082-071-00 Date Exported: 07/09/23

Appendices

Appendix A

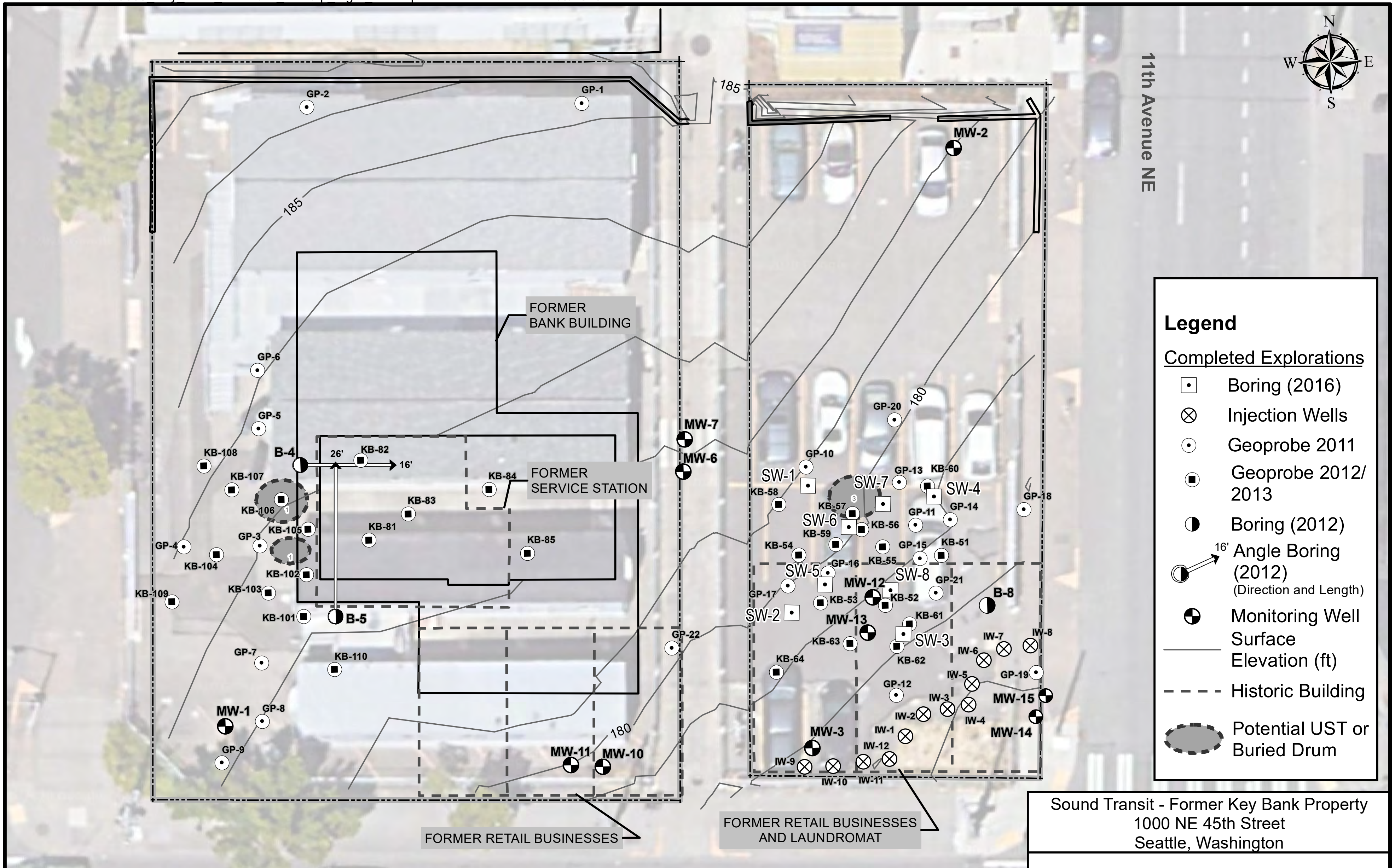
Excerpts from Prior Environmental Reports



WHITE SHIELD, INC.
1520 – 140th Ave. N.E., Suite 100
BELLEVUE, WA 98005
PHONE (425) 641 – 7800
FAX (425) 641 – 7734

FIGURE 1 – SITE PLAN
KEY BANK
1000 NE 45TH ST.
SEATTLE, WA
WSI PROJ–NO. 200–008–09

Filename: T:\21-1\16609_Key_Bank_RI-FS\AV_mxd\up_Fig-2_SiteExplorations.mxd Date: 12/9/2020 brl



NOTE:

1. Wells MW-1, MW-3, MW-6, MW-7, MW-11, MW-12, MW-13, IW-1, IW-2, IW-3 and IW-6 through IW-12 decommissioned in 2016.

0 10 20 40

Scale in Feet

Sound Transit - Former Key Bank Property
1000 NE 45th Street
Seattle, Washington

SITE AND EXPLORATION PLAN

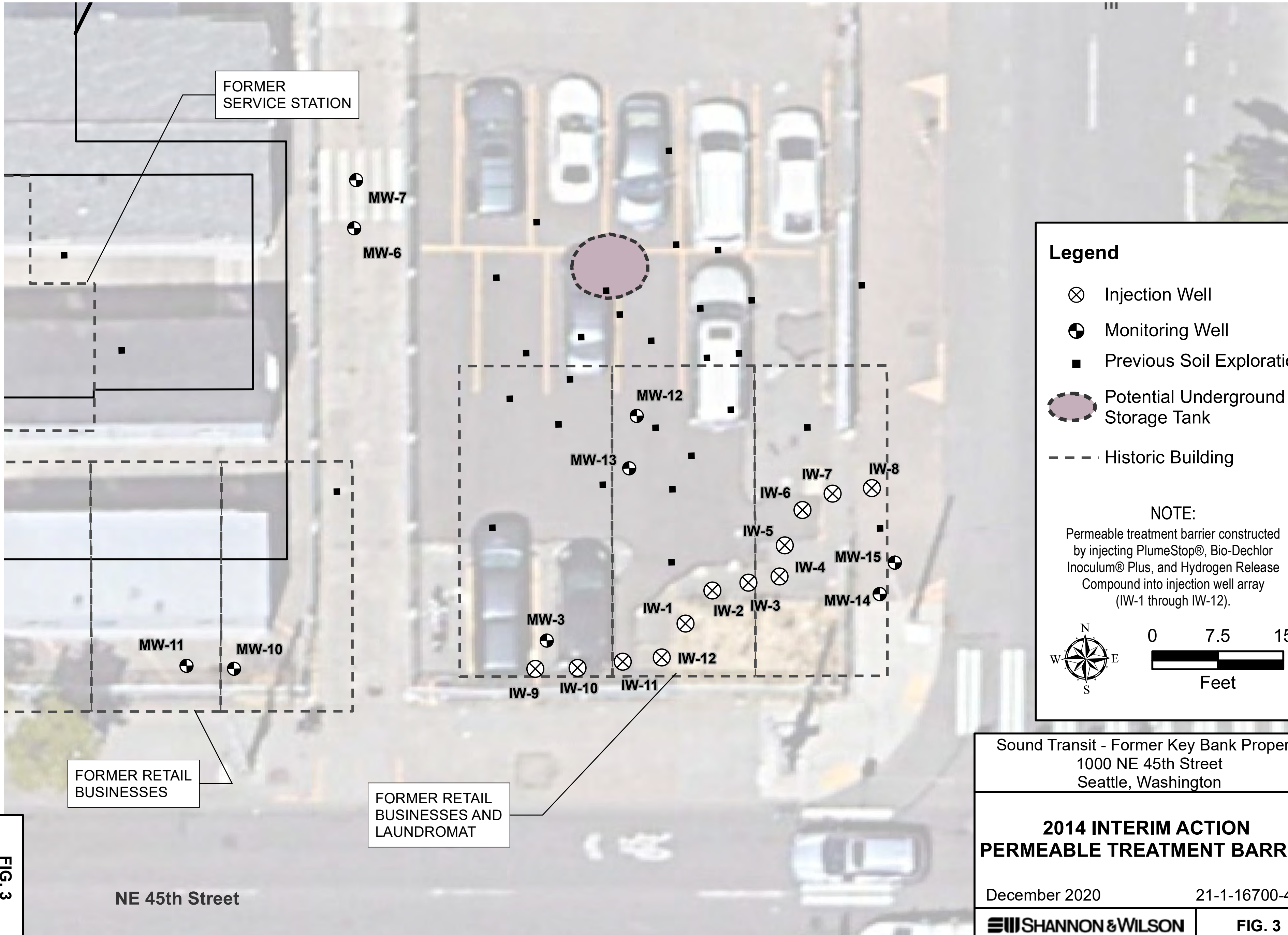
December 2020 21-1-16700-422

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2

FIG. 2

Filename: T:\21-1\16609_Key_Bank_RI-FS\AV_mxd\up_EcologyInjectionWells.mxd Date: 12/18/2020 brl



Sound Transit - Former Key Bank Property
1000 NE 45th Street
Seattle, Washington

2014 INTERIM ACTION PERMEABLE TREATMENT BARRIER

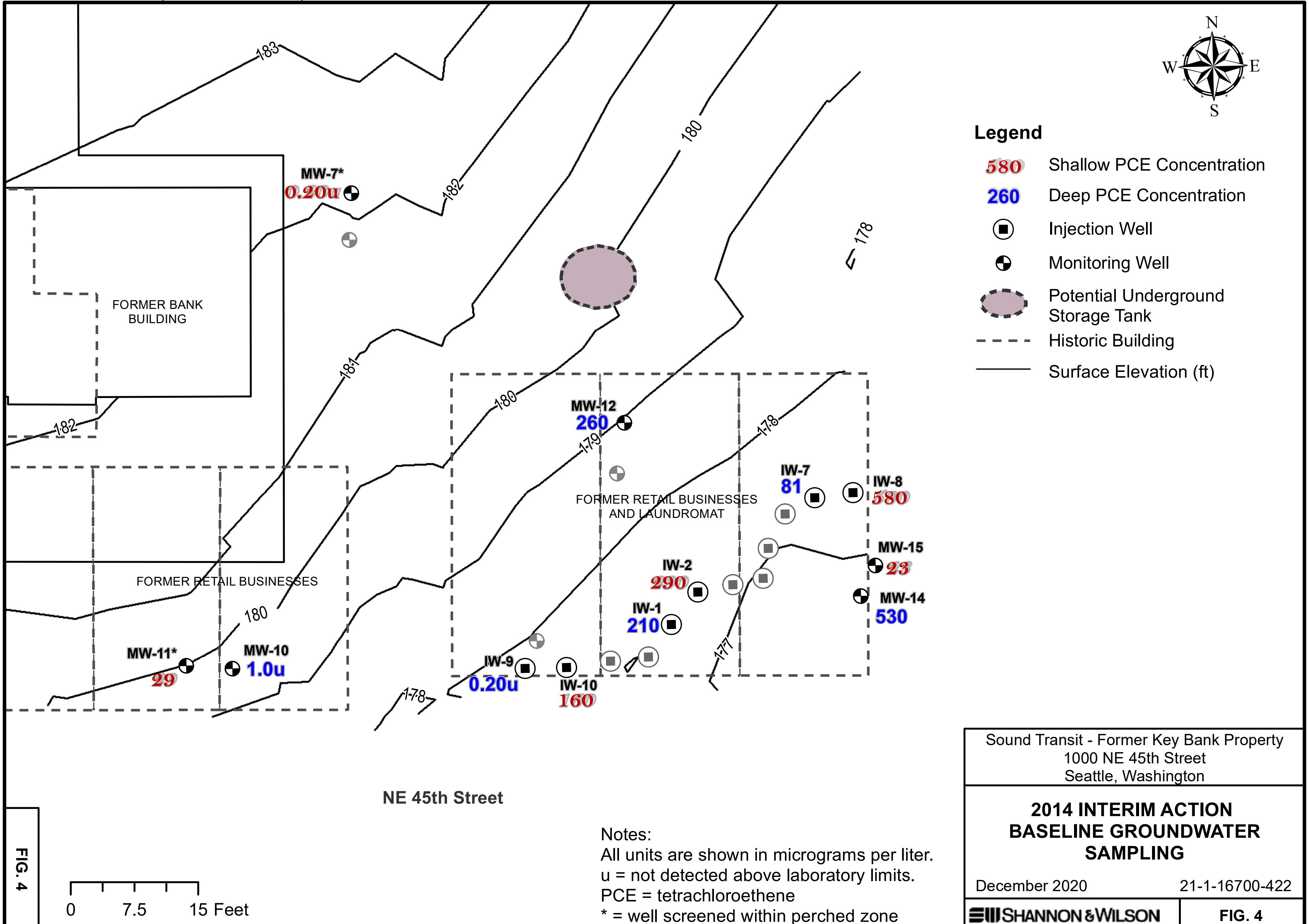
December 2020 | 21-1-16700-422

SHANNON & WILSON

FIG. 3

FIG. 3

Filename: T:\21-1\16609_Key_Bank_RI-FS\AV_mxd\up_PCE_GW_Results.mxd Date: 12/18/2020 brl



Notes:
All units are shown in micrograms per liter.
u = not detected above laboratory limits.
PCE = tetrachloroethene
* = well screened within perched zone

Sound Transit - Former Key Bank Property
1000 NE 45th Street
Seattle, Washington

2014 INTERIM ACTION BASELINE GROUNDWATER SAMPLING

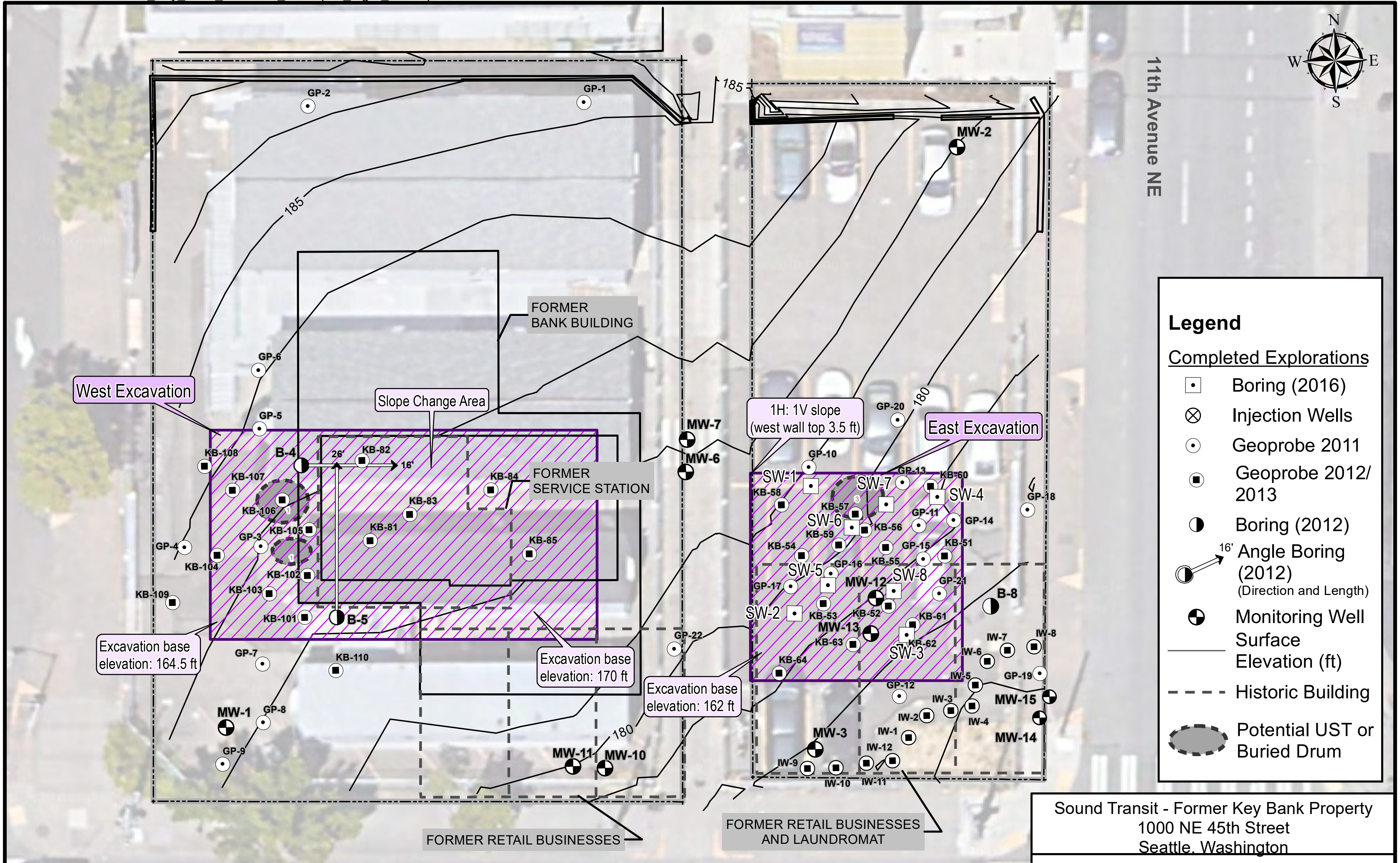
December 2020 21-1-16700-422

SHANNON & WILSON

FIG. 4

FIG. 4

Filename: T:\21-1\16609_Key_Bank_RI-FS\AV_mxd\up5a_Fig-2_SiteExplorations.mxd Date: 12/9/2020 brl



NOTE:

1. Wells MW-1, MW-3, MW-6, MW-7, MW-11, MW-12, MW-13, IW-1, IW-2, IW-3 and IW-6 through IW-12 decommissioned in 2016.

Sound Transit - Former Key Bank Property
1000 NE 45th Street
Seattle, Washington

2016 INTERIM ACTION MASS EXCAVATIONS

December 2020 21-1-16700-422

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 5

FIG. 5

Table 6 - Summary of Soil Analytical Results - 2016 West Excavation UST Site Assessment Sampling

	UST-1 (Western UST within West Excavation)					UST-2 (Eastern UST within West Excavation)			
Sample Number	UD-SW-E	UD-SW-W	UD-SW-N	UD-SW-S	UD-B1	UD2-SW-N	UD2-SW-S	UD2-B1	
Location	East of UST-1	West of UST-1	North of UST-1	South of UST-1	Below UST-1	North of UST-2	South of UST-2	Below UST-2	
Approximate Sample Depth (feet bgs)	8	8	7	10	11	5	6	6	
Date Sampled	09/06/16	09/06/16	09/06/16	09/06/16	09/06/16	09/13/16	09/13/16	09/13/16	MTCA Method A
Sample Delivery Group	1609081	1609081	1609081	1609081	1609081	1609155	1609155	1609155	Cleanup Criteria:
Total Petroleum Hydrocarbons									
Gasoline-Range	4,340 D	50.9	192	28.4	5,390 D	< 4.78	2,780 D	23.1	30[a]
Diesel-Range	< 21.3	< 22.7	< 20.8	< 23.1	< 23.0	< 23.4	< 22.5	< 23.5	2,000
Oil-Range	< 53.2	< 56.8	< 52.1	< 57.7	< 57.6	< 58.5	169	< 58.8	2,000
Metals									
Lead	2.83	5.90	25.3	3.40	2.50	19.7	19.3	19.9	250
Volatile Organic Compounds[b]									
Benzene	< 0.0245	< 0.0223	< 0.0175	< 0.0213	< 0.0204	< 0.0191	< 0.0210	< 0.0197	0.03
Toluene	< 0.0245	< 0.0223	< 0.0175	< 0.0213	< 0.0204	< 0.0191	< 0.0210	< 0.0197	7
Ethylbenzene	< 0.0368	< 0.0334	0.114	< 0.0320	3.03 D	< 0.0287	0.700	< 0.0296	*
m, p-Xylene	< 0.0245	0.0223	0.240	< 0.0213	3.52 D	0.033	1.73	0.0537	*
o-Xylene	< 0.0245	< 0.0223	0.0192	< 0.0213	< 0.0204	< 0.0191	< 0.0210	0.0246	*
1,2,3-Trichloropropane	< 0.0245	< 0.0223	< 0.0175	< 0.0213	< 0.0204	< 0.0191	0.0445	< 0.0197	*
1,2,4-Trimethylbenzene	0.946	0.246	0.584	0.0304	< 0.0204	0.0306	15.7 D	0.313	*
1,3,5-Trimethylbenzene	0.600	< 0.0223	0.114	< 0.0213	0.980	0.0191	8.35 D	0.145	*
2-Chlorotoluene	< 0.0245	< 0.0223	< 0.0175	< 0.0213	< 0.0204	< 0.0191	0.0529	< 0.0197	*
4-Chlorotoluene	< 0.0245	< 0.0223	0.0192	< 0.0213	0.205	< 0.0191	1.12	< 0.0197	*
Chloroform	< 0.0245	< 0.0223	< 0.0175	< 0.0213	< 0.0204	< 0.0191	< 0.0210	< 0.0197	*
Cumene	1.16	< 0.0892	< 0.0699	< 0.0852	3.98 D	< 0.0765	1.55	< 0.0788	*
Naphthalene	< 0.0368	0.0368	< 0.0262	< 0.0320	6.66 D	< 0.0287	3.29 D	0.098	5
n-Butylbenzene	5.87 D	0.0797	< 0.0175	0.0309	11.2 D	< 0.0191	< 0.0210	< 0.0197	*
n-Propylbenzene	1.37	0.0463	0.0892	< 0.0213	8.73 D	< 0.0191	2.14 D	0.0256	*
p-Isopropyltoluene	3.08 D	0.0407	0.0691	< 0.0213	5.14 D	< 0.0191	4.01 D	0.0502	*
Sec-Butylbenzene	3.70 D	0.0362	< 0.0175	0.0389	< 0.0204	< 0.0191	< 0.0210	0.0222	*
Tert-Butylbenzene	0.214	< 0.0223	< 0.0175	< 0.0213	0.251	< 0.0191	0.171	< 0.0197	*
Tetrachloroethene (PCE)	< 0.0245	< 0.0223	< 0.0175	< 0.0213	< 0.0204	0.140	< 0.0210	0.0635	0.05

NOTES:

a Criteria is based on benzene being present. Benzene was historically detected onsite.

b BTEX and other VOCs detected above labroatory reporting limits within western excavation sampling (including samples shown in Table 7) are shown.

* = MTCA Method A cleanup criteria have not been established for this analyte.

Samples collected during UST site assessment sampling; sampled soils were removed during subsequent excavation activities.

Results are in milligrams per kilogram.

< = not detected above laboratory reporting limit shown.

D = dilution was required.

Bold values indicate a detection above the laboratory reporting limit.

Shaded cells indicate a detection above the cleanup criteria.

BTEX = benzene, toluene ethylbenzene, and xylenes; MTCA = Model Toxics Control Act; UST = underground storage tank; VOCs = volatile organic compounds

Table 7 - Summary of Soil Analytical Results - 2016 West Excavation Confirmation Sampling

	West Excavation Extents - Locations Aligned to Former Location of UST-1				West Excavation Extents - Locations Aligned to Former Location of UST-2				
Sample Number	UD-W-T1N	UD-W-T1W	UD-W-TIS	UD-B2	UD-W-T2N	UD-W-T2S	UD-W-T2E	UD2-B2	
Location	North Wall - UST-1	West Wall - UST-1	South Wall - UST-1	Bottom - UST-1	North Wall - UST-2	South Wall - UST-2	East Wall - UST-2	Bottom - UST-2	
Approximate Sample Depth (feet bgs)	7.5	8	10	20	5	6	6.5	16	
Date Sampled	10/11/16	10/11/16	10/14/16	10/24/16	10/11/16	10/11/16	10/11/16	10/24/16	
Sample Delivery Group	1610176	1610176	1610259	1610353	1610176	1610176	1610176	1610353	MTCA Method A Cleanup Criteria:
Total Petroleum Hydrocarbons									
Gasoline-Range	398	< 6.55	1,410 D	< 3.03	< 5.14	< 5.11	< 5.09	< 5.52	30[a]
Diesel-Range	< 21.4	< 24.1	< 21.0	< 23.4	< 22.0	< 21.4	< 22.5	< 23.0	2,000
Oil-Range	< 53.4	< 60.3	122	< 58.4	< 55.0	< 53.5	< 56.2	< 57.4	2,000
Metals									
Lead	1.07	5.08	2.24	1.68	5.45	6.11	3.74	1.65	250
Volatile Organic Compounds[b]									
Benzene	< 0.0193	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	0.03
Toluene	< 0.0193	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	7
Ethylbenzene	< 0.029	< 0.0393	0.279	0.0248	< 0.0308	< 0.0307	< 0.0305	< 0.0331	*
m, p-Xylene	< 0.0193	< 0.0262	< 0.0183	0.0152	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
o-Xylene	< 0.0193	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
1,2,3-Trichloropropane	< 0.0193	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
1,2,4-Trimethylbenzene	0.311	< 0.0262	4.54 D	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
1,3,5-Trimethylbenzene	0.229	< 0.0262	2.23 D	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
2-Chlorotoluene	< 0.0193	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
4-Chlorotoluene	< 0.0193	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
Chloroform	< 0.0193	< 0.0262	< 0.0183	0.0179	< 0.0205	< 0.0204	< 0.0204	0.0363 B	*
Cumene	0.127	< 0.105	0.857	< 0.0486	< 0.0822	< 0.0817	< 0.0815	< 0.0883	*
Naphthalene	< 0.0290	< 0.0393	< 0.0274	< 0.0182	< 0.0308	< 0.0307	< 0.0305	< 0.0331	5
n-Butylbenzene	< 0.0193	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
n-Propylbenzene	0.224	< 0.0262	1.56	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
p-Isopropyltoluene	0.279	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
Sec-Butylbenzene	< 0.0193	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
Tert-Butylbenzene	0.0305	< 0.0262	< 0.0183	< 0.0121	< 0.0205	< 0.0204	< 0.0204	< 0.0221	*
Tetrachloroethene	< 0.0193	< 0.0262	< 0.0183	< 0.0121	0.0559	0.0454	< 0.0204	< 0.0221	0.05

NOTES:

a Criteria is based on benzene being present. Benzene was historically detected onsite.

b BTEX and other VOCs detected above laboratory reporting limits are shown.

* = MTCA Method A cleanup criteria have not been established for this analyte.

Samples collected from west excavation extents; sample locations selected to align with former UST locations.

Results are in milligrams per kilogram.

< = not detected above laboratory reporting limit shown.

D = dilution was required.

Bold values indicate a detection above the laboratory reporting limit.

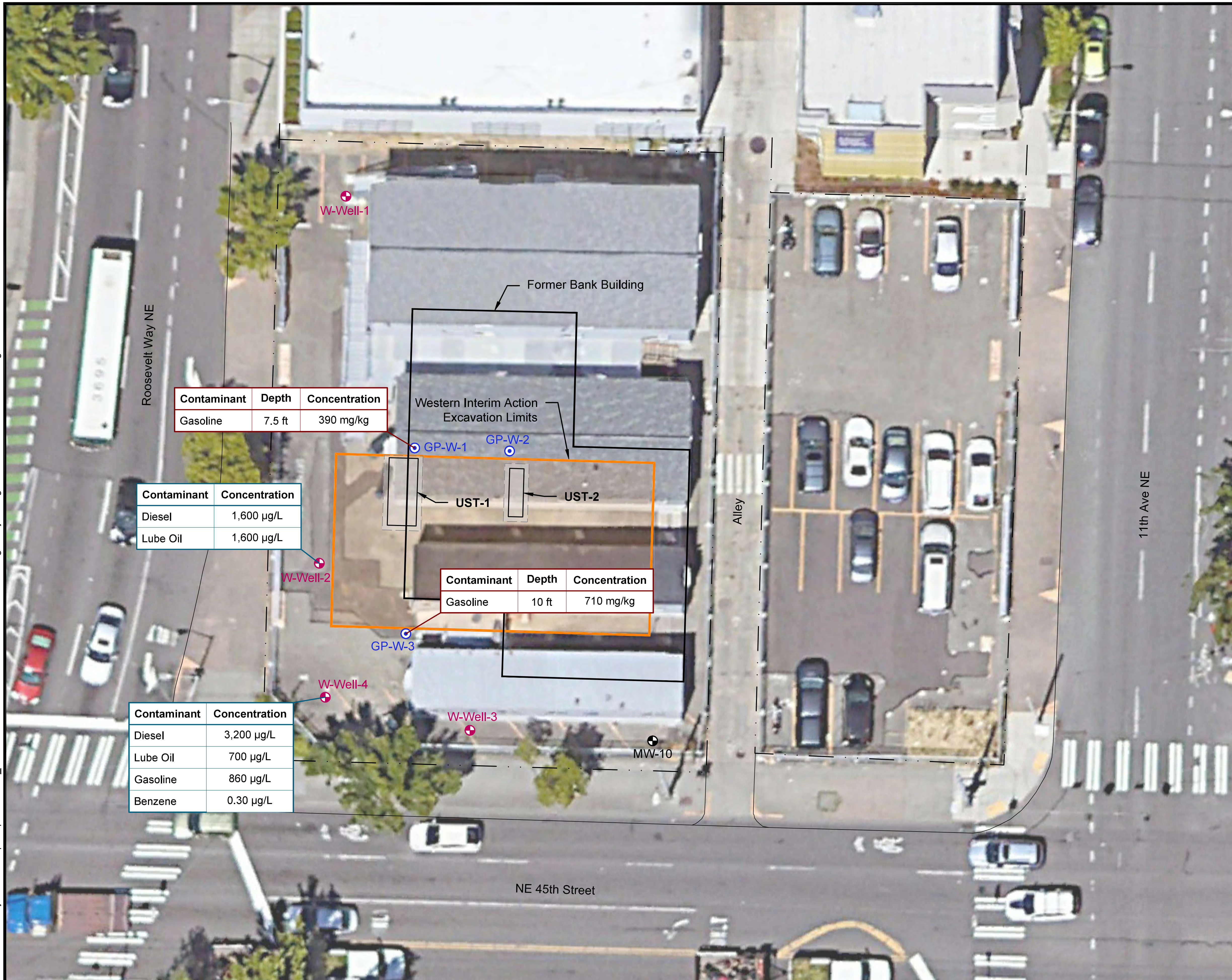
Shaded cells indicate a detection above the cleanup criteria.

bgs = below ground surface; BTEX = benzene, toluene ethylbenzene, and xylenes; MTCA = Model Toxics Control Act; UST =A1:J44 underground storage tank; VOCs = volatile organic compounds

Table 8 - Summary of Soil Analytical Results - 2016 East Excavation Confirmation Sampling

Sample Number	Location	Approximate Sample Depth (feet bgs)	Date Sampled	Sample Delivery Group	Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene	Vinyl Chloride	1,2- Dichloroethane	1,1-Dichloroethene	CFC-12	Chloroform
UD-E-1E	First Lift, East Wall	3	09/29/16	1609350	0.129	< 0.0191	< 0.0191	< 0.00191	< 0.0287	< 0.0478	< 0.0573	0.0244
UD-E-1N	First Lift, North Wall	3	09/29/16	1609350	0.0902	< 0.0195	< 0.0195	< 0.00195	< 0.0292	< 0.0487	< 0.0585	< 0.0195
UD-E-1S	First Lift, South Wall	2.5	09/29/16	1609350	0.0658	< 0.0188	< 0.0188	< 0.00188	< 0.0282	< 0.047	< 0.0564	0.0212
UD-E-1W	First Lift,West Wall	4	09/29/16	1609350	0.166	< 0.0209	< 0.0209	< 0.00209	< 0.0314	< 0.0523	< 0.0628	0.0267
UD-E-2E	Second Lift, East Wall	5	10/07/16	1610107	0.238	< 0.0193	< 0.0193	< 0.00193	< 0.029	< 0.0484	< 0.058	< 0.0193
UD-E-2N	Second Lift, North Wall	8.5	10/07/16	1610107	0.204	< 0.0201	< 0.0201	< 0.00201	< 0.0302	< 0.0504	< 0.0604	< 0.0201
UD-E-2S	Second Lift, South Wall	7	10/07/16	1610107	0.271	< 0.0189	< 0.0189	< 0.00189	< 0.0283	< 0.0472	< 0.0566	< 0.0189
UD-E-2W	Second Lift,West Wall	6.5	10/07/16	1610107	0.186	< 0.0171	< 0.0171	< 0.00171	< 0.0257	< 0.0428	< 0.0513	< 0.0171
UD-E-3E	Third Lift, East Wall	11	10/14/16	1610259	2.05	0.0986	< 0.0182	< 0.00182	< 0.0273	< 0.0455	< 0.0546	0.0454
UD-E-3N	Third Lift, North Wall	12	10/14/16	1610259	0.183	< 0.0187	< 0.0187	< 0.00187	< 0.028	< 0.0467	< 0.0561	0.0408
UD-E-3S	Third Lift, South Wall	11.5	10/14/16	1610259	0.293	< 0.0106	< 0.0106	< 0.00106	< 0.0159	< 0.0266	< 0.0319	0.0224
UD-E-3W	Third Lift,West Wall	12	10/14/16	1610259	0.428	< 0.0189	< 0.0189	< 0.00189	< 0.0284	< 0.0473	< 0.0568	0.0551
UD-E-4E1	Fourth Lift, East Wall	14	10/20/16	1610337	0.596	< 0.0237	< 0.0237	< 0.00237	< 0.0356	< 0.0594	< 0.0712	< 0.0237
UD-E-4E2	Fourth Lift, East Wall	14	10/20/16	1610337	2.14	0.0428	< 0.0275	< 0.00275	< 0.0413	< 0.0688	< 0.0826	< 0.0275
UD-E-4N	Fourth Lift, North Wall	15	10/20/16	1610337	1.01	0.155	< 0.0209	< 0.00209	< 0.0313	< 0.0521	< 0.0626	< 0.0209
UD-E-4S	Fourth Lift, South Wall	13.5	10/20/16	1610337	1.85	0.100	< 0.0229	< 0.00229	< 0.0343	< 0.0572	< 0.0687	< 0.0229
UD-E-4W	Fourth Lift,West Wall	17.5	10/20/16	1610337	0.587	< 0.0368	< 0.0368	< 0.00368	< 0.0552	< 0.092	< 0.11	< 0.0368
UD-E-B1	Bottom	17.5	10/20/16	1610337	0.478	< 0.0243	< 0.0243	< 0.00243	< 0.0365	< 0.0608	< 0.0729	< 0.0243
UD-E-B2	Bottom	18.5	10/20/16	1610337	1.27	0.0298	< 0.021	< 0.0021	< 0.0315	< 0.0525	< 0.063	< 0.021
UD-E-B3	Bottom	16.5	10/20/16	1610337	6.44	0.0631	< 0.0174	< 0.00174	< 0.026	< 0.0434	< 0.0521	< 0.0174
			MTCA Method A Cleanup Criteria:		0.05	0.03	*	*	*	*	*	*

NOTES:
* = MTCA Method A cleanup criteria have not been established for this analyte.
Results are in milligrams per kilogram.
< = not detected above laboratory reporting limit shown.
Bold values indicate a detection above the laboratory reporting limit.
Shaded cells indicate a detection above the cleanup criteria.
MTCA = Model Toxics Control Act



Contaminant	Depth	Concentration
Gasoline	7.5 ft	390 mg/kg

Contaminant	Concentration
Diesel	1,600 µg/L
Lube Oil	1,600 µg/L

Contaminant	Depth	Concentration
Gasoline	10 ft	710 mg/kg

Contaminant	Concentration
Diesel	3,200 µg/L
Lube Oil	700 µg/L
Gasoline	860 µg/L
Benzene	0.30 µg/L

N

LEGEND

MW-10 — Previously Installed Monitoring Well Designation and Approximate Location

W-Well-1 — Monitoring Well Designation and Approximate Location

GP-W-1 — Probe Designation and Approximate Location

Excavation Limits *(2014)*

UST Excavation Area *(2014)*

Property Line

Soil Detections Exceeding the MTCA Method A Cleanup Criteria

Groundwater Detections Exceeding the MTCA Method A Cleanup Criteria

ABBREVIATIONS

mg/kg = milligrams per kilograms
µg/L = micrograms per liter

0 20 40
Scale in Feet

Sound Transit
Former Key Bank Property
1000 NE 45th Street
Seattle, Washington

SITE PLAN
WEST EXCAVATION

April 2021 104059-103

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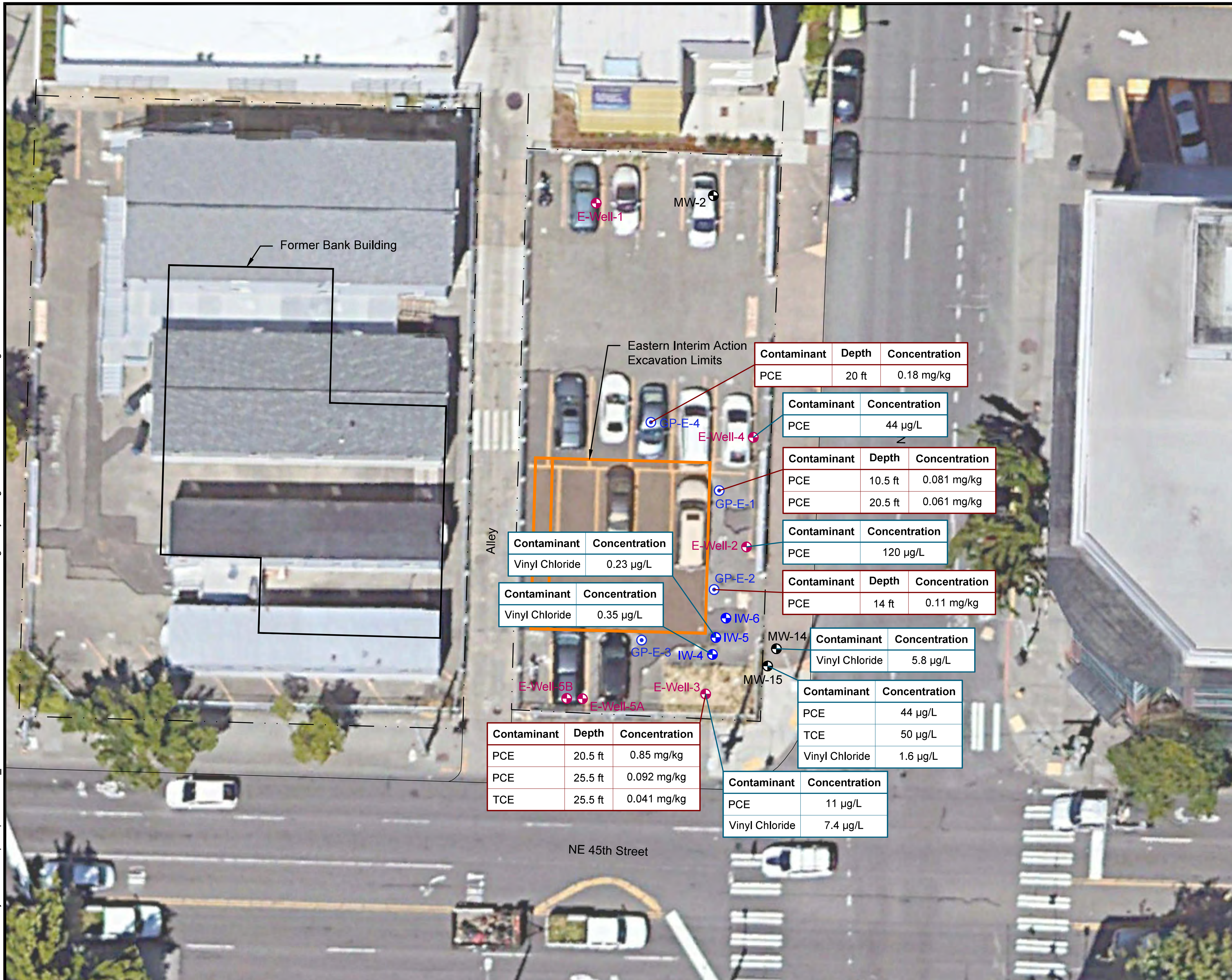
FIG. 2

Filename: C:\Users\jrs\CAD Group Dropbox\UDrive_SEA\104059\103\104059-103 Plan and Profiles.dwg Layout: Figure 2 Date: 04-02-2021 Login: JRS



Contaminant	Depth	Concentration
PCE	20 ft	0.18 mg/kg

Contaminant	Concentration
PCE	44 µg/L

Contaminant	Depth	Concentration
PCE	10.5 ft	0.081 mg/kg
PCE	20.5 ft	0.061 mg/kg

Contaminant	Concentration
PCE	120 µg/L

Contaminant	Depth	Concentration
PCE	14 ft	0.11 mg/kg

Contaminant	Concentration
Vinyl Chloride	0.23 µg/L

Contaminant	Concentration
Vinyl Chloride	0.35 µg/L

Contaminant	Concentration
Vinyl Chloride	5.8 µg/L

Contaminant	Concentration
PCE	44 µg/L
TCE	50 µg/L
Vinyl Chloride	1.6 µg/L

Contaminant	Depth	Concentration
PCE	20.5 ft	0.85 mg/kg
PCE	25.5 ft	0.092 mg/kg
TCE	25.5 ft	0.041 mg/kg

Contaminant	Concentration
PCE	11 µg/L
Vinyl Chloride	7.4 µg/L

N

LEGEND

MW-14 — Previously Installed Monitoring Well Designation and Approximate Location

E-Well-1 — Monitoring Well Designation and Approximate Location

GP-E-1 — Probe Designation and Approximate Location

Excavation Limits *(2014)*

Property Line

Soil Detections Exceeding the MTCA Method A Cleanup Criteria

Groundwater Detections Exceeding the MTCA Method A Cleanup Criteria

ABBREVIATIONS

mg/kg = milligrams per kilograms
µg/L = micrograms per liter

0 20 40
Scale in Feet

Sound Transit
Former Key Bank Property
1000 NE 45th Street
Seattle, Washington

SITE PLAN
EAST EXCAVATION

April 2021 104059-103

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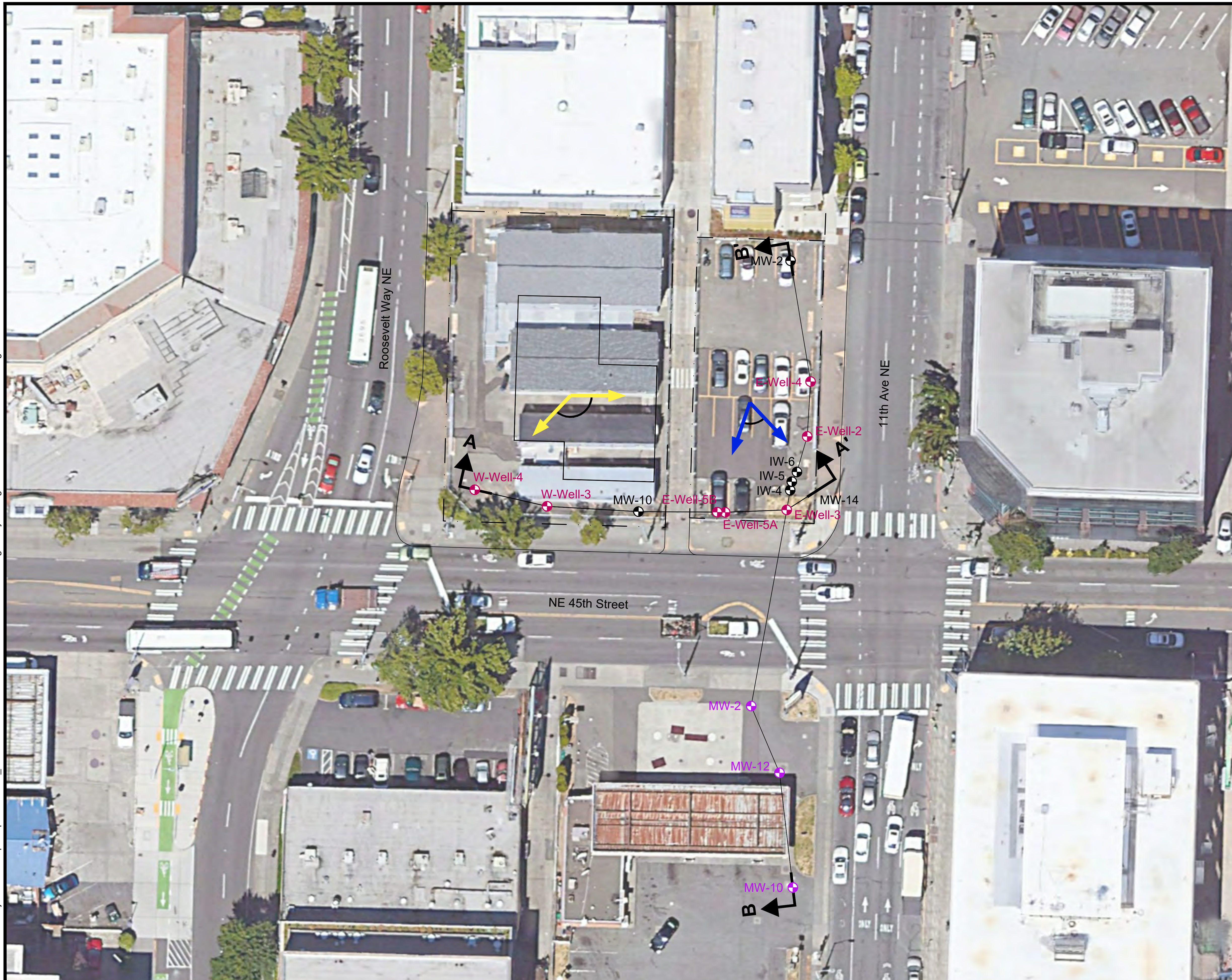
FIG. 3

Filename: C:\Users\jrs\CAD Group Dropbox\UDrive_SEA\104059\103\104059-103 Plan and Profiles.dwg Layout: Figure 3 Date: 04-02-2021 Login: JRS



N

LEGEND

MW-10 — Previously Installed Monitoring Well Designation and Approximate Location

W-Well-1 — Monitoring Well Designation and Approximate Location

MW-2 — Off-Site Monitoring Well Designation and Approximate Location

Property Line

Generalized Subsurface Profile

Estimated Range in Groundwater Flow Direction West Site

Estimated Range in Groundwater Flow Direction East Site

0 40 80

Scale in Feet

Sound Transit
Former Key Bank Property
1000 NE 45th Street
Seattle, Washington

CROSS SECTION LOCATION MAP

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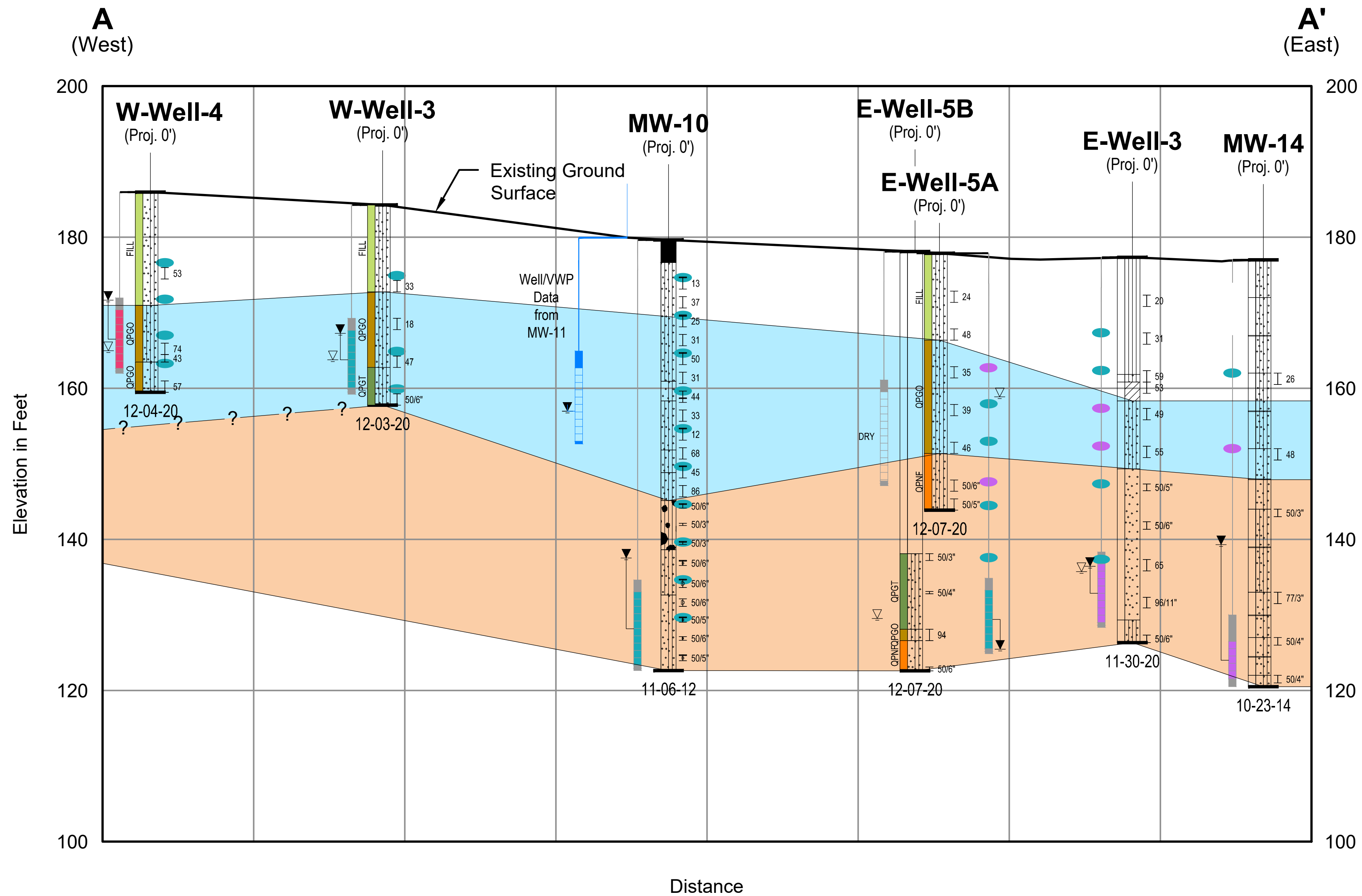
FIG. 4

Filename: C:\Users\jrs\CAD Group Dropbox\UDrive_SEA\104059\103\104059-103 Plan and Profiles.dwg Layout: Figure 4 Date: 04-09-2021 Login: JRS



LEGEND

Soil or Groundwater Concentrations Exceed Applicable CULs for Chlorinated Solvents

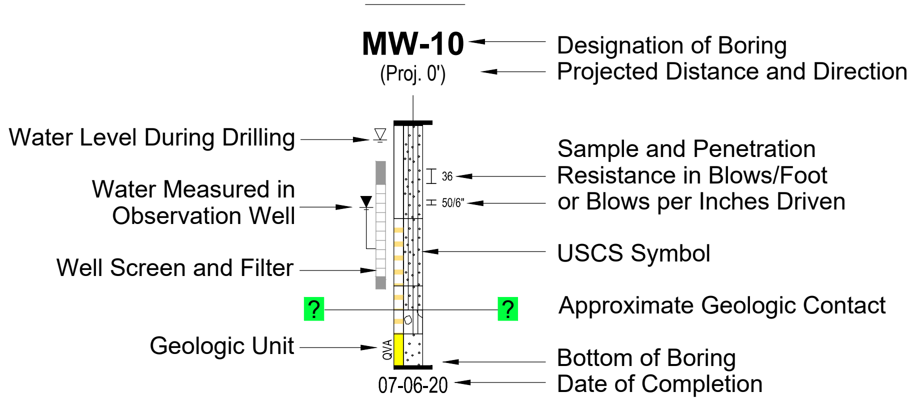
Groundwater Concentrations Exceed Applicable CULs for Petroleum Hydrocarbons

Soil and Groundwater Concentrations Do Not Exceed Applicable CULs for Chlorinated Solvents or Petroleum Hydrocarbons

Potential Water-Bearing Zone as Perched Water on Very Dense Soils. Groundwater Yield Locally Variable and Ephemeral.

Very Dense Glacially Over-riden Soil. Groundwater Likely to Occur Predominantly Within Intercalated Sands and Secondary Porosity Structures.

LEGEND



0 20 40

Scale in Feet
Vertical = Horizontal

NOTES

1. Ground surface adapted from client file, *20180-SV-BS.pdf*, received 1-29-21. "Advanced Demolition and Site Prep, Northgate and UDS Staging Contamination and Remediation Plan," dated 12/21/2020, and from gINT logs.

2. This subsurface profile is generalized from materials observed in soil borings. Variations may exist between profile and actual conditions.

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GENERALIZED SUBSURFACE PROFILE A-A'

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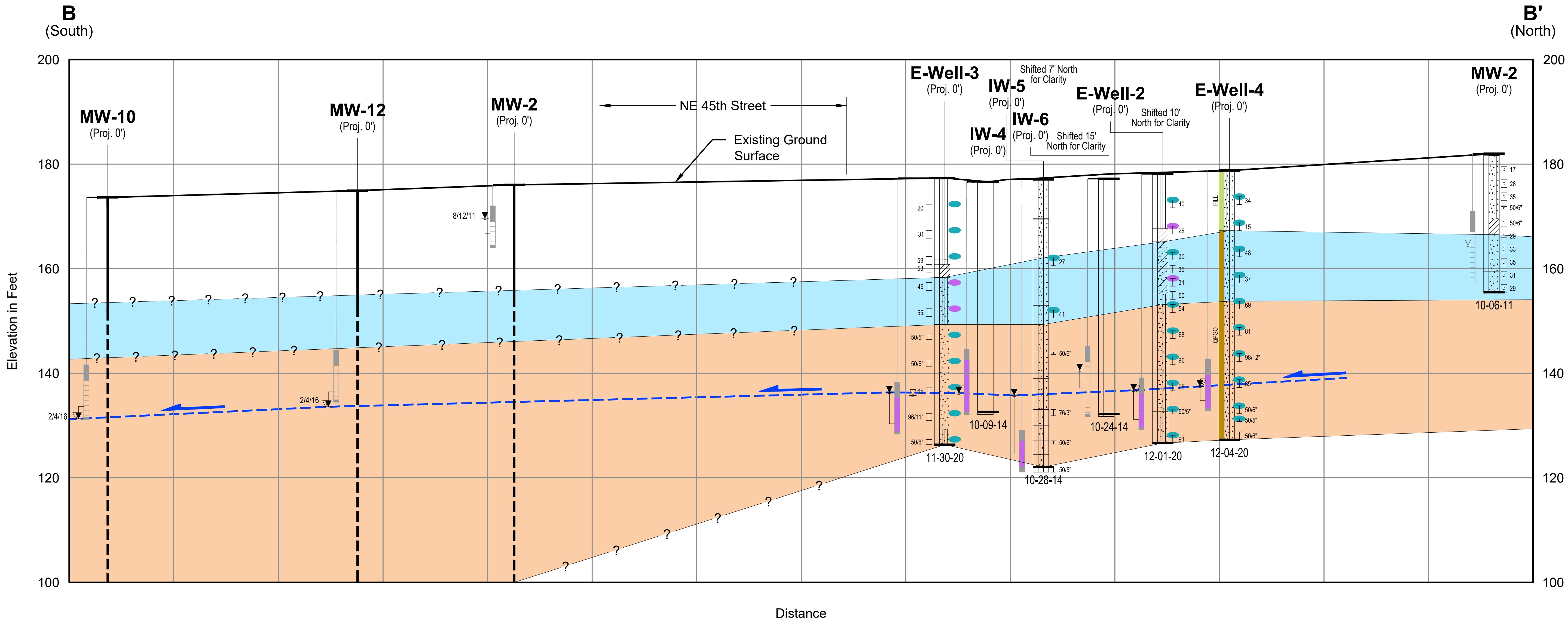
FIG. 5

Filename: C:\Users\jrs\CAD Group Dropbox\UDrive_SEA\104059\103\104059-103 Plan and Profiles.dwg Layout: Figure 5 Date: 04-02-2021 Login: JRS



LEGEND

MW-10 — Designation of Boring
(Proj. 0') — Projected Distance and Direction
Water Level During Drilling
Water Measured in Observation Well
Well Screen and Filter
Geologic Unit
Sample and Penetration Resistance in Blows/Foot or Blows per Inches Driven
USCS Symbol
? — Approximate Geologic Contact
Bottom of Boring
07-06-20 — Date of Completion

LEGEND

Soil or Groundwater Concentrations Exceed Applicable CULs for Chlorinated Solvents

Groundwater Concentrations Exceed Applicable CULs for Petroleum Hydrocarbons

Soil and Groundwater Concentrations Do Not Exceed Applicable CULs for Chlorinated Solvents or Petroleum Hydrocarbons

Potential Water-Bearing Zone as Perched Water on Very Dense Soils. Groundwater Yield Locally Variable and Ephemeral.

Very Dense Glacially Over-riden Soil. Groundwater Likely to Occur Predominantly Within Intercalated Sands and Secondary Porosity Structures.

Deep Groundwater Level

Deep Groundwater Flow Direction

0 20 40

Scale in Feet
Vertical = Horizontal

NOTES

1. Ground surface adapted from client file, *20180-SV-BS.pdf*, received 1-29-21. "Advanced Demolition and Site Prep, Northgate and UDS Staging Contamination and Remediation Plan," dated 12/21/2020, and from gINT logs.
2. This subsurface profile is generalized from materials observed in soil borings. Variations may exist between profile and actual conditions.

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Seattle, Washington

GENERALIZED SUBSURFACE PROFILE B-B'

April 2021 | 104059-103

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FIG. 6

Filename: C:\Users\jrs\CAD Group Dropbox\UDrive_SEA\104059\103\104059-103 Plan and Profiles.dwg Layout: Figure 6 Date: 04-02-2021 Login: JRS

Table 1 - Summary of Direct Push Soil Analytical Results (West Site)

Well ID:	GP-W-1	GP-W-2	GP-W-3	MTCA Method A CUL for Unrestricted Land Use
Sample Number:	GP-W-1:7.5	GP-W-2:5	GP-W-3:10	
Sample Collection Depth (feet bgs):	7.5	5	10	
Sample Date:	11/12/20	11/12/20	11/12/20	
Petroleum Hydrocarbons - (mg/kg)				
Gasoline-Range Organics	**390**	--	**710**	100
Volatile Organics - (mg/kg)				
Trichloroethene (TCE)	--	**0.013**	--	0.03
All other volatiles	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

Shaded text indicates detection above the CUL.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act; mg/kg = milligram per kilogram; NA = Not Applicable; -- = not analyzed

Table 2 - Summary of Borehole Soil Analytical Results (West Site)

Well ID:	W-Well-1	W-Well-2				MTCA Method A CUL for Unrestricted Land Use
Sample Number:	W-Well-1:30	W-Well-2 S-1	W-Well-2 S-2	W-Well-102 S-2	W-Well-2 S-3	
Sample Collection Depth (feet bgs):	30	10.5	15.5	15.5	20.5	
Sample Date:	12/02/20	12/03/20	12/03/20	12/03/20	12/03/20	
Petroleum Hydrocarbons - (mg/kg)						
Diesel-Range Organics	< 28	--	--	--	--	500
Lube Oil-Range Organics	< 56	--	--	--	--	500
Gasoline-Range Organics	< 4.5	< 6.6	< 6.7	< 6.8	< 6.9	100
Volatile Organics - (mg/kg)						
Trichloroethene (TCE)	< 0.00085	< 0.0011	< 0.0013	< 0.0015	< 0.0011	0.03
Acetone	< 0.0085	< 0.011	**0.014**	< 0.015	**0.018**	NA
All other volatiles	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; mg/kg = milligram per kilogram; NA = Not Applicable

Table 2 - Summary of Borehole Soil Analytical Results (West Site) - Continued

Well ID:	W-Well-3				W-Well-4			
Sample Number:	W-Well-3 S-1	W-Well-3 S-2	W-Well-3 S-3	W-Well-3 S-4	W-Well-4 S-1	W-Well-4 S-2	W-Well-4 S-3	MTCA Method A CUL for Unrestricted Land Use
Sample Collection Depth (feet bgs):	10.5	15.5	20.5	25.5	10.5	21.5	25.5	
Sample Date:	12/03/20	12/03/20	12/03/20	12/03/20	12/04/20	12/04/20	12/04/20	
Petroleum Hydrocarbons - (mg/kg)								
Gasoline-Range Organics	< 5.3	< 7.0	< 6.8	< 5.9	< 5.8	< 5.1	< 6.8	100
Volatile Organics - (mg/kg)								
Trichloroethene (TCE)	< 0.00092	< 0.0012	< 0.0012	< 0.00096	< 0.0011	< 0.0012	< 0.0012	0.03
Acetone	**0.011**	< 0.012	< 0.012	< 0.0096	**0.013**	**0.017**	< 0.012	NE
Isopropylbenzene	< 0.00092	< 0.0012	< 0.0012	**0.0030**	< 0.0011	< 0.0012	< 0.0012	NE
All other volatiles	ND	ND	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; mg/kg = milligram per kilogram; NA = Not Applicable

Table 3 - Summary of Groundwater Analytical Results (West Site)

Well ID:	W-Well-1	W-Well-2	W-Well-3		W-Well-4		MW-10	
Sample Number:	W-Well-1:GW	W-Well-2:GW	W-Well-3:GW	W-Well-103:GW	W-Well-4:GW	W-Well-104:GW	MW-10:GW	
Depth to Water (feet bgs):	28.92	12.45	16.97	16.97	14.30	14.30	42.05	
Sample Date:	12/07/20	12/07/20	12/07/20	12/07/20	12/08/20	12/08/20	12/11/20	MTCA Method A CUL for Unrestricted Land Use
Petroleum Hydrocarbons - (ug/L)								
Diesel-Range Organics	< 210	**1600**	**480**	**420**	**3200**	**3200**	--	500
Lube Oil-Range Organics	< 210	**1600**	**260**	< 220	**640**	**700**	--	500
Gasoline-Range Organics	< 100	**170**	**360**	**360**	**860**	**840**	< 100	1,000/800*
Volatile Organics - (ug/L)								
Bromomethane	< 1.4	**3.6**	< 1.4	< 1.4	< 2.7	< 2.7	< 1.1	NE
Acetone	< 5.0	**82**	< 5.0	< 5.0	< 5.0	< 5.0	--	NE
(cis) 1,2-Dichloroethene (DCE)	< 0.20	< 0.20	< 0.20	**0.22**	< 0.20	< 0.20	**0.60**	NE
Chloroform	**0.22**	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	**0.32**	NE
1,1,1-Trichloroethane	**0.30**	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	2
Benzene	< 0.20	< 0.20	< 0.20	< 0.20	**0.30**	**0.29**	< 1.0	0.03
Tetrachloroethene (PCE)	< 0.20	< 0.20	**0.22**	< 0.20	< 0.20	< 0.20	--	5
Ethylbenzene	< 0.20	**0.49**	**3.5**	**3.5**	**3.6**	**3.6**	< 1.0	6
m,p-Xylene	< 0.40	**0.96**	**5.7**	**5.4**	**2.0**	**1.9**	< 1.0	9**
o-Xylene	< 0.20	**0.64**	**0.29**	**0.29**	**0.43**	**0.37**	< 1.0	9**
Isopropylbenzene	< 0.20	**0.40**	**1.0**	**1.0**	**2.8**	**2.7**	--	NE
n-Propylbenzene	< 0.20	**0.36**	**0.43**	**0.41**	**1.2**	**1.2**	--	NE
1,3,5-Trimethylbenzene	< 0.20	**2.0**	**3.7**	**3.4**	**6.8**	**5.2**	--	NE
tert-Butylbenzene	< 0.20	< 0.20	**0.59**	**0.58**	**1.2**	**1.2**	--	NE
1,2,4-Trimethylbenzene	< 0.20	**1.9**	**4.3**	**3.9**	**3.1**	**3.0**	--	NE
sec-Butylbenzene	< 0.20	**0.37**	**0.35**	**0.32**	**4.2**	**4.2**	--	NE
p-Isopropyltoluene	< 0.20	**0.94**	**0.57**	**0.56**	**0.65**	**0.53**	--	NE
Naphthalene	< 1.0	< 1.0	**1.9**	**2.1**	**1.6**	**2.0**	--	5
All other analyzed volatiles	ND	ND	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

Shaded text indicates detection above the CUL.

* = CUL for gasoline-range orgaincs is 1,000 ug/L without the presence of benzene and 800 ug/L with the presence of benzene.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; ug/L = micrograms per liter; NA = Not Applicable; -- = not analyzed

Table 4 - Summary of Direct Push Soil Analytical Results (East Site)

Well ID:	GP-E-1	GP-E-2	GP-E-3		GP-E-4			MTCA Method A CUL for Unrestricted Land Use
Sample Number:	GP-E-1:14	GP-E-2:14	GP-E-3:13.5	GP-E-100:13.5	GP-E-4:15	GP-E-4:20.5	GP-E-4:25	
Sample Collection Depth (feet bgs):	14	14	13.5	13.5	15	20.5	25	
Sample Date:	11/12/20	11/12/20	11/12/20	11/12/20	11/12/20	11/12/20	11/12/20	
Volatile Organics - (mg/kg)								
(cis) 1,2-Dichloroethene (DCE)	< 0.00094	**0.010**	**0.013**	**0.011**	< 0.00097	**0.0070**	**0.0098**	NE
Trichloroethene (TCE)	< 0.00094	**0.0092**	**0.0027**	**0.0036**	< 0.00097	**0.010**	**0.0082**	0.03
Tetrachloroethene (PCE)	**0.033**	**0.11**	**0.032**	**0.022**	**0.029**	**0.18**	**0.028**	0.05
All other volatiles	ND	ND	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

Shaded text indicates detection above the CUL.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; mg/kg = milligrams per kilogram; NA = Not Applicable

Table 5 - Summary of Borehole Soil Analytical Results (East Site)

Well ID:	E-Well-1								MTCA Method A CUL for Unrestricted Land Use
Sample Number:	E-Well-1:5.5	E-Well-1:10.5	E-Well-1:15.5	E-Well-1:20.5	E-Well-1:25.5	E-Well-1:30.5	E-Well-1:35.5	E-Well-1:40.5	
Sample Collection Depth (feet bgs):	5.5	10.5	15.5	20.5	25.5	30.5	35.5	40.5	
Sample Date:	12/01/20	12/01/20	12/01/20	12/01/20	12/02/20	12/02/20	12/02/20	12/02/20	
Volatile Organics - (mg/kg)									
Vinyl Chloride	< 0.00087	< 0.00098	< 0.00073	< 0.00089	< 0.00084	< 0.00097	< 0.00088	< 0.0011	0.2
(cis) 1,2-Dichloroethene (DCE)	< 0.00087	< 0.00098	< 0.00073	< 0.00089	< 0.00084	< 0.00097	< 0.00088	< 0.0011	NE
Trichloroethene (TCE)	< 0.00087	< 0.00098	< 0.00073	< 0.00089	< 0.00084	< 0.00097	< 0.00088	< 0.0011	0.03
Tetrachloroethene (PCE)	< 0.00087	< 0.00098	< 0.00073	< 0.00089	< 0.00084	< 0.00097	< 0.00088	< 0.0011	0.05
All other volatiles	ND	ND	ND	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; mg/kg = milligrams per kilogram; NA = Not Applicable

Table 5 - Summary of Borehole Soil Analytical Results (East Site) - Continued

Well ID:	E-Well-2											MTCA Method A CUL for Unrestricted Land Use
Sample Number:	E-Well-2:5.5	E-Well-2:10.5	E-Well-2:15.5	E-Well-2:20.5	E-Well-2:25.5	E-Well-2:30.5	E-Well-2:35.5	E-Well-2:40.5	E-Well-2:45.5	E-Well-101:45.5	E-Well-2:50.5	
Sample Collection Depth (feet bgs):	5.5	10.5	15.5	20.5	25.5	30.5	35.5	40.5	45.5	45.5	50.5	
Sample Date:	12/01/20	12/01/20	12/01/20	12/01/20	12/01/20	12/01/20	12/01/20	12/01/20	12/01/20	12/01/20	12/01/20	
Volatile Organics - (mg/kg)												
Vinyl Chloride	< 0.00092	< 0.00098	< 0.00094	< 0.00090	< 0.00085	< 0.00095	< 0.00099	< 0.00096	< 0.00084	< 0.00088	< 0.00086	0.2
(cis) 1,2-Dichloroethene (DCE)	< 0.00092	< 0.00098	< 0.00094	< 0.00090	**0.032**	**0.0078**	**0.0019**	< 0.00096	< 0.00084	< 0.00088	< 0.00086	NE
Trichloroethene (TCE)	< 0.00092	**0.0032**	**0.0048**	**0.0041**	**0.0025**	< 0.00095	< 0.00099	< 0.00096	< 0.00084	< 0.00088	< 0.00086	0.03
Tetrachloroethene (PCE)	**0.020**	**0.081**	**0.013**	**0.061**	**0.022**	**0.010**	**0.0090**	**0.0096**	**0.024**	**0.022**	**0.0091**	0.05
All other volatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

Shaded text indicates detection above the CUL.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; mg/kg = milligrams per kilogram; NA = Not Applicable

Table 5 - Summary of Borehole Soil Analytical Results (East Site) - Continued

Well ID:	E-Well-3										MTCA Method A CUL for Unrestricted Land Use
Sample Number:	E-Well-3:5.5	E-Well-3:10.5	E-Well-3:15.5	E-Well-3:20.5	E-Well-3:25.5	E-Well-3:30.5	E-Well-3:35.5	E-Well-3:40.5	E-Well-3:45.5	E-Well-3:50.5	
Sample Collection Depth (feet bgs):	5.5	10.5	15.5	20.5	25.5	30.5	35.5	40.5	45.5	50.5	
Sample Date:	11/30/20	11/30/20	11/30/20	11/30/20	11/30/20	11/30/20	11/30/20	11/30/20	11/30/20	11/30/20	
Volatile Organics - (mg/kg)											
Vinyl Chloride	< 0.0013	< 0.0013	< 0.00085	< 0.0089	< 0.00087	< 0.00088	< 0.00084	**0.0012**	< 0.00082	< 0.0010	0.2
(cis) 1,2-Dichloroethene (DCE)	< 0.0013	**0.0022**	< 0.00085	< 0.0089	**0.011**	**0.0038**	< 0.00084	**0.0037**	**0.0018**	< 0.0010	NE
Trichloroethene (TCE)	< 0.0013	**0.011**	< 0.00085	**0.022**	**0.041**	**0.00099**	< 0.00084	< 0.00081	< 0.00082	< 0.0010	0.03
Tetrachloroethene (PCE)	**0.0025**	**0.0018**	**0.0039**	**0.85**	**0.092**	**0.013**	**0.0026**	**0.0041**	< 0.00082	< 0.0010	0.05
All other volatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

Shaded text indicates detection above the CUL.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; mg/kg = milligrams per kilogram; NA = Not Applicable

Table 5 - Summary of Borehole Soil Analytical Results (East Site) - Continued

Well ID:	E-Well-4										MTCA Method A CUL for Unrestricted Land Use
Sample Number:	E-Well-4 S-1	E-Well-4 S-2	E-Well-4 S-3	E-Well-4 S-4	E-Well-4 S-5	E-Well-4 S-6	E-Well-4 S-7	E-Well-4 S-8	E-Well-4 S-9	E-Well-4 S-10	
Sample Collection Depth (feet bgs):	5.5	10.5	15.5	20.5	25.5	30.5	35.5	40.5	45.5	47.3	
Sample Date:	12/04/20	12/04/20	12/04/20	12/04/20	12/04/20	12/04/20	12/04/20	12/04/20	12/04/20	12/04/20	
Volatile Organics - (mg/kg)											
Vinyl Chloride	< 0.0012	< 0.0012	< 0.0010	< 0.0013	< 0.0016	< 0.0011	< 0.0014	< 0.0017	< 0.0013	< 0.00098	0.2
(cis) 1,2-Dichloroethene (DCE)	< 0.0012	< 0.0012	< 0.0010	< 0.0013	**0.0055**	< 0.0011	< 0.0014	< 0.0017	< 0.0013	< 0.00098	NE
Trichloroethene (TCE)	< 0.0012	< 0.0012	< 0.0010	< 0.0013	**0.0020**	< 0.0011	< 0.0014	< 0.0017	< 0.0013	< 0.00098	0.03
Tetrachloroethene (PCE)	**0.0061**	< 0.0012	**0.016**	< 0.0013	**0.034**	**0.014**	**0.028**	**0.026**	**0.0028**	< 0.00098	0.05
All other volatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; mg/kg = milligrams per kilogram; NA = Not Applicable

Table 5 - Summary of Borehole Soil Analytical Results (East Site) - Continued

Well ID:	E-Well-5A							E-Well-5B				MTCA Method A CUL for Unrestricted Land Use
Sample Number:	E-Well-5A S-1	E-Well-5A S-2	E-Well-5A S-3	E-Well-5A S-4	E-Well-5A S-5	E-Well-5A S-6	E-Well-5A S-7	E-Well-5B S-1	E-Well-5B S-2	E-Well-5B S-3	E-Well-5B S-4	
Sample Collection Depth (feet bgs):	5.5	10.5	15.5	20.5	25.5	30.5	33.0	40.5	45.2	50.5	55.3	
Sample Date:	12/07/20	12/07/20	12/07/20	12/07/20	12/07/20	12/07/20	12/07/20	12/07/20	12/07/20	12/08/20	12/08/20	
Volatile Organics - (mg/kg)												
Vinyl Chloride	< 0.0011	< 0.00098	< 0.0011	< 0.0013	< 0.0016	< 0.060	< 0.00096	< 0.00092	< 0.0012	< 0.0011	< 0.064	0.2
(cis) 1,2-Dichloroethene (DCE)	< 0.0011	< 0.00098	< 0.0011	< 0.0013	**0.031**	**0.17**	**0.0093**	< 0.00092	< 0.0012	< 0.0011	< 0.064	NE
Trichloroethene (TCE)	< 0.0011	< 0.00098	**0.0047**	**0.0019**	< 0.0016	< 0.060	< 0.00096	< 0.00092	< 0.0012	< 0.0011	< 0.064	0.03
Tetrachloroethene (PCE)	**0.0053**	**0.0082**	**0.084**	**0.0069**	**0.0087**	**0.21**	**0.031**	**0.0027**	< 0.0012	< 0.0011	< 0.064	0.05
All other volatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

Shaded text indicates detection above the CUL.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; mg/kg = milligrams per kilogram; NA = Not Applicable

Table 6 - Summary of Groundwater Analytical Results (East Site)

Well ID:	E-Well-1	E-Well-2		E-Well-3		E-Well-4	E-Well-5B	MTCA Method A CUL for Unrestricted Land Use
Sample Number:	E-Well-1:GW	E-Well-2:GW	E-Well-102:GW	E-Well-3:GW	E-Well-103:GW	E-Well-4:GW	E-Well-5B:GW	
Depth to Water (feet bgs):	26.80	41.42	41.42	40.92	40.92	41.29	41.83	
Sample Date:	12/10/20	12/11/20	12/11/20	12/11/20	12/11/20	12/11/20	12/11/20	
Volatile Organics - (ug/L)								
Vinyl Chloride	< 0.20	< 0.80	< 0.80	**7.0**	**7.4**	< 0.20	< 0.20	0.2
(cis) 1,2-Dichloroethene (DCE)	< 0.20	**2.6**	**2.7**	**37**	**38**	< 0.20	**0.36**	NE
Trichloroethene (TCE)	< 0.20	**2.6**	**2.8**	**1.2**	**1.3**	**1.0**	< 0.20	5
Tetrachloroethene (PCE)	< 0.20	**120**	**120**	**11**	**11**	**44**	< 0.20	5
All other analyzed volatiles	ND	ND	ND	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

Shaded text indicates detection above the CUL.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; ug/L = micrograms per liter; NA = Not Applicable

Table 6 - Summary of Groundwater Analytical Results (East Site) - Continued

Well ID:	IW-4	IW-5	MW-14	MW-15	
Sample Number:	IW4:GW11620	IW5:GW11520	MW-14:GW11620	MW-15:GW11520	
Depth to Water (feet bgs):	40.62	41.47	40.66	41.79	
Sample Date:	11/06/20	11/05/20	11/06/20	11/05/20	MTCA Method A CUL for Unrestricted Land Use
Volatile Organics - (ug/L)					
Vinyl Chloride	**0.35**	**0.23**	**5.8**	**1.6**	0.2
Chloroethane	< 1.0	< 1.0	**1.1**	< 2.0	NE
(cis) 1,2-Dichloroethene (DCE)	< 0.20	**16**	**19**	**11**	NE
Trichloroethene (TCE)	< 0.20	< 0.20	**1.7**	**11**	5
Tetrachloroethene (PCE)	< 0.20	< 0.20	**0.60**	**50**	5
All other volatiles	ND	ND	ND	ND	NA

NOTES:

Bold text indicates detected analyte.

Shaded text indicates detection above the CUL.

< = not detected above indicated laboratory reporting limit; bgs = below ground surface; CUL = cleanup level; MTCA = Model Toxics Control Act;
NE = not established; ug/L = micrograms per liter; NA = Not Applicable

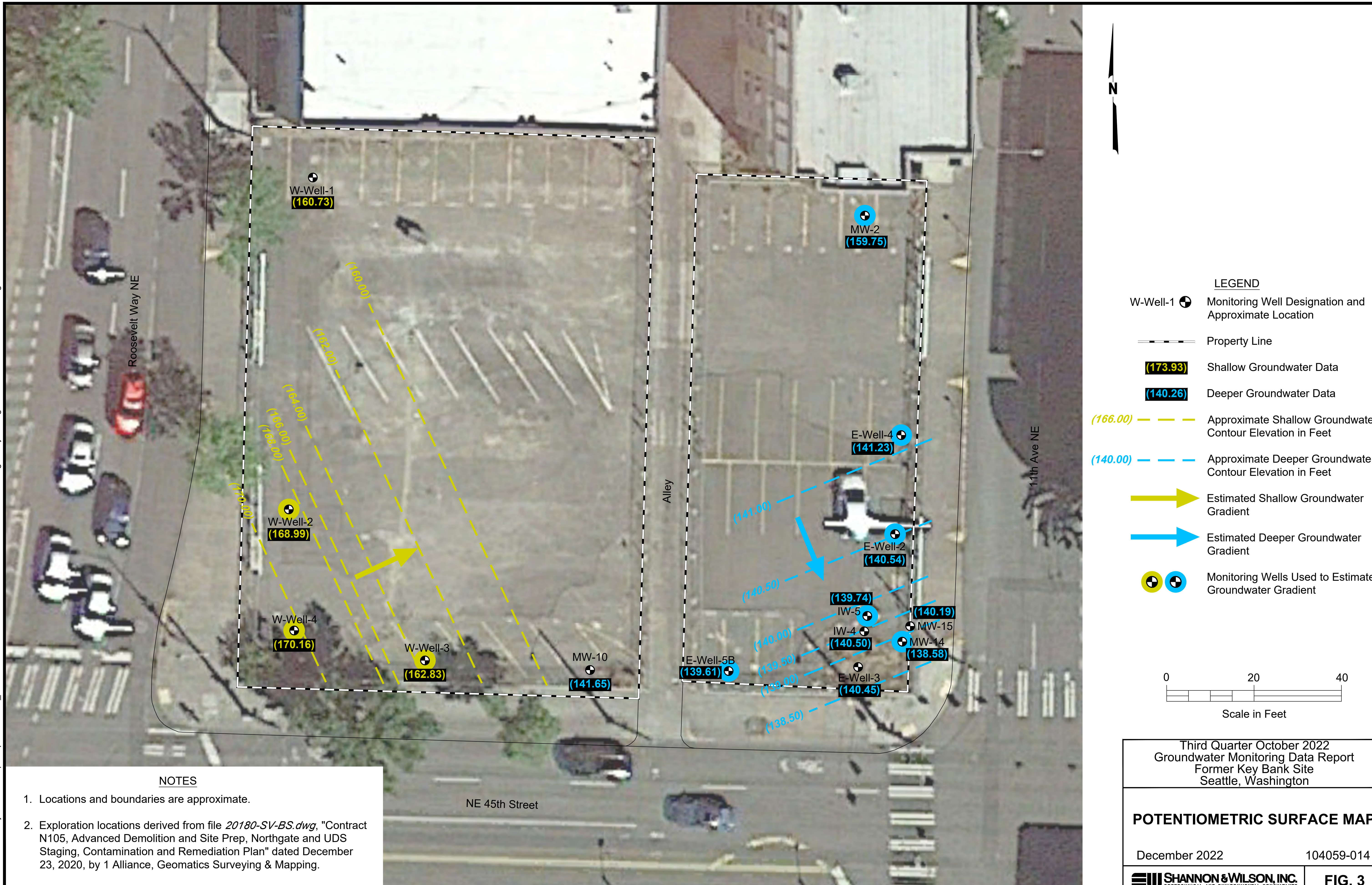
Table 7 - Recorded Groundwater Level Measurements

Well ID	Measured Depth to Bottom of Well* (feet bgs on 2/23/2021)	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Measured Depth to Water (feet bgs on 2/23/2021)
West Site Monitoring Wells				
W-Well-1	35.40	20	35	28.64
W-Well-2	19.78	10	20	10.08
W-Well-3	25.02	15	25	18.62
W-Well-4	24.46	14	24	12.73
MW-10	55.75	45	55	42.42
East Site Monitoring Wells				
E-Well-1	37.28	27	37	27.03
E-Well-2	48.60	39	49	41.43
E-Well-3	49.38	39	49	40.61
E-Well-4	45.38	36	46	41.18
E-Well-5A	32.42	17	32	DRY
E-Well-5B	51.70	43	52	41.37
IW-4	42.66	34	44	40.09
IW-5	54.45	50	55	40.55
MW-2	24.78	15	25	24.39
MW-14	54.56	50	55	41.33
MW-15	44.42	35	45	40.37

NOTES:

bgs = below ground surface

* = Measured depth to bottom can differ from the actual bottom due to the accumulation of sediment inside the well.



NOTES

1. Locations and boundaries are approximate.
2. Exploration locations derived from file *20180-SV-BS.dwg*, "Contract N105, Advanced Demolition and Site Prep, Northgate and UDS Staging, Contamination and Remediation Plan" dated December 23, 2020, by 1 Alliance, Geomatics Surveying & Mapping.

Third Quarter October 2022
Groundwater Monitoring Data Report
Former Key Bank Site
Seattle, Washington

POTENTIOMETRIC SURFACE MAP

December 2022 | 104059-014

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 3

Filename: C:\Users\jrs\CAD Group Dropbox\UDrive_SEA\104059\014\104059-014 Potentiometric-2022-3rdQ.dwg Layout: Figure 3 Date: 12-21-2022 Login: JRS

Table 1: Well Completion Details

Well No.	Ecology Tag	Installation Date	Northing[a]	Easting[a]	Field Observation (October 2022)	Ground Surface Elevation (feet)[a]	Monument Elevation (feet)[a]	Casing Stickdown Below Monument (feet)	Casing Elevation (feet)[a]	Top of Filter Depth (feet bgs)	Bottom of Filter Depth (feet bgs)	Filter Pack Elevation Range (feet)	Top of Screen Depth (feet bgs)	Bottom of Screen Depth (feet bgs)	Screen Elevation Range (feet)	Screen Length (feet)	Casing Depth (feet bgs)	Well Bottom Elevation (feet)	Inside Casing Diameter (inches)
Groundwater Monitoring Wells - Active																			
MW-2	BHJ 555	10/7/2011	244889.26	1274888.60	-	181.93	181.93	0.50	181.43	11	25	170.93 - 156.93	15	25	166.93 - 156.93	10	25	156.93	2
MW-10	BHS 595	11/6/2012	244785.27	1274825.70	-	179.66	179.65	0.40	179.25	45	57	134.66 - 122.66	46.6	56.3	133.06 - 123.36	9.7	56.7	122.96	2
MW-14	BIK 539	10/23/2014	244791.75	1274899.86	-	176.88	176.87	0.59	176.28	47	56.5	129.88 - 120.38	50.5	55.5	126.38 - 121.38	5	56.5	120.38	2
MW-15	BIK 540	10/27/2014	244795.30	1274901.68	-	177.01	177.01	0.60	176.41	33	45.5	144.01 - 131.51	35	45	142.01 - 132.01	10	45.5	131.51	2
E-Well-1	BND-083	12/2/2020	244887.46	1274864.41	Covered[1]	-	184.20	0.40	183.80	25	39	158.80 - 144.80	27	37	157.20 - 147.20	10	37.28	146.92	2
E-Well-2	BND-082	12/1/2020	244816.36	1274895.51	-	-	178.15	0.30	177.85	37	50	140.85 - 127.85	39	49	139.15 - 129.15	10	48.60	129.55	2
E-Well-3	BND-081	11/30/2020	244785.95	1274887.05	Accessible[2]	-	177.35	0.20	177.15	37	50	140.15 - 127.15	39	49	138.35 - 128.35	10	49.38	127.97	2
E-Well-4	BND-088	12/4/2020	244839.02	1274896.91	-	-	178.79	0.20	178.59	34	47	144.59 - 131.59	36	46	142.79 - 132.79	10	45.38	133.41	2
E-Well-5A	BND-089	12/7/2020	244784.96	1274861.57	-	-	177.88	0.30	177.58	15	33.5	162.58 - 144.08	17	32	160.88 - 145.88	15	32.42	145.46	2
E-Well-5B	BMP-413	12/8/2020	244785.03	1274857.41	-	-	178.12	0.30	177.82	43	55.5	134.82 - 122.32	43	52	135.12 - 126.12	9	51.70	126.42	2
W-Well-1	BND 084	12/2/2020	244897.98	1274762.25	-	-	186.78	0.40	186.38	18	35.5	168.38 - 150.88	20	35	166.78 - 151.78	15	35.40	151.38	2
W-Well-2	BND 085	12/3/2020	244822.02	1274756.75	-	-	183.72	0.30	183.42	8	20.5	175.42 - 162.92	10	20	173.72 - 163.72	10	19.78	163.94	2
W-Well-3	BND 086	12/3/2020	244787.45	1274787.91	-	-	184.27	0.30	183.97	13	25.5	170.97 - 158.47	15	25	169.27 - 159.27	10	25.02	159.25	2
W-Well-4	BND 087	12/4/2020	244794.30	1274757.98	-	-	185.98	0.30	185.68	12	26.5	173.68 - 159.18	14	24	171.98 - 161.98	10	24.46	161.52	2
Groundwater Monitoring Wells - Previously Decommissioned[b]																			
MW-1	BHJ 554	10/6/2011	244793.98	1274761.43	-	182.28	182.28	0.56	181.72	5	25	177.28 - 157.28	5	25	177.28 - 157.28	20	25	157.28	2
MW-3	BHJ 556	10/7/2011	244787.51	1274861.58	-	177.98	177.94	0.45	177.49	21	35	156.98 - 142.98	25	35	152.98 - 142.98	10	35	142.98	2
MW-6	BHS 597	11/7/2012	244835.33	1274840.85	-	181.83	181.79	0.42	181.37	47	59.5	134.83 - 122.33	49	59	132.83 - 122.83	10	59.5	122.33	2
MW-7	BHS 598	11/7/2012	244840.83	1274841.23	-	182.18	182.18	0.42	181.76	16	28.5	166.18 - 153.68	18	28	164.18 - 154.18	10	28.5	153.68	2
MW-11	BHS 596	11/6/2012	244785.76	1274820.25	-	180.06	180.02	0.36	179.66	15	27.3	165.06 - 152.76	17.2	26.9	162.86 - 153.16	9.7	27.3	152.76	2
MW-12	BHS 599	11/9/2012	244812.93	1274872.61	-	179.02	178.97	0.37	178.60	38	50.5	141.02 - 128.52	40	50	139.02 - 129.02	10	50.5	128.52	2
MW-13	BHS 600	11/9/2012	244806.97	1274871.58	-	178.48	178.48	0.45	178.03	13	30.5	165.48 - 147.98	15	30	163.48 - 148.48	15	30.5	147.98	2
Injection Wells - Active																			
IW-4	BIK 512	10/9/2014	244794.11	1274888.46	-	176.94	176.97	0.37	176.60	32	44.5	144.94 - 132.44	34	44	142.94 - 132.94	10	44.5	132.44	2
IW-5	BIK 541	10/28/2014	244797.63	1274889.15	-	177.06	177.07	0.42	176.65	48	56	129.06 - 121.06	50	55	127.06 - 122.06	5	56	121.06	2

Table 1: Well Completion Details

Well No.	Ecology Tag	Installation Date	Northing[a]	Easting[a]	Field Observation (October 2022)	Ground Surface Elevation (feet)[a]	Monument Elevation (feet)[a]	Casing Stickdown Below Monument (feet)	Casing Elevation (feet)[a]	Top of Filter Depth (feet bgs)	Bottom of Filter Depth (feet bgs)	Filter Pack Elevation Range (feet)	Top of Screen Depth (feet bgs)	Bottom of Screen Depth (feet bgs)	Screen Elevation Range (feet)	Screen Length (feet)	Casing Depth (feet bgs)	Well Bottom Elevation (feet)	Inside Casing Diameter (inches)
Injection Wells - Decommissioned[b]																			
IW-1	BCC 175	10/6/2014	244789.00	1274877.51	-	177.21	177.18	0.32	176.86	47.8	55.5	129.41 - 121.71	49.8	54.8	127.41 - 122.41	5	57	120.21	2
IW-2	BIK 510	10/8/2014	244792.72	1274880.72	-	177.28	177.31	1.00	176.31	32	45	145.28 - 132.28	34	44	143.28 - 133.28	10	45	132.28	2
IW-3	BIK 511	10/9/2014	244793.48	1274884.86	-	177.12	177.13	0.49	176.64	48.8	55	128.32 - 122.12	49.5	54.5	127.62 - 122.62	5	55	122.12	2
IW-6	BIK 538	10/24/2014	244801.64	1274891.26	-	177.22	177.18	0.37	176.81	32	45.5	145.22 - 131.72	35	45	142.22 - 132.22	10	45.5	131.72	2
IW-7	BIK 532	10/20/2014	244803.42	1274894.77	-	177.21	177.21	0.64	176.57	48	56	129.21 - 121.21	50.5	55.5	126.71 - 121.71	5	56	121.21	2
IW-8	BIK 533	10/20/2014	244803.92	1274899.29	-	177.23	177.23	0.49	176.74	33	45.5	144.23 - 131.73	35	45	142.23 - 132.23	10	45.5	131.73	2
IW-9	BIK 534	10/21/2014	244784.30	1274860.16	-	177.83	177.85	0.51	177.34	48	56.5	129.83 - 121.33	51	56	126.83 - 121.83	5	56.5	121.33	2
IW-10	BIK 535	10/22/2014	244784.29	1274865.01	-	177.49	177.50	0.49	177.01	30	44	147.49 - 133.49	33	43	144.49 - 134.49	10	44	133.49	2
IW-11	BIK 536	10/23/2014	244784.86	1274870.21	-	177.14	177.18	0.52	176.66	47	56.5	130.14 - 120.64	50	55	127.14 - 122.14	5	56.5	120.64	2
IW-12	BIK 537	10/24/2014	244785.24	1274874.69	-	177.02	177.08	0.63	176.45	31	44.5	146.02 - 132.52	34	44	143.02 - 133.02	10	44.5	132.52	2

NOTES:

1 Covered with a concrete block and/or asphalt patch as late as October 7, 2022.

2 E-Well-3 was not located during March 2022 event. However, following removal of surface vegetation and soil E-Well-3 was located and monitored in June 2022.

a Northings and eastings and elevation data for "MW" and "IW" wells by Lin & Associates, Inc. survey. "E-Well" or "W-Well" wells were surveyed by 1 Alliance Geomatics on December 21, 2020. Horizontal datum is State Plane of Washington Coordinate System of 1983, 1991 Adjustment [NAD83/91]. Verical datum is North American Vertical Datum (NAVD 88).

b MW-12 and MW-13 decommissioned on August 3, 2016. MW-3, MW-6, MW-7, MW-11, MW-12, MW-13, IW-1, IW-2, IW-3, and IW-6 through IW-12 decommissioned September 9, 2016.

bgs = below ground surface

Table 2: Summary of Groundwater Level Measurements

Well No.	Screened Interval (feet bgs)	TOC Elevation	Date	Depth to Water (feet below TOC)	Groundwater Elevation[a]
Active Wells					
West Site					
W-Well-1	18 - 35.5	186.38	12/7/2020	28.92	157.46
			2/23/2021	28.64	157.74
			6/8/2022	25.13	161.25
			10/6/2022	25.65	160.73
W-Well-2	8 - 20.5	183.42	12/7/2020	12.45	170.97
			2/23/2021	10.08	173.34
			3/4/2022	9.49	173.93
			6/8/2022	9.71	173.71
			10/6/2022	14.43	168.99
W-Well-3	13 - 25.5	183.97	12/7/2020	16.97	167.00
			2/23/2021	18.62	165.35
			3/4/2022	17.49	166.48
			6/8/2022	16.70	167.27
			10/6/2022	21.14	162.83
W-Well-4	12 - 26.5	185.68	12/8/2020	14.30	171.38
			2/23/2021	12.73	172.95
			3/4/2022	12.18	173.50
			6/8/2022	12.01	173.67
			10/6/2022	15.52	170.16
MW-10	46.6 - 56.3	179.25	12/3/2012	39.12	140.13
			10/8/2014	37.37	141.88
			2/10/2017	Dry[3]	--
			12/11/2020	42.05	137.20
			2/23/2021	42.42	136.83
			6/8/2022	37.61	141.64
			10/6/2022	37.60	141.65
East Site					
E-Well-2	37 - 50	177.85	12/11/2020	41.42	136.43
			2/23/2021	41.43	136.42
			3/3/2022	38.37	139.48
			6/8/2022	37.50	140.35
			10/7/2022	37.31	140.54

Table 2: Summary of Groundwater Level Measurements

Well No.	Screened Interval (feet bgs)	TOC Elevation	Date	Depth to Water (feet below TOC)	Groundwater Elevation[a]
E-Well-3	37 - 50	177.15	12/11/2020	40.92	136.23
			2/23/2021	40.61	136.54
			6/8/2022	36.87	140.28
			10/7/2022	36.70	140.45
E-Well-4	34 - 47	178.59	12/11/2020	41.29	137.30
			2/23/2021	41.18	137.41
			3/3/2022	38.33	140.26
			6/8/2022	37.65	140.94
			10/7/2022	37.36	141.23
E-Well-5A	15 - 33.5	177.58	2/23/2021	Dry	--
			3/3/2022	Dry	--
			6/8/2022	Dry	--
			10/7/2022	Dry	--
E-Well-5B	43 - 55.5	177.82	12/11/2020	41.83	135.99
			2/23/2021	41.37	136.45
			3/3/2022	39.30	138.52
			6/8/2022	38.08	139.74
			10/7/2022	38.21	139.61
MW-2	15 - 25	181.43	12/3/2012	20.71	160.72
			2/10/2017	Dry[3]	--
			11/3/2020	Dry	--
			2/23/2021	24.39	157.04
			6/8/2022	21.92	159.51
			10/7/2022	21.68	159.75
MW-14	50.5 - 55.5	176.28	10/31/2014	35.85	140.43
			11/1/2014	37.12	139.16
			2/10/2017	Dry[3]	--
			11/3/2020	41.80	134.48
			2/23/2021	41.33	134.95
			3/4/2022	38.10	138.18
			6/8/2022	37.58	138.70
			10/7/2022	37.70	138.58

Table 2: Summary of Groundwater Level Measurements

Well No.	Screened Interval (feet bgs)	TOC Elevation	Date	Depth to Water (feet below TOC)	Groundwater Elevation[a]
MW-15	35 - 45	176.41	10/31/2014	37.08	139.33
			11/1/2014	35.95	140.46
			2/10/2017	Dry[3]	--
			11/3/2020	40.61	135.80
			2/23/2021	40.37	136.04
			3/4/2022	37.11	139.30
			6/8/2022	36.35	140.06
			10/7/2022	36.22	140.19
IW-4	34 - 44	176.6	11/1/2014	36.08	140.52
			2/10/2017	Dry[3]	--
			11/3/2020	40.58	136.02
			2/23/2021	40.09	136.51
			3/4/2022	37.40	139.20
			6/8/2022	36.20	140.40
			10/7/2022	36.10	140.50
IW-5	50 - 55	176.65	11/1/2014	37.21	139.44
			2/10/2017	Dry[3]	--
			11/3/2020	41.23	135.42
			2/23/2021	40.55	136.10
			3/4/2022	37.60	139.05
			6/8/2022	36.89	139.76
			10/7/2022	36.91	139.74
Decommissioned or Inaccessible Wells					
West Site					
MW-1	5 - 25	181.72	12/3/2012	15.61	166.11
MW-6	49 - 59	181.37	12/3/2012	23.08	158.29
MW-7	18 - 28	181.76	12/3/2012	17.36	164.4
			10/6/2014	18.83	162.93
MW-11	17.2 - 26.9	179.66	12/3/2012	22.35	157.31
			10/7/2014	23.02	156.64
East Site					
E-Well-1	25 - 39	183.80	12/10/2020	26.8	157.00
			2/23/2021	27.03	156.77
MW-3	25 - 35	177.49	12/3/2012	34.46	143.03
			11/1/2014	Dry	--

Table 2: Summary of Groundwater Level Measurements

Well No.	Screened Interval (feet bgs)	TOC Elevation	Date	Depth to Water (feet below TOC)	Groundwater Elevation[a]
MW-12	40 - 50	178.6	12/3/2012	37.96	140.64
			10/7/2014	38.50	140.10
			11/1/2014	38.65	139.95
MW-13	15 - 30	178.03	12/3/2012	Dry	--
IW-1	49.8 - 54.8	176.86	10/8/2014	37.31	139.55
			11/1/2014	37.35	139.51
IW-2	34 - 44	176.31	10/9/2014	36.18	140.13
			11/1/2014	35.71	140.60
IW-3	49.5 - 54.5	176.64	11/1/2014	37.20	139.44
IW-6	32 - 45.5	176.81	11/1/2014	36.25	140.56
IW-7	50.5 - 55.5	176.57	10/23/2014	36.97	139.60
			11/1/2014	37.07	139.50
IW-8	35 - 45	176.74	10/24/2014	35.88	140.86
			11/1/2014	36.26	140.48
IW-9	51 - 56	177.34	10/27/2014	41.41	135.93
			11/1/2014	37.77	139.57
IW-10	33 - 43	177.01	10/28/2014	36.05	140.96
			11/1/2014	36.34	140.67
IW-11	50 - 55	176.66	11/1/2014	37.22	139.44
IW-12	35 - 44	176.45	11/1/2014	35.84	140.61

NOTES:

Data collected during October 2022 monitoring event.

East Well-1 was observed to be covered with a concrete block and/or asphalt patch as late as October 7, 2022.

E-Well-3 was not located during March 2022 event. However, following removal of surface vegetation and soil E-Well-3 was located and monitored in June 2022.

Water levels measured during February 2017 were believed to be dry due to dewatering to support the construction of the Sound Transit University District Station and/or due to dewatering associated with construction of an apartment building with multilevel underground parked to the north.

a The reference vertical datum is the North American Vertical Datum (NAVD 88).

bgs = below ground surface; TOC = top of casing

Table 3: Summary of Groundwater Analytical Results (West Site)

Well ID:	W-Well-1	W-Well-2				W-Well-3						MW-10		
Sample Number:	W-Well-1:GW	W-Well-2:GW	W-Well-2-03032022	W-Well-2:GW	W-Well-2:GW	W-Well-3:GW	W-Well-103:GW	W-Well-3-03032022	W-Well-100-03032022	W-Well-3:GW	W-Well-3:GW	MW-10:GW	MW-10:GW	MW-10:GW
Sample Date:	12/7/2020	12/7/2020	3/3/2022	6/7/2022	10/6/2022	12/7/2020	12/7/2020[1]	3/3/2022	03/3/2022[2]	6/7/2022	10/6/2022	11/19/2012	10/8/2014	12/11/2020
Petroleum Hydrocarbons - (ug/L)														
Diesel-Range Organics	< 210	1600	780	1300	1500	480	420	680	660	360	930	--	--	--
Lube Oil-Range Organics	< 210	1600	950	1600	1300	260	< 220	590	570	410	680	--	--	--
Gasoline-Range Organics	< 100	170	< 100	< 100	250	360	360	270	280	210	1200	< 100	--	< 100
Volatile Organics - (ug/L)														
1,1,1-Trichloroethane	0.30	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.40	--	< 1.0	< 0.20
1,2,4-Trimethylbenzene	< 0.20	1.9	0.72	0.46	8.0	4.3	3.9	6.1	7.5	3.9	49	--	< 1.0	--
1,3,5-Trimethylbenzene	< 0.20	2.0	0.87	0.62	2.1	3.7	3.4	< 0.20	< 0.20	< 0.20	< 0.40	--	--	--
Acetone	< 5.0	82	17	34	7.4	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10	--	--	--
Benzene	< 0.20	< 0.20	< 0.20	<0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.40	< 0.20	--	< 1.0
Bromomethane	< 1.4	3.6	< 3.1	< 2.0	< 1.0	< 1.4	< 1.4	< 3.1	< 3.1	< 2.0	< 2.0	--	< 1.3	< 1.1
Chloroform	0.22	< 0.20	1.2	1.6	0.52	< 0.20	< 0.20	< 0.20	< 0.20	0.34	0.64	--	1.9	0.32
(cis) 1,2-Dichloroethene (DCE)	< 0.20	< 0.20	< 0.20	<0.20	< 0.20	< 0.20	0.22	< 0.20	< 0.20	< 0.20	< 0.40	< 0.20	< 1.0	0.60
Ethylbenzene	< 0.20	0.49	< 0.20	0.26	1.5	3.5	3.5	1.2	1.6	0.68	59	< 0.20	--	< 1.0
Isopropylbenzene	< 0.20	0.40	< 0.20	<0.20	2.3	1.0	1.0	6.9	8.3	3.9	22	--	--	--
m, p-Xylene	< 0.40	0.96	0.43	0.40	5.4	5.7	5.4	< 0.40	< 0.40	< 0.40	11	< 0.40	--	< 1.0
Naphthalene	< 1.0	< 1.0	< 1.0	<1.0	3.2	1.9	2.1	< 1.0	1.1	1.3	11	--	--	--
n-Butylbenzene	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.26	0.27	0.21	1.4	--	--	--
n-Propylbenzene	< 0.20	0.36	< 0.20	< 0.20	2.0	0.43	0.41	4.2	4.6	2.0	17	--	--	--
o-Xylene	< 0.20	0.64	0.31	0.40	0.63	0.29	0.29	< 0.20	< 0.20	< 0.20	0.43	< 0.20	--	< 1.0
p-Isopropyltoluene	< 0.20	0.94	< 0.20	0.24	0.55	0.57	0.56	< 0.20	< 0.20	< 0.20	1.5	--	--	--
sec-Butylbenzene	< 0.20	0.37	< 0.20	< 0.20	0.65	0.35	0.32	4.1	3.9	2.8	6.8	--	--	--
tert-Butylbenzene	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.59	0.58	0.66	0.65	0.46	0.93	--	--	--
Tetrachloroethene (PCE)	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.22	< 0.20	0.27	0.22	0.41	< 0.40	< 0.20	< 1.0	< 0.20
Other analyzed volatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTES:

1 Sample W-Well-103:GW dated 12/7/2020 is a field duplicate of sample W-Well-3:GW dated 12/7/2020.

2 Sample W-Well-100-03032022 dated 3/3/2022 is a field duplicate of W-Well-3-03032022 dated 3/3/2022.

3 Sample W-Well-104:GW dated 12/8/2020 is a field duplicate of W-Well-4:GW dated 12/8/2020.

4 Sample W-Well-100:GW dated 6/7/2022 is a field duplicate of W-Well-4:GW dated 6/7/2022.

5 Sample W-Well-101:GW dated 10/6/2022 is a field duplicate of W-Well-4:GW dated 10/6/2022.

Bold text indicates detected analyte.

Data collected during October 2022 monitoring event.

Shaded text indicates detection above the MTCA Method A CUL.

* CUL for gasoline-range orgaincs is 1,000 ug/L without the presence of benzene and 800 ug/L with the presence of benzene.

† MTCA Method A CUL for total xylenes is used since a MTCA Method A CUL is not established for the isomers of m-, p-, or o-xylene.

-- = not analyzed; < = not detected above indicated laboratory reporting limit; ug/L = micrograms per liter; CUL = cleanup level; MTCA = Model Toxics Control Act; ND = not detected; NE = not established

Table 3: Summary of Groundwater Analytical Results (West Site)

Well ID:	W-Well-4							MW-10			MTCA Method A CUL for Unrestricted Land Use
Sample Number:	W-Well-4:GW	W-Well-104:GW	W-Well-4-03032022	W-Well-4:GW	W-Well-100:GW	W-Well-4:GW	W-Well-101:GW	MW-10:GW	MW-10:GW	MW-10:GW	
Sample Date:	12/8/2020	12/8/2020[3]	3/3/2022	6/7/2022	6/7/2022[4]	10/6/2022	10/6/2022[5]	11/19/2012	10/8/2014	12/11/2020	
Petroleum Hydrocarbons - (ug/L)											
Diesel-Range Organics	3200	3200	1500	900	920	700	620	--	--	--	500
Lube Oil-Range Organics	640	700	890	520	570	590	540	--	--	--	500
Gasoline-Range Organics	860	840	1100	980	1100	440	480	< 100	--	< 100	1,000/800*
Volatile Organics - (ug/L)											
1,1,1-Trichloroethane	< 0.20	< 0.20	< 0.20	<0.20	< 0.20	< 0.20	< 0.20	--	< 1.0	< 0.20	200
1,2,4-Trimethylbenzene	3.1	3.0	35	27	25	0.86	0.75	--	< 1.0	--	NE
1,3,5-Trimethylbenzene	6.80	5.2	4.7	4.6	4.3	< 0.20	< 0.20	--	--	--	NE
Acetone	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	NE
Benzene	0.30	0.29	0.26	0.21	0.21	< 0.20	< 0.20	< 0.20	--	< 1.0	5
Bromomethane	< 2.7	< 2.7	< 3.1	< 2.0	< 2.0	< 1.0	< 1.0	--	< 1.3	< 1.1	NE
Chloroform	< 0.20	< 0.20	< 0.20	0.38	0.38	0.28	0.26	--	1.9	0.32	NE
(cis) 1,2-Dichloroethene (DCE)	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 1.0	0.60	NE
Ethylbenzene	3.6	3.6	33	29	27	6.2	5.6	< 0.20	--	< 1.0	700
Isopropylbenzene	2.8	2.7	17	17	16	5.0	4.7	--	--	--	NE
m, p-Xylene	2.0	1.9	16	13	12	< 0.40	< 0.40	< 0.40	--	< 1.0	1000†
Naphthalene	1.6	2.0	8.2	7.6	7.8	1.7	1.6	--	--	--	160
n-Butylbenzene	< 0.20	< 0.20	1.8	1.7	1.7	< 0.20	< 0.20	--	--	--	NE
n-Propylbenzene	1.2	1.2	12	11	11	2.6	2.4	--	--	--	NE
o-Xylene	0.43	0.37	0.65	0.47	0.45	< 0.20	< 0.20	< 0.20	--	< 1.0	1000†
p-Isopropyltoluene	0.65	0.53	1.8	1.2	1.2	< 0.20	< 0.20	--	--	--	NE
sec-Butylbenzene	4.2	4.2	8.7	9.3	8.7	4.7	4.5	--	--	--	NE
tert-Butylbenzene	1.2	1.2	1.1	1.0	0.98	0.75	0.74	--	--	--	NE
Tetrachloroethene (PCE)	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 1.0	< 0.20	5
Other analyzed volatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

Table 4: Summary of Groundwater Analytical Results (East Site)

Well ID:	E-Well-1	E-Well-2						E-Well-3				E-Well-4				MTCA Method A CUL for Unrestricted Land Use
Sample Number:	E-Well-1:GW	E-Well-2:GW	E-Well-102:GW	E-Well-2-03042022	E-Well-2:GW	E-Well-2:GW	E-Well-102:GW	E-Well-3:GW	E-Well-103:GW	E-Well-3:GW	E-Well-3:GW	E-Well-4:GW	E-Well-4-03042022	E-Well-4:GW	E-Well-4:GW	
Sample Date:	12/10/2020	12/11/2020	12/11/2020[1]	3/4/2022	6/7/2022	10/7/2022	10/7/2022[3]	12/11/2020	12/11/2020[2]	6/8/2022	10/10/2022	12/11/2020	3/4/2022	6/8/2022	10/7/2022	
Volatile Organics - (ug/L)																
Vinyl Chloride	< 0.20	< 0.80	< 0.80	0.81	2.5	3.6	3.4	7.0	7.4	6.0	5.6	< 0.20	< 0.80	< 0.80	< 1.0	0.2
Chloroethane	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	< 5.0	< 5.0	< 1.0	< 1.0	< 2.0	1.0	< 1.0	< 4.0	< 4.0	< 5.0	NE
(cis) 1,2-Dichloroethene (DCE)	< 0.20	2.6	2.7	36	100	170	160	37	38	74	49	< 0.20	1.4	2.5	5.4	NE
1,2-Dichloroethane (EDC)	< 0.20	< 0.80	< 0.80	< 0.80	< 0.80	< 1.0	< 1.0	< 0.20	< 0.20	< 0.40	< 0.20	< 0.20	< 0.80	< 0.80	< 1.0	5
Trichloroethene (TCE)	< 0.20	2.6	2.8	4.2	5.7	7.8	7.8	1.2	1.3	3.0	3.0	1.0	2.6	3.3	3.2	5
Tetrachloroethene (PCE)	< 0.20	120	120	130	130	110	110	11	11	7.6	6.6	44	92	110	120	5
Other analyzed volatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--

NOTES:

1 Sample E-Well-102:GW dated 12/11/2020 is a field duplicate of sample W-Well-2:GW dated 12/11/2020.

2 Sample E-Well-103:GW dated 12/11/2020 is a field duplicate of sample E-Well-3:GW dated 12/11/2020.

3 Sample E-Well-102:GW dated 10/7/2022 is a field duplicate of sample E-Well-2:GW dated 12/7/2022.

* Sample for MW-15 erroneously labeled as MW-14.

§ Laboratory reports the gasoline result for these samples are attributed to a single peak (tetrachloroethane)

Bold text indicates detected analyte.

Data collected during October 2022 monitoring event.

Shaded text indicates detection above the MTCA Method A CUL.

Table 4: Summary of Groundwater Analytical Results (East Site)

Well ID:	E-Well-5B				IW-4	IW-5	MW-14	MW-15					MTCA Method A CUL for Unrestricted Land Use
Sample Number:	E-Well-5B:GW	E-Well-5B-03042022	E-Well-5B:GW	E-Well-5B:GW	IW4:GW11620	IW5:GW11520	MW-14:GW11620	MW-14*	MW-15:GW11520	MW-15-03042022	MW-15:GW	MW-15:GW	
Sample Date:	12/11/2020	3/4/2022	6/8/2022	10/10/2022	11/6/2020	11/5/2020	11/6/2020	10/31/2014	11/5/2020	3/4/2022	6/7/2022	10/7/2022	
Volatile Organics - (ug/L)													
Vinyl Chloride	< 0.20	< 0.20	0.23	0.23	0.35	0.23	5.8	< 0.20	1.6	4.3	2.5	4.8	0.2
Chloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0	< 2.0	< 2.0	<4.0	< 2.0	NE
(cis) 1,2-Dichloroethene (DCE)	0.36	4.2	5.3	8.9	< 0.20	16	19	0.33	11	67	100	57	NE
1,2-Dichloroethane (EDC)	< 0.20	0.60	0.60	0.66	< 0.20	< 0.20	< 0.40	< 0.20	< 0.20	< 0.40	< 0.80	< 0.40	5
Trichloroethene (TCE)	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	1.7	0.33	11	2.2	5.7	2.0	5
Tetrachloroethene (PCE)	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.60	23	50	4.5	8.2	1.1	5
Other analyzed volatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--

Table 5: Summary of Groundwater Natural Attenuation Parameters

		West Site Wells			East Site Wells					
Well ID:	MW-1	W-Well-4	W-Well-2	W-Well-3	MW-12	E-Well-4	E-Well-2	E-Well-5B	E-Well-3	MW-15
Estimated GW Flow Direction	--	Upgradient	*Downgradient*	*Downgradient*	--	Upgradient	Upgradient	*Downgradient*	*Downgradient*	*Downgradient*
Sample Number:	MW-1:GW:2	W-Well-4:GW	W-Well-2:GW	W-Well-3:GW	MW-12:GW:2	E-Well-4:GW	E-Well-2:GW	E-Well-5B:GW	E-Well-3:GW	MW-15:GW
Sample Date:	11/20/2012	10/6/2022	10/6/2022	10/6/2022	11/20/2012	10/7/2022	10/7/2022	10/10/2022	10/10/2022	10/7/2022
Natural Attenuation Parameters (mg/L)										
Ferrous Iron	--	0.395	0.205	1.30	--	< 0.100	< 0.100	1.05 D	0.642	1.47 E
Nitrate	0.53	< 0.050	0.15	< 0.050	0.33	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Nitrite	--	< 0.020	0.69	< 0.020	--	< 0.020	< 0.020	0.049	< 0.020	< 0.020
Sulfate	12	22	11	6.9	37	260	35	20	40	120
Sulfite	--	--	--	--	--	--	--	4.2 H	< 1.4 H	--
Chloride	--	45	52	40	--	7.3	34	35	35	8.9
Natural Attenuation Parameters (µg/L)										
Dissolved Manganese	--	1000	< 11	580	--	290	210	1300	1100	1600
Methane	--	130	4.7	220	--	120	270	160	250	80
Ethane	--	< 0.22	< 0.22	< 0.22	--	< 0.22	< 0.22	< 0.22	< 0.22	< 0.22
Ethene	--	< 0.29	< 0.29	< 0.29	--	< 0.29	0.47	< 0.29	0.38	0.34
Field Parameter										
Dissolved Oxygen (mg/L)	0.38	0.18	0.13	0.17	0.38	0.22	0.22	0.20	0.15	0.17
ORP (mV)	-73.3	-28.8	-70.5	-37.2	38.0	111.9	68.3	13.0	43.9	-14.6

NOTES:

D Laboratory flag indicating dilution was required

E Laboratory flag indicating value is above the quantitation range

H Laboratory flag indication hold time was exceeded

GW flow direction is estimated and based on October 22, 2022 depth to water measurements.

Bold text indicates detected analyte.

Data collected during October 2022 monitoring event.

-- = not analyzed; < = not detected above indicated laboratory reporting limit; GW = groundwater; mg/L = miligrams per liter; ORP = oxidation reduction potential; µg/L = micrograms per liter

Appendix B

Inadvertent Discovery Plan

INADVERTENT DISCOVERY PLAN

PLAN AND PROCEDURES FOR THE DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

To request ADA accommodation, including materials in a format for the visually impaired, call Ecology at 360-407-6000 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with a speech disability may call TTY at 877-833-6341.

Site Name(s): Sound Transit Former Key Bank Site Location: 1000 NE 45th Street, Seatlle, WA

Project Lead/Organization: Sound Transit County: King

If this Inadvertent Discovery Plan (IDP) is for multiple (batched) projects, ensure the location information covers all project areas.

1. INTRODUCTION

The IDP outlines procedures to perform in the event of a discovery of archaeological materials or human remains, in accordance with applicable state and federal laws. An IDP is required, as part of Agency Terms and Conditions for all grants and loans, for any project that creates disturbance above or below the ground. An IDP is not a substitute for a formal cultural resource review (Executive 21-02 or Section 106).

Once completed, **the IDP should always be kept at the project site** during all project activities. All staff, contractors, and volunteers should be familiar with its contents and know where to find it.

2. CULTURAL RESOURCE DISCOVERIES

A cultural resource discovery could be prehistoric or historic. Examples include (see images for further examples):

- An accumulation of shell, burned rocks, or other food related materials.
- Bones, intact or in small pieces.
- An area of charcoal or very dark stained soil with artifacts.
- Stone tools or waste flakes (for example, an arrowhead or stone chips).
- Modified or stripped trees, often cedar or aspen, or other modified natural features, such as rock drawings.
- Agricultural or logging materials that appear older than 50 years. These could include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, and many other items.
- Clusters of tin cans or bottles, or other debris that appear older than 50 years.
- Old munitions casings. ***Always assume these are live and never touch or move.***
- Buried railroad tracks, decking, foundations, or other industrial materials.
- Remnants of homesteading. These could include bricks, nails, household items, toys, food containers, and other items associated with homes or farming sites.

The above list does not cover every possible cultural resource. When in doubt, assume the material is a cultural resource.

3. ON-SITE RESPONSIBILITIES

If any employee, contractor, or subcontractor believes that they have uncovered cultural resources or human remains at any point in the project, take the following steps to ***Stop-Protect-Notify***. **If you suspect that the discovery includes human remains, also follow Sections 5 and 6.**

STEP A: Stop Work.

All work must stop immediately in the vicinity of the discovery.

STEP B: Protect the Discovery.

Leave the discovery and the surrounding area untouched and create a clear, identifiable, and wide boundary (30 feet or larger) with temporary fencing, flagging, stakes, or other clear markings. Provide protection and ensure integrity of the discovery until cleared by the Department of Archaeological and Historical Preservation (DAHP) or a licensed, professional archaeologist.

Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site. Do not allow work to resume within the boundary until the requirements of this IDP are met.

STEP C: Notify Project Archaeologist (if applicable).

If the project has an archaeologist, notify that person. If there is a monitoring plan in place, the archaeologist will follow the outlined procedure.

STEP D: Notify Project and Washington Department of Ecology (Ecology) contacts.

Project Lead Contacts

Primary Contact

Name: Tyler Benson, Sr. Grants Administrator
Organization: Sound Transit
Phone: 206-903-7372
Email: tyler.benson@soundtransit.org

Alternate Contact

Name: Susan Penoyar, Environmental Manager
Organization: Sound Transit
Phone: 206-370-5531
Email: susan.penoyar@soundtransit.org

Ecology Contacts (completed by Ecology Project Manager)

Ecology Project Manager

Name: Zak Wall, LG
Program: NW Region Toxics Cleanup Program
Phone: 425-758-5231
Email: ZWAL461@ecy.wa.gov

Alternate or Cultural Resource Contact

Name: Jon Klem, Archaeologist
Program: NW Region Toxics Cleanup Program
Phone: 206-556-5584
Email: JONK461@ecy.wa.gov

STEP E: Ecology will notify DAHP.

Once notified, the Ecology Cultural Resource Contact or the Ecology Project Manager will contact DAHP to report and confirm the discovery. To avoid delay, the Project Lead/Organization will contact DAHP if they are not able to reach Ecology.

DAHP will provide the steps to assist with identification. DAHP, Ecology, and Tribal representatives may coordinate a site visit following any necessary safety protocols. DAHP may also inform the Project Lead/Organization and Ecology of additional steps to further protect the site.

Do not continue work until DAHP has issued an approval for work to proceed in the area of, or near, the discovery.

DAHP Contacts:

Name: Rob Whitlam, PhD
Title: State Archaeologist
Cell: 360-890-2615
Email: Rob.Whitlam@dahp.wa.gov
Main Office: 360-586-3065

Human Remains/Bones:

Name: Guy Tasa, PhD
Title: State Anthropologist
Cell: 360-790-1633 (24/7)
Email: Guy.Tasa@dahp.wa.gov

4. TRIBAL CONTACTS

In the event cultural resources are discovered, the following tribes will be contacted. See Section 10 for Additional Resources.

Tribe:	Duwamish Tribe	Tribe:	Muckleshoot Indian Tribe
Name:	Nancy Sackman	Name:	Laura Murphy
Title:	Cultural Preservation Officer	Title:	Archaeologist
Phone:	206-856-2564	Phone:	253-876-3272
Email:	preservationdept@duwamishtribe.org	Email:	laura.murphy@muckleshoot.nsn.us
Tribe:	Snoqualmie Indian Tribe	Tribe:	Stillaguamish Tribe of Indians
Name:	Adam Osbekoff	Name:	Kerry Lyste
Title:	Cultural Resource Compliance Manager	Title:	THPO
Phone:	425-753-0388	Phone:	360-652-7362 x226
Email:	adam@snoqualmietribe.us	Email:	klyste@stillaguamish.com

Please provide contact information for additional tribes within your project area, if needed, in Section 11.

5. FURTHER CONTACTS (if applicable)

If the discovery is confirmed by DAHP as a cultural or archaeological resource, or as human remains, and there is a partnering federal or state agency, Ecology or the Project Lead/Organization will ensure the partnering agency is immediately notified.

Federal Agency:

Agency:	
Name:	
Title:	
Phone:	
Email:	

State Agency:

Agency:	
Name:	
Title:	
Phone:	
Email:	

6. SPECIAL PROCEDURES FOR THE DISCOVERY OF HUMAN SKELETAL MATERIAL

Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be treated with dignity and respect. Follow the steps under ***Stop-Protect-Notify.*** For specific instructions on how to handle a human remains discovery, see: *RCW 68.50.645: Skeletal human remains—Duty to notify—Ground disturbing activities—Coroner determination—Definitions*.

Suggestion: If you are unsure whether the discovery is human bone or not, contact Guy Tasa with DAHP, for identification and next steps. Do not pick up the discovery.

Guy Tasa, PhD State Physical Anthropologist
Guy.Tasa@dahp.wa.gov

(360) 790-1633 (Cell/Office)

For discoveries that are confirmed or suspected human remains, follow these steps:

1. Notify law enforcement and the Medical Examiner/Coroner using the contacts below. **Do not call 911** unless it is the only number available to you.

   Enter contact information below (required):
   - Local Medical Examiner or Coroner name and phone: King Co Medical Examiner 206-731-3232
   - Local Law Enforcement main name and phone: Seattle Police Department 206-625-5011
   - Local Non-Emergency phone number (911 if without a non-emergency number): 206-625-5011
2. The Medical Examiner/Coroner (with assistance of law enforcement personnel) will determine if the remains are human or if the discovery site constitutes a crime scene and will notify DAHP.
3. **DO NOT speak with the media, allow photography or disturbance of the remains, or release any information about the discovery on social media.**
4. If the remains are determined to be non-forensic, Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and to shield them from being photographed by others or disturbed.

Further activities:

- Per RCW 27.44.055, RCW 68.50, and RCW 68.60, DAHP will have jurisdiction over non-forensic human remains. Ecology staff will participate in consultation. Organizations may also participate in consultation.
- Documentation of human skeletal remains and funerary objects will be agreed upon through the consultation process described in RCW 27.44.055, RCW 68.50, and RCW 68.60.
- When consultation and documentation activities are complete, work in the discovery area may resume as described in Section 8.

If the project occurs on federal lands (such as a national forest or park or a military reservation) the provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) apply and the responsible federal agency will follow its provisions. Note that state highways that cross federal lands are on an easement and are not owned by the state.

If the project occurs on non-federal lands, the Project Lead/Organization will comply with applicable state and federal laws, and the above protocol.

7. DOCUMENTATION OF ARCHAEOLOGICAL MATERIALS

Archaeological resources discovered during construction are protected by state law RCW 27.53 and assumed eligible for inclusion in the National Register of Historic Places under Criterion D until a formal Determination of Eligibility is made.

The Project Lead/Organization must ensure that proper documentation and field assessment are made of all discovered cultural resources in cooperation with all parties: the federal agencies (if any), DAHP, Ecology, affected tribes, and the archaeologist.

The archaeologist will record all prehistoric and historic cultural material discovered during project construction on a standard DAHP archaeological site or isolate inventory form. They will photograph site overviews, features, and artifacts and prepare stratigraphic profiles and soil/sediment descriptions for minimal subsurface exposures. They will document discovery locations on scaled site plans and site location maps.

Cultural features, horizons, and artifacts detected in buried sediments may require the archaeologist to conduct further evaluation using hand-dug test units. They will excavate units in a controlled fashion to expose features, collect samples from undisturbed contexts, or to interpret complex stratigraphy. They may also use a test unit or trench excavation to determine if an intact occupation surface is present. They will only use test units when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's significance. They will conduct excavations using standard archaeological techniques to precisely document the location of cultural deposits, artifacts, and features.

The archaeologist will record spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock for each unit on a standard form. They will complete test excavation unit level forms, which will include plan maps for each excavation level and artifact counts and material types, number, and vertical provenience (depth below surface and stratum association where applicable) for all recovered artifacts. They will draw a stratigraphic profile for at least one wall of each test excavation unit.

The archaeologist will screen sediments excavated for purposes of cultural resources investigation through 1/8-inch mesh, unless soil conditions warrant 1/4-inch mesh.

The archaeologist will analyze, catalogue, and temporarily curate all prehistoric and historic artifacts collected from the surface and from probes and excavation units. The ultimate disposition of cultural materials will be determined in consultation with the federal agencies (if any), DAHP, Ecology, and the affected tribe(s).

Within 90 days of concluding fieldwork, the archaeologist will provide a technical report describing any and all monitoring and resultant archaeological excavations to the Project Lead/Organization, who will forward the report to Ecology, the federal agencies (if any), DAHP, and the affected tribe(s) for review and comment.

If assessment activities expose human remains (burials, isolated teeth, or bones), the archaeologist and Project Lead/Organization will follow the process described in **Section 6**.

8. PROCEEDING WITH WORK

The Project Lead/Organization shall work with the archaeologist, DAHP, and affected tribe(s) to determine the appropriate discovery boundary and where work can continue.

Work may continue at the discovery location only after the process outlined in this plan is followed and the Project Lead/Organization, DAHP, any affected tribe(s), Ecology, and the federal agencies (if any) determine that compliance with state and federal laws is complete.

9. ORGANIZATION RESPONSIBILITY

The Project Lead/Organization is responsible for ensuring:

- This IDP has complete and accurate information.
- This IDP is immediately available to all field staff at the sites and available by request to any party.
- This IDP is implemented to address any discovery at the site.
- That all field staff, contractors, and volunteers are instructed on how to implement this IDP.

10. ADDITIONAL RESOURCES

Informative Video

Ecology recommends that all project staff, contractors, and volunteers view this informative video explaining the value of IDP protocol and what to do in the event of a discovery. The target audience is anyone working on the project who could unexpectedly find cultural resources or human remains while excavating or digging. The video is also posted on DAHP's inadvertent discovery language website.

Ecology's IDP Video (https://www.youtube.com/watch?v=ioX-4cXfbDY)

Informational Resources

DAHP (https://dahp.wa.gov)

Washington State Archeology (DAHP 2003)

(https://dahp.wa.gov/sites/default/files/Field%20Guide%20to%20WA%20Arch_0.pdf)

Association of Washington Archaeologists (https://www.archaeologyinwashington.com)

Potentially Interested Tribes

Interactive Map of Tribes by Area

(https://dahp.wa.gov/archaeology/tribal-consultation-information)

WSDOT Tribal Contact Website

(https://wsdot.wa.gov/tribal/TribalContacts.htm)

11. ADDITIONAL INFORMATION

Please add any additional contact information or other information needed within this IDP.

Suquamish Tribe
Stephanie Trudel, THPO
360-394-8533
strudel@suquamish.nsn.us

Tulalip Tribe
Richard Young, Cultural Resources Director
360-716-2652
ryoung@tulaliptribes-nsn.gov

Implement the IDP if you see…

Chipped stone artifacts.

Examples are:

- Glass-like material.
- Angular material.
- “Unusual” material or shape for the area.
- Regularity of flaking.
- Variability of size.

Stone artifacts from Oregon.

Stone artifacts from Washington.

Biface-knife, scraper, or pre-form found in NE Washington. Thought to be a well knapped object of great antiquity. Courtesy of Methow Salmon Rec. Foundation.

Implement the IDP if you see…

Ground stone artifacts.

Examples are:

- Unusual or unnatural shapes or unusual stone.
- Striations or scratching.
- Etching, perforations, or pecking.
- Regularity in modifications.
- Variability of size, function, or complexity.

Above: Fishing Weight - credit CRITFC Treaty Fishing Rights website.

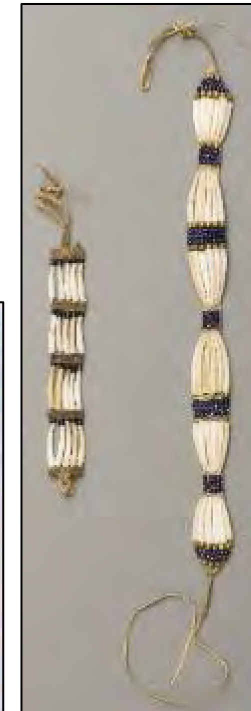
Artifacts from unknown locations (left and right images).

Implement the IDP if you see…

Bone or shell artifacts, tools, or beads.

Examples are:

- Smooth or carved materials.
- Unusual shape.
- Pointed as if used as a tool.
- Wedge shaped like a “shoehorn”.
- Variability of size.
- Beads from shell (dentalium) or tusk.



Upper Left:*Bone Awls from Oregon.*

Upper Center: *Bone Wedge from California.*

Upper Right: *Plateau dentalium choker and bracelet, from Nez Perce National Historical Park, 19th century, made using Antalis pretiosa shells Credit: Nez Perce - Nez Perce National Historical Park, NEPE 8762, Public Domain.*

Above: *Tooth Pendants. Right: Bone Pendants. Both from Oregon and Washington.*

Implement the IDP if you see…

Culturally modified trees, fiber, or wood artifacts.

Examples are:

- Trees with bark stripped or peeled, carvings, axe cuts, de-limbing, wood removal, and other human modifications.
- Fiber or wood artifacts in a wet environment.
- Variability of size, function, and complexity.

Left and Below: *Culturally modified tree and an old carving on an aspen (Courtesy of DAHP).*

Right, Top to Bottom: *Artifacts from Mud Bay, Olympia: Toy war club, two strand cedar rope, wet basketry.*

Implement the IDP if you see…

Strange, different, or interesting looking dirt, rocks, or shells.

Human activities leave traces in the ground that may or may not have artifacts associated with them. Examples are:

- “Unusual” accumulations of rock (especially fire-cracked rock).
- “Unusual” shaped accumulations of rock (such as a shape similar to a fire ring).
- Charcoal or charcoal-stained soils, burnt-looking soils, or soil that has a “layer cake” appearance.
- Accumulations of shell, bones, or artifacts. Shells may be crushed.
- Look for the “unusual” or out of place (for example, rock piles in areas with otherwise few rocks).

Shell Midden pocket in modern fill discovered in sewer trench.

Underground oven. Courtesy of DAHP.

Shell midden with fire cracked rock.

Hearth excavated near Hamilton, WA.

Implement the IDP if you see…

Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Agricultural or logging equipment. May include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, etc.
- Domestic items including square or wire nails, amethyst colored glass, or painted stoneware.

Left: Top to Bottom: *Willow pattern serving bowl and slip joint pocket knife discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*

Right: *Collections of historic artifacts discovered during excavations in eastern Washington cities.*

Implement the IDP if you see…

Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Railway tokens, coins, and buttons.
- Spectacles, toys, clothing, and personal items.
- Items helping to understand a culture or identity.
- Food containers and dishware.

Main Image: *Dishes, bottles, workboot found at the North Shore Japanese bath house (ofuro) site, Courtesy Bob Muckle, Archaeologist, Capilano University, B.C. This is an example of an above ground resource.*

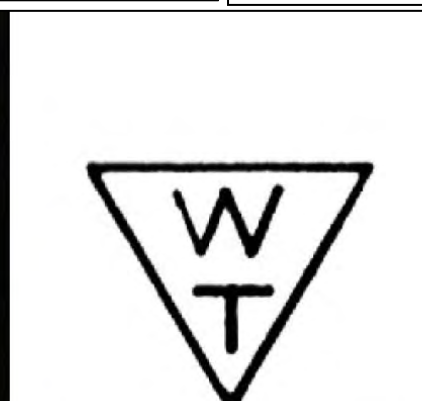
Right, from Top to Bottom: *Coins, token, spectacles and Montgomery Ward pitchfork toy discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*

Implement the IDP if you see…

- Old munition casings – if you see ammunition of any type – ***always assume they are live and never touch or move!***
- Tin cans or glass bottles with an older manufacturer's technique – maker's mark, distinct colors such as turquoise, or an older method of opening the container.

Far Left: .303 British cartridge found by a WCC planting crew on Skagit River. Don't ever touch something like this!
Left: Maker's mark on bottom of old bottle.

Right: *Old beer can found in Oregon. ACME was owned by Olympia Brewery. Courtesy of Heather Simmons.*



Logo employed by Whithall Tatum & Co. between 1924 to 1938 (Lockhart et al. 2016).

Can opening dates, courtesy of W.M. Schroeder.

Implement the IDP if you see…

You see historic foundations or buried structures.

Examples are:

- Foundations.
- Railroad and trolley tracks.
- Remnants of structures.

Counter Clockwise, Left to Right: *Historic structure 45KI924, in WSDOT right of way for SR99 tunnel. Remnants of Smith Cove shantytown (45-KI-1200) discovered during Ecology CSO excavation, City of Spokane historic trolley tracks uncovered during stormwater project, intact foundation of historic home that survived the Great Ellensburg Fire of July 4, 1889, uncovered beneath parking lot in Ellensburg.*

Implement the IDP if you see...

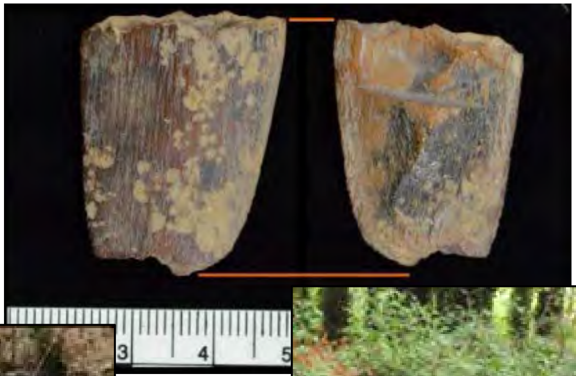
Potential human remains.

Examples are:

- Grave headstones that appear to be older than 50 years.
- Bones or bone tools--intact or in small pieces. It can be difficult to differentiate animal from human so they must be identified by an expert.
- These are all examples of animal bones and are not human.

Center: *Bone wedge tool, courtesy of Smith Cove Shantytown excavation (45KI1200).*

Other images (Top Right, Bottom Left, and Bottom) Center: Courtesy of DAHP.



Directly Above: This is a real discovery at an Ecology sewer project site.

What would you do if you found these items at a site? Who would be the first person you would call?

Hint: *Read the plan!*

Appendix C

Terrestrial Ecological Evaluation Form

Voluntary Cleanup Program

Washington State Department of Ecology
Toxics Cleanup Program

DEPARTMENT OF ECOLOGY
State of Washington

TERRESTRIAL ECOLOGICAL EVALUATION FORM

Under the Model Toxics Control Act (MTCA), a terrestrial ecological evaluation is necessary if hazardous substances are released into the soils at a Site. In the event of such a release, you must take one of the following three actions as part of your investigation and cleanup of the Site:

1. Document an exclusion from further evaluation using the criteria in WAC 173-340-7491.
2. Conduct a simplified evaluation as set forth in WAC 173-340-7492.
3. Conduct a site-specific evaluation as set forth in WAC 173-340-7493.

When requesting a written opinion under the Voluntary Cleanup Program (VCP), you must complete this form and submit it to the Department of Ecology (Ecology). The form documents the type and results of your evaluation.

Completion of this form is not sufficient to document your evaluation. You still need to document your analysis and the basis for your conclusion in your cleanup plan or report.

If you have questions about how to conduct a terrestrial ecological evaluation, please contact the Ecology site manager assigned to your Site. For additional guidance, please refer to https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Terrestrial-ecological-evaluation.

Step 1: IDENTIFY HAZARDOUS WASTE SITE	
Please identify below the hazardous waste site for which you are documenting an evaluation.	
Facility/Site Name: Sound Transit Former Key Bank Site	
Facility/Site Address: 1000 NE 45th Street, Seattle, WA 98105	
Facility/Site No: 8342	VCP Project No.:

Step 2: IDENTIFY EVALUATOR		
Please identify below the person who conducted the evaluation and their contact information.		
Name: Marsi Beeson		Title: Sr. Environmental Scientist
Organization: GeoEngineers, Inc.		
Mailing address: 1101 South Fawcett Avenue, Suite 200		
City: Tacoma	State: WA	Zip code: 98402
Phone: 253-383-4940	Fax:	E-mail: mbeeson@geoengineers.com

Step 3: DOCUMENT EVALUATION TYPE AND RESULTS

A. Exclusion from further evaluation.

1. Does the Site qualify for an exclusion from further evaluation?

☒ Yes — *If you answered **"YES,"** then answer **Question 2**.*

☐ No or Unknown — *If you answered **"NO" or "UNKNOWN,"** then skip to **Step 3B** of this form.*

2. What is the basis for the exclusion? *Check all that apply. Then skip to **Step 4** of this form.*

Point of Compliance: WAC 173-340-7491(1)(a)

☐ All soil contamination is, or will be,* at least 15 feet below the surface.

☐ All soil contamination is, or will be,* at least 6 feet below the surface (or alternative depth if approved by Ecology), and institutional controls are used to manage remaining contamination.

Barriers to Exposure: WAC 173-340-7491(1)(b)

☐ All contaminated soil, is or will be,* covered by physical barriers (such as buildings or paved roads) that prevent exposure to plants and wildlife, and institutional controls are used to manage remaining contamination.

Undeveloped Land: WAC 173-340-7491(1)(c)

☐ There is less than 0.25 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site and any of the following chemicals is present: chlorinated dioxins or furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, or pentachlorobenzene.

☒ For sites not containing any of the chemicals mentioned above, there is less than 1.5 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site.

Background Concentrations: WAC 173-340-7491(1)(d)

☐ Concentrations of hazardous substances in soil do not exceed natural background levels as described in WAC 173-340-200 and 173-340-709.

* An exclusion based on future land use must have a completion date for future development that is acceptable to Ecology.

± "Undeveloped land" is land that is not covered by building, roads, paved areas, or other barriers that would prevent wildlife from feeding on plants, earthworms, insects, or other food in or on the soil.

\# "Contiguous" undeveloped land is an area of undeveloped land that is not divided into smaller areas of highways, extensive paving, or similar structures that are likely to reduce the potential use of the overall area by wildlife.

B. Simplified evaluation.

1. Does the Site qualify for a simplified evaluation?

☐ Yes — *If you answered **"YES,"** then answer **Question 2** below.*

☐ No or Unknown — *If you answered **"NO"** or **"UNKNOWN,"** then skip to **Step 3C** of this form.*

2. Did you conduct a simplified evaluation?

☐ Yes — *If you answered **"YES,"** then answer **Question 3** below.*

☐ No — *If you answered **"NO,"** then skip to **Step 3C** of this form.*

3. Was further evaluation necessary?

☐ Yes — *If you answered **"YES,"** then answer **Question 4** below.*

☐ No — *If you answered **"NO,"** then answer **Question 5** below.*

4. If further evaluation was necessary, what did you do?

☐ Used the concentrations listed in Table 749-2 as cleanup levels. *If so, then skip to **Step 4** of this form.*

☐ Conducted a site-specific evaluation. *If so, then skip to **Step 3C** of this form.*

5. If no further evaluation was necessary, what was the reason? *Check all that apply. Then skip to **Step 4** of this form.*

Exposure Analysis: WAC 173-340-7492(2)(a)

☐ Area of soil contamination at the Site is not more than 350 square feet.

☐ Current or planned land use makes wildlife exposure unlikely. Used Table 749-1.

Pathway Analysis: WAC 173-340-7492(2)(b)

☐ No potential exposure pathways from soil contamination to ecological receptors.

Contaminant Analysis: WAC 173-340-7492(2)(c)

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations that exceed the values listed in Table 749-2.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations that exceed the values listed in Table 749-2, and institutional controls are used to manage remaining contamination.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays, and institutional controls are used to manage remaining contamination.

C. Site-specific evaluation. A site-specific evaluation process consists of two parts: (1) formulating the problem, and (2) selecting the methods for addressing the identified problem. Both steps require consultation with and approval by Ecology. *See* WAC 173-340-7493(1)(c).

1. Was there a problem? *See* WAC 173-340-7493(2).

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No *If you answered **"NO,"** then identify the reason here and then skip to **Question 5** below:*

- ☐ No issues were identified during the problem formulation step.
- ☐ While issues were identified, those issues were addressed by the cleanup actions for protecting human health.

2. What did you do to resolve the problem? *See* WAC 173-340-7493(3).

☐ Used the concentrations listed in Table 749-3 as cleanup levels. *If so, then skip to **Question 5** below.*

☐ Used one or more of the methods listed in WAC 173-340-7493(3) to evaluate and address the identified problem. *If so, then answer **Questions 3 and 4** below.*

3. If you conducted further site-specific evaluations, what methods did you use? *Check all that apply. See* WAC 173-340-7493(3).

☐ Literature surveys.

☐ Soil bioassays.

☐ Wildlife exposure model.

☐ Biomarkers.

☐ Site-specific field studies.

☐ Weight of evidence.

☐ Other methods approved by Ecology. If so, please specify:

4. What was the result of those evaluations?

☐ Confirmed there was no problem.

☐ Confirmed there was a problem and established site-specific cleanup levels.

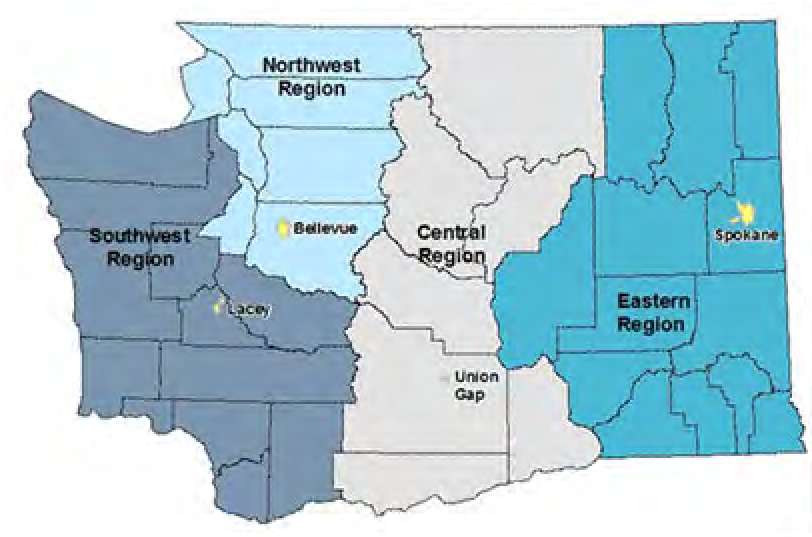
5. Have you already obtained Ecology's approval of both your problem formulation and problem resolution steps?

☐ Yes If so, please identify the Ecology staff who approved those steps:

☐ No

Step 4: SUBMITTAL

Please mail your completed form to the Ecology site manager assigned to your Site. If a site manager has not yet been assigned, please mail your completed form to the Ecology regional office for the County in which your Site is located.



Northwest Region: Attn: VCP Coordinator 3190 160th Ave. SE Bellevue, WA 98008-5452	**Central Region:** Attn: VCP Coordinator 1250 West Alder St. Union Gap, WA 98903-0009
Southwest Region: Attn: VCP Coordinator P.O. Box 47775 Olympia, WA 98504-7775	**Eastern Region:** Attn: VCP Coordinator N. 4601 Monroe Spokane WA 99205-1295

If you need this publication in an alternate format, please call the Toxics Cleanup Program at 360-407-7170. People with hearing loss can call 711 for Washington Relay Service. People with a speech disability can call 877-833-6341.

Appendix D

Sampling and Analysis Plan

1.0 Introduction

This Sampling and Analysis Plan (SAP) has been prepared for remedial investigation (RI) activities at the Sound Transit Former Key Bank property located at 1000 NE 45th Street in Seattle, Washington (Site).

2.0 Remedial Investigation Purpose and Scope

The purpose of the RI is to characterize and document soil and groundwater conditions at the Site. Specific proposed investigation activities are described in the RI Work Plan.

3.0 Health and Safety

A Site-specific Health and Safety Plan (HASP) will be developed for use during RI field activities. Companies providing services for this project on a subcontracted basis will be responsible for developing and implementing their own HASPs for use by their employees.

The Field Coordinator will be responsible for implementing the HASP during the field activities. The Field Coordinator will conduct a tailgate safety meeting prior to beginning daily field activities. The Field Coordinator has stop-work authority should field investigation activities fail to comply with the HASP. The Project Manager will discuss health and safety issues with the Field Coordinator on a routine basis during field activities.

4.0 Subsurface Investigation Methods

This section describes the following subsurface investigation methods to complete soil sampling, groundwater monitoring well installation, well development and surveying, groundwater level measurements, groundwater sampling and soil vapor sampling.

4.1 SOIL SAMPLING METHODOLOGY

Soil samples will be collected for chemical analysis during hollow-stem auger (HSA) drilling based on the field screening results. Field screening methodology are described in Section 5.1 of this SAP. Soil samples will be collected at approximately 2.5 to 5-foot depth intervals with a 2-inch-diameter, 18-inch-long stainless steel split spoon sampler. The sampler will be driven with a 140-pound hammer dropped from a distance of 30 inches. The number of blows needed to advance the sampler the final 12 inches or other specified distance will be recorded on the boring log.

After the sampler is advanced in the boring, it will be retrieved and disassembled to allow access to the recovered soil for collecting samples for chemical analyses and lithologic logging.

Soil samples will be collected for chemical analysis as described in Section 6.0 of the RI Work Plan. Additional soil samples may be collected for chemical analysis based on field screening results. Field screening is described in Section 5.1.1 of this SAP.

Soil samples to be analyzed for select volatile organic compounds (VOCs) will be collected first following United States Environmental Protection Agency (EPA) Method 5035A. At boring locations where soil samples will be analyzed for additional parameters as described in the RI Work Plan, additional sample volume will be collected and placed in a plastic bag and homogenized following soil sample collection for VOCs. The homogenized soil will be placed into the remaining sample containers provided by the analytical laboratory for the additional analytical parameters.

An environmental representative will observe the drilling activities and will maintain a detailed log of soil and groundwater conditions encountered in each boring. The soil samples will be visually examined and classified in general accordance with Unified Soil Classification System (USCS).

The collected soil samples will be placed into a cooler with ice and logged on the chain-of-custody (COC) record. Drill cuttings will be stored in marked drums on the Site pending waste characterization and appropriate disposal.

4.2 GROUNDWATER MONITORING WELL INSTALLATION

Drilling and construction of groundwater monitoring wells will be performed by a Washington State licensed driller in accordance with the Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 Washington Administrative Code [WAC]). Monitoring well installation will be observed by an environmental representative who will maintain a detailed log of the construction materials and well depths.

The monitoring wells will be constructed using 2-inch-diameter, flush-threaded Schedule 40 polyvinyl chloride (PVC) casing with machine-slotted PVC screen (0.010-inch slot width). Each well will be constructed with at least a 10-foot screen with the base of the well screen. Actual well screen intervals will be based on field conditions observed at the time of drilling. Additional details regarding monitoring well construction are provided in the RI Work Plan.

Drillers will submit resource protection well notification and construction documents to the Washington State Department of Ecology (Ecology).

4.3 GROUNDWATER MONITORING WELL DEVELOPMENT

Each groundwater monitoring well will be developed by surging the screened interval and purging the well. The turbidity of the purge water will be monitored during well development. Well development will continue until at least 5 well casing volumes of water are removed and the turbidity of the purge water is less than 500 nephelometric turbidity units (NTU). In addition, if any potable water is added to the borehole to control heave during drilling, an additional volume of water equal to the amount added during drilling will be removed. The purge rate and total volume of groundwater removed from each well will be recorded on field forms during well development. Well development water will be segregated by monitoring well and stored in marked drums on Sound Transit property, pending waste characterization and appropriate disposal.

4.4 GROUNDWATER MONITORING WELL SURVEYING

A licensed surveyor will perform an elevation and location survey of the new monitoring wells. Monitoring well elevations will be surveyed relative to NAVD88 to the nearest 0.01 foot.

4.5 SNAPSHOT WATER LEVEL MEASUREMENT

During each groundwater monitoring event, the depth to groundwater in each monitoring well will be measured to the nearest 0.01 foot relative to the top of the well casing using an electronic water level indicator. Dense nonaqueous phase liquid (DNAPL) and/or light nonaqueous phase liquid (LNAPL) thickness will be measured in all wells with product/water interface meters before any groundwater samples are collected. The Heron Interface meters and the Solinst interface meters are used to measure the thickness of the product layer as thin as 1 millimeter (mm). The groundwater level and DNAPL/LNAPL thickness measurements will be recorded on field logs.

4.6 GROUNDWATER SAMPLING

Groundwater samples will be collected from the monitoring wells using low-flow purging and sampling methods. The groundwater samples will be obtained using a decontaminated bladder pump with disposable bladder and sample tubing. The sample tubing inlet will be placed at the mid-point of the well screen interval or at the mid-point of the water column if the water column height is less than the screen length. Groundwater will be purged at approximately 0.5 liters per minute or less. Groundwater will be purged at a reduced rate to prevent groundwater drawdown greater than 10 percent of the water column height. The drawdown will be recorded on field logs if drawdown is necessary to obtain a groundwater sample.

A portable water quality measurement system equipped with a flow-through cell will be used to monitor purge water temperature, pH, electrical conductivity, dissolved oxygen (DO), and oxidation-reduction potential (ORP). Purge water turbidity will be measured using a turbidimeter. Water quality measurements of the purge water will be recorded on field logs. Purging will continue until the purge water temperature, pH, electrical conductivity, DO, and ORP stabilize to within 10 percent for three consecutive measurements or until 3 well casing volumes are removed and turbidity is less than 25 NTU.

Following well purging, the flow-through cell will be disconnected and the groundwater sample will be collected in laboratory-prepared containers. Groundwater samples will be placed into a cooler with ice and logged on the COC record. The groundwater samples will be submitted to the analytical laboratory for the chemical analyses identified in Section 6.0 of the RI Work Plan.

Purge water will be segregated by monitoring well as necessary and stored on Sound Transit property in labeled drums pending waste characterization and appropriate disposal.

4.7 SOIL VAPOR PROBE SAMPLING

Soil gas probes will be advanced to a depth of at least 6 feet below ground surface (bgs) as recommended in Ecology's Guidance for Evaluating Vapor Intrusion (Ecology 2022). Prepack wells with 5-foot screens are planned. Leak testing, purging and soil gas sampling will take place for at least 2 hours after vapor probe installation (DTSC 2012). GeoEngineers will keep detailed notes describing sampling activities. Soil gas samples will be collected using the following protocol:

- Direct-push tooling will be advanced to depths of approximately 5 to 6 feet bgs.
- The tubing (aboveground) will be connected to a sampling manifold and "summa" type (summa) canister. The summa canister sampling will be used to collect the soil gas sample. A seal will be placed on the well casing.

- Each probe will remain in place for a minimum of 20 to 30 minutes prior to sampling to allow for soil vapor to equilibrate.
- The sampling manifold will be vacuum tested by briefly introducing a vacuum to the aboveground portion of the sampling train and checking for loss of vacuum. If vacuum loss is observed, connections and fittings in the sample train will be checked and adjusted.
- A plastic shroud will be placed over the sample container and soil vapor probe where it enters the ground surface.
- The shroud will be charged with helium gas and the helium concentration inside of the shroud will be measured using a hand-held helium monitor.
- The sampling train (above and below ground components) will be purged using a landfill gas meter, peristaltic pump, evacuated summa canister or disposable syringe. After purging 3 sampling train volumes, the helium concentration within the sampling train will be measured and recorded. If helium is measured at a concentration greater than 10 percent of the shroud concentration, the fittings will be tightened, the bentonite seal will be checked and the previous purging and measurement tests will be repeated.
- The soil vapor sample will be collected using a laboratory-provided individually certified 1-liter summa canister set to a flow rate of less than or equal to approximately 200 milliliters per minute. The 1-liter canister was selected both to collect a soil gas sample as quickly as possible, and to achieve method reporting limits that would meet Ecology's soil gas screening level criteria. The canister will be filled with soil gas for approximately 5 minutes or until the remaining canister vacuum is approximately 5 inches of mercury. The initial and final canister vacuum will be recorded.
- Following the sample collection, the sample train will be re-evaluated for the presence of helium.
- Soil vapor samples will be submitted to the laboratory for analysis as described in Section 6.0 of the RI Work Plan.

5.0 Soil Field Screening Protocols

5.1 GENERAL PROCEDURES

Soil samples will be collected for chemical analysis and to document lithology. An environmental representative will classify the soils encountered and prepare a detailed log of each exploration. The field representative will visually classify the soil in general accordance with ASTM International (ASTM) Method D 2488 and record soil descriptions and field screening information on the field log. ASTM Method D 2488 is the visual-manual soil description method that corresponds to laboratory ASTM Method D 2487 (USCS method).

Samples will be placed in a clean plastic-lined cooler with ice following collection. The objective of the cold storage will be to attain a sample temperature of 2 to 6 degrees Celsius to minimize potential for volatilization. An environmental representative will provide for the security of samples from the time the samples are collected until the samples have been received by the courier service or laboratory personnel. A COC form will be completed for each group of samples being delivered to the laboratory using standard COC protocol. Samples will be transported and delivered to the analytical laboratory in the sample coolers by field personnel, laboratory personnel, courier service or a commercial shipping company.

5.1.1 Field Screening

Soil samples will be field screened for evidence of possible contamination. Field screening results will be recorded on field logs and the results will be used as a general guideline to delineate areas and depths of potential contamination. Field screening methods will consist of visual screening, water sheen screening and headspace vapor screening.

5.1.1.1 VISUAL SCREENING

The soil will be observed for unusual color or staining or debris that may be indicative of contamination.

5.1.1.2 WATER SHEEN SCREENING

This is a qualitative field screening method that can help identify the presence or absence of petroleum hydrocarbons. A portion of the soil sample will be placed in a plastic sheen pan containing water. The water surface will be observed for signs of sheen. The following sheen classifications will be used during field screening:

CLASSIFICATION	IDENTIFIER	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)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface
Heavy Sheen	(HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen

5.1.1.3 HEADSPACE VAPOR SCREENING

This is a semi-quantitative field screening method that can help identify the presence or absence of volatile chemicals. A portion of the sample is placed in a resealable plastic bag for headspace vapor screening as soon as possible following sample collection. Ambient air is captured in the bag and the bag is sealed and left for approximately 5 minutes. The bag is then gently agitated for approximately 10 seconds to expose the soil to the air trapped in the bag. Vapors present within the sample bag's headspace are measured by inserting the probe of a photoionization detector (PID) through a small opening in the bag.

6.0 Sample Handling and Field Documentation

6.1 SOIL AND GROUNDWATER SAMPLE CONTAINERS AND LABELING

The Field Coordinator will manage field protocols related to sample collection, handling, and documentation. Soil and groundwater samples will be placed in appropriate laboratory-prepared containers.

Sample containers will be labeled with the following information at the time of sample collection:

- Project number
- Sample name, which will include a reference to the sample location and sampling depth (if applicable)
- Date and time of collection

- ☐ Sampler's company and sampler's initials
- ☐ Preservative type (if applicable)

Sample collection activities will be noted on field logs. The Field Coordinator will monitor consistency between sample containers/labels, field logs and COC forms. Sample naming/labeling conventions are described below:

Soil Samples – Each sample will be labeled with the boring number (KB for "Key Bank" followed by the exploration number), sample interval start depth, and sample interval end depth. For example, a soil sample collected from 15 to 16 feet bgs from boring KB-MW-5 would be labeled KB-MW5-15-16. Field duplicate soil samples collected per the Quality Assurance Project Plan (QAPP) will be labeled with "Soil Dup"; the date (year, month and day) of sample collection; and the sequential field blank number collected on that date. For example, the second field duplicate soil sample collected on August 05, 2024 would be labeled Soil Dup-240805-2.

Groundwater Samples – Each sample will be labeled with the monitoring well number and the year, month and day of sample collection. For example, a groundwater sample collected from monitoring well KB-MW-5 on August 05, 2024 would be labeled KB-MW5-240805. Field duplicate groundwater samples collected per the QAPP will be labeled with "GW Dup"; the date (year, month and day) of sample collection; and the sequential field blank number collected on that date. For example, the second field duplicate groundwater sample collected on December 1, 2024 would be labeled GW Dup-241201-2.

Trip Blanks – Trip blanks (see QAPP) will be labeled with "TB"; the date (year, month and day) the trip blank was labeled; and the sequential trip blank number labeled on that date. For example, the first trip blank labeled on August 5, 2024 would be labeled TB-240805-1.

6.2 SAMPLE HANDLING

Samples will be handled and delivered to the laboratory as described in the QAPP.

6.3 FIELD OBSERVATIONS DOCUMENTATION AND RECORDS

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will record soil and groundwater sampling information on field logs and will maintain a daily field report. Entries in the field logs will be made in pencil or water-resistant ink on water-resistant paper, and corrections will consist of line-out deletions. Field logs and field reports will become part of the project files at the conclusion of the field work.

The following information will be recorded during the collection of samples:

- Sample location and description.
- Site or sampling area sketch showing sample location and measured distances, as necessary.
- Sampler's Company and name(s).
- Date and time of sample collection.
- Designation of sample as composite or discrete.
- Type of sample (soil or water).

- Type of sampling equipment used.
- Field instrument readings.
- Field observations and details that are pertinent to the integrity/condition of the samples (e.g., weather conditions, performance of the sampling equipment, sample depth control, sample disturbance, etc.).
- Sample descriptions (e.g., lithology, noticeable odors, color, field screening results).
- Sample preservation.
- Shipping arrangements (overnight air bill number).
- Name of recipient laboratory.

The following specific information will also be recorded in the field log for each day of sampling in addition to the sampling information:

- Team members and their responsibilities.
- Time of arrival/entry on Site and time of Site departure.
- Other personnel present at the Site.
- Summary of pertinent meetings or discussions with regulatory agency or contractor personnel.
- Deviations from sampling plans, Site safety plans and QAPP procedures.
- Changes in personnel and responsibilities with reasons for the changes.
- Levels of safety protection.
- Calibration readings for any equipment used and equipment model and serial number.

The Field Coordinator is responsible for the handling, use and maintenance of field logs.

6.4 SAMPLING EQUIPMENT DECONTAMINATION

Reusable sampling and measurement equipment that directly contacts samples or sampled media and could cause cross-contamination between different sampling locations or depths will be decontaminated before each use as follows:

- ☐ Equipment will be brushed with a nylon brush as needed to remove large particulate matter.
- ☐ Equipment will be rinsed with potable water as needed.
- ☐ Equipment will be washed with a solution of Alconox® (or Liquinox®) and potable water.
- ☐ Equipment will be rinsed with potable water.

7.0 Investigation-Derived Waste Management

Investigation-derived waste (IDW) will include drill cuttings, well development water, sampling equipment decontamination water, pre-sampling purge water from monitoring wells and incidental waste.

Drill cuttings, well development water, decontamination water and pre-sampling purge water will be stored in sealed drums. The drums will be temporarily stored on the former Key Bank Property pending waste designation and off-site disposal. The drums will be labeled with the following information:

- Material contained in the drum (e.g., drill cuttings, decontamination water, etc.).
- Source of the material (e.g., investigation locations and depths where applicable).
- Date material was generated.
- Name and telephone number of the appropriate contact person.

Incidental waste to be generated during sampling activities includes items such as disposable gloves, plastic sheeting, sample bags, paper towels, and similar expended and discarded field supplies. These materials are considered *de minimis* and will be disposed of in a trash receptacle or county disposal facility.

Additional details regarding IDW management are provided in the RI Work Plan.

Appendix E

Quality Assurance Project Plan

1.0 Introduction

This Quality Assurance Project Plan (QAPP) was prepared for remedial investigation (RI) activities at the Sound Transit former Key Bank Site located at 1000 NE 45th Street in Seattle, Washington. The RI is being conducted to characterize the nature and extent of contamination at the site. Objectives of the RI are discussed in the Work Plan.

RI sampling procedures are outlined in the Sampling and Analysis Plan (SAP). The QAPP serves as the primary guide to integrate Quality Assurance (QA) and Quality Control (QC) functions into the RI field sampling and analyses activities. The QAPP presents the objectives, procedures, organization, functional activities, and specific QA and QC activities designed to achieve data quality goals that have been established for the project. This QAPP is based on guidelines specified in Washington Administrative Code (WAC) 173-340-820 and United States Environmental Protection Agency (EPA) guidelines for quality assurance project plans (EPA 2004).

Environmental measurements will be conducted to produce data that are scientifically valid, of known and acceptable quality, and meet established objectives. QA/QC procedures will be implemented so that precision, accuracy, representativeness, completeness and comparability (PARCC) of data generated meet the specified data quality objectives.

2.0 Project Organization, Roles and Responsibilities

Services completed under this QAPP will be in cooperation with the following key project personnel and representatives of Sound Transit's contractor and their environmental consultant (names and roles will be designated separately).

AFFILIATION	CONTACT INFORMATION
Sound Transit, Environmental Compliance Division	Ross Stainsby Ross.Stainsby@soundtransit.org 206.418.8830 Seattle, Washington
Environmental Consultant (GeoEngineers, Inc.)	Jacob Letts, JLetts@geoengineers.com 253.383.4940 Tacoma, Washington
Analytical Laboratories	OnSite Environmental, Inc. 425.883.3881 Redmond, Washington
	Friedman & Bruya 206.285.8282 Seattle, Washington

Descriptions of the responsibilities and communication for the key positions to QA/QC are provided below. This organization facilitates the efficient production of project work, allows for an independent quality review, and permits resolution of QA issues before submittal.

2.1 PROJECT LEADERSHIP AND MANAGEMENT

The Project Manager's duties consist of providing concise technical work statements for project tasks, selecting project team members, determining subcontractor participation, establishing budgets and schedules, adhering to budgets and schedules, providing technical oversight, and providing overall production and review of project deliverables.

2.2 FIELD COORDINATOR

The Field Coordinator is responsible for the daily management of activities in the field. Specific responsibilities include the following:

- Provides technical direction to the field staff.
- Develops schedules and allocates resources for field tasks.
- Coordinates data collection activities to be consistent with information requirements.
- Supervises the compilation of field data and laboratory analytical results.
- Assures that data are correctly and completely reported.
- Implements and oversees field sampling in accordance with project plans.
- Supervises field personnel.
- Coordinates work with on-site subcontractors.
- Schedules sample shipment with the analytical laboratory.
- Monitors that appropriate sampling, testing, and measurement procedures are followed.
- Coordinates the transfer of field data, sample tracking forms, and logbooks to the PM or other consultant representative for data reduction and validation.
- Participates in QA corrective actions as required.

2.3 QA LEADER

The QA Leader is responsible for the project's overall QA and coordinating QA/QC activities as they relate to the acquisition of field data. The QA Leader has the following responsibilities:

- Serves as the official contact for laboratory data QA concerns.
- Responds to laboratory data, QA needs, resolves issues, and answers requests for guidance and assistance.
- Reviews the implementation of the QAPP and the adequacy of the data generated from a quality perspective.
- Maintains the authority to implement corrective actions as necessary.
- Reviews and approves the laboratory QA Plan.
- Evaluates the laboratory's final QA report for any condition that adversely impacts data generation.

- Ensures that appropriate sampling, testing, and analysis procedures are followed and that correct QC checks are implemented.
- Monitors subcontractor compliance with data quality requirements.

2.4 LABORATORY MANAGEMENT

The Laboratory's QA Coordinator administers the Laboratory QA Plan and is responsible for QC. Specific responsibilities of this position include:

- Ensure implementation of the QA Plan.
- Serve as the laboratory point of contact.
- Activate corrective action for out-of-control events.
- Issue the final QA/QC report.
- Administer QA sample analysis.
- Comply with the specifications established in the project plans as related to laboratory services.
- Participate in QA audits and compliance inspections.

3.0 Data Quality Objectives

The QA objective for technical data is to collect environmental monitoring data of known, acceptable, and documentable quality. The QA objectives established for the project are:

- Implement the procedures outlined herein for field sampling, sample custody, equipment operation and calibration, laboratory analysis, and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for PARCC, and by testing data against these criteria.

The sampling design, field procedures, laboratory procedures and QC procedures are set up to provide high-quality data for use in this project. Specific data quality factors that may affect data usability include quantitative factors (precision, bias, accuracy, completeness and reporting limits) and qualitative factors (representativeness and comparability).

Quantitative factors such as precision and accuracy will be assessed using control limits which are specific and internal to the individual laboratory used for this project. If laboratory QC parameters such as surrogates, laboratory control samples, or matrix spike samples are reported to have failed the laboratory's own statistical control limits or the reporting limits do not meet the requirements listed in this QAPP, then the associated batched sample(s) should be immediately re-extracted and re-analyzed by the laboratory. If the QC problem persists after re-extraction and re-analysis has taken place, re-sampling may be warranted.

3.1 ANALYTES AND MATRICES OF CONCERN

3.1.1 Chemical Analysis

The analyses to be performed for RI soil, groundwater and soil vapor samples are summarized in Table E-1, Soil Practical Quantitation Limits, Table E-2, Water Practical Quantitation Limits and Table E-3, Soil Vapor Practical Quantitation Limits.

3.1.2 Detection Limits

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Individual instruments often can detect but not accurately quantify compounds at concentrations lower than the MDL, referred to as the instrument detection limit (IDL). Although results reported near the MDL or IDL provide insight to site conditions, QA dictates that analytical methods achieve a consistently reliable level of detection known as the practical quantitation limit (PQL). The contract laboratory will provide numerical results for all analytes and report them as detected above the method reporting limit (MRL) or undetected at the PQL.

Achieving a stated detection limit for a given analyte is helpful in providing statistically useful data. Intended data uses such as comparison to numerical criteria or risk assessments, typically dictate specific project target reporting limits (TRLs) necessary to fulfill stated objectives. The PQL for target analytes are presented in Table E-1 (soil), Table E-2 (groundwater) and Table E-3 (soil gas). These reporting limits were obtained from Ecology-certified laboratories (OnSite Environmental Inc., of Redmond, Washington and Friedman & Bruya of Seattle, Washington). The analytical methods and processes selected will provide PQLs less than the TRLs under ideal conditions. First, moisture and other physical conditions of soil affect detection limits. 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 is that other analytes could be reported as undetected but at a value much higher than a specified TRL. Data users must be aware that high non-detect values, although correctly reported, can bias statistical summaries and careful interpretation is required to correctly characterize site conditions.

3.2 PRECISION

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses, and duplicate spiked environmental samples (matrix spike duplicates). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons for water samples. This value is calculated by:

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

Where:

D_1 = Concentration of analyte in sample.

D_2 = Concentration of analyte in duplicate sample.

The calculation applies to split samples, field and laboratory duplicate analyses, duplicate spiked environmental samples (matrix spike duplicates), and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Persons performing the evaluation must review one or more pertinent documents (EPA 2009; EPA 2017a; EPA 2017b) that address criteria exceedances and courses of action. Relative percent difference goals for this effort are between 20 and 35 percent, depending on the analysis, unless the duplicate sample values are within 5 times the reporting limit.

3.3 ACCURACY

Accuracy is a measure of bias in the analytic process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported value versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest. Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

Accuracy will be expressed as the percent recovery of a surrogate compound (also known as “system monitoring compound”), a matrix spike (MS) result, or from a standard reference material where:

$$Recovery\ (\%) = \frac{Sample\ Result}{Spike\ Amount}\ X\ 100$$

Persons performing the evaluation must review one or more pertinent documents (EPA 2009; EPA 2017a; EPA 2017b) that address criteria exceedances and courses of action. Accuracy criteria for surrogate spikes, MS, and laboratory control spikes (LCS) are to meet the quality objective of the chosen laboratory. If a sample does not meet the laboratory’s control standards, the data exception will need to be evaluated for its significance considering the purpose and use for the data collected.

3.4 REPRESENTATIVENESS, COMPLETENESS AND COMPARABILITY

Representativeness expresses the degree to which data accurately and precisely represent the actual site conditions. The determination of the representativeness of the data will be performed by completing the following:

- Comparing actual sampling procedures to those delineated within the SAP and this QAPP.
- Comparing analytical results of field duplicates to evaluate variability due to field and/or laboratory handling.
- Invalidating non-representative data or identifying data to be classified as questionable or qualitative. Only representative data will be used in subsequent data reduction, validation and reporting activities.

Completeness establishes whether a sufficient amount of valid measurements were obtained to meet project objectives. The number of samples and results expected establishes the comparative basis for completeness. Completeness goals are 90 percent useable data for samples/analyses planned. If the completeness goal is not achieved an evaluation will be made to determine if the data are adequate to meet study objectives.

Comparability expresses the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, a statement on comparability will be prepared to determine overall usefulness of data sets, following the determination of both precision and accuracy.

3.5 HOLDING TIMES

Holding times are defined as the time between sample collection and extraction, sample collection and analysis, or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample was analyzed outside the holding time, then the results may be biased low. For example, if the extraction holding time for volatile analysis of soil sample is exceeded, then the possibility exists that some of the organic constituents may have volatilized from the sample or degraded. Results for that analysis will be qualified as estimated to indicate that the reported results may be lower than actual site conditions. Holding times are summarized in Test Methods, Sample Containers, Preservation and Hold Times, Table E-4.

3.6 BLANKS

According to the *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017a), "The purpose of laboratory (or field) blank analysis is to determine 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 (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks)." Trip blanks are placed with samples during shipment; method blanks are created during sample preparation and follow samples throughout the analysis process.

Analytical results for blanks will be interpreted in general accordance with *National Functional Guidelines for Organic Data Review* and professional judgment.

4.0 Sample Collection, Handling and Custody

4.1 SAMPLING EQUIPMENT AND SUPPLIES

One-time use sampling equipment and supplies will not be re-used. Care will be exercised when using sample containers, the photoionization detector (PID), and other instruments or supplies in order to ensure that contaminants from one sample will not be transferred to other samples. This will be achieved by not reusing one-time-use equipment and supplies, by regularly changing into clean, disposable nitrile gloves, by following field decontamination procedures and by preventing samples and used equipment from contacting other samples.

4.2 SAMPLING METHODS, CONTAINERS AND LABELING

The Field Coordinator will monitor consistency between the SAP, sample containers/labels, field logbooks, and the chain-of-custody (COC) form.

4.2.1 Sampling Methods and Containers

The Field Coordinator will establish field protocol to manage field sample collection, handling, and documentation. Soil, groundwater and soil gas samples obtained during this study will be placed in appropriate laboratory-prepared containers. Sufficient sample volume will be obtained for the laboratory to complete the method-specific QC analyses. Additional volumes of soil will need to be collected from appropriate borings for physical testing; the amount of sample needed to complete a given analyses will be provided by the project analytical laboratory. Sample containers and preservatives are listed in Table E-4.

4.2.2 Sample Labeling

Sample containers will be labeled as described in the Sampling and Analysis Plan.

4.3 SAMPLE HANDLING

Soil and groundwater samples will be placed in a cooler with “blue ice” or double-bagged “wet ice” immediately after they are collected. The objective of the cold storage will be to attain a sample temperature of 4 degrees Celsius. Holding times will be observed during sample storage. Holding times for the project analyses are summarized in Table E-4.

The samples will be transported and delivered to the analytical laboratory in the coolers by field personnel, laboratory personnel, by courier service or shipping company. The Field Coordinator will monitor that the shipping container (cooler) has been properly secured using clear plastic tape and custody seals.

Measures will be implemented to minimize the potential for sample breakage, which includes packaging materials and placing sample bottles in the cooler in a manner intended to minimize damage. Sample bottles will be appropriately wrapped with bubble wrap or other protective material before being placed in coolers. Trip blanks will be included in coolers with samples.

4.4 COC RECORDS

The Field Coordinator is responsible for the security of samples from the time the samples are taken until the samples have been received by the shipper or laboratory. A chain-of-custody (COC) form will be completed at the end of each field day for samples being shipped to the laboratory. Information to be included on the COC form include the following.

- Project name and number.
- Sample identification number.
- Date and time of sampling.
- Sample matrix (soil, water, etc.) and number of containers from each sampling point, including preservatives used.
- Analyses to be performed.
- Names of sampling personnel and transfer of custody acknowledgment spaces.

- Shipping information including shipping container number.

The original COC record will be signed by a member of the field team and bear a unique tracking number. Field personnel shall copy or scan the COC and place the original and remaining copies in a plastic bag, placed within the cooler or taped to the inside lid of the cooler before sealing the container for shipment. This record will accompany the samples during transit by carrier to the laboratory.

4.5 LABORATORY CUSTODY PROCEDURES

The laboratory will follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. The COC will be signed by the laboratory personnel, and the conditions of the samples will be recorded on the form. Documentation by the laboratory will include, at a minimum, the analyst's name or initials, and the time and date at which the samples are received, and the temperature of the samples at receipt. The original COC form will remain with the laboratory and copies will be returned to the relinquishing party.

4.6 FIELD DOCUMENTATION

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will maintain daily field logs while on site as described in the SAP. The Field Coordinator is responsible for the daily field logs as explained in the SAP.

5.0 Calibration Procedures

5.1 FIELD INSTRUMENTATION

Equipment and instrumentation calibration facilitates accurate and reliable field measurements. Field and laboratory equipment used on the project will be calibrated and adjusted in general accordance with the manufacturer's recommendations. Methods and intervals of calibration and maintenance will be based on the type of equipment, stability characteristics, required accuracy, intended use and environmental conditions. The basic calibration frequencies are described below.

The PID used for vapor measurements will be calibrated daily, if required (based on the model used), for site safety monitoring purposes in general accordance with the manufacturer's specifications. If daily calibration is not required for a specific PID model, calibration of the PID will be checked to make sure it is up to date. The calibration results will be recorded in the daily field report.

The YSI water quality measuring system will be calibrated or calibration-checked prior to each monitoring event in general accordance with the manufacturer's specifications. Results will be recorded in the field report.

The Helium dielectric detector will be calibrated or calibration-checked prior to each sampling event in general accordance with the manufacturer's specification. Results will be recorded in the daily field report.

5.2 LABORATORY INSTRUMENTATION

For analytical chemistry, calibration procedures will be performed in general accordance with the methods cited and laboratory SOPs. Calibration documentation will be retained at the laboratory and readily available for a period of at least 6 months after sample analyses.

6.0 Data Reporting and Laboratory Deliverables

Laboratory data reports will include internal laboratory quality control checks and sample results. Analytical data will be supplied in both electronic data deliverable (EDD) format and PDF format. The PDF will serve as the official record of laboratory results. The EDDs will contain only data reported in the hard copy reports (e.g., only reportable results).

7.0 Internal QC

The types and frequency of QC samples to be collected to represent both field QC samples and laboratory QC samples are summarized in Table E-5.

7.1 FIELD QC

Field QC samples serve as a control and check mechanism to monitor the consistency of sampling methods and the influence of off-site factors on environmental samples. Off-site factors include airborne volatile organic compounds and potable water used in drilling activities.

7.1.1 Field Duplicates

In addition to replicate analyses performed in the laboratory, field duplicates also serve as measures for precision. Field duplicates (referred to as split samples) are created under ideal field conditions when a volume of the sample matrix is thoroughly mixed, placed in separate containers and identified as different samples. Field duplicates allow evaluation of both the precision and consistency of laboratory analytical procedures and methods, and the consistency of the sampling techniques used by field personnel.

One field duplicate will be collected for every 20 groundwater samples or one per sampling event when less than 40 samples are collected. One field duplicate will be collected for every 20 soil samples or one per sampling event when less than 40 samples are collected. No field duplicates are planned for the soil gas sampling.

7.1.2 Trip Blanks

Trip blanks accompany groundwater sample containers used for VOC analyses during shipment and sampling periods. One trip blank will be used per cooler when samples are tested for VOCs. Trip blanks will be submitted on hold and analyzed for VOCs if cross contamination is suspected.

7.2 LABORATORY QC

Laboratory QC procedures will be evaluated through a formal data validation process. The analytical laboratory will follow standard method procedures that include specified QC monitoring requirements. These requirements will vary by method but generally include the following.

- Method blanks.
- Internal standards.
- Calibrations.
- Matrix spike/matrix spike duplicates (MS/MSD).

- Laboratory control spike/laboratory control spike duplicates (LCS/LCSD).
- Laboratory replicates or duplicates.
- Surrogate spikes.

7.2.1 Laboratory Blanks

Laboratory procedures employ the use of several types of blanks but the most commonly used blank for QA/QC assessments are method blanks. Method blanks are laboratory QC samples that consist of either a soil-like material having undergone a contaminant destruction process or high performance liquid chromatography (HPLC) 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 then one (or more) of the following may have occurred:

- Measurement apparatus or containers were not properly cleaned and contained contaminants.
- Reagents used in the 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 toward the sample matrix contaminated the samples during preparation or analysis.

It is difficult to determine which of the above scenarios took place if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. Given method blank results, validation rules assist in determining which substances in samples are considered "real," and which ones are attributable to the analytical process. Furthermore, the guidelines state, "there may be instances where little or no contamination was present in the associated blank, but qualification of the sample is deemed necessary. Contamination introduced through dilution water is one example."

7.2.2 Calibrations

Several types of calibrations are used, depending on the method, to determine whether the methodology was 'in control' by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations and continuing calibration verification.

7.2.3 MS/MSD

MS/MSD samples are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH affects the results of semivolatile organic compounds (SVOCs), or the presence of a particular compound may interfere with accurate quantitation of another analyte. MS/MSD data are reviewed in combination with other QC monitoring data to determine matrix effects. In some cases, matrix affects cannot be determined due to dilution and/or high levels of related substances in the sample. An MS is evaluated by spiking a known amount of one or more of the target analytes ideally at a concentration of 5 to 10 times higher than the sample result. A percent recovery is calculated by subtracting the sample result from the spike result, dividing by the spiked amount and multiplying by 100.

The samples for the MS and MSD analyses should ideally be from a boring or sampling location that is believed to exhibit low-level contamination. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to determine the presence of matrix interferences, which can best be evaluated where contaminant levels are low. MS/MSD samples will be homogenized to achieve a level of representativeness and reproducibility in the data.

7.2.4 LCS/LCSD

Also known as blank spikes, LCSs are similar to MSs in that a known amount of one or more of the target analytes are spiked into a prepared media and the percent recovery of the spiked substances is calculated. The primary difference between a MS and LCS is that the LCS media is considered “clean” or contaminant free. For example, HPLC 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 controls to determine if out-of-control events have occurred.

7.2.5 Laboratory Replicates/Duplicates

Laboratories often utilize MS/MSDs, LCS/LCSDs and/or replicates to assess precision. Replicates are a second analysis of a field collected environmental sample. Replicates can be split at varying stages of the sample preparation and analysis process, but most commonly occur as a second analysis on the extracted media.

7.2.6 Surrogate Spikes

The purposes of using a surrogate are to verify the accuracy of the instrument being used and extraction procedures. Surrogates are substances similar to but not one of the target analytes. A known concentration of surrogate is added to the sample and passed through the instrument noting the surrogate recovery. Each surrogate used has an acceptable percent recovery range. Sample results may be biased low if a surrogate recovery is low. A possibility of false negatives may exist depending on the recovery value. Conversely, when recoveries are above the specified range of acceptance, a possibility of false positives exists, although non-detected results are considered accurate.

8.0 Data Reduction and Assessment Procedures

8.1 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 and PM.

8.2 FIELD MEASUREMENT EVALUATION

Field data will be reviewed by the Field Coordinator at the end of each day by following the QC checks outlined below and procedures in the SAP. Field data documentation will be checked against the applicable criteria as follows:

- Sample collection information.
- Field instrumentation and calibration.

- Sample collection protocol.
- Sample containers, preservation and volume.
- Field QC samples collected at the frequency specified.
- Sample documentation and COC protocols.
- Sample shipment.

Cooler receipt forms and sample condition forms provided by the laboratory will be reviewed for out-of-control incidents. The RI report will identify discrepancies that may affect data quality. Sample collection information will be reviewed for accuracy before inclusion in a final report.

8.3 FIELD QC EVALUATION

A field QC evaluation will be conducted by reviewing field logbooks and daily reports, discussing field activities with field staff, and reviewing field QC samples (trip blanks and field duplicates). Trip blanks will be evaluated using the same criteria as method blanks.

8.4 LABORATORY DATA QC EVALUATION

The laboratory data assessment will consist of a formal review of the following QC parameters:

- Holding times;
- Method blanks;
- MS/MSD;
- LCS/LCSD;
- Surrogate spikes; and
- Replicates.

Other documentation such as cooler receipt forms and case narratives will be reviewed to fully evaluate laboratory QA/QC in addition to these QC mechanisms.

8.5 ENVIRONMENTAL INFORMATION MANAGEMENT SYSTEM SUBMITTAL

Chemical analytical results for soil and groundwater samples collected will be submitted to the Ecology Environmental Information Management (EIM) database.

9.0 References

United States Environmental Protection Agency (EPA). 1998. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). Revision 5. April.

United States Environmental Protection Agency (EPA). 2004. EPA Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. EPA 04-03-030.

United States Environmental Protection Agency (EPA). 2009. Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. EPA-540-R-08-005. January.

United States Environmental Protection Agency (EPA). 2017a. Contract Laboratory Program National Functional Guidelines for Organic Superfund Methods Data Review," EPA-540-R-2017-002. January.

United States Environmental Protection Agency (EPA). 2017b. Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review," EPA-540-R-2017-001. January.

Table E-1

Soil Practical Quantitation Limits (PQLs)

Quality Assurance Project Plan (QAPP)

Sound Transit Former Key Bank

Seattle, Washington

Analyte	CAS Number	PQL[1]	Units	Analytical Method
Petroleum Hydrocarbons				
Gasoline Range Hydrocarbons	--	5.0	mg/kg	NWTPH-Gx
Diesel Range Hydrocarbons	--	25	mg/kg	NWTPH-Dx
Heavy Oil Range Hydrocarbons	--	50	mg/kg	NWTPH-Dx
(EPH) C8-C10 Aliphatics/C8-C10 Aromatics	--	5.0/5.0	mg/kg	WA EPH
(EPH) C10-C12 Aliphatics/C10-C12 Aromatics	--	5.0/5.0	mg/kg	WA EPH
(EPH) C12-C16 Aliphatics/C12-C16 Aromatics	--	5.0/5.0	mg/kg	WA EPH
(EPH) C16-C21 Aliphatics/C16-C21 Aromatics	--	5.0/5.0	mg/kg	WA EPH
(EPH) C21-C34 Aliphatics/C21-C34 Aromatics	--	5.0/5.0	mg/kg	WA EPH
Metals				
Arsenic	7440-38-2	10	mg/kg	6010/200.7
Cadmium	7440-43-9	0.5	mg/kg	6010/200.7
Chromium	7440-47-3	0.5	mg/kg	6010/200.7
Lead	7439-92-1	5.0	mg/kg	6010/200.7
Mercury	7439-97-6	0.25	mg/kg	7471B
Volatile Organic Compounds (VOCs)				
Dichlorodifluoromethane	75-71-8	1.0	µg/kg	8260D
Chloromethane	74-87-3	5.0	µg/kg	8260D
Vinyl Chloride	75-01-4	1.0	µg/kg	8260D
Bromomethane	74-83-9	1.0	µg/kg	8260D
Chloroethane	75-00-3	5.0	µg/kg	8260D
Trichlorofluoromethane	75-69-4	1.0	µg/kg	8260D
1,1-Dichloroethylene	75-35-4	1.0	µg/kg	8260D
Acetone	67-64-1	5.0	µg/kg	8260D
Methyl Iodide	74-88-4	5.0	µg/kg	8260D
Carbon Disulfide	75-15-0	1.0	µg/kg	8260D
Methylene Chloride	75-09-2	5.0	µg/kg	8260D
Acrylonitrile	107-13-1	--	µg/kg	8260D
trans-1,2-Dichloroethylene	156-60-5	1.0	µg/kg	8260D
Methyl tert-butyl ether	1634-04-4	1.0	µg/kg	8260D
1,1-Dichloroethane	75-34-3	1.0	µg/kg	8260D
Vinyl Acetate	108-05-4	5.0	µg/kg	8260D
2,2-Dichloropropane	594-20-7	1.0	µg/kg	8260D
cis-1,2-Dichloroethylene	156-59-2	1.0	µg/kg	8260D
Methyl ethyl ketone (MEK)	78-93-3	5.0	µg/kg	8260D
Bromochloromethane	74-97-5	1.0	µg/kg	8260D
Chloroform	67-66-3	1.0	µg/kg	8260D
1,1,1-Trichloroethane	71-55-6	1.0	µg/kg	8260D
Carbon Tetrachloride	56-23-5	1.0	µg/kg	8260D
1,1-Dichloropropene	563-58-6	1.0	µg/kg	8260D
Benzene	71-43-2	1.0	µg/kg	8260D
1,2-Dichloroethane	107-06-2	1.0	µg/kg	8260D
Trichloroethylene	79-01-6	1.0	µg/kg	8260D
1,2-Dichloropropane	78-87-5	1.0	µg/kg	8260D
Dibromomethane	74-95-3	1.0	µg/kg	8260D
Dichlorobromomethane	75-27-4	1.0	µg/kg	8260D

Analyte	CAS Number	PQL[1]	Units	Analytical Method
2-Chloroethyl Vinyl Ether	110-75-8	5.0	µg/kg	8260D
cis-1,3-Dichloropropene	10061-01-5	1.0	µg/kg	8260D
Methyl Isobutyl Ketone	108-10-1	5.0	µg/kg	8260D
Toluene	108-88-3	5.0	µg/kg	8260D
trans-1,3-Dichloropropylene	10061-02-6	1.0	µg/kg	8260D
1,1,2-Trichloroethane	79-00-5	1.0	µg/kg	8260D
Tetrachloroethylene	127-18-4	1.0	µg/kg	8260D
1,3-Dichloropropane	142-28-9	1.0	µg/kg	8260D
2-Hexanone	591-78-6	5.0	µg/kg	8260D
Dibromochloromethane	124-48-1	1.0	µg/kg	8260D
1,2-Dibromoethane	106-93-4	1.0	µg/kg	8260D
Chlorobenzene	108-90-7	1.0	µg/kg	8260D
1,1,1,2-Tetrachloroethane	630-20-6	1.0	µg/kg	8260D
Ethylbenzene	100-41-4	1.0	µg/kg	8260D
Xylene, m-,p-	179601-23-1	2.0	µg/kg	8260D
Xylene, o-	95-47-6	1.0	µg/kg	8260D
Styrene	100-42-5	1.0	µg/kg	8260D
Bromoform	75-25-2	5.0	µg/kg	8260D
Isopropylbenzene	98-82-8	1.0	µg/kg	8260D
Bromobenzene	108-86-1	1.0	µg/kg	8260D
1,1,2,2-Tetrachloroethane	79-34-5	1.0	µg/kg	8260D
1,2,3-Trichloropropane	96-18-4	1.0	µg/kg	8260D
trans-1,4-Dichloro-2-butene	110-57-6	--	µg/kg	8260D
n-Propylbenzene	103-65-1	1.0	µg/kg	8260D
2-Chlorotoluene	95-49-8	1.0	µg/kg	8260D
4-Chlorotoluene	106-43-4	1.0	µg/kg	8260D
1,3,5-Trimethylbenzene	108-67-8	1.0	µg/kg	8260D
tert-Butylbenzene	98-06-6	1.0	µg/kg	8260D
1,2,4-Trimethylbenzene	95-63-6	1.0	µg/kg	8260D
sec-Butylbenzene	135-98-8	1.0	µg/kg	8260D
1,3-Dichlorobenzene	541-73-1	1.0	µg/kg	8260D
4-Isopropyltoluene	99-87-6	1.0	µg/kg	8260D
1,4-Dichlorobenzene	106-46-7	1.0	µg/kg	8260D
1,2-Dichlorobenzene	95-50-1	1.0	µg/kg	8260D
n-Butylbenzene	104-51-8	1.0	µg/kg	8260D
1,2-Dibromo-3-chloropropane	96-12-8	5.0	µg/kg	8260D
1,2,4-Trichlorobenzene	120-82-1	1.0	µg/kg	8260D
Hexachlorobutadiene	87-68-3	5.0	µg/kg	8260D
Naphthalene	91-20-3	1.0	µg/kg	8260D
1,2,3-Trichlorobenzene	87-61-6	1.0	µg/kg	8260D

Notes:

[1] PQL is the lowest available value from OnSite Environmental, Inc. of Redmond, Washington.

CAS = Chemical Abstract Services

EPH = Extractable Petroleum Hydrocarbons

SIM = Selective Ion Monitoring

mg/kg = milligrams per kilogram

PQL = Practical Quantitation Limit

µg/kg = micrograms per kilogram

VOCs = volatile organic compounds

VPH = volatile petroleum hydrocarbons

"--" = not Available

Table E-2

Groundwater Practical Quantitation Limits (PQLs)

Quality Assurance Project Plan (QAPP)

Sound Transit Former Key Bank

Seattle, Washington

Analyte	CAS Number	PQL	Units	Analytical Method
Petroleum Hydrocarbons				
Gasoline Range Hydrocarbons	--	100	µg/L	NWTPH-Gx
Diesel Range Hydrocarbons	--	0.1	mg/L	NWTPH-Dx
Heavy Oil Range Hydrocarbons	--	0.2	mg/L	NWTPH-Dx
(EPH) C8-C10 Aliphatics/C8-C10 Aromatics	--	50/50	µg/L	WA EPH
(EPH) C10-C12 Aliphatics/C10-C12 Aromatics	--	50/50	µg/L	WA EPH
(EPH) C12-C16 Aliphatics/C12-C16 Aromatics	--	50/50	µg/L	WA EPH
(EPH) C16-C21 Aliphatics/C16-C21 Aromatics	--	50/50	µg/L	WA EPH
(EPH) C21-C34 Aliphatics/C21-C34 Aromatics	--	50/50	µg/L	WA EPH
Metals				
Arsenic	7440-38-2	200	µg/L	6010/200.7
Cadmium	7440-43-9	10	µg/L	6010/200.7
Chromium	7440-47-3	10	µg/L	6010/200.7
Lead	7439-92-1	100	µg/L	6010/200.7
Mercury	7439-97-6	0.50	µg/L	7470A
Volatile Organic Compounds (VOCs)				
Dichlorodifluoromethane	75-71-8	0.20	µg/L	8260D
Chloromethane	74-87-3	1.0	µg/L	8260D
Vinyl Chloride	75-01-4	0.20	µg/L	8260D
Bromomethane	74-83-9	0.20	µg/L	8260D
Chloroethane	75-00-3	1.0	µg/L	8260D
Trichlorofluoromethane	75-69-4	0.20	µg/L	8260D
1,1-Dichloroethylene	75-35-4	0.20	µg/L	8260D
Acetone	67-64-1	5.0	µg/L	8260D
Methyl Iodide	74-88-4	1.0	µg/L	8260D
Carbon Disulfide	75-15-0	0.20	µg/L	8260D
Methylene Chloride	75-09-2	1.0	µg/L	8260D
Acrylonitrile	107-13-1	0.50	µg/L	8260D
trans-1,2-Dichloroethylene	156-60-5	0.20	µg/L	8260D
Methyl tert-butyl ether	1634-04-4	0.20	µg/L	8260D
1,1-Dichloroethane	75-34-3	0.20	µg/L	8260D
Vinyl Acetate	108-05-4	1.0	µg/L	8260D
2,2-Dichloropropane	594-20-7	0.20	µg/L	8260D
cis-1,2-Dichloroethylene	156-59-2	0.20	µg/L	8260D
Methyl ethyl ketone (MEK)	78-93-3	5.0	µg/L	8260D
Bromochloromethane	74-97-5	0.20	µg/L	8260D
Chloroform	67-66-3	0.20	µg/L	8260D
1,1,1-Trichloroethane	71-55-6	0.20	µg/L	8260D
Carbon Tetrachloride	56-23-5	0.20	µg/L	8260D
1,1-Dichloropropene	563-58-6	0.20	µg/L	8260D
Benzene	71-43-2	0.20	µg/L	8260D
1,2-Dichloroethane	107-06-2	0.20	µg/L	8260D
Trichloroethylene	79-01-6	0.20	µg/L	8260D
1,2-Dichloropropane	78-87-5	0.20	µg/L	8260D
Dibromomethane	74-95-3	0.20	µg/L	8260D
Dichlorobromomethane	75-27-4	0.20	µg/L	8260D
2-Chloroethyl Vinyl Ether	110-75-8	1.0	µg/L	8260D

Analyte	CAS Number	PQL	Units	Analytical Method
cis-1,3-Dichloropropene	10061-01-5	0.20	µg/L	8260D
Methyl Isobutyl Ketone	108-10-1	2.0	µg/L	8260D
Toluene	108-88-3	1.0	µg/L	8260D
trans-1,3-Dichloropropylene	10061-02-6	0.20	µg/L	8260D
1,1,2-Trichloroethane	79-00-5	0.20	µg/L	8260D
Tetrachloroethylene	127-18-4	0.20	µg/L	8260D
1,3-Dichloropropane	142-28-9	0.20	µg/L	8260D
2-Hexanone	591-78-6	2.0	µg/L	8260D
Dibromochloromethane	124-48-1	0.20	µg/L	8260D
1,2-Dibromoethane	106-93-4	0.20	µg/L	8260D
Chlorobenzene	108-90-7	0.20	µg/L	8260D
1,1,1,2-Tetrachloroethane	630-20-6	0.20	µg/L	8260D
Ethylbenzene	100-41-4	0.20	µg/L	8260D
Xylene, m-,p-	179601-23-1	0.40	µg/L	8260D
Xylene, o-	95-47-6	0.20	µg/L	8260D
Styrene	100-42-5	0.20	µg/L	8260D
Bromoform	75-25-2	1.0	µg/L	8260D
Isopropylbenzene	98-82-8	0.20	µg/L	8260D
Bromobenzene	108-86-1	0.20	µg/L	8260D
1,1,2,2-Tetrachloroethane	79-34-5	0.20	µg/L	8260D
1,2,3-Trichloropropane	96-18-4	0.20	µg/L	8260D
trans-1,4-Dichloro-2-butene	110-57-6	0.50	µg/L	8260D
n-Propylbenzene	103-65-1	0.20	µg/L	8260D
2-Chlorotoluene	95-49-8	0.20	µg/L	8260D
4-Chlorotoluene	106-43-4	0.20	µg/L	8260D
1,3,5-Trimethylbenzene	108-67-8	0.20	µg/L	8260D
tert-Butylbenzene	98-06-6	0.20	µg/L	8260D
1,2,4-Trimethylbenzene	95-63-6	0.20	µg/L	8260D
sec-Butylbenzene	135-98-8	0.20	µg/L	8260D
1,3-Dichlorobenzene	541-73-1	0.20	µg/L	8260D
4-Isopropyltoluene	99-87-6	0.20	µg/L	8260D
1,4-Dichlorobenzene	106-46-7	0.20	µg/L	8260D
1,2-Dichlorobenzene	95-50-1	0.20	µg/L	8260D
n-Butylbenzene	104-51-8	0.20	µg/L	8260D
1,2-Dibromo-3-chloropropane	96-12-8	1.0	µg/L	8260D
1,2,4-Trichlorobenzene	120-82-1	0.20	µg/L	8260D
Hexachlorobutadiene	87-68-3	1.0	µg/L	8260D
Naphthalene	91-20-3	1.0	µg/L	8260D
1,2,3-Trichlorobenzene	87-61-6	0.20	µg/L	8260D

Notes:

[1] PQL is the lowest available value from OnSite Environmental, Inc. of Redmond, Washington.

EPA = United States Environmental Protection Agency

NWTPH = Northwest Total Petroleum Hydrocarbon

SIM = Selective Ion Monitoring

CAS = Chemical Abstract Services

µg/L = micrograms per liter

mg/L = milligrams per liter

mg-N/L= milligrams of Nitrogen per liter

"--" = not available

Table E-3

Soil Vapor Practical Quantitation Limits

Quality Assurance Project Plan (QAPP)
Sound Transit Former Key Bank
Seattle, Washington

Analyte	CAS Number	PQL[1]	Units	Analytical Method
Leak Tracer Gas				
Helium	--	3.6	µg/m^3	ASTM D 1946
Petroleum Fractions				
APH EC5-8 Aliphatics	--	75	µg/m^3	MA-DEP APH
APH EC9-12 Aliphatics	--	25	µg/m^3	MA-DEP APH
APH EC9-10 Aromatics	--	25	µg/m^3	MA-DEP APH
Select Volatile Organic Compounds				
Benzene	71-43-2	0.32	µg/m^3	TO-15
Toluene	108-88-3	7.5	µg/m^3	TO-15
Ethylbenzene	100-41-4	0.43	µg/m^3	TO-15
m,p-Xylene	179601-23-1	0.87	µg/m^3	TO-15
o-Xylene	95-47-6	0.43	µg/m^3	TO-15
Naphthalene	91-20-3	0.052	µg/m^3	TO-15
Vinyl Chloride	75-01-4	0.26	µg/m^3	TO-15
1,1-Dichloroethylene	75-35-4	0.4	µg/m^3	TO-15
trans-1,2-Dichloroethylene	156-60-5	0.4	µg/m^3	TO-15
cis-1,2-Dichloroethylene	156-59-2	0.4	µg/m^3	TO-15
Trichloroethylene	79-01-6	0.11	µg/m^3	TO-15
Tetrachloroethylene	127-18-4	6.8	µg/m^3	TO-15

Notes:

[1] PQL is the lowest available value for soil vapor analyses from Friedman & Bruya of Seattle, Washington.

CAS = Chemical Abstract Services

EPA = United States Environmental Protection Agency

MTCA = Model Toxics Control Act

NWTPH = Northwest Total Petroleum Hydrocarbon

PQL = Practical Quantitation Limit

µg/m^3 = microgram per cubic meter

SM = standard method

"--" = not available

Table E-4

Test Methods, Sample Containers, Preservation and Hold Times

Quality Assurance Project Plan (QAPP)
Sound Transit Former Key Bank
Seattle, Washington

Analysis	Method	Soil				Groundwater				Soil Vapor		
		Minimum Sample Size	Bottle Size	Preservation	Holding Times	Minimum Sample Size	Bottle Size	Preservation	Holding Times	Minimum Sample Size	Bottle Size	Holding Times
Gasoline-Range Petroleum Hydrocarbons	NWTPH-Gx	5 g	VOA Vials or 4 oz jar (if necessary)	≤ 6°C (field preservation kit- 5 ml of methanol)	14 days if properly preserved; 48 hours otherwise (frozen upon arrival)	40 ml	2 40-ml VOAs	≤ 6°C (HCL Ph<2)	14 days if properly preserved; 7 days otherwise	--	--	--
Diesel- and Lube Oil-Range Petroleum Hydrocarbons	NWTPH-Dx	15 g	4 oz. CWM jar	≤ 6°C	14 days to laboratory extraction; 40 days to analysis	500 ml	500 ml Amber	≤ 6°C (HCL Ph<2)	14 days if properly preserved; 7 days otherwise	--	--	--
Air-Phase Petroleum Hydrocarbons (APH)	MA-DEP	--	--	--	--	--	--	--	--	1 L	Summa Canister (150-200 mL per minute)	30 Days
Extractable Petroleum Hydrocarbon (EPH)	NWTPH-EPH	15 g	4 oz. CWM jar	≤ 6°C	14 days to laboratory extraction	--	--	--	--	--	--	--
Volatile Petroleum Hydrocarbon (VPH)	NWTPH-VPH	15 g	4 oz. CWM jar	≤ 6°C (field preservation kit- 5 ml of methanol)	14 days to laboratory extraction	--	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)	EPA 8260 D	Three 40 ml VOAs, 2 with stir bar	4 oz glass with Teflon-lined lid, 40 ml VOA (pre-weighted)	≤ 6°C	48 Hours to Freeze/14 days	40 ml	2 40-ml VOAs	≤ 6°C (HCL Ph<2)	14 days to injection on Purge & Trap	--	--	--
Select VOCs	TO-15	--	--	--	--	--	--	--	--	1 L	Summa Canister (150-200 mL per minute)	30 Days
Helium	ASTM-D-1946	--	--	--	--	--	--	--	--	1 L	Summa Canister	30 Days
MTCA Metals	EPA 6000/7000 Series	100 g	4 oz. CWM jar	≤ 6°C	6 months to analysis	100 ml	500 ml HDPE	≤ 6°C (HNO_3 Ph<2)	6 months to analysis	--	--	--

Notes:

[1] The analytes 'NO_2' and 'NO_3' need to be listed out separately on the COC.

[2] The soil and groundwater test methods, sample containers, preservation and hold times are from Onsite Laboratory Located in Redmond, Washington.

[3] The soil vapor test methods, sample containers, preservation and hold times are from Friedman & Bruya Laboratory Located in Seattle, Washington.

Extraction holding time is based on elapsed time from date of sample collection.

Poly = polycarbonate

HDPE = high-density polyethylene
SM = standard method
EPA = United States Environmental Protection Agency
ASTM = ASTM International
SM = standard method
HCl = hydrochloric acid
HNO3 = nitric acid
VOA = volatile organic analysis
g = grams
˚C = degree Celsius
oz = ounce
ml = milliliter

Table E-5

Quality Control Samples - Type and Frequency

Quality Assurance Project Plan (QAPP)
Sound Transit Former Key Bank
Seattle, Washington

Samples Collected for Chemical Analytical Testing	Field QC		Laboratory QC			
	Field Duplicates	Trip Blank	Method Blanks	LCS	MS/MSD	Lab Duplicates
Soil	1 in 20 samples	None	1 per batch	1 per batch[4]	1 per batch[1]	1 per batch[2]
Groundwater	1 in 20 samples	One per sample storage cooler used for samples analyzed for VOCs	1 per batch	1 per batch[4]	1 per batch[1 and 3]	1 per batch[2]
Soil Vapor	None	None	1 per batch	1 per batch	None	1 per batch

Notes:

[1] Matrix spike sample/matrix spike duplicate sample (MS/MSD) analyses are not completed on NWTPH-Gx and NWTPH-Dx analysis.

[2] Lab duplicates are not completed on volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) analysis because the MS/MSD serves as the lab duplicate sample.

[3] Two times the sample volume will be collected to provide adequate sample volume to perform MS/MSD analyses.

[4] Laboratory control sample (LCS) analysis are not completed on NWTPH-Gx analysis.

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 lab duplicate).

One batch will comprise no more than 30 field samples.

LCS = laboratory control sample

MS = matrix spike sample

MSD = matrix spike duplicate sample

NA = not applicable

VOCs = volatile organic compounds

PAHs = polycyclic aromatic hydrocarbons

QC = quality control